NSW GOVERNMENT | Planning & Infrastructure

MAJOR PROJECT ASSESSMENT:

North Nowra Link Road

Land located generally between Illaroo Road and the Princes Highway and comprising part of the Bomaderry Creek Regional Park, North Nowra and Bomaderry

(MP07_0037)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

September 2012

ABBREVIATIONS

CIV	Capital Investment Value
Department	Department of Planning & Infrastructure (DP&I)
DGRs	Director-General's Requirements
Director-General	Director-General of the Department of Planning & Infrastructure
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPI	Environmental Planning Instrument
MD SEPP	State Environmental Planning Policy (Major Development) 2005
Minister	Minister for Planning and Infrastructure
PAC	Planning Assessment Commission
Part 3A	Part 3A of the *Environmental Planning and Assessment Act 1979*
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PPR	Preferred Project Report
Proponent	Shoalhaven City Council
RtS	Response to Submissions

Cover Photograph: Bomaderry Creek (DP&I 2012)

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EXECUTIVE SUMMARY

Shoalhaven Council (the proponent) is proposing a new link road approximately 1.7 kilometres and 1.8 kilometres in length, connecting the suburbs of North Nowra and Bomaderry, on the NSW south coast. The subject Concept Plan application comprises three route options, being the northern, central and southern options. The proponent has identified the central route corridor as being the preferred route.

- The northern option would link the Illaroo Road / West Cambewarra Road intersection with the Moss Vale Road / Elvin Drive intersection.
- The central option would link the Illaroo Road / Pitt Street intersection with the Narang Road / Princes Highway intersection.
- The southern option would link Illaroo Road between Byron Avenue and Falcon Crescent with the West Bunberra Street / Princes Highway intersection.

The capital investment value (CIV) of each of the proposed options is: $14.3 million for the northern option; $13.0 million for the central option; and $18.5 million for the southern option. The proposal is expected to generate 50 full time equivalent jobs during construction.

The main objectives of the proposal are to reduce congestion at the Illaroo Road / Princes Highway intersection, reduce congestion and improve safety and amenity on Illaroo Road, and provide infrastructure to accommodate future growth in the area.

On 5 December 2006 the former Minister for Planning declared the project to be subject to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) under section 75B of that Act. Therefore the Minister for Planning and Infrastructure is the approval authority.

Part 3A of the EP&A Act, as in force immediately before its repeal on 1 October 2011 and as modified by Schedule 6A to the EP&A Act, continues to apply to transitional Part 3A projects. The project is considered to be a transitional Part 3A project.

The proposed Concept Plan is consistent with the aims and objectives of relevant State policies, including the South Coast Regional Strategy as it would provide certainty for the provision of new infrastructure to accommodate future growth in the region.

The central option has been determined to be a "controlled action" under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to the potential detrimental impacts the proposal may have on the Bomaderry Zieria (*Zieria baeuerlenii*) flora species. The department's assessment under Part 3A has been accredited for the purposes of the EPBC Act, by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).

The EA was publicly exhibited from Wednesday 16 February 2011 until Friday 18 March 2011 (31 days). The department received 170 submissions during the exhibition of the EA - 4 submissions from public authorities and 166 submissions from the general public and special interest groups.

Key issues raised include impacts on the Bomaderry Creek Regional Park (including fragmentation impacts and loss of amenity), impacts on threatened species, traffic, loss of amenity to the picnic area, Aboriginal heritage and biodiversity offsets.

Strategic justification/ traffic and biodiversity are considered to be the main issues in relation to the Concept Plan. The department has undertaken a detailed analysis and assessment of the proponent's Environmental Assessment, submissions from the general public and public authorities, the Response to Submissions Report and Statement of Commitments and has concluded that the northern and southern options would have the least environmental impact. The central option cannot be supported on biodiversity grounds.

Based on its assessment, the department is of the opinion that on balance the northern and southern options are justified and in the public interest. The implementation of the proponent's commitments and the recommended future assessment requirements would ensure that any future application comprises an adequate level of assessment to meet acceptable environmental performance and amenity limits. Therefore, is it recommended that the North Nowra Link Road Concept Plan northern and southern options be approved subject to future assessment requirements. This means that the proponent could seek approval to construct either the northern or southern alignment consistent with the requirements of the Concept Plan approval.

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1. BACKGROUND

Shoalhaven Council (the proponent) is proposing to connect the suburbs of North Nowra and Bomaderry via a new link road. The subject Concept Plan application comprises three options for the link road; the central, southern and northern options. The objectives of the proposal are as follows:

- to reduce congestion at the intersection of Illaroo Road and the Princes Highway;
- to reduce congestion and improve safety and amenity on Illaroo Road; and
- to provide infrastructure to adequately meet the demands of future growth in North Nowra as identified in the Nowra Bomaderry Structure Plan.

The subject area is situated approximately 3 kilometres (straight line distance) from Nowra CBD, on the northern side of the Shoalhaven River.

The proposal is located partly within the Bomaderry Creek Regional Park on land generally bound by West Cambewarra Road to the north, the Princes Highway to the east and Illaroo Road to the west. The land is relatively flat, particularly on the western half of the site, but falls towards Bomaderry Creek, which crosses the site from north to south before flowing into the Shoalhaven River. The topography of the land on either side of Bomaderry Creek becomes more rugged and gorge-like towards the southern end of the site. The project location is shown in **Figures 1 - 3** below.

The Bomaderry Creek Regional Park, established in 2002 and managed by the National Parks and Wildlife Service (NPWS), covers an area of 82 hectares of the subject bushland (**Figure 4**).

Land uses adjoining the proposed corridors are primarily urban bushland with low density residential at the western, northern and southern extremities. Some commercial premises are located at the eastern end of the central option. A NPWS picnic area is located at the eastern end of the central option which comprises picnic facilities and signage/information boards for walking trails within the Park. The former North Nowra Landfill site is located adjacent to the southern boundary of the Bomaderry Creek Regional Park.

A cleared unsealed access track runs between Illaroo Road and Bomaderry Creek in the central portion of the site in an east west direction along an electricity transmission line alignment. This track is used to service an Endeavour Energy 33kV transmission line and Council's water pipeline.

Figure 1: Project Location in Context (Base Image Source: Google Maps 2012)

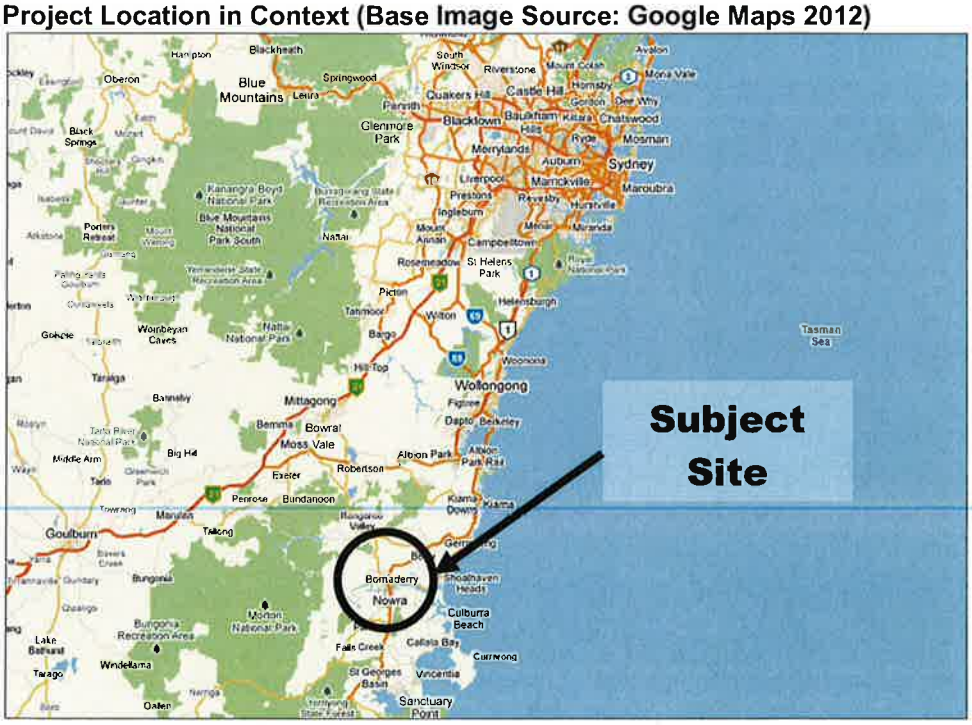


Figure 2: Project Location (Base Image Source: Google Maps 2012)

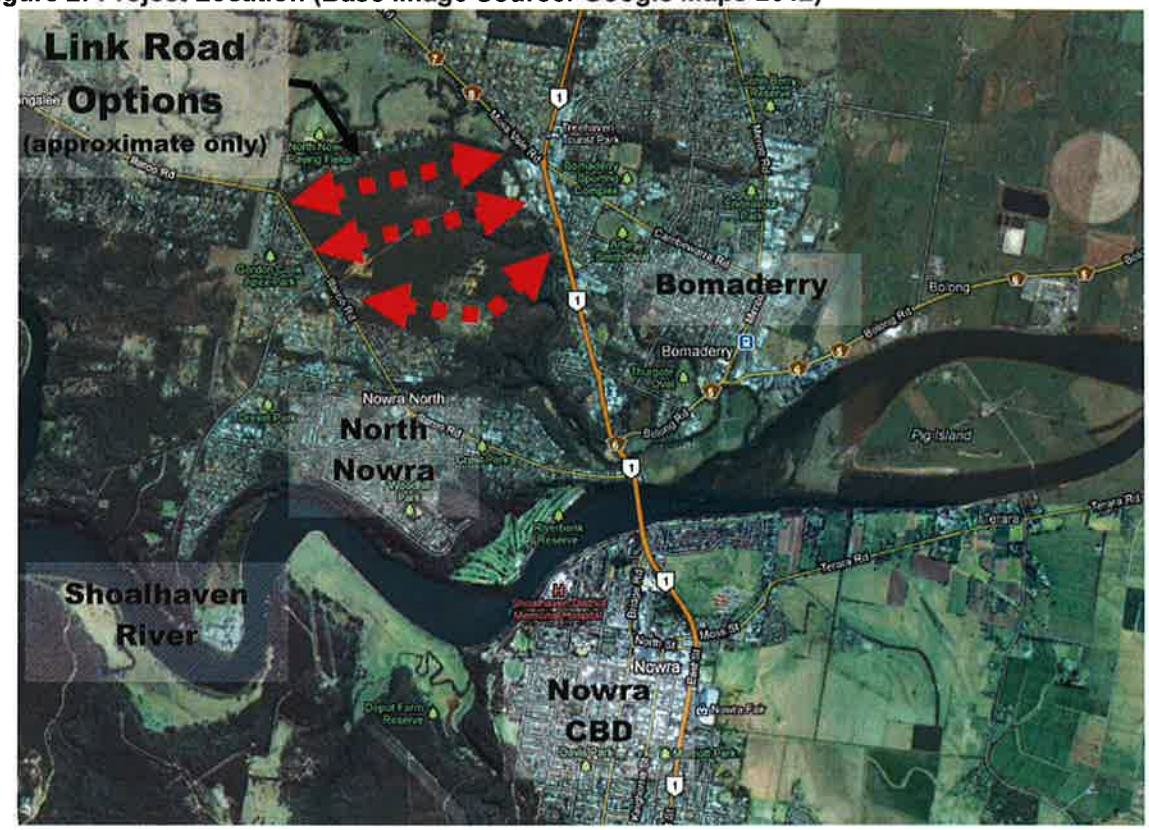


Figure 3: Project Location (Base Image Source: Land and Property Management Authority 2012)

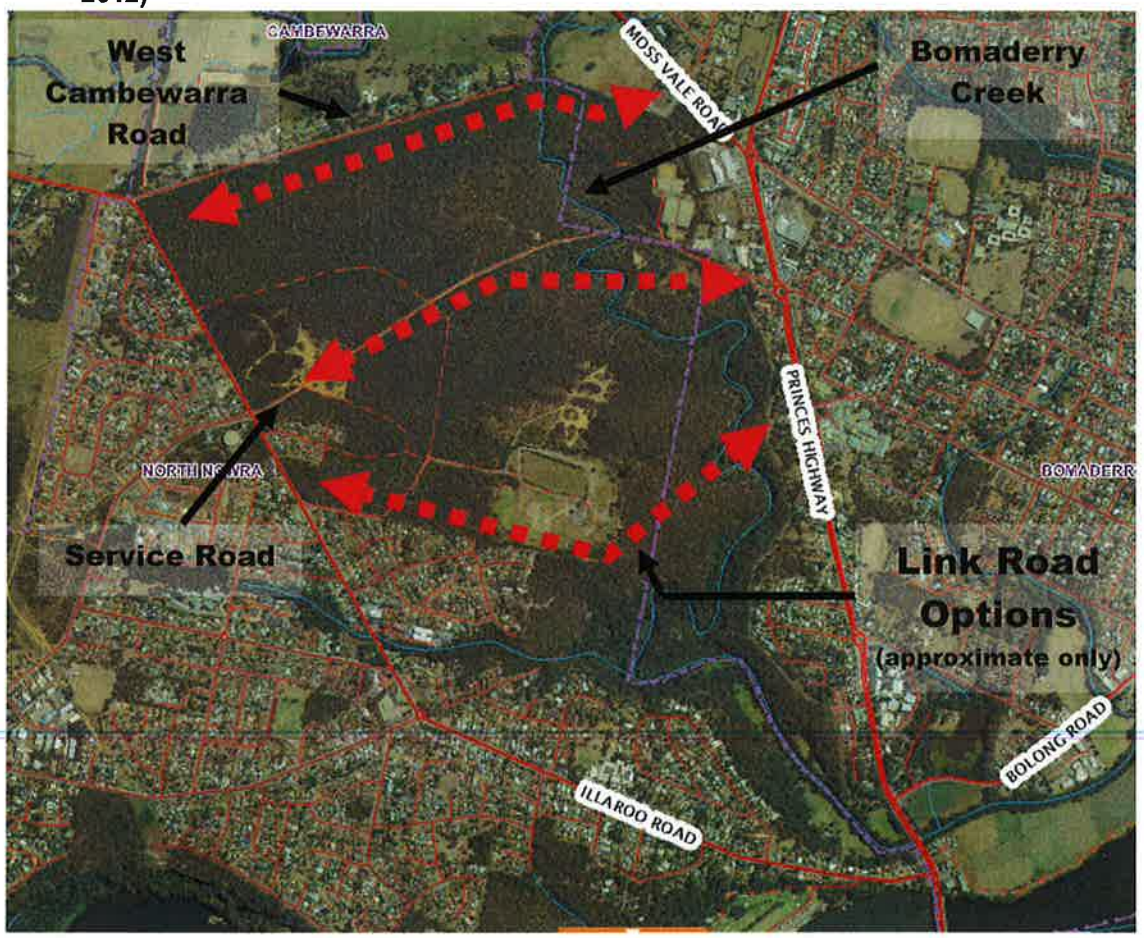
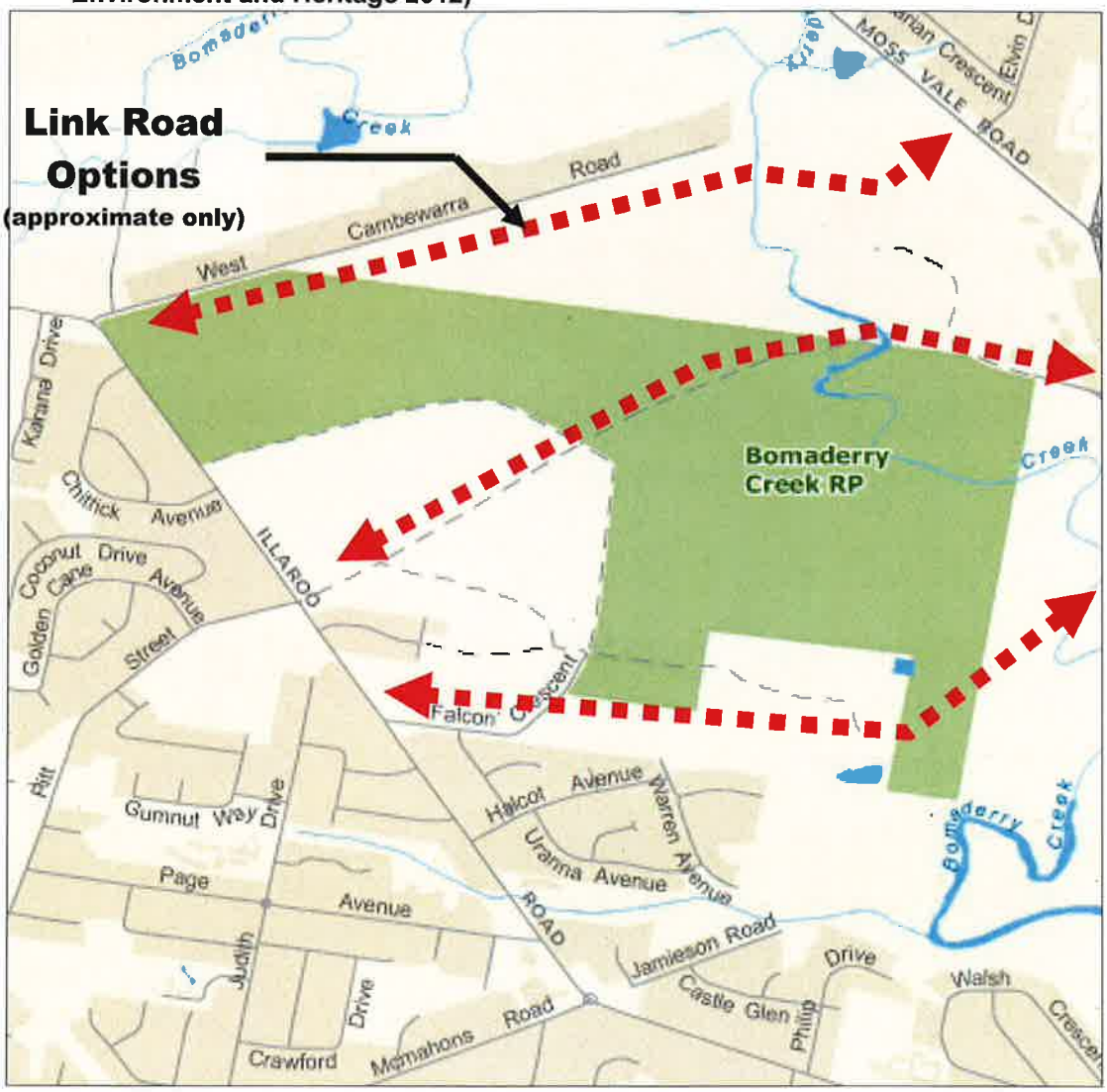


Figure 4: Boundaries of the Bomaderry Creek Regional Park (Base Image Source: Office of Environment and Heritage 2012)



2. PROPOSED PROJECT

2.1. Project Description

The proponent is seeking Concept Plan approval for a road corridor connecting Illaroo Road, North Nowra with the Princes Highway, Bomaderry. The road is known as the North Nowra Link Road and would cover a distance of between 1.7-1.8 kilometres.

The proposed corridor would adopt a width of 30 metres (20 metres in one section of the central option) to enable a sealed single carriageway for 2 lanes of traffic. Each lane would be 3.5 metres in width, with a 2.5 metre wide shoulder (2 metres of which would be sealed).

Indicative designs for a bridge over Bomaderry Creek indicate that the shoulders would be reduced to 2 metres in width and incorporate a shared path on the southern side for pedestrians/cyclists.

The proposal comprises 3 corridor options, all of which cross the Bomaderry Creek Regional Park, Bomaderry Creek and gorge. A description of each option follows.

The Central Route Option would link the existing Illaroo Road / Pitt Street intersections with the existing Narang Road / Princes Highway intersection. It would cross the central portion of the Bomaderry Creek Regional Park for a distance of approximately 600 metres. This is the proponent's preferred option and has a CIV of $13.0 million

The Southern Route Option would link Illaroo Road (new intersection 80 metres north of the existing Illaroo Road and Falcon Crescent intersection) with the existing West Bunberra Street / Princes Highway intersection. It would cross the south eastern extremity of the Bomaderry Creek Regional Park for a distance of less than 100 metres. This option has a CIV of $18.5 million.

The Northern Route Option would link the existing Illaroo Road / West Cambewarra Road intersection with the existing Moss Vale Road / Elvin Drive intersection. It would run parallel to the existing West Cambewarra Road and cross the north western corner of the Bomaderry Creek Regional Park for a distance of approximately 250 metres. This option has a CIV of $14.3 million.

The project layout is shown in **Figure 5** below and key components are listed in **Table 1** below.

Table 1: Key project components (central, southern and northern options)

Aspect	*Central Option*	*Southern Option*	*Northern Option*
Corridor Length	1.81km	1.82km	1.73km
Design Speed	80km/h	80km/h	80km/h
Bridge Length	75m (3 span) with elevated approaches of 75m to the west and 50m to the east	120.5m (3 span)	75.6m (5 span)
Bridge Height	12m from underside of bridge to creek bed.	26.5m from underside of bridge to creek bed.	9m from underside of bridge to creek bed.
Intersections	Upgrade of existing Illaroo Road / Pitt St intersection to a new 4 way roundabout. Access into existing Narang Road / Princes Hwy roundabout	New intersection on Illaroo Road comprising a 3 way roundabout. New signalised intersection at the existing West Bunberra St / Princes Hwy intersection.	Upgrade existing Illaroo Rd / West Cambewarra Rd intersection to a roundabout. New roundabout at the existing Moss Vale Road / Elvin Drive intersection.

Figure 5: Project Layout (Source: RtS 2012)

2.2. Project Need and Justification

NSW 2021: A plan to make NSW number one
The NSW 2021 plan contains 32 goals under the following key headings: Rebuild the Economy, Return Quality Services (Transport, Health, Family and Community Services, Education and Police & Justice), Renovate Infrastructure, Strengthen our Local Environment & Communities, and Restore Accountability to Government.

The North Nowra Link Road would result in reduced travel times and improved road safety, both of which are key objectives of the proposal but also key goals of the NSW 2021 plan. The department also considers that the proposal could be built with a view to minimising detrimental impacts on the environment, which is another key goal of the plan.

South Coast Regional Strategy
The site lies in the area covered by the South Coast Regional Strategy. The strategy sets a target of an additional 25,800 jobs and 45,600 dwellings (6,700 for the Nowra area) by 2031. The strategy also classifies Nowra Bomaderry as a "Major Regional Centre" which is well suited to cater for the majority of the forecast growth.

A key aim of the strategy is to protect high value environments including threatened species, vegetation communities and habitat corridors by limiting new urban development from occurring in these areas.

The proposed road corridor is to be situated primarily in urban bushland, which comprises part of the Bomaderry Creek Regional Park. State and Commonwealth listed threatened flora and fauna inhabit these areas. Therefore any assessment for development of these lands must be robust in terms of identifying and addressing potential impacts to these species.

While the proposal is considered to be consistent with the South Coast Regional Strategy in principle, matters such as impacts on flora and fauna need to be carefully managed. These have been assessed in **Section 5** of this report.

Nowra Bomaderry Structure Plan
The Nowra Bomaderry Structure Plan (2007) sets the strategic framework for development and growth in the Nowra Bomaderry area for the next 20-30 years. It echoes the South Coast Regional Strategy in that it aims to accommodate most of the region's growth in the Nowra Bomaderry area, being the region's main service provider and is being used as a strategic tool to inform the preparation of the draft Shoalhaven Local Environmental Plan 2009.

A key principle of the plan is to "manage development and change to accommodate economic and population growth, in a manner which endorses community values, conserves natural resources and safeguards ecological systems."

The structure plan maps existing land uses and identifies areas suitable for future growth and expansion in residential, retail, commercial and industrial sectors. Future infrastructure requirements are also mapped, which includes the three North Nowra Link Road options, the Moss Vale Road Link and western bypass.

With regards to residential land uses, the plan identifies 7 future living areas, one of which, Area 4 Crams Road, is located within North Nowra. Approximately 90 ha (to be reduced due to riparian lands) will be considered for residential development with a potential capacity of up to 1,080 dwellings.

While the proposal is considered to be consistent with the Nowra Bomaderry Structure Plan, a detailed assessment of its strategic justification is included in **Section 5** of this report.

3. STATUTORY CONTEXT

3.1. Major Project

On 5 December 2006 the then Minister for Planning declared the project to be subject to Part 3A of the EP&A Act under section 75B of that Act. Therefore the Minister for Planning and Infrastructure is the approval authority.

3.2. Concept Plan

The proponent has applied for approval of a Concept Plan under section 75M of the *Environmental Planning and Assessment Act 1979* (EP&A Act). On 5 December 2006 the then Minister for Planning authorised the submission of a Concept Plan.

The Concept Plan application seeks approval for at least 1 of the three proposed corridor options. Further approvals will be required for construction activities. No details have been provided of future applications or proposed staging.

3.3. Environment Protection and Biodiversity Conservation Act

On 10 January 2010, the proposal (central option) was determined to be a "controlled action" under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as it was considered likely that the proposal could have a significant impact on the only known population of Bomaderry Zieria (*Zieria baeuerlenii*), which is listed as endangered under the EPBC Act.

The Concept Plan has been assessed by accredited assessment under Part 3A of the EP&A Act. This means that separate assessment processes are not required under both the EPBC Act and the EP&A Act, and the NSW assessment process has been accredited by the Commonwealth. However, the Commonwealth Minister for the Environment maintains an independent approval role, and the Commonwealth provides input to certain stages of the assessment process. The department has consulted with the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) throughout the assessment process, and the department's assessment of Commonwealth matters is detailed in **Section 5** of this report.

3.4. Continuing Operation of Part 3A

Part 3A of the EP&A Act, as in force immediately before its repeal on 1 October 2011 and as modified by Schedule 6A to the EP&A Act, continues to apply to transitional Part 3A projects. The Director General's environmental assessment requirements (DGRs) have been issued in respect of this project and the environmental assessment report was lodged prior to 1 October 2011. The project is therefore a transitional Part 3A project.

Consequently, this report has been prepared in accordance with the requirements of Part 3A and associated regulations, and the Minister for Planning and Infrastructure (or his delegate) may approve or disapprove of the carrying out of the project under section 75O of the EP&A Act.

On 14 September 2011, the Minister for Planning and Infrastructure delegated his functions under section 75O of the EP&A Act to the Planning Assessment Commission where the application is made by a local authority, and to the Department of Planning and Infrastructure, depending on whether there have been more than 25 submissions objecting to a proposal.

Based on the number of submissions received (>25 objections), the Planning Assessment Commission is the determining authority for the Concept Plan under section 75O of the EP&A Act.

3.5. Permissibility

The proposed road corridors occupy land zoned 2(c) (Residential "C" (Living Area) zone), 6(a) (Open space – Recreation "A" (existing) zone), 6(c) (Open space – Recreation "C" (proposed) zone) and 1(b) (Rural "B" (Arterial and Main Road Protection) zone). under the Shoalhaven Local Environmental Plan (LEP) 1985. Roads are permissible with consent under each of these zones.

The Bomaderry Creek Regional Park is zoned mostly for residential purposes, with the exception of the gorge which is zoned open space under the Shoalhaven LEP 1985.

Under the draft Shoalhaven LEP 2009, the Regional Park is zoned "E1 National Parks and Nature Reserves." Roads are also permissible with consent under the E1 zone.

Notwithstanding the above, *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) permits through clause 94(1) development for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority on any land, without consent. However, where land is reserved under the *National Parks and Wildlife Act 1974* (NP&W Act), roads are permissible without consent only if the development is authorised by or under the NP&W Act. As the project traverses the Bomaderry Creek Regional Park, development of the project within this land would require an authorisation by or under the NP&W Act. The proponent has advised that it would seek a partial revocation of the Regional Park under the NP&W Act.

Revocation of Land from the Bomaderry Creek Regional Park

In 2002, the Bomaderry Creek Regional Park was established under the NP&W Act 1974. The Park is administered by the National Parks and Wildlife Service.

All three route options would traverse a portion of the Park to varying extents, requiring the revocation of land under the NSW Revocation of Land Policy. This occurs as a separate process through an Act of Parliament which revokes the identified land, and follows any approval for construction. This process is assessed by the Office of Environment and Heritage under the NPW Act.

3.6. Environmental Planning Instruments

Under Sections 75I(2)(d) and 75I(2)(e) of the EP&A Act, the Director-General's report for a project is required to include a copy of, or reference to, the provisions of any State Environmental Planning Policy (SEPP) that substantially governs the carrying out of the project, and the provisions of any environmental planning instruments (EPI) that would (except for the application of Part 3A) substantially govern the carrying out of the project and that have been taken into consideration in the assessment of the project.

There are no EPIs that substantially govern the carrying out of the project, however, the southern option traverses part of the former North Nowra Landfill site, consequently SEPP 55 – Remediation of Land may be applicable and this is considered in **Section 5.3** of this report.

3.7. Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

(a) to encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land,
(iii) the protection, provision and co-ordination of communication and utility services,
(iv) the provision of land for public purposes,
(v) the provision and co-ordination of community services and facilities, and
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
(vii) ecologically sustainable development, and
(viii) the provision and maintenance of affordable housing, and

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

Of particular relevance to the environmental assessment and eventual determination of the Concept Plan application, are those objects stipulated under section 5(a) (i), (ii), (vi), and (vii) of the EP&A Act. With respect to ecologically sustainable development, the EP&A Act adopts the definition of the *Protection of the Environment Administration Act 1991*, including the precautionary principle (i.e. if 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 degradation), the principle of inter-generational equity, the principle of conservation of biological diversity and ecological integrity, and the principle of improved valuation, pricing, and incentive mechanisms.

It is important to recognise that whilst the EP&A Act requires that the principles of ecologically sustainable development be encouraged, it provides other objects that must be equally included in the decision-making process for the subject proposal. The department has given due consideration to the objects of the EP&A Act in its assessment, including:

- the proper management, development and conservation of natural and artificial resources, including natural areas, forests, water, towns and villages – the department's assessment of the project has considered bio-physical impacts to natural areas including forests and water resources in **Sections 5.2 & 5.3** as well as amenity and socio-economic impacts to Nowra and its suburbs in **Sections 5.1 & 5.3**;
- the promotion and co-ordination of the orderly and economic use and development of land - the department has assessed the biophysical and amenity constraints of the proposal in **Section 5.3** and the strategic need for the project in **Section 2.2 & 5.1**;
- the protection of the environment including the protection and conservation of native animals and plants including threatened species, populations, and ecological communities and their habitats – the department's assessment of flora and fauna issues is provided in **Section 5.2**; and
- ecologically sustainable development – the department's assessment of the project has considered the principles of ecologically sustainable development, and the need to balance these principles with other social, economic, and environmental factors. In its assessment of the project against the principles of ecologically sustainable development, the department has considered:
  - the proponent's assessment which considered the 'worst case scenario' of the project impacts, consistent with the precautionary principle;
  - the proponent's consideration of issues that have long-term term implications (such as consumption of non-renewable resources, waste disposal, greenhouse gas emissions, removal of vegetation, impacts on visual amenity and water quality), which has sought to avoid and minimise adverse impacts as far as possible through route selection and application of the proposed mitigation measures, consistent with the principles of inter-generational equity and the conservation of biological diversity and ecological integrity; and

- the proponent's commitment to appropriately value and offset residual impacts (such as biodiversity), consistent with the principle of improved valuation, pricing, and incentive mechanisms.

3.8. Statement of Compliance

In accordance with section 75I of the EP&A Act, the department is satisfied that the Director-General's environmental assessment requirements have been complied with.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Environmental Assessment (EA)
Under section 75H(3) of the EP&A Act, the Director-General is required to make the environmental assessment (EA) of an application publicly available for at least 30 days. After accepting the EA, the department publicly exhibited it from Wednesday 16 February 2011 until Friday 18 March 2011 (31 days) on the department's website, and at the department's Information Centre; Shoalhaven City Council; Nowra Library; the Department of Sustainability, Environment, Water, Population and the Arts; and the Nature Conservation Council of NSW.

The department also advertised the public exhibition in the Sydney Morning Herald on Wednesday 16 February 2011 and Nowra Shoalhaven News on Thursday 17 February 2011 and notified relevant State and local government authorities in writing.

The department received 170 submissions during the exhibition of the EA - 4 submissions from public authorities and 166 submissions from the general public and special interest groups.

A summary of the issues raised in submissions is provided below.

4.2. Public Authority Submissions

Four submissions were received from public authorities, including: the Department of Primary Industries - Fisheries (formerly Department of Industry and Investment); Roads and Maritime Services (formerly Roads and Traffic Authority); the Office of Environment and Heritage and the NSW Office of Water.

Department of Primary Industries - Fisheries (former Department of Industry and Investment)

- raises no objection to the proposal subject to the inclusion of relevant conditions relating to bridge design and soil and water;
- agrees with the proposed biodiversity mitigation measures, particularly the proposed 50ha dedication of land for inclusion into the Bomaderry Creek Regional Park;
- agrees with the proposal to construct a new bridge structure to minimise impacts on the Bomaderry Gorge riparian vegetation; and
- requests that any Erosion and Sediment Control Plan and Water Management Plan be referred for comment.

Roads and Maritime Services (former Roads and Traffic Authority)

- supports the proposal in principle as it would reduce traffic congestion along Illaroo Road and at its intersection with the Princes Highway;
- supports the central option as it would be more heavily utilised, the existing roundabout on the Princes Highway has ample capacity, the Level of Service (LoS) would be unaffected and this option has a better return on investment (Cost Benefit Ratio);
- the southern option introduces a new signalised intersection on the Princes Highway, resulting in a reduced LoS to all motorists;
- the northern option would reduce the LoS to the Moss Vale Road / Cambewarra Road / Princes Highway Intersection in the PM peak, exacerbated by other Princes Highway upgrades between Gerringong and Bomaderry; and
- the RTA will continue to monitor traffic conditions along the Princes Highway particularly around the Shoalhaven River and associated key intersections.

Office of Environment and Heritage

- objects to the principle of dissecting a Regional Park;
- the proposed central route would have permanent detrimental impacts on the Bomaderry Zieria;
- of all the route options, the northern option would have the least impact on threatened species, as there would be no impact on any flora species listed under the *Threatened Species Conservation Act 1995*;
- all three routes would have an impact on biodiversity that exceeds the amount proposed to be offset. Of the three route options, the northern option is best placed in terms of being able to create a suitable offset package subject to some further refinement;
- the central option is the least preferred option from a park management perspective due to fragmentation and amenity impacts, greater opportunities for vandalism, littering, arson, bushfire management and the introduction of pests and weeds;
- the central option would reduce the quality of the visitor experience to the central portion of the Park by fragmenting walking trails and introducing road noise;
- noise impacts of all three options on residents and the bushland area are similar. Additionally, the central route is predicted to result in noise impacts to the lookout, picnic area and walking trails;
- all three routes can have noise mitigation measures implemented to reduce the potential noise impacts to guideline levels;
- the central and northern options would have a lower impact on Aboriginal archaeological and cultural features than the southern option, which would have a moderate impact; and
- a number of conditions of approval have also been suggested relating to additional flora and fauna surveys, alignment of the northern option to take into account noise mitigation measures, and Aboriginal archaeology.

NSW Office of Water

- the central option would fragment the Regional Park;
- the southern and northern options follow the extremities of the Regional Park and would not result in the same fragmentation impacts;
- notes the potential for the central and southern options to impact on the Sandstone Sedgeland vegetation community by altering flow regimes. The northern option would not have the same impact;
- only a small amount of riparian vegetation is located at the bridge crossing of the northern option; and
- while it is argued that the bridge crossing of the central option would facilitate fauna movement beneath the bridge and through riparian vegetation, fauna movement would be restricted within the gorge during periods of high flows/water levels.

4.3. Public Submissions

One hundred and sixty six (166) submissions were received from the public. This included submissions from the following special interest groups:

- Nature Conservation Council of NSW;
- National Parks and Wildlife Service South Coast Region Advisory Committee;
- Endeavour Energy;
- Shoalhaven Business Chamber;
- Jervis Bay Regional Alliance;
- Native Animal Network Association;
- Gerroa Environmental Society Inc.;
- Bomaderry Creek Landcare/Bushcare Group;
- National Parks Association of NSW; and
- Australian Conservation Foundation – Shoalhaven Branch.

Of the 166 public submissions, 139 (84%) supported the project in principle (i.e. a link road between North Nowra and Bomaderry) and 27 (16%) objected to the project. Of the submissions in support, 53 (32%) supported the central option, 1 (0.6%) supported the southern option, 83 (50%) supported the northern option. A further 2 (1.2%) submissions in support did not state a preference for any particular option. The key issues raised in public submissions are listed in **Table 2**.

Table 2: Summary of Key Issues Raised in Public Submissions

Issue	Proportion of submissions (%)
Supports the project in principle	83.73
Supports the northern option	50.00
Supports the central option	31.93
Proposal should preserve Bomaderry Creek Regional Park	27.71
Central option would destroy threatened species	27.11
Central option would detrimentally impact on fauna	22.29
Northern option would have a lesser environmental impact	21.47
Central option would result in fragmentation of Bomaderry Creek Regional Park	19.88
Objects on environmental and ecological grounds	18.67
The proposal would not improve traffic	17.47
Objects to project in principle	16.27
Northern option would have a lesser impact on flora and fauna	16.27
Loss of amenity to picnic area and Park generally	15.06
Detrimental impacts on Aboriginal heritage	12.65
Objects to biodiversity offsets	12.05
Central option follows existing service road	12.05

The department has considered the issues raised in submissions in its assessment of the project.

4.4. Proponent's Response to Submissions (RtS)

The proponent provided a response to the issues raised in submissions (Response to Submissions) which is included in **Appendix C**. The RtS identified additional assessment undertaken since the exhibition of the EA and included a response to the issues raised in submissions from the general public and public authorities. As part of the RtS, the proponent provided a petition dated 6 September 2011 containing 518 signatures supporting the central option, on the basis that this option would alleviate AM and PM congestion on Illaroo Road, particularly during school times.

No amendments were made to the Concept Plan, however additional fauna surveys were undertaken for the Eastern Pygmy-possum, Spotted-tailed Quoll and Giant Burrowing Frog. Additional information was also provided for the Grey-headed Flying-fox. A supplementary Heritage Assessment and additional traffic analysis was also provided, together with a revised Statement of Commitments to clarify/address comments made in submissions

The department forwarded a copy of the RtS to the Office of Environment and Heritage (OEH), Roads and Maritime Services (RMS), the Department of Primary Industries (DPI) and the NSW Office of Water (NOW) for comment.

The documents were also placed on the department's website. One joint submission was received from Bomaderry Creek Landcare & Friends of Bomaderry Creek raising issues such as strategic justification/traffic, biodiversity, amenity (noise/visual impact), impacts on recreational areas, tourism and educational values and proposed offset lands. The Landcare and Friends of Bomaderry Creek groups do not believe the RtS has satisfactorily addressed the issues raised in the submissions.

A summary of agency comments on the RtS is provided below.

Department of Primary Industries - Fisheries

- confirms that no objection is raised to the proposal; and
- recommends a number of conditions to be placed on any approval.

Roads and Maritime Services

- RMS undertook additional sensitivity analysis of all three key intersections on the Princes Highway, taking into account projected traffic volumes for 2026 and the upgraded Princes Highway (between Gerringong and Bomaderry which is expected to result in an increase in traffic flows on the Princes Highway). Based on this additional analysis, the following conclusions were made:
  - does not object to any option, however notes that each of the link road options would result in traffic impacts; and
  - requires that for future detailed applications, additional detailed network analysis is carried out taking into account 2026 traffic volumes, the identification of intersection upgrade requirements and works, including for the Princes Highway / Cambewarra Road / Moss Vale Road intersection, and that consideration should be given to the constructability of any proposed upgrade(s).
- notes that any connection into the Princes Highway involving changes to traffic control facilities would require RMS concurrence and a Works Authorisation Deed.

Office of Environment and Heritage

- confirms its position that the northern option presents the least risk of impact on biodiversity, and that a suitable biodiversity offset package could be achieved subject to route refinement and assessment of the proposed offset area;
- as a result of the detection of the Eastern Pygmy-possum in recent surveys, more extensive surveys will be required to determine the potential impact on this species;
- states that the southern option would directly traverse the endangered ecological community within the gorge, however impacts could be mitigated through the construction of the bridge;
- reiterates its concern that the central option would have a detrimental impact on the amenity and visitor's experience of the Park;
- current facilities would not need upgrading if the central option is not approved;
- raises concern that the central option would increase management costs of the Park, as the roadway would allow easy access into the heart of the Park to dump rubbish, introduce weeds, nutrients and fire; and
- raises concern that a number of factors have not been taken into account with the cost benefit analysis i.e. reduction of speed, mitigation of biodiversity impacts, changes to walking tracks and NPWS maintenance vehicle access. This may result in the central option being less cost effective.

NSW Office of Water

- reiterates its concern with the fragmentation impacts associated with the central option, noting that there are alternative options available that would minimise these impacts; and
- the central and southern options could potentially impact upon groundwater dependant ecosystems, depending on how compressible the soils are in the area.

5. ASSESSMENT

The department considers the key environmental issues for the project to be:

- Strategic Justification/Traffic; and
- Flora and Fauna.

The department has also considered other issues raised in submissions and in the proponent's assessment, including, land acquisitions, cost, Aboriginal land claims, the need for a new bridge over the Shoalhaven River, Nowra bypass and dumping. The department considers these issues generally pose a low environmental risk and that the proponent has developed a range of commitments to manage or mitigate these impacts. Where no specific commitment exists, or where the department considers a commitment needs strengthening, specific future assessment requirements have been recommended. The department's consideration of these issues is addressed in **Section 5.3**.

5.1. Strategic Justification/Traffic

Issue

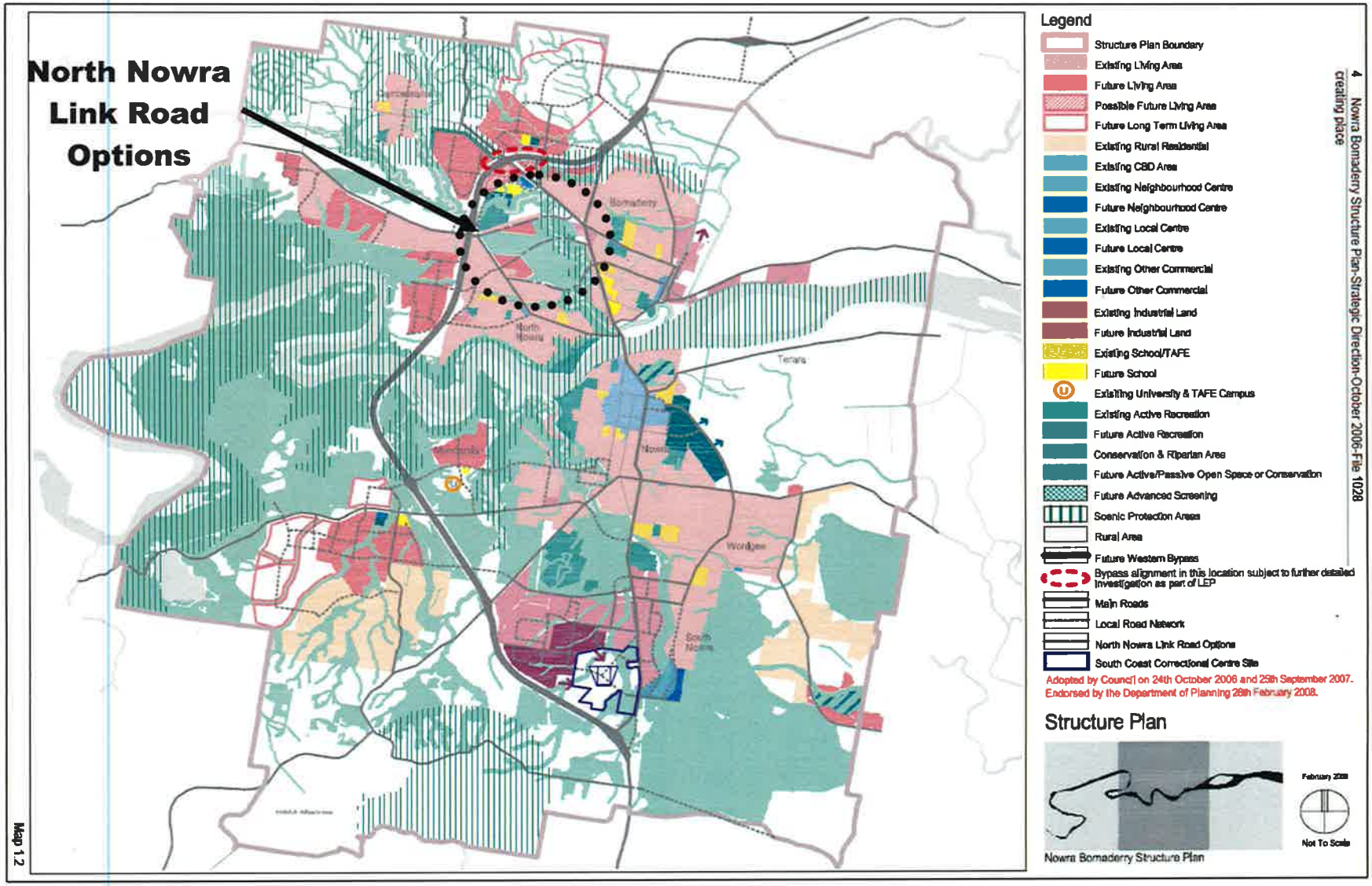
Current situation
Two of Nowra's main residential areas are located in North Nowra and Bomaderry. The majority of employment lands are located in Bomaderry, Nowra CBD and South Nowra (**Figure 6 below**). Currently the only direct route connecting North Nowra and Bomaderry is via the Illaroo Road / Princes Highway intersection. It is also the only route for North Nowra residents to access the Nowra CBD and South Nowra.

A link road connecting North Nowra with Bomaderry has been planned by Shoalhaven City Council for at least 30 years. In 1980, the Princes Highway between Moss Vale Road and the Shoalhaven Bridge was upgraded. At the time, the roundabout at Narang Road was designed and constructed to a standard which could accommodate a possible link road connecting North Nowra and Bomaderry along the central option alignment, to relieve pressure at the Illaroo Road / Princes Highway intersection and lessen traffic volumes on Illaroo Road.

The proponent has stated that of the AM peak traffic entering the Illaroo Road / Princes Highway intersection from Illaroo Road, approximately 30% turn left at the Princes Highway intersection, and approximately half of those vehicles make a right turn movement into Bolong Road. The current intersection arrangement allows both southbound lanes on Illaroo Road to turn right onto the Princes Highway. As the Princes Highway traffic becomes congested during the AM peak, not all southbound traffic can exit Illaroo Road during the green cycle. Those vehicles wishing to turn left onto the Princes Highway are caught behind right turning (southbound) vehicles. As a result, Illaroo Road currently experiences congestion during the AM peak.

While the Level of Service (LoS) at this intersection in the AM peak is currently C and PM peak is currently B, this intersection is approaching capacity.

Figure 6: Overview of Existing and Proposed Land uses in Nowra (Base Image Source: Nowra Bomaderry Structure Plan 2008)



Forecasts

The South Coast Regional Strategy sets a target of an additional 25,800 jobs and 45,600 dwellings (6,700 for the Nowra area) by 2031. With Nowra Bomaderry classified as a "Major Regional Centre," it is expected to cater for the majority of the forecast growth.

The Nowra Bomaderry Structure Plan also aims to accommodate most of the region's growth in the Nowra Bomaderry area, being the region's main service centre. It identifies a number of future living areas, one of which is located within North Nowra and has a potential capacity of up to 1,080 dwellings.

Based on growth envisaged by the South Coast Regional Strategy (and being catered for in the draft Shoalhaven LEP), by 2016 under a 'low growth' scenario (which does not include growth in the North Nowra area), the Illaroo Road / Princes Highway intersection would be performing at a LoS E (AM peak) and LoS F (PM peak), which, according to RMS, is considered to be unsatisfactory. Under a 'high growth' scenario, queuing in the AM peak would be expected for up to 2 kilometres along Illaroo Road, and 800 metres along the Princes Highway (southbound). Average delays of 122 seconds and 131 seconds in the AM and PM peaks respectively would be experienced at this intersection in a do nothing scenario.

Possible Solutions

The proponent has listed a number of options which could help to alleviate some of North Nowra's traffic congestion to varying degrees, including:

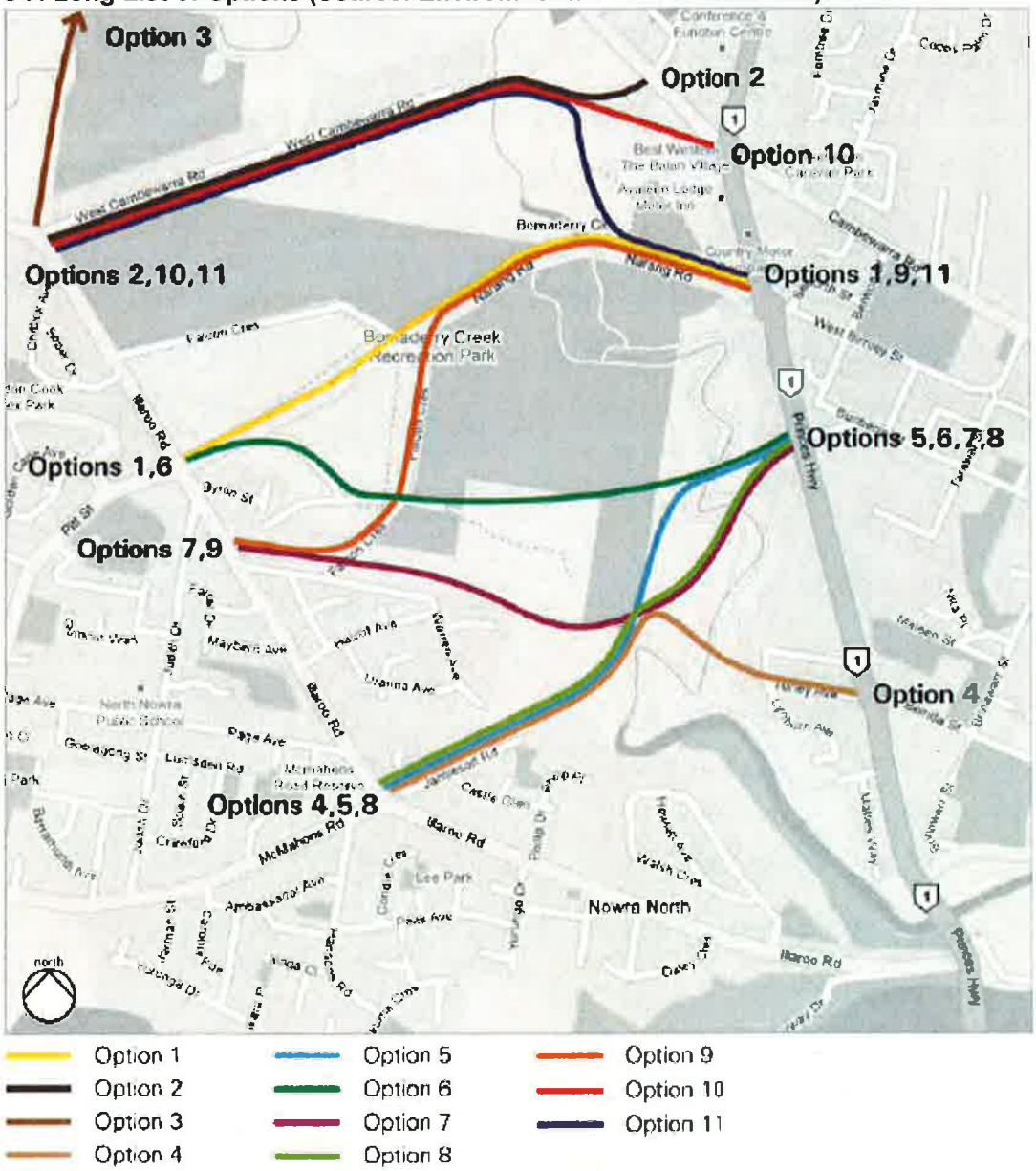
- western and eastern bypass of Nowra;
- local eastern connection (separates local traffic from through traffic at the river crossing);
- duplication or replacement of the existing bridge;
- local western connection (separates local traffic from through traffic at the river crossing);
- Illaroo Road widening to accommodate left turn only lane (part of the River Crossing Relief Improvement works – see below);
- grade separation (Illaroo Road flyover) and;
- Moss Vale Road Link (MVRLK) (links the Illaroo Road / West Cambewarra Road intersection with Moss Vale Road – option 3 in **Figure 7** below).

These options have all been considered but discounted due to cost, jurisdiction of the RMS, land acquisitions or inability to meet project objectives.

In addition, the RMS is also considering River Crossing Relief (RCR) works. This would be a short term solution to improve network efficiency and would involve intersection adjustments on the northern and southern side of the Shoalhaven River bridge. However, while the RMS to date has not committed any funding to these improvements, monitoring of this section of the Princes Highway is ongoing.

In relation to the link road proposal, the proponent considered 11 different options, referred to in the EA as "the long list of options" (**Figure 7 below**), before selecting the 3 options the subject of this application. The central option was selected as it is the shortest route, the southern option was the best performing of the southern options, and the northern option was the best performing of the northern options. The other options were discounted based on a number of reasons including failure to meet project objectives, impact on existing and future residents, cost and complexity of intersection designs.

Figure 7: Long List of Options (Source: Environmental Assessment 2011)



The proponent has stated that "Vehicle Hours Travelled (VHT) and Vehicle Kilometres Travelled (VKT) are key performance measures that authorities aim to minimise in network planning." The lower the VHT and VKT, the more efficient the road network, the greater the economic benefit and the less impact on the environment through reduced carbon emissions. **Table 3** below compares the VHT and VKT to the do nothing scenarios and the 3 link road options.

Table 3: Comparison of VHT, VKT and average speed between link road options and 2016 – do nothing scenario across the entire network during peak periods

		Do Nothing	Central Option	Southern Option	Northern Option
2016 AM Peak	**VKT**	17,153	**17,887** *(+734)*	17,433 *(+280)*	18,089 *(+936)*
	VHT	709	**672** *(-37)*	663 *(-46)*	705 *(-4)*
	Average Speed*	24 km/h	**27 km/h** *(+3 km/h)*	26 km/h *(+2 km/h)*	26 km/h *(+2 km/h)*
2016 PM Peak	**VKT**	19,049	**19,687** *(+638)*	19,626 *(+577)*	19,717 *(+668)*
	VHT	903	**854** *(-49)*	832 *(-71)*	965 *(+62)*
	Average Speed*	21 km/h	**23 km/h** *(+2 km/h)*	24 km/h *(+3 km/h)*	20 km/h *(-1 km/h)*

* Average speed across entire modelled network

The department acknowledges that the further north the option, the greater the VKT. It also notes that in terms of VHT, the central and southern options are better performing options than the northern option. While each option would result in a higher average speed across the network (with one exception being for the northern option in the PM peak), a 4km/h difference between each option is not considered significant enough to become a differentiating factor. It could however be argued that the central and southern options are better performing options when taking the entire network into account at peak periods.

A contributing factor to VHT is intersection performance, as an efficient intersection would result in fewer delays to journey times. The proponent has modelled three key intersections, the Illaroo Road / Princes Highway intersection, the Bolong Road / Princes Highway intersection and the Moss Vale Road / Cambewarra Road / Princes Highway intersection (**Figure 8 below**). See **Table 4** below for a comparison of intersection performance for each of the link road options against the do nothing scenario.

The Illaroo Road / Princes Highway intersection would experience the same LoS as the do nothing scenario for all link road options, however delays would be somewhat reduced (up to 52 seconds for the southern option) in peak times.

The Bolong Road / Princes Highway intersection would experience greater delays at peak times than the do nothing scenario for all options, however this was attributed to the model parameters not being adjusted to optimise flow based on changed traffic patterns.

In general terms, the Moss Vale Road / Cambewarra Road / Princes Highway intersection would continue to operate efficiently in the AM peak, however performance would worsen by 27%, 8%, and 152% for the central, northern and southern options respectively, compared to the do nothing option. It is evident that the northern option would have a significant impact on the performance of this intersection in the PM peak and would experience a LoS E (compared to LoS A in the do nothing scenario).

While the Bolong Road / Princes Highway intersection would become less efficient when taking into account the performance of this intersection with the Illaroo Road / Princes Highway intersection (without adjusting signal phasing to suit changed traffic patterns), average network delays would still be reduced by approximately 18%, 22% and 14% for the central, southern and northern options respectively, compared to the do nothing option.

Figure 8: Key Intersections (Base Image Source: Google Maps 2012)

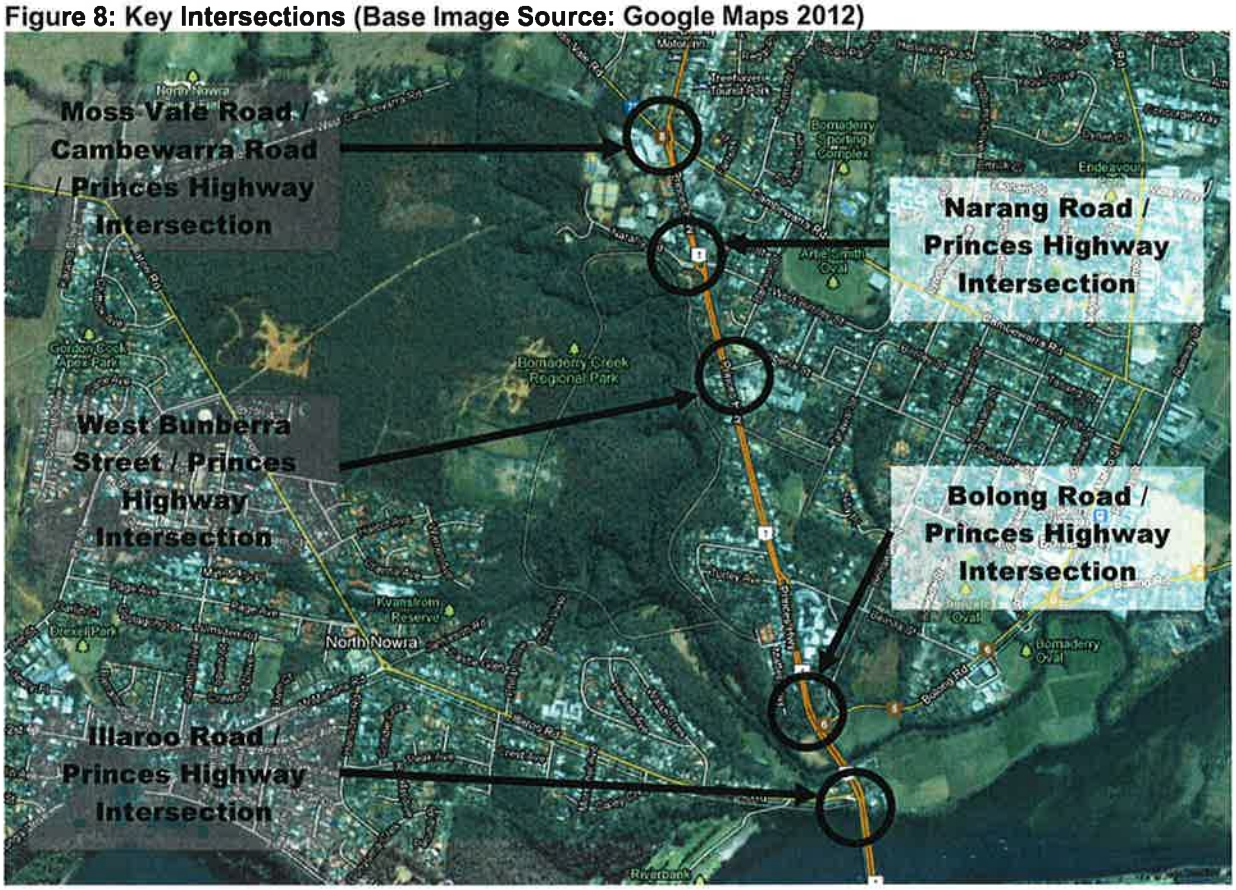


Table 4: Comparison of performance of modelled intersections between link road options and do nothing scenario during peak periods (Source: Link Road Options Study 2011)

Intersection	Option	2016 AM Peak	2016 PM Peak
Illaroo Rd / Princes Hwy	Do Nothing *(Avg delay*)*	LOS F *(122)*	LOS F *(131)*
	Central Option *(Avg delay*)*	**LOS F *(96)***	**LOS F *(94)***
	Southern Option *(Avg delay*)*	LOS F *(97)*	LOS F *(79)*
	Northern Option *(Avg delay*)*	LOS F *(103)*	LOS F *(113)*
Bolong Rd / Princes Hwy	Do Nothing *(Avg delay*)*	LOS E *(65)*	LOS D *(43)*
	Central Option *(Avg delay*)*	**LOS F *(88)***	**LOS F *(82)***
	Southern Option *(Avg delay*)*	LOS F *(81)*	LOS E *(70)*
	Northern Option *(Avg delay*)*	LOS F *(82)*	LOS F *(94)*
Moss Vale Rd / Cambewarra Rd / Princes Hwy	Do Nothing *(Avg delay*)*	LOS B *(16)*	LOS A *(14)*
	Central Option *(Avg delay*)*	**LOS B *(16)***	**LOS B *(19)***
	Southern Option *(Avg delay*)*	LOS B *(17)*	LOS D *(14)*
	Northern Option *(Avg delay*)*	LOS A *(14)*	LOS E *(57)*

* Average delay in seconds

A further intersection was modelled on Illaroo Road, being the intersection with McMahons Road. This intersection was found to perform at LoS F for all link road options in both the AM and PM peaks. However, delays were reduced by up to 26 seconds in the AM peak (central option) and 52 seconds in the PM peak (southern option). The northern option resulted in the lowest improvement in delays, being 19 seconds in the AM peak and 18 seconds in the PM peak.

In addition to the modelling undertaken by the proponent, RMS' submission on the RtS document discussed further modelling which was undertaken by the RMS on the three key intersections (Moss Vale Road / Cambewarra Road / Princes Highway, Narang Road / Princes Highway, and West Bunberra St / Princes Highway) for a 2026 scenario with and without the link road.

This modelling included the projected increase in traffic on the Princes Highway as a result of the completion of the Princes Highway upgrade between Gerringong and Bomaderry. The RMS found that in a do nothing scenario, the West Bunberra St eastern approach at the intersection with the Princes Highway would operate over capacity. A summary of how each option would detrimentally impact on intersections with the Princes Highway is listed below:

- with the central option, the West Bunberra St western approach and the Moss Vale Road eastern approach in the PM peak would operate over capacity;
- with the southern option, the West Bunberra St western approach and the Moss Vale Road eastern approach in the PM peak would operate over capacity. In addition, southbound flows on the Princes Highway, particularly at the Moss Vale Road / Cambewarra Road intersection and the Narang Road intersection would be detrimentally impacted; and
- with the northern option, the Moss Vale Road / Cambewarra Road / Princes Highway intersection would operate over capacity in the PM peak, particularly the southbound Princes Highway and Moss Vale Road approaches.

In considering the journey times between the Bridge Road / Princes Highway intersection on the south side of the river and the Illaroo Road / Princes Highway intersection on the north side of the river, it is clear that any of the link road options (except the northern option in the PM peak) would improve the journey time between these intersections. This can be attributed to the Illaroo Road / Princes Highway intersection receiving less traffic (favouring Illaroo Road). As discussed above, this has proven to be one of the key factors contributing to increased journey times in and out of North Nowra, particularly in the AM peak. **Table 5** below shows a 1-3 minute improvement on travel times in and out of North Nowra compared to the do nothing scenario.

Table 5: Comparison of journey times between link road options and 2016 – do nothing scenario during peak periods

	Do Nothing	Central Option	Southern Option	Northern Option
2016 - AM Peak (mins)*	11:52	**9:24** ***(-2:28)***	9:48 *(-2:04)*	9:56 *(-1:56)*
2016 - PM Peak (mins)*	7:58	**5:47** ***(-2:11)***	4:50 *(-3:08)*	6:43 *(-1:15)*

* Calculated travel times between Illaroo Road, North Nowra and Bridge Road, Nowra

The table above indicates time savings of each of the link road options over a do nothing scenario. In terms of predicted usage, **Table 6** below demonstrates that a link road would remove between 24%-30% of vehicle traffic from Illaroo Road during peak times, improving congestion, road safety and amenity.

Table 6: Comparison of link road usage (vehicle numbers) between link road options and 2016 – do nothing scenario during peak periods

	Do Nothing *(Illaroo Road Traffic)*	**Central Option *(Illaroo Road Traffic)***	**Southern Option *(Illaroo Road Traffic)***	**Northern Option *(Illaroo Road Traffic)***
2016 - AM Peak	1,779 (100%)	**536 (30%)**	480 (27%)	450 (25%)
2016 - PM Peak	1,894 (100%)	**499 (26%)**	460 (24%)	478 (25%)

Given the above, an assessment of a link road in isolation of any other network improvement reveals that the central option performs better in both the AM and PM peak. However, the degree of difference between options in many respects is relatively minor, and any option would assist with relieving congestion on Illaroo Road and on the network generally.

The department acknowledges that ultimately, the link road would not operate in isolation of other likely upgrades. Of the options listed previously, the EA reveals that the MVRLK and the RCR works would be the most likely to proceed (the latter dependent on RMS funding), operating in conjunction with a link road. The EA and RtS provide an assessment of how these separate improvements would affect the performance of the link road and network efficiency more generally.

With respect of the RCR works, the RtS notes that each of the link road options "would perform better with the RCR improvements in place, generally in the same proportion as their respective performance levels indicate in isolation." The works associated with the RCR would allow greater traffic release from North Nowra during the AM peak periods, and provide a more efficient network in the PM peak and non peak periods.

The central and southern link road options would function in a more efficient manner when taking into consideration the MVRLK. However, the northern option would result in an unacceptable level of performance. Should the northern option be approved, the proponent has indicated that it may need to re-assess the need for the MVRLK.

Department's Consideration

The department acknowledges that the Illaroo Road / Princes Highway intersection is nearing capacity, and will reach saturation point by 2016 under a low growth scenario. Taking into account forecast growth for the area as proposed by the South Coast Regional Strategy and the Nowra Bomaderry Structure Plan, congestion at this intersection and along Illaroo Road is expected to worsen.

The proponent has established a clear need for the proposal, backed by an assessment of possible options to address the issue. Through a detailed selection process three options have been shortlisted and are subject of this Concept Plan application. The central option is the proponent's preferred route. These options have been assessed against other likely upgrades (MVRLK and RCR works) to ensure compatibility with other road projects.

It has been demonstrated that the central and southern options would have the greatest level of improvement for both VHT and VKT, and would reduce travel times into and out of North Nowra by a greater margin compared to the northern option. Notwithstanding, the department notes that for the AM peak, the greatest difference between improved travel times for each option is 32 seconds (between the central and southern option). For the PM peak, the greatest difference between improved travel times for each option is 1 minute 52 seconds (between the southern and northern option). It is acknowledged that the differences between options are noticeable in the PM peak, however, the 32 second difference between options for the AM peak could not be considered a determining factor in selecting the most appropriate option.

In terms of link road usage, the department notes that Illaroo Road traffic would be reduced by 25-30% in the AM peak and by 24-26% in the PM peak depending on the option selected. This equates to a difference of 86 fewer vehicles in the AM peak and 21 fewer vehicles in the PM peak. It is argued that all three options would result in substantial reductions in traffic on Illaroo Road during peak periods, in accordance with the primary objectives of the proposal.

In relation to the performance of the link road options with other improvements such as the RCR and MVRLK, it is considered that the potential impacts have been adequately identified. The RCR works would improve the general network performance regardless of the option selected, and the MVRLK would work more efficiently with the central and southern options than it would with the northern option. This is primarily due to the MVRLK and the northern option performing a similar function.

RMS has indicated that while all three options would impact on key intersections with the Princes Highway, no objection is raised to any option being supported by the department. However, a number of requirements would need to be addressed with any future detailed application, such as further modelling to incorporate 2026 traffic volumes, identification of intersection upgrade works and consideration of constructability constraints for any proposed intersection upgrade. These upgrades should form part of the future detailed link road application.

The performance of key intersections, while for the most part not improved in terms of LoS, delays are reduced. One exception exists, where LoS improvements are observed in the AM peak for the northern option at the Moss Vale Road / Cambewarra Road / Princes Highway (from LoS B to LoS A).

The department has considered the analysis of traffic impacts/improvements provided by the proponent, and considers that all link road options would have efficiency benefits on the wider network. The primary objective of relieving congestion at the Illaroo Road / Princes Highway intersection and on Illaroo Road itself is achieved through each of these options to varying extents. In some cases, the difference between each of the three options in terms of reducing congestion and improving intersection performance/travel times is negligible. The department is therefore of the opinion that all three options would provide a satisfactory level of network improvement compared to the do nothing scenario, subject to additional modelling, identification of intersection upgrades and consideration of constructability constraints. These matters have been recommended as part of the future assessment requirements for any subsequent application.

5.2. Flora and Fauna

Issue

The proponent undertook a biodiversity assessment including detailed field surveys of terrestrial ecology throughout the study area.

The field surveys recorded seven natural vegetation communities within the proposed road corridors covered by the three route options. One potential endangered ecological community (EEC) listed under the *Threatened Species Conservation Act, 1995* (the TSC Act) was recorded in the study area, being the Coachwood/Ironwood Warm Temperate Rainforest, located in the Bomaderry Creek gorge.

A total of twenty threatened flora and fauna species listed as vulnerable or endangered under the *Environment Protection Biodiversity Conservation Act, 1999* (the EPBC Act) and TSC Act, were identified as either known or with potential to be present in the study area (**Table 8**).

Table 8: Threatened Flora and Fauna Species

Scientific Name	Common Name	Listing	Listing Status	Occurrence
Eucalyptus langleyi	Albatross Mallee	EPBC Act TSC Act	Vulnerable Vulnerable	Known
Zieria baeuerlenii	Bomaderry Zieria	EPBC Act TSC Act	Endangered Endangered	Known
Genoplesium baueri	Bauer's Midge Orchid	TSC Act	Vulnerable	Known
Hibbertia sp. Nov. "Menai."		TSC Act	Endangered	Known
Callocephalon fimbriatum	Gang-gang Cockatoo	TSC Act	Vulnerable	Known
Lophoictinia isura	Square-tailed kite	TSC Act	Vulnerable	Known
Calyptorhynchus lathami	Glossy Black Cockatoo	TSC Act	Vulnerable	Known
Tyto novaehollandiae	Masked Owl	TSC Act	Vulnerable	Known
Ninox strenua	Powerful Owl	TSC Act	Vulnerable	Known
Tyto tenebricosa	Sooty Owl	TSC Act	Vulnerable	Known
Myotis macropus	Large-footed Myotis	TSC Act	Vulnerable	Known
Pteropus poliocephalus	Grey-headed Flying-fox	EPBC Act TSC Act	Vulnerable Vulnerable	Known
Petaurus australis	Yellow-bellied Glider	TSC Act	Vulnerable	Known
Cercartetus nanus	Eastern Pygmy-possum	TSC Act	Vulnerable	Known
Petroica boodang	Scarlet Robin	TSC Act	Vulnerable	Potential
Petroica phoenicea	Flame Robin	TSC Act	Vulnerable	Potential
Glossopsitta pusilla	Little Lorikeet	TSC Act	Vulnerable	Potential
Daphoenositta chrysoptera	Varied Sittella	TSC Act	Vulnerable	Potential
Heleioporus australiacus	Giant Burrowing Frog	EPBC Act TSC Act	Vulnerable Vulnerable	Potential
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll, Spotted-tailed Quoll, Tiger Quoll (southeastern mainland population)	EPBC Act TSC Act	Endangered Vulnerable	Potential

Additional targeted surveys for the Giant Burrowing Frog, Spotted-tailed Quoll and the Eastern Pygmy-possum were undertaken in March 2011. One individual of the Eastern Pygmy-possum was captured in the south western corner of the study area near Falcon Crescent. The same individual was captured a second time during the survey effort. The surveys did not record the presence of the Giant Burrowing Frog or the Spotted-tailed Quoll. While no targeted surveys were undertaken for the Grey-headed Flying-fox, information obtained from a Native Animal Network Association wildlife carer, NPWS and Shoalhaven City Council reveal that as many as 15,000 Grey-headed Flying-foxes are known to roost in the southern section of the study area near Bomaderry Creek between September and May each year. The site has been confirmed as a maternal roost and covers an area of approximately 4.7 hectares.

The proponent identified that an area of approximately 2.31 hectares of native vegetation would be cleared within the corridor of the central option, 4.14 hectares within the corridor of the southern option and 4.52 hectares within the corridor of the northern option. Direct impacts on native vegetation and potential EECs are shown in **Table 9 below**. The clearing of native vegetation would result in the permanent loss of foraging habitat, including preferred food tree species and winter flowering trees that provide important seasonal food resources. The loss of roosting and nesting habitat such as hollow-bearing trees, hollow logs and fallen timber could impact on fauna breeding behaviour. Furthermore, there is an increased risk of fauna injury and mortality as a result of vehicle strike along the new link road. Habitat fragmentation would also restrict feeding resources for terrestrial fauna.

Table 9 also shows the direct impact on threatened flora species. Although no individual Bomaderry Zieria would be cleared for the project, the indirect impacts of the construction and operation of the central option are considered in the department's assessment of ecological impacts.

Table 9: Natural Vegetation Clearing

VEGETATION COMMUNITY	PREDICTED IMPACT (CENTRAL / SOUTHERN / NORTHERN)
Spotted Gum – Turpentine Tall Forest	nil / nil / 0.43 ha
Grey Gum – Stringybark Forest Woodland	0.96 ha / 2.13 ha / nil
Scribbly Gum – Casuarina Forest Woodland Scribbly Gum – Bloodwood Forest Woodland	1.16 ha / 1.46 ha / 4.02 ha
Kunzea Shrubland	0.09 ha / 0.13 ha / nil
Sandstone Sedgeland	nil / 0.17 ha / nil
Total Natural Native Vegetation Loss	**2.21 ha / 3.89 ha / 4.45 ha**
POTENTIAL ENDANGERED ECOLOGICAL COMMUNITY (EEC)	
Gorge Complex – Coachwood Warm Temperate Rainforest	0.10 ha / 0.25 ha / 0.07 ha
Total Natural Vegetation and Potential EEC Vegetation Loss	**2.31 ha / 4.14 ha / 4.52 ha**
THREATENED FLORA SPECIES CLEARED (individuals)	
Hibbertia sp.*nov. 'Menai'*	**11 / 23 / nil**
Eucalyptus langleyi (Albatross Mallee)	**2 / nil / nil**
Genoplesium baueri (Bauer's Midge Orchid)	**1 / 9 / nil**
Zieria baeuerlenii (Bomaderry Zieria)	**nil / nil / nil**

An assessment of the significance of potential direct and indirect impacts from the proposal on threatened flora and fauna species has been undertaken by the proponent. This assessment has concluded that the proposal would not result in adverse impacts which could lead to the extinction of any species, subject to the implementation of mitigation measures.

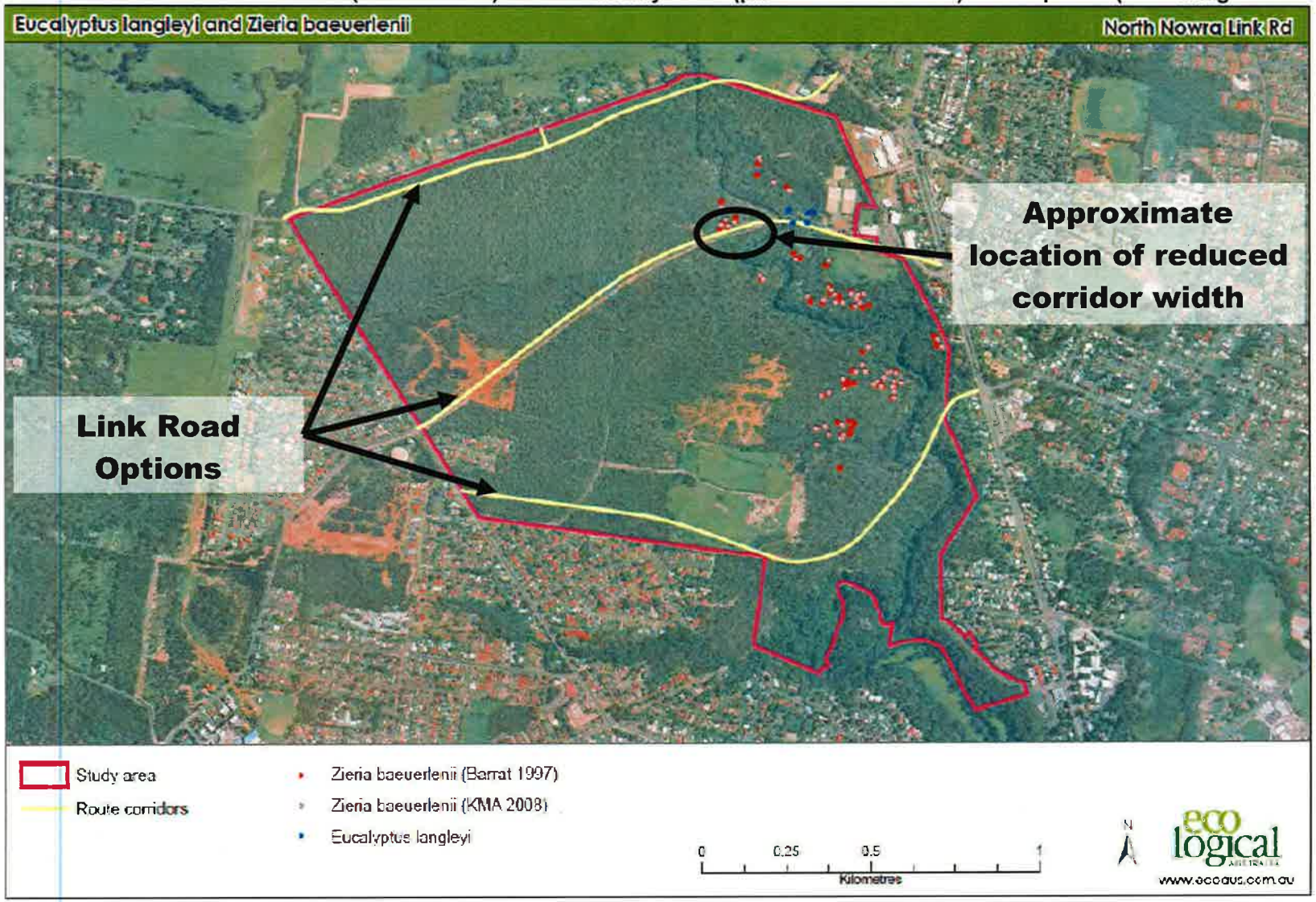
Department's Consideration – Central Option

Impacts on Flora

The department notes that the most significant species potentially indirectly impacted by the proposal is the Bomaderry Zieria, which is listed as endangered under both the TSC and EPBC Acts. This species occurs in only one known location being an area of 0.5 kilometres x 1.0 kilometre on both sides of Bomaderry Creek within the Bomaderry Creek Regional Park. DSEWPaC, EPA, National Parks and Wildlife Service South Coast Region Advisory Committee and a number of public submissions raised significant concern over the possible impact (both direct and indirect) and protection of this species as a result of the construction of this option.

A large group of individual plants are located 13 metres north of the centre line of the central option, two of which were located within the initial 30 metre corridor. The corridor has since been reduced in width from 30 metres to 20 metres in the vicinity of the Bomaderry Zieria, in an attempt to minimise any indirect impact on this species as a result of construction and operation of the roadway (**Figure 9 below**).

Figure 9: Distribution of the Albatross Mallee (blue markers) and Bomaderry Zieria (pink and red markers) Flora Species (Base Image Source: EA 2011)



As the central option has been determined to be a "controlled action" under the EPBC Act, DSEWPaC also provided comments on the proposal. The DSEWPaC's comments included a review of the potential impacts of the proposed central option on the Bomaderry Zieria, carried out by an independent, qualified and experienced expert.

DSEWPaC raise significant concerns in relation to the lack of discussion on potential direct and indirect impacts of the proposal on threatened species and the effectiveness or reliability of the proposed mitigation measures. As such, DSEWPaC found it difficult to determine the acceptability of impacts arising from the proposal, especially considering that "this is a species that is currently confined to a very small area that may represent the only suitable habitat in which it can persist for long periods."

DSEWPaC disagrees with the proponent's argument that the Bomaderry Zieria reproduces vegetatively rather than sexually, and that "disturbance to the movement of pollinators and seed dispersal vectors is not considered important." Available evidence suggests that while this species does not reproduce sexually in all years, there is the potential for sexual reproduction to occur in some years. Long term studies are therefore required to ascertain the reproduction cycle of this species. Until these studies are undertaken, the management of this species "should not impede pollen transfer between existing plants."

Concern is also raised by DSEWPaC that fragmentation of the Park would impact upon the movement of pollinators and seed dispersal vectors of the Bomaderry Zieria, thereby fragmenting the population. This is of particular concern given that the northern portion of the population comprises a separate genotype to those in other areas of the Park. Any barrier for pollination (i.e. a significant roadway) may result in indirect impacts on this species and a "significant loss of genetic diversity to the population."

Lastly, DSEWPaC raised concern that the EA contains insufficient information in relation to mitigation measures to be implemented for the protection of the Bomaderry Zieria. Given there is only one population, it is stated that "we do not currently understand either its micro habitat requirements and susceptibility to disturbance or the nature of its pollination system or seed dispersal vectors." It has not been adequately justified how mortality from indirect impacts would be prevented. It is expected that construction would result in the loss of plants in close proximity to the proposed corridor and "the basis for the [proponent's] statement that construction will not result in the mortality of the nearest plants is unfounded."

OEH shares the same view as DSEWPaC in relation to the potential impact of the central option on the Bomaderry Zieria. Such a heavy reliance upon multiple mitigation measures increases the chances of failure. Further, OEH believes the greatest long term threat to this species is weed invasion. It has been documented in the 2011 Commonwealth's Recovery Plan for this species that the Park's edges contain a number of weed species. Introducing a road through the centre of the Park will also introduce weed vectors along its edges and in close proximity to this species. The existing service road does not currently pose such a threat.

The department acknowledges the proponent's argument that no direct impact would occur to this species, however it cannot be ruled out that indirect impacts would not occur. A number of mitigation measures to protect this species from indirect impacts are proposed, including: additional assessment of fragmentation effects; consideration of minor re-alignment opportunities; consideration of the 'road effect zone;' and additional studies relating to the removal of shade trees, compensatory plantings, clearing, soil and water management, and herbicide treatment etc.

While the RtS provides additional mitigation measures, it concedes that the "Bomaderry Zieria is one of the rarest plants in Australia...as such the efficacy of the proposed [mitigation] measures is unknown as the measures are untried." The department also concurs with the proponent's statement that the precautionary principle should be applied in this case, given the relatively unknown nature of the reproduction cycle of this species.

In considering the above, the department believes that for such a rare and relatively unknown plant species, the central option represents an outcome that may have detrimental and irreversible consequences for the only known species of Bomaderry Zieria. As so little is known about this species, particularly its reproductive cycle and its susceptibility to: construction activities, edge/fringe impacts, pollutants from runoff, overland flows/drainage, altered groundwater flows, changes to habitat, and the introduction of weeds, the department is not convinced that the mitigation measures proposed would be effective in maintaining a healthy and genetically diverse population of plants.

In considering the RtS, both DSEWPaC and OEH have maintained their concerns with the central option, particularly the impacts of the proposal on the genetic diversity of the Bomaderry Zieria. They have also reiterated their position in relation to the proposed mitigation measures. Given that these measures cannot be relied upon, potential impacts to this species should be avoided.

The department also acknowledges that the central option would result in: the likely impact on 2 individual plants from the Albatross Mallee species (listed as endangered under both the EPBC Act and TSC Act); the possible impact on 11 individual plants from the *Hibbertia* sp.*nov. 'Menai'* species (listed as vulnerable under the TSC Act); and the likely impact on 1 individual plant from the Bauer's Midge Orchid species (listed as vulnerable under the TSC Act).

The Biodiversity Assessment states that thousands of individual Albatross Mallee species exist in the region. DSEWPaC considers that the loss of 2 species (out of thousands) is negligible, however is concerned that the fragmentation impacts of the proposed central option would reduce habitat availability and encourage weed invasion, both of which would potentially further impact this species. OEH agrees with this view, however states that the risk of extinction is increased and the impacts at a local and regional level requires consideration. Following consideration of impacts at both levels, the department acknowledges the loss of 2 individuals through habitat change (as a result of the construction of the bridge) would result in an impact that would be more obvious at a local level. However, in the wider regional context it is unlikely the long term viability of this species would be compromised. Notwithstanding, the department notes that there are alternative link road options that would not impact on any individual species of Albatross Mallee.

The *Hibbertia* sp.*nov. 'Menai'* species is described as 'abundant in the Shoalhaven region.' A total of 45 plants were identified in the study area that closely resembles this undescribed taxon. OEH does not believe the proposal would adversely impact on the regional population of this species. Given the abundant distribution of this species, no objection is raised to the loss of these 11 individuals.

With regards to the Bauer's Midge Orchid, 23 individuals have been recorded in the study area, and another 3 sites within 5-10 kilometres of the site containing this species. OEH has raised concern over the adverse impacts on an important regional population of this species, however has recommended comprehensive surveys to be undertaken during the flowering period to better assess the impacts, develop appropriate mitigation measures and appropriate offsets. The potential loss of 3 individual plants is therefore not considered to be detrimental to the longevity of this species.

Impacts on Fauna and Connectivity

Of the three options proposed, the central option would have the greatest impact on habitat fragmentation, particularly to threatened species listed under the EPBC Act such as the Spotted-tailed Quoll and threatened species listed under the TSC Act such as the Eastern Pygmy-possum, effectively dissecting the Regional Park. Both OEH and DSEWPaC raise concern with this option and potential impacts on the Spotted-tailed Quoll, especially considering that "road mortality is a major threat to this species" (DSEWPaC).

It has been argued by the proponent that the existing service road fragments the Park. The department does not agree, as the service road has restricted access, is unsealed and single lane. There is essentially no physical barrier which currently prevents the movement of fauna (both terrestrial and arboreal) from one end of the Park to the other. DSEWPaC also disagrees with the proponent's claim that the proposal would not result in further fragmentation of the Park due to the presence of an existing unsealed service road. It is argued that the proposal for a 2 way sealed road with an associated shoulder carrying significant traffic volumes through the Park does not "constitute an equal barrier," and fragmentation impacts would be more significant with the "increased spread of weeds and mortality of terrestrial fauna."

While additional surveys for the Spotted-tailed Quoll have been undertaken and results provided in the RtS, no detailed information has been provided by the proponent in relation to physical mitigation measures for any fauna species. The proponent has instead advised that it would address the fragmentation of fauna habitat, the barrier effect of the road and road kill mortality through a commitment to undertake a detailed assessment of structural and non structural mitigation measures. This could include, but would not be limited to, canopy bridges, glider poles, culverts, tunnels, fences, canopy connectivity and micro-habitat placement. The proposed fauna crossing measures would aim to maintain linkages between vegetation communities and allow for the movement of fauna within the Park. DSEWPaC does not consider the proponent's commitments provide a sufficient level of detail to assess the possible impacts arising from the proposed action on the Spotted-tailed Quoll, and as such, an assessment of the acceptability of any residual impacts cannot be adequately undertaken.

While it is considered that a detailed assessment of mitigation measures could be undertaken at a later detailed application stage for species not listed under the EPBC Act, the central option would still have a greater impact on habitat fragmentation than the alternative options, which are located at the northern and southern extremities of the Park. It is difficult for the department to support the central option, where alternative road options exist that would result in a lesser impact on fauna connectivity.

Department's Consideration – Southern Option

Impacts on Flora

The southern option would result in possible impacts to 23 individual *Hibbertia* sp.*nov. 'Menai'* and 9 individual Bauer's Midge Orchid plants. No Bomaderry Zieria plants are located near this option.

Similar to the central option, the possible loss of individual *Hibbertia* sp.*nov. 'Menai'* species is not considered detrimental to the regional population, as there is a relatively large amount of suitable habitat in the Park and adjacent Council land, and another 3 sites containing this species are located between 5-10 kilometres away. OEH concur with this view.

The Bauer's Midge Orchid species has been observed within the Scribbly Gum-Bloodwood Woodland/Open Woodland vegetation community, which occupies much of the central and western sections of the Park. As per the central option, OEH recommends that should the southern option be pursued, additional surveys should be carried out for this species to better understand likely impacts, develop appropriate mitigation measures and offsets. The department acknowledges the broad distribution of this species (from Port Stephens to Ulladulla) and the abundance of suitable habitat which exists within the locality. Subject to additional comprehensive surveys, suitable mitigation measures and offsets, the department does not consider this option to have a detrimental impact to the survival of this species.

In addition to the potential impacts to individual flora species, the southern option would have potential impacts on the Coachwood/Ironwood Warm Temperate Rainforest EEC, which is located in the Bomaderry Creek gorge. As the gorge becomes deeper at the southern end of the Park, OEH believes the potential impact of any proposed bridge on the southern alignment could be managed through detailed design/construction. The department concurs with this view.

Impacts on Fauna and Connectivity

The Eastern Pygmy-possum has been previously identified in the northern section of the Park. During the most recent survey effort, one individual of the Eastern Pygmy-possum was captured at the western end of the southern option near Falcon Crescent. A large Grey Headed Flying Fox roost is also located at the southern end of Bomaderry Creek, which has been confirmed as a large maternal camp covering an area of 4.7 hectares.

The Eastern Pygmy-possum has been identified in both the northern and southern sections of the study area. In addition, suitable habitat for this species covers a large proportion of the Park and study area. Therefore, it is assumed that this species would cover a greater area than the areas surrounding the two confirmed sightings. It is not considered likely that habitat fragmentation would detrimentally impact upon this species, as the corridor of this option is located closer to residential areas to the west, and less suitable (gorge) habitat to the east. Further, this option would result in only a small portion of the Park being cleared (approximately 0.32 hectares), protecting much of its suitable habitat.

Further assessment of the potential construction and operational impacts of the southern option on the Grey-headed Flying-fox camp should be undertaken as part of any future project application under the EP&A and EPBC Acts (or relevant State and Commonwealth legislation). The assessment should be undertaken in consultation with the DSEWPaC and OEH and should also address any potential impacts on other listed threatened species that may potentially occur in the study area.

Concerns raised by DSEWPaC and OEH in relation to the Spotted-tailed Quoll for the central option also apply to the southern option, but to a lesser extent. Notwithstanding, the department considered the southern option to be a better performing option in terms of impacts on fauna and connectivity compared to the preferred (central) option, subject to the implementation of suitable and appropriate mitigation measures.

Department's Consideration – Northern Option

Impacts on Flora

The northern option is not considered likely to impact on any threatened flora species listed under the EPBC Act or TSC Act.

Impacts on Fauna and Connectivity

This option is located on the northern extremity of the Bomaderry Creek Regional Park, parallel to West Cambewarra Road for much of its length before deviating towards Moss Vale Road at its eastern end.

The Glossy Black Cockatoo (listed as vulnerable under the TSC Act) feeds primarily on the she-oak species of tree, specifically Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) and Drooping She-oak (*A. verticillata*). The greatest concentration of feed trees is located along the edge of West Cambewarra Road (within the proposed buffer area to achieve relevant noise criteria), as these trees are generally found in areas which have been previously disturbed. In addition to feed trees, the vegetation community surrounding the northern option also contains a high proportion of hollow bearing trees, within which the Glossy Black Cockatoo nests. The biodiversity assessment estimates that 0.01 hectares of habitat would be cleared for this option. Considering that a number of suitable habitat trees exist in the Park, and the Glossy Black Cockatoo is known to travel large distances with a widespread distribution between Queensland and Victoria, the proposal is considered unlikely to have a detrimental impact on this species.

With regards to connectivity, this corridor option would be separated from the existing West Cambewarra Road by a strip of natural bushland between approximately 15 metres and 40 metres in width. At its eastern end, the corridor adjoins cleared land. This option is considered to have the least impact of the three options in terms of connectivity for terrestrial and arboreal fauna species, as it is located at the Park's northern extremity.

Conclusion

The department accepts that the disturbance and removal of native vegetation for the proposal and the consequent impacts on native fauna, particularly threatened species is unavoidable. However, it is noted that the proponent through the route selection process has identified 3 corridors which it believes balance competing environmental, engineering, social and economic constraints, to varying extents. The department recognises that this process may not result in an alignment with the least biodiversity impacts but would be corridors where the biodiversity impacts are minimised as far as is feasible and reasonable.

Of the three proposed options, the department considers both the southern and northern options to be the best performing in terms of biodiversity impacts. As there is limited knowledge on the Bomaderry Zieria, and how it would react to habitat change through construction and operation of a roadway (central option), it is impossible to predict that the mitigation measures proposed would be effective. Considering this species has such a limited range and is found nowhere else in Australia, and alternative route options are available, the precautionary approach should be taken in this case, at least until the long term studies as recommended by DSEWPaC have been undertaken.

The department is satisfied the proponent, in designing the route corridors for the southern and northern options, has given due regard to the avoidance and minimisation of impacts on flora and fauna as far as is feasible and reasonable. The central option is not supported by the department, DSEWPaC and the OEH due to the potential indirect impacts on the Bomaderry Zieria species, fragmentation impacts and barrier effect/edge impacts on the Bomaderry Creek Regional Park, and direct impacts to the Albatross Mallee.

<u>Biodiversity Offsets</u>

The NPWS Revocation of Land Policy requires an assessment of proposed compensatory lands to be undertaken, demonstrating that this land is of equal or greater ecological value than that land being revoked. The proponent has undertaken a revocation and offsets assessment of the proposal.

The assessment has broken down the proposed offset lands (adjacent to the Regional Park) into 10 sections. A total of 6 sections are considered to be high quality; 2 sections are considered high quality but with some exotic species; and 2 sections are considered more disturbed, comprising understorey weeds, cleared land and areas of dumped rubbish. However, these more disturbed parcels do exhibit canopies similar to that of other high

quality offset parcels and would form a valuable protected vegetative buffer between existing development and the higher quality land within the Park.

The proponent has stated that an agreement would be entered into with the OEH for the dedication of Council owned land to be incorporated into the Bomaderry Creek Regional Park following approval of the link road. **Table 10** summaries the amount of native vegetation clearing within the Park, and the proposed area of offset land. **Figure 10** illustrates the location of proposed offset lands.

The OEH has advised that "all three proposed routes would have an impact on biodiversity that is greater than is able to be offset by the proposed addition of the offset lands to the Park." However, it was noted that a suitable offset package could be achieved for alternative options with some route refinement.

Table 10: Vegetation Clearing within Bomaderry Creek Regional Park and Proposed Offset Land

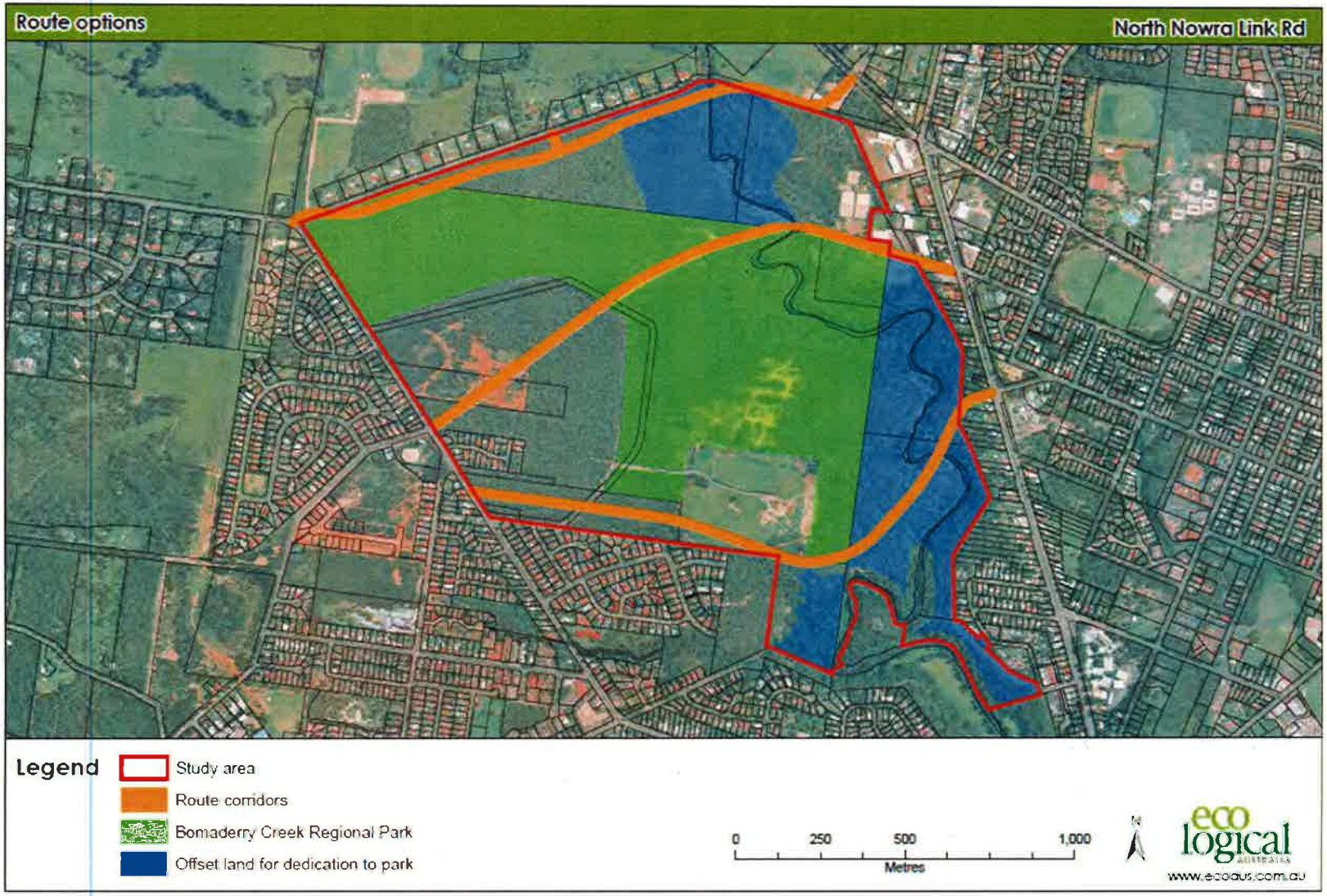
Option	Clearing (ha)	Offset (ha)
Central	1.6	50
Southern	0.3	12
Northern	0.9	17

The proposed offset for the central option would increase the size of the Bomaderry Creek Regional Park by 61% (from 82 hectares to 132 hectares). The proposed offset land for the southern and northern options would increase the size of the Park by 15% (to 94 hectares), and 21% (to 99 hectares) respectively. Of the offset land proposed for each of these options, a number of Bomaderry Zieria would be included in the Regional Park, as would additional suitable habitat for a number of threatened fauna species.

With regards to the proposed central option, the department shares DSEWPaC and OEH's concerns about the value of the offset lands in terms of mitigating potential impacts on the Bomaderry Zieria. Further, DSEWPaC states that they are "unconvinced of the value of the offset area in mitigating impacts arising from the proposed action" and have argued that it is unlikely that this species would inhabit new areas, particularly as some of the proposed offset land has been described as containing weeds/rubbish. It is therefore difficult to argue the benefit of the offset land for this option.

While no objection is raised in principle to the proposed offset lands for the proposed northern and southern options, a more detailed assessment is required at future application stage, which demonstrates the suitability of the offset lands in terms of the required vegetation types and habitat values, and thereby mitigating the potential impacts of these options.

Figure 10: Bomaderry Creek Regional Park (green) and Proposed Offset Lands (blue) (Source: Environmental Assessment 2011)



5.3. Other Matters

Noise

The proponent undertook an assessment of the noise impacts of the proposed link road, including modelling of noise along each of the proposed road corridors, assessment of the effect of the proposed link road on noise levels along Illaroo Road and the Princes Highway, assessment of noise impacts on bushland and recreational areas within the Bomaderry Creek Regional Park, assessment of sleep disturbance levels and identified potential noise mitigation measures.

The operational noise impact of the proposed link road has been assessed in accordance with the *Environmental Criteria for Road Traffic Noise*. (EPA, 1999) (ECRTN). The noise limits for new roads, existing roads and sensitive land uses (such as schools and recreational areas) are set by the ECRTN. The relevant noise criteria for the proposed link road are shown in **Table 11**.

Table 11 – Summary of Relevant Noise Criteria

Location	Criteria ($L_{aeq\ 1\ hour}$)		Where criteria are already exceeded
	Day (7.00am-10.00pm)	Night (10.00pm-7.00am)	
New Collector Roads (the link road)	60	55	Not increase existing noise levels by more than 0.5 dB(A)
Surrounding collector roads	60	55	Not increase existing noise levels by more than 2 dB(A)
Passive recreational areas	55	-	Not increase existing noise levels by more than 0.5 dB(A) for new roads and more than 2 dB(A) for existing roads

The noise modelling undertaken for the proposal predicted the daytime noise levels for the existing, do nothing 2016, and 2016 link road (proposal) scenarios for the three road corridors. The daytime period was identified as the critical assessment period as it contained both the AM and PM peak periods.

The purpose of the noise assessment was primarily to determine the relative performance of the route options based on road traffic noise impact. The EPA has indicated support for the noise assessment undertaken for the Concept Plan as it gives a broad understanding of the potential noise impacts of each route option. The proponent recognises that additional noise assessment would be necessary following finalisation of the road design and pavement heights, to confirm the mitigation and treatment measures.

Table 12 provides a summary of the 2016 predicted road traffic noise impacts at key locations and surrounding roads and shows the direct noise impacts from the three road corridors. The noise levels in some locations along the Princes Highway and Illaroo Road currently exceed the 60 dB(A) daytime traffic noise criterion. In a do nothing scenario, the noise assessment indicates there may be a significant increase in traffic noise levels in these locations in 2016 without a link road between Illaroo Road and the Princes Highway

Table 12: Summary of Predicted Daytime Noise Impacts

Location	Predicted Noise Level; Daytime $L_{A\ eq\ 1\ hour}$ 2016					Greater than 0.5 dB(A) increase from new link road			Greater 2 dB(A) increase from existing roads		
	Existing (2006)	Do nothing	Option 1 - Central Route	Option 2 - Southern Route	Option 3 - Northern Route	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Byron Ave	48 to 57	51 to 59	53 to 62	52 to 59	51 to 59	Yes	-	-	-	-	-
Narang Rd	61 to 65	66 to 71	69 to 71	65 to 70	65 to 70	-	-	-	Yes	No	No
Princes Hwy/Narang Rd	64 to 73	70 to 78	70 to 77	-	69 to 76	-	-	-	No	-	No
Princes Hwy/West Bunberra St	72 to 75	76 to 77	-	77 to 78	-	-	-	-	-	No	-
Upgraded Illaroo Rd/Pitt St	55 to 69	57 to 71	60 to 73	-	-	-	-	-	No	-	-
New Illaroo Rd intersection	63 to 66	66 to 69	-	69 to 72	-	-	Yes	-	-	Yes	-
West Cambewarra Rd/Illaroo Rd	63 to 64	66 to 67	-	-	67 to 68	-	-	-	-	-	No
Falcon Cr near Illaroo Rd	49 to 57	52 to 60	53 to 60	57 to 62	51 to 59	-	Yes	-	-	Yes	-
Sutherland Dr	50	52 to 53	52	59 to 61	51 to 52	-	-	-	-	Yes	-
West Cambewarra Rd	48 to 55	50 to 55	51 to 55	50 to 55	60 to 66	-	-	-	-	-	Yes
Moss Vale Road (500m from Princes Hwy)	54 to 66	58 to 69	58 to 69	58 to 70	59 to 70	-	-	-	No	No	No
Moss Vale Rd/Elvin Rd	54 to 59	58 to 62	58 to 62	58 to 63	59 to 64	-	-	-	No	No	No
Illaroo Road Primary School	73	74	73	73	73	-	-	-	No	No	No
45 Illaroo Rd	74	75	74	75	74	-	-	-	No	No	No
Surrounding road network	48 to 76	50 to 78	51 to 78	50 to 78	50 to 77	-	-	-	No	No	No

The noise assessment indicated the impact of the proposed road alignments on traffic noise levels are:

- the central option would increase noise levels in Byron Avenue by more than 0.5 dB(A) and in Narang Road by more than 2 dB(A);
- the southern option would increase noise levels at the new Illaroo Road intersection and Falcon Crescent by more than 0.5 dB(A) and at the new Illaroo Road intersection, Falcon Crescent and Sutherland Drive by more than 2 dB(A); and
- the northern option would increase noise levels in West Cambewarra Road by more than 2 dB(A).

Table 13 provides a summary of noise impacts on residences and bushland/ recreational facilities. The noise impact of the three road corridors on residences are similar, with approximately 600-700 residences predicted to experience an increase in traffic noise levels of 0.5 dB(A) or greater. The southern option would increase noise levels by more than 2 dB(A) at approximately 202 residences, approximately four times the number of residences impacted by the other route options (40-70 / residences). The number of residences potentially affected by sleep disturbance (greater than 65 dB(A)) for the southern option (104 residences) is approximately twice the number that would be affected by the central and northern options (40-50 residences).

Table 13: Summary of Noise Impacts on Residences and Bushland (Unmitigated)

Route Option	Number of residences > 0.5 dB(A) increase	Number of residences > 2 dB(A) increase	Number of residences exceed LAMax > 65 dB(A)	Hectares of bushland/park impacted	Other bushland/park impacts
Central	621	46	52	57	Lookout, picnic area and walking tracks
Southern	706	202	104	60	None
Northern	686	74	43	53	None

The noise assessment identifies that noise mitigation measures in the form of barriers (mounds and/or walls) and low noise pavement (such as open graded asphalt) are feasible for the central and southern options to meet the ECRTN criteria. The assessment also identified that it is possible to build noise walls to achieve noise reduction for the northern option, however it would not be feasible as access points to residences would result in gaps in the noise wall which would reduce the amount of noise reduction that may be obtained. The assessment identified that offsetting the alignment by 80 metres from the West Cambewarra Road residences would reduce noise to acceptable levels.

Following the implementation of the above measures, the noise assessment has predicted 3, 14 and 27 residences adjacent to the central, southern and northern routes, respectively, would require additional noise mitigation measures to comply with the ECRTN traffic noise criteria. Such measures would involve individual property treatments.

The impact of the route options on Bomaderry Creek Regional Park and bushland in Council owned land is summarised in **Table 13**. Noise levels exceeding the ECRTN's passive recreational noise criteria (55 dB(A)) would be experienced for the central option on 57 hectares of the Regional Park and bushland. This includes the lookout point, a picnic area and walking tracks within the Park. Approximately 60 and 53 hectares of the Park and bushland would receive noise levels of greater than 55 dB(A) from traffic using the southern and northern options, respectively. However, no picnic areas or walking tracks in the Park are affected by these options.

Department's Consideration

The noise assessment predicted the southern option would have a greater noise impact on residential receivers (unmitigated) than the central and northern options. However, with the implementation of noise mitigation measures at source, the number of residential receivers directly impacted is reduced substantially. The EPA noted that feasible noise mitigation measures have been identified for all three route options. The department is satisfied that feasible noise mitigation measures could be implemented to address and mitigate noise impacts to acceptable levels for all three route options. However, the central option would have a greater noise impact on visitors to the Park than the other two options.

The noise assessment has not considered construction noise impacts, however, has noted that an assessment would be carried out to identify construction related noise issues and management measures would be implemented during construction. Such measures would include construction noise management plans and limiting of construction hours.

The department is satisfied that as the proposal is for a concept approval of an alignment and which does not permit construction, the proponent's commitment to undertake further assessment and consideration of mitigation measures is appropriate and supported.

In conclusion, the department considers the three route alignments have similar noise impacts on residences and the environment. The proponent has identified feasible mitigation measures to address compliance with the operational noise criteria and that further detailed assessment would be undertaken as part of a future application to construct and operate the proposed link road. The department has recommended comprehensive further assessment requirements in relation to noise and vibration impacts of the proposed link road, including:

- construction noise and vibration impacts; and
- operational traffic noise impacts.

Aboriginal Heritage

An Aboriginal cultural heritage assessment was undertaken which focussed on the three proposed route options and the locality in general. An updated impact assessment was also submitted as part of the RtS.

The Aboriginal heritage assessment identified a total of twenty-eight locally significant sites in the vicinity, including shelters with art, occupation shelters with artefacts, shelters with shell middens, axe grinding grooves and open scatters of midden and artefacts.

The updated impact assessment concludes the following:

- the central option may potentially impact upon an artefact scatter of low archaeological significance. A rock shelter and an isolated find (both of low archaeological significance) should be avoided through detailed design. While no mitigation measures are recommended, any impact should be avoided if possible. The Aboriginal community recognise this site as having low cultural value;
- the southern option may potentially impact upon one rock shelter of low archaeological significance, however these impacts should be able to be limited or eliminated through detailed design. While no mitigation measures are recommended, any impact should be avoided if possible The Aboriginal community recognise this site as having moderate cultural value; and
- the northern option may partially impact upon an open site and isolated find, both of which are considered to have low archaeological significance. These impacts should be able to be limited or eliminated through detailed design. While no mitigation measures are recommended, any impact should be avoided if possible. The Aboriginal community recognise this site as having moderate cultural value, however not as significant as the southern option.

With regards to indirect impacts, it is noted that some sites may be susceptible to vibration impacts within the vicinity of the proposed corridors, particularly rock art. As the identified rock art sites are generally located a distance of more than 200 metres from the proposed corridors, the level of impact is considered negligible. A more detailed analysis will be undertaken at future detailed application stage for construction activities.

For all sites, it has been recommended that temporary fencing be installed along the construction boundaries to minimise direct impacts.

The Aboriginal land claims referred to in submissions relate to 3 parcels of land, two of which are opposite Pitt Street on Illaroo Road and would be traversed by the central option. The third site is located on the corner of Illaroo Road and Falcon Crescent and would be traversed by the southern option. The department understands that these claims were lodged in 2000 and are being assessed by the Land and Property Management Authority (former Department of Lands). While not a matter that affects the assessment of the proposal, the department notes that the Nowra Local Aboriginal Land Council has not objected to the principle of a link road.

Department's Consideration
A key consideration in the department's assessment of the proponent's Aboriginal heritage assessment was whether relevant Aboriginal stakeholders had been provided sufficient opportunity to provide input into the assessment undertaken, consistent with the *Interim Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DECC July 2005). In this regard, the department is satisfied that the proponent has adequately consulted with relevant Aboriginal stakeholders.

In relation to the potential impacts on Aboriginal archaeology, all corridor options have the potential to impact upon individual sites, however the level of impact is dependant on the significance of the sites. The department considers that, with the implementation of recommended mitigation measures (fencing & vibration controls), potential impacts to all identified sites for each option could be managed during the construction period.

Historic Heritage

A historic heritage study prepared by the proponent was submitted as part of the EA. A concrete dam wall, located adjacent to the central route option within Bomaderry Creek, was built in 1937 to provide water to the residents of Bomaderry. Following its decommissioning, a small section of dam was removed to form a weir. This was undertaken in 1998 to allow the migration of fish, particularly Australian Bass, to travel along the creek.

The foundations of the dam's former pumping station, some pipeline, pedestals and artefacts can be found in the immediate area.

While none of the features described are listed as having any heritage significance on the State Heritage Register or in the Shoalhaven LEP, they have been listed as having local significance under the Shoalhaven Heritage Study and the area generally is known as the "Bomaderry Creek Gorge Conservation Area."

Department's Consideration
Only the proposed central option could have a potential impact on these identified European heritage features, as the southern and northern options are located some distance to the south and north respectively.

The department notes that the weir and associated relics would not be disturbed by the construction of the central option, however notes that it would be possible to view any new bridge from the weir, resulting in a possible visual impact. While any new bridge associated with the central option would be located approximately 30 metres from the weir, it is not considered that the visual impact of a new bridge would have a detrimental impact on the heritage significance of the weir and associated relics. As such, the department raises no objection to the proposal on historic heritage grounds.

Visual Amenity

The Bomaderry Creek Regional Park and surrounding natural bushland (including Bomaderry Creek and gorge) provides high amenity values for surrounding residents and users of the Park. Park facilities include a number of walking trails, a picnic area and signage with information on Aboriginal heritage and local plant and wildlife species in the area. Access to the picnic area is currently via a short walk off Narang Road. A limited number of parking spaces are located at the Park gates, with overflow parking across the road at the tennis centre.

Information on three formal walks is provided at the picnic area: Bernies Lookout (less than 500 metres), the Bomaderry Creek Walk 1 (1.4 kilometres); and the Bomaderry Creek Walk 2 (5.5 kilometres). In addition to these formal walking trails, a number of lesser known trails exist throughout the site and surrounding area linking the picnic area to other parts of North Nowra including Falcon Crescent, Illaroo Road and West Cambewarra Road.

As discussed above, the area is considered to have high biodiversity values with a number of threatened flora and fauna species inhabiting the area.

Departments Consideration
With regards to the central option, some adjustments would be required to the walking trails to enable the Bernies Lookout walk and Bomaderry Creek Gorge walks to cross underneath the proposed bridge. Further, revised access arrangements would be required to link the picnic area with the parking area on the opposite side of the proposed road. While an existing transmission line and pipeline crosses the creek in this location, the proposed road and bridge structure is considered to be a more substantial and permanent structure as it would appear incongruous in the natural landscape and would detrimentally impact upon the visual amenity and visitor experience of the bushland setting of the walks and picnic area. In addition, the proposed bridge structure of the central option is considered to be visually intrusive when viewed from the locally significant Bomaderry Creek Weir, accessed via the Bomaderry Creek Gorge walks (depending on walking loop chosen).

The southern extremity of the Bomaderry Creek Walk 2 would pass beneath the proposed bridge of the southern option. It is argued that the visual impact of this bridge on walkers below would be less obtrusive than the central option, as it would be 26.5 metres (approximately) from the creek bed to the underside of the bridge. This is more than double the height of the proposed bridge for the central option (12 metres). The additional height, which is required due to the depth of the gorge in this location, would result in an environment below that is less oppressive and a bridge structure that is less imposing when viewed from below. Further, no items of heritage significance are located in the vicinity and the proposed bridge would not be visible from the picnic area.

The visual impact of the northern option on the Park/bushland is considered to be low, particularly as the Bomaderry Creek gorge becomes shallower at the northern end of the Park. The crossing/bridge in this location would be relatively low compared to other options. Some changes would occur to the outlook from the residences along West Cambewarra Road, however these would be identified at a future application stage. Noise attenuation (mounds/walls) and appropriate landscaping would be likely along this interface.

The department has assessed the amenity impacts of each of the three proposed options, and considers that the central option would have the greatest impact on amenity values of the Park, due to its fragmentation impacts and proximity of the road corridor to the picnic facilities and walking trails. The bushland setting currently enjoyed by users of the Park would be lost due to the detrimental visual impact of the new roadway dissecting the Park, and the bridge structure over the creek/gorge.

Flooding

The proponent carried out a flood study of the impact of the proposed link road on Bomaderry Creek and its floodplain. The primary objective of the study was to understand flood behaviour under existing conditions for a variety of flood events.

This modelling demonstrates that for the central and southern options, the extent of flooding is contained within the narrow gorge. The proposed bridge at the northern option is located in close proximity to the entrance of the gorge, and therefore would experience greater flood depths (up to 31.3 metres 1% AEP) due to the shallower and wider creek valley. The level of the proposed bridge deck for the central option is 35 metres AHD, the southern option is 38 metres AHD, and the northern option is 35 metres AHD. The height of the bridge deck above floodwater would be 10 metres, 28 metres and 4 metres respectively.

With regards to the number of bridge piers with footings within the ARI 100 flood level, the central and southern options would have 1 pier within the flood level whereas the northern option would have 3 piers within the flood level (due to the topography and width of the flood extend at this location). No piers and footings are proposed to be constructed within the creek bed itself.

Department's Consideration
The department acknowledges that each of the three bridges are designed to be above the ARI 100 flood level, and that some piers with footings would be required to be constructed on land susceptible to flooding. However, it is not considered likely that the afflux created as a result of these piers would contribute to additional scouring or flooding. The department therefore raises no objection to the proposal in regards to flooding.

Soil and Water

The water quality for Bomaderry Creek is considered to be good, although phosphorous concentrations are slightly elevated. The proponent identified the main short term risk to water quality (for all route options) will occur during the construction stage. Potential impacts include over clearing through poor delineation of the construction area, degradation of topsoil through poor handling and stockpiling, soil erosion and transport of sediments to bushland and flow lines, resulting in contamination of Bomaderry Creek and groundwater.

The proponent considers the southern option to have the greatest risk to erosion and sediment control due to it having the longest length of the 3 options and the highest level of disturbance within the riparian corridor due to the length of the gorge and the lack of suitable access to construct the bridge footings/ piers.

The proponent considers the operational risk to water quality from all route options include: increased surface runoff from impervious surfaces and flow velocities from stormwater drainage, pollutants and spillages entering the flow lines and contamination of the perched water table associated with the Sandstone Sedgeland Vegetation Community. The proponent considers that water quality impacts associated with the construction and operation of the link road can be prevented or minimised through appropriate stormwater/ bridge design and implementation of appropriate mitigation measures.

The NSW Office of Water noted that the central and southern options could potentially impact on groundwater dependent ecosystems, depending on how compressible the soils are.

Department's Consideration
The department is satisfied with the consideration of soil and water impacts of the proposal and that the proponent has identified the potential risks from construction and operation of the link road. The department has recommended further assessment of soil and water impacts, including acid sulfate soils, be undertaken in the assessment of future applications for the link road.

Contaminated Land

The North Nowra Landfill is located in the southern part of the study area and is adjacent to the Bomaderry Creek Regional Park. Landfill operations commenced in the 1960s and included solid waste from residential and industrial/ commercial sources. Anecdotally, some liquid waste (eg. oils) may have been dumped at the landfill site. The site was closed in December 1983 at which time most of it was covered with soil and grassed.

The central and northern options are located to the north of the landfill site and would have no impact on potentially contaminated land. There are no known contamination risks and no known historical uses which would indicate a ground contamination risk, associated with these route options. The southern option would pass immediately to the south east of the leachate management ponds and would follow a section of the former leachate discharge channel.

The proponent states that geotechnical studies will be required to determine the ability of the landfill to have a road constructed along its southern edge and that a detailed contaminated land investigation of the land surrounding the former landfill would be necessary as part of detailed design. If contamination is found, remediation would be discussed with the EPA.

Department's Consideration
The proponent has advised that the landfill was capped following closure and that in the 1990s a leachate collection and irrigation system was installed. In 2006, field investigations were undertaken to inform Council's landfill closure plan. The investigation concluded the existing cover was suitable as a capping system, however the thickness of the existing cover was variable and would need to be augmented to appropriately cap the whole site. The level of contaminants were below EPA guidelines for open space purposes and that a landfill gas management system would need to be installed in the vicinity of the residential areas.

In January 2010, the EPA approved the surrender of Environment Protection Licence 3558 (which authorised the discharge of polluted water from the closed landfill) for the North Nowra Landfill site. The surrender approval required the installation of 4 sub-surface gas monitoring wells along the southern boundary of the landfill site and the completion of the capping of the former landfill and the leachate collection pond by 30 June 2012.

The department notes that all route options have no known contamination issues. The EPA has approved the closure plan for the former North Nowra Landfill site and only requires ongoing monitoring of gas levels (initially for 6-months following installation) in the vicinity of the residential areas. The proponent has committed to undertake geotechnical investigations of the landfill site for the southern route option and detailed contaminated land investigation of surrounding land. The department notes there is the potential for contaminated material and land to be disturbed and therefore has recommended that a future application for the southern option undertake an assessment of the former landfill site in accordance with the *Contaminated Land Management Act 1997* and State Environmental Planning Policy No. 55 – Remediation of Land.

Other

Cost
The department has identified a number of submissions which argue a particular route option based on cost. The CIV of each option is not a material planning consideration and does not have any influence on the merit assessment undertaken by the department.

New bridge over the Shoalhaven River / Nowra bypass
The department acknowledges the higher level options available to assist in alleviating traffic congestion in the area, however these two options are matters for RMS to consider.

Dumping of Rubbish
The department considers that this matter, which relates to illegal dumping should the central option be approved, is an operational matter and can be addressed through the assessment and determination of any future detailed application.

Land Acquisitions
Land acquisitions are not a material planning consideration.

6. RECOMMENDATION

The department has considered the proponent's EA, submissions from the general public and public authorities, the proponent's Response to Submissions and the final Statement of Commitments in its assessment of the proposal.

The department notes that the Concept Plan for the North Nowra Link Road would link the suburbs of North Nowra and Bomaderry and comprise three route options. The department recognises the justification for the proposal in that it would reduce congestion at the Illaroo Road / Princes Highway intersection and along Illaroo Road, improve safety and amenity on Illaroo Road and provide infrastructure to meet the growing demands of future growth in North Nowra. In this regard, the department considers the Concept Plan to be consistent with the aims and objectives of relevant government policies, including the *South Coast Regional Strategy*, which has identified Nowra as being able to accommodate the majority of the forecast growth for the south coast.

The proposal will have direct and indirect impacts on native vegetation, including threatened flora species and threatened fauna habitat. The impacts on native vegetation are unavoidable, however, the proponent has committed to addressing the impacts on native vegetation and removal of foraging, roosting and breeding habitats of native fauna, including threatened fauna species, by a range of mitigation measures in any future application. These include offsetting vegetation and providing an assessment of possible crossing structures to maintain connectivity between areas of key habitat. Notwithstanding, the department, along with DSEWPaC and OEH, are concerned that the central option would have significant adverse impacts on threatened species. In particular:

- the potential indirect impacts (construction and operational) on the only known population of Bomaderry Zieria, which is listed as an endangered plant species under both the EPBC and TSC Acts;
- the failure to adequately demonstrate that the proposed offset lands meet the "maintain or improve" biodiversity outcome;
- that the alternative options will not detrimentally impact the Bomaderry Zieria, and have a lesser impact on biodiversity generally; and
- loss of connectivity and biodiversity impacts associated with the fragmentation of the Bomaderry Creek Regional Park.

Both OEH and the department notes that there are a number of constraints with the northern and southern options, which will need to be carefully considered at a subsequent application stage, including construction and operational noise mitigation measures, soil and water impacts, access to walking trails, biodiversity impacts (particularly threatened flora and fauna species, fauna movement and habitat impacts) and the development of a comprehensive biodiversity offset package. These issues were reflected in submissions from the general public and public authorities. The proponent has committed to develop and implement mitigation measures to address residual construction and operational impacts and develop biodiversity offset measures in consultation with the relevant public authorities. The department has recommended future assessment requirements to support and enhance the proponent's commitments on the construction and operation of the proposal.

The department considers other impacts associated with the proposal, including heritage, visual amenity and flooding, have been adequately addressed at the Concept Plan level and will require further analysis at future application stage. The department believes that, while acceptable, implementation of the mitigation measures proposed in the EA and the revised Statement of Commitments would ensure that best management practices are refined for any future application, and applied throughout the construction and operation of the project. This would ensure that any potential impacts are minimised to an acceptable level and the

proposal does not unduly impact on the amenity of surrounding residents, the community in general and the environment.

Based on its detailed assessment, the department does not support the proponent's preferred option (central route), in particular the uncertainty surrounding the potential to adversely impact on the only known population of the endangered Bomaderry Zieria. In consideration of the precautionary principle, the department does not support the central option and it is recommended that the central option be excluded from the Concept Plan. The department considers that the northern and southern options can be undertaken in an ecologically sustainable manner while also providing an improved route for local traffic movement and the approval of the southern and northern options would be in the public interest.

In order to ensure that any future development is consistent with the impacts identified under this assessment and key environmental impacts are managed to acceptable levels, the department has recommended environmental assessment requirements to be considered in future applications under relevant State and Commonwealth legislation to ensure that future development achieves acceptable environment standards and protects public amenity. These requirements relate to both key environmental issues as identified in this report as well as those raised in submissions from agencies and the public. Specifically, any future applications, including a potential referral under the EPBC Act, must provide an updated environmental assessment, including further detailed traffic network model analysis, identification of intersection upgrade works required, additional flora and fauna surveys, biodiversity offset package, noise and vibration assessment and contamination assessment (southern option).

Based on the above, the department considers the northern and southern options to be in the public interest and recommends that the Minister for Planning and Infrastructure (or his delegate) grant approval for the Concept Plan (the southern and northern options only), subject to the terms of the approval.

19.9.12

13/9/12

A/Director
Infrastructure Projects

Executive Director
Major Projects Assessment

23/9/12

Deputy Director-General
Development Assessment & Systems Performance

SH Addaui 25/9/2012

Director-General

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=134

APPENDIX B SUBMISSIONS

See the department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=134

APPENDIX C PROPONENT'S RESPONSE TO SUBMISSIONS

See the department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=134

APPENDIX D INSTRUMENT OF APPROVAL