North Nowra Link Road

Response to Submissions Report

North Nowra Link Road

North Nowra

Submitted to NSW Department of Planning and Infrastructure
On Behalf of Shoalhaven City Council

February 2012 ■ 10188

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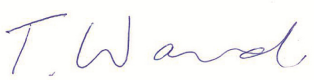
This report has been prepared by: Tim Ward



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This report has been reviewed by: Gordon Kirkby

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Contents

1.0 Introduction and Background 1

1.1 The Proposal 1
1.2 Statutory context 3
1.3 Approval Sought 3
1.4 Environmental Assessment Exhibition 4
1.5 Purpose of this Report 4

2.0 Summary of Submitters 5

2.1 Government Agencies 5
2.2 Special Interest Groups and Organisations 5
2.3 Members of the General Public 6

3.0 Response to Issues 8

3.1 Responses to Government Agencies 124
3.2 Special Interest Groups 144

4.0 Additional Ecological Information 145

4.1 Additional Ecological Surveys 145
4.2 Revised Ecological Impact Assessment 147
4.3 Ecological Offsets 149
4.4 Revised Ecological Mitigation Measures 149

5.0 Additional Information on Recreational and Amenity Values of BCRP 154

5.1 Values of BCRP and Bushland 154
5.2 Option 1 Impacts on Recreational Values 157
5.3 Option 2 Impacts on Recreational Values 162
5.4 Option 3 Impacts on Recreational Values 162
5.5 Impacts on Educational Values 163
5.6 Impacts on Tourism Values 163
5.7 Additional Mitigation Measures 164

6.0 Additional Aboriginal Heritage Information 166

7.0 Additional Detail for Soil and Water Assessment 168

8.0 Updated Risk Assessment and Comparative Analysis 176

8.1 Updated Environmental Risk Assessment 176
8.2 Updated Comparative Assessments 177

9.0 Final Statement of Commitments 179

10.0 Conclusion 180

10.1 Preferred Option 180
10.2 Implications of Refusing Preferred Options 181
10.3 Concept Plan Approval Sought 181

List of Acronyms and Abbreviations 182

Contents

Figures

1 Conceptual Location of the three NNLR Options declared by the Minister for Planning 2
2 Key Issues Raised in Submissions 7
3 Reproduction of Figure 1 from Appendix L of the AECOM Report showing the noise impact to the BCRP recreational area 159

Tables

1 Traffic and Benefit Cost Analysis Issues Summary and Responses 9
2 Ecology and Biodiversity Issues Summary and Responses 68
3 Impacts to BCRP Values and Amenity Issues Summary and Responses 100
4 Noise Issues Summary and Responses 107
5 Aboriginal Heritage Issues Summary and Responses 109
6 Other Issues Summary and Responses 112
7 Summary of Traffic Performance of Cambewarra Rd / Princes Highway Intersection 137
8 Updated Environmental Risk Assessment Scores 176
9 Updated Ranking Route Option Analysis – Method 1 177
10 Updated Ranking Route Option Analysis – Method 2 178

Appendices

A Schedule of Issues by Submission
JBA Planning

B Summary of Key Traffic Modelling Results
Shoalhaven City Council

C Supplementary Ecological Survey Reports
Ecological Australia

D Amended Vegetation Map
Ecological Australia

E Supplementary Aboriginal Heritage Assessment
Kelleher Nightingale

F Supplementary Drawings and Maps
Shoalhaven City Council

G Final Statement of Commitments
Shoalhaven City Council and JBA Planning

1.0 Introduction and Background

1.1 The Proposal

The proposed North Nowra Link Road is for a local sub-arterial road connection between Illaroo Road in North Nowra, and Bomaderry.

Shoalhaven City Council (Council), the proponent, has identified traffic, safety and amenity issues on local roads, as well as broader network constraints, through observed evidence and traffic modelling. To address these issues, Council has developed the North Nowra Link Road (NNLR) project so as to create and maintain improved accessibility for North Nowra, and for movements between North Nowra and Bomaderry, to satisfy the following project objectives:

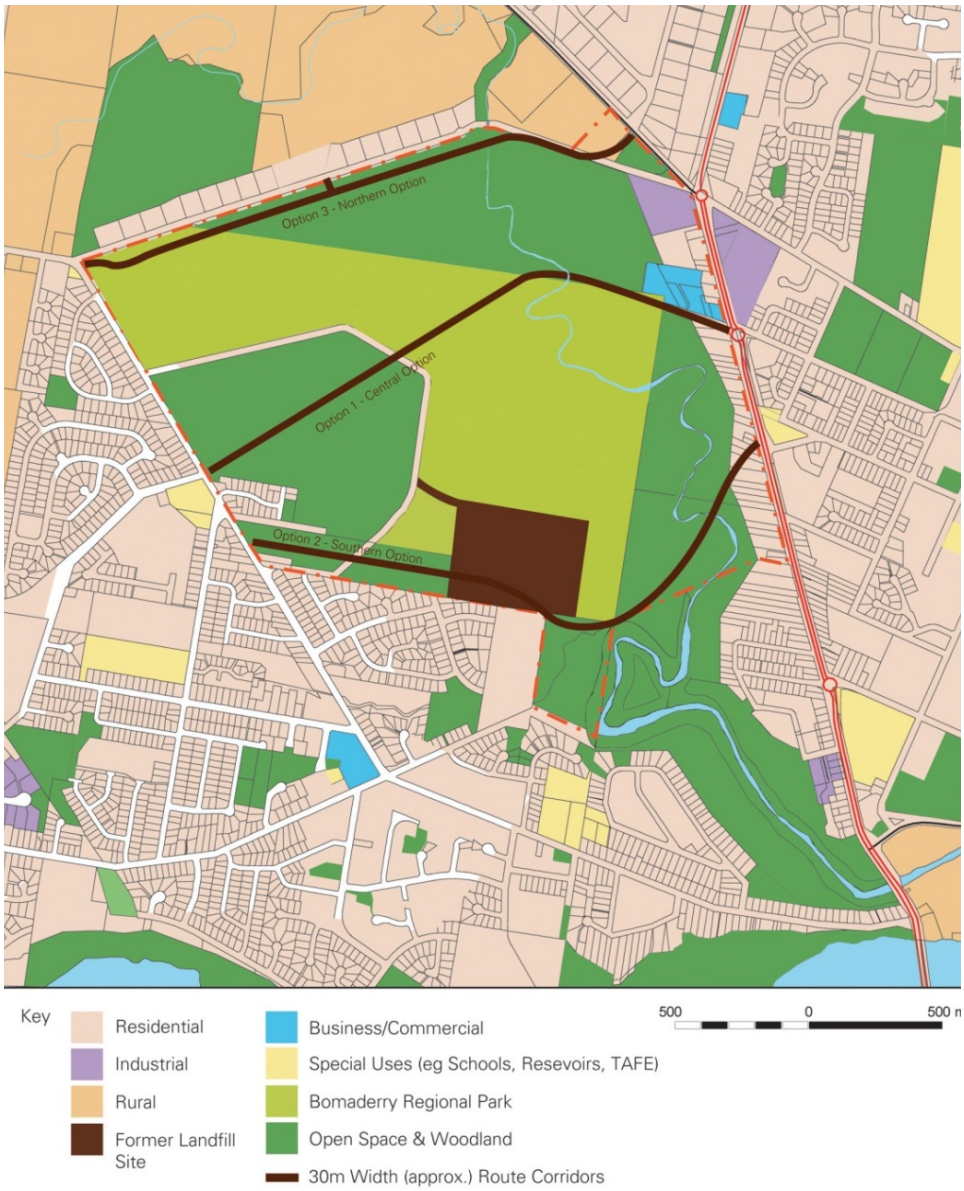
- To reduce congestion at the Illaroo Road/Princes Highway intersection.
- To address the existing severity of traffic problems and relieve existing traffic congestion and improve safety and amenity on more than 2 kilometres (kms) of Illaroo Road, which is subject to frequent congestion.
- To create a road that was determined as an important element of future infrastructure required to cater for future growth as set out in the Nowra Bomaderry Structure Plan, which was endorsed by the NSW Department of Planning, and which in turn satisfies the NSW Government's overarching *South Coast Regional Strategy 2007*.

Three route options were assessed as part of the Concept Plan application, and Council had selected Option 1: The Central Option as the preferred route alignment. The three route options assessed as part of the Concept Plan are (see also Figure 1):

- **Option 1: Central Option** – This option connects Pitt Street with Narang Road, generally following an existing cleared services corridor which contains transmission lines and a water main, across Crown Land, Council owned land and through the middle of the Bomaderry Creek Regional Park (BCRP). There is no private land acquisition required for Option 1. By resolution of Council, subject to approval of Option 1 Council has offered to transfer approximately 50 Ha of nearby and adjoining land to the BCRP.
- **Option 2: Southern Option** – This option joins Illaroo Road to the Princes Highway at West Bunberra Street, crossing Bomaderry Creek further to the south east (compared to Option 1) and following an alignment near the southern boundary of the BCRP and Council's closed landfill site. This option requires the largest bridge structure to cross Bomaderry Creek and requires acquisition of several private properties fronting the Princes Highway.
- **Option 3: Northern Option** – This option generally follows an alignment immediately to the south of West Cambewarra Road partly through Council owned land and partly through the north western corner of the BCRP, connecting to Moss Vale Road at Elvin Drive. This Option involves the greatest area of native bushland to be removed to make way for the link road and the acquisition of land from the stockyards fronting Moss Vale Road.

A more detailed description of each of the three route options can be found in the Environmental Assessment Report (EAR) prepared by JBA on behalf of Shoalhaven City Council, dated February 2011.

Figure 1 – Conceptual Location of the three NNLR Options declared by the Minister for Planning



1.2 Statutory Context

The *Environmental Planning and Assessment Act 1979* (EP&A Act) governs the approvals process for developments in the State. On 5 December 2006 the Minister published an order in the NSW Government Gazette No. 186 declaring that the North Nowra Link Road project was a Major Project subject to Part 3A of the EP&A Act.

On 16 June 2011 the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* was passed through both houses of the NSW Parliament. The Part 3A Repeal Act establishes alternative regimes for projects to which Part 3A of the EP&A Act applied, and provides transitional provisions to deal with projects that have already commenced the planning process under Part 3A.

Where a Major Project has Director-General's requirements issued only for an EAR to support a Concept Plan Application then under the transitional provisions in the Part 3A Repeal Act the project is categorised as a Non-Part 3A Transitional Project. This is the case for the NNLR. Under this definition:

- Part 3A continues to apply in respect of the assessment and determination of the Concept Plan application.
- If the Concept Plan is approved then any subsequent development in accordance with the approved Concept Plan is considered to be development that may be carried out with development consent under Part 4 of the EP&A Act or under Part 5 of the EP&A Act.
- In accordance with clause 94 of *State Environmental Planning Policy (Infrastructure) 2007* the NNLR would constitute development that may be carried out without consent (i.e. under Part 5 of the EP&A Act) once the land has been revoked from the BCRP.

1.3 Approval Sought

With this Concept Plan application SCC is seeking approval of one (1) route corridor, preferably the selected preferred route corridor (which is Option 1 – the Central Option), being a single road corridor nominally 30 metres wide to accommodate a new North Nowra Link Road.

The proposed road would be developed as a local sub-arterial road with no direct private access. It would be fully funded by Council which has the funding invested in its reserves for the project.

The Concept Plan application does not seek approval for the construction of the NNLR, but rather is seeking approval for a route alignment so that Council can proceed with the detailed design and construction planning activities with confidence that the general alignment has been approved.

A Concept Plan approval will provide Council with the confidence to progress the design development of the proposed road and to initiate proceedings with the Office of Environment and Heritage (OEH) to revoke part of the BCRP for the proposed road.

If Concept Plan approval is granted by the Minister for Planning and Infrastructure then, in accordance with Schedule 6A of the EP&A Act, further planning approvals will be required prior to the commencement of construction for the NNLR. Consistency with the Concept Plan approval, including the Statement of Commitments and any conditions of approval imposed by the Minister for Planning and Infrastructure, will be a key matter for consideration in regards to the determination of any subsequent approval under Part 4 or Part 5 of the EP&A Act.

1.4 Environmental Assessment Exhibition

The environmental assessment was exhibited for 30 days from 16 February 2011 to 18 March 2011. The environmental assessment was exhibited at:

- Shoalhaven City Council – City Administrative Centre, 36 Bridge Road, Nowra.
- Nowra Library (Central Library), 10 Berry Street, Nowra.
- Department of Sustainability, Environment, Water, Population and Communities – John Gorton Building, Environment Entrance, King Edward Terrace, Parkes, ACT.
- Nature Conservation Council of NSW, Level 2, 5 Wilson Street, Newtown, NSW.
- Department of Planning – Information Centre, 23 Bridge Street, Sydney.

1.5 Purpose of this Report

During the exhibition of the environmental assessment, 163 submissions were received by the Department of Planning and Infrastructure (DoPI), who made them available via its website. In accordance with Section 75H of the EP&A Act, the Director-General requires that Council respond to the issues raised in the submissions.

This report identifies the issues raised during exhibition of the environmental assessment and provides Council's responses to those issues. It includes information regarding additional studies carried out since the exhibition of the environmental assessment and provides a Final Statement of Commitments.

It is highlighted that Council has not modified the Concept Plan, nor changed the approval which is being sought. As such, it is not considered necessary for this document to be a Preferred Project Report, but rather that it remains as a Response to Submissions Report.

2.0 Summary of Submitters

The public exhibition of the NNLR Concept Plan EAR was completed in March 2011 and the submissions were forwarded to Council for review and response. In total there were 163 submissions received from the public, including local or regional special interest groups and organisations, as well as members of the community. There were also seven submissions from State Government agencies.

2.1 Government Agencies

The following NSW Government agencies, departments/offices within Government agencies, and statutory corporations, made submissions:

- Department of Environment, Climate Change and Water, now the Office of Environment and Heritage (OEH).
- The South Coast Region Advisory Committee, which is part of the National Parks and Wildlife Service, itself now part of OEH.
- NSW Office of Water (NoW).
- Roads and Traffic Authority, now part of Roads a Maritime Service (RMS).
- Endeavour Energy.
- The Southern Regional Office of the Department of Planning, now the Department of Planning and Infrastructure (DoPI).
- Department of Industry and Investment.

After reviewing the EAR as well as all of the submissions the Department of Planning and Infrastructure also raised a number of issues for Council to respond to. The issues raised by Government agencies are summarised and responded to in **Section 3.1**. Note: throughout this report the current name for an agency has been used.

2.2 Special Interest Groups and Organisations

The following special interest groups made submissions:

- Nature Conservation Council of NSW
- Jervis Bay Regional Alliance
- Native Animal Network Association Inc.
- Gerroa Environmental Protection Society Inc.
- Friends of Bomaderry Creek
- Bomaderry Creek Landcare/Bushcare Group
- National Parks Association of NSW
- Australian Conservation Foundation – Shoalhaven Branch
- Shoalhaven Business Chamber

(Note: In some cases submissions were received from representatives of special interest groups or organisations and it was unclear whether these submissions represented the view of the organisation as a whole. Where this is the case the submitter has been considered as being from a member of the general public. Their issues however have still been addressed in the same way.)

Appendix A provides a summary of the issues raised in each submission, including for the above-listed specialist interest groups and organisations.

2.3 Members of the General Public

In addition to the submissions made by specialist interest groups a further 156 submissions have been made by members of the general public. The issues raised in submissions were analysed and grouped into categories to enable responses to be prepared. **Appendix A** provides a summary of the issues raised in each submission from members of the public. (Note: **Appendix A** refers to the submission number provide by the DoPI. Submissions made by specialist interest groups were included in this numbering system, however Government agencies were not. The Nature Conservation Council of NSW also was not included in this numbering system).

A statistical analysis of the submissions has been made with the key outcomes summarised as follows.

- 90% of the submitters were in favour of a NNLR.
- Overall, by a ratio of approximately 2:1 the most preferred option from the community submissions was Option 3 over Option 1.
- Virtually no support was recorded for Option 2.
- Of the local residents who live in North Nowra and who made a submission approximately 50% support Option 1 and approximately 40% support Option 3. The remaining 10% either support any option, no option or Option 2.
- Of residents who live outside of North Nowra and who made a submission approximately 27% support Option 1 and approximately 67% support Option 3. The remaining 6% do not support any option.
- Responses from those residences along West Cambewarra road objected to Option 3.

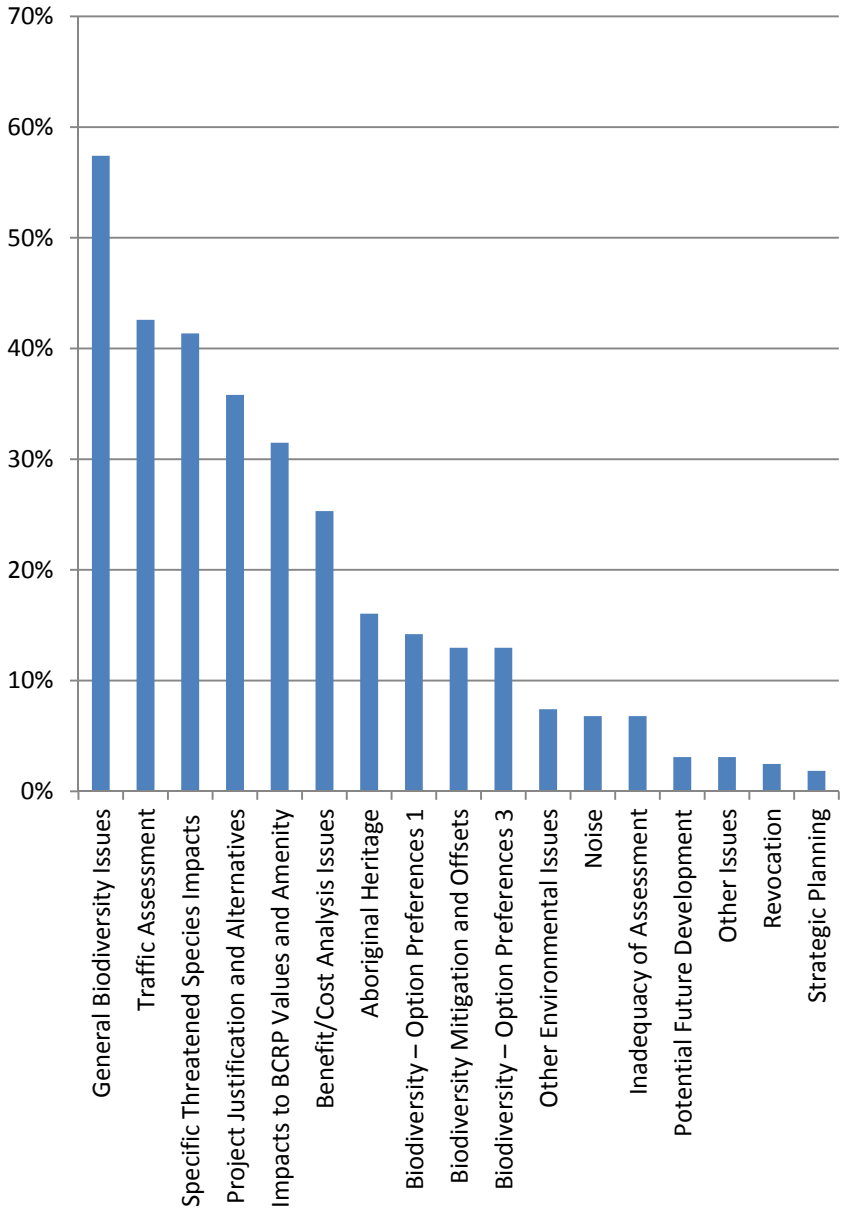
While consideration of the statistics can be useful in gauging the level of community support of objection for a project, or for identifying the priorities of the local community, the process of addressing issues raised in submissions is not based on the number of times an issue is raised. A legitimate issue only needs to be raised in one submission to warrant a detailed response.

On the other hand an issue based on a misunderstanding would require only a simple clarification, irrespective of the number of submissions the issue is raised in. As such, it is important to focus on the nature and content of the issues raised in the submissions, not just the statistics. Notwithstanding this, it is important to highlight that the vast majority of residents were supportive of the construction of a new road to improve access between North Nowra and Bomaderry.

The key issues that were raised by submissions are shown in **Figure 2**, which clearly shows that the issues raised most often in submissions are:

- Biodiversity impacts, including the fragmentation impacts from the Central Option on the BCRP and surrounding bushland.
- Project justification, strategic transport planning and the benefit cost analysis (BCA).
- The impacts to the amenity, accessibility and recreational values of the BCRP and its facilities, including walking trails and picnic area.

Figure 2 – Key Issues Raised in Submissions



3.0 Response to Issues

Each of the submissions made by agencies, groups, organisations and members of the general public have been reviewed and broken down into component issues, and then amalgamated into six categories. A full summary of all the issues raised in submissions is provided in the following Tables, along with Council's response to each issue. The six issue categories are:

- **Table 1:** Strategic Justification, traffic and benefit/cost analysis.
- **Table 2:** Ecology and biodiversity.
- **Table 3:** Amenity and recreational issues in the BCRP.
- **Table 4:** Noise
- **Table 5:** Aboriginal Heritage.
- **Table 6:** Other – including administrative and process related issues, as well as other environmental issues.

For completeness a summary of the key issues raised by Government agencies is provided in **Section 3.1** below. **Section 3.2** below summarises the key issues from special groups and organisations. Unless explicitly stated, all issues raised by agencies and groups have been summarised and addressed in **Tables 1-6** below.

The input provided as a response to the issues raised about the traffic impacts and the benefit cost ratio of the project have been provided by traffic specialists at Shoalhaven City Council.

Table 1 – Traffic and Benefit Cost Analysis Issues Summary and Responses

TAG	Issue Summary	Detailed Issue Description	Issue Response
1. Strategic Justification, Traffic and Benefit Cost Analysis (BCA)			
Project Justification and Alternatives			
1A	The main issue is the river crossing – the NNLR cannot be justified on the basis of improving the river crossing.	The major factor in causing traffic congestion is the Princes Highway Bridge crossing over the Shoalhaven River and the constrained road and traffic signal system at the southern end of the bridge. This often prevents Illaroo Road traffic from entering the Princes Highway, causing the congestion on Illaroo Road.	There are a number of factors affecting traffic congestion on the Highway and whilst it is well understood, through both anecdotal evidence from observation of traffic crossing the Shoalhaven River bridges, as well as from the TRACKS and AECOM Paramics traffic modelling, that one of the constraints to the operation of the Illaroo Road / Princes Highway intersection is the capacity on the Shoalhaven River bridges (predominantly affected by the limited capacity of the southbound bridge and the capacity of the Bridge Road / Princes Highway intersection on the south side of the bridge), it is demonstrated a NNLR could remove up to 30% of traffic from Illaroo Road (Options 1 & 2) providing significant benefits to traffic conditions at the northern side of the river (namely improvements to Bolong Road and Illaroo Road intersections). This is one of the reasons why the RMS support the NNLR project because of the very considerable benefits the project would have in removing traffic from one of the most critical traffic bottle necks on the Princes Highway. Queuing routinely occurs (again observed both anecdotally and seen in the model outputs) back across the southbound bridge, preventing the traffic on Illaroo Road from accessing the Princes Highway, southbound. This was one of the key outputs from the AECOM Paramics modelling, which identified that the benefits of the NNLR were being constrained by the presence of traffic congestion across the network generally, and specifically on the Princes Highway. In the context of only looking for solutions on the Princes Highway; this is one of the reasons that improvements to the intersection at the Illaroo Road / Princes Highway alone will not improve the operation of the intersection (to full potential) unless additional capacity is also provided on the river crossing (either through additional bridge lanes or improved intersection performance on the south side).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			However despite the significant congestion, both the TRACKS and Paramics models showed significant improvements to network performance, particularly for Options 1 & 2 by removing a significant amount of traffic from that most critical part of the network. Up to 30% of traffic on Illaroo Road turns left at the Princes Highway. Of that traffic approximately 50% continue north along the Princes Highway to Bomaderry or further north, the remaining 50% turn right into Bolong Road accessing Bomaderry or other destinations further to the east/north. By allowing this traffic an alternative access to avoid the critical Princes Highway/Illaroo Road intersection (through construction of the NNLR alone) has been demonstrated to have considerable network benefit, and this has been recognised by RMS in providing their support for the NNLR project. It is agreed that substantive improvements to the Shoalhaven River crossings would provide for improved operation of the Illaroo Road / Princes Highway intersection. However, the carrying out of the necessary works is outside of Council's control and authority but, is the responsibility of the RMS. However Council has worked closely with the RMS to ensure possible highway upgrades have been considered, and to investigate how these might interact with the NNLR. The NNLR study was part funded by the RMS and Council worked closely with RMS in a workshop type environment during development of the models and assessing the study findings. The RMS also ran the Paramics models in house as part of their assessment of the modelling undertaken. Finally, it is highlighted that the purpose of the NNLR is not solely to improve the operation of the Illaroo Road / Princes Highway intersection. It is also to provide better access between North Nowra and Bomaderry and to prevent further deterioration of safety and amenity on Illaroo Road while also providing for growth in North Nowra and Cambewarra envisaged under the Nowra Bomaderry Structure Plan (NBSP).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Without a NNLR the growth envisaged under the NBSP would need to be reconsidered, either to lower the amount of growth in Nowra (which would affect the implementation of the South Coast Regional Strategy) or to find alternative locations for growth through consolidation of other urban areas in Nowra and different new greenfield development.
		The construction of the NNLR cannot be justified on the basis of its contribution to reducing congestion on the highway at the bridges. All a Link Rd achieves in relation to this issue is to provide access and egress to the Princes Highway via two routes rather than one. However traffic from all directions still has to traverse the highway across the Shoalhaven River Bridges.	Refer comments above. Council's project objectives are to improve access into and out of North Nowra, to prevent further deterioration in the safety and amenity on Illaroo Road as a result of traffic, and provide for growth envisaged under the NBSP. It is not a project objective of the NNLR to reduce congestion on the highway at the bridges, however the modelling results clearly demonstrate that the NNLR project alone will contribute to improvements at the Highway in particular by removing considerable traffic from the critical part of the network between Bolong Road and Illaroo Road. In assessing the benefits or otherwise of the three NNLR route options a test case was modelled to determine the impact of the providing additional capacity on the Princes Highway on the performance of the NNLR. This test (the River Crossing Relief scenario or RCR) showed that the performance of the NNLR (all options) would benefit from improved capacity on the highway. This indicates that whilst the NNLR project alone will provide benefits to the Highway by removing considerable traffic from the critical part of the network between Bolong Road and Illaroo Road, the test option (RCR) showed that the full potential of the NNLR will be realised when additional capacity on the highway is provided, particularly southbound capacity. It is exactly the purpose of the NNLR to provide a second access way to the Princes Highway, therefore diverting traffic away from Illaroo Road and from the Illaroo Road / Princes Highway intersection.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			It is accepted that some diverted to the NNLR will also travel south across the river (up to 70% of all traffic in North Nowra has a destination south of the river). However irrespective of which route is followed to the northern side of the river; it is the removal of up to 30% of traffic from the most critical part of the network between Bolong Road and Illaroo Road where the greatest network benefits are provided from the NNLR (improved performance of the Highway).
		The NNLR would just transfer the traffic, and the resulting congestion problems and maintenance costs, onto the Princes Highway. The bottle neck will just be moved to another place, in the absence of a 3rd bridge over the Shoalhaven River.	The Traffic modelling demonstrates a NNLR will provide benefit to both Illaroo Road and the Princes Highway. Refer comments above. Whilst the NNLR project will allow a re-distribution of traffic including to different parts of the Highway network, the project will remove a significant amount of traffic from the most critical part of the network between Bolong Road and Illaroo Road, and in the case of Option 1 transfer traffic to a location on the Highway where there is spare capacity to absorb the traffic on to the Highway. Traffic volumes and delays are not proportional in a linear sense. On a congested network considerable improvement in delays can be achieved by even a small decrease in traffic and this has been observed with the NNLR traffic modelling. The traffic modelling for the NNLR was carried out in consultation with the RMS, and the RMS is supportive of the methodology used, the outcomes of the model, and Council's preferred option – being Option 1.
		The ever-growing number of cars and traffic delays on the Princes Highway can only be resolved with the building of a new bridge over the Shoalhaven River. Council should give priority to working with the RMS to get the real problem rectified, rather than spend around 18 million dollars of taxpayer's money for a "no solution" road.	Refer comments above. The purpose of the NNLR is to improve access to North Nowra, improve safety and amenity on Illaroo Road and provide for growth in North Nowra and Cambewarra. However it is also a fact (demonstrated through the TRACKS and Paramics modelling) that the NNLR project alone will contribute to improvements to the Princes Highway (particularly Options 1 & 2). It is agreed that additional benefits could be obtained by directly addressing capacity of the Highway, particularly the southbound lanes over the Shoalhaven river. Council has worked closely with the RMS on these matters, and will continue to work with the RMS to address congestion on the highway.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The traffic modelling for the NNLR was carried out in consultation with the RMS, and the RMS is supportive of the methodology used, the outcomes of the model, and Council's preferred option – being Option 1.
1B	The Central or Southern routes cannot be justified in terms of relieving traffic congestion on Illaroo Rd.	The traffic benefits of the NNLR are unlikely to be achieved to the level predicted and cannot be justified in terms of relieving traffic congestion on Illaroo Rd.	The Traffic models prepared in support of the EAR are robust, having been prepared under review of a working party comprising RMS & Council technical staff and specialist (AECOM) traffic consultants. Refer comments above. The Council's TRACKS analysis models the impacts of traffic generation as consequence of the population growth in accordance with the Nowra Bomaderry Structure Plan. This information was provided in the EAR. Illaroo Road currently has some 18,000 vehicles per day (vpd) and is the only road access to the Princes Highway from North Nowra. Based on the full potential for new housing stock (greenfield sites and increased densities in existing urban areas) the TRACKS model has predicted a total demand of 39,000 vpd will access the Princes Highway in the future from North Nowra and surrounding residential areas. According to the TRACKS model, with that level of potential traffic growth the only way to contain Illaroo Road to its present day traffic volumes will be to provide the NNLR, in addition to the Moss Vale Road Link (MVRDLK), and in addition to good levels of access to/from the future Western Bypass direct to North Nowra (vicinity of Illaroo Road and Moss Vale Road). Varying degrees of traffic shift were observed with the TRACKS model, as with the AECOM Paramics model, however in general at full potential of the Structure Plan (in the long term); 6,000 vpd would use a MVRDLK, 6,000 vpd would access to/from the future Western Bypass, and between 6,000 – 10,000 vpd would use a NNLR depending on option (in general 6,000 vpd would use the northern Option, leaving 21,000 vpd on Illaroo Road; 9,000vpd would use the central option, leaving 18,000 vpd, and 10,000vpd would use the southern option, leaving 17,000 vpd.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			These numbers demonstrate the importance of the NNLR in the context of the Nowra Bomaderry Structure Plan but also indicate that the NNLR is just one of many key infrastructure projects that will all assist to alleviate traffic congestion on Illaroo Road in future. Assuming that there are not any improvements to Illaroo Road, safety and amenity is directly proportional to the volume of traffic. As such, increasing traffic volumes will mean a corresponding decrease in the levels of safety and amenity. Traffic will continue to increase on Illaroo Road as it currently provides the only viable access into and out of North Nowra at the present time. One of the project objectives of the NNLR is to prevent deterioration of safety and amenity conditions on Illaroo Road, with special consideration of the growth envisaged under the NBSP. Irrespective of TRACKS v Paramics model outcomes, it is a fact that both models identify a traffic shift from Illaroo Road to the link road by varying degrees depending on the option, and any shift of traffic from Illaroo Road results in improved conditions along Illaroo Road as well as improvements on the Highway in the critical part of the network between Bolong Road and Illaroo Road.
		The Central Option is a longer journey (by almost 2km) and so would therefore not attract motorists off Illaroo Road. Both the Southern and Northern routes are longer than the Central route. Existing and future motorists are not likely to be attracted to the proposed Central and Southern Link Rd routes as these would be considerably longer and more time and petrol-consuming than the Illaroo Rd route.	This argument seems to consider that all traffic travels along Illaroo Road and across the river. The argument does not consider the very significant delays at the Princes Highway / Illaroo intersection, the fact that the central option would result in the least delays at the Highway (of all the link options), the fact that some 30% of traffic on Illaroo Road has an origin/destination north of the Shoalhaven river but is currently forced to queue on Illaroo Road through lack of an alternative route, and the fact that removal of up to 30% of traffic from Illaroo Road provides considerable network benefits by reducing delays in the most critical part of the network (on the Highway between Bolong Road and Illaroo Road).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The link road routes are only longer if you lived on Illaroo Road (south of the link road) and chose to use the link road to travel south across the river. For the proportion of traffic with origin/destination to the west or north of the link road connection (current and future residents), and for the 30% of traffic that has origin/destination north of the river; the NNLR is a considerably shorter route, and the modelling analysis identifies transport economic benefits for all options which represents cost savings from travel time and vehicle operational cost savings as a direct consequence of providing a link road. Accordingly, it is demonstrated that there are travel time and vehicle operating cost savings from all of the link road options (varying degrees) resulting in less overall travel on the network, in turn providing social, economic and environmental benefits.
1C	Alternative traffic solutions should be investigated.	Council lodged the Part 3A application for the NNLR but has not implemented improvements to intersections with the Princes Highway as part of the package of strategic traffic planning measures set out in the Structure Plan. Justification for undertaking this proposal over the other measures should be provided.	Part of the adopted NBSP is a preferred road network for the entire Nowra Bomaderry urban area that has been derived from the TRACKS modelling analysis. Whilst it is not relevant to list all of the road projects, of importance to the North Nowra Bomaderry link road equation, and in context of impacts of future growth on Illaroo Road; according to the TRACKS model the only way to contain Illaroo Road to its present day traffic volumes will be to provide the NNLR, in addition to the MVRDLK, and in addition to good levels of access to/from the future Western Bypass direct to North Nowra (vicinity of Illaroo Road and Moss Vale Road). Capacity and safety improvements will also be required along the Princes Highway. With the predicted traffic volumes along the Highway through Bomaderry it is predicted that six traffic lanes will be required in addition to turning lanes at signalised intersections. Currently there are only two southbound lanes across the river and (north of Bolong Road) there are no other signalised intersections through Bomaderry.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The management of traffic on the Princes Highway, including any improvements to the Princes Highway, is the responsibility of the RMS. The carrying out of such works is outside of Council's control and authority. As such, it is inappropriate for Council to investigate the feasibility or otherwise of improvements to the highway on behalf of the RMS. Notwithstanding this, Council has worked closely with the RMS on matters relating to traffic congestion on the Princes Highway, and will continue to work with the RMS into the future. Council has worked particularly closely with the RMS on the assessment of the NNLR project and RMS have indicated their support of the NNLR project (and particularly Option 1) recognising the benefits of the project to the Highway the link road will provide in isolation, but recognising the link road is just one of numerous upgrades that will be required to accommodate future growth. Council is committed to deliver on local road works under its care and control, however Council is reliant on the State Government to meet its responsibilities along the State road network. Whilst the modelling analysis has identified that the NNLR in isolation will provide benefits to the Highway (in particular Options 1 & 2); Council has not sought a funding commitment from the RMS towards the NNLR, recognising that this would only divert funds away from the Princes Highway where a more significant investment is required to address future capacity constraints. Council is keen to ensure that (like the RMS) the State Government will recognise the benefits of the NNLR, particularly Options 1 & 2 and will allow Council to complete these necessary works which are integral component of the transport provisions of the NBSP.
		In all the Link Road documentation there is no mention of any initiatives that could be considered to reduce the volume of "local" vehicular traffic going into the Nowra CBD.	It is highlighted that the NBSP identifies a suite of investigations that Council will pursue in order to reduce private vehicle usage and increase the use of public transport including: ▪ Providing bus routes to new living areas. ▪ Park and ride facilities north and south of Nowra. ▪ The creation of a system of cycle ways and footpaths (on and off road routes).

TAG	Issue Summary	Detailed Issue Description	Issue Response
		This could include rezoning for higher density housing near the CBD, providing better public transport and actively promoting the use of bicycles as an efficient transport alternative for commuting to school, work and shopping.	In conjunction with the adoption of the former concept plan (that later evolved to the NBSP) Council also adopted an Integrated Transport Strategy that aims to encourage and ensure alternative modes of transport are considered. The Nowra CBD Master plan also promotes consideration of alternative modes of transport. The modelling undertaken for the NBSP had included sensitivity analysis that looks at whether there would be any change to infrastructure planning required as a consequence of a shift to alternative modes of transport. At the levels of modes shift predicted to be the maximum in an area such as Nowra Bomaderry; there were no observed changes to the level of road infrastructure required. That is the high dependence on the private motor vehicle will continue to dominate planning requirements in the foreseeable future and the adopted strategies do not alter the need to provide the NNLR. North Nowra is currently serviced by a shared path linking the Princes Highway to North Nowra along Illaroo Road. The path has recently been extended by Council along Illaroo Road out as far as Tapitallee. North Nowra is currently serviced by public transport; however predominant patronage is school children.
		We do not need a link Road, the money could be spent better on other alternatives including: ▪ Options to reduce the overall amount of traffic in the local road network. Improvements to the bicycle network, and walking network might take pressure off local road network.	Refer comments above. In particular, refer to the response above in regards to reducing local traffic demand. Given the considerable growth envisaged under the NBSP; other strategies and initiatives (local or State) do not alter the need to provide the NNLR, and other infrastructure identified to be required as consequence of the NBSP. RMS had previously undertaken the Shoalhaven River Feasibility studies which looked at corridor options in Stage 1 and options to maximise capacity of the existing bridges in Stage 2. It is Council's understanding that RMS investigations and monitoring is ongoing.

TAG	Issue Summary	Detailed Issue Description	Issue Response
		▪ Options to improve the capacity of the existing bridges and the capacity of the constrained road a traffic signal system at the southern end of the bridge. ▪ Remotely monitoring and actively manage the Bridge Road/highway intersection. ▪ Modifying the Pleasant Way/highway intersection. ▪ Improving bus network.	It is further noted (in response to the specific query regarding Princes Highway/Pleasant Way) that Council has previously proposed that the RMS could optimise capacity at the southern side of the Shoalhaven river by making amendments to the Princes Highway / Bridge Road / Pleasant Way intersection. This would involve construction of a new intersection approximately 300m further south along the Highway (extension of Hawthorn Avenue) and relocation of the Pleasant Way movements only to the new signals, which results in marked improvement to capacity. This option was also included in the RMS SMEC study which investigated options to maximise capacity of the Shoalhaven River bridges (was completed prior to the AECOM NNLR study). Council believe the RMS is still considering this option, among other options that may extend the life of the existing bridges.
		This project is not a priority. The money required to complete the project could be spent in a much more productive project.	Refer comments above. Whilst there may be some debate about whether the NNLR is required now (Illaroo Road is currently 18,000vpd) there is not likely to be much debate when Illaroo Road gets to 39,000vpd as predicted will occur as consequence of the NBSP if nothing is done to further develop the road network. In the context of the growth forecast under the NBSP, which identifies North Nowra as one of the key locations for both urban consolidation and new greenfield development, the NNLR is a piece of critical infrastructure needed to facilitate this growth. Without a NNLR the significant contribution towards regional growth that North Nowra is expected to provide, as detailed in the NBSP, would be jeopardised through constraints on the traffic network. Council is not responsible for the management of the Princes Highway or for carrying out improvements to the Princes Highway. The only projects which are in the control of Council to plan and fund are local road solutions. The NNLR Option 1 has been identified as the route option that would best facilitate the growth envisaged for North Nowra under the NBSP.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The modelling results indicate that the NNLR will improve conditions on the Princes Highway, particularly in the critical part of the network (between Bolong Road and Illaroo Road) and this is seen by Council and the RMS as a considerable advantage in the management of Illaroo Road and Princes Highway flows now and into the future.
1D	The strategic objectives of the NNLR are unclear.	The EAR and the AECOM report present a confused picture of the role of the NNLR including: ▪ Access from NN to Nowra CBD and south of the river (AECOM and JBA) ▪ Access between NN and Bomaderry (AECOM and NBSP) ▪ Access between NN and areas to the north (AECOM).	As identified in the EAR Council's project objectives are to improve access into and out of North Nowra, to prevent further deterioration in the safety and amenity on Illaroo Road as a result of traffic, and provide for growth envisaged under the NBSP. It is vitally important the NNLR is considered in the context of the NBSP as an integrated transport solution. If any one of the infrastructure projects identified for the North Nowra expansion area are not provided (for example the link road), the cumulative impacts of growth will be more greatly felt on Illaroo Road and at the Princes Highway / Illaroo Road intersection. It is not the intention of the NNLR to provide for particular journeys, but rather it is part of an integrated traffic network, and the traffic modelling carried out has investigated the benefits to Illaroo Road, the benefits to the Princes Highway, and the impact of the NNLR route options on the overall efficiency of the broader network. It was also the intention of the EAR and the supporting documentation to identify the key traffic constraints across the whole North Nowra /Bomaderry/Nowra CBD network. With the southern focus of North Nowra (due to Illaroo Road being the only access point), and the close proximity of the three key intersections of Bridge Road, Illaroo Road and Bolong Road with the Shoalhaven River bridges, it is demonstrated in the EAR that this stretch of road is the critical part of the network in terms of Highway integrity (maintain through put) and current access into and out of North Nowra.

TAG	Issue Summary	Detailed Issue Description	Issue Response
1E	Justification for not assessing the RCR options with the Southern and Northern Options.	The EA discusses the impact of the NNLR on the surrounding road network and analyses how the NNLR – Central Option performs with and without the construction of other road upgrades (MVRLK and RCR Improvements). It does not, however, compare the Northern and Southern option with these other road upgrades.	The RCR option was tested only with the central option, and the impacts of the MVRDLK was tested with only Options 1 & 3, however, this was based on sound reasons as detailed below. A working party was established for the NNLR options study which included Council and RMS technical staff to ensure the modelling was sufficiently realistic and robust to be confident of the results and that both road authorities were comfortable with the modelling and outcomes recommended. Because of the high costs of undertaking detailed traffic modelling; the main objective was to ensure that sufficient modelling was undertaken to be able to understand the relative benefits or impacts of each option and to be confident in selection of a preferred option. The original brief included a Do Nothing Option (all growth as envisaged under the NBSP), a second Do Nothing Option (background growth considered along the main road network but with no further growth in North Nowra), and all three link road options with growth as envisaged under the NBSP. All of these options were to be tested in the AM peak, the PM peak, and all at 2016 and 2036. Because of the outcomes of the TRACKS analysis which looked at eleven options both with / without a MVRDLK (in 2006, 2016, and 2036), the working party agreed that it would be interesting to consider the impacts of the MVRDLK in the Paramics modelling analysis. This would have no relevance if Option 1 or 2 were selected as preferred option, however the close proximity of Option 3 to the MVRDLK means that it is vital to consider whether it (Option 3) would be viable considering that MVRDLK was considered to be a necessary link in the context of the NBSP. That is if Option 3 was found to have some merit in traffic terms; would it still have merit if modelled in conjunction with the MVRDLK. Accordingly, this was only considered necessary for Options 1 & 3, noting that a more comprehensive TRACKS analysis looked at this issue for eleven options (included the three options being considered as part of the 3A project).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			A summary of results of the TRACKS and AECOM analysis (benefit-cost ratio calculations and rank, with / without the MVRDLK) can be found in **Appendix B**. In regards to the query about the RCR option only being modelled with Option 1; the RCR option was never a part of the original brief, nor was it ever really required. The base mode results indicated that the NNLR in isolation would have considerable benefits to the Highway by removing traffic from the critical part of the network (Highway between Bolong Road and Illaroo Road). All 3 base options reduced traffic and overall average delays in the critical zone on the Highway (Bolong Road to Illaroo Road), which has a positive impact on the Highway. Option 2 resulted in the greatest reduction in traffic and overall average delay through the intersections of Bolong Road and Illaroo Road, closely followed by Option 1. Option 3 showed least reduction in traffic and overall average delay through the intersections of Bolong Road and Illaroo Road. Despite these results, the Paramics model showed a queue on the Highway north of Bolong Road (transfer of queue from Illaroo Road), this was primarily because the model parameters were not adjusted to optimise flows based on the changed traffic patterns. This was a decision of the working party to avoid any criticism that results were tweaked in any way in the modelling. In reality however traffic signals would be adjusted by RMS to optimise traffic flows and considerable reduction in delays would result from the modelled reduction in traffic (at the level of congestion observed in the modelling, even small decreases in traffic would result in far more considerable reductions in delay, the relationship is not linear).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Because of the base model results that showed a queue on the Highway north of Bolong Road (transfer of queue from Illaroo Road), rather than tweak the signal parameters in the model to address the issue (as would occur in reality), because the extent of tweaking would vary from option to option; the working party agreed to consider instead a suite of low cost options on the Highway to determine whether this would be sufficient to address the queuing problem (primarily to respond to any concerns about the base modelling results). The RCR option was agreed to by the working party as a variation of the original brief; and solely in the context of seeing whether (hypothetically) a low cost solution could address the apparent adverse queuing impact on the Highway (which would not be expected to occur in reality, as noted above). Because the RCR would be the same for each option and because the RCR predominantly reflected low cost improvements at/on the Highway, it was only considered necessary to test this for one option, as the same relative improvements would be expected for each option. Because Option 1 was (at that stage) the best performing option in transport economic terms, Option 1 was the option that the working party agreed to test the RCR against. The RCR option did address the queuing problem, which in the modelling returned conditions to pre link road conditions at Highway / Bolong Road. Because of that finding (with the RCR), the working party had no further interest with the RCR option, it was not necessary to test the RCR with all of the other options, as similar relative improvements could be expected, and it was certainly never intended to undertake any of the RCR works. It was intended (test of RCR) solely to identify that if traffic problems did arise as a consequence of the link road that there were low cost solutions that could address the problem.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			As stated above this was a hypothetical test only, as the queuing observed in the modelling would not even be expected to occur in reality, the reductions in traffic at the intersections of Princes Highway (Bolong and Illaroo Road) as consequence of the NNLR (alone) would result in considerable improvement to traffic conditions, these results can be seen in the summary tables included in **Appendix B**.
1F	RCR measures are unclear and banning right turn from Illaroo Road into Princes Highway is not acceptable.	Banning right turn from Princes Highway to Illaroo Road would upset many current Illaroo Road residents, particularly those who live east of McMahons Road and visitors to the Nowra Gold Club. Note error in JBA EAR report which does not include the banned right hand turn as part of the RCR measures.	The management of traffic on the Princes Highway, including any improvements to the Princes Highway, is the responsibility of the RMS. The carrying out of such works is outside of Council's control and authority. As such, it is not part of this application to carry out any of the RCR improvements. Further, Council would not support any ban of right turn from the Princes Highway into Illaroo Road. In fact such a ban would not be necessary in Council's view; as the modelling results indicate that the NNLR alone would provide considerable benefits to the Princes Highway / Illaroo Road intersection, such that a banned right turn would not need to be considered. Such an impact on accessibility would have to be justified. On the basis of the modelling works undertaken Council does not consider that a banned right turn would be justified. The comments above (in response to issue 1E) explain the context in which the RCR was tested, and the reasons why the RCR was tested when it was not included in the original modelling brief. A banned right turn was included in the RCR option, for no other reason that it is a very low cost option. The RCR option included: ▪ A banned right turn from the Highway into Illaroo Road ▪ An additional lane on Illaroo Road on approach to the Highway (third approach lane to the signals) ▪ The new traffic signals (extension of Hawthorne Avenue) and associated amendments to Princes Highway/Bridge Road intersection to relocate Pleasant Way movements to the new signals

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Compared to the medium-long term requirements to provide additional capacity to the bridges; the above RCR works were considered to be low cost in comparison. In the context of investigating highway improvements at the bridges; all three of these components would otherwise have been modelled in isolation to appreciate their individual benefits. However not detracting from the primary purpose of the study (to determine which of the three link road options would be preferred in transport economic terms), to keep costs of the study at a reasonable level and not delve into the RMS's area of responsibility to investigate Highway improvement measures; in the context of the RCR option (as explained above) they were all modelled as a single RCR option to identify whether those measures alone would be sufficient to address the queuing observed in the model as a consequence of the base link road options. The RCR improvements described in the EAR are outside of Council's control and authority, and the RMS is responsible for determining the scope of any highway improvements and the feasibility of such improvements. It is acknowledged that JBA's description of the RCR measures described in Section 4.1 (page 30-31) and Appendix B of the EAR erroneously did not include the ban of the right hand turn from the Princes Highway into Illaroo Road. As described above, this Concept Plan application does not include the RCR improvements, the context in which the RCR was tested is described above. It is not considered that this error affects or invalidates any of the outcomes of the assessment.
Strategic Planning			
1G	Impacts from the Central and Southern Routes are not consistent with the State Plan, the SCRS and the NBSP.	The NNLR is inconsistent with the NSW State Plan to improve biodiversity, i.e. to increase recovery of threatened species, populations and ecological communities not just to avoid significant impacts on them. The strategic assessment is not in compliance with the DGRs.	**State Plan – Urban Development and Traffic Priorities** The State Plan contains a large number of priorities and targets. As with any strategy these aims and objectives need to be considered holistically rather than in isolation of each other. The priorities and targets within the State Plan that are relevant to the NNLR include: • Improving the road network, measured through improved efficiency of the network as shown by travel speeds. • Improve road safety.

TAG	Issue Summary	Detailed Issue Description	Issue Response
		The Central and Southern options are not consistent with the South Coast Regional Strategy because they would not maintain or enhance the regionally significant biodiversity of the Bomaderry Creek Regional Park or direct development away from this area known to be important for conservation.	• Improve housing affordability, by providing 300,000 new dwellings in regional NSW with increased rates of infill development. **South Coast Regional Strategy Urban Development Objectives and Actions** As with the State Plan, the South Coast Regional Strategy contains a large number of aims and objectives, and these aims and objectives need to be considered holistically rather than in isolation of each other. As described in Section 11.2 of the EAR, the South Coast Regional Strategy identifies Nowra Bomaderry to be a Major Regional Centre which will be required to accommodate most of the growth throughout the Shoalhaven LGA and strengthening the role of Nowra Bomaderry to be the major residential, employment and administrative centre for the northern part of the region. The NNLR is critical to the achievement of the traffic, growth and urban development objectives of the State Plan and the South Coast Regional Strategy. In particular, the NBSP provides detailed analysis of possible future growth in Nowra Bomaderry, and identifies North Nowra as one of six key areas required to provide for the envisaged growth. North Nowra currently provides approximately 21% of the number of dwellings in Nowra Bomaderry, but is predicted to be able to accommodate approximately 27% of the infill growth forecast for Nowra Bomaderry. It is forecast to be the largest contributor of infill growth in Nowra Bomaderry across the 6 key areas. In terms of new living areas, North Nowra has been assessed to be able to accommodate 2 new living areas at Crams Road and Bangalee Road West, with a total of 1,280 new dwellings envisaged, providing for approximately 18% of growth in new dwellings across Nowra Bomaderry. Not located in North Nowra, but of relevance are the proposed new growth areas in Moss Vale Road, which are expected to contribute 2,550 new dwellings (or 36% of all new dwellings in Nowra Bomaderry under the NBSP). Of particular importance under the State and Regional plans is the expectation of increased densities in existing urban areas over time and this alone is also likely to lead to significant increases in traffic along Illaroo Road.

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<tr><th>TAG</th><th>Issue Summary</th><th>Detailed Issue Description</th><th>Issue Response</th></tr>
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This demonstrates the importance of North Nowra to the achievement of growth targets for Nowra Bomaderry, and the South Coast Region, which needs to be the context for considering the natural environment priorities, targets, actions and objectives.

State Plan Environmental Priorities
In terms of the natural environment the State Plan identifies a priority to protect native vegetation, biodiversity, land, rivers and coastal waterways, with 13 State-wide targets specified for natural resource management.

It is highlighted that the development of the NNLR is not an action that is part of the State's response to this priority item, nor is it a project with a stated objective of improving the natural environment. Development of this nature by definition modifies and affects the natural environment. The purpose of the environmental impact assessment is to ascertain whether there are significant environmental impacts that cannot be mitigated or managed such that the significance of the impact can be reduced to an acceptable level. In this context, the question that needs to be answered in responding to the State Plan's priority and target is whether the detrimental effects on threatened species, populations and ecological communities are significant enough to prevent the State from achieving its target. With this in mind a response to each of the 13 State wide targets for natural resource management has been provided below:

<table>
<tr><th>State Plan Target</th><th>NNLR Response</th></tr>
<tr><td>▪ By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition.</td><td>▪ All NNLR route options will require the removal of native vegetation. Option 1 will result in the lowest amount of clearing of native vegetation due to its colocation with an existing services corridor and the existing part of Narang Road. The northern option results in the greatest extent of natural vegetation clearing required.</td></tr>
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TAG	Issue Summary	Detailed Issue Description	Issue Response	
			▪ By 2015 there is an increase in the number of sustainable populations of a range of native fauna species.	▪ The ecological studies conclude that the NNLR is not likely to impact significantly on native fauna species if appropriate mitigation measures are incorporated. Option 3 would have the lowest impact due to its location adjacent to a residential area.
			▪ By 2015 there is an increase in the recovery of threatened species, populations and ecological communities.	▪ The ecological studies conclude that the NNLR will not impact significantly on the recovery of threatened species, populations and ecological communities if appropriate mitigation measures are incorporated. Option 3 would have the lowest impact since it would impact on fewer relevant specimens. ▪
			▪ By 2015 there is a reduction in the impact of invasive species.	▪ The ecological studies conclude that the NNLR will not impact significantly on the presence of invasive species if appropriate mitigation measures are incorporated. Option 3 would have the lowest impact due to its location at the edge of the bushland area.
			▪ By 2015 there is an improvement in the condition of riverine ecosystems.	▪ All NNLR route options cross Bomaderry Creek. The bridge for all options can be designed to treat road runoff prior to discharge into the creek.

TAG	Issue Summary	Detailed Issue Description	Issue Response	
			▪ By 2015 there is an improvement in the ability of groundwater systems to support groundwater-dependent ecosystems and designated beneficial uses.	▪ The NNLR will not affect ground water resources or groundwater dependent ecosystems.
			▪ By 2015 there is no decline in the condition of marine waters and ecosystems.	▪ The NNLR will not affect marine waters or ecosystems.
			▪ By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained.	▪ The NNLR will not affect wetlands.
			▪ By 2015 there is an improvement in the condition of estuaries and coastal lake ecosystems.	▪ The NNLR will not affect estuaries or coastal lake ecosystems.
			▪ By 2015 there is an improvement in soil condition.	▪ The NNLR will not affect soil condition.
			▪ By 2015 there is an increase in the area of land that is managed within its capability.	▪ The NNLR will not affect whether land is managed within its capability.

TAG	Issue Summary	Detailed Issue Description	Issue Response	
			▪ Natural resource decisions contribute to improving or maintaining economic sustainability and social wellbeing.	▪ NNLR Option 1 and Option 2 will result in improved economic sustainability and social wellbeing, without significant environmental impacts. NNLR Option 3 will result in limited or no improvement to economic sustainability and social wellbeing, and results in unacceptable adverse impacts on the Highway at Cambewarra Road, however is the best performing option in terms of some of these natural resource targets.
			▪ There is an increase in the capacity of natural resource managers to contribute to regionally relevant natural resource management.	▪ The NNLR will not affect the involvement of natural resource managers to contribute. All options will improve access to parts of the BCRP which will assist in the park's management. Option 1 provides the most direct access and greater level of natural surveillance. Further improvements to walking track access and vehicle access are possible to incorporate with Option 1.
			South Coast Regional Strategy Environmental Objectives and Actions The South Coast Regional Strategy sets out a series of actions related to the preparation of strategic plans in such a way as to direct urban development away from areas known or likely to be of high conservation significance. It is highlighted that the development of a road is not an action specified in the South Coast Regional Strategy, and so the development of the NNLR cannot be inconsistent with the South Coast Regional Strategy's set of actions.	

TAG	Issue Summary	Detailed Issue Description	Issue Response
			In terms of the objective to direct urban development away from high conservation areas, it is highlighted that the NNLR, including the Central and Southern Options, would be critical to the achievement of the growth of North Nowra in ways which are consistent with this objective. In particular, North Nowra has been identified within the NBSP as an area that can accommodate significant infill growth, as well as two areas of greenfield residential development. These new living areas include: ▪ Bangalee Road West which is an area largely cleared for agricultural uses; and ▪ Crams Road where the location of higher conservation quality areas are being considered as part of the rezoning investigations and will influence the areas proposed for development. The NNLR is therefore a project which facilitates the South Coast Regional Strategy's objective of directing urban development away from areas of high conservation significance. **Integrating Land Use and Transport – Guidelines for Planning and Development** It is also highlighted that the State's *Integrated Landuse and Transport Guideline* (prepared by Transport NSW, the Department of Urban Affairs & Planning, and the NSW RTA, 2001) identifies that the Government's objective is to reduce the growth in Vehicle Kilometres travelled (VKT) to improve air quality and reduce greenhouse gas emissions. The output VKT and vehicle hours travelled (VHT) parameters from the modelling of all options indicate that Option 3 is the only option that leads to worse VHT conditions (compared to the Do Nothing). Options 1 & 2 both improve VKT and VHT across the network. Option 2 results in lowest values of VKT and VHT, closely followed by Option 1.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Option 3 results in the highest values of VKT and VHT, and therefore is least capable of all options in complying with the State Government's integrated land use and transport objectives of minimising network values of VKT and VHT. Because Option 3 results in the highest values of VKT and VHT it has the greatest indirect social, economic, and environmental impacts of all of the options (highest overall network delays, highest overall network operating costs, and highest overall emissions) of all of the options modelled. Option 2 results in the lowest values of VKT and VHT, it therefore has the least indirect social, economic, and environmental impacts of all of the options (lowest overall network delays, lowest overall network operating costs, and lowest overall emissions) of all of the options modelled, closely followed by Option1.
		The Northern route is the only route consistent with the strategic objectives of the NBSP to provide transport infrastructure for future residents whilst at the same time ensuring that the values of the BCRP and Bushland are maintained.	The TRACKS and AECOM Paramics modelling demonstrate that the Northern Route Option is the least capable route option in regards to meeting the objectives of the NBSP. The northern option: ▪ Does not provide improvements to the Highway at the intersections with Bolong Road and Illaroo Road to the same extent that could be achieved with Options 1 or 2. ▪ Would result in less diversion of traffic from Illaroo Road. ▪ Is the only option that results in unacceptable adverse impacts at the Princes Highway / Cambewarra Road / Moss Vale Road intersection. The NBSP includes the MVRDLK as a key transport link to support the development of the Moss Vale new living areas – which are the most significant new living areas proposed for Nowra Bomaderry. The MVRDLK is one of the primary road links required as part of the NBSP. Its role is to facilitate access to the Moss Vale South (east) release area providing access to new residential and commercial development and importantly to provide direct access between Moss Vale South and North Nowra to reduce the impact of the new release area on the state road network (Moss Vale Road and Princes Highway).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The modelling demonstrates that the Moss Vale Road Link does not interact well with Option 3. Refer to the summary of the TRACKS modelling assessment provided in **Appendix B** which identifies that Option 3 would reduce in rank over time (because of the adverse impacts at the Highway / Moss Vale Road) but also that Option 3 reduces in rank when modelled with the MVRDLK, indicating that both roads are not required. Based on the modelling results it is by no means certain (in fact unlikely) that Council would choose to fund both the MVRDLK and the NNLR Option 3. Because of the adverse traffic impacts associated with Option 3, and because of the close proximity to MVRDLK it is likely that if Option 3 were approved no link road would be built (other than MVRDLK). The result of this would mean failure to contain traffic volume increases on Illaroo Road which is the primary objective of the package of infrastructure works identified in the NBSP. The consequence of this would mean unacceptable traffic impacts on Illaroo Road and at the Highway / Illaroo Road and Highway / Bolong Road intersections, or alternatively less growth in North Nowra (failure to provide the dwelling stock envisaged for the North Nowra area under the NBSP and SCR strategy). It would also mean overall network VKT and VHT parameters would be considerably worse than the Do Nothing. That is the advantages of the MVRDLK are achieved if provided in conjunction with a link road, not in isolation.
		The Northern Route would be suitable for growth of traffic generated in the new urban land release areas to the west including Tapitallee, Bangalee, and Gypsy Point.	Refer comments above regarding the northern route. Further, the traffic modelling carried out for the NNLR examines the efficiency of the entire road traffic network, rather than interrogating individual journeys from specific locations. This traffic modelling concludes that Option 3 is the option which returns the lowest overall benefit across the traffic network and so is least capable of meeting the growth forecast in and around North Nowra.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Option 3 is the only option that results in unacceptable adverse impacts at the Highway / Cambewarra Road / Moss Vale Road intersection, and is the only option that leads to values of VKT and VHT that are worse than the Do Nothing (refer results summarised in **Appendix B**).
Traffic Assessment			
1H	Flawed traffic analysis	The AECOM study has not compared the VKT and VHT analysis for Illaroo Road itself.	The VKT and VHT are measures of the efficiency of the entire network being modelled. It does not make sense for the VKT or VHT to be considered for individual roads, however Illaroo Road has been considered as the base "Do Nothing" option, and compared with the link road options as shown in the summary of the modelling assessment provided in **Appendix B** which identifies the relative benefits / or impacts of each option as output from the modelling analysis. In terms of the VHT outputs the only option worse than the base option is Option 3 (northern option), all other options returned lower values of VHT than the base Do Nothing option and Option 3. This indicates that Options 1 & 2 would provide far better network efficiency, less overall delay and operating cost, and less environmental impact (lower overall emissions) compared with the Do Nothing (Illaroo Road) and Option 3. In terms of the VKT outputs Option 3 (northern option) is again the worst option (highest VKT). Option 1 + MVRDLK returns the lowest VKT and VHT parameters of the options modelled. Based on the base option results (with no MVRDLK) it is very clear that if Option 2 + MVRDLK were modelled it would have returned the lowest VKT and VHT parameters of the options modelled. The base options (no MVRDLK) indicated that the further north the option the higher the values of VKT and VHT.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			This means the further north the option the less transport efficiency, the higher overall network delays and operating costs and higher emissions (greater environmental impacts), meaning less ability to meet the States objectives of minimising VKT and VHT. The AECOM Paramics model demonstrates that Option 1 and Option 2 result in lower traffic on Illaroo Road compared with Option 3, and the TRACKS model shows that over the 24 hour period Option 1 and Option 2 result in lower traffic on Illaroo Road compared with Option 3. The *Integrated Landuse and Transport Guidelines* (Transport NSW, RMS, DUAP, 2001) have an objective to minimise VKT and VHT on the transport network. The Do Nothing (Illaroo Road) option has the adverse consequence of significantly increasing VHT, decreasing transport efficiency and increasing pollution, this is not desirable, nor is Option 3 which the model results indicate would lead to worse conditions than the Do Nothing (in terms of VKT and VHT parameters).
		Most of the residents that reside to the east and south of the North Nowra Shops will continue to go down Illaroo Rd so the Central Option will have less than an estimated 10% impact on the Illaroo traffic levels and the Northern option around 8.5%, so the traffic impact difference between the Central and Northern options is only 1.5%.	It is not intended to establish what route a particular person takes for a particular journey, nor does the success of the NNLR depend on a particular person taking a particular route for a particular journey. It is clear that many people who live in the southern and eastern parts of North Nowra will continue to use Illaroo Road. However, the purpose of the NNLR is to create a new road that integrates well with the existing (and likely future) road network in a way which prevents the further deterioration of safety and environmental conditions on Illaroo Road in the context of the growth set out in the NBSP. Aside from the safety, amenity and traffic conditions along Illaroo Road, the fact that Illaroo Road connects with the Highway at the very northern end of the Shoalhaven river is itself a transport network problem in terms of reducing capacity of the Highway at one of the most critical locations in the network (due to the already constrained capacity at the bridges and close proximity to other key intersections on both sides of the river).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			It is a fact that at the very high levels of congestion on the Princes Highway even small decreases of traffic have very considerable benefits in terms of operation of the traffic signals on the Highway between Bolong Road and Illaroo Road. Refer to the summary of the modelling assessment provided **Appendix B** which identifies the relative benefits / or impacts of each option as output from the modelling analysis. Refer in particular to the higher reductions in delay attributed to the modelled reductions in traffic. It is a fact that up to 30% of traffic on Illaroo Road turns left at the Highway, irrespective of where they live in North Nowra. This is largely influenced by the fact that some 30% of the total number of jobs in Nowra/Bomaderry are in fact north of the river (most in Bomaderry). It is also an influence that there is no high school in North Nowra so a considerable number of trips each morning drop children at high schools in Bomaderry before their parents travel to work (even if the work destination is south of the river) and this has considerable impacts particularly in the critical AM peak period due to the higher directional split in that period. It is acknowledged that motorists will continue to use Illaroo Road, particularly governed by their origin/destination. Similarly a large proportion of traffic that will use the new link road will also travel south across the river. However the modelling is very clear (refer results summarised below) in that by providing a new link road there will be a considerable reduction of traffic from Illaroo Road and from the Highway in the critical zone between Bolong Road and Illaroo Road, leading to overall network improvements particularly with Options 1 & 2. The reductions are likely to be in the order of some 30% (traffic diversion from Illaroo Road).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The TRACKS analysis (described above) indicates that provision of a link road, in addition to the MVRDLK and in addition to good levels of access to/from the future Bypass, will all be required to contain traffic levels on Illaroo Road to present day levels (due to traffic growth impacts of the NBSP likely to increase from 18,000 vpd to 39,000 vpd). This is not to mention the untenable impacts at the Highway if all additional traffic is forced to connect with the Highway at the one location as per the present situation via Illaroo Road (which just happens to be at one of the most sensitive locations in the network due to the constrained capacity at the Shoalhaven river). Whilst particular individuals may continue to use Illaroo Road (post link road construction), that is not a plausible reason why Council should not be doing the best they can as a planning authority to provide an appropriate level of transport infrastructure to address current traffic problems and plan appropriately for growth as envisaged in the adopted NBSP. It is also demonstrated in the modelling that as particular individuals continue to use Illaroo Road (post link road construction) they will do so enjoying significantly improved conditions along Illaroo Road and less delay at the Highway as a consequence of the link road following the removal of up to 30% of traffic that would choose an alternative route if presented with that opportunity (based on their origins/destinations). The results provided in **Appendix B** summarise the modelled diversions of traffic as a consequence of each of the link road options (summary of TRACKS and AECOM modelling) and demonstrate diversion levels significantly greater than noted in this particular submission. Up to 30% diversion can be achieved with Option 1 and this is consistent between both the TRACKS and Paramics analysis. It is also not ironic that the likely extent of modelled traffic diversion is also consistent with the proportion of traffic at Illaroo Road / Highway intersection that has destination to/from the north (up to 30%).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			In both the AECOM and TRACKS analysis Option 1 results in highest diversions of traffic, this is because the Narang Road roundabout has greater capacity to absorb the additional traffic on to the Highway compared with the proposed traffic signals at Option 2 and the Moss Vale Road/Cambewarra Road roundabout at Option 3. Option 3 resulted in lowest diversions of traffic in both models due to the additional distance from Illaroo Road and inadequate capacity of The Moss Vale Road / Cambewarra Road roundabout to absorb the additional flows. Compared with Option 3, Option 1 could divert up to 19% more traffic than Option 3 based on the AECOM Paramics analysis, and up to 34% more traffic than Option 3 based on the TRACKS analysis. This is a significant difference, and the problems associated with the additional distance and capacity constraints of Option 3 (at the Highway / Cambewarra Road / Moss Vale Road intersection) are also highlighted in the higher delay calculations and overall higher network VHT calculation associated with Option 3.
		The assessment dismisses the diversion of traffic towards Illaroo Road during the PM peak for the north bound journey as a minor diversion with no adverse consequences.	This comment relates to the analysis provided on page 115 of the EAR which discusses the interaction of the NNLR with the Moss Vale Road Link (MVRDLK). The modelling shows that the average PM northbound travel time on Illaroo Road worsens once the MVRDLK is included into the network. The EAR suggests that this is caused by motorists who would normally take the Princes Highway and Moss Vale Road to travel to Cambewarra (or beyond), but once the MVRDLK is in place would divert via Illaroo Road and MVRDLK. The EAR suggests that this is fairly minor impact with no adverse consequences. It was not the intention of the EAR to downplay this issue. But rather, to demonstrate that this diversion results in a net benefit across the efficiency of the entire network, with savings to be made via reduced congestion on the Princes Highway and Moss Vale Road.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			When the MVRDLK was modelled with Option 1; further increases in traffic and overall delay were observed on the Highway at Cambewarra Road / Moss Vale Road intersection, although the way the MVRDLK was modelled perhaps influenced additional traffic along West Cambewarra Road than would occur in reality. When the MVRDLK was modelled with Option 3; a more significant increase in overall delays was observed on the Highway at Cambewarra Road / Moss Vale Road intersection. It is partly because of the higher delays modelled at the Highway /Moss Vale Road/ Cambewarra Road intersection as a consequence of the MVRDLK options that led to some additional traffic diversion along Illaroo Road (particularly in the PM peak). The way MVRDLK was modelled perhaps influenced additional traffic along West Cambewarra Road than would occur in reality, and as such the consequences of the additional delays modelled would not be expected to occur in reality to the same extent. The MVRDLK will have a lower influence of traffic diversion on Illaroo Road (traffic from the Highway) in reality due to origins/destinations being closer to Moss Vale Road, whereas the modelled MVRDLK was located immediately to the north of West Cambewarra Road. That said the network advantages of a treatment such as the free flowing left turn slip lane from the Princes Highway onto Illaroo Road are considerable. It is also important to note that as a consequence of the link road there will be a considerable reduction in traffic on the critical section of Highway between Bolong Road and Illaroo Road. It was also explained above that the model parameters were not adjusted to optimise flows based on the changed traffic patterns (a decision of the working party to avoid any criticism that results were tweaked in any way in the modelling).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			However in reality the traffic signals would be adjusted by RMS to optimise traffic flows and considerable reduction in delays would result from the modelled reduction in traffic (at the level of congestion observed in the modelling, even small decreases in traffic would result in far more considerable reductions in delay, as the relationship is not linear). As such it is not considered that the modelled diversions of traffic along Illaroo Road (westbound) would occur to the same extent as estimated in the models, the model assignment of traffic responds to the higher levels of delay in the model on the Highway. Notwithstanding that there will not be any adverse impacts on Illaroo Road solely as consequence of providing additional road infrastructure. Refer comments above which discuss the ability of the link road, MVRDLK and Bypass access points to all play an integrated role in containing traffic levels on Illaroo Road to present day levels (manage impacts of the NBSP growth). It is demonstrated that as a consequence of the link road alone there will be considerably less traffic on Illaroo Road in both directions, as shown in the models, although due to the higher delays for traffic to access the Highway, there will always be the potential for a higher directional flow of traffic on the link road (approach to the Highway), and a higher directional flow of traffic on Illaroo Road away from the Highway (traffic diverting at first opportunity from the Highway).
		During the PM peak there is little congestion due to the dedicated slip lane off the bridge and so higher PM (vs. AM) accident rates are due to higher speeds and low westerly sun in the eyes of motorists. The only significant congestion experienced early in the PM peak is caused by the school where it can take up to three traffic light changes to get through.	Whilst the left slip lane on the Highway (left turn into Illaroo Road) plays a considerable role in improving PM peak traffic conditions often in the PM peak the lane is not fully utilised because of the traffic queuing back across the river. Without any road infrastructure improvements to improve capacity at the northern end of the river this queuing problem will increase in frequency and severity, and this is reflected in the model due to the future conditions modelled.

TAG	Issue Summary	Detailed Issue Description	Issue Response
		Traffic delays on Illaroo Road are mostly caused by school traffic, buses, drop-off and children crossing at the lights. Council should consider measures to minimise school traffic related congestion, including an overpass and bus and car stops.	Notwithstanding that it is not accepted that there is no problem in the PM peak, although it is agreed that at the Princes Highway / Illaroo Road intersection the AM peak is worse than the PM peak due to the higher directional flows trying to travel southbound across the river. Overall there is more traffic in the PM peak but the directional flows are not as concentrated in one direction as per the AM peak. However the traffic surveys and modelling results still indicate that the PM is a problem with LOS F conditions (lowest possible level of service) and that considerable improvements to both the AM peak and PM peak could result from provision of a link road which removes a considerable proportion of traffic from Illaroo Road and from the most critical section of the Princes Highway. It is agreed that the school is another factor that impacts traffic flows on Illaroo Road. There are already clear zones installed on Illaroo Road that reflect the directional AM and PM peak flows (clear zone north side to allow more efficient eastbound flows in the morning and clear zone south side to allow more efficient west bound flows in the evening peak period) and these clear zones provide a marked improvement in travel efficiency. The buses pick up school children on the north (school) side of the road. This means provision of a dedicated bus lane would add considerable advantage in the AM peak period but would not address PM peak congestion. The traffic signals in front of the school also add to the AM delays however not to the same extent as in the PM period. The predominant cause of congestion in the PM peak period is the traffic signals that the school children use to cross the road safely.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Based on the restrictions of the road reserve the only effective way to improve travel conditions westbound along Illaroo Road in the vicinity of the school in the PM peak is to remove traffic by providing alternative routes into North Nowra (such as the proposed link road). Council have previously discussed the potential for a dedicated bus lane to be provided in front of the school. This would involve impact on Department of Education and Training land. The RMS is also responsible for Safety around schools in NSW. Accordingly there are several parties involved and concurrence and funding would be required from the State Government to achieve the works. Such commitments have not been forthcoming to date from the State Government. As a separate objective Council is likely to pursue the potential for a dedicated bus lane in front of the school in future (to improve travel conditions along Illaroo Road), however, such a treatment is not in lieu of the link road (because it does not remove traffic it does not address overall safety and amenity along Illaroo Road, because it does not remove traffic it does not address congestion and delays at / on the Princes Highway, and because it does not remove traffic it does not provide additional network capacity to absorb the adverse impacts of the NBSP growth).
		The report does not mention the Bangalee West future residential area identified in the structure plan.	The EAR does not refer explicitly to the Bangalee Road West future residential area which is identified in the NBSP. The EAR does refer generally to new living areas and also provides Map 2.2 of the NBSP which clearly shows the Bangalee Road West future living areas. It was not the intention of the EAR to provide an exhaustive description of the new living areas as spelt out in the NBSP, but to demonstrate how the NBSP provides for growth that will exacerbate traffic conditions on Illaroo Road.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The Crams Road new living area was considered the most relevant in this regard, in addition to the significant impacts of increased densities in the existing urban areas, however it is accepted that the Bangalee Road West new living area would also contribute to future growth in North Nowra and along Illaroo Road. To that end, the Bangalee Road West new living area is forecast to provide approximately 16ha of developable land for residential development, providing for an additional 200 dwellings. Providing a link road in addition to the MVRDLK will directly contribute to a reduction in traffic on Illaroo Road and improvement to travel conditions along the State Road network to lessen the impacts of such developments by providing improved accessibility (distribution of traffic load) and allowing internal trip making (so that trips with local origins/destinations in North Nowra and or the expansion areas) can do so without impacting the State Road network. It is an objective of the NBSP to mitigate the adverse impacts of development and in traffic terms this can only be achieved by providing additional road infrastructure projects (such as the proposed link road, the MVRDLK, and good levels of access to /from the future Western Bypass).
1l	Central option would impact local traffic network	Narang Road would become an unsafe intersection due to the close proximity to the school zone and poor visibility for northbound traffic potentially increasing the number of accidents at this intersection.	Refer other comments above about the capacity of the Princes Highway / Narang Road intersection which the modelling has demonstrated has greater capacity to absorb the link road traffic compared to Options 2 & 3, and this is one of the reasons why Option 1 attracts more traffic than Options 2 & 3. When the Princes Highway was upgraded through Bomaderry in the early 1980's the Narang Road / Princes Highway intersection roundabout was constructed on the expectation that the link road was being provided along that corridor. In consultation with residents and businesses along the Highway the RMS considered it necessary to provide roundabouts along the Highway at designated locations to facilitate U-turn movements for local access.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Whilst there were several locations that could have been considered, Narang Road was constructed on the basis of its primary role to accommodate the future link road. The Shoalhaven Anglican school on the Princes Highway in Bomaderry is protected by a 40kph school zone like all other schools throughout the State. The traffic volumes on the Highway through Bomaderry are predicted (as a consequence of the NBSP) to increase in future from the current 20,000vpd to somewhere in the order of some 40,000vpd (approximately double). At that level the Princes Highway through Bomaderry will need to provide six lanes and traffic signals (the existing four lanes and roundabout configurations will have inadequate capacity to accommodate for future growth). The predominant traffic increases along the Highway will result from background traffic growth, not from the proposed link road. Because there is no high school in North Nowra, there are many students from North Nowra that attend the Anglican college and the Bomaderry High School. The proposed link road will provide an alternative travel route to / from North Nowra so that school traffic will not have to un-necessarily impact Illaroo Road and along the Princes Highway between Illaroo Road and the Anglican School, and as the modelling results indicate there is considerable network advantages in removing that traffic from Illaroo Road and the most critical location on the Highway (section between Bolong Road and Illaroo Road). In statistical terms the occurrence of accidents is directly proportional to volumes of traffic. There is also a nexus between VKT/VHT and crash rates (improvements in transport efficiency leads to higher concentration and lower overall driver frustration). Illaroo Road is an emerging black spot due to increased crash rates which is a reflection of the high volume of traffic.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The Princes Highway / Illaroo Road intersection is one of the greatest black spots in the Nowra area, and this is also a reflection of the high volume of traffic. There are considerable safety advantages in diversion of traffic from these critical locations. The Central option (in conjunction with MVRDLK) results in the lowest values of VKT and VHT of all the options modelled, and this is likely to contribute to overall safety improvements network wide. That all said any introduction of a new intersection (particularly on the Highway) will increase the potential for crashes at that isolated location. This is the same for Options 2 & 3. An adverse impact of the NBSP (or any growth) is the generation of traffic and subsequent potential for increases in crash events across the entire urban area. The objective is to plan a network that minimises VKT and VHT and that allows a broader distribution of traffic so that the potential for high conflict points in the network are minimised. It is considered that whilst Option 1 may have some potential for crashes to occur (like any junction along the Highway including Options 2 &3) the modelling results indicate that it is the option likely to result in the least potential for localised crashes (at the Highway intersection): ▪ Due to Narang Road having the greatest spare capacity to absorb the additional traffic (less overall intersection delay and lower degree of saturation inevitably leads to lower relative crash rates) and the modelling results indicate that it is the option likely to result in the greatest overall reduction in network crash events. ▪ Due to Option 1 having the greatest potential for diverting traffic from Illaroo Road (maximum safety improvements on Illaroo Road).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			▪ Due to Option 1 having the greatest potential for diverting traffic from the critical part of the Highway network (between Bolong and Illaroo Roads) and associated safety improvements. ▪ Due to Option 1 (+ MVRDLK) having the lowest values of VKT and VHT (and associated network wide safety improvements). It is also relevant that Option 1 has the least potential to create adverse impacts on existing Bomaderry Collector Roads (relative to other options) because it does not directly connect to an existing Road. Option 2 directly aligns with West Bunberra Street and therefore is likely to increase traffic in Bunberra Street. Option 3 directly aligns with Cambewarra Road and therefore is likely to increase traffic in Cambewarra Road. Irrespective of the planning advantages of aligning a new link road with existing collector roads in the network (accessibility and transport advantages), both Options 2 & 3 have schools and other community facilities located on them so increases in traffic along those roads is a sensitive issue. Because Option 1 does not directly connect with an existing collector road it has greater capacity at the Highway to absorb link road traffic (compared with the other options that have greater conflicts at the Highway) and it is unlikely to influence a greater increase in traffic along existing Bomaderry roads solely as a consequence of the new link road. Accordingly Option 1 is the option least likely to impact an existing school. Regarding the potential for the Princes Highway through Bomaderry to increase to six lanes and traffic signals in future (comment above) the intersection of West Bunberra Street is most likely going to be one of the intersections signalised due to anticipated traffic conflicts and to provide a safe crossing for pedestrians.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The NNLR (option 1) itself will have little influence over the need to signalise other intersections up/down stream of the Narang Road intersection (this is more likely to occur as a consequence of background traffic growth).
		Traffic entering the highway at Narang Rd from the proposed Central Option would become even more congested than Illaroo Road. There is already congestion in this part of the Highway that this road would make worse.	Refer other comments above about the capacity of the Princes Highway to absorb traffic at Narang Road which is far superior to any other option, including the Do Nothing Option (where little to no additional traffic can be absorbed via Illaroo Road within the peak hours). According to the AECOM Paramics modelling results: ▪ Do Nothing / Princes Highway Illaroo Road intersection is LOS F (105.3 seconds average delay) in the AM peak and is LOS F (93.1 seconds average delay) in the PM peak (i.e. unacceptable conditions) ▪ Option 1 / Princes Highway Illaroo Road intersection is LOS F (70.3 seconds average delay) in the AM peak and is LOS F (71.3 seconds average delay) in the PM peak (still LOS F but up to 33% reduction in overall average delay which is considerable) ▪ Option 1 / Princes Highway Narang Road intersection is LOS A (9.1 seconds average delay) in the AM peak and is LOS A (8.5 seconds average delay) in the PM peak (highest level of service achievable based on RMS guidelines) and indicating spare capacity to accommodate higher link road flows. ▪ Option 2 / Princes Highway West Bunberra Street intersection would be LOS C/D (40.3 seconds average delay) in the AM peak and is LOS D (42.8 seconds average delay) in the PM peak (up to 5 times the level of overall average delay compared to Option 1). ▪ Option 3 / Princes Highway / Moss Vale Road / Cambewarra Road intersection would be LOS A (13.9 seconds average delay) in the AM peak however would be LOS E (57.1 seconds average delay) in the PM peak (almost 7 times the level of overall average delay compared to Option 1).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Option 3 is the only option that results in technical failure of the intersection Highway/Moss Vale Road / Cambewarra Road (LOS D or worse), and conditions deteriorate further with Option 3 when modelled in conjunction with the MVRDLK. Additional modelling results comparing the options are also contained in **Appendix B**. It is demonstrated that Option 1 is the option that would lead to best possible conditions along Illaroo Road (maximum diversion of traffic) and along the Highway (maximum diversion of traffic from the critical zone between Bolong Road and Illaroo Road) and Option 1 (Princes Highway/Narang Road intersection) has greatest spare capacity to absorb the link road flows on to the Highway compared to all other options.
		The Central Option will only cause more traffic problems as it is only a short distance from the existing Illaroo Road/Princes Highway connection.	This is addressed in responses provided above. Refer also to the summary of traffic modelling results provided as **Appendix B**. In summary Options 1 & 2 (closest to Illaroo Road / Princes Highway intersection) provide for the greatest diversion of traffic from Illaroo Road and the greatest reduction of traffic from the most critical part of the Highway network (between Bolong and Illaroo Roads) which are the most influential factors in determining the best overall network performance. Because of the extent of congestion on the Highway removal of even small proportions of traffic results in significant improvement in overall average delays (improved flow conditions on the Highway). If the link road options are relocated further to the north however (Option 3 for example) it results in less diversion of traffic from Illaroo Road and from the most critical part of the Highway (between Bolong and Illaroo Roads) and due to the limited spare capacity at the intersection of Princes Highway with Moss Vale Road / Cambewarra Road Option 3 resulted in considerable adverse impacts on the Princes Highway.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The VKT and VHT results were also highest with Central and Southern options (i.e. those closest to the Illaroo Road / Princes Highway intersection) and were lowest for the northern route (which leads to less improvement in overall transport economic and environmental conditions). The central option is also the option with the greatest spare capacity to absorb link road flows and this was the predominant reason why the Central Option attracted the greatest amount of traffic away from Illaroo Road (up to 30%) resulting in considerable network improvements on Illaroo Road and the Highway.
		This option dumps traffic onto a roundabout on the Princes Highway with only 2 directions to turn.	The more conflicts at an existing intersection, the greater the likely impact of connecting the link road to the existing network. It is because Narang Road essentially operates as a Tee junction with minimal additional conflicts other than through traffic on the Highway that it has the greatest spare capacity to absorb link road flows and this was the predominant reason why the Central Option attracted the greatest amount of traffic away from Illaroo Road (up to 30%) resulting in considerable network improvements on Illaroo Road and the Highway. The modelling results are discussed above and presented in **Appendix B**. Option 3 is the only option that leads to failure of an existing intersection (Highway / Moss Vale Road / Cambewarra Road) which does not have the spare capacity to accommodate an Option 3 link road. Option 2 could work but does not result in the best possible conditions along the Highway due to the lower likely levels of service at the Highway intersection (West Bunberra Street). There are certain advantages to Option 2 however in transport planning terms (has the lowest VKT and VHT of all the base link options which is a considerable network advantage, and results in the most amount of traffic being diverted from the critical part of the Highway network between Bolong and Illaroo Roads).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			However Option 2 would also lead to concerns of increased traffic along West Bunberra and Bunberra Streets due to the additional traffic that may be influenced along Bunberra Street by virtue of direct alignment with the Option 2 link road. Because Option 1 does not directly connect to an existing collector road in Bomaderry it is the option least likely to influence adverse conditions on local Bomaderry roads. Illaroo Road only has two directions to turn at the Highway and this doesn't prevent 18,000vpd from using Illaroo Road every day. The Option 1 link road is estimated to carry up to 10,000vpd (maximum with full impacts of the NBSP) and there is less traffic on the Highway at Narang Road compared to on the Highway at Illaroo Road (therefore less conflict). The model did not indicate any adverse conditions as consequence of Option 1 only having two directions to turn at the Highway, in fact Option 1 attracted the most amount of traffic to the link road compared to all other options (as indicated above this is likely due to Narang Road having the greatest spare capacity to absorb a link road of all options considered).
1J	The traffic modelling does not rule out Option 3.	The conclusion that the Northern Option fails to meet project objectives is not substantiated by the AECOM modelling as follows: ▪ Each Link Road option has a similar average travel time along Illaroo Road between 9 to 10 minutes. ▪ "The improvement in Level of Service during the AM peak at the McMahons Road	The traffic modelling does demonstrate Option 3 least meets the objectives of a NNLR. The travel time outputs along Illaroo Road, and the level of service at the McMahons Road roundabout in North Nowra, are not good network indicators of the performance of any option. With the levels of traffic on Illaroo Road; apart from the roundabout at McMahons Road and the traffic signals at Crest Avenue, the 3.5km of Illaroo Road between the Highway and to the west of Cambewarra Road (as covered in the Paramics model) essentially has right of way for through traffic, meaning that reductions or increases in traffic alone do not have a significant impact on the travel times between options.

TAG	Issue Summary	Detailed Issue Description	Issue Response
		intersections with Illaroo Road indicates that Illaroo Road will become less congested with the construction of any of the Link Roads and the flow of traffic will improve from residential roads onto Illaroo Road. "	Similar; with the levels of traffic on Illaroo Road, the modelled reductions or increases in traffic alone between options do not have a significant impact on the roundabout at McMahons Road, and particularly not in the PM peak where the high northbound flows have right of way over traffic entering from McMahons Road. However with the significantly higher volumes of traffic on the Highway the relative differences in traffic diverting makes a significant difference to the delay calculations on the Highway. Accordingly overall network delays (particularly the VHT indicator) is a better indicator of overall network delay response to a given option. Refer also to **Appendix B** that summarises the results of the traffic modelling undertaken and associated key parameters. The modelling indicates that Option 3 cannot be accommodated on the Highway; in fact it is the only option that leads to unacceptable traffic impacts at the intersection Princes Highway / Moss Vale Road / Cambewarra Road. This indicates that substantial works would be required to accommodate Option 3 on the Highway which is not required for Options 1 or 2. No works on the Highway would be required to accommodate Option 1 and only minor works (relative) would be required to accommodate Option 2. The extent of works required to accommodate Option 3 have not been determined because the costs are likely to be prohibitive, and it is likely that the roundabout may have to be replaced with a traffic signals solution which would have adverse impacts to local accessibility (means another roundabout is also likely to have to be provided further north on the Highway if the existing roundabout facility is removed). The benefit-cost ration (BCR) for Option 3 is already very low. Based on RMS guidelines the existing BCR calculated for Option 3 would mean the project is not viable.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			If incorporating the cost of works on the Highway to accommodate Option 3, the BCR for Option 3 would be further reduced. Notwithstanding that the values of VKT and VHT increase the further the option is north, meaning that a substantial investment would be made on the Highway to accommodate Option 3, even though the impacts (benefits) of Option 3 on Illaroo Road and on the key section of Highway (between Illaroo Road and Bolong Road) are substantially less than would otherwise be the case with Options 1 & 2. Refer other comments above about the capacity of the Princes Highway to absorb traffic at Narang Road which is far superior to any other option, including the Do Nothing Option (where little to no additional traffic can be absorbed via Illaroo Road within the peak hours). It is agreed that each NNLR route option will reduce road traffic on Illaroo Road, and will result in similar outcomes in respect of average travel times on Illaroo Road and Level of Service of the McMahons Road / Illaroo Road intersection. However, these two parameters by themselves do not provide for a comprehensive network-wide analysis of the impact of each NNLR route option. The purpose of the model (and the power of the model) is that it can interrogate the performance of the overall network, which is defined by a number of parameters that are outputs of the Paramics model. These network parameters are, *inter alia*: ▪ Vehicle kilometres travelled (VKT) across the network. ▪ Vehicle hours travelled (VHT) across the network. ▪ Average speed across the network. ▪ Output traffic flows which can be interrogated by detailed intersection models (such as SIDRA) for interpreting and comparing impacts / or benefits of respective options.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			▪ Extent of traffic diversion from each option and the detailed analysis of this. By all of these network-wide measures of efficiency: ▪ The VKT and VHT results indicate that the do nothing option is not acceptable in terms of network VHT. This indicates considerable reductions in delay across the broader network can be achieved with link road options 1 and 2, however not with Option 3 which is worse than the Do Nothing option (Option 3 has highest VHT). ▪ Option 2 results in lowest values of VKT and VHT, closely followed by Option 1 (best performing options). ▪ Option 3 results in the highest values of VKT and VHT, and therefore is least capable of all options in complying with the State Government Integrated land use and transport objectives of minimising network values of VKT and VHT. ▪ Option 2 results in the lowest values of VKT and VHT, it therefore has the least indirect social, economic, and environmental impacts of all of the options (lowest overall network delays, lowest overall network operating costs, and lowest overall emissions) of all of the options modelled, closely followed by Option1 ▪ Because Option 3 results in the highest values of VKT and VHT, it therefore has the greatest indirect social, economic, and environmental impacts of all of the options (highest overall network delays, highest overall network operating costs, and highest overall emissions) of all of the options modelled. ▪ This means whilst there may be some localised environmental impacts addressed by constructing Option 3 instead of Options 1 or 2; the overall social economic and environmental impacts (greater emission levels) are highest with Option 3. Further, in regards to the summary of traffic diversion outputs from the modelling contained in **Appendix B** key assessment findings are: ▪ In both the AECOM and TRACKS analysis Option 1 results in highest diversions of traffic, this is because the Narang Road roundabout has greater capacity to absorb

TAG	Issue Summary	Detailed Issue Description	Issue Response
			the additional traffic on to the Highway compared with the proposed traffic signals at Option 2 and the Moss Vale Road/Cambewarra Road roundabout at Option 3. ▪ Option 3 diverts the least amount of traffic (up to 19% less than Option 1 based on the AECOM Paramics analysis, and up to 34% less than Option 1 based on the TRACKS analysis). This is a significant difference. ▪ The Narang Road roundabout is only 3 leg roundabout with no other side road conflicts (only conflicts with through traffic on the Highway). ▪ The Moss Vale Road / Cambewarra Road roundabout is a 4 leg roundabout with considerable additional conflicts (conflicts with existing Moss Vale Road and Cambewarra Road traffic in addition to through traffic on the Highway). This means the Moss Vale Road / Cambewarra Road roundabout has less capacity to absorb the additional link road flows. ▪ Option 3 resulted in lowest diversions of traffic in both models due to the additional distance from Illaroo Road and inadequate capacity of the Moss Vale Road / Cambewarra Road roundabout to absorb the additional flows. ▪ Reductions in delay are not proportional to reduction in traffic – in constrained congested network very high reductions in delay can result from small reductions in traffic (reductions in delay at key intersections is presented above for Princes Highway/Illaroo Road, Princes Highway/Bolong Road, and Princes Highway Moss Vale/Cambewarra Road). Whilst some may perceive the lower relative diversion to Option 3 insignificant, because of the level of congestion on Illaroo Road and the Highway the delay results are very considerable, and the adverse impacts of Option 3 on the Princes Highway Moss Vale/Cambewarra Road intersection cannot be ignored. ▪ To the contrary, Option 1, which results in the greatest diversion of traffic from Illaroo Road, has capacity to absorb the link road at the Highway/Narang Road roundabout within acceptable limits (this intersection has the most spare capacity

TAG	Issue Summary	Detailed Issue Description	Issue Response
			to absorb the link road flows of all options). ▪ The TRACKS analysis indicates greater levels of diversion as the network becomes more congested (2006 through to 2036), at 2036 (daily model) similar levels of diversion are observed in the TRACKS model compared with the AECOM Paramics model. This indicates the problems associated with Illaroo Road intersection with the Highway and reflects the increasing importance of providing a link road over time (particularly Option 1 would provide the most significant difference to Illaroo Road and the Princes Highway). While each NNLR route option provides benefits to safety and amenity on Illaroo Road relative to each option, Option 1 does so in the most cost effective and efficient way, whereas Option 3 returns network wide parameters that are either marginally beneficial or negative, and is the only option that results in unacceptable conditions at the Highway / Moss Vale Road / Cambewarra Road. Given the outcomes of the modelling, and with consideration of the project objectives: ▪ Option 3 provides the lowest benefit to the level of service of the Illaroo Road / Princes Highway intersection. ▪ Option 3 provides the lowest benefit in regards to safety and environmental conditions on Illaroo Road. ▪ Option 3 has the lowest benefit in providing for access between North Nowra and Bomaderry in a way that satisfies the NBSP growth expectations. ▪ Option 3 should not be considered due to the adverse impacts on the Highway ▪ Option 3 should not be considered due to the higher overall environmental impacts (higher emissions) which is not consistent with the State Governments objectives to minimise VKT and VHT (Option 3 has the highest VKT and VHT of all base options modelled).

TAG	Issue Summary	Detailed Issue Description	Issue Response
1K	The Northern Option provides a better connection to the local and regional road network.	The northern option provides better access to Kangaroo Valley, Bomaderry, Hume Highway, Wollongong, Sydney as well as access north and south on the Princes Highway. The Central and Southern Options only provide highway access. This option better directs traffic to a major destination such as Kangaroo Valley, Bomaderry railway station, basketball stadium and sports fields. It will give traffic from North Nowra the choice of turning four directions.	Whilst it is accepted that the northern option (compared to Options 1 & 2) may provide a closer geographic link to Moss Vale Road for vehicles with destinations to/from Kangaroo Valley, this is not a project objective and is not a major determinant of road infrastructure planning (because of the very low relative number of traffic movements involved). Considering the adverse impacts of Option 3 (it is the poorest performing of all route options, and the only option that results in adverse impacts at the Highway/Moss Vale Road/Cambewarra Road intersection) providing new road access to Kangaroo Valley as a planning objective is not justified when based on a very low number of movements (relative) and when such an option would have least improvement to Illaroo Road and greatest impacts at the Highway/Moss Vale Road intersection. It is further noted that when ultimately constructed the MVRDLK itself will provide the most efficient travel between North Nowra and Kangaroo Valley (an indirect benefit of the MVRDLK which is required to accommodate growth of the Moss Vale Road South sector and to mitigate the adverse impacts of the Moss Vale Road South sector growth area on the State road network). Once the MVRDLK is ultimately provided, the link road Option 3 would not be utilised by those vehicles wishing to travel to/from Kangaroo Valley. Similar to Option 2, Option 3 is also likely to lead to increased traffic on existing Bomaderry streets due to the direct connection of the link road to Cambewarra Road (Option 3) and Bunberra Street (Option 2). Accordingly for all of the other suggested destinations (for example the train station, basketball stadium and sports fields etc.) Option 1 provides for alternative access to these areas (in addition to Illaroo Road) in manner that has least impact on the Highway and existing Bomaderry Streets, and which provides for optimum benefit to Illaroo Road and significant benefit to the critical section of the Highway between Bolong and Illaroo Roads (compared to Option 3).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Refer to other comments above about connections at the Highway. The Princes Highway/Narang Road intersection has a superior capacity to absorb link road flows because that location does not have the additional traffic conflicts prevalent with options 2 & 3 (because they are 4-legged intersections), and this is one of the reasons why Option 1 attracts more traffic than the other options. Option 3 will result in significant impacts on the level of service of the Moss Vale Road / Princes Highway intersection. It is because of these adverse impacts that the RMS does not support Option 3. As described in other responses Option 3 results in the least efficient operation of the whole road traffic network and so whatever benefits it delivers for particular journeys, it is at the expense of inefficiency and cost in-effectiveness across the network.
1L	Option 3 will impact heavily on existing road network.	The proposed intersection of Option 3 at Moss Vale Road would involve a roundabout which is close to the existing roundabout on the Princess Highway. This new roundabout will impact the already congested roundabout during peak times. Option 3 will introduce a new intersection with West Cambewarra Road which is undesirable from a traffic perspective.	The traffic modelling demonstrates that Option 3 will result in unacceptable traffic impacts and least benefit to the broader network however the reasons stated for the objector's position are not agreed. There is some 290m between Elvin Drive and the Princes Highway so the spacing between these intersections is an acceptable distance for a developing urban road network. The spacing between these intersections is not the reason why Option 3 led to failure at the Highway intersection. Further Option 3 will not create a new intersection on Moss Vale Road, it is suggested (for Option 3) that the existing intersection of Moss Vale Road and Elvin Drive could be upgraded to a roundabout to accommodate a northern option. This in itself does not contribute to failure or any undesirable localised impacts at Moss Vale Road (however the more remote northern location and the associated impacts at the Highway are the factors that would contribute to an underutilisation of the northern route and unacceptable traffic impacts at the Highway/ Moss Vale Road/ Cambewarra Road intersection).
Benefit/Cost Analysis Issues			

TAG	Issue Summary	Detailed Issue Description	Issue Response
1M	The BCA is flawed and there are significant doubts regarding the comparative costings for the routes – in particular in regards to the construction of Options 1 and 2.	Common sense would suggest that the Central and Southern options involving major bridges and approaches over the Gorge (with major construction requiring heavy machinery to place the spans) would be the most expensive. Yet the Central route is estimated to be the least expensive. The Northern route road and bridge do not seem to require the same heavy engineering as the other routes, so the higher estimated costs for this route seem questionable. Option 3 should be the most economically viable. The cost of building a tall bridge over Bomaderry Creek, with difficult access, including moving power lines, re-locating a large water supply pipeline, plus exit/entry provision for Narang Road businesses, tennis courts & the picnic area must exceed the cost of a small bridge with easy access on the West Cambewarra Rd option.	The BCR calculations were very comprehensive, and included sensitivity of cost estimates to see the relative impacts of cost variations on the BCR values, which provides invaluable information. The fact is that economic viability is not just about costs. It is about transport economic benefits in relation to costs outlaid, and the modelling has clearly indicated that Option 3 has least benefit to Illaroo Road and the critical section of the Highway (between Bolong and Illaroo Roads) and is the only option that results in unacceptable impacts at the Highway/Moss Vale Road/Cambewarra Road intersection. This had the most impact on the BCR calculations, not the costs which in the analysis were very fairly weighted towards Option 3 (refer details below) and despite this Option 3 still came out with very poor BCR because of the least benefits to the network and adverse impacts at the Highway/Moss Vale Road/Cambewarra Road intersection. The assumptions that were used in generating cost estimates for each route option are set out in Section 7 of the EAR. In general, cost estimates account for: ▪ New road construction, including bridges over Bomaderry Creek. ▪ Allowances for property acquisition. ▪ Allowances for utility relocations. ▪ Allowances for clearing. ▪ Allowances for predicted noise treatments, including noise berms and/or noise walls. In terms of these key factors, Option 2 is clearly the most expensive route option with: ▪ The highest road construction rate per kilometre due to the geology along the

TAG	Issue Summary	Detailed Issue Description	Issue Response
			route. ▪ It has the largest and most complex bridge structure. ▪ It is the longest route option. ▪ It has the highest property acquisition costs. In terms of the comparative costing between Option 1 and Option 3: ▪ The cost estimate of road construction rate per kilometre is the same for Option 1 and Option 3. Although Option 3 was originally identified as a shorter route, refinement of the route options to accommodate noise mitigation measures, as well as the benefit of existing road infrastructure at Option 1, mean that Option 1 has a marginally lower new link road construction length of 1,780m (and therefore marginally lower cost estimate) compared to Option 3 (1,800 m), for the road construction component. ▪ Reconstruction of the Narang Road / Princes Highway intersection would not be required as the roundabout has been designed for the development of a NNLR at this location. ▪ Option 3 is expected to be a less expensive bridge construction cost than Option 1, due to the lower height of the bridge, although the differences are not that considerable due to the need to address flood issues at Option 3 (because the crossing at Option 3 is more of a shallow creek than a gorge the impacts of the bridge construction on flooding is more considerable). ▪ Cost estimates for clearing of vegetation are 67% higher for Option 3 than for Option 1 (Option 3 results in the greatest clearing of native bushland, although this is not a significant overall cost factor). ▪ Option1 has no land acquisition whereas Option 3 includes land acquisition (sale yards) for alignment to Elvin Drive ▪ Option1 has no intersection costs on the Highway whereas Option 3 includes a

TAG	Issue Summary	Detailed Issue Description	Issue Response
			roundabout at the Moss Vale Road / Elvin Drive intersection, which (because on the State Road network) will be very expensive. It is important to understand that to make the assessment as fair as possible for Option 3, there has been no costs included in the analysis to date for Option 3 associated with any upgrading of Moss Vale Road (between Elvin Drive and the Highway) nor on the Princes Highway itself. Because of the adverse impacts of Option 3 on the Highway, it is likely that if Option 3 were approved for it to be constructed the RMS (who manage Moss Vale Road and the Princes Highway as part of the State road network) will require very considerable works on Moss Vale Road and the Princes Highway to accommodate Option 3. RMS don't support Option 3, nor do Council, because it provides the least benefits to the network and results in adverse impacts at the Highway/Moss Vale Road/Cambewarra Road intersection (compared to Options 1 & 2). The actual package of works on the Highway that may be required to accommodate the Option 3 haven't been defined, although they likely to be very considerable. As such it would have been unfair to have included those additional costs in the economic analysis when detailed scope of work was not known, however the BCR for Option 3 is already very poor, and Council believes that due to the adverse impacts modelled (Option 3) the cost of undertaking works on Moss Vale Road and Princes Highway (if included) is likely to lead to Option 3 having significantly lower BCR (it is likely that the costs of Option 3, when including the required works on the State Road network) would be even more expensive than Option 2. Option 3 is not supported by Council or RMS when Options 1 & 2 have greater network benefits, can be absorbed on the Highway with less impacts, and are all likely to be less cost than Option 3 (when taking into consideration the likely package of works on the State Road network to offset the adverse impacts of Option 3).

TAG	Issue Summary	Detailed Issue Description	Issue Response
			It is highlighted that these most current cost estimates have been modified from the cost estimates used by AECOM in the benefit-cost analysis. The latest cost estimates are more accurate than what was used by AECOM because of the following inputs: ▪ A newer more accurate survey was completed. ▪ Vegetation clearing was included. ▪ More accurate flood impact assessment data, which resulted in a longer bridge for Option 3 (as noted above to address flooding impacts) ▪ More accurate cost estimates for calculation of property acquisition and noise mitigation. Taking account of contingencies (at 40%), the difference in cost between Option 1 and Option 3 is very low (less than 10% of overall costs). The cost factors in constructing the NNLR are therefore not a significant differentiator in the comparison between Option 1 and Option 3, although as noted above if the costs of upgrading the State Road network to accommodate Option 3 had been included Option 3 costs would have been significantly higher and would be likely to exceed the costs of Option 2. What has had the greatest impact on the economic analysis (BCR calculations) is the fact that the traffic modelling has shown that Option 3 has the least benefits to the network and most adverse impacts at the Highway/Moss Vale Road/Cambewarra Road intersection (compared to Options 1 & 2).
		Independent costing is needed to verify these cost estimates. There seems to be much greater potential for cost overruns with the Central and Southern Options.	Refer comments above. The greatest potential for cost over runs (compared with the original estimates) is Option 3 due to the fact that the Option 3 costs to date have not included the costs to upgrade the State Road network (Moss Vale Road and Princes Highway) to

TAG	Issue Summary	Detailed Issue Description	Issue Response
			address the unacceptable traffic impacts associated with Option 3 and these costs are likely to be very significant (likely to lead to Option 3 costs being greater than Option 2 costs). The cost estimates account for potential cost overruns in the following way: ▪ The estimated cost rate for bridge construction was increased for higher bridges to account for the increased level of difficulty and complexity in construction. ▪ The inclusion of a 40% contingency. If this is compounded on a higher underlying construction rate then the total level of contingency is increased. In terms of the bridge construction cost rates, the rates used for the calculations in the AECOM Report are \$1,750/m^2 for Option 1, \$1,850/m^2 for Option 2 and 1,650/m^2 for Option 3, creating a clear distinction between Option 3 as the lowest bridge and the lowest rate of construction and Option 2 and the highest bridge and the highest rate of construction. A more accurate estimate of bridge construction rates is provided in Appendix D of the EAR by Jim Alexander Bridge Design, which shows that, based on the proposed construction methodology and more contemporaneous information, the cost rate for bridge construction has approximately doubled, although the difference between Option 1 and Option 3 has narrowed. While this would result in bridge construction costs of approximately 100% (i.e. doubling), the overall amount of increase for Option 1 and Option 3 (\$1.6M-\$1.8M) is within the contingencies provided for by AECOM (40% default contingencies used which is typical value adopted at concept planning stage and sensitivity analysis undertaken using 10% low contingency test, and 50% high contingency test). As such the findings and outcomes of the AECOM Report would not change as a result of these refinements. Option 2 would result in an increased bridge construction cost of approximately \$3.7M which, while significantly larger than for Option 1 and Option 3, is still within the contingencies provided for by AECOM.

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			Taking account of contingencies (at 40%), the difference in cost between Option 1 and Option 3 is very low (less than 10% of overall costs). The cost factors in constructing the NNLR are therefore not a significant differentiator in the comparison between Option 1 and Option 3. Cost variations are possible for all options and this is why sensitivity analysis was included with the BCR calculations. However as explained above the only Option that is likely to increase costs beyond the range of sensitivity analysis is Option 3 (if State road network upgrade costs are included for Option 3 this could increase Option 3 costs higher than Option 2), and Option 3 is already the poorest performing option, therefore this is likely to further reduce the BCR for Option 3. It is highlighted that Council only seeks concept approval at this stage, and has not developed a detailed design. It would be pointless to put more resources into cost estimates until a detailed design has been undertaken, and apart from Option 3 the sensitivity analysis included with the BCR calculations by AECOM is sufficient to address most cost variations possible.
		The BCA does not include an economic value for the bushland biodiversity that is degraded and put at risk by the Central Option. There is also the potential loss of tourist revenue. Not enough weight has been given to the economic and social values of the natural bushland. The value of the park has not been recognised to the community. No price has been	Council consider the economic analysis was comprehensive and appropriate, included values that could be measured, and was undertaken in accordance with RMS guidelines. To consider the economic value of bushland, a value has to be agreed relative to the other values (other criteria) in the model, which is very difficult due to the subjective nature of placing a monetary value on something that has no real monetary value, and secondly this would also be applied to the other Options. The EAR demonstrates that Option 1 results in the least amount of natural vegetation removal and Option 3 results in the greatest amount of natural vegetation removal. Accordingly, if a cost was put on quantum direct impacts of

TAG	Issue Summary	Detailed Issue Description	Issue Response
		put on the value of losing such a valuable piece of habitat and recreational community resource.	natural vegetation Option 1 would be favoured over Option 3. In regards to social and tourist values, it is also a fact that some people may view Option 1 as actually providing improved access to the Park, particularly if in conjunction with Option 1 works included bush track access and car park access improvements, viewing platforms and improved amenities. The same opportunities could not be provided with Options 2 and 3. The AECOM Report provides an analysis of environmental externalities by considering the impacts of noise, air pollution, water pollution, greenhouse gas emissions and natural landscape affects using the factors provided in the RMS's Economic Analysis Manual. These environmental externalities are based on vehicle kilometres travelled (VKTs), and relative to the level of net road user benefits they work out to be low in monetary terms. Notwithstanding this, it is acknowledged that the AECOM economic model does not fully account for the potential impact on the natural environment, including the intrinsic value of the bushland, and the value it provides as a scientific, educational, and recreational resource. As noted above, putting a cost on the impacts to the Bomaderry Creek Regional Park is extremely subjective. That is, some may see the Central Option as impacting the Park, others may see that the Central Option actually provides improved access to the Park and presents other opportunities to improve the parks facilities. The purpose of the benefit-cost analysis prepared by AECOM is to establish the viability of each of the NNLR route options in terms of the likely construction costs, and the resultant effects on the traffic network. This project is designed solely around improving the local road traffic network with consideration of the likely changes to that network. The purpose of this approach is to guide Council in its decision making with respect to the spending of Council funds which are supported by rate payments, such that decisions are made which result in

TAG	Issue Summary	Detailed Issue Description	Issue Response
			maximum benefits to the community constituents / rate-payers. In that context, it is inappropriate for Council to consider spending money on projects which will return a net negative benefit to the community constituents / rate-payers. The purpose of the BCA is therefore to establish the financial viability of the local road project, using standard practices and methodologies set out in the RMS's Economic Analysis Manual. It is highlighted that the purpose of the project is to improve the local road traffic network, and so it is only correct for the analysis of the road traffic network to focus on road traffic network impacts and benefits – rather than less tangible subjective non-road traffic related aspects whereas the cost parameters in the RMS's economic analysis manual are factual measured parameters and represent best practice for evaluating the benefits in relation to costs of road construction projects. On the other hand, it is the explicit purpose of the environmental impact assessment process to consider less tangible environmental issues. In particular to establish whether there are likely to be significant environmental impacts from a project, and what mitigation or management measures need to be put in place to ensure any predicted environmental impacts are reduced to an acceptable level. It is therefore considered to be normal process for these issues to be addressed by way of environmental impact assessment, rather than to attempt to incorporate these aspects into a focussed economic appraisal which has a specific set of objectives, in terms of assessing the viability of the project in traffic management and net road user benefits. It is also important to note Option 3 results in the highest values of VKT and VHT, and therefore has the greatest indirect social, economic, and environmental impacts of all of the options (highest overall network delays, highest overall network operating costs, and highest overall emissions) of all of the options modelled.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			That said the economic analysis has not placed additional costs on the environmental impacts of Option 3, the impacts have been calculated as monetary values through the calculated transport benefits (or dis-benefits) of each option (comparison of overall network delays and operational costs). As such it is not logical to attempt to place an environmental cost on the direct environmental impacts on the bushland (as part of the traffic/transport BCR assessment) and not place a cost on the broader indirect environmental consequences of options that result in highest VKT and VHT (which, as consequence of the very high VHT and VKT values associated with Option 3) are not likely to result in a favourable outcome for Option 3. It is reiterated that normal process is for these issues to be addressed by way of environmental impact assessment. The biodiversity impacts of the bushland are dealt with in detail in Section 13 and Appendix F of the EAR, and have been further considered in this Response to Submissions Report. The social, recreational and touristic values of the Bomaderry Creek Regional Park and surrounding bushland have been further considered in this Response to Submissions Report (see **Section 5**).
1N	The Southern Route is not viable	This option is unlikely to be considered due to the creek crossing and landscape making a new road by this route would be very time consuming. The southern route appears to have the largest cost (30% higher cost) with buy backs off the residents, the highest cost with the bridge crossing over the Bomaderry Creek and it will	The EAR demonstrates there are a number of advantages and disadvantages associated with Option 2. One of the main reasons Option 2 was considered as a part of the Concept Plan application was predominantly due to previous OEH position that they would not support an Option that severed the BCRP but they would be more favourable to an option that only impacts the edges of the Park. Accordingly the Concept Plan area included the Central Option (Council's preferred) but also northern and southern options (the options that impact the fringe edges of the Park).

TAG	Issue Summary	Detailed Issue Description	Issue Response
		only move slightly more vehicles than the central route.	Based on the TRACKS and AECOM Paramics traffic modelling; Option 2 was the Option that removed the most amount of traffic from the most critical section of highway (between Bolong Road and Illaroo Road) and this resulted in significant improvement to the Highway (reductions in delay even greater than was observed with Option 1) - refer to the summary of modelling results presented at the bottom of this report. Option 2 also had the lowest VHT and VKT of all options, which is significant in terms of the State Governments environmental objectives (greater transport efficiency and lower overall emissions). However Option 2 requires new traffic signals on the Highway at West Bunberra Street which leads to higher overall delays on the Highway at that location (not as much spare capacity to absorb link road traffic compared with the roundabout at Narang Road for Option 1), however the delay results with option 2 were still within acceptable RMS limits. Option 2 (by directly aligning with Bunberra Street) would also lead to increased traffic on Bunberra Street which may be seen as an adverse impact by residents and the school community, although in fact the actual modelled increases were not that much greater than would otherwise be the case without the link road (due to background traffic growth along Bunberra Street). RMS also raised concerns about the proposed traffic signals on the Highway, however as explained above as consequence of the NBSP it is likely the whole Highway through Bomaderry will need to be upgraded to six lanes and traffic signals to accommodate the predicted volumes of traffic, and the intersection of West Bunberra Street and the Highway will need traffic signals in Council's view in any event to manage traffic and pedestrian conflicts. That is the link road Option 2 would only bring forward the need for the signals. However Option 1 is Council's preferred Option as it represents best value for

TAG	Issue Summary	Detailed Issue Description	Issue Response
			money (in transport economic terms), results in the greatest shift of traffic from Illaroo Road and achieves the project objectives with least impact on the Highway and least impact to existing Bomaderry Streets. If Option 1 is not successful, the TRACKS and AECOM work indicate that Option 2 would achieve the project objectives, however Council would have to consider the land acquisitions required as consequence of Option 2 and that Option 2 would cost significantly greater amount to construct (cost was the main reason why Option 2 had lower BCR compared with Option 1).
10	Option 3 is not viable	The northern route is the least viable because: ▪ Of the higher capital and ongoing maintenance and transport costs. ▪ It will not move sufficient traffic and will deliver the least benefits for the cost involved. ▪ It substantial clearing of bushland along the southern side of the existing West Cambewarra Road. ▪ It will not reduce traffic substantially enough through Illaroo Road to have any benefit.	The EAR demonstrates Option 3 is the least able to meet the objects of the NNLR.

The input provided as a response to biodiversity and ecological issues raised in submissions have been provided by Ecological Australia.

Table 2 – Ecology and Biodiversity Issues Summary and Responses

TAG	Issue Summary	Detailed Issue Description	Issue Response
2. Biodiversity			
General Biodiversity Issues			
2A	Threatened Species assessments are not consistent with the guidelines. Threatened Species assessment guidelines, The Assessment of Significance and under-estimate the impacts to species.	Threatened Species assessments are not consistent with the Threatened Species assessment guidelines, The Assessment of Significance and so not consistent with the DGRs. These concerns arise from several issues, including incomplete and absent Threatened Species surveys, incorrect statements and failure to address cumulative local impacts rather than regional impacts. Survey work for several Threatened Species and specific for these proposals were not completed or reported in the EA at the time of the release of the EIA for public comment. These include: Giant Burrowing Frog, Spotted-tailed Quoll, Grey-headed Flying Fox, and Eastern Pygmy Possum. No targeted surveys were conducted for the Broad-headed Snake and Brittle Midge Orchid. In the case of the Broad-headed snake, targeted surveys were not undertaken because of an	The Draft Guidelines for Threatened Species Assessment (Department of Environment and Conservation and Department of Primary Industries July 1995) identifies important factors and/or heads of consideration that must be considered by proponents and consultants when assessing potential impacts on threatened species, populations, or ecological communities, or their habitats for development applications assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. The threatened species assessment undertaken by Eco Logical Australia Pty Ltd (ELA) contained within the Flora and Fauna Assessment Report (FFA) (Appendix F of the EAR) on behalf of Council was consistent with the Part 3A Draft Guidelines for Threatened Species Assessment in that: ▪ The six (6) guiding principles for threatened species assessment identified in the draft assessment guidelines were considered in the report; ▪ Nineteen (19) threatened species and one (1) Endangered ecological community were identified as occurring or likely to occur within the study area; ▪ Project impacts were assessed against these entities in accordance with the six (6) factors for consideration in Appendix 3 of the guidelines; ▪ A range of mitigation measures and offsets were recommended to avoid or minimise direct and indirect impacts on threatened species; and ▪ The approach followed the five (5) Steps identified in the assessment guidelines The Director General's Environmental Assessment Requirements (DGRs) for

TAG	Issue Summary	Detailed Issue Description	Issue Response
		assumption that no suitable habitat was present in the area. This is not the case. Habitat is considered to be located in the Park and the Bushland. In the case of the Brittle Midge Orchid, it seems that data from other surveys has been incorrectly applied in the maps provided and no surveys specific for this study were carried out. Yet surveys conducted by others shows that specimens of the Brittle Midge Orchid are present on the route of the power line easement affected by the Central route. Therefore this route would directly impact on this threatened species. Another serious omission from the EA is an assessment of the Eastern Pygmy Possum, which is understood to have been identified recently in the Bushland. There are questions also about the approach taken to Threatened Species Impact Assessment. The guidelines advise that the factors to be taken into consideration should focus particularly on impacts at the local, rather than the regional	Biodiversity for the Concept approval are: ▪ The Environmental Assessment must include a detailed flora and fauna impact assessment in accordance with the DEC's Guidelines for Threatened Species Assessment (draft). This assessment must clearly identify and consider any direct and indirect impacts on critical habitats, threatened species, populations or ecological communities listed under both State and Commonwealth legislation recorded along the nominated routes and surrounding area, such as *Zieria baeuerlenii* and *Eucalyptus langleyi*; ▪ The Environmental Assessment must also consider the potential impacts of the route options on the conservation values and integrity of the Bomaderry Creek Regional Park, particularly as a result of fragmentation impacts and edge effects; and ▪ Measures to avoid or mitigate impacts associated with the option(s) must be identified with an assessment of the feasibility, effectiveness and reliability of these proposed measures. At the time of the assessment, it was determined that a comprehensive and systematic survey and assessment was not required to inform the Concept alignment approval stage and that comprehensive assessments would be undertaken as part of the approval of details stage. This understanding was based on the adaptive approach to survey and assessment deemed to be consistent with the planning and assessment framework provided under (the now repealed) Part 3A of the EP&A Act. Staged assessments are designed to incrementally develop and further the existing store of species and scientific knowledge gathered during previous studies over time so that specific and detailed mitigation measures and offsets can ultimately be developed and refined prior to the approval of details. This approach is designed to achieve an overall net biodiversity benefit as required under Part 3A of the EPA Act. The scope for the flora and fauna assessment was required to consider biodiversity values and potential project impacts and effective mitigation measures for the three route options (instead of the central and preferred option only). As such

TAG	Issue Summary	Detailed Issue Description	Issue Response
		environment. This shift in emphasis to local impacts was because the long term loss of biodiversity at all levels arises mainly from the accumulation of losses and depletions of populations at a local level. The emphasis in this EA is on regional rather than local impacts resulting in a failure to properly assess the significance of the impacts on the local populations of these Threatened species. The assessments focus on individual specimen and so fail to address the implications of the impact on each of the relevant species' habitat. Every Environmental Assessment prepared for public display should comply with the Director-General Requirements. For example, the DEC guidelines for threatened species assessment were not complied with as far as the following species are concerned: Giant Burrowing Frog, Spotted-tailed Quoll, Grey headed Flying Fox and Eastern Pygmy Possum. In fact the Eastern Pygmy Possum has now been found in the Bushland and yet this very important discovery of another threatened species has not been acknowledged	ELA has determined that the level of survey and assessment is adequate for the purposes of Concept approval. In addressing the DGRs the FFA report considered: ▪ flora and fauna impact assessment in accordance with the Draft Guidelines for Threatened Species Assessment in the following sections of the Flora and Fauna Assessment: 2.2, 4.1-4.2, 6.1.1 and 6.1.2 including *Zieria baeuerlenii* and *Eucalyptus langleyi*; ▪ the potential impacts of the route options on the conservation values and integrity of the BCRP, particularly as a result of fragmentation impacts and edge effects in the following sections of the report 6.1.4 and 7.1 and 7.2 ▪ Mitigation and avoidance measures are identified and considered in section 6.1-6.4 in the context of their effectiveness and relevance to each route option Nevertheless the weight of public and regulatory stakeholder submissions in favour of the adoption of the 'precautionary principle' underlines the perception/expectation that the flora and fauna assessment report could have more fully considered the principles of ecologically sustainable development (ESD) as part of the Concept alignment approval process. ESD is described in s 6(2) of the *Protection of the Environment Administration Act 1991* and includes the 'precautionary principle'. The precautionary principle states that decision-makers should make an assessment of the risk-weighted consequences of any action before deciding to proceed with the action. The application of this principle is achievable under the planned staged assessment process. The public submissions have been summarised according to key themes and are systematically addressed in this response table. Where issues cannot be currently resolved due to a lack of information or scientific certainty, we advocate additional assessment as part of the Approval of details stage and in accordance with the NSW statutory planning and approval provisions. This approach involves adoption of recommended actions through twenty three (23)

TAG	Issue Summary	Detailed Issue Description	Issue Response
		in the assessment. The location of the Brittle Midge Orchid (*Genoplesium baueri*) was incorrectly mapped and resulted in a failure to realise that it occurs on the central route. Thus there has been no assessment provided for this species. There have been no targeted surveys for the Broad headed Snake based on the incorrect assertion that there is no suitable habitat for this species. The DoPI should demand that all of this unfinished work be finalised and then resubmit a completed job for further community comment. Impacts to the Lowland Rainforest EC are unclear for each option. Better mapping of the Lowland Rainforest EEC needs to be provided. No specific mitigation measures have been provided for the EEC. Further surveys are required to determine if vegetation includes breeding sites for the Glossy Black-cockatoo, Gang-gang Cockatoo, Masked Owl, Sooty and Powerful Owls. The surveys will also need to determine whether the loss of breeding habitat can be offset.	statements of commitment during the approval of details stage to address the issues raised. As indicated in 2.1 and 4.2.9 of the FFA additional targeted surveys were recommended for Giant Burrowing Frog and Eastern Pygmy-possum and these were undertaken in January, March and May 2011. Targeted surveys were also undertaken for Spotted-tailed Quoll during March 2011 and a more rigorous desktop review of information (consultation) regarding the significance of the Bomaderry Creek area for Grey-headed Flying-fox was also undertaken. These additions were not undertaken in time for inclusion in the version of the FFA supplied for public comment. As the findings are relevant to the consultant's response to relevant issues, the reports are provided in **Appendix C**. <u>Giant Burrowing Frog</u> In 1992 GBF was tentatively identified from the Bomaderry Creek locality by an ecological consultant with considerable herpetological experience. The record relates to a single call. No supporting voucher specimens, photographs, or sound recordings were made to verify the record, hence tentative identification. Despite targeted searches the species has not been detected in the last nineteen years. This species is particularly difficult to find, even in preferred habitat and can be easily overlooked (NSW NPWS). The 2011 ELA survey was led by an experienced terrestrial ecologist with direct experience surveying for GBF, and is provided in **Appendix C**. Methods included: call playback, spotlighting, tadpole searches and night driving surveys. These methods are consistent with the State and Commonwealth regulatory guidelines and therefore are in accordance with the DGRs. No GBF were detected during the surveys which builds on the data from past studies that the species is either absent or occurs at such a low level of abundance that detection is likely to require extended surveys which was beyond the requirements for Concept approval. Given that there remains limited potential for GBF to occur in the study area

TAG	Issue Summary	Detailed Issue Description	Issue Response
			based on habitat presence and the tentative 1992 record and that if present a population may warrant consideration for eligibility listing as an endangered population by the NSW Threatened Species Scientific Committee, a commitment has been recommended to be undertaken during the approval of details stage. Further targeted surveys during approval of details using a range of techniques during optimal conditions by experienced ecologists will be undertaken to detect or further reduce the likelihood of present day occurrence. In the event that GBF is detected during approval of details surveys a shift away from the proposed emphasis on impact mitigation along Bomaderry Creek is required to ensure future management relates to north south habitat connectivity under the proposed Central Option. Culverts and tunnels would be considered, as would frog fencing, to provide mitigation against vehicle strike and improve the efficacy of crossing underpass structures. <u>Eastern Pygmy-possum</u> The 2011 survey was led by an experienced ELA terrestrial ecologist with direct experience surveying for EPP. 25 Elliott A-type aluminium box traps at three sites over 4 nights or 300 trap-nights and two pit traps at each of the option sites over 4 nights or 24-trap nights. This sampling effort is within the recommended DEC guidelines and therefore consistent with the DGRs. One (1) EPP was detected in a pit fall trap and recaptured. EPP has now been confirmed in the north (AH Ecology 2010) and south of the study area and as suitable habitat exists more broadly it is likely that the species is also distributed more widely. In accordance with guidelines extensive surveys would be required to establish population size and distribution within the locality so that the assessment of significance can be updated and suitable detailed mitigation measures identified. Further targeted surveys are proposed throughout the study area at the recommended level of effort and by experienced field ecologists during the approval of details phase. A range of recommended detection methods is

TAG	Issue Summary	Detailed Issue Description	Issue Response
			proposed including: ▪ Arboreal camera traps and bait stations; ▪ Arboreal and terrestrial Elliot traps; ▪ Pitfall traps; and ▪ Spotlighting. Specific quantitative and effective mitigation measures will be applied using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for EPP under the proposal. EPP are susceptible to habitat fragmentation and vehicle strike and a suite of proven measures will be applied to promote habitat connectivity and reduce the risk of vehicle strike. <u>Spotted-tailed Quoll</u> The 2011 survey was led by an experienced ELA terrestrial ecologist with direct experience surveying for STQ. Four remote cameras over 20 nights or 80 trap nights were used to target Spotted-tailed Quoll which is consistent with the regulatory guidelines and the DGRs. No STQs were detected. Further targeted surveys are proposed throughout the study area during the approval of details phase at the level of effort recommended in the relevant State and Commonwealth survey guidelines by experienced field ecologists and using a range of accepted detection methods including: ▪ Camera traps and bait stations ▪ Cage traps and ▪ Hair tubes Should STQs be detected during approval of details then specific quantitative and

TAG	Issue Summary	Detailed Issue Description	Issue Response
			effective mitigation measures will be applied using the hierarchy of avoid, minimise, mitigate and offset to ensure a maintain or improve biodiversity outcome is achieved for STQ under the proposal. STQ are susceptible to vehicle strike due to their wide ranging movements. In the event of detection within the study area specific measures would be proposed to promote connectivity across the landscape and reduce the likelihood of road mortality. Measures are likely to include fauna fencing in conjunction with underpasses such as culverts and or 1.5m furnished fauna tunnels where constructability permits <u>Grey-headed Flying-fox</u> Information provided by various sources confirmed the significance of Bomaderry Creek for the species particularly between September and May when a maternity camp has been established for 5 of the last 8 years. Around 4.7 hectares is utilised by between five (5) and fifteen (15) thousand bats. The camp is located closest to Option 2. Bomaderry Creek is likely to provide significant foraging, roosting and breeding habitat for GHFF during this period. Further targeted surveys will be undertaken during the approval of details phase in the event that Option 2 is approved. A range of recommended detection methods will be used including: ▪ Diurnal counts to estimate the area of occupancy of the camp between September and February; and ▪ Survey of the arrival and departure flyways to the maternity camp. Surveys would be undertaken by experienced field ecologists to determine the potential impact of Option 2 on the species and determine quantitative and effective mitigation measures using the hierarchy of avoid, minimise, mitigate and offset to ensure a maintain or improve biodiversity outcome is achieved for GHFF under the proposal.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Potential for direct and indirect project impacts on GHFF including habitat removal, noise and other disturbance related issues will be assessed in the context of State and Commonwealth requirements. If the further assessments determine that GHFF are susceptible to vehicle collision and disturbance impacts under the Option 2, specific measures will be proposed to mitigate against these threats. <u>Glossy Black-cockatoo, Gang-gang Cockatoo</u> A hollow-bearing tree and feed tree assessment was undertaken for the FFA report and potentially suitable breeding hollows were detected along the northern and central route. GBC feed trees were detected along the northern route. No surveys were undertaken to determine whether the identified habitat values (hollow-bearing trees and GBC feed trees) were being utilised by GBC or GGC. Surveys will be undertaken to determine whether hollow-bearing trees and Glossy Black Cockatoo (GBC) feed trees are being used along the chosen route option and adjacent areas to assess direct and indirect impacts. Surveys will be undertaken during the recognised breeding season for each species to determine the potential significance of these resources for GBC and Gang-gang Cockatoo (GGC). The potential for direct or indirect impacts on GBC and GGC will be assessed in accordance with the State assessment requirements. The mitigation measures proposed will reduce the severity of any potential impact on threatened cockatoos under the detailed assessment. <u>Masked Owl, Sooty and Powerful Owls</u> Records exist for Masked, Sooty and Powerful Owl within the study area. ELA surveys undertaken for the project in 2010 detected all three species. The impact of the project on forest owls is considered to be negligible as optimal habitats occur in the Bomaderry Creek gorge and direct impacts to gorge habitats used by forest owls are not planned under the project.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Surveys will be undertaken to determine whether hollow-bearing trees or cave habitats are being used in the gorge area along the selected option and adjacent areas to assess the potential for direct and indirect impacts in accordance with the State assessment requirements. The mitigation measures proposed in the Concept FFA will be strengthened to further reduce the severity of any potential impact on forest owls under the detailed assessment. <u>Broad-headed Snake</u> No targeted surveys were undertaken for BHS due to the absence of record. The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. The most suitable sites occur in sandstone ridge tops. BHS shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer. The current distribution of this species extends from Wollemi National Park in the north, the Clyde River catchment in ranges south-west of Nowra in the south, east to the Royal National Park and near Illawarra, and west to the upper Blue Mountains at Blackheath and Newnes. Major populations occur in the Blue Mountains, southern Sydney, an area north-west of the Cumberland Plain, and the Nowra hinterland (NSW NPWS 2001). Common canopy species include *Corymbia eximia*, *C. gummifera*, *Eucalyptus sieberi, E. punctata and E. piperita*. Snakes prefer sites with a west to north-west aspect. Suitable habitat is patchily distributed throughout the species range. In consideration of the above and habitat resources identified during the targeted fauna surveys for EPP, STQ and GBF it is possible that some sub-optimal habitat and or habitat resources may occur within the study area for BHS (westerly facing sandstone cliffs and large flat rocks on rocks) and that the precautionary principle should be applied requiring targeted habitat and species searches.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			Habitat and targeted species surveys will be undertaken in accordance with State and Commonwealth survey guidelines to determine the likelihood of Broad-headed Snake (BHS) occurring within the development footprint and any additional areas that are likely to be affected by the proposal, either directly or indirectly. Searches of suitable sheltering sites under rocks or in crevices on westerly facing sandstone cliffs should be undertaken by day during winter. Likely detection should be supported with photographs. The potential for direct or indirect impacts on BHS will be assessed in accordance with the State and Commonwealth assessment requirements. <u>Brittle Midge Orchid</u> As reported in the FFA report, surveys were undertaken by NSW NPWS in February 2010 which identified twenty three (23) individuals from twelve (12) clusters from within the study area. Of these 23 individuals fourteen (14) are in the vicinity of the Central route option and one (1) specimen may be impacted due to clearing. A further nine (9) specimens detected by an Australian Orchid Society Conservation Officer in April 2010 may potentially be impacted by clearing activities associated with construction of the Southern route. The loss of one individual to the project under option 1 was assessed as an acceptable loss. The mitigation measures proposed in the Concept FFA will be strengthened to further reduce the severity of any potential impact on Brittle Midge Orchid under the detailed assessment. Verification of desktop records will be undertaken during approval of details by experienced botanists/ecologists or recognised experts with an understanding of the requirements of both species in February – March (Brittle Midge Orchid) and July-December (Hibbertia sp. Nov 'Menai') to determine the location of individuals in proximity to the approved route option. The findings of the field survey will be used to inform the assessment undertaken during approval of details for the project's potential to impact at both the species and population levels. Specific quantitative and effective mitigation measures will

TAG	Issue Summary	Detailed Issue Description	Issue Response
			be proposed using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for both species under the proposal. Lowland Rainforest EEC The EEC potentially correlates with the Coachwood/Ironwood Warm Temperate Rainforest as shown in the amended map provide in **Appendix D**. This endangered ecological community may be indirectly impacted by the construction of the southern route. However, mitigation and management measures implemented during and post construction as outlined in section 6 of the FFA will alleviate potential indirect impacts to this community. No part of the community will be directly impacted by any of the route options. An impact assessment will be undertaken to determine the potential for loss and recovery of the Lowland Rainforest community in the context of project actions and the mitigation measures proposed in the Concept FFA will be strengthened if necessary to further reduce the likelihood of any indirect impact on Lowland Rainforest EEC under the detailed assessment. Additional considerations Two species of microchiropteran bat were assessed in the FFA for their likelihood of occurrence. One species, the Large-eared Pied Bat, was considered unlikely to occur and the second species, the Large-footed Myotis was considered likely to occur on the basis of previous records and presence of known habitats. A third species, the Greater Broad-nosed Bat occurs in open woodland and dry open forest habitats as well as rainforest and wet sclerophyll, usually roosts in tree hollows and has been recorded in the locality. It is possible that this species may occur in the study area from time to time on the basis of availability of suitable habitats and nearby records. Survey for threatened microchiropteran bat species and their use of hollow-bearing trees will be undertaken throughout the study area in accordance with the

TAG	Issue Summary	Detailed Issue Description	Issue Response
			assessment guidelines. An impact assessment will be undertaken to determine the potential for loss and recovery of threatened microchiropteran bats in the context of project actions and proposed mitigation measures.
2B	The Vegetation and habitat loss and biodiversity impacts of the route options have been under-estimated, especially for the Central and Southern Routes, and so the Route Options Comparison is flawed.	Estimates of vegetation loss appear to relate to the areas cleared for the roads and not the additional vegetation clearance that would be needed for the construction of the proposed bridges and the elevated approaches and for the Central option, the relocation of the water pipeline and power line across the gorge due to the road and bridge route. There is also no inclusion in clearance areas for sedimentation basins which may be required. Accordingly the loss of native vegetation involved seems to represent a considerable under-estimate. Gaining access to the difficult Central and Southern proposed bridge sites for very large plant and equipment items would have serious implications for native vegetation and the need to establish secure footings for the bridge supports would almost certainly result in clearing of the vegetation within the gorge for a considerable distance around these footings.	At the time the FFA report was prepared for the Concept approval, the full details of the proposal had not been finalised. The full details of the proposal are to be determined under the approval of details stage. Accordingly the assessment of vegetation loss was made based on actions that had been identified or were predicted to occur as part of the key attributes of the proposal. For instance estimates of vegetation loss related to areas to be cleared for the route option carriageways including: ▪ Northern Option 4.52 hectares including 0.9 hectares within the Bomaderry Creek Regional Park; ▪ Central Option 2.31 hectares including 1.6 hectares within the BCRP; ▪ Southern Option 4.14 hectares including 0.3 hectares within the BCRP. Details surrounding the relocation of the water pipeline and electricity transmission line had not been determined. One possibility for the Central Route Option could be to relocate some of the existing infrastructure underground within the road corridor (existing access track) which may not necessitate clearing over and above what has been assessed. Precise locations for ancillary works such as sedimentation basins, stockpile sites, access tracks and so forth had not been determined and therefore could not be assessed for the concept plan approval. It is likely that the requirement for these at concept level, regardless of option, would be generally equal and carry equal weight if considered in any assessment. The FFA concludes that the riparian area will not be impacted by construction actions under the current concept proposal as the proposed concept bridge plan has been designed to span the riparian corridor. This would be confirmed during the details stage.

TAG	Issue Summary	Detailed Issue Description	Issue Response
		The Central and Southern Options should be rejected on the basis of the precautionary principle, that "where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental damage." Accordingly, the Northern option is the only route that should be considered for approval	Section 6 of the FFA deals with avoidance and mitigation measures and recommends the preparation of a Project Environmental Management Plan (PEMP) to avoid, minimise and mitigate potential project actions that may affect ecological values and the local environment. Section 6.1.1 of the FFA identifies the requirement to fence off the immediate construction footprint to avoid the risk of direct impact to vegetation outside of the footprint. There is likely to be a degree of risk that unidentified project actions could negatively affect the environment including threatened entities and their habitats and or landscape features and values that promote ecological services and functions supporting threatened entities. For this reason council has undertaken a risk management approach through applying the precautionary approach and a number of commitments are recommended for assessment during the Detailed stage to promote a 'maintain or improve' biodiversity outcome. To manage the potential for future project actions significantly impacting on threatened entities a specific and quantitative proposal will be developed during the approval of details phase so that direct and indirect project impacts can be fully evaluated and the potential effect on threatened biodiversity and the environment be considered. Attributes of the proposal that require development will include but not be limited to: ▪ A mapped location of the route corridor approved by the Concept approval and any other additional areas required to facilitate the proposal; ▪ Identification of all activities and actions including ancillary works and work stages; ▪ The duration and timing of the project including staging; ▪ Details of the arrangements for relocating and or managing existing linear infrastructure e.g. transmission line, water pipeline and access requirements.

TAG	Issue Summary	Detailed Issue Description	Issue Response
			The FFA report to be prepared during the detailed phase will name, map and assess each vegetation community type to be directly and indirectly impacted by project actions and activities. The overall extent of the impact will be provided for each vegetation community under the approved option and any ancillary action or activity. To address the uncertainty around the extent of impact to the riparian corridor, a final bridge design will be provided including pylons, footings, span and installation access requirements for the subsequent approval of details. The potential for direct and indirect impact to terrestrial and aquatic ecosystems and values will be evaluated against the final design including the likelihood for river flows and fish passage to be impeded and terrestrial habitat connectivity to be severed or reduced for certain threatened species. In a broader sense the FFA to be prepared for the approval of details will consider the nature, extent, frequency, duration and timing of the potential project effects in order to fully determine a set of comprehensive measures likely to avoid, minimise, mitigate and offset the potential impacts of the proposal on threatened biodiversity and habitats.
2C	Fragmentation of bushland in and around BCRP caused by Central Option and the Southern Option affecting very high conservation and biodiversity values and impacting threatened species. The proposed NNLR will have a detrimental	The central route has a significant fragmentation impact on the Regional Park. It effectively divides the bushland and Regional Park in two, creating a significant barrier between two areas of bushland. The current single unsealed utility service track cannot be compared with a two lane sealed public road carrying thousands of vehicles per day, with maintained road shoulders and verges. In particular the GBF, YBG, GBCX utilise and cross the	The FFA report recognises the likelihood of increased habitat fragmentation within the BCRP and the potential to impact threatened fauna under the central route option in 6.1.4 Potential impacts are described as: ▪ Increased fragmentation effects through loss and degradation of vegetation and fauna habitat; and ▪ The possibility of direct mortality due to collision with vehicles. To reduce these impacts the FFA recommends a number of mitigation measures such as: ▪ Retaining overhanging trees where safety is not compromised;

TAG	Issue Summary	Detailed Issue Description	Issue Response
	impact on the biodiversity of the BCRP.	existing easement. The impacts of fragmentation are not confined to the actual infrastructure corridor but extend into the bushland on both sides of the corridor for some distance due to increased edge effects. This option has significant implications for ecological functioning of the bushland due to impacts including habitat change (from changes to lighting, nigh-time lights, drainage and runoff and micro-climate changes), road maintenance, vehicle accidents, vandalism, littering, weed invasion and increased access for illegal bikes. The fragmentation would not be consistent with the ecological integrity of the BCRP, nor would it maintain or enhance significant habitat corridors or conserve natural values consistent with the BCRP management objectives. Fragmentation would isolate plants and animals, lowering numbers of individual species, increasing vehicle animal collisions and potentially	▪ Building rope bridges; and ▪ Installing glider poles. The use of habitat connectivity measures in conjunction with fauna exclusion fencing and underpasses to manage the potential impact of vehicle collision are not comprehensively addressed in the FFA report and measures to reduce the likelihood of road kill are not considered. Threatened fauna species considered to be vulnerable to vehicle strike known, likely, or potentially likely to occur in the study area from time to time include: ▪ Spotted Tailed-Quoll ▪ Eastern Pygmy Possum ▪ Giant Burrowing Frog ▪ Masked Owl ▪ Powerful Owl Sooty Owl ▪ Yellow-bellied Glider ▪ Glossy-Black Cockatoo ▪ Gang-gang Cockatoo ▪ Square-tailed Kite ▪ Scarlet Robin ▪ Flame Robin ▪ Little Lorikeet ▪ Varied Sittella ▪ Large Footed Myotis

TAG	Issue Summary	Detailed Issue Description	Issue Response
		resulting in local extinction for native and threatened species. BCRP is a highly valued natural area. It is home to hundreds of species which will be threatened by the NNLR and which needs to be protected for future generations. The rainforest itself is very valuable as it represents a unique environment within the sandstone gorge. The animal species the system supports is precious. Many native animals will become road kill.	▪ Greater Broad-nosed bat The potential for habitat severance leading to local extinctions of populations of threatened species within the BCRP requires further assessment during the approval of details due to the potential for a significant impact on threatened species. The assessment will address: ▪ The potential internal fragmentation effects on vegetation, specifically how during construction (and post-construction through management sub-plans) the proposal would avoid and minimise direct loss of habitat, avoid rare or threatened species through minor re-alignment opportunities and protect valuable habitat components; ▪ The potential internal fragmentation effects on fauna, specifically loss of habitat, and the implications for severing viable populations in a small reserve; ▪ The implications/consequences of internal fragmentation of flora and fauna in the regional context of isolation; ▪ Assessment of the low probability of recruitment through immigration for many species i.e. Eastern pygmy possum in the regional isolation context; ▪ Use of a technical specialist to undertake predictive modelling to identify and quantify the potential impacts of vehicle collisions and incorporation of mitigation measures from this modelling to reduce animal and human trauma; ▪ Vehicle collision mortality and the implications for localised extinctions of threatened species within the study area caused by further reduction in already small population sizes e.g. Eastern pygmy possum and potentially Giant Burrowing Frog and Broad-headed Snake. Discussion is also required for likely impact of vehicle collision on highly mobile protected non-threatened species known to occur in the BCRP such as Swamp Wallaby and Lace Monitor; ▪ Consideration of the 'road effect zone' or the area over which significant

TAG	Issue Summary	Detailed Issue Description	Issue Response
			ecological effects of the proposed road and its traffic, extend into the adjacent landscape and the potential incursion of pest animals and weed species in the context of local and threatened biodiversity; ▪ A detailed assessment of all measures likely to mitigate internal habitat fragmentation and recommendations of appropriate measures that have been evaluated as effective in similar circumstances (road design, geography and biodiversity values). Measures to be considered should include structural mitigation such as: - Road design principles - Canopy bridges; - Glider poles; - Local traffic management; - Culvert crossings; - Tunnels; - Fences; - Bridge design over Bomaderry Creek. ▪ Non-structural mitigation including: - Canopy connectivity - Micro-habitat placement to encourage movement toward crossing points; - Existing drainage lines and watercourses; and - Road management and driver education should be considered in collaboration with the RMS. -

TAG	Issue Summary	Detailed Issue Description	Issue Response
Specific Threatened Species Impacts			
2D	Impacts to Bomaderry Zieria specimen close to the Central Route Option	Indirect impacts to the two Z. baeuerlennii closest to the central route alignment, located 13 metres from the centreline, are likely and the long term persistence of two plants is doubtful. The narrower road alignment may not be achievable making direct or indirect impacts more likely. The EAR erroneously states the distance to the BZ specimen as 10 m from the road edge but it should be 5 m. It may be possible for the Z. baeuerlennii specimen could be protected during the construction phase, however the claim of "no direct impacts" for the Bomaderry Zieria must be questioned, as plants are at risk of being destroyed during construction. In the longer term the current single unsealed utility service track cannot be compared with a two lane sealed public road carrying thousands of vehicles per day, with maintained road shoulders and verges. As such it is highly likely that indirect impacts will kill the individual plants. Indirect impacts include:	The FFA report considers direct and indirect impacts to Bomaderry Zieria in detail. Mitigation measures are proposed in section 6.1.1 The FFA concludes that no direct impacts are likely as a result of a redesign of the central route corridor and careful management during construction and operations. Further the FFA considers that indirect impacts may affect plants adjacent to the Central route and that a range of measures would be required to be adopted to mitigate potential impacts. These measures include: ▪ Permanent fencing ▪ Retention of shade producing trees where possible ▪ Compensatory planting of shade trees ▪ Minimal stopping areas along the road ▪ Fencing prior to construction ▪ Signage as no-go areas ▪ Road verge management ▪ Weed management ▪ Erosion and sedimentation Regulatory guidelines state that all proposed measures that mitigate, improve or compensate for the action, development or activity should not be considered in determining the degree of the effect on threatened species, populations or ecological communities, unless the measure has been used successfully for that species in a similar situation. Bomaderry Zieria is one of the rarest plants in Australia and has an extent of occurrence of 26 hectares and area of occupancy of approximately one (1) hectare contained wholly within the study area. As such the efficacy of the proposed measures is unknown as the measures are untried. The ecology of this State and Commonwealth listed endangered species is poorly understood and given the species status and

TAG	Issue Summary	Detailed Issue Description	Issue Response
		▪ habitat change (including changes to water flows, drainage and micro-climate and bushfires), ▪ road maintenance, ▪ vehicle accidents, ▪ rabbit herbivory; ▪ • vandalism, ▪ • littering ▪ • weed invasion. This is the major long term threat to the Z. baeuerlennii as the Central Option would create a corridor for the movement of weeds into the population of Z. baeuerlennii to a much larger degree than the existing utility easement and service track. The Central Route would introduce a weed vector through the centre of the BCRP, in close proximity to the Z. baeuerlennii. These impacts could further compromise the long term viability of the northern sub-populations of the species and mitigation measures would be unlikely to be effective.	extremely limited area of occurrence the precautionary principle should be applied and further studies undertaken to determine the nature and magnitude of the impacts including: ▪ Pre-construction, construction and occupation/maintenance phases; ▪ All on-site and off-site impacts, including location, installation, operation and maintenance of auxiliary infrastructure and fire management zones; ▪ All direct and indirect impacts; ▪ The frequency and duration of each known or likely impact/action; ▪ The total impact which can be attributed to that action over the entire geographic area affected, and over time; ▪ The sensitivity of the receiving environment; ▪ The degree of confidence with which the impacts of the action are known and understood; and ▪ In consideration of recovery and threat abatement plans, priorities action statements, threatened species profiles and other fact sheets to provide further guidance on whether an action or activity is likely to be significant. Human activities are reported to have negatively influenced the distribution and abundance of Bomaderry Zieria in the past. A national recovery plan has been prepared for Bomaderry Zieria. The recovery plan states “there is no evidence to suggest that the distribution of the Bombaderry Zieria ever extended outside the Bomaderry Creek locality, although it is likely that its numbers have been reduced by human activities on its margins”. The recovery plan identifies areas of critical habitat and locations for the species on page 5 and indicates that the southern route corridor would traverse and therefore directly impact critical habitat identified for the species. In NSW the TSC Act makes provision for the identification and declaration of Critical Habitat. In response to a public nomination the Director-General of NPWS prepared a

TAG	Issue Summary	Detailed Issue Description	Issue Response
			proposal to list Critical Habitat. This proposal was placed on public exhibition in May 2002, and 54 ha of the bushland was nominated as Critical Habitat for the Bomaderry Zieria in 2003. The boundary of the nominated critical habitat is the local top of the watershed, to provide protection from pollutants and water borne pathogens such as *Phytophthora cinnamomi*, excepting in the north east portion of the area where the top of the watershed occurs beyond existing development. The potential for impact of *Phytophthora cinnamomi* and other root pathogens is not considered in the Concept FFA. Further studies will be undertaken during approval of details directly relating to the proposed measures such as predicted removal of shade trees and compensatory plantings in the context of the ecological requirements of Bomaderry Zieria to determine the likely efficacy of the measures. The proposal will require the revocation of an area of the BCRP for the road corridor and therefore assessment during the approval of details will consider the implications for *Phytophthora cinnamomi* and other waterborne threats. Some actions or activities are likely to require individual assessment such as clearing, soil and water management, herbicide treatment etc.
2E	Impacts to two *Eucalyptus langleyi* specimens would significantly increase the risk of extinction of the local population.	A 10% reduction in the adult population in addition to the recent 37% reduction in the population further reduces the viability of the local Endangered Population of this species, increasing the risk of extinction of the local population. An assessment of the impacts on this local Endangered Population should therefore be conducted. The Central route might result in the loss of more plants (in particular S4 near the pipeline – which would	The FFA report forms the conclusion that the proposal is unlikely to result in adverse impacts to *Eucalyptus langleyi* and that generic mitigation measures aimed at minimising the potential for indirect impacts associated with the construction of the central route will be implemented. The FFA recognises that the Endangered population of Albatross Mallee has undergone a recent decline of 37% and in this context a further reduction of 10% through the removal of two trees under the preferred central route option is considered unlikely to place the population at risk of extinction. Mitigation measures proposed for Bomaderry Zieria are considered sufficient to address the conservation requirements of Albatross Mallee. Specific and quantitative mitigation measures to reduce the potential for the proposal to impact upon Albatross Mallee will be developed during approval of

TAG	Issue Summary	Detailed Issue Description	Issue Response
		make the total loss more like 15%) because of the area required for the construction of the bridge and for the dismantling and relocation of the existing water pipe line and power line across the Gorge and so impacts have been under-estimated. The proposed mitigation strategy of adding the land where the two plants likely to be destroyed to the Park is a strange suggestion and not considered to be an effective means of counteracting the impacts from the bridge construction and relocation of the water pipeline and the power line on the habitat of this species. Raising the height of the bridge is unlikely to prevent impacts to the species.	details in conjunction with the offset protection measures already proposed in the Concept FFA report.
2F	Impacts to Giant Burrowing Frog (GBF) from cutting through potential habitat.	The 'siting' of the GBF was confirmed by Daly and should be treated as a confirmed siting. GBF assessment is not consistent with the DGRs. The potential impacts have not been correctly assessed and the proposed measures to avoid or mitigate impacts are totally inadequate, with no assessment of the feasibility,	Additional targeted surveys were undertaken for GBF after the Concept FFA was placed on public exhibition. No GBF were detected during surveys. Further targeted surveys during approval of details using a range of techniques during optimal conditions by experienced ecologists will be undertaken to detect or further reduce the likelihood of present day occurrence. In the event that GBF is detected during approval of details surveys a shift away from the proposed emphasis on impact mitigation along Bomaderry Creek is required to ensure future management relates to north south habitat connectivity under the proposed Central Option. In the event that GBF is detected culverts and tunnels would be included in the road design, where appropriate, to facilitate movement

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		reliability and effectiveness, as required. Impacts to GBF from cutting through potential habitat needs to be further considered and more mitigation included. In particular consider further an underpass. No possibility of mortality to this small population should be permitted. The current track does not form a barrier to movement of the GBF. The track is rarely used and not used at night time when the GBF are more likely to be active. The impact of the Central Option is under-stated. The EAR makes an error in the location and breeding habitat and the name of relevant vegetation type (sandstone sedge instead of kunzea shrubland). The Central Route option bisects the largest northern occurrence of kunzea shrubland which is prime habitat for the GBF (not sub-optimal) and extends as a single habitat across the Central Option from north to south. The assessment of impact to GBF that there would be no need for GBF	between habitats and consideration will be given to frog fencing to mitigate against vehicle strike and improve the efficacy of crossing or underpass structures.

TAG	Issue Summary	Detailed Issue Description	Issue Response
		to traverse the road because breeding sites are identified only on the northern side of the corridor is at odds with the observation that the GBF moves great distances from breeding areas in search of food. The Central Option would create a major barrier to the frog and prove a threat to its survival. The bridge crossing is located to the east of the GBF habitat and so would be unlikely to act as an effective underpass for GBF.	
2G	Impacts to *Genoplesium baueri* and *Hibbertia sp. nov 'Menai'* from the Central and Southern Options are significant	Field surveys were not undertaken to assess the number of plants this species to be impacted by this proposal and the Biodiversity Assessment used others' data collected for a separate purpose. Due to mapping/coordinate errors, the Central Route will directly impact on 3 individual *Genoplesium baueri,* not 1 as stated in the Biodiversity Assessment. The Southern Route will directly impact on 9 individual *Genoplesium baueri.* The EA relies on claims that impacts are unlikely because of the occurrence of this species elsewhere in the Shoalhaven Region, rather than concentrating on the impact on	Use of desktop information is recommended to inform field investigations (Guidelines for Threatened Species Assessments). Limitations surrounding the currency and accuracy of data and application of a prescribed scope of works would generally preclude the reliance of desktop data to form assessment conclusions. Exceptions to this may be when the accuracy of the data can be independently verified. In the case of the FFA desktop studies were reviewed including results of two field surveys: ▪ NSW NPWS surveys undertaken in February 2010; and ▪ Australian Orchid Society April 2010. Public submissions challenge two aspects of the FFA report being: ▪ The accuracy of the geo-referenced point locality records for Brittle Midge Orchid and therefore the ability of the assessment to accurately conclude the potential for project impacts; and ▪ The regional (local government area) and not local (study area) assessment context of the proposal to impact on Brittle Midge Orchid and *Hibbertia sp. Nov*

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		the habitat of this local population. The population of this species in the Bomaderry Creek bushland is significant, and the survey results not definitive. Further survey is required to better assess the impacts and to develop appropriate mitigation measures and appropriate off-sets. Changes to the micro-climate, especially drainage/hydrology, will affect the long-term survival of the species in the surrounding habitat. The existing power line easement provides habitat for this species. Impacts to *Hibbertia sp. nov 'Menai'* from the Central Option and the Southern Option are significant in regards to the local population.	*'Menai'.* Verification of desktop records will be undertaken during approval of details by experienced botanists/ecologists or recognised experts with an understanding of the requirements of both species in February – March (Brittle Midge Orchid) and July-December (Hibbertia sp. Nov 'Menai') to determine the location of individuals in proximity to the approved route option. The findings of the field survey will be used to inform the assessment undertaken during approval of details for the project's potential to impact at both the species and population levels. Specific quantitative and effective mitigation measures will be proposed using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for both species under the proposal.
2H	Impact to Spotted-tailed Quoll (STQ) from vehicle collision will be significant for the Central Route and the Southern Route. Impact to Eastern Pygmy Possum (EPP) from vehicle collision will be significant for the Central and	**STQ** This species is known to occur within the local area and the study area does provide suitable shelter/breeding and foraging habitat for the Spotted-tailed Quoll, therefore it is Expected that the home range of this species would cover the subject site. Impacts from vehicle collision are likely to be significant due to the large amount of habitat on either side of the	Surveys for STQ and EPP were carried out in 2011. See **Appendix C** for the 2011 survey report. <u>STQ</u> The 2011 survey was led by an experienced ELA terrestrial ecologist with direct experience surveying for STQ. Four remote cameras over 20 nights or 80 trap nights were used to target Spotted-tailed Quoll which is consistent with the regulatory guidelines and the DGRs. No STQs were detected. Further targeted surveys are proposed throughout the study area during the approval of details phase at the level of effort recommended in the relevant State and Commonwealth survey guidelines by experienced field ecologists and using

TAG	Issue Summary	Detailed Issue Description	Issue Response
	Southern Routes. Impacts to Grey-headed Flying Fox (GHFF) are likely to be significant from the Central and Southern Routes The Central and Southern routes would have impacts on Yellow-bellied Glider (YBG) habitat.	Central and Southern Option, which can lead to a loss of top order predators and change the ecological function of an area. Further surveys are necessary, and additional mitigation measures required. **EPP** The EPP is expected to occur within the local area. Impacts from vehicle collision are likely to be significant due to the large amount of habitat on either side of the Central and Southern Options. Further surveys are necessary, and additional mitigation measures required. **GHFF** The survey area is inadequate since it fails to include the maternal camp for the GHFF. It is likely given the size of the colony that the GHFF range widely within the Bushland and Park where there is suitable habitat and a significant amount of feed trees. The Flying Fox fly well beyond the immediate campsite area to feed on the Red Bloodwood, which is a significant component of the Grey Gum-stringy bark Forest/Woodland. This vegetation community is	a range of accepted detection methods including: ▪ Camera traps and bait stations ▪ Cage traps and ▪ Hair tubes Should STQs be detected during approval of details then specific quantitative and effective mitigation measures will be applied using the hierarchy of avoid, minimise, mitigate and offset to ensure a maintain or improve biodiversity outcome is achieved for STQ under the proposal. STQ are susceptible to vehicle strike due to their wide ranging movements. In the event of detection within the study area specific measures would be proposed to promote connectivity across the landscape and reduce the likelihood of road mortality. Measures are likely to include fauna fencing in conjunction with underpasses such as culverts and or 1.5m furnished fauna tunnels where constructability permits <u>EPP</u> The 2011 survey was led by an experienced ELA terrestrial ecologist with direct experience surveying for EPP. 25 Elliott A-type aluminium box traps at three sites over 4 nights or 300 trap-nights and two pit traps at each of the option sites over 4 nights or 24-trap nights. This sampling effort is within the recommended DEC guidelines and therefore consistent with the DGRs. One (1) EPP was detected in a pit fall trap and recaptured. EPP has now been confirmed in the north (AH Ecology 2010) and south of the study area and as suitable habitat exists more broadly it is likely that the species is also distributed more widely. In accordance with guidelines extensive surveys would be required to establish population size and distribution within the locality so that the assessment of significance can be updated and suitable detailed mitigation measures identified.

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		extensive throughout the Bushland and Park and would be the vegetation community most affected by the Southern Route. Both option 1 and option 2 has the potential to impact habitat critical to the survival of the grey-headed flying foxes and that council has inadequately considered the impact in their proposal." The Flying foxes are also known to disperse north along Bomaderry Creek so that the Central Option and Northern Option bridges would present a hazard to the safety of both animals and humans. There is also concern regarding the impacts of the proposed road construction including disturbance due to the noise and vibration of heavy machinery during construction, causing animals to fly during the day and to shift their campsite or abandon it altogether. Grey-headed Flying-fox is a Commonwealth listed species and should be included in Section 8.3. **YBG** Grey Gum-Stringybark Forest/	Further targeted surveys are proposed throughout the study area at the recommended level of effort and by experienced field ecologists during the approval of details phase. A range of recommended detection methods is proposed including: ▪ Arboreal camera traps and bait stations; ▪ Arboreal and terrestrial Elliot traps; ▪ Pitfall traps; and ▪ Spotlighting. Specific quantitative and effective mitigation measures will be applied using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for EPP under the proposal. EPP are susceptible to habitat fragmentation and vehicle strike and a suite of proven measures will be applied to promote habitat connectivity and reduce the risk of vehicle strike. <u>GHFF</u> The FFA identifies the presence of GHFF from one Wildlife Atlas record and recommends further studies be undertaken to confirm the presence of a maternity camp within the study area. The assessment undertaken for GHFF in the FFA report assesses the potential impact on foraging individuals likely to be itinerant to the area. Subsequent studies conducted by ELA in 2011 (see **Appendix C**) verified the presence and an approximate location of a Grey-headed Flying Fox maternity camp which can retain up to 15 000 individuals. Individuals are reported to occupy the camp between September and May which represents the breeding season for the species. The camp is located in the southern parts of the study area near Bomaderry Creek. No assessment has been undertaken for the

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		Woodland around the gorge are the core habitat for the Yellow-bellied Glider, Scribbly Gum provides food resources and tall Spotted Gums facilitate gliding and also provide den sites. These trees should all be taken into account as habitat for the Yellow-bellied Glider. These communities are present in the vicinity of the Central route, so it is clear that the Central route would have impacts on Yellow-bellied Glider habitat. Feed trees will be lost from the alignment of the Southern Route. Loss and fragmentation of habitat is a key threatening process for Yellow-bellied Glider, and such a small population as it present in the BCRP is unlikely to survive such fragmentation so the species may be forced into local extinction.	potential for the project to impact on this maternity camp which is most likely under option 2. Further targeted surveys will be undertaken during the approval of details phase in the event that option 2 is approved. A range of recommended detection methods will be used including: ▪ Diurnal counts to estimate the area of occupancy of the camp between September and February; and ▪ Survey of the arrival and departure flyways to the maternity camp. Surveys would be undertaken by experienced field ecologists to determine the potential impact of option 2 on the species and determine quantitative and effective mitigation measures using the hierarchy of avoid, minimise, mitigate and offset to ensure a maintain or improve biodiversity outcome is achieved for GHFF under the proposal. If the further recommended surveys determine that GHFF are susceptible to vehicle collision and disturbance impacts under the option 2, specific measures will be proposed to mitigate against these threats. <u>YBG</u> It is likely that the population is small and isolated from other populations and therefore potentially susceptible to stochastic events such as high intensity wildfire as well as habitat removal, disturbance and predation by Powerful and Sooty Owl. Quantitative and effective mitigation measures using the hierarchy of avoid, minimise, mitigate and offset would be adopted to ensure a 'maintain or improve' biodiversity outcome is achieved for YBG under the proposal. Measures will include glider poles and rope bridges to facilitate movement across the road corridor.
Biodiversity Mitigation and Offsets			
2l	Biodiversity mitigation	Assessment of the practicality and	Predictive modelling and desktop research will be undertaken during the

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	measures are unlikely to be effective and need to be further considered	effectiveness of mitigation measures needs to be provided. In particular: ▪ 60kph speed limit is not expected to significantly reduce the number of collisions. ▪ There is evidence of the effectiveness of road signage. ▪ Effectiveness of overpasses and underpasses are unproven. ▪ The feasibility of the road narrowing measure. This should include consideration of the following: ▪ Inclusion of terrestrial underpasses. ▪ Reduce the road corridor width along the length of the road. ▪ Predictive modelling of animal vehicle collision to develop more comprehensive range of mitigation measures to avoid animal vehicle collisions. EMP should be done prior to approval for construction otherwise it is too late.	approval of details stage to gather evidence to support the use and placement of appropriate and effective mitigation measures. Forms of mitigation may include: ▪ Speed limit reductions ▪ Signage ▪ Barriers to exclude fauna from entering the road corridor ▪ Infrastructure to support fauna habitat connectivity Modelling and research will be used to guide the appropriate suite of measure's that would have the most direct benefits to local fauna populations. All mitigation measures and offsets will require a full review in light of the findings of the surveys and assessments undertaken during approval of details. The hierarchy of avoid, minimise, mitigate and offset will be adopted to ensure a 'maintain or improve' outcome is achieved for all threatened entities under the proposal. Mitigation measures would be proposed where it can be demonstrated that they have proven to be effective in similar circumstances. The precautionary principle will be adopted throughout the approval of details stage to promote ecologically sustainable development practices and provide certainty around impact assessment and proposed impact minimisation measures. Management sub-plans including a Project Environmental Management Plan that incorporates vegetation and fauna management measures and practices will be based upon the recommendations proposed in the detailed assessment to provide transparency in approach, consistency of management and continuity and transmission of project knowledge.
2J	The proposed offset is	The proposed 50 ha biodiversity off-	Public submissions on the adequacy of the offset site are diverse and in some

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	not adequate or acceptable.	set area will not ameliorate the effects of habitat fragmentation and isolation of the Central Route Option. Much of the proposed offset area is weed infested. As such the proposed offset approach is not consistent with the OEH BioBanking scheme. The land swap deal that Council is offering as a sweetener means the reserve will be burdened with a weed infested area. This Bushland is already managed very well with a joint arrangement between the various government agencies and the community (through the Bomaderry Creek Landcare/ Bushcare Group). The proposal to transfer land from Council to OEH therefore make no sense from a practical management sense and certainly does nothing to enhance the biodiversity values of the Bushland. How can a transfer of land from one agency to another in return for a destructive road through the middle of it all be of any benefit to the wildlife, cultural resources or the recreating public? This offer is not considered to be	cases polarised. The application of biobanking methodology is not one of the Director General's Requirements for the project and has not been adopted for the purposes of determining the compensatory offset site. Council will continue to liaise with agency stakeholders to ensure that the proposed offset lands are suitable for the purposes of compensating the proposal. Issues of tenure exchange, ownership and management will form the basis of ongoing discussions to deliver a 'maintain or improve' biodiversity outcome. The offset assessment would be on the determined concept alignment only, and under the limitations of current commitments by Council in relation to offset areas and may include provision of funding assistance to NPWS for further investigation or implementation of the Bomaderry Zieria recovery plan. Any commitment to future funding of the offset land by Council would be on the basis on current funding availability to Council remaining available. Any offset package would be viewed in the context of aspiring to a 'maintained or improved' biodiversity outcome.

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		compensation. From an ecological perspective the Bushland and Park are integral parts of the same complex landscape. There are no natural barriers between them, only the administrative boundaries due to administration of the Park by OEH and the remaining parts of the bushland by Shoalhaven City Council. The loss of overall landscape and biodiversity values due to a road and bridge following the Central or Southern Route cannot be compensated by an exchange of ownership for part of the Bushland. This offer would still constitute an overall loss. SCC should specify whether it will provide funding or contribution to the future management of the offset sites. Much of the existing conservation and weed management work is funded by community grants which are not available to OEH – so there is not reasons to hand over the land to OEH.	
Biodiversity – Option Preferences			
2K	Option 1 follows an	Less bushland would be required to	Assumptions around improved biodiversity outcomes under option 1 such as

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	existing, permanently cleared service corridor whereas bushland would be required to be cleared for almost the entire lengths of option 2 and 3.	be cleared for option 1. Option 2 and 3 will require substantially more bushland clearing. It avoids further environmental disturbance by following the cleared route of the existing overhead electricity supply line and the underground trunk water main - both having been in existence for approximately 30 years or more. The crossing point of Bomaderry Creek for option 1 already has the elevated electricity line and trunk water main crossings, and it is appropriate that the road, water main and electricity line crossing points be grouped together for access and maintenance purposes. The northern route will destroy more bushland than the other more southern options because the road simply can't be built along the existing West Cambewarra Road (it will need to be built parallel to the south of West Cambewarra Road into bushland as identified in the studies resulting in substantial vegetation loss far exceeding that of either the Central or southern routes).	the requirement to clear less vegetation than options 2 and 3 are not supported by OEH. This is largely due to the fact that a higher number of biodiversity values are concentrated along the central and southern route options.

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2L	Option 3 road already exists.	The west Cambewarra Northern Option is the option that will cause the least amount of environmental damage because it skirts the BCRP and does not cut through it. The northern option will result in less impact on the noise, pollution and sustainability of the local fauna and fauna and will not impact on the bushland to any significant extent. The road is set back 50m from the bush and will provide local residents with privacy and a natural noise barrier. Additionally safety is improved.	Assumptions around improved biodiversity outcomes under option 1 such as the requirement to clear less vegetation than options 2 and 3 are not supported by OEH. This is largely due to the fact that a higher number of biodiversity values are concentrated along the central and southern route options.

Table 3 – Impacts to BCRP Values and Amenity Issues Summary and Responses

TAG	Issue Summary	Detailed Issue Description	Proposed Response
3. Impacts to BCRP Values and Amenity			
3A	Fragmentation of bushland in and around BCRP caused by Central Option affecting recreational, educational, cultural and tourism values, including visual and amenity impacts to visitor attractions and park facilities.	The central route has a significant fragmentation impact on the Regional Park. It effectively divides the bushland and Regional Park in two, creating a significant barrier between two areas of bushland. The fragmentation would not be consistent with the cultural integrity of the BCRP, nor would it maintain or enhance significant landscape, cultural values, public appreciation, sustainable visitor use etc. consistent with the BCRP management objectives. The current single unsealed utility service track cannot be compared with a two lane sealed public road carrying thousands of vehicles per day, with maintained road shoulders and verges. The impacts of fragmentation are not confined to the actual infrastructure corridor but extend into the bushland on both sides of the corridor for some distance. This option impedes the recreational use and enjoyment (e.g. walking tracks, picnic facilities). The current integrity of the Bomaderry bushland provides an opportunity for residents and tourists to escape the urban environment. The central option will significantly impact on the integrity of the bushland and enjoyment by locals and tourists. The impacts to the visitor facilities would be severe, including: ▪ Aboriginal Heritage interpretation and Reconciliation Wall.	A detailed analysis of the recreational, educational and tourism values of the BCRP and the surrounding bushland has been carried out in **Section 5** of this report. This analysis is supported by plans provided in **Appendix F**. Section 5 also provides an assessment of the impacts of the NNLR route options to the recreational, educational and tourism values of the BCRP and surrounding bushland. In summary: ▪ There would be no direct impact to the fabric or immediate setting of the Aboriginal Heritage interpretation board and Reconciliation Wall. ▪ Access the facilities will need to be modified for Option 1 and this may necessitate crossing the roadway or providing a pathway underneath the bridge structure. However, there will be no direct impact to existing picnic area. The noise environment of the picnic area will be affected by Option 1. At this stage noise modelling shows that half of the picnic area will comply with the passive recreational noise criterion and half will not. More detailed noise modelling will be required once the road design is progressed, and if necessary mitigation measures will be investigated to ensure, if practicable, then the passive recreational noise criterion is complied with in the picnic area. ▪ Access to Bernie's Lookout would be affected. Council would provide alternative access arrangements, which would provide for continued access by disabled people.

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		▪ Access to the facilities and the weir would be from underneath the bridge approaches, destroying quiet ambience of the picnic area. ▪ Walk to Bernie's Lookout would be affected and access by disabled people made more difficult or impossible. ▪ The walking track along the water pipeline and power line alignment would be lost. The central route adjacent to the Park picnic area would have particularly severe impacts on recreational and educational values and the tourism values of the bushland as a regional attraction would be effectively lost. Both the southern and central routes require large elevated bridges across the Bomaderry Creek gorge and would have a significant impact on visual amenity and the natural setting of visitor attractions and facilities (including walking tracks, picnic area, and lookouts) and the natural vistas of the Gorge itself in the Regional Park or adjacent bushland. The Central Option route would result in a road destroying the entrance and parking area of the Bomaderry Creek Regional Park and passing within a few metres of the picnic area.	▪ Until the final horizontal alignment is developed it is unclear as to whether the existing easement will be retained in part or in full. Access to walking trails severed by Option 1 would be retained, as far as practicable, the details of which would be subject to further design. In Pedestrian access in the road reserve for Option 1 would be investigated as part of the design process. ▪ The recreational, educational and tourism values of the BCRP and surrounding bushland are not predicted to be significantly impacted by any of the NNLR route options. ▪ Option 1 would impact the visual setting of the bank side area on the eastern side of Bomaderry Creek where the weir can be viewed from, as well as from certain vantage points on some of the walking trails. This area is already affected by the development of infrastructure, including the weir, the electricity line and water pipeline. The new impact arising from the Option 1 bridge structure at this location would be localised. ▪ Option 2 would impact on the visual setting of a small section of the long loop walking trail in a location that is currently not affected by infrastructure development. The scientific and cultural values of the BCRP and surrounding bushland derive from the biological diversity of the bushland and the Aboriginal and European heritage attributes. The biodiversity, Aboriginal heritage and European heritage values of the BCRP have been addressed in detail throughout the EAR and where necessary in **Table 3**, **Table 5**, **Section 4** and **Section 6** for this Response to Submissions Report, and have not been revisited in the context of responding to this issue.

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3B	Impact to value of and management of infrastructure and facilities provided in the BCRP.	The central route bisects the BCRP and is close to visitor facilities including walking tracks, lookouts, picnic tables, barbecues, toilets, children's play feature and an Aboriginal mural. If this route was constructed it would render much of this infrastructure not able to be used. The infrastructure would need to be replaced elsewhere in the Park at significant cost, environmental impact and loss of amenity and function. Park management issues need to be further addressed.	**Section 5** also provides an assessment of the impacts of the NNLR route options on the access and accessibility of the recreational areas in the BCRP and surrounding bushland. In summary: ▪ Option 1 would necessitate the provision of alternative car parking and park access arrangements, as well as realignment of the Bernie's Lookout walking trail and the access trail to the weir. Council has provided for these modifications to the access infrastructure to be made such that existing accessibility (for example by people with disabilities) is maintained. Option 1 would not undermine the fabric of the function of the picnic and amenities area, and Council would investigate noise mitigation options to ensure noise in the picnic area remains below the allowable criterion. ▪ Option 2 would impact the access to the BCRP from the western side and access into the former landfill site by severing Falcon Crescent. Council would investigate options for maintaining this access point as part of the design process for option 2 if progressed. ▪ Option 3 would sever up to four walking trails that currently provide access into the BCRP and surrounding bushland. Accessibility into the BCRP via these trails would be maintained, subject to agreement with the NPWS as part of the design for Option 3, if progressed.
3C	Access to the BCRP facilities and trails will be affected by the Central Option.	The Central Option will impact on the existing access arrangements for the walking trails and the picnic ground and associated facilities. No designs for alternative access arrangements have	See **Section 5**, and responses to issue 3A and 3B. In summary: ▪ Option 1 will impact on the existing access arrangements for walking trails and the picnic ground and associated

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		been provided. A new entrance would have to be provided and a new parking area within the Park. Besides the impact of this road on the extensive Landcare regeneration work carried over many years adjacent to the Park entrance, there would be additional impacts caused by the development of the new entrance/parking area. With the absence of any comment on these matters one must be left with the question of who would provide the new entrance and who would pay for it. It is strongly suspected that no thought has been given to these matters and that the costs involved have not been factored into the estimates for Option 1. How can the proponent assure us that access will be improved if these basic details have not been considered? This sealed walking track was built on a level gradient by the Bomaderry Rotary Club in the 1980s for access by the disabled to Bernie's Lookout and the Camellia Garden situated north of the picnic area. Option 1 would cut off any future access for the disabled to these features at the northern end of the Bushland. Thus approval for an Option 1 route would in effect close off this excellent outdoor opportunity from use by the disabled – the only such facility provided in the Bushland. The concept design of Option 1 does do not allow for an exit from Nerang Rd into the Picnic area or the start of the creek walks. A safe two way underpass or access route would be needed just over the bridge crossing Bomaderry Creek to enable walkers to park their car and exit either the Bomaderry side or the North Nowra side	facilities. ▪ The alternative access arrangements will be funded and carried out as part of the construction works for the Central Option by Council. ▪ Council has considered at a conceptual level the alternative access arrangements that will need to be provided – commensurate with the conceptual level of design that has taken place for the road itself. These access arrangements will include an alternative car parking area and a new access trail, and will consider the need for special under or over passes for pedestrians. ▪ Council are satisfied that suitable alternative access arrangements can be provided, and would present these details as part of the approvals process for the detailed design of the road. ▪ Council would ensure that the alternative access arrangements would be designed so as to maintain accessibility for people with disabilities to the picnic area and to the Bernie's Lookout walking trail. ▪ The development of the Central Option, together with alternative parking arrangements, and alternative access arrangements will undoubtedly improve awareness of locals and visitors alike of the recreational facilities available in the BCRP and surrounding bushland.

TAG	Issue Summary	Detailed Issue Description	Proposed Response
		into the new link road safely. I note that the preliminary road and bridge design for Option 1 (Central Route) has not specifically shown the access to the Bomaderry Creek picnic area. The existing picnic area will have greater importance and access for persons with mobility difficulties can be improved. Access for people with disabilities and the elderly will be seriously compromised with the loss of the level walkway to the old Camelia garden. In the Bomaderry area there are few accessible tracks into the bushland for people with disabilities and the elderly. The claim made by council that the road will make the park more accessible to the public is disingenuous. For many years we passed close by without even knowing it was there for lack of signage. This is Nowra's best kept secret.	
3D	Impacts to the perceived value of the BCRP and surrounding bushland leading to an increase in anti-social behaviour from the Central Option / Southern Option.	The central route would significantly increase opportunities for vandalism, arson, littering and rubbish dumping in the Park as it would introduce vehicle movements to the central portion, which is relatively protected at present. The location of a transport corridor through the bushland may lower community perceptions of the value of the area and result in increased antisocial behaviour. The Southern Route would create opportunities for vandalism, arson, littering and rubbish dumping to the Park's edges but would have significant impacts on the wider Bomaderry bushland.	There is a documented history of anti-social behaviour in the Bomaderry Creek bushland. In particular: ▪ Arson records have been interrogated and the NSW Fire Brigades consulted. ▪ There are well known areas where dirt motorcycle riders ride. These areas are easily recognisable on the aerial photographs, with one being located in the western end of Option 1 and the other located to the north of the closed landfill site between Option 1 and Option 2.

TAG	Issue Summary	Detailed Issue Description	Proposed Response
			In relation to arson incidents, investigations by the NSW Fire Brigades identified that most incidents in the North NNLR study area were likely to be arson and that they occurred along the existing maintenance access track, which is generally the vicinity of Option 1. The view of the NSW Fire Brigades is that these incidents were a result of there being no passive surveillance along the track, and that the location of the NNLR along the same general alignment as this maintenance track would contribute positively towards a reduction in anti-social behaviour. The NSW Fire Brigade also identified that it would be an improvement to have the road for more expeditious access to the area when fire incidents require attendance. The Fire Brigade advised that the highest threat was fire outbreak while north-westerly winds are prevailing, and that generally from the study area a fire travelling towards the gorge can be inaccessible for control, and with the wind pushing it upwards on the east side of the gorge it would threaten the houses that back onto the Princes Highway [and other minor local roads such as Turley Ave]. The development of Option 1 (Central Route) with locked gate access points provided offer the best solution to fire fighting and general protection of the community. With this in mind, it also is obvious that optimised protection from fire of the threatened flora species *Zieria baeuerlenii* and *Eucalyptus langleyi* and of course any fauna present in the area. Option 2 (Southern Route) and Option 3 (Northern Route) will not provide the higher level of accessibility.
3E	Option 3 will heavily impact on residential amenity and ambiance	Option 3 will heavily impact on every resident and property owner along the West Cambewarra road – and will increase traffic along Cambewarra Road past the	Council generally agrees with these comments. Amenity impacts along West Cambewarra Road would be

TAG	Issue Summary	Detailed Issue Description	Proposed Response
	along West Cambewarra Road.	Bomaderry public school and Bomaderry High School. The ambience and natural beauty of West Cambewarra Road, wildlife habitat to numerous bird, animal and native plant species would be totally destroyed should Option 3 become a reality. West Cambewarra Road and the junction at its eastern end with Bomaderry Creek provides high quality recreation activities for bushwalkers, cyclists, fitness runners and fitness walkers. This option would destroy that for the locals who presently can enjoy the benefit.	high, and as such a significant amount of additional noise and visual mitigation would be required. This is proposed to be provided through a combination of setback and noise berm (or mound), and through maintaining West Cambewarra Road as a local access road. The AECOM Paramics traffic modelling indicates that Option 3 could increase traffic on Cambewarra Road by approximately 10% during peak periods. In comparison Option 1 is modelled to increase traffic on Cambewarra Road by half this amount. Irrespective, it is not considered that the NNLR (any route option) will impact significantly on the safety or amenity of Cambewarra Road. However, it is highlighted that Option 3 would also impact severely on the level of service of the Cambewarra Road / Princes Highway intersection, which is likely to require treatment to ensure it continues operate at an acceptable level. The solution for this intersection may affect traffic flows on Cambewarra Road.
3F	The southern option will heavily impact on the environmental values of the bushland and residential amenity.	The southern option will have the largest environmental impact with nearly the full length travelling through bushland. It will also disturb the highest number of residents.	Council generally agrees with this comment. While Option 2 and Option 3 would require substantially more vegetation clearing than Option 1, Option 2 would require clearing through the largest amount of gorge complex rainforest and would affect the noise environment of the existing walking trail, which currently follows the gorge. Option 2 would also have the most significant impact in terms of acquisition of private residential property and would require a substantive amount of noise mitigation to reduce noise impacts to acceptable levels.

Table 4 – Noise Issues Summary and Responses

TAG	Issue Summary	Detailed Issue Description	Proposed Response
4. Noise Impacts (Note: noise impacts to the amenity values of visitor facilities in the BCRP are generally included in Issue 3).			
4A	Noise impacts to residences from Gorge Bridges.	Road noise from the Central Option would take away from the current quiet, peaceful experience and there would be a loss of social benefits such as a feeling of escape from the pressures of urban life. Central and Southern Option Bridges would cause noise to reverberate down the gorge to the detriment of residents at the southern end.	Noise impacts to the recreational areas of the BCRP and surrounding bushland have been addressed in detail in Section 5 of this Response to Submissions Report. There will be some parts of the recreational areas within the BCRP that will be impacted by noise levels from Option 1 in excess of the criteria recreational areas as established by the EPA's *Environmental Criteria for Road Traffic Noise*. Council would investigate noise mitigation strategies as part of the design development of the road and seek to limit noise impacts to the permissible criteria where it is feasible and reasonable. The topology has been taken into account in the noise modelling carried out by AECOM. As can be seen in noise contours provided in Appendix K and Appendix L of the AECOM Report (which itself is Appendix E of the EAR), noise form the NNLR route options is not predicted to enter the gorge. This is due to the noise being generated in all cases above the gorge, and so the noise would simply pass over the top. This has also been observed anecdotally, since the existing Princes Highway noise, which can be heard on either side of the top of the gorge, cannot be heard once at the base. The issue of reverberation through the gorge would be an issue if the noise was generated within the gorge, but that will not be the case for any of the route options.
4B	Option 2 and 3 will have the most noise impact on residents.	The Central Option will have the least impact on residents for noise and air pollution and requires the least amount of Noise Mitigation measures. Significant noise mitigation work is required for Option 3.	Council generally agrees with this comment and does need to respond.

TAG	Issue Summary	Detailed Issue Description	Proposed Response
4C	Noise mitigation on the Northern Option should be by setback.	If the Road is set back along the northern option then this would enable the She-oak trees for the Glossy Black Cockatoo to be retained and lessen the impact on this species.	Council generally agrees with this comment and does need to respond.
4D	Discrepancy in the noise monitoring figures.	Table 7.4 of the AECOM report indicates existing noise levels at each logger location as well as other locations. It is not clear to OEH how the levels in Table 7.4 at logger locations 1-5 relate to the measured Day $L_{Aeq\ (1hour)}$ road traffic noise levels presented in Table 7.1, as the levels differ.	The measured noise levels presented in Table 7.1 are "free field" at logger locations 1-4. The noise level at logger location 5 was measured at the facade. Table 7.4 presents modelled noise levels from the SoundPLAN model. Differences exist for the following reasons: ▪ In order to compare the noise levels with the ECRTN traffic criteria (which apply at 1 m from the most affected facade) all of the modelled road traffic noise levels were corrected by 2.5 dB(A) to determine facade noise levels. (This will result in modelled noise levels at locations 1-4 which are approximately 2.5 dB(A) more than those measured in the "free field".) ▪ The measured noise level at location 3 is higher than the modelled road traffic noise levels. This is due to the distance between location 3 and existing major roads. The noise measurement at location 3 was affected by other erroneous neighbourhood noise rather than road traffic noise alone and therefore the modelled noise levels, which only account for road traffic noise, are lower. ▪ The noise levels presented in Table 7.4 are "modelled" with the model being calibrated on measured noise levels, therefore small differences between modelled and measured noise levels at some locations are to be expected.

Table 5 – Aboriginal Heritage Issues Summary and Responses

TAG	Issue Summary	Detailed Issue Description	Issue Response
5. Aboriginal Cultural Heritage			
5A	There are significant errors in the Aboriginal archaeological assessment.	Incorrectly states that ethnographic recordings are not available for the Bomaderry Creek Area. OEH has recorded such information in a cultural mapping places project in 2005. This should be included. Aboriginal Land Claim not mentioned: I note the parcel of land directly opposite Pitt Street is the subject of an Aboriginal Land Claim. The road route favoured by Council – the Central Option proposes to cross directly through this parcel. In the submitted documents the consultant's report does not make mention of this violation of the Land Claim or of the Land Council plans or wishes as regards the road through the existing Regional Park. Consultation between Council and the NSW ALC in regards to the Land Claim must be demonstrated. Aboriginal cultural heritage impacts of Option 1 have been under-estimated due to errors in assessing item BCRP 11: Previous surveys have identified a larger number of items at BCRP11 compared to what is described and assessed in the Aboriginal Archaeological Assessment report. As such the site is larger and more significant than realised by the proponent. The greater number and variability of artifacts previously recorded at BCRP 011 would suggest the need for a reassessment of its significance and that of the other nearby sites.	Section 4.2 of the Aboriginal Archaeological Assessment Report (Appendix G of the EAR) describes the ethnographic information that was used as part of the assessment of Aboriginal heritage. This included consideration of the *Lower Shoalhaven River Valley: Aboriginal Heritage and Cultural Mapping Project* prepare by Goulding in Schell in 2002, which provides a synthesis review of ethnohistoric material for the area. It is highlighted that OEH are satisfied with the level of ethnohistoric information provided for the Aboriginal Archaeological Assessment Report. Land tenure is not a component of an Aboriginal archaeological assessment. The Nowra Local Aboriginal Land Council has not objected to Option 1. Kelleher Nightingale Consultants concurs that site BCRP 011 extends outside the proposed impact corridor. This portion of the site will be conserved. KNC also concurs that more artefacts exist within BCRP 011 than were observed during the field survey. Subsurface deposits will almost always contain more objects than surface deposits. Archaeological scientific significance however is not linked to the number of artefacts; rather significance is related to the information present within objects and/or sites. The potential information content of the impacted portion of BCRP 011 is limited by existing disturbance and poor integrity of the soil. In sum, BCRP 011 extends beyond the potential impact corridor. The potentially impacted portion represents a portion of the overall site. The impacted portion of BCRP 011 exhibits relatively low archaeological value.

TAG	Issue Summary	Detailed Issue Description	Issue Response
5B	Option 1 and 2 will have the greatest impact on Aboriginal Heritage	The central option will significantly impact the aboriginal heritage of the park. The Aboriginal Heritage tends to be ignored and will be jeopardised. These types of places are continually being destroyed and soon there will be nothing left. The report has incorrectly mapped the route for the West Cambewarra Rd option, which has subsequently been modified and therefore results in an over-estimate of the Aboriginal Heritage impacts of Option 3. Option 3 would be more culturally sensitive as the route impacts less on aboriginal archaeological values.	The potential impact of the three route options was considered in the Aboriginal archaeological report in accordance with the project requirements to assist in the development of concept plans. An updated assessment of the potential impacts of the most recent concept plan is attached in **Appendix E** and summarised in **Section 6** of this report. Some specific impacts have changed as a result of the refinements, but the overall impact on archaeological significance has not changed.
5C	Option 2 and 3 will have a greater impact on Aboriginal Heritage	Aboriginal archaeological sites along Option 1 are rated of low significance compared to Option3.	Council generally agrees with this comment and does need to respond. Kelleher Nightingale has updated the significance of potentially affected items and the assessment of the level of impact on those items. See **Section 6** and **Appendix E**. Based on comments from the local Aboriginal community Kelleher Nightingale identify that the archaeology associated with Option 2 and Option 3 is considered to be more culturally significant than the archaeology associated with Option 1.
5D	Aboriginal assessment, including level of consultation with the Aboriginal Community, is inadequate.	The Aboriginal assessment is not consistent with the DGRs. Evidence of which groups were contacted should be provided – in particular the Shoalhaven Elders and Friends Group. No conclusions of the significance of Aboriginal heritage items should be drawn until appropriate Aboriginal people have been consulted. Reference is made to one Aboriginal person being consulted in 2009. This is clearly an inadequate level of Aboriginal consultation for such a significant proposal. This minimal level of consultation is not acceptable, especially when Aboriginal people can	Aboriginal community consultation was undertaken in accordance with the relevant OEH requirements. OEH has confirmed the adequacy of the consultation in its submission to the EAR. According to the NPWS website, the Reconciliation Wall is a mosaic and clay tile decorated wall which acknowledges the special significance of Bomaderry Creek for Aboriginal people, and results from collaboration between children and adults from Shoalhaven High School, Boori pre-school, the Shoalhaven Aboriginal Elders Group and the NPWS. While this wall has obvious cultural significance it is not identified

TAG	Issue Summary	Detailed Issue Description	Issue Response
		demonstrate continuous use of this area and there are organizations and individuals in Nowra and surrounds who are appropriately authorised to provide advice. Impacts to the Reconciliation Wall have not been considered.	as an Aboriginal archaeological object as defined under the *National Parks and Wildlife Act 1974* and therefore does not form part of an Aboriginal archaeological assessment. There will be no direct impact to the fabric or immediate setting of the Reconciliation Wall as a result of any of the NNLR route options.

Table 6 – Other Issues Summary and Responses

TAG	Issue Summary	Detailed Issue Description	
6. Other			
Inadequacy of Assessment			
6A	The EAR is inadequate due to lack of design and not assessing construction issues.	Since temporary construction impacts can constitute major impacts on the environment, how can there be any meaningful understanding of the implications of the project and development of mitigating measures for consideration by the community if there is to be no detailed assessment? Equally, if there has only been a limited amount of design development how can the proponent carry out a meaningful assessment of the direct and indirect impacts of the proposal? Proposed route descriptions are too vague.	The application that has been prepared by Council is for a Concept Plan. As explained in Section 1.5 of the EAR a Concept Plan approval would not necessarily permit Council to commence with any construction activities. Rather, a Concept Plan approval would give Council the confidence to progress with design development of the approved route option, including carrying out detailed construction planning activities as well as further environmental impact assessment to ensure that appropriate mitigation and management measures are identified and implemented prior to construction activities commencing. The outcomes of this additional environmental impact assessment process, including the adequacy of mitigation and management measures would be subject to further assessment approval by the relevant agencies, and may, where appropriate, include for further public exhibition and community consultation. In accordance with the above, it is not considered necessary or appropriate for Council to consider in more detail construction related issues than has already addressed in the EAR. Further, Council has not yet carried out geotechnical investigations which would inform the construction methodology and the soil and water management and mitigation measures. The EAR sets out a level of impact that Council expects to be able to meet. As part of the detailed design development for the approved route option, Council would provide

TAG	Issue Summary	Detailed Issue Description	
			refined assessment which would conclude whether the project could be constructed and operated within these expectations, with consideration of specific mitigation and management measures to be applied.
6B	EIA not impartial	The three NNLR options have not been considered impartially and there is a preference towards supporting the Council's preferred option. Council has shown little interest in impartially explaining the issues involved and encouraging residents to provide an input.	The EAR openly and transparently describes all of the issues associated with the three NNLR route options. Each section in the EAR provides an analysis which is based on the outcomes of technical assessments by specialist consultants. For each route option, the various specialists have identified whether significant environmental impacts are likely to occur, and what mitigation and management measures are available to reduce the predicted environmental impacts. The EAR summarises the likely impacts of each route option, and provides a comparative analysis of the relative benefits and impacts of each route option. While it is agreed that Council has a preferred option, it is considered that the open and transparent assessment provided in the EAR allows for each interested member of the community to draw their own conclusions in relation to balancing the benefits and impacts of each route option.
6C	Ranking System too simple.	The final rankings for the three route options use a numerical matrix to ascribe risks and benefits associated with the proposal across environmental, socio-economic, heritage, traffic and visual aspects. This simple numerical ranking does not account for the complexities and scale of potential impacts on biodiversity for very rare endangered species such as Bomaderry Zieria relative to (for example) a time saving for traffic, or a noise impact on a local resident. The scoring system is too limited to allow sensitivity in the outcomes.	The ranking system provided in the EAR is a tool to assist Council and the DoPI to evaluate the relative benefits and impacts of the three route options. It is necessary to consider the ranking tool in this context, as part of an overall environmental impact assessment framework for balancing out many different issues and competing priorities. Council has placed significant weight on maximising benefits across the road traffic network, as well as ensuring value for money, and this has certainly influenced the overall rankings. It is highlighted that if the financial

TAG	Issue Summary	Detailed Issue Description	
		Such numerical rankings across vastly different aspects and impacts of the proposal oversimplify the process of arriving at a preferred route option. The indirect impact on existing residential areas for Option 3 is too high (the setback would reduce this impact), and the amenity impact on the gorge is under rated. Changing these 2 scores accordingly would better reflect the comparison of the Central and Northern Routes.	feasibility of the NNLR drops too much then Council would not consider funding the road, but would instead investigate other options. This would be likely to jeopardise the growth projected for North Nowra under the NBSP. Notwithstanding the above the complexities, scale and significance of potential environmental impacts was based on the input provided by specialists, including specialist ecologists, specialist Aboriginal Heritage consultants and specialist noise consultants. These specialists have determined whether significant impacts are likely, the scale of these potential impacts, and whether measures would be available to reduce the potential impacts. Certainly there remain uncertainties in the level of potential impact and the mitigation measures that could be applied, due to the limited amount of design that has been done to date. However, it is the opinion of the relevant specialists that none of the issues are insurmountable and that design solutions, mitigation or management measures are available to ensure that the environmental impact for each of the route options would be acceptable. I.e. that none of the possible issues for each of the route options would result in environmental impacts that could not be mitigated to the point that they would be unacceptable and prevent the road from proceeding. In this context, the ranking system is a tool to assist Council in determining the best route option on balance.
6D	Community consultation inadequate	Shoalhaven City Council has not conducted any community consultation regarding this specific proposal. The consultations to date do not constitute formal and impartial consultation, based on presentation of all the facts and figures to the community. The proponents	Section 9 of the EAR documents the community consultation that has occurred for the NNLR. It is highlighted that the NNLR has had a long history, and that consultation has occurred through many forms, including as part of strategic and statutory planning documents, as part

TAG	Issue Summary	Detailed Issue Description	
		should be facilitating genuine community consultation on all the options Consultation carried out in response to the 2009 DGRs was not detailed enough, not adequately focused, was totally lacking with regard to the general community and community groups and thus ineffective. No attempt has been made to justify this overall inappropriate level of community consultation. This inadequate treatment of this basic requirement of the principles laid down in the EP&A Act with regard to community consultation is further demonstrated by the lack of attention to the many requirements and expectations detailed in the DoPI's 2007 Guidelines for Major Project Community Consultation. The proponent has failed to comply with the DGRs with regards to its Consultation requirements. Residents were not adequately consulted. No maps were provided to the residents during the consultation process. The lack of detailed diagrams, plans, technical details and environmental descriptions is disappointing and results in a poor assessment outcome. Express its concern at the relatively short exhibition period allowed for such a complex and detailed series of documents. Difficulty accessing the planning documents online.	of previous development applications, and through community surveys carried out by Council and by local politicians. A brief summary of the consultation for the NNLR is provided below: ▪ Inclusion as part of the first Nowra Bomaderry Structure Plan in 1974. ▪ Inclusion as part of the 1986 Shoalhaven Local Environmental Plan. ▪ Consultation activities (including statutory consultation) as part of the 1992 development application. ▪ Community survey and public meetings in 1995. ▪ Community consultation by way of newsletter distribution and public meetings in 2001. ▪ Inclusion in the NBSP, which included public meetings in 2006. ▪ Community survey by local Member of Parliament in 2006/2007. ▪ Consultation by way of distribution of community information sheets and community survey in 2007, carried out by Council. ▪ A planning focus meeting with the relevant Government agencies in 2007. ▪ Targeted follow up consultation, including meetings and correspondence with DoPI, OEH, RMS, Endeavour Energy and the NSW Rural Fire Service during 2009 and 2010. It is clear from the above list of consultation activities, and

TAG	Issue Summary	Detailed Issue Description	
		With regard to the public display period, it was clearly too short a period of time for anybody to adequately deal with the very large number of documents and the complexity of them. The majority of community members would have taken one look at the documents whether on the web page or available locally as hard copy and turned away in despair. This would be due in part to their complexity, but I believe more due to the fact that the proponent failed to conduct a focussed and effective community consultation process during the almost 2-year period from May 2009 to February 2011 as required by the DGRs. It is my view that this EAR should not have been released until that part of the DGRs had been complied with. During the formal display period, community participation may have been improved by mounting a display at the hard copy outlets interpreting some of the more relevant details and explaining the participation process.	the cumulative feedback that has been obtained over the years, and the substantial local coverage of the project in the local media, that the NNLR is a project about which the relevant stakeholders are aware. It was not considered necessary to consult further with the local community in the preparation of the EAR for the Concept Plan since the views of the local community were well known and had been taken into account by Council in its decision to proceed with the Concept Plan application. This decision is supported by the response to the public exhibition of the EAR for the NNLR which attracted a large number of submissions which reflect similar views and concerns as have been obtained from previous consultation exercises.
6E	The site analysis of the BCRP is inadequate it does not deal with the values of the BCRP and Bushland. The EAR has not adequately addressed the recreational	The Site Analysis seems to seek to downgrade these values by reducing the very important features of the Bushland to a brief summary, omitting some very significant features, concentrating on the Regional Park rather than the Bushland as a whole and by making unsubstantiated comments such as: "*…but the grounds are not well used due to being concealed and the access being located on a dead-end street.*" This so-called analysis follows the same line as much of the whole series of documents associated with this Concept Plan Application, and that is, it fails to look at	A detailed analysis of the recreational, educational and tourism values of the BCRP and the surrounding bushland has been carried out in **Section 5** of this report. This analysis is supported by plans provided in **Appendix F**. **Section 5** also provides an assessment of the impacts of the NNLR route options to the recreational, educational and tourism values of the BCRP and surrounding bushland, which are summarised in the response to issue 3A. In response to the specific issues raised:

TAG	Issue Summary	Detailed Issue Description	
	values of the park	(and as a consequence fails to analyze) the study area as a whole, i.e., as the Bomaderry Creek Bushland. The so-called analysis also underrates the area of the Regional Park within the Bushland and overrates the importance of the area of Council land therein. The Park constitutes about one third of the Bushland, the Council owned land also constitutes about one third and the remaining one third is taken up mostly with Crown land and a small percentage of freehold. Full details of the amenities in the BCRP need to be provided including: an attractive entrance and parking area, a pleasant walk past regenerated bushland to a very attractive picnic area with toilet facilities (suitable for the disabled), sheltered picnic tables, a gas barbeque and interpretive signage including an outstanding reconciliation wall. Scenic zonings should not be considered environment protection. The only reference to the recreational values of the Park in the EAR is dealt with in a summary fashion which is quite inadequate given the clear impact of the road being constructed within a few metres of the entrance to a picnic area and the cutting off of a track specifically developed for the disabled.	▪ It was not intended to undervalue or disregard the entirety of the Bomaderry Creek Bushland. The ecological and Aboriginal heritage assessment considered the entire study area equally. In relation to the recreational values of the bushland, it was considered important to highlight that a significant quantum of these values are located on Council owned land and they are currently maintained by Council (e.g. Bernie's Lookout, and most of the long loop walk through the Bomaderry Creek Gorge). ▪ **Section 5** includes a detailed description of the picnic and amenities area, and provides an assessment of the impacts of the NNLR route options on the physical fabric of this area, the access arrangements, and the amenity – with consideration of the noise and visual effects. ▪ It is agreed that scenic zonings are not environment protection zones. The EAR refers to some of the Council owned land adjacent to the BCRP as being zoned for conservation. Most of the Council owned land adjacent to the BCRP is zoned for open space – recreation, and so is managed accordingly to conserve the recreational values of this land. Some of the land located in the south east of the study area is zoned for environmental protection.
6F	Errors in the Biodiversity Assessment	▪ Incorrect mapping of Spotted Gum – Turpentine Tall Forest as Spotted Gum Blackbutt Forest ▪ Figure 16 is inaccurate.	Map amended and attached in **Appendix D**.

TAG	Issue Summary	Detailed Issue Description	
Potential Future Development			
6G	The construction of the NNLR will potentially lead to future development within the bushland.	Due to proposed development of the road and increased motor traffic there is potential for the bushland to be developed for residential purposes. The NNLR will give the green light for significantly more development.	It is one of the primary objectives of the NNLR to support growth in North Nowra (and beyond) as envisaged in the NSW Government endorsed NBSP. The growth envisaged in the NBSP, and summarised in Section 2.3 of the EAR, includes: ▪ Consolidation and revitalisation through increasing permitted densities in the existing living areas within North Nowra, focussed mostly around the Illaroo Road McMahons Road intersection. ▪ New living areas proposed at Crams Road and Bangalee Road West. In addition to the above, it is identified that the NBSP Background Report identifies two additional areas in North Nowra as possible future living areas. These are: ▪ The area of Crown Land between the BCRP and Illaroo Road which is currently subject to an Aboriginal Land Claim, bounded by Falcon Crescent. Option 1 would pass through this land. ▪ A triangle of land wedged between West Cambewarra Road to the north, the BCRP to the south and Bomaderry Creek riparian corridor to the east. Option 3 would pass through this land. These possible future living areas have not been investigated at this stage by Council, however they may be investigated in the future to determine their suitability for rezoning for residential development.

TAG	Issue Summary	Detailed Issue Description	
			Council therefore agrees in part with the sentiment of this comment, in that the NNLR will support future development in and around North Nowra. Notwithstanding this, it is highlighted that the EP&A Act sets out a rigorous environmental impact assessment process to determine whether any land is suitable for rezoning, and to govern the nature of development on that land.
Other Environmental Issues			
6H	Increased risk of soil disturbance, erosion and pollution of the BC are substantial.	Increased risks of soil disturbance, erosion and pollution of the BC are substantial. For the construction period these impacts include over-clearing through poor delineation of the site and overall disturbance, degradation and compaction of the soil due to stockpiling, erosion through loss of vegetation and breaking up of the sandstone for construction, contamination of Bomaderry Creek by petrol spillage and concrete waste, introduction of weeds, exposure of leachate from former land fill on the Southern route. The Southern Route would involve impacts within the riparian corridor, due to the width of the Gorge at this location and the need to construct footings and piers for the bridge. The activities and impacts represent high level risks and potential irreversible impacts to Park and Bushland biodiversity and integrity and to water quality and to the riparian areas of Bomaderry Creek and its gorge. There seems to be limited mention of any plans to address soil erosion along the routes. Such statements do not inspire confidence that the prevention and	See response to Issue 6A in relation to construction related issues. Section 17 of the EAR identifies the potential impacts in relation to flooding, water quality and erosion/sedimentation issues, which are generally similar for each of the route options. There is a large range of possible mitigation and management measures that could be applied during construction and operational activities to ensure soil and water pollution impacts are minimised, and these would be similar for each of the route options. The types of mitigation measures that would be considered during the detailed design development and construction planning phases are detailed in **Section 7** of this Response to Submissions Report. As part of the detailed design development for the approved route option, Council would provide refined assessment to identify which mitigation and management measures would be applied to ensure that the predicated environmental impacts meet the expectations.

TAG	Issue Summary	Detailed Issue Description	
		mitigation measures have been thought through and that they would in fact prevent and minimise these potentially high impacts. Water pollution control technology is simply not capable of replicating natural runoff quality from native vegetation. There is no way of preventing pollution of Bomaderry Creek and the Park and Bushland environment from the construction and operation of a major road. All that gross pollution control traps would do is collect trash and solids that would have to be periodically cleaned out and taken away. Who would have responsibility to do this? Any NNLR should be consistent with the *NSW Groundwater Dependent Ecosystems Policy*, and should maintain natural patterns of groundwater flow and not disrupt groundwater levels that are critical to Groundwater Dependent Ecosystems.	In relation to groundwater dependent ecosystems it is identified that the vegetation community Kunzea Shrubland mapped in **Appendix D** is potentially reliant to some degree on groundwater. Elements of this community are located to the north and south of the Central Option and in close proximity to the Southern Option. It is highlighted that the NNLR has not been subject of any rigorous design, and so it is unknown what final levels will be developed. However, for each of the route options, the terrain through which they pass is generally flat, and it is unlikely that substantial cuttings and embankments would be needed, except in close proximity to the Bomaderry Creek Gorge, where they road would be developed on a bridge. Due to the expected low requirements for substantive cuttings and embankments it is unlikely that groundwater flows would be substantially modified in the BCRP and surrounding bushland. Council would ensure that the geotechnical investigations to be carried out for road design would consider the potential groundwater issues and that the road would be designed to minimise disruption to groundwater levels and minimise adverse impacts on groundwater systems, in accordance with the *NSW Groundwater Dependent Ecosystems Policy*.
6l	Option 3 route is prone to flooding	Option 3 is flood prone and therefore not a good option. Option 3 would require road approaches and the bridge to be constructed at a high level due to the periodic flooding at Bomaderry Creek and the end of West Cambewarra Rd. Other options are less prone to flooding or floodway restrictions	Council generally agrees that Option 3 is more constrained by risk of flooding due to the lower and flatter nature of the Bomaderry Creek Gorge at the location of the bridge crossing. This has been reflected in the discussion in Section 17 of the EAR, and in the comparative analysis of the route options.

TAG	Issue Summary	Detailed Issue Description	
Revocation			
6J	Revocation of land is unacceptable	The State Government policy relating to such revocations requires the matter to be one of exceptional circumstances and where no suitable alternative sites are available outside NPWS land. The policy goes further by giving an example of such exceptional circumstances, e.g., "... a major highway routing or upgrade". 'Where is it established in this application that such exceptional circumstances exist? Once an area is protected the community expects that it would be removed from any future development consideration except in exceptional circumstances. In this case there is a viable alternative.	The NSW Government has a Revocation of Land Policy which relates to the consideration of land revocation from regional parks (*inter alia*) for the purposes of development. That policy specifies that revocation of land is: ▪ An avenue of last resort, where no other practical options are available. ▪ Investigated only in exceptional circumstances and where no suitable alternative sites are available. The EAR in its entirety relates directly to the specific circumstances and objectives of the project, and the alternatives that have been considered. These matters have been summarised in Section 21 of the EAR with a view to specifically address the requirements of the Revocation of Land Policy. In particular: ▪ The NNLR is an avenue of last resort, which, if not progressed, will require Council to reconsider the growth envisaged for North Nowra under the NBSP. ▪ Council has demonstrated that no other alternative is available and that one of the NNLR route options which require revocation of land from the BCRP is an avenue of last resort. (Note: all three of the route options in the EAR would require revocation of land from the BCRP). It is therefore considered that the NNLR is an exceptional circumstance for which revocation of land from the BCRP is appropriate. The subsequent analysis therefore relates to the question of degree of revocation, which is different for each route option. This is addressed through the balancing

TAG	Issue Summary	Detailed Issue Description	
			of all environmental benefits and impacts of each route option. On balance, Council considers that the Central Option remains the most suitable route option even though it has the largest quantum of revocation.
Other Issues			
6L	Approvals more complicated for Central and Southern Options	Approvals more complicated for Central and Southern Options – resulting in increased uncertainty and more project risk in terms of viability. The northern option would not affect any commonwealth species and so would not require Commonwealth approval. In the interests of reducing the time frame for the approval of this project and ensuring that the project will actually go ahead, it is an important matter that this route is the only one under consideration that will not require the matter to be referred to the Australian Government for approval under the Environmental Protection and Biodiversity Conservation Act.	Council generally concurs with these comments. Regulatory uncertainty is high for both Option 1 and Option 2. This is precisely the purpose of seeking Concept Plan approval, to afford Council the certainty required to progress with detailed design, construction planning and associated environmental impact assessment.
6M	Financial and resourcing impacts.	Increased animal vehicle collision will impact on the resources and costs of animal welfare and wildlife rescue and recovery organisations. Loss of Landcare/Bushcare resources, and in-kind community resources for management of offset areas if it were transferred to OEH. The proponent should indicate whether it proposes to fund contribute to future management of the offset area.	As part of the detailed design development and further environmental impact assessment detailed mitigation and management measures will be developed to ensure minimal animal vehicle collision will occur. It is highlighted that animal vehicle collision is likely to occur whether the NNLR is constructed or not. As the network becomes more congested then VHT and VKT will increase across the network, increasing the potential for animal vehicle collision on other parts of the network. Irrespective of this, it is acknowledged that the location of the NNLR Central and Southern Options is significant in

TAG	Issue Summary	Detailed Issue Description	
			regards to the potential for animal vehicle collision. As part of the design stage it is proposed to use a technical specialist to undertake predictive modelling to identify and quantify the potential impacts of vehicle collisions and incorporate mitigation measures against this modelling to reduce animal and human trauma. Council is willing to provide some ongoing funding and/or management of the offset areas that are proposed to be transferred to OEH. Council is willing to negotiate this with OEH (and other stakeholders) during the design phase.
6N	Councillor Interference	The preferred option being pushed by council is a result of Councillors being concerned about the value of their homes.	It is highlighted that the decision to proceed with the application has been carried through a full Council resolution. The selection of the preferred route option is based on a wide number of factors including the outcomes of technical assessments by specialist consultants, and balancing of a number of issues. For each route option, the various specialists have identified whether significant environmental impacts are likely to occur, and what mitigation and management measures are available to reduce the predicted environmental impacts. On balance, this analysis has concluded that the Central Option is the preferred route option.

3.1 Responses to Government Agencies

3.1.1 Department of Planning and Infrastructure

The Southern Regional office of the DoPI supports Option 1 as it considers it pivotal in the delivery of growth areas identified in the NBSP, which will help the Shoalhaven to provide for the growth forecast under the NSW Government's South Coast Regional Strategy.

Summary of Issues

The DoPI has also requested that the following issues be addressed in the Response to Submissions Report:

1. More comprehensive analysis is provided to address a more extensive range of traffic improvement scenarios and combinations of scenarios, including:
    a. All link road options with MVRLK;
    b. All link road options with RCR Improvements;
    c. All link road options with both MVRLK and RCR Improvements;
    d. All link road options with third bridge over the Shoalhaven River;
    e. RCR Improvements in isolation (without NNLR);
    f. Third bridge in isolation (without NNLR); and
    g. RCR Improvements and third bridge (without NNLR).
2. Further consideration of a 5-leg intersection at the eastern end of the Northern Option should be provided.
3. Consideration should be provided for extending West Cambewarra Road to the Princes Highway along the historic alignment.
4. A more in-depth analysis of fragmentation impacts on BCRP, including potential impacts on flora, fauna and recreational users, as well as additional detail in regards to design and location of fauna crossings.
5. Fragmentation and edge effects be considered in the context of possible clearing/development of land adjacent to the park which is zoned 2(c) Residential.
6. Further information be provided in relation to the protection of Bomaderry Zieria from indirect impacts associated with construction and operation of Option 1, including providing indicative measures to mitigate possible detrimental impacts.
7. Council clarify whether *Hibbertia sp. Nov. Menai* will be potentially affected by clearing.
8. Council provide indicative access/intersection arrangements between Option 3 and West Cambewarra Road.
9. Better mapping of the extent of Lowland Rainforest Endangered Ecological Community be provided.
10. Council provide the results of additional fauna surveys that were agreed to.
11. Aboriginal heritage impact assessment be amended to take into account the modified alignment of the Northern Option.
12. Consideration be provided to reducing the overall width of the proposed route corridors to 20m.

13. An A3 sized plan be provided which shows all three route options laid over an aerial photograph.

Response to Issues

Responses to the above list of issues raised by the Department of Planning are provided below. Responses to items numbered 1-3 have been prepared primarily by the traffic specialist from Council.

1. More comprehensive analysis to address a more extensive range of traffic improvement scenarios and combinations of scenarios.

We have provided additional analysis below in response to the specific comparisons requested by the DoPI. However, it is highlighted that the traffic modelling presented in Appendix E of the EAR is considered sufficient to address this request for a more comprehensive analysis, and no further traffic modelling has been carried out.

There are very sound reasons why the options and variations to options were modelled in the way they were.

At **Appendix B** of the Response to Submissions Report Council has prepared a summary of the results of key parameters in the traffic modelling. That information has been compiled to assist the reader to better understand some of the key findings of the traffic study, particularly on some of the key issues raised in the submissions and queries from DoPI.

That information will also inform the reader of the correct interpretation of the modelling results which is useful (for example to demonstrate that it is not necessary to model all three base options with MVRDLK and RCR to make a decision to adopt a preferred link road option - to do so would be un necessary and add un necessary cost).

The working party (Council, RMS, and AECOM) formed to workshop issues arising and review / oversee the AECOM traffic modelling study originally agreed that the modelling works undertaken were sufficient and that no additional analysis was necessary (that is the working part considered that there is sufficient information in the AECOM report, and from the original TRACKS analysis, to be able to interpret the likely results of modelling of other options with MVRDLK and RCR), as described in **Appendix B**.

The RCR option was tested only with the central option, and the impacts of the MVRDLK was tested only with both Options 1 & 3, however this was based on sound reasoning as indicated herein.

The primary purpose of the working party established for the NNLR options study (AECOM report) which included Council and RMS technical staff was to ensure the modelling was sufficiently realistic and robust to be confident of the results and that both road authorities were comfortable with the modelling and outcomes recommended.

Because of the high costs of undertaking detailed traffic modelling; the main objective was to ensure that sufficient modelling was undertaken to be able to understand the relative benefits or impacts of each option and to be confident in selection of a preferred option for the link road.

The original brief included a Do Nothing Option (all growth as envisaged under the NBSP), a second Do Nothing Option (background growth considered along the main road network but with no further growth in North Nowra), and all three link

road options with growth as envisaged under the NBSP. All of these options were to be tested in the AM peak, the PM peak, and all at 2016 and 2036.

Illaroo Road to Moss Vale Road link (MVRDLK)

Because of the outcomes of the TRACKS analysis which looked at eleven options (all with / without a MVRDLK in 2006, 2016, and 2036), the working party agreed that it would be interesting to consider the impacts of the MVRDLK in the Paramics modelling analysis.

The results of the TRACKS analysis (with/without the MVRDLK) are shown and discussed in **Appendix B**.

Based on the TRACKS analysis if Option 1 or 2 were selected as preferred option the working party agreed this would have little relevance, as the Options 1 & 2 links remove the most amount of traffic from Illaroo Road and the most amount of traffic from the most critical section of Highway (between Bolong Road and Illaroo Road). Also, the more northern the option the higher the values of VHT and VKT were, which have an adverse impact on the BCR.

The MVRDLK is one of the primary road links required as part of the NBSP. Its role is to facilitate access to the Moss Vale South (east) release area providing access to new residential and commercial development and importantly to provide direct access between Moss Vale South and North Nowra to reduce the impact of the new release area on the state road network (Moss Vale Road and Princes Highway).

The close proximity of Option 3 to the MVRDLK means that it is vital to consider whether it (Option 3) would still be viable considering that the MVRDLK is considered to be a necessary link in the context of the NBSP.

The TRACKS analysis found that modelling Options 1 & 2 with the MVRDLK had no bearing on the ranking of these options, that is, Options 1 & 2 remained a very high ranking compared to other options with/without the MVRDLK.

However the TRACKS results did not show the same result with Option 3 (the modelling demonstrates that the Moss Vale Road Link does not interact well with Option 3).

Refer to the summary of the TRACKS modelling assessment provided in **Appendix B** which identifies that Option 3 would reduce in rank over time (because of the adverse impacts at the Highway / Moss Vale Road) but also that Option 3 reduces in rank when modelled with the MVRDLK, indicating that both roads are not required.

Accordingly, the working party agreed that it was only considered necessary for Options 1 & 3 to be modelled with/without the MVRDLK, noting that a more comprehensive TRACKS analysis has already looked at this issue for eleven options (which included all three of the options being considered as part of the 3A project).

The test was primarily to assess whether the AECOM Paramics model would indicate similar findings to the TRACKS analysis with respect of Option 1 (Council preferred) and Option 3, and this was undertaken.

A summary of results of the TRACKS and AECOM analysis (BCR calculations and rank, with / without the MVRDLK) can be found in **Appendix B**.

River Crossing Relief Option (RCR)

In regards to query about the RCR option only being modelled with Option 1; the RCR option was never a part of the original works required to meet the DGR's, nor was it ever really required in the view of the working party.

In-depth consideration of the RCR (including broader modelling analysis of the Highway and solutions to address Highway capacity) goes beyond an assessment of a local road project (which is a Council responsibility) to a State road authority responsibility (i.e. assessing solutions to resolve congestion on the State road network).

Even the RMS, in their role of part funding of the NNLR project and providing technical input to the working party overseeing the development of the AECOM report, agreed that it was not the role of the NNLR study (or Council as a local roads authority) to delve into more detailed assessment of Highway capacity and solutions to address capacity constraints.

The base model results indicated that the NNLR in isolation would have considerable benefits to the Highway by removing traffic from the critical part of the network (i.e. the Princes Highway between Bolong Road and Illaroo Road). These results are summarised in **Appendix B**.

All 3 base options reduced traffic and overall average delays in the critical zone on the Highway (Bolong Road to Illaroo Road), to varying degrees, which has a positive impact on the Highway.

Option 2 resulted in the greatest reduction in traffic and overall average delay through the intersections of Bolong and Illaroo Roads, closely followed by Option 1.

Option 3 showed least reduction in traffic and overall average delay through the intersections of Bolong and Illaroo Roads.

Despite these results, the Paramics model showed a queue on the Highway north of Bolong Road (transfer of queue from Illaroo Road), this was primarily because the model parameters were not adjusted to optimise flows based on the changed traffic patterns (not that this would be expected to occur in reality, in reality the signal parameters would be adjusted based on changed traffic patterns to optimise the integrity of the Highway).

The decision not to tweak the Paramics models to optimise the performance of any individual option was a decision of the working party to avoid any criticism that results were tweaked in any way in the modelling.

In reality however traffic signals would be adjusted by RMS to optimise traffic flows and considerable reduction in delays would result from the modelled reduction in traffic (at the level of congestion observed in the modelling, even small decreases in traffic would result in far more considerable reductions in delay, the relationship is not linear).

Because of the base model results that showed a queue on the Highway north of Bolong Road (transfer of queue from Illaroo Road), rather than tweak the signal parameters in the model to address the issue (as would occur in reality), because the extent of tweaking would vary from option to option; the working party agreed to consider instead a suit of low cost options on the Highway (that could be applied to all options) to determine whether this would be sufficient to address the queuing problem (primarily to respond to any concerns about the base modelling results).

The RCR option was agreed to by the working party as a variation of the original brief; and solely in the context of seeing whether (hypothetically) a low cost solution could address the apparent adverse queuing impact on the Highway (which would not be expected to occur in reality, as noted above) without having to tweak the traffic signal parameters in the individual base link road options.

Because the RCR would be the same for each option and because the RCR predominantly reflected low cost improvements at/on the Highway, it was only considered necessary to test this for one option, as the same relative improvements would be expected for each option.

Because Option 1 emerged from the preliminary modelling runs to be by far the best performing option in transport economic terms, and as a result of the higher absorption capacity at the Highway (Option 1 shifts more traffic from Illaroo Road to the link road than any other option) Option 1 also happened to be associated (in the modelling) to have marginally greater queuing consequence on the Highway, immediately to the north of Bolong Road.

This was the main reason why option 1 was the obvious option to test the RCR and the working party unanimously agreed that Option 1 would be tested with the RCR, and if the RCR was seen to address the queuing in the model it was agreed no further action would be required.

It is reiterated that the queuing observed in the model would not be expected to occur in reality. **Appendix B** summarises the very considerable reductions in traffic on the critical section of Highway (between intersections Bolong Road and Illaroo Road) and solely as consequence of those reductions in traffic very considerable reductions in delay (less queuing) would be expected on the Highway and at both Illaroo and Bolong Roads.

The benefits to the Highway of the base link road options (without the RCR) is demonstrated in the SIDRA modelling (the SIDRA program is automatically designed to optimise conditions based in the input traffic flows), however the Paramics model was validated with real time traffic signal parameters (as they operate now) and these parameters were not amended in the model to optimise flow conditions (as explained above) due to the fact that different levels of amendment would be required for each model option and the working party were concerned about potential criticisms that certain options may have been deliberately tweaked to achieve better results than other options (it was agreed that the models outputs would be assessed “as modelled” without any tweaking of the models to optimise individual results, despite the fact this would be the approach in reality).

The modelling results showed that the RCR option did address the queuing problem, which in the modelling returned conditions to pre link road conditions at Highway / Bolong Road.

Because of that finding (with the RCR), the working party had no further interest with the RCR option, it was not necessary to test the RCR with all of the other options, as similar relative improvements could be expected, and it was certainly never intended to undertake any of the RCR works.

It was intended (test of the RCR) solely to identify that if traffic problems did arise as a consequence of the link road that there were low cost solutions that could address the problem, and the working party (including the RMS) were satisfied that the benefits of the link road (particularly Options 1 or 2) alone would provide marked improvements to the Highway (between Bolong Road and Illaroo Road at the northern end of the bridges) and that the RCR would not be required in reality solely as a consequence of the link road.

As stated above the RCR was a hypothetical test only, as the queuing observed in the modelling would not even be expected to occur in reality, that is the reductions in traffic at the intersections of Princes Highway (Bolong and Illaroo Road) as consequence of the NNLR (alone) would result in considerable improvement to traffic conditions, these results can be seen in the summary tables included in **Appendix B**.

Further comments about the individual modelling assessments requested by the DoPI are provided below. We have provided additional discussion below to identify that in our view (and the view of the RMS), that sufficient modelling analysis has already been undertaken to determine the relative benefits/dis-benefits of the respective link options and to determine the best option to proceed to detailed design / construction stage (Option 1 remains Council's preferred Option, also supported by the RMS – being the option that provides the greatest transport benefits in relation to costs and is the option that can be accommodated with least impact to the Highway and least impact to existing Bomaderry Streets).

Option 3 is not supported by Council or RMS due to Option 3 providing the least benefits to the broader network in transport economic terms, provides the highest values of VHT and VKT (thus greater indirect social, economic and environmental impacts) and is the only option that leads to unacceptable traffic impacts at the Princes Highway/Moss Vale Road/ Cambewarra Road intersection.

These conclusions can be drawn without additional analysis. The above response also details why additional analysis is not considered justified.

The traffic modelling presented in Appendix E of the EAR is also considered sufficient to address this request for a more comprehensive analysis.

a) All link road options with MVRLK

Further to the details provided above, while the AECOM Report tested both Options 1 and 3 with and without the MVRDLK, the TRACKS analysis (provided in Appendix F of the AECOM Report) tested all three route options (as well as 8 other options) with and without the MVRDLK. The result of this analysis shows that Option 1 performs the best on a benefit-cost ratio analysis against a long list of 11 route options (both with/without the MVRDLK).

The AECOM Report only modelled Option 1 and Option 3 with the MVLKRD. The AECOM Report presented paramics modelling which was generated to investigate a more focussed study area (e.g. North Nowra and Bomaderry) and more specific congestion times (both peak hour periods) in more detail than Council's TRACKS model (which operates across the entire network (entire Nowra Bomaderry urban area) and throughout the whole 24-hour average weekday period). The results of the Paramics modelling were generally consistent with the TRACKS model outcomes.

Certainly the TRACKS model is a more appropriate model to test the MVRDLK (being a broader study area). Due to the more refined study area in the Paramics model the modelling of the MVRDLK in the Paramics model was via a stub connection north of the intersection of Illaroo Road/Cambewarra Road (i.e. where the MVRDLK is proposed to connect in the NBSP). However the connection of the MVRDLK in this manner may have provided unbalanced results (compared to the TRACKS analysis). That is, connecting the MVRDLK in this manner (in the Paramics model) may have influenced a greater number of trips via the Option 3 link (when modelled with Option 3) than could be expected to occur in reality, however both Option 3 and Option 3 + MVRDLK were the only options that reduced the conditions at the Highway/Moss Vale Road to unacceptable levels, and Option 3 and Option 3 + MVRDLK had the highest values of VKT and VHT of the comparably modelled options.

Notwithstanding the technicalities of how the MVRDLK was set up in the Paramics modelling, the outcomes were generally consistent with the TRACKS model outcomes in that; the modelling of Options 1 & 3 didn't change order of rank (in the BCR assessment) between Options 1 & 3.

An unusual result was revealed with the Option 3 + MVRDLK option. In the TRACKS analysis for all options the addition of the MVRDLK reduced the overall BCR. However in the detailed Paramics modelling the addition of the MVRDLK reduced the overall BCR for Option 1 but increased the BCR for Option 3. This is primarily because of the very high level of congestion associated with Option 3 at the intersection of the Princes Highway / Moss Vale Road/Cambewarra Road intersection. The MVRDLK allows some traffic to be diverted from the Option 3 link to the MVRDLK (avoiding the capacity constrained intersection of the Princes Highway / Moss Vale Road) and this led to higher overall calculated benefits.

However despite the unusual result with the Option 3 + MVRDLK option; in the AECOM Paramics modelling both Options 3 and the Option 3 + MVRDLK still resulted in unacceptable BCR values (not viable according to RMS guidelines), whereas both Options 1 and the Option 1 + MVRDLK resulted in acceptable BCR values (i.e. a viable project according to RMS guidelines).

Further, despite the unusual result with the Option 3 + MVRDLK option; in the AECOM Paramics modelling both Option 3 and Option 3 + MVRDLK were also the only options that resulted in unacceptable traffic conditions at the intersection of the Princes Highway / Moss Vale Road/Cambewarra Road intersection. All other options could be absorbed on to the Highway within acceptable limits (based on RMS guidelines).

Further, notwithstanding the technicalities of how the MVRDLK was set up in the Paramics modelling, the outcomes were also generally consistent with the TRACKS model outcomes in that the ranking of forecast traffic diversions were similar between the models (that is Option 1 attracted the most traffic from Illaroo Road in both models, whereas Option 3 attracted the least traffic from Illaroo Road in both models).

The purpose of testing Option 1 and Option 3 with the MVLKRD, as stated on page 2 in the AECOM Report, was to determine whether the MVLKRD (proposed as a key strategic transport link part in the NBSP) affects the outcome of the individual analysis of the three route options being investigated. In particular, the purpose of this comparative analysis was to check that the benefit-cost ratio of the NNLR was not jeopardised by the MVRDLK, and also to establish whether the NNLR impacted on the benefit-cost ratio of the MVRDLK.

Council's TRACKS analysis (see Appendix F of the AECOM Report) compared each of the 11 route options on the initial long list to identify whether the MVRDLK impacted on the benefits of each of the route options to the point that it affected their comparative rankings.

The outcomes of the TRACKS and AECOM analysis are summarised and discussed in **Appendix B**.

The preliminary analysis carried out through TRACKS identified an issue with the combination of Option 3 with the MVRDLK. Modelling outcomes aside it is likely that Option 3 would be most affected by the MVRDLK because it is the northern-most route option with connections most similar to the MVRDLK and therefore it is a sensible outcome of the TRACKS analysis. Because of the TRACKS analysis which clearly indicated that Option 3 was not a good network combination (when provided in conjunction with the MVRDLK) the impact of the MVRDLK on Options 1 & 3 was further investigated through the detailed AECOM paramics modelling to assess whether a similar result could be concluded.

In the context of the MVRDLK Option 1 and Option 2 are very similar, both with a connection point to Illaroo Road well to the south of the MVRDLK, and eastern connections to the Princes Highway in similar locations (compared to the connection of the MVRDLK to Moss Vale Road well to the northwest).

The major difference between Options 1 & 2 is the absorption capacity (where the link road connects with the Highway), the relative benefits to the most critical section of the Highway (between Illaroo Road and Bolong Road), and the relative VHT/VKT outcomes.

Option 3 is far enough to the north and has no spare capacity to accommodate the link road at the intersection of Princes Highway / Moss Vale Road/Cambewarra Road and this had a significant impact on Option 3 both with/without the MVRDLK.

With reference to the outcomes of the TRACKS and AECOM analysis (summarised and discussed in **Appendix B**) it can be concluded that (without having to undertake any additional modelling analysis):

- The results of modelling of base options in isolation indicate that VKT and VHT both increase in value the further north the link road is
- Option 2 results in lowest values of VKT and VHT, closely followed by Option 1.
- Option 3 results in the highest values of VKT and VHT, and therefore is least capable of all options in complying with the State Government Integrated land use and transport objectives of minimising network values of VKT and VHT.
- Because Option 3 results in the highest values of VKT and VHT, it therefore has the greatest indirect social, economic, and environmental impacts of all of the options (highest overall network delays, highest overall network operating costs, and highest overall emissions) of all of the options modelled.
- The results of modelling of the MVRDLK (Options 1 & 3) indicate that VKT and VHT reduce with the introduction of the MVRDLK (options that include the MVRDLK are the highest ranked options in terms of least VKT and VHT) and the results are proportional to the base option results (option 1 + MVRDLK) has less VKT and VHT than (option 3 + MVRDLK) etc.
- This indicates that if Option 2 were modelled with the MVRDLK, consistent with the base options modelled in isolation; Option 2 + MVRDLK is likely to result in the lowest of VKT and VHT values of all the options (being the southern most of all options).
- This also indicates that if MVRDLK were modelled in isolation is likely to result in the highest of VKT and VHT values (being the northern most of all of the link road options).
- However the results of the base options (with MVRDLK) indicate the distinct advantages of building the MVRDLK (in addition to the link road) to optimise network performance by optimising network accessibility, however it would not return the same level of performance if built isolation.
- One of the distinct advantages of the MVRDLK (apart from mitigating the adverse impacts of the Moss Vale Road South growth area on the State Road network by providing a direct link between North Nowra and the Moss Vale Road South expansion area) is the advantage of providing an alternative route for traffic to travel directly between Illaroo Road and Moss Vale Road (local traffic and traffic with origins / destinations further north along Moss Vale Road) the modelling indicates benefits of removing this traffic from the very congested Princes Highway/Moss Vale Road intersection. The modelling

indicates this could work well with Options 1 & 2, but does not work well with Option 3 because the northern (Option 3) results in the greatest traffic impacts at Princes Highway/Moss Vale Road intersection.

The results of this comparative analysis demonstrate that the NNLR (any option) has good synergies with the MVRDLK, resulting in good economic parameters when combined. It was not considered necessary to analyse the MVRDLK with all three of the route options since the purpose was to understand conceptually whether the benefits of the route option were affected by the introduction of the MVRDLK, and whether the modelling outcomes were similar between the TRACKS and AECOM Paramics results.

It is important to note that Option 3 (without the MVRDLK) returned net negative economic parameters – this is largely because of the additional kilometres travelled across the road network (due its northern location) if Option 3 were constructed, and also due to the fact there is clearly insufficient capacity to accommodate the Option 3 link at the Highway / Moss Vale Road / Cambewarra Road intersection.

The combination of Option 3 with the MVRDLK returned net positive economic parameters, however the economic analysis clearly demonstrates that the entirety of the beneficial outcomes result from the MVRDLK and not from Option 3. As such, in regards to Option 3 this comparative analysis is useful in building the business case for the MVRDLK, but does not provide any further information in regards to the benefits or otherwise of Option 3.

It remains that Option 3 and the Option 3 + MVRDLK both result in BCR values that are unacceptable (project not viable in accordance with RMS guidelines) compared with Option 1 and the option 1 + MVRDLK which both result in acceptable BCR values, and that Option 3 and the Option 3 + MVRDLK both result in unacceptable traffic impacts at the intersection of Princes Highway with Moss Vale Road and Cambewarra Road where as Option 1 and the option 1 + MVRDLK can both be accommodated with acceptable impacts at the Highway.

The additional modelling of Option 2 + MVRDLK in Paramics is not justified considering the results can be reliably predicted (as discussed above and in **Appendix B**) and when this scenario has already been modelled in TRACKS and does not lead to better results than could be obtained with Option 1. This is primarily due to greater impacts modelled at traffic signals (required for Option 2) compared with the roundabout (already present and with adequate spare capacity at Narang Road as with Option1).

b) All link road options with RCR Improvements

The reasons for modelling the RCR option have been explained above. Further, the Concept Plan application is for the NNLR and is not intended to be a detailed Highway evaluation – which is the responsibility of the RMS in its role as the manger of State roads.

The RMS remains responsible for investigating any improvements to the Princes Highway (including the RCR improvements and any other options that may improve traffic flows on the Princes Highway).

This is not the unique view of Council, it is also the view of RMS.

The RCR (and more broadly the modelling analysis of the Highway and solutions to address Highway capacity) goes beyond an assessment of a local road project (Council responsibility) to a State road authority responsibility (assessing solutions to resolve congestion on the State road network).

Even the RMS in their role of part funding of the NNLR project and providing technical input to the working party over seeing the development of the AECOM report agreed that it was not the role of the NNLR study (or Council as a local roads authority) to delve into more detailed assessment of Highway capacity and solutions to address capacity constraints.

The working party (Council, RMS, and AECOM) formed to workshop issues arising and review / oversee the AECOM traffic modelling study originally agreed that the modelling works undertaken were sufficient and that no additional analysis was necessary.

The conclusions from the modelling works to date identify that:

- The benefits of the link road (particularly Options 1 or 2) alone would provide marked improvements to the Highway (between Bolong Road and Illaroo Road at the northern end of the bridges) and that the RCR would not be required in reality solely as a consequence of the link road.
- Despite the very significant traffic diversion and delay reduction results, the Paramics model showed a queue on the Highway north of Bolong Road (transfer of queue from Illaroo Road), this was primarily because the model parameters were not adjusted to optimise flows based on the changed traffic patterns (not that this would be expected to occur in reality, in reality the signal parameters would be adjusted based on changed traffic patterns to optimise the integrity of the Highway).
- The decision not to tweak the Paramics models to optimise the performance of any individual option was a decision of the working party to avoid any criticism that results were tweaked in any way in the modelling.
- In reality however traffic signals would be adjusted by RMS to optimise traffic flows and considerable reduction in delays would result from the modelled reduction in traffic (at the level of congestion observed in the modelling, even small decreases in traffic would result in far more considerable reductions in delay, the relationship is not linear).
- All of the NNLR route options would perform better with the RCR improvements in place, generally in the same proportion as their respective performance levels indicate in isolation.
- Any NNLR will be constrained until such time that the Highway improvements are addressed by the State Government, however not withstanding that the summary of modelling results provided **Appendix B** identify very considerable reductions in delay at the most critical section of Princes Highway (between Illaroo and Bolong Roads) particularly for Options 1 & 2 (minimal benefits with Option 3) solely as consequence of providing the link road.
- The working party (Council, RMS, and AECOM) formed to workshop issues arising and review / oversee the AECOM traffic modelling study consider that the modelling works undertaken were sufficient and that no additional analysis was necessary.

c) All link road options with both MVRLK and RCR Improvements

The reasons for modelling the MVRDLK and RCR options have been explained above and including details in **Appendix B**.

The main purpose of the AECOM traffic study was to undertake sufficient analysis in order to identify the relative benefits / or disbenefits of each option for the primary purpose of being able to identify a preferred option. Further to ensure the impacts of each of the link road options on the Highway and the local road network were fully appreciated.

The conclusion of the modelling works (provided in **Appendix B**) is that either Options 1 or 2 could be accepted however Option 1 provides the greatest transport benefits in relation to cost, the greatest shift of traffic from Illaroo Road, and can be provided with least impact to the Highway (at Narang Road) and least impact to existing Bomaderry Streets.

Option 3 has been found to have the least benefits to the network and most adverse impacts to the environment (highest values of VKT and VHT) and the modelling has found that Option 3 leads to unacceptable impacts at the Princes Highway / Moss Vale Road / Cambewarra Road intersection.

The working party (Council, RMS, and AECOM) formed to workshop issues arising and review / oversee the AECOM traffic modelling study consider that the modelling works undertaken were sufficient and that no additional analysis was necessary.

Building more complexity into the traffic model is costly and not justified (will not achieve a better understanding of the general principles for impact assessment nor will it assist in establishing the comparative analysis of the three route options).

It is accepted that more detailed analysis is required to identify optimum improvements for the Princes Highway however that is the responsibility of the RMS and has absolutely no relationship to the link road study.

Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

Further, the RCR and the MVRDLK are unrelated from each other and are geographically separated from each other so are most unlikely to provide any results of relevance.

In general the following conclusions can be drawn from the existing modelling outputs:

- All of the options have already been modelled with/without the MVRDLK (in TRACKS) and sufficient analysis undertaken in the AECOM Paramics modelling to determine the relative similarity between the TRACKS and Paramics modelling in terms of the key model outputs (particularly for Options 1 & 3) with/without the MVRDLK.
- Based on the analysis already undertaken conclusions can be drawn in regards to modelling of Option 2 with MVRDLK as noted above and in the response to submissions report
- The network benefits of the RCR are directly associated with the improvement to capacity at the Shoalhaven river bridges as consequence of the RCR option modelled. Accordingly all of the NNLR route options would benefit from the future upgrade of the Princes Highway in general accordance with the RCR improvements, irrespective of whether the MVRDLK is constructed or not. That is not to say that the RCR option is supported or there are not other options that would provide significantly greater benefits.
- It was intended (test of the RCR) solely to identify that if traffic problems did arise as a consequence of the link road that there were low cost solutions that

could address the problem, and the working party (including the RMS) were satisfied that the benefits of the link road (particularly Options 1 or 2) alone would provide marked improvements to the Highway (between Bolong Road and Illaroo Road at the northern end of the bridges) and that the RCR would not be required in reality solely as a consequence of the link road.

- Due to the benefits that would be provided as consequence of the RCR, the benefit-cost ratio of all of the options would improve if analysed with both the RCR improvements and the MVRDLK.
- It is accepted that more detailed analysis is required to identify optimum improvements for the Princes Highway however that is the responsibility of the RMS and has absolutely no relationship to the link road study (the traffic modelling has demonstrated that the link road alone would provide considerable benefits to the Highway, particularly Options 1 &2, but not Option 3 which has least impact on the Highway between Bolong and Illaroo Roads and results in unacceptable impacts at the Highway/Moss Vale Road intersection)
- Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

d) All link road options with third bridge over the Shoalhaven River

Council is seeking Concept Approval for a local road, not a major upgrading of the Princes Highway. The purpose of this local road is to improve accessibility into North Nowra, ease congestion on Illaroo Road and provide for predicted growth in North Nowra. A traffic model has been constructed to analyse the benefits and costs associated with the three NNLR route options. As part of that analysis certain future road improvements have been considered to establish general principles about the comparative benefits of these future road improvements and to identify what the implications are for the comparative benefit of the three route options. The traffic model is not meant to provide a comprehensive model of the Princes Highway which extends north and south of the NNLR.

If additional capacity over the Shoalhaven River was provided for by the RMS (either through a third bridge, or significant upgrades to the existing bridges) then this is likely to result in similar (or greater) outcomes as the RCR test, depending on the options modelled, and the same relative benefit is likely to be calculated for all of the link road options (with results proportional to the base model link road runs).

That is, additional river crossing capacity would improve the operation of the Princes Highway in much the same way as the RCR improvements would, however a new bridge (more lane capacity) would provide more Highway capacity across the river and accordingly would provide greater network benefits relative to the RCR improvements.

As such, without the need for expensive additional modelling it can be concluded that the performance of all NNLR route options would improve (generally in the same proportion as their respective performance levels indicate in isolation), and that the improvement would be more than likely to exceed the performance of the RCR test.

It is accepted that more detailed analysis is required to identify optimum improvements for the Princes Highway however that is the responsibility of the RMS and has absolutely no relationship to the link road study (the traffic modelling has demonstrated that the link road alone would provide considerable benefits to the Highway, particularly Options 1 &2, but not Option 3 which has least impact on the Highway between Bolong and Illaroo Roads and results in unacceptable impacts at the Highway/Moss Vale Road intersection)

Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

e) RCR Improvements in isolation (without NNLR)

The reasons for modelling the RCR option have been explained above. Council considers that there is sufficient evidence in the existing studies submitted to demonstrate the very substantial benefits of the RCR, not that it is supported in all respects or that it is even required (the modelling has demonstrated considerable benefits to the Highway from construction of the link road alone – Options 1 or 2, but not Option 3).

Council is not responsible for investigating improvements to the Princes Highway (which is the RMS responsibility) or for carrying out or funding such improvement works. As such it is not appropriate for Council to carry out investigations into the feasibility or otherwise of any such improvements. Notwithstanding this, Council does work closely with the RMS to ensure an integrated approach and strategic consideration of road traffic issues throughout the Shoalhaven.

As described above the reason for including the RCR improvements into the AECOM model was to demonstrate that any adverse impacts associated with the link road could be mitigated through low cost measures on the Highway.

This (the RCR option) was included as a variation to the modelling brief due to the way the link road options were modelled (for consistency with fixed traffic signal parameters), although as explained above the benefits of link road options 1 or 2 alone will be sufficient to provide considerable benefits to the Highway (no adverse impacts would be expected in reality, as the RMS would adjust the traffic signal parameters to optimise the benefits to the Highway as consequence of the link road) and Options 1 & 2 in particular show very considerable traffic and delay reductions, evidenced in the SIDRA outputs). The same results were not seen with Option 3.

Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

f) Third bridge in isolation (without NNLR)

This is the same response as for the RCR improvements in isolation. As this application is not for an upgrade to the Princes Highway (which is the responsibility of the NSW Government) it is not necessary, nor appropriate, for Council to carry out investigations into the feasibility of improvements to the Princes Highway, including the feasibility of a new bridge across the Shoalhaven River.

It is accepted that more detailed analysis is required to identify optimum improvements for the Princes Highway however that is the responsibility of the RMS and has absolutely no relationship to the link road study (the traffic modelling has demonstrated that the link road alone would provide considerable benefits to the Highway, particularly Options 1 &2, but not Option 3 which has least impact on the Highway between Bolong and Illaroo Roads and results in unacceptable impacts at the Highway/Moss Vale Road intersection)

Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

g) RCR Improvements and third bridge (without NNLR)

This is the same response as for the RCR improvements and third bridge in isolation. As this application is not for an upgrade to the Princes Highway (which is the responsibility of the NSW Government) it is not necessary, nor appropriate, for Council to carry out investigations into the feasibility of improvements to the Princes Highway.

It is accepted that more detailed analysis is required to identify optimum improvements for the Princes Highway however that is the responsibility of the RMS and has absolutely no relationship to the link road study (the traffic modelling has demonstrated that the link road alone would provide considerable benefits to the Highway, particularly Options 1 &2, but not Option 3 which has least impact on the Highway between Bolong and Illaroo Roads and results in unacceptable impacts at the Highway/Moss Vale Road intersection)

Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

2. Further consideration of a 5-leg intersection at the eastern end of the Northern Option should be provided.

Appendix E of the AECOM report provides the intersection performance outcomes for the Princes Highway / Moss Vale Road intersection (also known as the Princes Highway / Cambewarra Road intersection) for each of the route options.

Table 7 – Summary of Traffic Performance of Cambewarra Rd / Princes Highway Intersection

	AM Peak		PM Peak	
	Average Delay	**Level of Service**	**Average Delay**	**Level of Service**
Base Year	10.7	B	10.6	B
Do Nothing – Low Growth	11.9	B	10.7	B
Do Nothing – High Growth	15.6	B	13.7	B
Option 1	16.4	B	18.5	B
Option 2	16.6	B	14.2	B
Option 3	13.9	B	57.1	E
Option 1 + MVRDLK	16.1	B	23.0	C
Option 3 + MVRDLK	12.9	B	65.3	E

Refer also to the summary of the TRACKS modelling assessment provided in **Appendix B**.

There is also discussion in the response to submission about the number of conflict points and the higher calculated delays at intersections where more movements are allowed.

In general a four leg intersection will have greater conflicts than a three leg intersection and a five leg intersection will have significantly higher conflict points. The more conflict points and the more complicated an intersection layout the higher delays.

The traffic modelling has already shown that the existing intersection of Princes Highway with Moss Vale Road / Cambewarra Road has limited capacity and in fact inadequate capacity to accommodate a northern link road option.

Without doing any additional analysis it can be concluded that a five leg intersection at Princes Highway with Moss Vale Road / Cambewarra Road would have less capacity than the present intersection due to the additional conflict points introduced.

It is also known that pedestrian safety is reduced when additional legs are introduced to an intersection.

Council has previously consulted with RMS in regards to the concept of five leg intersections. Prior to the detailed modelling undertaken which has indicated that intersection at Princes Highway with Moss Vale Road / Cambewarra Road has inadequate capacity to accommodate a link road anyway, this concept (of five legs) has previously been discussed with the RMS who indicated their concerns.

In more recent times Stockland had requested consideration to a five leg intersection arrangement at The Wool Road / Naval College Road intersection (as part of the Vincentia District Centre). Even though this was on a local road, a roundabout (being a prescribed traffic facility) Council cant approve a prescribed facility without considering the advice of the local traffic committee (including the RMS), and RMS approval of a five leg roundabout was not forthcoming; quoting geometric, capacity, and pedestrian safety concerns. The advice received was that RMS do not support five leg roundabouts as a general principle due to primarily capacity and pedestrian safety concerns.

The main problem with Option 3 is that it directly increases the amount of traffic through the intersection of Princes Highway with Moss Vale Road / Cambewarra Road, and because of the limited capacity at the existing four leg roundabout, without undertaking analysis a five leg intersection is unlikely to be acceptable due to capacity and pedestrian safety concerns.

It is clear that the level of service of the Princes Highway / Moss Vale Road intersection is severely impacted by Option 3.

This is due to the additional traffic that would utilise the intersection in order to travel on the NNLR Option 3 to access West Cambewarra and North Nowra. In order to address this impact, it is likely that the Princes Highway / Moss Vale Road intersection would need to be signalised if Option 3 were progressed.

This would reduce the functionality of the intersection, which currently provides an important U-turn capability for local traffic (residents and businesses) on the Princes Highway.

If this intersection was signalised as part of the development of Option 3, then it is likely that alternative U-turn facilities would need to be included on the princes Highway north of the intersection.

As such, if Option 3 was progressed then as part of the detailed design further consideration of traffic management and road design mitigation options would need to be considered, in consultation with the RMS, in order to reduce the impact to this intersection to an acceptable level.

There is further discussion on this aspect in the response to submissions report. Of particular concern is that Option 3 already has very poor performance (unacceptable BCR) and if the additional costs to upgrade Moss Vale Road and Princes Highway were taken into consideration (to the extent necessary to offset

the adverse impacts of Option 3) this would further reduce the BCR for Option 3 to some considerable degree.

In summary the AECOM analysis shows that the existing Princes Highway / Moss Vale Road intersection does not have sufficient capacity to accommodate a northern NNLR route with the existing 4 leg arrangement. As such, modelling is not required to be satisfied that an additional leg to an existing intersection will have a negative impact on the capacity of the intersection.

RMS has previously advised Council on several occasions in different contexts they do not support a 5th leg at that intersection, irrespective of whether roundabout or traffic signals, due to safety reasons and reduction in capacity and pedestrian safety that result from an additional leg.

Sufficient analysis has already been undertaken in order to identify a preferred route and to examine the relative benefits and impacts of all route options, and even the RMS agree that the level of analysis undertaken is sufficient.

The RMS has indicated its objection to the northern Option due to the impacts existing Princes Highway / Moss Vale Road intersection and Council agree.

Further Option 3 has least benefit to the network (least amount of traffic diversion from Illaroo Road and least benefits to the most critical section of Highway between Bolong and Illaroo Roads).
Option 3 also has the highest values of VHT and VKT (poorest transport performance and highest environmental and social costs) and lowest BCR of all the options modelled.

Addressing the intersection of Princes Highway / Moss Vale Road/ Cambewarra Road alone would not constitute an acceptable Option 3 and as indicated above any major upgrade of the intersection of Princes Highway / Moss Vale Road/ Cambewarra Road is likely to have further adverse impacts to local accessibility (for local residents and businesses).

3. Consideration should be provided for extending West Cambewarra Road to the Princes Highway along the historic alignment.

There are two issues associated with this point. Firstly, there is the use of the existing West Cambewarra Road carriageway rather than the proposed Option 3 alignment located to the south of the existing carriageway for West Cambewarra Road. Secondly, there is the extension of West Cambewarra Road along an alignment which enters the Cambewarra Road,/ Princes Highway / Moss Vale Road intersection from the west (and would create a 5-legged intersection).

In relation to the first issue, Section 7.5 of the EAR sets out why a revised alignment for Option 3 was selected for inclusion in the Concept Plan application. In summary, the reasons are as follows:

- The proposed road is to be a sub-arterial road which does not permit private accesses, especially not a long and extended series of private accesses which would be required along West Cambewarra Road.
- The close proximity of residential dwellings on West Cambewarra Road will mean that it would be necessary to set back the Northern Route Option significantly from the residences and/or to provide significant noise attenuation measure, such as an earth bund or noise wall. The noise mitigation (e.g. earth bund or noise wall) would not work if it was interspersed by numerous private accesses creating gaps in the noise mitigating structure.

It is highlighted that if Option 3 were to be constructed along the existing carriageway of West Cambewarra Road then it would need to be at a lower speed limit to ensure suitable safety to provide multiple private accesses. However, this would further reduce the comparative benefits of Option 3 (i.e. increased travel times and VHT), and would result in a lower BCR. The lower speed limit could result in up to 2 dBA lower noise impacts, however this would rely on enforcement of the speed limit through police presence, camera or traffic calming devices. In any case the OEH's ECRTN criteria would not be met at the residences on West Cambewarra Road without further noise mitigation measures described above.

In relation to the second issue, as described above, the existing Princes Highway / Moss Vale Road intersection would operate beyond an acceptable capacity if Option 3 were constructed, even with the current 4-leg intersection arrangement. If the arrangement was modified to provide for a 5th leg then this would result in an additional negative impact to the operation of the intersection.

Further traffic modelling options have been previously considered that look at (instead of deviating Option 3 to Moss Vale Road) a deviation of Moss Vale Road to Option 3 (i.e. Option 3 extends along its historic alignment) to intersect with the Princes Highway / Moss Vale Road intersection as a modified four leg junction.

The results were identical to the Option 3 results due to the fact that it is the same volume of traffic and same traffic patterns resulting at the Princes Highway as consequence of Option 3. The only difference is the internal intersection between Moss Vale Road and Option 3 and that intersection is not the problem.

It is reiterated that Option 3 also has the highest values of VHT and VKT (poorest transport performance and highest environmental and social costs) and lowest BCR of all the options modelled.

Addressing the intersection of Princes Highway / Moss Vale Road / Cambewarra Road alone would not constitute an acceptable Option 3 and as indicated above any major upgrade of the intersection of Princes Highway / Moss Vale Road / Cambewarra Road is likely to have further adverse impacts to local accessibility (for local residents and businesses).

4. A more in-depth analysis of fragmentation impacts on BCRP, including potential impacts on flora, fauna and recreational users, has been provided in **Table 2**, and **Table 3**, in particular responses provided for issues 2C and 2H (flora and fauna), and 3A, 3B and 3C (recreational and amenity issues). **Section 5** also provides a detailed consideration of the recreational and amenity issues.
5. DoP highlight that on the northern and western sides of the BCRP the land is zoned 2(c) Residential. Some of this land has been identified through the NBSP background investigations as possible future residential land, however these parcels of and have not been identified as critical for supporting the growth envisaged for North Nowra. At this stage there is no development proposal for these parcels of land. In the event that a development proposal is made on these parcels of land then that would be assessed under the EP&A Act at that time. It is impossible for Council to carry out any kind of cumulative impact assessment if a development (or clearing) proposal has not been proposed. It is not considered appropriate for Council to hypothesise a possible proposal on these parcels of land for clearing and/or development for the purposes of carrying out a cumulative impact assessment for the NNLR.
6. Further information has been provided in relation to the protection of Bomaderry Zieria in **Table 2**.

7. As specified in Section 13.2.5 of the EAR up to 23 individuals of Hibbertia sp. Nov. Menai will be potentially affected by clearing and construction for Option 1, up to 23 individuals would be affected by Option 2 and no individuals would be affected by Option 3. These individual specimen are located within or near to the footprint of the respective route option corridor and so there may be opportunities to reduce the number of specimen impacted through detailed design and the application of appropriate mitigation and management measures during construction.
8. As described in Section 7.5.1 of the EAR, for access between Option 3 and West Cambewarra Road a single connection point would be constructed approximately midway along West Cambewarra Road. This would be the only way of accessing West Cambewarra Road. The details of this intersection have not been designed at this point in time; however the intersection will be designed such that it is consistent with the AUSTROADS Guidelines for at grade intersections. The design will most likely be a Type B or a Type C T-intersection, where a deceleration lane would be provided on the NNLR (Option 3) to provide for cars turning right off the NNLR into the access road for West Cambewarra Road. Typical layouts for at grade T-intersections in the AUSTROADS Guide to Road Design are shown below.
9. The extent of Lowland Rainforest Endangered Ecological Community potentially correlates with the Coachwood/Ironwood Warm Temperate Rainforest as shown in the amended map provide in **Appendix D**.
10. Additional fauna surveys reports are provided in **Appendix C**.
11. A supplementary Aboriginal heritage impact assessment for the Northern Option is provided in **Appendix E**.
12. Consideration be provided to reducing the overall width of the proposed route corridors to 20m.

The proposed NNLR will generally be contained within a 30 m wide road reserve corridor, which would require a minimum cleared area of 21 metres under the AUSTROADS standards for new roads, based on the likely operational speed environment of 80 km/hr. This would be required to satisfy minimum safe road design standards even if the actual sign posted limit was lower. In addition to this some additional clearing will be required to account for curves along the alignment and other structures which must be located outside of the cleared zone. Accordingly, a nominal 25 m cleared area has therefore been adopted for the proposed 30 m wide road reserve corridor.

To avoid ecologically sensitive areas near the route (i.e. in the vicinity of threatened flora species), it may be possible to reduce the extent of cleared area to 20 metre wide road reserve (clearance restricted to 20 metres wide) however to satisfy safe clear zone requirements under national road standards and not adversely impact future growth this would only be possible if there were no non-frangible vegetation species, utility poles or glider poles within the clear zone limits (25m effective corridor).

So while the road reserve can be reduced in specific locations and remain compliant with the safe clear zone requirements, it cannot be reduced along the entire length otherwise it would not be able to provide for structures such as electricity transmission poles and glider poles within the road reserve.

13. An A3 sized plan numbered Plan 2587_70, which shows all three route options over an aerial photograph is provided in **Appendix F**.

3.1.2 Office of Environment and Heritage

Summary of Issues

Submissions received from OEH, which includes the South Coast Regional Advisory Committee, generally opposed the Central Option for reasons mostly to do with the impacts to flora and fauna and the impact to biodiversity and conservation values of the bushland within and surrounding the BCRP.

- The OEH is the primary NSW Government agency responsible for protection of the environment and the conservation of habitat for threatened species. In this capacity, OEH raised concerns that Option 1 would have unacceptable impacts on threatened species and their habitats as well as to the general loss of biodiversity integrity and conservation values arising from Option 1. Similar concerns are raised in regards to the Option 2, whereas OEH highlights that biodiversity and conservation impacts associated with Option 3 are substantially less and more likely to be able to be managed acceptably. Biodiversity and ecological related issues raised by OEH have been summarised and addressed in **Table 3**.

  OEH also made comments in relation to noise issues and Aboriginal heritage which have been summarised and addressed in **Table 4** and **Table 5** respectively.

- The South Coast Regional Advisory Committee (SCRAC) will be responsible for advising the NSW Minister for the Environment on the revocation of land from the BCRP. The SCRAC raised similar concerns to the OEH submission. The SCRAC submission focussed predominantly on the loss of biodiversity and conservation values from the bushland within and adjacent to the Regional Park, and the impacts to the educational, recreational, and tourism values of the Regional Park which would arise from the fragmentation of the bushland for Option 1. The SCRAC submission also raised concerns in relation to the level of community consultation, impacts on Aboriginal cultural heritage, consistency with the *South Coast Regional Strategy 2007*, the strategic justification of the Central Option, and the validity of the comparative costings for the three route options.

  The SCRAC clearly does not support the revocation of land from the Regional Park for the purposes of Option 1 or for Option 2 – but identifies that it considers Option 3 to be consistent with public interest. Based on its submission it is reasonable to conclude that the SCRAC does not consider that the need for revocation of land from the BCRP for Option 1 has been suitably demonstrated.

  Issues raised by SCRAC have been summarised and addressed in **Tables 1-6**.

Response to Issues

The issues raised by OEH, including the SCRACS submission, have been summarised and addressed in **Appendix A** and **Tables 1-6**.

3.1.3 NSW Office of Water

The NSW Office of Water (NoW) reiterates concerns relating to the impacts to conservation values arising from fragmentation of the habitat by Option 1, as well as concerns about the potential for the NNLR to affect the flow of groundwater and so impact groundwater dependent ecosystems.

Response to Issues

The issues raised by the NoW have been summarised and addressed in **Appendix A** and **Tables 1-6**.

3.1.4 Roads and Maritime Service

Summary of Issues

The RMS is the principal authority in the management of road infrastructure and traffic management along the Princes Highway through Nowra and Bomaderry. The RMS supports Option 1 due to the local and regional traffic benefits it provides, and because it has the least impact on the Princes Highway, which has excess capacity at the existing Narang Road / Highway intersection available.

The RMS is opposed to Option 2 and Option 3 due to impacts on the level of service of the Princes Highway and its existing intersections. In particular:

- Option 2 would introduce a new signalised intersection on the Princes Highway at West Bunberra Street. The RMS expects that this would introduce delays to Princes Highway through traffic and reduce the level of service for the majority of vehicles travelling on this section of the highway.
- Option 3 would significantly reduce the Level of Service of the Cambewarra Road/ Princes Highway intersection (a roundabout) in the PM peak.

Response to Issues

Council agrees with the RMS's comments and conclusions.

Council has not investigated in detail the solutions that might be necessary to mitigate the lower Level of Service of the Cambewarra Road/ Princes Highway intersection (a roundabout) in the PM peak if Option 3 was progressed. However, since the AECOM Paramics modelling identifies that this intersection would deteriorate to LoS E it is likely that the intersection would need to be upgraded to signals.

3.1.5 Endeavour Energy

Summary of Issues

Endeavour Energy is the owner of the existing electricity transmission line which occupies part of the cleared services corridor adjacent to the alignment of Option 1. Endeavour Energy supports Option 1 as it will provide improved accessibility to its transmission line asset.

Response to Issues

If Option 1 is approved then Council would investigate, in consultation with Endeavour Energy, as part of the detailed design phase the practicality and feasibility of undergrounding the existing electricity transmission line within the road corridor as part of the road construction works.

3.1.6 Department of Industry and Investment

The Department of Industry and Investment (Fisheries Conservation and Aquaculture) does not raise any objections in relation to any of the route options subject to the implementation of the mitigation measures proposed in the EAR.

3.2 Special Interest Groups

Summary of Issues

In general the ecologically motivated groups and organisations object to the Central Option for reasons mostly to do with the impacts to flora and fauna and the impact to biodiversity and conservation values of the bushland within and surrounding the BCRP. These groups do not consider that the traffic benefits of the Central Option outweigh the potential ecological impacts and so object to Option 1. Generally speaking these groups support or prefer Option 3.

The Shoalhaven Business Chamber supports Option 1 on the basis that better transport access for workers and improved conditions for trading and commerce.

Response to Issues

JBA has summarised and responded to the issues raised in submissions from groups and organisations in **Appendix A** and **Tables 1 to 6** above.

4.0 Additional Ecological Information

Eco Logical Australia (ELA) has provided a detailed response to the biodiversity issues raised in submissions in **Table 3** (see **Section 3**).

The threatened species assessment undertaken by ELA contained within the FFA (Appendix F of the EAR) was consistent with the P*art 3A Draft Guidelines for Threatened Species Assessment* in that:

- The six (6) guiding principles for threatened species assessment identified in the Draft Assessment Guidelines were considered in the report;
- Nineteen (19) threatened species and one (1) Endangered ecological community were identified as occurring or likely to occur within the study area;
- Project impacts were assessed against these entities in accordance with the six (6) factors for consideration in Appendix 3 of the guidelines;
- A range of mitigation measures and offsets were recommended to avoid or minimise direct and indirect impacts on threatened species; and
- The approach followed the five (5) Steps identified in the assessment guidelines

The scope for the flora and fauna assessment was required to consider biodiversity values and potential project impacts and effective mitigation measures for the three route options (instead of the central and preferred option only). As such ELA considers that the level of survey and assessment is adequate for the purposes of Concept Plan approval in through addressing the DGRs the FFA report considered:

- flora and fauna impact assessment in accordance with the Draft Guidelines for Threatened Species Assessment in the following sections of the Flora and Fauna Assessment: 2.2, 4.1-4.2, 6.1.1 and 6.1.2 including *Zieria baeuerlenii* and *Eucalyptus langleyi*;
- the potential impacts of the route options on the conservation values and integrity of the BCRP, particularly as a result of fragmentation impacts and edge effects in the following sections of the report 6.1.4 and 7.1 and 7.2
- Mitigation and avoidance measures are identified and considered in section 6.1-6.4 in the context of their effectiveness and relevance to each route option.

In reviewing the submissions it is apparent that concerns raised with respect to certain issues are legitimate and require specific consideration. As indicated in 2.1 and 4.2.9 of the FFA Report additional targeted surveys were recommended for Giant Burrowing Frog and Eastern Pygmy-possum and these were undertaken in January, March and May 2011. Targeted surveys were also undertaken for Spotted-tailed Quoll during March 2011 and a more rigorous desktop review of information (consultation) regarding the significance of the Bomaderry Creek area for Grey-headed Flying-fox was also undertaken. Supplementary survey reports prepared by ELA are provided in **Appendix C**.

4.1 Additional Ecological Surveys

As agreed with OEH additional surveys have been carried out for the following species, the results of which are detailed in supplementary survey reports provided in **Appendix C** and summarised below:

- Giant Burrowing Frog;
- Eastern Pygmy-possum; and
- Spotted-tailed Quoll.

4.1.1 Giant Burrowing Frog

A supplementary survey report was prepared for Giant Burrowing Frog (GBF) by ELA, and is provided in **Appendix C**.

A combination of techniques was used in the survey, including call playback, spotlighting, tadpole searches and night driving surveys. Methods used were consistent with *State and National amphibian survey guidelines* (DECC 2009 and DEWHA 2010). Nocturnal surveys for the GBF were undertaken on 12 January, 21 and 22 March 2011, as these times coincided with optimum weather conditions as per the relevant survey guidelines.

No GBF or other threatened frog species were recorded during the survey period. A total of nine frog species were recorded. Few tadpoles were seen, all of which were of the Common Eastern Froglet *Crinia signifera*.

4.1.2 Eastern Pygmy Possum

A supplementary survey report was prepared for Eastern Pygmy Possum by ELA, and is provided in **Appendix C**.

The Eastern Pygmy-possum was targeted by a combination of Elliott trapping and pitfall trapping in areas of suitable habitat close to each of the three link road route options. Survey areas were initially selected to sample likely habitat (Scribbly Gum – Bloodwood Woodland) mapped as occurring along each of the route options. Refinement of survey sites involved selecting areas of good quality habitat (primarily tree hollows and high densities of foraging resources such as *Lambertia formosa* and *Banksia spinulosa*), that were close to each proposed route option, but also concealed from public view. At the request of the NPWS, construction of pitfall traps (which involves some vegetation clearing and soil disturbance) was not undertaken within NPWS lands.

One Eastern Pygmy-possum was recorded in the pitfall trap located in the south west of the study area, close to the Falcon Crescent gate. The same individual was captured on two of the four survey nights. No other Eastern Pygmy-possums were recorded during the survey and no other vertebrate species were captured by pitfall traps.

The Eastern Pygmy-possum is now known to occur in the north and south of the study area, but is expected to occur more widely given the presence of suitable habitat over most of the Regional Park and adjoining vegetated areas. The species is known to inhabit a range of vegetation types from heath to rainforest, although in the study area, Scribbly Gum – Bloodwood woodland containing tree hollows and a heathy understorey of myrtaceous shrubs are likely to be preferred habitat. Extensive surveys would be required to establish the species population size and distribution within the area.

4.1.3 Spotted-tailed Quoll

A supplementary survey report was prepared for Spotted-tailed Quoll by ELA, and is provided in **Appendix C**.

The Spotted-tailed Quoll was targeted by remote cameras stations due to the species large home range and the need to survey over a longer period. Areas associated with Bomaderry Creek Gorge were considered the most likely habitat for the species. Four Reconyx Hyperfire infra-red motion-activated cameras and bait stations were placed approximately 500m apart on the western edge of the Bomaderry Creek gorge in association with gully slopes or cliffs. The cameras were attached to tree trunks about 1m from the ground, and provided night and day surveillance of fauna investigating the bait stations. Bait stations were fixed to the ground and contained tinned cat food (fish) and raw chicken wings.

The four cameras were in use from 7 March to 28 March 2011, giving a survey effort of 80 camera days/nights. Baits were replaced mid-way through the survey period. The Spotted-tailed Quoll was not recorded during the survey period. Although the study area contains suitable habitat for the Spotted-tailed Quoll, the species remains unrecorded from the BCRP. These survey results, together with a lack of previous records, suggest that the species may not be present or may not be a permanent resident of the Park and adjoining areas.

4.1.4 Grey-headed Flying-fox

No field surveys were undertaken for the Grey-headed Flying-fox. Information on the species and the roosting area was obtained by ELA via correspondence or discussions with relevant wildlife management professionals at Shoalhaven City council and OEH.

The Grey-headed Flying-fox is known to regularly roost in the southern parts of the study area near Bomaderry Creek on a seasonal basis, generally between September and May. The camp has been occupied on five of the past eight years since monitoring of the camp has been undertaken, and has probably been used over a much longer period. Estimates of the camp size over the last three years are between 5,000 and 15,000 individuals, utilising an area of up to 4.7 ha. The camp has been confirmed as a maternity roost, with adult males, females, and dependent young observed. Foetuses have also been found on the ground beneath the roosting area, suggesting that females give birth within the camp.

The camp is significant because of its size, relatively protected location, strategic position in relation to broader foraging resources, and use as a maternity roost. The GHFF roost locations can vary from year to year according to numbers of bats, but the main site is located immediately to the east of offset parcel 9, and west of offset parcel 10, over 150 m to the south of Option 2, and almost 1 km to the south of Option 1. To put this in context, the main camp site is located less than 500 m from both the Princes Highway and Illaroo Road.

4.2 Revised Ecological Impact Assessment

It is clear from **Table 3** that there remains some uncertainty surrounding the ecological and biodiversity impacts associated with the route options for the NNLR. These uncertainties are summarised below.

- For the Central Option there remain the following key uncertainties:
    1. Whether the potential risk of direct impacts during construction, or the indirect impacts during construction and operation, will result in significant impact to individual specimen of Bomaderry Zieria. In turn, whether any impact to individual specimen will affect the viability of the population or increase the risk of extinction of this species.
    2. Whether the impact on two individual specimen of Albatross Mallee will increase the risk of extinction of the Endangered Population in the Bomaderry Creek Area.
    3. The exact number of Bauer's Midge Orchid that might be directly impacted. OEH acknowledges that this is a difficult species to survey for and therefore concludes that the impact of the Central Option on this species is likely to be more extensive that predicted.
    4. Whether there exists a population of Giant Burrowing Frog in the study area.
    5. What level of significance the road will cause by animal vehicle collision, and whether mitigation measures can be developed to minimise this impact to acceptable level.
    6. Whether the fragmentation and edge effects of the road will undermine the ecological functioning of the Bomaderry Creek bushland.

Council do not consider it feasible or reasonable to expect all of these uncertainties to be addressed as part of this Concept Plan application. Council make the following comments, and where appropriate commitments in relation to these core uncertainties.

1. The risk of an impact to Bomaderry Zieria will remain high, and Council would commit to the strictest of mitigation and management measures. However, due to the rarity of this species and it's very small distribution it is clearly impossible to demonstrate that the mitigation measures have been used in similar situations elsewhere and were effective. If the Central Option was approved, Council would develop a suite of mitigation and management measures as part of the subsequent road design process, in consultation with OEH and DSEWPaC. Further studies will be undertaken during approval of details directly relating to the proposed measures such as predicted removal of shade trees and compensatory plantings in the context of the ecological requirements of Bomaderry Zieria to determine the likely efficacy of mitigation measures.
2. If the Central Option was approved Council would endeavour, as part of the subsequent road design process, to avoid the potential impact of the road on the Albatross Mallee. If these specimen cannot be avoided then Council commits to establishing specific and quantitative mitigation measures to reduce the potential for the proposal to impact upon Albatross Mallee in conjunction with the offset protection measures already proposed in the Concept FFA report. This may potentially include carrying out protective and regeneration works for the Endangered Population which is located almost entirely on Council owned land.
3. If the Central Option was approved then Council would commit to carrying out a detailed survey during the recognised breeding season for the Bauer's Midge Orchid as part of the detailed design process for the road. This survey would inform the final design alignment and the development of mitigation measures to be incorporated into the design and construction of the road.
4. Council has carried out a number of surveys for the Giant Burrowing Frog and there remains no recent evidence that this species occurs within the study area. As part of the road design Council would consider designing a fauna underpass which could accommodate the frog.
5. OEH requested predictive modelling to be used to model animal vehicle collision risk and to inform the development of detailed mitigation measures. If the Central Option was approved, then Council would commit to use of a technical specialist to undertake predictive modelling to identify and quantify the potential impacts of vehicle collisions and incorporation of mitigation measures against this modelling to reduce animal and human trauma.
6. There is likely to be a degree of risk that unidentified project actions could negatively affect the environment including threatened entities and their habitats and or landscape features and values that promote ecological services and functions supporting threatened entities. For this reason Council has undertaken a risk management approach through applying the precautionary approach and a number of commitments are recommended for assessment during the subsequent design stage to promote a 'maintain or improve' biodiversity outcome.

- For the Southern Option there remain the following uncertainties:
  1. The exact number of Bauer's Midge Orchid that might be directly impacted. OEH acknowledges that this is a difficult species to survey for and therefore concludes that the impact of the Southern Route on this species to be more extensive that predicted.
  2. What level of significance the road will cause by animal vehicle collision, and whether mitigation measures can be developed to minimise this impact to acceptable level.

3. Whether the bridge for Option 2 would present a significant risk to the ongoing viability and continued use of the Grey-headed Flying-fox camp.

Council do not consider it feasible or reasonable to expect all of these uncertainties to be addressed as part of this Concept Plan application. Council make the following comments, and where appropriate commitments in relation to these core uncertainties.

1. If the Southern Option was approved then Council would commit to carrying out a detailed survey during the recognised breeding season for the Bauer's Midge Orchid as part of the detailed design process for the road. This survey would inform the development of mitigation measures to be incorporated into the design, and implemented during construction and operation of the road.
2. OEH requested predictive modelling to be used to model animal vehicle collision risk and to inform the development of detailed mitigation measures. If the Southern Option was approved, then Council would commit to use of a technical specialist to undertake predictive modelling to identify and quantify the potential impacts of vehicle collisions and incorporation of mitigation measures against this modelling to reduce animal and human trauma.
3. If the Southern Option was approved, and progressed by Council, then Council make a referral to the Commonwealth in relation to the Grey-headed Flying-fox camp.

- For the Northern Option OEH requested predictive modelling to be used to model animal vehicle collision risk and to inform the development of detailed mitigation measures. If the Northern Option was approved, and Council determined to progress the route to a detailed approval stage, then Council would commit to investigating the feasibility of predictive modelling in this circumstance, and would develop the detailed mitigation measures to minimise animal vehicle collision in consultation with OEH. It is highlighted that, as indicated elsewhere in this Response to Submissions Report, if the Northern Option only is approved, Council would need to reconsider its strategy under the NBSP and whether the NNLR remains viable.

4.3 Ecological Offsets

Many submissions raised the issue that the offsets proposed by Council do not represent an offset at all, but are merely a transfer of ownership / management of the land. It is pointed out that this is exactly what the purpose of the offset is. It prevents the future development of the land that has been proposed to be included in the offset – the zoning of which provides for a number of development opportunities. It is highlighted that the OEH has not questioned the benefit of the offset, only whether the biodiversity values of the proposed offset parcels sufficiently compensate for the vegetation removed for the road. Council remains committed to negotiating an offset package with OEH that satisfactorily compensates for the actual impacts of the road and aspires towards a 'maintain or improve' biodiversity outcome.

4.4 Revised Ecological Mitigation Measures

As identified above, there remain multiple issues which cannot be currently resolved due to a lack of information or scientific certainty.

Council do not consider it feasible or reasonable to expect all of these uncertainties to be addressed as part of this Concept Plan application when no road design has been carried out and so horizontal and vertical alignments are not known.

To manage the potential for future project actions significantly impacting on threatened entities a specific and quantitative proposal will be developed during the approval of details phase so that direct and indirect project impacts can be fully evaluated and the potential effect on threatened biodiversity and the environment be considered. Attributes of the proposal will include but not be limited to:

- A mapped location of the route corridor approved by the Concept approval and any other additional areas required to facilitate the proposal;
- Identification of all activities and actions including ancillary works and work stages;
- The duration and timing of the project including staging;
- Details of the arrangements for relocating and or managing existing linear infrastructure e.g. transmission line, water pipeline and access requirements.

Council would carry out additional assessment as part of the subsequent design phase, which would involve the approval of final horizontal and vertical alignments. These additional assessments would be carried out in accordance with the NSW statutory planning and approval provisions. This approach involves adoption of recommended actions through carrying out a range of additional surveys and assessments during the approval of details stage to address the issues raised.

A detailed Flora and Fauna Assessment (FFA) Report would be prepared as part of the approval of the details for the approved route alignment. In a broader sense the FFA to be prepared for the approval of details will consider the nature, extent, frequency, duration and timing of the potential project effects in order to fully determine a set of comprehensive measures likely to avoid, minimise, mitigate and offset the potential impacts of the proposal on threatened biodiversity and habitats. The detailed FFA would include the studies, investigations and surveys described below:

- In the event that Option 2 is approved under the Concept Plan then assessment of potential direct and indirect project impacts on Grey-headed Flying-fox in the context of State and Commonwealth requirements will be carried out as part of the approvals of the details. A referral to the Commonwealth would be made.
- Surveys will be undertaken to determine whether hollow-bearing trees and Glossy Black Cockatoo (GBC) feed trees are being used along the chosen route option and adjacent areas to assess direct and indirect impacts. Surveys will be undertaken during the recognised breeding season for each species to determine the potential significance of these resources for GBC and Gang-gang Cockatoo (GGC) and the forest owls. The potential for direct or indirect impacts on will be assessed in accordance with the State assessment requirements. The mitigation measures proposed will reduce the severity of any potential impact on threatened cockatoos and forest owls under the detailed assessment.
- Habitat and targeted species surveys will be undertaken in accordance with State and Commonwealth survey guidelines to determine the likelihood of Broad-headed Snake (BHS) occurring within the development footprint and any additional areas that are likely to be affected by the proposal, either directly or indirectly. Searches of suitable sheltering sites under rocks or in crevices on westerly facing sandstone cliffs will be undertaken by day during winter. The potential for direct or indirect impacts on BHS will be assessed in accordance with the State and Commonwealth assessment requirements.

- An impact assessment will be undertaken to determine the potential for loss and recovery of the Lowland Rainforest EEC in the context of project actions and mitigation measures proposed i to reduce the likelihood of any indirect impact on Lowland Rainforest EEC under the detailed assessment.
- Survey for threatened microchiropteran bat species and their use of hollow-bearing trees will be undertaken throughout the study area in accordance with the assessment guidelines. An impact assessment will be undertaken to determine the potential for loss and recovery of threatened microchiropteran bats in the context of project actions and proposed mitigation measures.
- The FFA report to be prepared during the detailed phase will name, map and assess each vegetation community type to be directly and indirectly impacted by project actions and activities. The overall extent of the impact will be provided for each vegetation community under the approved option and any ancillary action or activity.
- To address the uncertainty around the extent of impact to the riparian corridor, a final bridge design will be provided including pylons, footings, span and installation access requirements for the approval of details. The potential for direct and indirect impact to terrestrial and aquatic ecosystems and values will be evaluated against the final design including the likelihood for river flows and fish passage to be impeded and terrestrial habitat connectivity to be severed or reduced for certain threatened species.
- Assessment of habitat severance will address:
    - The potential internal fragmentation effects on vegetation, specifically how during construction (and post-construction through management sub-plans) the proposal would avoid and minimise direct loss of habitat, avoid rare or threatened species through minor re-alignment opportunities and protect valuable habitat components;
    - The potential internal fragmentation effects on fauna, specifically loss of habitat, and the implications for severing viable populations in a small reserve;
    - The implications/consequences of internal fragmentation of flora and fauna in the regional context of isolation;
    - Assessment of the low probability of recruitment through immigration for many species i.e. Eastern pygmy possum (EPP) in the regional isolation context;
    - Use of a technical specialist to undertake predictive modelling to identify and quantify the potential impacts of vehicle collisions and incorporation of mitigation measures against this modelling to reduce animal and human trauma.
    - Vehicle collision mortality and the implications for localised extinctions of threatened species within the study area caused by further reduction in already small population sizes e.g. Eastern pygmy possum and potentially GBF and BHS. Discussion is also required for likely impact of vehicle collision on highly mobile protected non-threatened species known to occur in the BCRP such as Swamp Wallaby and Lace Monitor;
    - Consideration of the 'road effect zone' or the area over which significant ecological effects of the proposed road and its traffic, extend into the adjacent landscape and the potential incursion of pest animals and weed species in the context of local and threatened biodiversity;

  - A detailed assessment of all measures likely to mitigate internal habitat fragmentation and recommendations of appropriate measures that have been evaluated as effective in similar circumstances (road design, geography and biodiversity values). Measures to be considered should include structural mitigation such as road design principles, canopy bridges; glider poles; local traffic management; culvert crossings; tunnels; fences; and bridge design over Bomaderry Creek.
  - And non-structural mitigation including canopy connectivity, micro-habitat placement to encourage movement toward crossing points; existing drainage lines and watercourses; and road management and driver education should be considered in collaboration with the RMS.

- Further studies will be undertaken during approval of details directly relating to the proposed measures such as predicted removal of shade trees and compensatory plantings in the context of the ecological requirements of Bomaderry Zieria to determine the likely efficacy of the measures. The proposal will require the revocation of an area of the BCRP for the road corridor and therefore assessment during the approval of details will consider the implications for *Phytophthora cinnamomi* and other waterborne threats. Some actions or activities are likely to require individual assessment such as clearing, soil and water management, herbicide treatment etc.
- Specific and quantitative mitigation measures to reduce the potential for the proposal to impact upon Albatross Mallee will be developed during approval of details in conjunction with the offset protection measures already proposed in the EAR.
- Further targeted GBF surveys during approval of details using a range of techniques during optimal conditions by experienced ecologists will be undertaken to detect or further reduce the likelihood of present day occurrence. In the event that GBF is detected during approval of details surveys a shift away from the proposed emphasis on impact mitigation along Bomaderry Creek is required to ensure future management relates to north south habitat connectivity under the proposed central road/southern road option.
- Verification of desktop records will be undertaken during approval of details by experienced botanists/ecologists or recognised experts with an understanding of the requirements of both species in February – March (Brittle Midge Orchid) and July-December (Hibbertia sp. Nov 'Menai') to determine the location of individuals in proximity to the approved route option. The findings of the field survey will be used to inform the assessment undertaken during approval of details for the project's potential to impact at both the species and population levels. Specific quantitative and effective mitigation measures will be proposed using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for both species under the proposal.
- Further targeted surveys are proposed for STQ throughout the study area during the approval of details phase at the level of effort recommended in the relevant State and Commonwealth survey guidelines by experienced field ecologists and using a range of accepted detection methods. Should STQs be detected during approval of details then specific quantitative and effective mitigation measures will be applied using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for STQ under the proposal. STQ are susceptible to vehicle strike due to their wide ranging movements.

In the event of detection within the study area specific measures would be proposed to promote connectivity across the landscape and reduce the likelihood of road mortality. Measures are likely to include fauna fencing in conjunction with underpasses such as culverts and or 1.5m furnished fauna tunnels where constructability permits.

- Further targeted surveys are proposed for EPP throughout the study area at the recommended level of effort and by experienced field ecologists during the approval of details phase. A range of recommended detection methods is proposed. Specific quantitative and effective mitigation measures will be applied using the hierarchy of avoid, minimise, mitigate and offset to ensure a 'maintain or improve' biodiversity outcome is achieved for EPP under the proposal. EPP are susceptible to habitat fragmentation and vehicle strike and a suite of proven measures will be applied to promote habitat connectivity and reduce the risk of vehicle strike.
- Quantitative and effective mitigation measures using the hierarchy of avoid, minimise, mitigate and offset would be adopted to ensure a 'maintain or improve' biodiversity outcome is achieved for Yellow-bellied Glider under the proposal. Measures will include glider poles and rope bridges to facilitate movement across the road corridor.

All mitigation measures and offsets will require a full review in light of the findings of the surveys and assessments undertaken during approval of details. The hierarchy of avoid, minimise, mitigate and offset will be adopted to ensure a 'maintain or improve' outcome is achieved for all threatened entities under the proposal. Mitigation measures would be proposed where it can be demonstrated that they have proven to be effective in similar circumstances. The precautionary principle will be adopted throughout the approval of details stage to promote ecologically sustainable development practices and provide certainty around impact assessment and proposed impact minimisation measures.

Management sub-plans including a Project Environmental Management Plan that incorporates vegetation and fauna management measures and practices will be based upon the recommendations proposed in the detailed assessment to provide transparency in approach, consistency of management and continuity and transmission of project knowledge.

The offset assessment would be on the determined concept alignment only, and under the limitations of current commitments by Council in relation to offset areas and may include provision of funding assistance to NPWS for investigation of a Bomaderry Zieria recovery plan. Any commitment to future funding of the offset land by Council would be on the basis on current funding availability to Council remaining available. Any offset package would be viewed in the context of aspiring to a 'maintained or improved' biodiversity outcome.

5.0 Additional Information on Recreational and Amenity Values of BCRP

The South Coast Regional Advisory Committee of the National Parks and Wildlife Association (SCRAC), as well as a number of private submissions, has submitted that the EAR is deficient in its consideration of the potential impacts of the route options on the cultural, recreational, educational, scientific, and tourism values of the BCRP and its surrounding bushland. These concerns relate primarily to:

- The proximity of the Central Option to the main visitor facilities and picnic area.
- The impact of the Central Option to the accessibility and amenity of walking trails in the BCRP and surrounding bushland.

In response to these issues a more detailed analysis of the recreational, educational and tourism values of the BCRP and the surrounding bushland has been carried out, and is set out below. This analysis extends on the information provided in Section 6 of the EAR through detailed investigation of aerial mapping, a site visit by Council's project team members and through consideration of the detailed information provided in submissions. The publication entitled *Bomaderry Creek Bushland Walks* authored by Terry Barratt, Jim Walliss and May Leatch has also been considered in this analysis.

5.1 Values of BCRP and Bushland

The BCRP and surrounding bushland comprises three main areas.

- The land within the BCRP, which includes the trailheads for and some of the Bomaderry Creek, walking trails, part of the cleared services easement, the weir, and picnic facilities.
- Council owned land to the east and north of the BCRP, which contains contiguous bushland and includes the Bomaderry Creek, and walking trails that connect to the walking trails within the BCRP.
- Crown land located to the west of the BCRP which contains contiguous bushland and a continuation of the cleared services easement.

The *Bomaderry Creek Bushland Walks* identifies the following important values for the Bomaderry Creek bushland:

- A ruggedly scenic environment, with an array of ever changing scenery.
- It has an extensive system of walking tracks through a topographically diverse environment, including the creek gorge and the sandstone tops.
- It provides a buffer against pollution of the creek.
- It provides an unparalleled recreational and educational resource for the community and is a special focus for the recreational, educational and conservation requirements.
- An extremely diverse range of native plant life resides within the bushland – including rare, endangered and endemic species.
- Because of the high diversity of habitats there is also a large number of native animal species that occur within the BCRP and surrounding bushland.

- The BCRP and surrounding bushland contains evidence of pre-European occupation including shelter deposits, stone tool scatters, axe-grinding groves and art sites.
- The 1938 Bomaderry Weir is located in the Bomaderry Creek within the BCRP and provided Bomaderry's first permanent water supply.

The biodiversity, Aboriginal heritage and European heritage values of the BCRP have been addressed in detail throughout the EAR and in **Table 3**, **Table 5**, **Section 4** and **Section 6** for this Response to Submissions Report, and have not been revisited in this section. The biodiversity and heritage attributes of the BCRP and surrounding bushland contribute to the scientific and cultural values of the BCRP and surrounding bushland.

5.1.1 Recreational Values of BCRP and Bushland

It is clear from the submissions that the BCRP has significant value as a place for active and passive recreational activities. In particular, the walking trails provide for walkers, joggers, dog walkers and some cases bicycles riders, and the main facilities provide for picnicking and group activities. There is no formal information available as to the usage rates of the BCRP picnic area and walking trails, however anecdotal evidence from the Shoalhaven Tourist Information services indicates that it is popular with locals and visitors alike.

The recreational components of the BCRP and surrounding bushland have been considered in terms of passive and active recreation areas. Passive recreation areas have been categorised as picnic areas and the like, whereas active recreation areas have been categorised as walking trails and the like. This is consistent with the categorisation provided in the RMS's *Environmental Criteria for Road Traffic Noise.*

Passive Recreational Values

The main access into the BCRP and its amenities is via the entrance off Narang Road, which provides pedestrian access to the BCRP picnic area and facilities. Plan 2587_66 provides a detailed view of the main BCRP access point, car park, amenities and picnic area.

This main amenities area is landscaped, grassed area fringed by bushland. It is located about 150m from the car park and accessed via a sealed walking track from the car park. According to the NPWS visitor information material, and the *Bomaderry Creek Bushland Walks*, the BCRP amenities area includes the following facilities:

- A grassy picnic area with sheltered barbeque facilities, visitor shelters containing picnic tables and amenities (including flush toilets). The picnic areas provide open space for picnicking and for children to play in and an art installation that's also a children's game. Children can walk, skip or hop the ten mosaic stepping stones that show a gum tree's growth from seed to tree. At the end of the path three carved sandstone gumnuts end the game but start the tree's life cycle again.
- A mosaic and clay tile decorated wall which acknowledges the special significance of Bomaderry Creek for Aboriginal people. Clay footprints made by community members, from the elders through to toddlers, lead from the past to the future. A serpent, representing the creek, winds along the wall and carries the story of the connection between Bomaderry Creek, Bomaderry Children's Home and Aboriginal people. The work is the result of close collaboration between children and adults from Shoalhaven High School, Boori pre-school, the Shoalhaven Aboriginal Elders Group and the National Parks and Wildlife Service.

- An information board which provides information of the walking trails, and includes Aboriginal artwork and interpretation of the Aboriginal heritage significance of the BCRP and the surrounding bushland.

The BCRP amenities and picnic area provides a valuable resource for passive recreation, including picnicking and interpretation of local history and heritage for locals, families and visitors. It is highlighted that the value of this facility is due to its proximity to the BCRP walking trails (see below) and bushland, and that it provides a unique space within Nowra-Bomaderry for such activities.

Active Recreational Values

There are many walking trails in the BCRP bushland. Plan 2587_70 provides detailed illustration of the walking trails available throughout the BCRP and the surrounding bushland. Plan 2587_66 provides a detailed view of the main access point for walking trails that start/finish from the BCRP amenities and picnic area.

Bomaderry Creek Bushland Walks provides a detailed description of four of these walking trails, which have been summarised as follows:

- The Weir to Mossy Gully Walk is a short loop walk (approximately 1.4 km), which starts at the main amenities area, and passes the weir, the creek banks and the gorge, before ascending up to the cliff tops where is bypasses a hanging swamp and a lookout, before passing back down to the gorge to return the trailhead at the amenities areas. This walk passes through a range of diverse vegetation types including Coachwood rainforest, Grey Gum woodland, and the hanging swamp, and provides many opportunities for views of the gorge as well as Cambewarra Mountain. This walk is located entirely within the BCRP.
- The River Oak Crossing Walk is a longer loop walk (approximately 5.5 km) which starts at the main amenities area, and follows the gorge southwards mostly through the Coachwood rainforest. This walk passes underneath large rock overhangs and provides evidence of past collapses of huge slabs of rocks and provides opportunities to observe delicate 'honeycomb' rock formations.
- The North Nowra to Bomaderry Creek Walk connects the Mossy Gully crossing of Bomaderry Creek (see the Weir to Mossy Gully Walk) to Falcon Crescent on the western boundary of the BCRP, via the hanging swamp. This walk also provides access to another trail which connects through to West Cambewarra Road.
- Bernie's Lookout and Camelia Garden Walk is a short sealed track that commences at the main amenities are and travels northwest to Bernie's Lookout. The track was developed by the Bomaderry Creek Rotary Club to help people with disabilities experience the natural environment. The initial portion of the walk leaving the amenities area passes underneath the existing electricity transmission line and water pipeline easement where there is quite a deal of environmental disturbance which has allowed weeds to flourish. Bernie's lookout provides a pleasant view of Bomaderry Creek and the surrounding bush. This walk can be extended to the Camellia Garden, and then either return the same way or return via the access road for the Camellia Garden.

In addition to these four main walking trails Plan 2587_71, provided in **Appendix F**, shows that there are several more walking trails which connect to Falcon Crescent and West Cambewarra Road in the western portion of the BCRP and the surrounding bushland. Finally, the existing transmission line and water pipeline easement provides a direct pedestrian route between the western side of the Bomaderry Creek gorge and Falcon Crescent.

5.1.2 Educational Values of BCRP and Bushland

It is understood that the picnic area is used by local schools for outings in relation to environmental studies. This would be likely to include:

- Appreciation and understanding of local Aboriginal history and the significance of the area to Aboriginal cultural heritage through the interpretive information board and the mosaic wall.
- Appreciation and understanding of local European history and heritage significance of the weir.
- Appreciation and understanding of ecology and biodiversity through the diversity of native flora and fauna that exists in the BCRP and surrounding bushland.
- Appreciation and understanding of the natural processes that have contributed to the geography and topology of the area – in particular the geological structure of the gorge and how it has been formed over time through the passage of Bomaderry Creek.

The proximity of the BCRP, gorge and bushland to the urban areas of Nowra-Bomaderry means that it contributes significantly to the educational resources available to local school teachers, and provides a unique learning opportunity for local school children.

5.1.3 Tourism Values of BCRP and Bushland

There is no formal information available as to the usage rates of the BCRP picnic area and walking trails by tourists. While the BCRP and bushland is not heavily publicised or marketed, anecdotal evidence from the Shoalhaven Tourist Information services centre indicates that it is a popular attraction for tourists and visitors who are spending time in Nowra-Bomaderry.

Due to its location and size, and the limited range of activities available within the BCRP and surrounding bushland it is considered unlikely that the BCRP would constitute a destination in and of itself. That is, it is unlikely to be the primary reason that tourists would visit Nowra-Bomaderry, but rather it is a conveniently located attraction that is available for tourists and visitors to take in once they have chosen to stop.

The tourism values of the BCRP and surrounding bushland are based around the recreational facilities and walking trails.

5.2 Option 1 Impacts on Recreational Values

Plan 2587_67 and Plan 2587_71, provided in **Appendix F**, illustrate the key impacts on the recreational values for each route option. The key impacts which arise as a result of the NNLR are:

- Access and accessibility impacts where walking trails are severed.
- Noise impacts arising from road traffic noise.
- Visual impacts associated with the road, and especially the bridge structures.

The Central Option has received the vast majority of objections due to the impacts to recreational and amenity values of the BCRP and bushland. This is due to the proximity of the route alignment passing close to the BCRP amenities and picnic area, and impacting on some of the walking trails. Plan 2587_67, provided in **Appendix F**, shows in detail the route alignment of the Central Option in its spatial context.

5.2.1 Access and Accessibility to Recreational Areas

Option 1 will impact on the existing BCRP car parking area, however it is highlighted that promotional material for the BCRP advises that visitors not use the existing car park, but rather use nearby Council owned car parks due to a recent history of break-ins to cars in the BCRP car park. Development of Option 1 will necessitate the removal of the BCRP car park. Alternative parking and access arrangements will be subject to detailed design, however it is likely that car parking will be consolidated at the adjacent tennis courts car parking area operated by Council. Access between this proposed car parking area and the BCRP picnic and amenities area, across the Central Option, would need to be provided for, and would be dealt with as part of the road design. Options available to Council include:

- Provision of an underpass of overpass, or a pedestrian refuge to facilitate crossing.
- Provision of a new track underneath the bridge structure for Option 1 connecting the BCRP amenities area to the proposed car parking area.

As part of the design of any access arrangements it will be important to maintain the current accessibility for people with disabilities through provision of sealed pavements on access tracks and ramps with appropriate grades. The road intersection arrangements between any proposed new car parking area and the Central Option would also be developed as part of the design phase.

In addition to access to the BCRP and its facilities, access and accessibility of four walking trails will be impacted by Option 1.

- The walking trail to Bernie's Lookout will be severed by the Central Option. Council propose to provide an alternative trail access to connect the BCRP amenities and picnic area with the northern part of the Bernie's Lookout walking trail. The design for this alternative trail will be developed as part of the next phase of road design and would be designed to ensure it maintains the same level of access as is currently afforded for people with disabilities.
- The Walking trail which connects the BCRP picnic and amenities area with the area of the Bomaderry Creek bank where it is possible to view the weir would be potentially impacted by the Central Option bridge structure. Until the final horizontal and vertical alignment is established it is unclear what level of impact may occur and therefore it is uncertain whether this walking trail would need to be modified. It is considered likely that a minor realignment of the existing walking trail will be likely, and Council propose to provide for this realignment as part of the next road design phase.
- Two walking trails which connect through to West Cambewarra Road, as well as Falcon Crescent itself, would be severed by the Central Option. It is uncertain whether pedestrian crossings of the road would be required in these locations. As part of the design of the road, and with consideration of safety issues, Council would investigate the need for pedestrian crossings in one or both of these locations. If pedestrian crossings are not feasible then Council will need to investigate alternative trail access between the existing walking trails and West Cambewarra Road.

Option 1 creates a number of design challenges in relation to maintaining access and accessibility of people to the recreational assets of the BCRP and surrounding bushland. However, it is considered that these can be addressed through the design phase and that the existing level of access and accessibility will be able to be retained through modification and realignments.

5.2.2 Noise Impacts on Recreational Areas

In relation to noise impacts the RMS's *Environmental Criteria for Road Traffic Noise* establishes two noise criteria:

- For passive recreational areas an $L_{Aeq(1hr)}$ of 55 dBA.
- For active recreational areas an $L_{Aeq(1hr)}$ of 60 dBA.

The different criteria take into to account the different values of passive and active recreational areas, and how they are used by people. The most stringent criterion is for passive recreational areas, where people tend to be stationary within one location and therefore more sensitive to noise.

Passive Recreation Areas

Figure 1 of Appendix L of the AECOM Traffic Report (which is Appendix E of the EAR) illustrates the areas that will exceed the 55 dBA noise level (this Figure has been reproduced as **Figure 3**). As described in the EAR, and as can be seen in **Figure 3**, the BCRP amenities and picnic area is partly within the area that would exceed the 55 dBA noise limit. It is highlighted that the southern part of the picnic area, which includes the visitor shelters, picnic tables, barbeque facilities and amenities, is outside of the area where the 55 dBA noise level is exceeded. The northern part of this area, including the mosaic wall and information board, would be potentially affected by noise, which would be in marginal exceedance of the 55 dBA limit.

It is highlighted that the noise impact assessment has modelled only the worst case traffic conditions, which are generally the PM peak hour. Peak usage of the passive recreational facilities would be expected to occur on weekends and school holidays, which would not be subject to the worst case traffic volumes. Further, the noise modelling has not taken into account any road design. The noise levels will be dependent on these final horizontal and vertical alignments. Detailed noise modelling will be carried out as part of the detailed design development to ascertain whether the Central Option would actually result in a noise impact in exceedance of the 55 dBA noise criteria in the passive recreational picnic and amenities area of the BCRP.

Figure 3 – Reproduction of Figure 1 from Appendix L of the AECOM Report showing the noise impact to the BCRP recreational area

If the detailed noise modelling proposed for the design phase identifies an exceedance, then the reasonableness and feasibility of mitigation measures to reduce the noise within the passive recreational area will be investigated by Council. These will include:

- Low noise pavement could be used for the part of the road closest to the passive recreational area.
- Installation of a noise barrier along the section of the road closest to the passive recreational area.

It will not be possible to determine whether these noise mitigation measures will result in the reduction of noise impacts on the passive recreational area until the final horizontal and vertical alignments have been designed.

Active Recreation Areas

Noise impacts on active recreational areas are subject to the 60 dBA criterion. There are five locations where walking trails are expected to be subject to an exceedance of this 60 dBA criteria:

- Part of the walking trail to Bernie's Lookout will be likely to be impacted by noise in excess 60 dBA during the worst case traffic conditions. As described above Council will need to modify this walking trail due to it being severed by Option 1. Due to the requirement maintain as much as practicable a level walking trail so as to retain the existing level of accessibility for people with disabilities, and the fact that walking trail intersects the route alignment for Option 1, it is unlikely that the entire walking trail can be realigned so as to prevent any part of it being subject to noise in excess of 60 dBA during the worst case traffic conditions. As with the passive recreational areas, it is highlighted that the worst case traffic conditions are unlikely to occur at the same time as the main periods of usage for this walking trail. As part of the design for the alternative trail detailed noise modelling will be carried out and reasonable and feasible noise mitigation measures investigated will be developed as part of the next phase of road design.
- The Walking trail which connects the BCRP picnic and amenities area with the area of the Bomaderry Creek bank where it is possible to view the weir would potentially be impacted by noise from the Central Option in excess of the 60 dBA criterion. Reasonable or feasible noise mitigation measures will be investigated as part of the design phase, however a small section of this trail would be located very close to the roadway and it is unlikely that mitigation would be effective for this component. It is highlighted that the weir viewing area and part of the walking trails located at the base of the gorge are identified as not being subject to noise in excess of the criterion due to the separation in grade.
- A small part of the short loop trail that connects the BCRP amenities and picnic area with the Mossy Gully crossing of the Bomaderry Creek would be subjected to noise potentially in excess of the 60 dBA criterion during the worst case traffic conditions. It will not be possible to accurately determine whether noise would exceed the criterion for this walking trail until more detailed noise modelling has taken place based on the finalised horizontal and vertical alignments. However, since this trail is further away from the Central Option alignment than the picnic area and the weir viewing area, it is plausible that noise impacts on this part of the short loop trail will not exceed the criterion, especially once mitigation measures applied for the picnic area have been applied.

- Small sections of the two walking trails which connect through to West Cambewarra Road, as well as Falcon Crescent itself, would be subject to noise in excess of the 60 dBA criterion during the worst case traffic period where they would be severed by the Central Option. It is estimated that only approximately 50 m of walking trail on either side of the road would be subject to noise potentially in excess of the 60 dBA criterion. As with the Bernie's Lookout walk, because these trails would be severed it is unlikely that the noise impact could be mitigated so as to be below 60 dBA during this worst case period. Also as highlighted above the noise impact would be lower than the worst case period most of the time when levels of traffic are well below the worst case PM peak period. Due to the very close proximity of small sections of these walking trails route alignment for Option 1 it is unlikely that noise mitigation measures will be reasonable or feasible, but would be investigated as part of the design phase.

There will almost certainly be short sections of walking trails in the BCRP that will be subject to noise in excess of the 60 dBA criterion during the worst case traffic period, being the PM peak. More detailed noise modelling will be required once the final horizontal and vertical alignments have been developed, and reasonable and feasibly noise mitigation measures investigated, before it will be possible to accurately define the length of each walking trail that will be impacted in such a way. The results of the modelling carried out to date indicate that it will be only very short sections of walking trails that would be affected (i.e. less than 100 m).

5.2.3 Visual Impacts on Recreational Areas

The Central Option will generally not be visible from the picnic and amenities area due to the intervening vegetation, although it may be possible to catch glimpses from certain vantage points.

However, due to the access and accessibility issues discussed above, the Central Option will significantly alter the current visual amenity of the main BCRP access area. In particular:

- Relocation of the car park, probably to the existing parking area on the northern side of Narang Road would force visitors to cross the Central Option roadway – whether through an alternative trail which passes underneath the bridge, or via some included pedestrian crossing facility – and this would affect the visual appearance of the park entry. Council would include in the design of the Central Option details of park entry facilities, including signage or similar where appropriate. It is considered by Council that the presence of the roadway combined with good signage could significantly increase the awareness of and patronage to the BCRP and its facilities.
- The visual amenity of the Bernie's Creek Lookout walking trail would be impacted by the Central Option, not least of all through the need to relocate a small section of the trail to either cross the Central Option roadway or pass underneath the bridge structure. Secondly, south-westerly views from part of the Bernie's Lookout walking trail would at times take in the bridge structure for Option 1. This would be mitigated through the removal of the existing water pipeline, which will be consolidated into the bridge structure.
- The area of the Bomaderry Creek bank where it is possible to view the weir would be impacted by the bridge for Option 1, which would pass only about 20 m to the north of the eastern side of the weir. Due to the depth of the gorge at this location (approximately 10-15 m) it is considered that the bridge would have a potentially significant effect on the visual setting of the weir viewing area. Council note that a pedestrian pathway would be incorporated onto the southern side of the bridge, which would provide an opportunity for viewing of the weir from the bridge.

- The portion of the short loop walking trail, on the western side of the creek and immediately south of the weir would be affected. In particular, for approximately 100 m of this walking trail, views to the northeast would be likely at times (subject to intervening overhanging vegetation) to be take in the new bridge structure.

In addition to the above the location, where the two existing walking trails (that connect through to West Cambewarra Road on the western side of Bomaderry Creek) would be severed by the Central Option there would be a localised affect to the visual amenity. The significance of the impact would be dependent on the design solution adopted to maintain pedestrian accessibility along these walking trails.

Except for the realignment of walking trails to pass underneath the proposed bridge structure, it is highlighted that only very small sections of the existing walking trails would be visually affected by the Central Option.

5.3 Option 2 Impacts on Recreational Values

5.3.1 Access and Accessibility to Recreational Areas

Option 2 would not impact on the BCRP picnic and amenities area, nor will it impact directly on access of accessibility to any walking trails in the BCRP or surrounding bushland. However, the Southern Option would sever Falcon Crescent at its south-easterly extent (see Plan 2587_71, provided in **Appendix F**). This would necessitate an overpass of underpass, or the development of an alternative access arrangement for providing access to the former landfill site.

5.3.2 Noise Impacts on Recreational Areas

The Southern Option would not result in any noise impact to active or passive recreational areas. The noise modelling indicates that the walking trails at the base of the gorge would not be impacted by noise in excess of the criteria due to the separation of grade between the bridge and the base of the gorge. Where Option 2 bridges the gorge this distance is approximately 30m.

5.3.3 Visual Impacts on Recreational Areas

The Southern Option would only impact on the visual amenity of one walking trail, at the location where it bridges Bomaderry Creek. This walking trail is the long loop walk (The River Oak Crossing Walk) and is located predominantly on Council land outside of the BCRP. Due to the dramatic topography of the gorge in this location, with a depth of some 30 m, it is considered that the bridge structure would have a significant impact on the visual setting of the walking trail. However, due to the topography, and the location of the bridge on a bend, it would only be visible for a comparatively short section of the trail, reducing the significance of the impact.

5.4 Option 3 Impacts on Recreational Values

5.4.1 Access and Accessibility to Recreational Areas

Option 3 would not impact on the BCRP picnic and amenities area. It will impact directly on several walking trails which currently link West Cambewarra Road to Falcon Crescent and other walking trails within the BCRP by severing these trails. Plan 2587_71, provided in **Appendix F**, shows that there are four walking trails that would be affected in this way. As part of the design for Option 3, Council would consider providing pedestrian crossing infrastructure, most likely through the installation of pedestrian refuges at specific locations.

The trails would be extended over the noise bud to West Cambewarra Road, or the trail would be detoured along the northern part of the Northern Option road reserve to connect to West Cambewarra Road via the local access road. If necessary, parallel road-side parking bays would be incorporated into the final road design.

The access arrangements for trails that currently connect into the BCRP bushland would be agreed with OEH.

5.4.2 Noise Impacts on Recreational Areas

Small sections of the four existing walking trails which connect to West Cambewarra Road would be subject to noise in excess of the 60 dBA criterion during the worst case traffic period where they would be severed by Option 3. It is estimated that only approximately 50 m of walking trail would be subject to noise potentially in excess of the 60 dBA criterion. As with the walking trails severed by the Central Option (described above), due to the very close proximity of small sections of these walking trails route alignment for Option 3 it is unlikely that noise mitigation measures will be reasonable or feasible, but would be investigated as part of the design phase.

5.4.3 Visual Impacts on Recreational Areas

Where the Northern Option would sever the four existing walking trails there would be a localised affect to the visual amenity.

5.5 Impacts on Educational Values

Options 2 and 3 are not considered to impact significantly on the educational values of the BCRP and surrounding bushland.

Option 1 will modify the visual setting of the entrance and access way into the BCRP, as well as affecting the visual setting of the viewing area for the weir, and small sections of the walking trails. The presence of the bridge will not undermine the educational opportunities available to students in relation to understanding and appreciating historical values of the weir.

The educational values of the amenities and picnic area will not be undermined by Option 1. In particular, the functionality and setting of the physical infrastructure will not be substantially modified as a result of the Central Option, and the noise amenity values will largely be protected so that they are within the allowable criteria.

Most of the length of each of the walking trails will not be affected in any way by the Central Option (or any option). They will retain the opportunity to understand the natural processes that have led to the formation of the gorge and they will continue to provide opportunities to observe native flora and fauna. As such, the Central Option will not undermine the educational values of the BCRP and the surrounding bushland.

5.6 Impacts on Tourism Values

As stated above, the tourism values of the BCRP and surrounding bushland derive predominantly from the recreational activities available within the bushland – in particular the picnic area and the walking trails.

Option 1 will modify the visual setting of the entrance and access way into the BCRP, as well as affecting the visual setting of the viewing area for the weir, and small sections of the walking trails.

This will have an effect on the amenity of this main access area, but will not prevent tourists and visitors from accessing and enjoying the picnic area. As described above, there will be short sections of the existing walking trails that will be affected by noise and views of the bridge structure. However, the current amenity values along the vast majority of each walking trail will be retained.

It is highlighted that the promotional material for the BCRP advises that visitors not use the existing car park, but rather use nearby Council owned car parks due to a recent history of break-ins to cars in the BCRP car park. Development of Option 1 will necessitate the removal of the BCRP car park and provision of alternative parking arrangements located at the adjacent tennis courts car parking area operated by Council. Due to the increased visibility of this car parking there is a lower potential for anti-social behaviour.

Option 2 and 3 will not impact on the main access point into the BCRP off Narang Road. However, they will both have some impacts on existing walking trails in the bushland surrounding the BCRP:

- Option 2 will affect the visual amenity for a short section of the long loop walk, where the bridge structure will be observable.
- Option 3 will affect the existing accessibility of four walking trails that connect up to trails within the BCRP. The visual and noise amenity of a short section of these trails will be affected. Subject to agreement with OEH, accessibility to the BCRP walking trails will be maintained via these walking trails that currently start/finish on West Cambewarra Road.

It is not expected that any option will significantly detrimentally impact on the tourism values of the BCRP and surrounding bushland.

5.7 Additional Mitigation Measures

5.7.1 Central Route Option

Option 1 creates a number of design challenges in relation to maintaining access and accessibility to the recreational assets of the BCRP and surrounding bushland. To address these challenges Council would carry out the following as part of the next phase of road design:

- Access between this proposed car parking area and the BCRP picnic and amenities area, across the Central Option, would be included in the road design. The design will maintain the current accessibility for people with disabilities through provision of sealed pavements on access tracks and ramps with appropriate grades.
- The road intersection arrangements between any proposed new car parking area and the Central Option would also be developed.
- Council would design an alternative trail access to connect the BCRP amenities and picnic area with the northern part of the Bernie's Lookout walking trail. The design for this alternative trail will be developed to ensure it maintains the same level of access as is currently afforded for people with disabilities.
- Council will provide for a modified access trail between the picnic area and the weir.
- For walking trails severed within the BCRP west of Bomaderry Creek, Council would investigate the need for pedestrian crossings or alternative trail access.

There will almost certainly be parts of the BCRP that will be subject to noise in excess of the relevant criteria during the worst case traffic period. Council would carry out detailed noise modelling once the final horizontal and vertical alignments have been developed to define areas that will be impacted by road noise. Reasonable and feasibly noise mitigation measures would be investigated.

5.7.2 Southern Route Option

Council would design suitable alternative access arrangements for Falcon Crescent, including for providing access to the former landfill site.

5.7.3 Northern Route Option

For the trails that currently connect between West Cambewarra Road and the BCRP bushland and which would be severed by Option 3 the access arrangements would be agreed with OEH.

6.0 Additional Aboriginal Heritage Information

6.1.1 Revised Aboriginal Heritage Assessment

The Aboriginal Heritage impact assessment has been updated in accordance with the current concept plan to better reflect potential impacts on Aboriginal archaeological heritage. The response to submissions and updated assessment information prepared by Kelleher Nightingale Consulting is provided in **Appendix E**.

The findings of the updated assessment are in keeping with the original assessment (July 2010) which stated detailed design should be able to limit potential impacts to Aboriginal heritage.

The overall impact on Aboriginal archaeological significance remains unchanged. All three options still exhibit some potential to directly impact on Aboriginal archaeological heritage. Informed detailed design should be able to limit or eliminate impact on Aboriginal archaeological heritage.

In summary:

- Option 1 will likely have an impact on archaeological site BCRP 011 (52-5-0390). This artefact scatter is identified as having low archaeological value. However, due to their location it is predicted that direct impacts to sites BCRP 006 (52-5-0542) and BCRP 012 (52-5-0544) should be able to be avoided through detailed design.
- The route alignment for Option 2 would avoid previously predicted impacts to BCRP 19 (52-5-0551) and BCRP 27 (52-5-0558). The route alignment is predicted to potentially impact site BCRP 026 (52-5-0557) due to its close proximity, however the road will be on a bridge at this location, and it is expected that direct impacts to this rockshelter of low archaeological significance should be able to limited or eliminated. Notwithstanding the above, the southern portion of the Bomaderry Creek Gorge, around the area to be bridged for Option 2, has been identified as exhibiting some Aboriginal cultural significance.
- The route alignment for Option 3 has the potential to impact the northern extent of artefact scatter 52-5-0545 (BCRP 013) and isolated find 52-5-0547 (BCRP 015). However, the potential impact to these sites should be able to be limited or eliminated during detailed design. Culturally the area has been identified as exhibiting some cultural significance (although less than Option 2).

All three route options exhibit some level of potential impact on Aboriginal archaeological and cultural heritage. None of the potentially impacted archaeological sites are significant, although all archaeological sites should be conserved if possible.

6.1.2 Revised Comparative Assessment

The refinements to the Aboriginal heritage assessment identify that there are unlikely to be any impacts to Aboriginal archaeological items of moderate or high significance for any of the route options. Option 1 and Option 3 would be likely to impact to some degree on items of low archaeological significance.

The assessment has not resulted in any changes to the assessment of cultural significance.

Discussions with the Aboriginal community during field inspections indicate a preference for Option 1. This option was seen to have a small overall impact on Aboriginal archaeological and cultural heritage. The identified archaeological sites potentially impacted by Option 1 were seen as representing low cultural significance and not warranting mitigation. Furthermore, based on discussions in the field with Aboriginal representatives, the perceived cultural significance (and archaeology) of the gorge is greatest around Option 2.

Discussion with the Aboriginal community indicated that the southern portion of Bomaderry Gorge has some cultural significance. The archaeology associated with Option 2 was also recognised as having moderate cultural value. For this reason Option 2 was not a preferred option.

Discussion with the Aboriginal community indicated that the archaeology associated with Option 3 exhibits moderate cultural value. Cultural value was specifically attached to the axe grinding grooves 52-2-1797 (BCRP 028), located in the vicinity of artefact scatter 52-5-0546 (BCRP 014), neither site of which are directly impacted by Option 3.

Based on the above the comparative rankings of the three route options have become closer. Aboriginal heritage is not considered to be a useful differentiator between the route options.

6.1.3 Revised Mitigation Measures

No change is proposed to the Aboriginal heritage mitigation measures.

7.0 Additional Detail for Soil and Water Assessment

For all three Route Options, during the construction of the project impacts associated with soil and water issues, such as erosion and sedimentation, will occur once existing vegetated surfaces are disturbed. Effective erosion and sediment control initially involves minimising erosion, as this will directly impact on the amount of sediment generated and reduce the number and size of sediment control measures required to prevent off-site sedimentation.

There are a large number of possible mitigation and management measures that could be applied during the construction phase of the NNLR project. While the range of possible mitigation and management measures are generally the same for each of the route options at this stage of design and construction planning, once a route option is selected, and detailed design and construction planning has commenced it will be possible to determine exactly which mitigation and management options will be required to be put in place.

Advice has been obtained from BeauCon Services in relation to the identifying the following erosion and sediment control measures and practices should be implemented during the construction phase of the project to minimise erosion and offsite sedimentation. They have been divided into the following areas:

- Site management;
- Construction activities;
- Temporary erosion and sediment control measures.
- Protection of Riparian Vegetation
- Chemical and Fuel Storage
- Wastewater Management

Site Management

The manner in which a site is managed has a significant influence on its impact on the adjacent environment. Good site management, supervision and construction practice will dramatically reduce on-site erosion and off-sedimentation. They will also provide a cost advantage by decreasing downtime after rain events, minimise offsite clean-up costs and onsite repair costs (associated with cleaning out culverts and repairing batters) and reduce revegetation costs. Such practices include:

- Developing and implementing a Soil and Water Management Plan which will include a Primary (Generic) Erosion and Sediment Control Plan (ESCP). The Primary ESCP is a document of intent outlining how erosion and sediment control will be managed onsite during construction. It is supported by a series of site-specific Progressive ESCPs, drawn on design plans that reflect the constantly changing, dynamic nature of construction.
- Ongoing proactive planning of work activities that focus on minimising or preventing any environmental risks associated with an activity. This can include the development of Environmental Work Method Statements and Progressive ESCPs.
- To ensure that the most appropriate controls are being planned, implemented and maintained, a suitably qualified Soil Conservationist must be engaged to undertake regular inspections of permanent and temporary erosion and sediment control measures.

- Promoting and establishing a culture that emphasises the implementation of best environmental management practice throughout the life of the project.
- Undertaking regular (weekly) inspections of all erosion and sediment control measures as well as undertaking inspections during and after rainfall events. Any maintenance of control measures must be completed within 5 days of rain ceasing. This means having sufficient resources (staff, equipment and products) to complete all maintenance within this time frame.
- Having approved procedures in place for activities such as bridge works in and adjacent to Bomaderry Creek, dewatering, works associated with culverts and the maintenance of control measures.
- Planning for permanent drainage works and outlet protection works to be implemented as early as possible in the construction program.
- Staging construction activities to keep the area of disturbance to a practical minimum. This will also reduce the number of erosion and sediment controls needed at any one time, reduce risk on fill batters and reduce maintenance costs.
- Implementing erosion and sediment control measures throughout catchment areas to minimise the pressure on 'last line of defence' controls at site boundaries.
- All construction personnel must undergo a site induction and environmental awareness seminars at the start of the project that include erosion and sediment control and soil and water management.
- Clearly defining the limits of clearing to prevent unnecessary over-clearing.
- Prior to clearing commencing, fence off vegetation that is to be retained and any designated 'no-go' areas.
- Close supervision of sub-contractors to ensure that they are planning, implementing, inspecting and maintaining sufficient erosion and sediment control measures to minimise erosion and sedimentation. Interface areas between sub-contractors or between a sub-contractor and the main contractor must be managed by the main contractor with responsibilities and accountability clearly defined and communicated to all involved parties.
- Toolboxing staff on areas of vegetation to be retained, environmentally high-risk areas, the limits of clearing and designated 'no-go' areas.
- Keeping the number of all-weather site accesses to a few well-defined access points.
- Ensuring any access roads associated with the project have appropriate drainage and a low-erosion prone surface to minimise erosion and offsite sedimentation.
- Ensuring that all runoff is managed onto, through and off the site in a controlled manner using permanent and/ or temporary drainage structures. This will assist with preventing and/ or minimising erosion.
- Supervising the delivery of construction supplies to ensure that they are not stockpiled on control measures or vegetation to be retained and that the delivery vehicles are not driving over off-limit areas.
- Locating the site compound in an area that is low risk, where it will have a minimal impact on the surrounding environment, that is located close to the project to minimise travel to and from the site and can easily be revegetated at the completion of the project.
- Ensuring the site compound has all-weather access to minimise erosion of the compound site.

- Stockpiling any topsoil according to identified vegetation communities along the selected project route for later respreading back in those areas.
- Stockpiling mulched native vegetation according to identified vegetation communities along the selected project route for later respreading back in those areas.
- Ensuring that areas designated as stockpile sites are clearly defined and are located in environmentally low risk areas that are easily accessed. This means locating stockpiles away from flow lines, steep areas, flood plains, native vegetation to be retained and trafficked areas.
- Undertaking regular inspections and maintenance of erosion and sediment control measures to ensure that the controls are fully functional. The frequency of inspections will be determined by the stage of works, rainfall and extended work breaks. A minimum frequency of once a week and directly after rain will be required.
- Sufficient resources must be available onsite to enable the proactive management of erosion and sediment control measures. This includes non-woven geotextile, sediment fence, strawbales, sandbags, cover crop seed, plant equipment, sufficient staff responsible for the installation and maintenance of control measures and water carts to manage dust.

Construction Activities

How construction activities are undertaken will have a direct influence on the amount of erosion and off-site sedimentation that will occur. Construction practices that minimise erosion and sedimentation include:

- Installing, maintaining and monitoring temporary erosion and sediment control measures. Maintenance of these structures should be undertaken when their capacity is reduced by 30%.
- Erosion and sediment control measures must be installed and managed as per the Manual 'Managing Urban Stormwater: Soils and Construction' (2004 Ed.).
- Staging clearing, where practical, to minimise the amount of soil disturbed.
- Maintaining as much groundcover as possible on the soil surface during clearing to minimise soil erosion.
- Stockpiling topsoil according to each of the identified vegetation communities so that it can be respread back in the relevant vegetation community.
- Utilising cleared vegetation to create mulched vegetation windrows at the limits of clearing.
- Mulching cleared vegetation and stockpiling it separately according to each of the identified vegetation communities and being respread in the relevant community.
- Leaving cleared surfaces rough.
- Installing sediment basins once clearing has been completed so that any sediment-laden runoff can be directed to the basins via temporary drains. The basins must be completed as quickly as possible with the spillways lined.
- Sediment basins must be treated with a flocculant such as Gypsum and tested prior to discharge to ensure that the water quality meets the OEH's water quality guidelines.

- Constructing temporary banks/ drains across cleared areas, the road formation and sections with steep slope gradients. This will reduce flow velocities, flow volumes and direct runoff to strategic locations to be captured and treated prior to leaving the site. The spacing between the banks/ drains should be no greater than 20 - 30m apart and may need to be even more closely spaced depending on slope. These temporary banks and drains should be directed to sediment traps.
- Completing drainage structures as quickly as possible which includes installing inlet and outlet protection directly after the pipe work is completed.
- Double handling of excavated material should be prevented or kept to a minimum to reduce the need for stockpile areas, associated erosion and sediment control measures and costs.
- Topsoil stockpiles must be kept to less than 2m in height and revegetated with a cover crop within two weeks of being stockpiled. Topsoil stockpiles must have a sediment fence on the downslope side and a clean water diversion drain constructed on the upstream side of the stockpile
- Other stockpiled materials must have a sediment fence or mulch windrow on the downslope side and a clean water diversion drain constructed on the upstream side of the stockpile. The sediment fence should be located at least two metres away from the anticipated toe of the stockpile to prevent its capacity being reduced by material being stockpiled up against it or it being buried.
- Undertaking the excavation of cuts so as to pond water in the cuts rather than it flowing out of the cuts across adjacent slopes.
- Constructing the bridge, for the selected route option, from both sides of the creek removing the need to install a temporary creek crossing.
- Keeping the area needed to construct a working platform beneath the bridge to the absolute practical minimum area required.
- Progressively stabilising batters. It may be necessary to use erosion matting on fill batters with slope gradients greater than 2:1.
- Installing earth windrows along the edge of fill batters directing runoff from the formation to geotextile-lined batter drains that outlet into sediment controls at the toe of the fill. The temporary batter drains can be extended as the fill comes up and the windrows reinstated at the end of each day's work.
- Maintaining stabilised site access points to minimise the amount of mud being tracked onto adjacent sealed roads.
- Bridge protection works at the abutments must be undertaken as soon as practical to stabilise the batters adjacent to the bridge.
- All disturbed areas must be progressive revegetated and stabilised as soon as practical. This will minimise costs associated with the ongoing maintenance of sediment control measures.
- Water carts must be used to manage dust along the project. It is recommended that a dust management strategy be developed that identifies critical areas and activities that generate significant dust as well as areas that require dust suppression on a less frequent basis. This will assist in determining the number of water carts required onsite, the length of time it takes a water cart to complete a circuit (including refilling time) and the frequency of the wetting down of different areas along the project to keep dust to safe levels.

- Installing and maintaining drainage along any proposed temporary access tracks. This includes installing rollover banks on steep sections. These banks should outlet into mitre drains/ spoon drains that have sediment controls at their outlet. The most appropriate sediment control measures include sandbag sediment traps whose height and width can be varied to suit the mitre drain more easily than sediment fences or strawbales.

Temporary Erosion and Sediment Control Measures

Some key temporary erosion and sediment control measures include, but are not limited to, the following:

- Temporary drains - temporary drains should be at least 400mm deep and have a slope no greater than 1 - 2%. If temporary drains are also constructed with a bank on their downslope side, it should have a height of 300mm and be track rolled (the steeper the slope the drain is on the greater the bank height must be). Temporary drains must outlet onto stable areas. This can be natural ground that is well vegetated, onto geotextile or into a sediment trap which will trap sediment and slow flow velocities. Temporary drains should extend across the length of a disturbed area.
- Earth windrows - earth windrows should be installed along the top of fill batters to direct runoff to geotextile lined batter drains. These can be installed at the completion of each day's work and should be at least 400mm high and track rolled.
- Geotextile lined batter drains - these should be installed on fill batters to direct runoff from the formation over a fill batter without causing erosion. The geotextile must be trenched in at the top and secured along the length of the batter drain. Geotextile can be also used to line drainage lines during the installation and extension of culverts and protect disturbed areas (particularly adjacent to the creek) from erosion.
- Timber/ mulched timber windrows – timber/ mulched timber windrows are a cost effective measure that can be used immediately outside the toe of fill batters where there is sufficient vegetation to create them. They should have a maximum height of 1.5m and maximum width of 2m. Timber windrows can include the heads of trees to increase their sediment trapping capacity. Stumps should not be included in timber windrows and care should be taken to minimise the amount of soil incorporated into the windrows. Soil can be problematic if there is a bushfire as it tends to increase the length of time it takes to extinguish a fire in a windrow.
- Sediment fences and geotextile wrapped strawbales - these should be installed along the contour as much as practical below disturbed areas, in areas with low to moderate slopes gradients. Both these types of sediment control must be trenched in and have their ends turned up. They should have a length of no longer than 20m. Sediment fences and strawbales are not designed for concentrated flow situations. Wrapping strawbales in geotextile can increase the life of the sediment control and prevents the spread of weeds.
- Sandbag or rock sediment traps - sandbag sediment traps are a versatile control that can be used in variety of situations. They can be installed in catch drains to slow flow velocities and trap sediment, at the outlets of mitre drains and temporary V drains and in areas of concentrated flows. They are constructed in a similar fashion as a check dam with a lower section in the middle to create a spillway. Their height can be varied to suit a range of situations.

- Filter bags- these are made from geotextile and filled with gravel or sand. These are ready-made proprietary products. They can be installed (up to three high) along the edge of haul or access roads where there is limited space to install other sediment control measures, at the outlets of mitre drains and in a horse shoe shape (facing downslope) along the formation to trap sediment. These have a minor sediment trapping capacity and should be used in conjunction with other control measures.
- Excavated sediment traps - excavated sediment traps can be installed upslope of other control measures to increase their capacity. They involve the excavation (a bucket load or more) of material directly upslope of a sediment fence, strawbales or sandbag sediment trap.
- Mulch windows - these are similar to timber windrows but consist of mulched vegetation. They can be used in similar locations and have a maximum height of 1m and maximum width of 2m. They can be later respread over the adjacent batter.

Protection of Riparian Vegetation

- Riparian habitat will be assessed in the field prior to any construction work. Removal or clearing of riparian vegetation should be minimised as much as practical. It is anticipated that some minor clearing will be required adjacent to the bridge alignments.
- Appropriate protection, such as fencing/flagging off, should be undertaken to protect riparian vegetation that does not require removal.
- All work areas should be contained within the construction footprint. There should be no unnecessary intrusion into adjacent riparian vegetation. Machinery required for the installation of the bridge should stay within the construction footprint and areas where vegetation is to be retained should be fenced off and signposted as a 'no-go' area.
- The destruction of riparian vegetation within the bed and banks of the watercourse should be minimised where possible with targeted lopping of vegetation where necessary rather than its complete removal. If vegetation clearing is unavoidable, trees should be cut to 100mm above the ground surface and the rootstock left in place and undisturbed.

Chemical and Fuel Storage

- All concrete should be supplied from off-site and delivered to the site in agitator trucks.
- During each concrete pour, allowance should be made for the amount of concrete left in the concrete pump to be "blown" out and used as part of the pour to minimise amount to be washed out of pump. Washout of the concrete pump should be into an imperviously lined bunded area which will be monitored and cleaned out when there is less than 30% capacity remaining in the bunded area.
- Concrete washout areas should be clearly signposted with concrete truck operators informed of their location prior to a pour commencing.
- Scree washout should be undertaken in the same manner as that for concrete washouts associated with concrete pours.
- Any spillage of materials as a result of delivery or handling should be cleaned up as immediately and placed into suitable receptacles for reclamation or disposal at a suitable location.
- Concrete samples used by the on-site laboratory should be collected and disposed of at a suitable location/ facility.

- Prior to the establishment of any fuel/chemical storage areas, a plan of the site should be prepared detailing:
    - Site layout.
    - Measures used to exclude external runoff.
    - Location of bunded areas.
    - Bund capacity.
    - Lining of bunds to provide an impervious seal to prevent leakage of chemicals/ fuel.
    - Design criteria for any on-site retention structures will be provided.
    - Location of spill 'clean-up' kits other than those in the foremen vehicles.
    - Management of wastewater on-site.
- Fuel and oils, to be used during construction, should be stored at the site compound and be surrounded by impervious bund walls to retain any spills of more than 120% of the total volume of all the containers in the bunded area. There should be no pipes and valves in the bund and the storage area should be designed to slope to one corner to allow for the cleanup of any spilt material. Bunds should be inspected after rain and any rainwater that is compromising the capacity of the bund should be removed and disposed of appropriately (as contaminated wastewater).
- Chemicals should be stored in covered, impermeable bunded areas that have sufficient capacity to store at least 120% of the total volume of all containers in the bund. These will be enclosed containers that do not permit the entry of rain. Any spillage should immediately be contained and absorbed with a suitable absorbent material. The contaminated material should be collected for disposal at a waste depot licensed to receive such waste.
- Spills of fuels and oils should be cleaned up using available spill kits. There should be spill kits at the site compound and mobile spill kits in foremen' vehicles.
- OEH Guidelines "Bunding and Spill Management" should be available and used on site, with their requirements met.
- Materials Safety Data Sheets (MSDS) for all chemicals stored on-site should be readily available to site personnel. They should be informed of these as a part of their site induction.
- Chemicals to be used on site should be stored in the site compound. The storage of chemicals on-site shall be in accordance with relevant Australian Standards as well as any OEH requirements and OHS legislative matters under Workcover authorisation.
- Chemical drums should not be left open either inside or outside of bunded areas.
- Refuelling of equipment on-site or any other activity which may result in a spillage of a chemical, fuel or lubricant should be undertaken a minimum of 20 metres away from creeks, where practical.

- A mobile refuelling truck should be used to refuel the plant and equipment along the project. Each mobile refuelling truck should be fitted with an automatic shut off valve to minimise the risk of spills. Each refuelling vehicle should have a spill kit with all drivers trained in the use of the spill kit and emergency response procedures. Any spilt material should be contained and disposed of off-site. MSDS sheets for the fuel that are carrying in the refuelling trucks should be kept in the vehicle. All site personnel including the drivers of mobile refuelling trucks should be inducted prior to commencing work on site.
- All equipment used should be regularly maintained to prevent leaking fuel tanks, hoses, etc.
- Refuelling activities should not be left unattended while refuelling is in progress.
- A procedure should be in place for the management of the curing compound to ensure any runoff containing this product is contained prior to entering any adjacent drainage lines or being deposited where there is the potential for it to flow into adjacent flow lines.

Wastewater Management

- All activities that generate wastewater, other than site runoff should, where practical, utilise bunding to contain wastewater to enable its removal off-site to an approved waste disposal facility.
- Site runoff should be directed to and captured in sediment traps, GPTs and sediment filters via temporary drains, temporary earth windrows along the top of fill batters, lined batter drains and shaping of earthworks.
- All sub-contractors, particularly those who undertake site activities that generate or handle potential pollutants must be made aware of their responsibilities under the *Protection of the Environment Operations Act 1997* with regular inspections undertaken to ensure that they are complying with all relevant legislation. All potentially contaminated wastewater should be contained and disposed of in accordance with OEH Guidelines 2008'.
- Machinery should be washed down prior to coming onto the site to prevent/ minimise weed contamination.
- Concrete washout should be into lined impervious bunded areas, which should be cleaned regularly and the contents disposed of appropriately.
- Port-a-loos and / or an onsite port-a-loo toilet block shall be maintained and cleaned out regularly by the licensed contractor supplying the port-a-loos.

8.0 Updated Risk Assessment and Comparative Analysis

Additional assessments have been carried out since the public exhibition of the EAR which affects the outcomes of the comparative assessment (see Sections 19 and 20 of the EAR for the original environmental risk analysis and comparative assessments of the three route options. To ensure completeness updated comparative analyses are provided below.

8.1 Updated Environmental Risk Assessment

Table 8 provides an updated summary of the environmental risks assessments, of which the original versions are contained within Section 19 of the EAR. As can be seen in **Table 8**, the modified assessment results have resulted in changes to the risk values for biodiversity (for Option 1), traffic (for Option 3), and Aboriginal Heritage (for Option 2 and Option 3) and overall closer risk assessment scores for the three route options. **Table 8** includes an explanation for each change in the risk assessment score.

Table 8 – Updated Environmental Risk Assessment Scores (scored in **BOLD** have been modified)

Risk Indicator	Central Route Option	Southern Route Option	Northern Route Option	Comment
Biodiversity	**9 (High)**	6 (Medium)	4 (Low/ Medium)	Option 1 has been rescored to a high risk based on the biodiversity issues raised in submissions.
Traffic	4 (Low/ Medium)	5 (Low/ Medium)	**8 (Medium/ High)**	The Northern Route has been re-scored to a higher risk to reflect the impact to Moss Vale Rd/Princes Highway intersection.
Noise	5 (Low/ Medium)	6 (Medium)	6 (Medium)	No change
Visual	5 (Low/ Medium)	5 (Low/ Medium)	5 (Low/ Medium)	No change
Aboriginal Heritage	3 (Low)	**4 (Low/ Medium)**	**3 (Low)**	The Southern and Northern Options have been rescored to a lower risk to reflect that the direct impacts to Aboriginal heritage items are unlikely. Option 2 remains higher due to its cultural significance.
European Heritage	3 (Low/ Medium)	2 (Low)	2 (Low)	No change
Soil and Water Quality	3 (Low)	3 (Low)	3 (Low/ Medium)	No change
Socio-Economic	4 (Low/ Medium)	5 (Low/ Medium)	5 (Low/ Medium)	No change

Risk Indicator	Central Route Option	Southern Route Option	Northern Route Option	Comment
Air Quality	2 (Low)	2 (Low)	2 (Low)	No change
Contamination	2 (Low)	6 (Medium)	2 (Low)	No change
Waste	3 (Low)	3 (Low)	3 (Low)	No change
Total Score	**43**	**47**	**43**	**The revised risk assessment shows less differentiation between the route options.**
Original Score	*41*	*48*	*41*	

8.2 Updated Comparative Assessments

Section 20 of the EAR provided two different methodologies for ranking the three route options. **Table 9** and **Table 10** below set out the amended route ranking analyses following the same methodology and approach described Section 20 of the EAR. The analyses below indicate that Option 1 remains the best performing option overall. As can be seen, however, the comparative scores of the three route options have become closer as a result of the revised assessments made as part of this Response to Submissions Report. As above, **Table 9** includes an explanation for each change in the score for each option.

Table 9 – Updated Ranking Route Option Analysis – Method 1

Parameter	Central Route Option	Southern Route Option	Northern Route Option	Comments
Land Use	10	11	9	No change.
Traffic Impacts	13	12	24	No change
Biodiversity Impacts	**25**	22	16	The Central Option has been rescored to reflect higher impacts to *Geonplesium Baueri* and Yellow Bellied Glider.
Noise Impacts	**7**	9	7	The noise impact for Option 1 has been increased to account for the impact of Option 1 on the walking trails outside of the BCRP.
Aboriginal Heritage	**4**	**4**	4	Scores have been modified to reflect updated Aboriginal assessment.
Soil and Water	4	5	7	No change
Economic	4	8	12	No change
Sub-Total Score	67	71	79	
Environmental Risk Analysis	43	47	43	
Total Score (Revised)	110	118	122	
Original Score (See EAR)	*102*	*119*	*120*	

Note: The lowest score is the best performing route option.

Table 10 – Updated Ranking Route Option Analysis – Method 2

Parameter	Central Route Option	Southern Route Option	Northern Route Option
Land Use Impacts	2	3	1
Traffic Impacts	2	1	3
Biodiversity Impacts	3	2	1
Noise Impacts	1	3	1
Aboriginal Heritage	1	1	1
Soil and Water	1	2	3
Economic	1	2	3
Sub-Total Score	**11**	**14**	**13**
Environmental Risk Analysis	1	3	1
Total Score	**12**	**17**	**14**
Original Score (See EAR)	***12***	***19***	***16***

Note: The lowest score is the best performing route option.

9.0 Final Statement of Commitments

The Statement of Commitments has been updated, and is attached in **Appendix G**.

The final Statement of Commitments includes new commitments related to:

- Biodiversity (see **Section 4**).
- Access and amenity for the recreational areas (see **Section 5**).
- Soil and water management (see **Section 7**).

10.0 Conclusion

The submissions clearly demonstrate a significant level of interest in the project, including a strong desire by the local community for a project such as the NNLR to be developed to address the deteriorating traffic conditions on Illaroo Road. Analysis of the submissions indicates that residents of North Nowra are particularly supportive of the NNLR, with a strong support for Option 1 – the Central Route Option.

The submissions also identify a strong desire from members of the community to maintain the form and function of the BCRP and the surrounding bushland. For this reason there is broader public support for Option 3 to be progressed and for Option 1 and Option 2 to be rejected.

However, the assessment presented in the EAR and supplemented in this Response to Submissions Report clearly identifies that Option 3 is a poor performing in regards to value for money and meeting the project's traffic related objectives. That is, it results in a negative benefit ratio and provides the lowest benefit to the local road traffic network. Importantly, Option 3 also results in a significant deterioration of the Moss Vale Road / Princes Highway intersection, which will require substantive upgrade works to rectify. For this reason the RMS does not support Option 3. For these reasons Council would need to consider carefully whether to fund the development of the NNLR along the alignment of Option 3.

10.1 Preferred Option

As such, based on the results of all the assessments carried out, the Central Route Option (Option 1) remains Council's preferred alignment for the NNLR. Council recognises the Southern Route Option (Option 2) is clearly the most expensive, and represents the highest overall environmental risk, however it is the only other route option which would result in beneficial effects on the road traffic network.

As part of this Concept Plan application Council is seeking approval of one (1) route corridor, preferably the selected preferred route corridor (which is Option 1 – the Central Option). Council appreciates that there remains uncertainties and environmental risks with the preferred route option.

Council do not consider it feasible or reasonable to expect all of these uncertainties to be addressed as part of this Concept Plan application when no road design has been carried out and so horizontal and vertical alignments are not known.

To address these uncertainties Council has proposed a number of mitigation measures, many of which provide for additional ecological surveys and assessments with a view to more accurately determine the level of impact and to establish appropriate mitigation and management measures within the context of a road alignment design. In particular:

- While the risk of impact on Bomaderry Zieria will remain high, Council considers that it is possible to construct and operate the Central Option in a way that will not jeopardise the ongoing viability of the cluster of Bomaderry Zieria located to the north of the corridor through the application of suitable mitigation measures. However, due to the rarity of this species and it's very small distribution it is clearly impossible to demonstrate that any mitigation measure has been used in similar situations elsewhere and was effective. If the Central Option was approved, Council would develop a suite of mitigation and management measures as part of the subsequent road design process, in consultation with OEH and DSEWPaC.

- If the Central Option was approved Council would endeavour, as part of the subsequent road design process, to avoid the potential impact of the road on the Albatross Mallee. If these specimen cannot be avoided then Council commits to establishing specific and quantitative mitigation measures to reduce the potential for the proposal to impact upon the viability of the Endangered Population of Albatross Mallee.
- If the Central or Southern Options were approved then Council would commit to carrying out a detailed survey during the recognised breeding season for the Bauer's Midge Orchid as part of the detailed design process for the road. This survey would inform the final design alignment and the development of mitigation measures to be incorporated into the design and construction of the road.
- If the Central or Southern Options were approved, then Council would commit to use of a technical specialist to undertake predictive modelling to identify and quantify the potential impacts of vehicle collisions and incorporation of mitigation measures against this modelling to reduce animal and human trauma.

10.2 Implications of Refusing Preferred Options

The implications of refusing the preferred option would be that Council would need to reconsider its strategy for dealing with growth for North Nowra. In particular, this would include a reanalysis of the growth projection for North Nowra under the Nowra Bomaderry Structure Plan. It would be unlikely to be acceptable for the growth to proceed as predicted without augmentation of the local road network. Measures available to Council would therefore be:

- Bring forward alternative road proposals, in particular the Moss Vale Road Link, and
- Reduce the amount of growth projected for North Nowra, and accommodate this growth elsewhere in the Nowra-Bomaderry area.

If Option 1 and Option 2 were refused, but Option 3 approved, then this reanalysis would include further consideration of the viability of the Option 3 in the context of the NBSP, and further detailed consultation with the RMS in relation to developing a suite of road improvement for the Princes Highway.

10.3 Concept Plan Approval Sought

With consideration of the above, Council respectfully request that the Minister consider granting Concept Plan approval for the preferred route option, being Option 1 – the Central Route Option, for the NNLR.

Concept Plan approval would give confidence for Council to proceed with engineering design and further detailed environmental assessments, which would establish more accurately the level of environmental impact and the appropriate suite of mitigation measures to ensure environmental impacts are lower than currently predicted.

List of Acronyms and Abbreviations

Note: There has been many changes to the names of Government agencies during the course of the environmental assessment for the NNLR project. In general, the current name of the relevant agency has been used in this report.

AHIMS	Aboriginal Heritage Information Management System
ALC	Aboriginal Land Claim
ARI	Annual Recurrence Interval
BCR	Benefit Cost Ratio
BCRP	Bomaderry Creek Regional Park
BHS	Broad-headed Snake
CBD	Central Business District
dB(A)	decibel
DBH	Diameter Breast Height
DECCW	NSW Department of Environment, Climate Change and Water (now part of OEH)
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts (now the DSEWPaC)
DGRs	The Director-General's requirements for the preparation of an EA
DNR	NSW Department of Natural Resources
DPI	NSW Department of Primary Industries
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (incorporates the former DEWHA)
EA	Environmental Assessment
EAR	Environmental Assessment Report
ECRTN	The NSW Government's *Environmental Criteria for Road Traffic Noise*
EEC	Endangered Ecological Community
EEP	Eastern Pygmy Possum
ELA	Ecological Australia Pty Ltd
EMP	Environmental Management Plan
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ESD	Ecologically Sustainable Development
FFA	Flora and Fauna Assessment Report
GCC	Glossy Black Cockatoo
GBF	Giant Burrowing Frog
GGC	Gang-gang Cockatoo
GHFF	Grey-headed Flying-fox
Ha	hectares
IRR	Internal Rate of Return
Km	kilometre
kV	kilovolt
$L_{A,eq}$	Equivalent continuous A-weighted sound pressure level
$L_{A,90}$	Sound pressure level exceeded for 90% of the time (taken as background noise levels)
LGA	Local Government Area
LOS	Level of Service

MVRDLK	Moss Vale Road Link (to Illaroo Road)
NLALC	Nowra Local Aboriginal Land Council
NNLR	North Nowra Link Road
NBSP	Nowra Bomaderry Structure Plan
NoW	NSW Office of Water
NPV	Net present value
NPVI	Net present value per dollar of investment
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	NSW National Parks and Wildlife Service (now part of OEH)
OEH	NSW Office of Environment and Heritage (incorporates the former DECCW)
REF	Review of Environmental Factors
RCR	River Crossing Relief
RMS	Roads and Maritime Services, incorporates the former RTA
RTA	NSW Roads and Traffic Authority (now part of RMS)
SCC	Shoalhaven City Council
SIS	Species impact Statement
SLEP	*Shoalhaven Local Environmental Plan 1985*
STQ	Spotted-tailed Quoll
TSC Act	*Threatened Species Conservation Act 1995 (NSW)*
VHT	Vehicle Hours Travelled
VKT	Vehicle Kilometres Travelled
VPD	Vehicles per day