STATE SIGNIFICANT INFRASTRUCTURE ASSESSMENT:
Stage 2 – Northern Beaches Hospital Connectivity and Network Enhancement Works (SSI 6622)

Secretary’s Environmental Assessment Report
Section 115ZA of the
Environmental Planning and Assessment Act 1979

February 2016
Cover Photograph: Photomontage of Proposed Grade-Separation of Intersection of Warringah Road with Forest Way (Source: EIS).

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### ABBREVIATIONS

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ARI</td>
<td>Average Recurrence Interval</td>
</tr>
<tr>
<td>BAR</td>
<td>Biodiversity Assessment Report</td>
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<tr>
<td>BOP</td>
<td>Biodiversity Offset Package</td>
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<tr>
<td>CCAFMP</td>
<td>Construction Compound and Ancillary Facilities Management Plan</td>
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<tr>
<td>CFFMP</td>
<td>Construction Flora and Fauna Management Plan</td>
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<tr>
<td>CNVMP</td>
<td>Construction Noise and Vibration Management Plan</td>
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<tr>
<td>CSWMP</td>
<td>Construction Soil and Water Management Plan</td>
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<tr>
<td>CTAMP</td>
<td>Construction Traffic and Access Management Plan</td>
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<tr>
<td>DEC</td>
<td>Department of Education and Communities</td>
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<tr>
<td>DFEC</td>
<td>Duffy's Forest Ecological Community</td>
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<tr>
<td>DPI</td>
<td>Department of Primary Industries</td>
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<tr>
<td>EEC</td>
<td>Endangered Ecological Community</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<td>EMP</td>
<td>Ecological Monitoring Program</td>
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<td>EPA</td>
<td>Environment Protection Agency</td>
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<td>EP&amp;A Act</td>
<td>Environmental Planning and Assessment Act 1979</td>
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<td>EPL</td>
<td>Environment Protection Licence</td>
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<td>ESD</td>
<td>Ecologically Sustainable Development</td>
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<td>ESU</td>
<td>Ecological Sampling Unit</td>
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<td>HI</td>
<td>NSW Health Infrastructure</td>
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<td>ICNG</td>
<td>Interim Construction Noise Guidelines</td>
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<tr>
<td>LCZ</td>
<td>Landscape Character Zone</td>
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<td>LoS</td>
<td>Level of Service</td>
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<tr>
<td>NBH</td>
<td>Northern Beaches Hospital</td>
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<tr>
<td>NCA</td>
<td>Noise Catchment Area</td>
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<td>NML</td>
<td>Noise Management Level</td>
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<td>NOW</td>
<td>NSW Office of Water</td>
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<td>Office of Environment Heritage</td>
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<td>Operational Traffic Performance Review</td>
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<td>PIR</td>
<td>Preferred Infrastructure Report</td>
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<td>Rating Background Level</td>
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<td>Roads and Maritime Services</td>
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<td>Road Noise Policy</td>
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<td>RIS</td>
<td>Response to Submissions</td>
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<td>SEAR(s)</td>
<td>Secretary's Environmental Assessment Requirement(s)</td>
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<td>SEPP</td>
<td>State Environmental Planning Policy</td>
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<td>SSI</td>
<td>State Significant Infrastructure</td>
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<td>SWQMP</td>
<td>Surface Water Quality Monitoring Program</td>
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<td>TSC Act</td>
<td>Threatened Species conservation Act 1995</td>
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<tr>
<td>USLE</td>
<td>Universal Soil Loss Equivalent</td>
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<tr>
<td>VAP</td>
<td>Visual Assessment Precinct</td>
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<td>WMP</td>
<td>Water Management Plan</td>
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EXECUTIVE SUMMARY

The Proposal
NSW Roads and Maritime Services (RMS) (the Proponent) proposes to upgrade the road network in the vicinity of the Northern Beaches Hospital (NBH). These upgrades are proposed to improve traffic flow and the performance of intersections across the broader road network. The project is Stage 2 of an approved Concept Plan (and Stage 1 project) which was granted on 29 June 2015.

The key component of Stage 2 is the widening of Warringah Road and a new grade-separated (sub-surface) open slot road along the centre of Warringah Road, between Fitzpatrick Avenue East to approximately 350 m east of the Wakehurst Parkway intersection.

The project also includes upgrading and widening sections of Wakehurst Parkway (approx. 370 m), Allambie Road (approx. 110 m) and Aquatic Drive (approx. 140 m), all south of Warringah Road. Improvements to pedestrian and cycleway infrastructure, including two purpose-built bridges, are also proposed.

Need and Justification
Concept approval for the NBH was granted in June 2014 and the NBH is planned to become operational in 2018. The NBH will be a 488-bed hospital and is identified in the NSW State Infrastructure Strategy 2012-2032 as important health infrastructure based on the level of services provided to the surrounding region.

The existing road network in the vicinity of the NBH currently experiences a high level of congestion, with low average peak travel speeds, unreliable travel times and disruptions to traffic movements impacting both road users and the adjoining community. Warringah Road currently operates at or beyond capacity during peak periods and is expected to experience continued traffic growth in the future.

The NBH is predicted to introduce up to 900 additional outbound vehicles during evening peak periods and without improvements, the road network performance would further deteriorate. Therefore, the location requires a considerable increase in network capacity in order to maintain, if not improve on, the existing level of service.

The strategic aim of the approved Concept Plan is to provide an efficient road network surrounding the NBH. The project would reinforce Warringah Road and Wakehurst Parkway as key arterial connections between the Northern Beaches, Chatswood and Sydney CBD.

The proposal also aligns with a number of NSW government policies including the NSW Long Term Transport Master Plan, NSW 2021: A plan to make NSW number 1 (2011), NSW State Infrastructure Strategy 2012-2032, NSW State Infrastructure Strategy Update 2014, and A Plan for Growing Sydney 2014.

Assessment and Approvals Process
The proposal is State significant infrastructure and the Minister for Planning is the approval authority.

The Environmental Impact Statement was publicly exhibited for 31 days from Wednesday 22 July 2015 to Friday 21 August 2015. A total of 55 submissions were received during exhibition including 47 submissions from the public and 8 submissions from government agencies. No public authority objected to the proposal, however each raised issues for consideration.

Of the 47 public submissions, 4 (9%) generally supported the proposal, 14 (29%) provided comments and 29 (62%) objected. Key concerns raised in public submissions included impacts on traffic and transport, noise, groundwater, biodiversity, visual amenity and social and economic impacts.
Key Assessment Issues

Traffic and Transport
The Department has considered the potential traffic impacts of the project and proposed mitigation measures during its assessment. The Department also commissioned an independent peer review to inform its assessment of traffic impacts.

Key potential impacts of the project include construction activities affecting traffic flows, changes to access arrangements for local roads and properties, potential impacts on the public transport network, and changes in pedestrian and cyclist routes.

To manage the potential construction traffic impacts, RMS proposes to schedule road/lane closures and major activities such as bridge construction outside peak periods, and to implement the recommendations of a road safety audit. The management of traffic flows and safety during construction would be described in a Construction Traffic and Access Management Plan for the project to be prepared in consultation with key stakeholders including Council, emergency services, key road user groups, Health Infrastructure and the Forest High School Working Group.

Compared with the likely performance of the road network based on minimal upgrades, the assessment concludes that the Stage 2 project would generally improve the performance of the traffic network around the NBH, particularly along the key arterial roads and intersections. RMS proposes to review the performance of the network during operation and determine any additional necessary mitigation measures to manage residual impacts.

The Department is satisfied that the pedestrian and cyclist environment would be improved due to the project. Connectivity and safety would be enhanced and would result in the increased attractiveness of active transport. The provision of local bus priority measures would also improve average bus speeds through the area.

Overall, the Department is satisfied that the Stage 2 works would relieve congestion on the regional and local road network and facilitate the required access to the NBH. The Department and the independent peer review consider the potential traffic and transport impacts, particularly during construction, can be managed to acceptable levels.

Noise and Vibration
The construction of Stage 2 is predicted to generate substantial noise, with a large number of receivers around the site predicted to experience noise greater than the recommended levels established under the *Interim Construction Noise Guideline*.

RMS proposes to install noise barriers along the southern side of Warringah Road to manage noise during operation of the road, and it would prioritise the installation of these as soon as possible to assist in mitigating construction noise on the residences along this section. RMS also proposes to consult with surrounding residents during construction and use respite periods or similar mitigation, including during examination periods at the schools and undertaking noisy activities outside of school hours.

The proposed mitigation measures would be further developed during detailed design and their implementation would be described in a Construction Noise and Vibration Management Plan (CNVMP) for the project.

The noise assessment predicts that once operational, fewer receivers would experience road noise levels above the relevant RNP criteria due to the project, compared with not undertaking the project. With the installation of road noise barriers, the assessment found that up to 333 receivers may be eligible for architectural treatments as a result of the Stage 1 and Stage 2 projects. The Forest High School and Frenchs Forest Public School may also be eligible for architectural treatment. RMS would review the operational noise from the project to determine the
effectiveness of noise mitigation measures and to determine if any additional measures are required.

The Department is satisfied that the mitigation measures proposed by RMS should provide the necessary mitigation to reduce, wherever possible, the construction and operational noise impacts generated by the project.

**Water Resources**

The key potential impacts of the project on surface and groundwater resources include the subsurface excavation of the slot road intercepting the groundwater table and changed flow regimes and water quality in surrounding catchments due to the groundwater interception and stormwater runoff.

RMS proposes to monitor the effects of the slot road excavation on the groundwater system and any subsequent downstream effects. RMS also proposes standard water quality management measures during construction, including erosion and sediment control and spill response procedures.

While the proposal is likely to impact both groundwater and surface water flows during construction and operation, these impacts would be effectively managed through the implementation of the water management plan framework envisaged in the Department’s recommended conditions of approval.

Through the implementation of proposed measures and the recommended conditions of approval, the Department is satisfied that the wider catchment and waterway health would be addressed by RMS during construction and operation of the project.

**Biodiversity**

The project would disturb approximately 6.13 hectares of vegetation, which includes approximately 6.1 hectares of the Duffs Forest Endangered Ecological Community and approximately 1.3 hectares of potential habitat for the Red-crowned Toadlet. The vegetation also forms part of a high priority wildlife corridor between Oxford Falls and Manly Dam.

The Department notes the project area is limited by site constraints such as road geometry and the adjoining urban development. Whilst the Department considers the project has been designed in a manner that generally avoids biodiversity impacts where feasible, some impacts are unavoidable.

To mitigate impacts of the project on biodiversity, RMS proposes to establish exclusion zones around sensitive areas during construction and to locate construction access and facilities in cleared or disturbed areas as much as possible. RMS proposes to offset residual impacts on biodiversity through a Biodiversity Offset Strategy, to be developed in consultation with the Office of Environment and Heritage and consistent with the objectives established for the Stage 1 project.

The Department is satisfied that the removal of the vegetation and impacts upon fauna are acceptable when balanced with the enhanced connectivity and provision of access to the Northern Beaches Hospital. The Department has recommended conditions requiring the implementation of the proposed management and offset measures to ensure potential impacts are adequately managed and monitored and considers that impacts to biodiversity are acceptable.

**Urban Design and Visual Impact**

While the Stage 2 project would alter the character and visual appearance of the local area, the Department notes that the changes are in line with infrastructure associated with a major hospital precinct. The Department is satisfied that the visual impacts can be minimised for the
Stage 2 works through the Department’s recommended conditions and implementation of the identified Urban Design and Landscape Plan and urban design objectives and principles.

The Department is also satisfied that RMS proposes to design and construct the noise barriers in consultation with adjoining residences and include translucent sections to reduce the potential impacts of shadows on the adjoining residences.

Social, Economic and Land Use
The Department acknowledges that the construction of the project is likely to cause changes for the surrounding local community that would result in short-term impacts, such as loss of access to properties and commercial areas and general amenity impacts. Land acquisition of approximately 31,713 m\(^2\) is required to accommodate the construction of Stage 2 across 35 separate properties. This includes residential properties, Council land, Crown land and 12 businesses located at the Bantry Bay shops.

The Bantry Bay Road Shops contribute approximately 40 to 55 full time equivalent jobs. The Department notes that the impacts to the business owners as a result of this removal would be unavoidable and would require compensation as a consequence of land acquisition.

Whilst the alignment of the Stage 2 works would result in the removal of the Bantry Bay Road Shops, the Department considers that other local neighbourhood centres could provide similar services.

The Department is satisfied with the range of mitigation and management measures proposed by RMS to address impacts to local businesses. The Department considers that the road network upgrades due to the project, particularly improved east-west movements along Warringah Road and improved pedestrian and cyclist safety and connectivity, would provide significant benefits to local and regional road users.

Other issues
A range of other issues including heritage, air quality, land contamination and waste management have been considered in the Department’s assessment, which can be appropriately addressed through the implementation of best practice management and mitigation measures. Supplementary management and mitigation measures to those proposed by RMS are identified in recommended conditions of approval, where required.

Conclusion and Recommendation
The project is part of the broader Northern Beaches Hospital redevelopment and would, on balance, meet the project’s objectives of providing benefits to the community by improving peak period travel speeds, reliability and network performance (and in particular improved through-traffic performance along Warringah Road) whilst supporting the development and activation of the NBH precinct.

The Department considers that the potential environmental impacts associated with the construction and operation of the proposal could be managed to an acceptable level subject to the implementation of appropriate mitigation measures identified in the EIS and further development of a CEMP. The Department has recommended the implementation of these measures through conditions of approval.

The Department considers that the project’s benefits outweigh the potential residual impacts which can be managed and would not, subject to the recommended conditions, result in any long term adverse or irreversible effects. It is therefore in the public interest that the project is approved. The Department recommends the Project be approved subject to strict conditions.
1. BACKGROUND

On 29 June 2015, the Acting Executive Director, Industry and Infrastructure, as delegate of the Minister for Planning, approved the Concept Proposal and Stage 1 works (Stage 1 Project) application for the Northern Beaches Hospital (NBH) Connectivity and Network Enhancement Project.

The NBH is a new 488 bed public hospital to be built at the intersection of Warringah Road and Wakehurst Parkway, Frenchs Forest, in the Warringah local government area (refer Figure 1 and Figure 2). Construction of the NBH has commenced and it is scheduled to become operational in 2018.

The road network surrounding the NBH site provides an important transport link for movements to and from the northern beaches. The road network currently experiences high levels of traffic congestion with several key intersections, including Warringah Road and Wakehurst Parkway operating at or over capacity. During peak traffic periods the road network is particularly prone to congestion.

The NBH is predicted to introduce up to additional 900 outbound vehicles during evening peak periods and without improvements, the road network performance would further deteriorate. Therefore, the location requires a considerable increase in network capacity in order to maintain, if not improve on, the existing level of service.

![Figure 1: Site location - Northern Beaches Hospital (Source: EIS)](image-url)
Figure 2: Approved Concept Plan and Stage 1 Project (Source: Stage 1 EIS)
1.1. Northern Beaches Hospital Connectivity and Network Enhancement Project
The Concept Proposal and Stage 1 Project was approved as a staged State significant infrastructure (SSI) proposal under Section 115ZD of the Environmental Planning and Assessment Act 1979 (the Act).

The approved Concept Proposal incorporates a range of road network upgrades to relieve current and forecast traffic congestion on arterial and sub-arterial roads surrounding the NBH. Roads to be upgraded include Warringah Road, Wakehurst Parkway, Forest Way, Naree Road, Frenchs Forest Road West and Frenchs Forest Road East.

The approved Concept Proposal includes:
- widening of Warringah Road from west of Fitzpatrick Avenue to the east of Allambie Road to include a central subsurface open slot road, parallel surface lanes and upgrades to intersections with Forest Way, Hilmer Street and Wakehurst Parkway at surface level;
- widening, intersection upgrades, new signalised intersections and potential changes to access along sections of Forest Way, Naree Road, Frenchs Forest Road and Allambie Road;
- widening of Wakehurst Parkway from north of the intersection with Frenchs Forest Road to south of Aquatic Drive;
- provision of a new connection at Aquatic Drive and Wakehurst Parkway and traffic management measures along a number of local roads;
- substantial utility relocations, including water, sewer mains, telecommunication, electricity and gas services; and
- ancillary works for construction including, but not limited to, construction compounds and stockpile sites.

The Stage 1 Project includes:
- widening of local roads servicing the NBH north of Warringah Road and a 700 m section of Warringah Road east of the Allambie Road intersection;
- upgrading intersections along Naree Road and Frenchs Forest Road between Forest Way and Allambie Road, inclusive;
- changes to bus stops, bus priority measures, car parking and pedestrian crossings; and
- utility relocation and ancillary works for construction of the Concept Proposal.

Construction of the Stage 1 Hospital Connectivity Works commenced in late 2015 and is scheduled to take 24 months, to be completed by 2017 at a cost of approximately $70 million.

Stage 2 of the Concept Proposal involves works to increase capacity across the broader road network, particularly along Warringah Road. Construction works are scheduled to take 30 months and planned to be completed in time for the scheduled NBH opening in late 2018, at a cost of $330 million. This report assesses Stage 2 of the Concept Proposal.

1.2. Locality
The surrounding land uses are diverse and include low density residential, retail, commercial, light industrial warehousing, educational establishments, bushland, utilities and recreational facilities. Three business parks in the locality serve the local and sub-regional area.

The Forest High School is located adjacent to Warringah Road and the NBH site, and the Frenchs Forest Public School is adjacent to the Forest Way and Warringah Road intersection.
The Forestway shopping centre is the primary shopping centre, with local shops located on Bantry Bay Road and Frenchs Forest Road East.

The predominant form of public transport in the area is bus, with key routes linking the Northern Beaches with the Chatswood rail interchange and the Sydney CBD. Heavy traffic conditions along both Warringah Road and Wakehurst Parkway during peak travel periods cause frequent delays to bus services.

The project area is located on a ridge bordering the catchments of Bantry Bay, Curl Curl Creek (Manly Dam) and Middle Creek (Narrabeen Lakes). It is within the Sydney Basin Bioregion and contains pockets of vegetation considered to be of high biodiversity value, including potential habitat for threatened flora and fauna species and a portion of Duffy’s Forest Ecological Community (DFEC), listed as endangered under the NSW Threatened Species Conservation Act 1995. The area also serves as a Priority 1 Wildlife Corridor, connecting Oxford Falls and Manly.

2. PROPOSED DEVELOPMENT

Roads and Maritime Service (RMS) is seeking approval for Stage 2 of the NBH Connectivity and Network Enhancement Project.

Stage 2 involves road network upgrades of Warringah Road and associated intersections in the vicinity of the NBH to improve traffic flow and the performance of intersections across the broader road network. The key components of the project are summarised below and shown in Figure 3, and described in detail in the EIS.

The infrastructure is designed to provide additional lane capacity for Warringah Road through-traffic by allowing traffic to avoid the signalised intersections of Warringah Road with Wakehurst Parkway, Hilmer Street, and Forest Way.

The works proposed under Stage 2 are consistent with the relevant components of the approved Concept Proposal, as described in the EIS and Preferred Infrastructure Report (PIR) for the Concept Proposal and Stage 1 Project.

2.1. Stage 2 Project Infrastructure

Grade-Separated Open Slot Road

The key component of Stage 2 is a new grade-separated open slot road along the centre of Warringah Road, spanning a 1.3 km section between the intersection with Fitzpatrick Avenue East to approximately 350 m east of the Wakehurst Parkway intersection.

The slot road would comprise four subsurface, grade-separated traffic lanes (two lanes in each direction), in a cutting excavated to a maximum 8 m below the existing surface level. A minimum clearance of 5.5 m would be provided beneath the grade-separated intersections with Wakehurst Parkway, Hilmer Street, and Forest Way.

Access and egress to the existing six-lane surface road configuration would be provided at either end of the slot road. A two-lane on-ramp would also be provided for southbound traffic on Wakehurst Parkway for vehicles travelling west on the slot road. Figures 4 and 5 illustrate the proposed open slot road.

Road Widening and Intersection Works

To accommodate the slot road, the existing Warringah Road corridor would be widened to the south by up to 40 m, from west of Fitzpatrick Avenue East to Allambie Road.
Figure 3: Project Location and Alignment of the Concept Plan and Stage 2 Project (Source: EIS)
Surface roads would run parallel to the slot road and provide access to adjoining roads and the NBH. Intersection upgrade works are proposed to improve the performance of intersections of Warringah Road with:

- Forest Way;
- the secondary NBH access point and Hilmer Street;
- Wakehurst Parkway; and
- Allambie Road.
Stage 2 also includes widening Wakehurst Parkway between Warringah Road and south of Aquatic Drive, to establish a new intersection of Wakehurst Parkway and Aquatic Drive. The intersection would include an auxiliary left turn lane to Aquatic Drive from Wakehurst Parkway southbound traffic and a right-turn lane for Wakehurst Parkway northbound traffic turning into Aquatic Drive.

Allambie Road between Warringah Road and Rodborough Road would also be widened to provide two lanes in each direction and a right turn lane onto Warringah Road.

Provisions for Pedestrians and Cyclists
Pedestrian and cyclist pathways and bridges are proposed to facilitate connections to both the established pathway network, and those networks to be provided as part of Stage 1. Proposed pedestrian and cyclist bridges include:

- replacing the existing pedestrian overpass across Warringah Road, approximately 45 m west of the intersection with Forest Way; and
- a new pedestrian overpass across Warringah Road at the intersection with Hilmer Street.

Indicative cross sections for both proposed Warringah Road bridge crossings are shown in Figures 6 and 7.
Public Transport Facilities
The proposal retains all but one of the existing bus stops within the project area (refer Figure 8), with adjustments to be made, where required, for road widening works. The existing bus stop on Warringah Road south of Fitzpatrick Avenue East (westbound) is to be removed due to its location in the vicinity of the slot road merge location for westbound traffic.

The provision of an extended bus bay is proposed at the southbound bus stop on Forest Way (opposite the Forestway Shopping Centre) to cater for an additional bus (two buses in total). An indented bus bay is also proposed at the existing bus stop on Wakehurst Parkway (southbound), north of Aquatic Drive.

In their Response to Submissions the Proponent made the following design refinements:
• a bus lane is proposed on the approach and departure side of the Warringah Road/Forest Way intersection (eastbound), which replaces a chevron line marked area;
• the provision of a bus lane south bound at the intersection of Warringah Road and Wakehurst Parkway, which also allows left turn for other vehicles;
• the provision of a short section of bus lane (of about 20m) in the eastbound direction at the intersection of Warringah Road and Wakehurst Parkway extending to around 70m on the departure side of the intersection;
• the provision of a bus lane (of about 20m) in the westbound direction at the intersection of Warringah Road and Wakehurst Parkway.

Retaining Walls and Noise Abatement Structures
Retaining structures with a maximum height of 8 m are proposed on either side of the slot road. Table 1 details the proposed locations and assumed dimensions of the proposed retaining walls.

Noise barriers are proposed along the rear boundaries of Panorama Crescent properties between the Sydney Water pipeline and Fitzpatrick Avenue East, along the southern verge of Warringah Road from Fitzpatrick Avenue East to Hilmer Street, and from Hilmer Street to Bantry Bay Road. Barriers of up to four metres in height may be required to effectively mitigate noise impacts on local residents and will be constructed of appropriate materials that meet structural and maintenance requirements while providing appropriate urban design principles.
Table 1: Proposed Retaining Walls

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<th>Location</th>
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<tr>
<td>Warringah Road west of the intersection with Fitzpatrick Avenue East</td>
<td>A maximum height 1 m (approx.) required along the front curtilage of up to 4 residential properties on Warringah Road, west of the intersection with Fitzpatrick Avenue East.</td>
</tr>
<tr>
<td>Warringah Road near Karingal Crescent</td>
<td>A maximum height of 4.3 m (approx.) required to minimise encroachment on private property backing on to Warringah Road from Karingal Crescent.</td>
</tr>
<tr>
<td>South-west of the intersection of Warringah Road with Wakehurst Parkway</td>
<td>A maximum height of 6 m (approx.) required to minimise encroachment on the Brick Pit Reserve, south of the intersection of Warringah Road with Wakehurst Parkway.</td>
</tr>
<tr>
<td>South-west of the intersection of Warringah Road with Wakehurst Parkway</td>
<td>A maximum height of 6.1 m (approx.) required to minimise encroachment on Duffys Forest EEC vegetation and commercial properties, south of the intersection of Warringah Road with Wakehurst Parkway.</td>
</tr>
<tr>
<td>Wakehurst Parkway</td>
<td>A maximum height of 3.9 m (approx.) required on both sides of Wakehurst Parkway, north of Aquatic Drive and 1 m facing to the road, south of Aquatic Drive. These are required to minimise encroachment on existing vegetation.</td>
</tr>
<tr>
<td>Aquatic Drive</td>
<td>A maximum height of 2 m (approx.) required to minimise encroachment on existing vegetation on either side of Aquatic Drive.</td>
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Drainage Works

A new and upgraded road drainage system is proposed to control stormwater runoff from the widened sections of road pavement. This includes new and upgraded pit and pavement drainage systems discharging into Council’s existing piped stormwater drainage system, inclusive of:

- a slot drainage design that would include the separation of groundwater inflow and surface water inclusive of capture, treatment and discharge requirements for stormwater; and
- two separate below ground detention storages, one at the intersection of Fitzpatrick Avenue East and Warringah Road, and one at the intersection of Aquatic Drive and Wakehurst Parkway.

2.2. Construction Infrastructure and Activity

Construction of Stage 2 is scheduled to commence in early 2016 and is planned for completion by mid-2018 (based on a dry weather program). All works proposed under the approved Concept Plan are planned for completion prior to the opening of the NBH in late 2018.

An estimated 180,000 cubic metres of material would be excavated to construct Stage 2, to be reused on site or transported offsite for beneficial reuse, such as quarry rehabilitation.

The approved construction compound sites for Stage 1 would also be utilised for Stage 2, and are located near the Warringah Road and Wakehurst Parkway intersection and the Allambie Road and Aquatic Drive intersection, as shown on Figure 9. The construction compounds would contain temporary buildings for personnel use, parking areas, material lay down and storage areas. The compounds will be fenced to screen them from surrounding properties.

Designated access for haulage routes will be via the existing arterial road network. Construction traffic movements for Stage 2 will predominantly be between the construction compounds and work zones. Figure 9 shows the anticipated haulage routes to be used throughout construction of Stage 2.
Figure 9: Stage 2 Construction Compound Sites and Proposed Haulage Routes (Source: EIS)
2.3. Project Need and Justification
The strategic aim of the Concept Proposal (and Stage 1 and Stage 2 projects) is to provide an efficient road network surrounding the NBH. The Concept Proposal and Stage 2 project would reinforce Warringah Road and Wakehurst Parkway as key arterial connections between the Northern Beaches, Chatswood and Sydney CBD. The Stage 2 project objectives are to:
• improve peak periods travel speeds and reliability on Warringah Road following the development of the NBH and surrounding precinct;
• improve the network performance surrounding the NBH to support the development of the precinct;
• support the activation of the NBH Precinct by facilitating access connections to the proposed hospital;
• allow for road based public transport along and across the corridor;
• maintain or improve road safety in accordance with current standards;
• minimise impacts on the environment; and
• optimise the design to provide an urban design and landscape outcome that complements the surrounding environs.

The existing road network in the vicinity of the NBH currently experiences a high level of congestion, with low average peak travel speeds, unreliable travel times and disruptions to traffic movements impacting both road users and the adjoining community. Warringah Road currently operates at or beyond capacity during peak periods and is expected to experience continued traffic growth in the future. In the evening peak period, the average travel speed is predicted to decrease by up to 50 percent (from 28 kilometres per hour (km/hr) in 2012 to 14 km/hr in 2018) and the average delay per vehicle is predicted to increase by 150 percent (from 3.5 minutes in 2012 to over 9 minutes in 2018).

The NBH is currently under construction and is set to commence operation in 2018. The hospital is identified by the NSW State Infrastructure Strategy 2012-2032 as important health infrastructure for the future of the Northern Beaches with capital investment value of approximately $600 million. The hospital is a level 5 facility providing a greater range of medical and health services and complex care, reducing the need for community members to travel outside of the Northern Beaches region. Operation of the NBH is predicted to result in an additional 900 vehicles entering the road network during PM peak periods.

Furthermore, the project is strategically justified and is consistent with the following policy documents of the NSW government:
• Warringah Road is identified by the NSW Long Term Transport Master Plan as a strategic transport corridor with the potential to be expanded as part of the strategic transport network;
• the Stage 2 works are consistent with priority actions of NSW 2021: A plan to make NSW number one (2011) including enhancing and expanding capacity on roads corridors, improving safety and reducing congestion;
• the proposal is consistent with the NSW State Infrastructure Strategy 2012-2032 and the State Infrastructure Strategy Update 2014, as it aims to address congestion on key arterial routes in the Northern Beaches and facilitate ease of access to the NBH health precinct; and
• the proposal is consistent with the ‘Priorities for Strategic Centres’ in the North Subregion as outlined in A Plan for Growing Sydney 2014 by providing road improvements to support the NBH Precinct and by improving walking and cycling connections in the precinct.

2.4. Project Development and Alternatives
During project development, RMS listed the following four alternatives to be evaluated. Each of these alternatives was evaluated against the project’s objectives and a preferred strategic alternative was determined.
'Do Minimal'
The 'Do minimal' alternative would involve the provision of basic access arrangements to the NBH including hospital entrances from Frenchs Forest Road West. Evaluation of this alternative showed that intersection performances would deteriorate, regional accessibility during peak periods would diminish and that NBH accessibility would not be facilitated. This alternative can be considered the base case.

Investment to Improve Public Transport
This alternative involved the improvement of the strategic bus corridor and provision of bus lanes within the road network without any road upgrades. In the absence of rail connections, the Department recognises the importance of bus services in the area.

The evaluation of this alternative found that improved public transport in isolation would not wholly address the objectives of the project.

Demand Management
The demand management alternative involved reducing dependence on cars as a primary form of travel by limiting parking in key destination areas and changing land use policy. RMS noted that this would require significant changes to social attitudes and travel behaviour. It was concluded that on its own, demand management would not provide relief from congestion and would not adequately facilitate access to the NBH.

The Stage 2 Project
This option involved the upgrade of the wider regional road network and improved connectivity within the NBH Precinct. Upon evaluation, it was determined that this option, when supplemented with elements of improved public transport, was the most optimal approach in meeting the project objectives. The project alternative was considered to be within the public interest, cost effective and delivered the most favourable environmental outcomes. The final option developed included:
- hospital connectivity and minor network enhancements (Stage 1); and
- network enhancement through an underpass grade separation (Stage 2).

The RMS undertook a comprehensive evaluation of Stage 2 options including a combination of overpass and underpass options at the key intersections. The preferred option was chosen based on better relative network performance and superior urban design and landscape benefits. Environmental and community impacts of the preferred option were similar to one other option.

3. STATUTORY PLANNING REQUIREMENTS

3.1. State Significant Infrastructure
Section 115U(2) of the EP&A Act provides that a SEPP may declare any development, or any class or description of development, to be SSI. Clause 1 of Schedule 3 of SEPP (State and Regional Development) 2011 identifies SSI to be an activity for which the RMS is also the determining authority and would require an EIS to be obtained under Part 5 of the Act. RMS has formed the opinion that an EIS would be required for the proposal. The project is therefore SSI under Part 5.1 of the EP&A Act. Therefore the Minister for Planning is the approval authority for the project.

Concept and Stage 1 approval was granted in June 2015. RMS is now seeking approval of the SSI application for Stage 2 consistent with the Concept and Stage 1 approval and in accordance with Section 115ZD Division 3 of the Act.

3.2. Permissibility
The proposal is characterised as development permitted without consent, in accordance with Clause 94 of SEPP (Infrastructure) 2007.
3.3. Environmental Planning Instruments
In accordance with Section 115ZF(2) of the Act, the only environmental planning instruments that apply to the proposal are SEPP (Infrastructure) 2007 (insofar as it relates to the declaration of development that does not require consent) and SEPP (State and Regional Development) 2011 (as it pertains to the declaration of infrastructure as SSI). There are no other environmental planning instruments that substantially govern the carrying out of the project.

3.4. Objects of the Act
Decisions made under the Act must have regard to the objects defined under Section 5. The Department’s consideration of the objects of the EP&A Act includes:

- how the proposal would impact on the management, development and conservation of the area, with reference to the management of traffic and transport, noise and vibration, water hydrology and quality, visual amenity and social and economic issues (refer Section 5);
- the strategic justification of the proposal in terms of the orderly and economic use and development of land, and how the proposal would affect traffic and access throughout the region and beyond (refer Section 5);
- protection of the environment by assessing the effectiveness of proposed management and mitigation measures (refer Section 5);
- the principles of ecologically sustainable development (refer Section 3.5); and
- public involvement and participation in the assessment of the proposal by placing the proposal documents on exhibition at community locations in the local area and on the Department’s website (refer Section 4).

3.5. Ecologically Sustainable Development
The Act adopts the definition of ESD found in the Protection of the Environment Administration Act 1991. Section 6(2) states that ESD requires the effective integration of economic and environmental consideration in decision-making process, and that ESD be achieved through the implementation of:

a) the precautionary principle;
b) inter-generational equity;
c) conservation of biological diversity and ecological integrity; and
d) improved valuation, pricing and incentive mechanisms.

The Department notes the project objectives developed by RMS to guide the delivery and operation of the proposal would contribute to the sustainability of the project and the meeting of ESD principles. In addition to the objectives, RMS has addressed the above principles directly in the EIS and has identified a broad range of mitigation measures to manage impacts associated with these issues.

RMS has noted the application of the precautionary principle throughout the EIS and the Department considers the assessment undertaken and the range of mitigation measures have incorporated the principle. The Department is also satisfied that inter-generational equity and conservation of biological diversity and ecological integrity has been adequately considered. The Department is also satisfied that the valuation and pricing of the environmental resources associated Stage 2 have been adequately undertaken and internalised through the proposal of RMS mitigation measures.
4. CONSULTATION

4.1. Public Exhibition
Under Section 115Z(3) of the Act, the Department is required to make the EIS publicly available for a minimum period of 30 days. The Department publicly exhibited the EIS from Wednesday 22 July 2015 to Friday 21 August 2015 (a total of 31 days). The EIS was provided on the Department’s website, and was also made available for viewing at the following exhibition locations:

- Department of Planning and Environment, Information Centre, Sydney;
- Roads and Maritime Services (Head Office), North Sydney;
- Warringah Council, Dee Why;
- Libraries in Dee Why, Belrose, Forestville and Warringah Mall; and
- Nature Conservation Council, Newtown.

The Department advertised exhibition of the EIS in the Sydney Morning Herald, the Daily Telegraph, the North Shore Times, and the Manly Daily. Written notification was also provided to the relevant government authorities, including Warringah Council (council).

4.2. Submissions
The Department received 55 submissions during the exhibition period including 8 submissions from public authorities and 47 submissions from the general public and special interest groups.

The following public authorities made submissions on the project:

- NSW Environment Protection Authority (EPA);
- NSW Office of Environment and Heritage (OEH);
- NSW Department of Primary Industries (DPI), including the Division of Water (DPI Water);
- Northern Sydney Local Health District in NSW Health (NSW Health);
- Sydney Water;
- NSW Rural Fire Services;
- Shore Regional Organisation of Councils (SHOROC); and
- Warringah Shire Council (Council)

Special interest groups that made submissions included the National Parks Association of NSW, Australian Plants Society, Friends of Narrabeen Lagoon, Garigal Landcare and Belrose Rural Community Association.

Of the 47 public submissions, 4 (9%) generally supported the proposal, 14 (29%) provided comments and 29 (62%) objected. A summary of the key issues raised in the submissions is provided in Table 2. A full copy of all submissions can be found in Appendix A.

Consideration of the public authority and public submissions is provided in Section 5 of this report.

Table 2: Key issues raised in submissions on the EIS

<table>
<thead>
<tr>
<th>Key Issue</th>
<th>Detail</th>
<th>Raised by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic and Transport</td>
<td>• changes to intersections, performance and access to local roads;</td>
<td>33 objections/comments and 4 supporting submissions from the public, and comments from:</td>
</tr>
<tr>
<td></td>
<td>• changes to the bus network and lack of dedicated bus lanes to facilitate a bus rapid transport network;</td>
<td>• Council</td>
</tr>
<tr>
<td></td>
<td>• requests for further integration of public transport and increased bus bay allocations;</td>
<td>• NSW Health</td>
</tr>
<tr>
<td></td>
<td>• cycling and pedestrian access and connectivity</td>
<td>• SHOROC</td>
</tr>
</tbody>
</table>
### Biodiversity
- Impacts of clearing for the project, including:
  - [o] further reduction in a significant wildlife corridor;
  - [o] clearing of the Duffys Forest Ecological Community; and
  - [o] loss of habitat for the Red Crowned Toadlet;
- potential for increased road kill due to wider road corridor;
- increased risk of weed infestation;
- impacts of changed hydrological regime impacting creeks downstream of the project;
- changed groundwater conditions affecting the groundwater dependent vegetation and habitat for the Red Crowned Toadlet;
- the proposed biodiversity offset should be established in the local region; and
- issues raised regarding survey and methodology adequacy.

### Ground and surface water
- groundwater management, in particular further work is required for adequate understanding, management and mitigation of potential water related impacts;
- DPI Water notes its preference for the lining of the slot road to contain groundwater unless strong justification is provided that it is in the public interest to adopt an alternate design;
- design of drainage infrastructure;
- including establishing water quality criteria for site discharge and the implementation of erosion and sediment control measures; and
- waterway health, nutrient loads and runoff due to increased impervious surfaces.

### Noise and Vibration
- impacts of construction noise on surrounding residences (particularly the implementation of measures to minimise noise generated by construction vehicles);
- height and location of noise barriers; and
- impacts of vibration during construction on surrounding structures.

### Visual Amenity
- impacts associated with loss of vegetation; and
- visual impact of the noise barriers.

### Air Quality
- off-road diesel emissions from construction vehicles and equipment; and
- control of dust generation during construction and development and implementation of a construction Air Quality Management Plan.
Key Issue | Detail | Raised by
--- | --- | ---
Social Economic and Land Use | • impacts of acquisition of local businesses and the Warringah Road medical centre; and • the strategic need and justification of the proposal was questioned. | 2 objections/comments from the public

4.3. Proponent’s Response to Submissions
The RMS provided a Response to Submissions (RtS) to the Department which was made publicly available on 25 November 2015. The RtS includes a response to all the issues raised in submissions from the general public, local government and public authorities. Comments on the RtS were received from Council, DPI Water, OEH and EPA.

5. ASSESSMENT OF KEY ISSUES

5.1. Traffic and Transport

Issue
The key traffic and transport issues associated with the proposal include the impacts of construction activities on traffic flows, changes to access arrangements for local roads and properties, potential impacts on the public transport network, and changes in pedestrian and cyclist routes.

The key potential impacts associated with the construction of Stage 2 include:

- traffic flow impacts and increased travel times (due to reduced speed limits, construction traffic movements, lane closures and traffic diversions);
- temporary changes to bus routes and access arrangements, particularly for buses operating on Warringah Road and Wakehurst Parkway;
- a reduction in available kerbside parking;
- impeded or modified access to residences, shops/businesses and The Forest High School;
- connectivity and access arrangements for pedestrians and cyclists may also be impacted due to increased distances between crossing locations, altered footpath alignments and traffic diversions; and
- cumulative impacts associated with construction Stages 1, the NBH and Mona Vale Road upgrade.

The key operational traffic and transport impacts associated with the project include network and intersection performance, changes to on-street car parking, pedestrian and cyclist infrastructure, connectivity and public transport.

Roads surrounding the NBH site (Stage 1 and Stage 2 combined) are shown in Figure 3 and summarised in Table 3, together with their existing conditions and traffic volumes as of 2013.

Submissions
Approximately 20 of the public submissions objected to the project, and a further 9 raised concerns, due to the potential impacts of changes to the road network and intersections, access to local roads, cycling and pedestrian access and connectivity, public transport and construction impacts. Approximately 70% of the public submissions related to operational design and performance of the Stage 2 works, particularly the proposed changes to Warringah Road and its intersections with Wakehurst Parkway and Forest Way. Four submissions supported the proposed road upgrades.
Table 3: Summary of major roads within the Stage 1 and Stage 2 corridor

<table>
<thead>
<tr>
<th>Road</th>
<th>Hierarchy</th>
<th>Direction through corridor</th>
<th>Reach</th>
<th>Avg. # Lanes</th>
<th>Avg. # Weekday Vehicles</th>
<th>Avg. Speed Limit through corridor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warringah Road</td>
<td>State Road</td>
<td>East-West</td>
<td>Dee Why - Chatswood</td>
<td>6</td>
<td>70 - 80,000</td>
<td>70</td>
</tr>
<tr>
<td>Wakehurst Parkway</td>
<td>State Road</td>
<td>North-South</td>
<td>North Narrabeen - Seaforth</td>
<td>2 to 4</td>
<td>20 -30,000</td>
<td>70</td>
</tr>
<tr>
<td>Forest Way</td>
<td>State Road</td>
<td>North-South</td>
<td>Terrey Hills - Frenchs Forest</td>
<td>6</td>
<td>45,000</td>
<td>70</td>
</tr>
<tr>
<td>Naree Road/ Frenchs Forest Road</td>
<td>Local/Collector Road</td>
<td>East-West</td>
<td>Forestway Shopping Centre - Skyline Shops</td>
<td>2 (undivided, on-street parking present)</td>
<td>15-20,000</td>
<td>50 (School zone also present)</td>
</tr>
<tr>
<td>Allambie Road</td>
<td>Regional/Local Road</td>
<td>North-South</td>
<td>Frenchs Forest - North Manly</td>
<td>2</td>
<td>4-20,000</td>
<td>60</td>
</tr>
</tbody>
</table>

Warringah Council raised a number of matters for consideration including intersection performance and design, road network amendments, cyclist and pedestrian connectivity, bus network impacts and design, management of traffic impacts during construction and the design and maintenance of road furniture including noise barriers and street lighting.

NSW Rural Fire Service supports the connection to and from Aquatic Drive with Wakehurst Parkway advising that it would improve vehicular access for fire-fighting vehicles and egress for residents, employees and visitors during a bush fire emergency.

The Shore Regional Organisation of Councils (SHOROC), which represents Manly, Mosman, Pittwater and Warringah Councils, supports the project and recommended the project design maximises the opportunities for public transport, cycling and pedestrian access as part of its role in supporting the future growth of the region. SHOROC also recommended construction activities be carefully managed to minimise traffic disruptions.

The Northern Sydney Local Health District in NSW Health recommended the consideration of measures to reduce the reliance on single occupancy private vehicle travel, including an extension of the proposed Bus Rapid Transport network, a T3 transit lane on Warringah Road, park and ride facilities and separated cycling and pedestrian paths.

**Department’s Consideration**

The Department has considered the potential traffic impacts of the project and sought independent expert advice from Samsa Consulting in relation to the traffic and transport assessment. The consultant’s report is located in Appendix B. The review found that the traffic and transport assessment is adequate and by implementing the recommended actions, the project’s impacts would be satisfactorily mitigated.

The key findings and recommendations from the consultant include:

- the removal of the left turn movement from Warringah Road into Fitzpatrick Avenue East could be confusing to road users without adequate signage;
- no specific mitigation measures exist to address rat running along local streets;
- some proposed road widths are less than 3.5 m which has the potential to adversely affect road safety;
- an assessment of the effect of the new shared pedestrian/cyclist bridge west of Hilmer Street on parking and traffic flow has not been undertaken;
- the assessment is unclear on certain shared path connections and bicycle signals are incorporated at intersections;
- bus travel times through the corridor are predicted to operate below the target average operating speed sought by Transport for NSW; and
- maintaining network capacity during peak periods during construction is considered an important principle.

Construction Impacts
The EIS includes an assessment which considers the traffic impacts during construction of the project on the surrounding road network and access arrangements.

The arterial road network would form the main construction traffic route, however construction traffic would also utilise local roads during the upgrading of the surrounding road network (including Allambie Road and Frenchs Forest Road) and to access lanes in particular directions where use of arterial roads is not available (refer Figure 10 and Figure 11).

Traffic flows may be disrupted by the diversions and road closures associated with Stage 2 construction (particularly on Warringah Road) and the cumulative impacts with Stage 1 and NBH construction, if not managed accordingly. The assessment notes that a reduction in lane widths and posted speed limits is unlikely to have a major impact on traffic flows, given current peak hour speeds on Warringah Road average between 25 and 41 km/hr.

To maintain the capacity of the network during peak periods, RMS proposes to schedule construction related road/lane closures during off-peak periods when traffic demands are lower (refer Figure 12 and Table 4), and only with the prior approval of the Transport for NSW Transport Management Centre. The Department and its consultant consider that this commitment is appropriate and would minimise the potential construction impacts on network performance during peak periods.
Figure 11: Construction traffic vehicle route from the site
(from Warringah Road Compound indicated in red and from Allambie Road Compound in blue)

Figure 12: Proposed lane closures
RMS proposes to commission independent road safety audits during detailed design of the project, to assess the safety performance of the road network. The audit would also recommend designs and management measures to improve the safety of the road network, including during construction.

The construction of Stage 2 would require an average of 490 heavy vehicle movements per day and 260 light vehicle movements per day. An additional 100 heavy vehicle and 130 light vehicle movements would be associated with the construction of Stage 1. The assessment concludes that the additional construction traffic volumes (for Stage 1 and Stage 2 combined) would equate to approximately 1% of the existing road network (Forest Way, Frenchs Forest Road, Warringah Road and Wakehurst Parkway). A 2.4% increase is predicted for Allambie Road (between the compound and construction sites).

However, the proportion of heavy vehicle movements on local roads is predicted to substantially increase during construction, due to the existing low proportion of heavy vehicles on the road network (refer Table 5).

### Table 5: Proportion of additional heavy vehicles from construction traffic

<table>
<thead>
<tr>
<th>Road network</th>
<th>Morning peak increase (%)</th>
<th>Inter peak increase (%)</th>
<th>Evening peak increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frenchs Forest Road</td>
<td>17.4</td>
<td>60</td>
<td>45</td>
</tr>
<tr>
<td>West</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allambie Road</td>
<td>12.8</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Whilst RMS proposes to minimise heavy vehicle activity on local roads between construction sites and site compounds, it is recommended that an updated assessment be undertaken once the preferred compound arrangements and truck routes have been confirmed. This would inform the Construction Traffic Management Plan for the project.

The assessment concludes that the increase in traffic due to construction would not significantly impact the operation of the road network. RMS also proposes to minimise traffic activity between construction sites and site compounds during peak periods.

The NBH construction is predicted to contribute less than 0.1% of the existing traffic and is therefore considered to be a minor cumulative impact. Notwithstanding, RMS proposes to consult with Health Infrastructure to coordinate scheduling of construction activities and deliveries and to facilitate construction access to the NBH construction site.

The Department also notes cumulative impacts may occur (particularly associated with additional construction traffic on Warringah Road and potential effects on travel times) with the simultaneous construction of Stage 1, Stage 2, NBH and the Mona Vale Road Upgrade.

---

Table 4: Proposed lane closures during construction

<table>
<thead>
<tr>
<th>Location</th>
<th>Closure Type</th>
<th>Days of the Week</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working司 - Frenchs Forest Road</td>
<td>Shoulder</td>
<td>Mon - Fri</td>
<td>10:00am to 3:00pm</td>
</tr>
<tr>
<td>Working司 - Frenchs Forest Road</td>
<td>Shoulder</td>
<td>Sun - Thu</td>
<td>10:00pm to 5:00am</td>
</tr>
<tr>
<td>Working司 - Frenchs Forest Road</td>
<td>Shoulder</td>
<td>Sun - Thu</td>
<td>10:00pm to 5:00am</td>
</tr>
<tr>
<td>Working司 - Frenchs Forest Road</td>
<td>Shoulder</td>
<td>Mon - Fri</td>
<td>10:00am to 3:00pm</td>
</tr>
<tr>
<td>Working司 - Frenchs Forest Road</td>
<td>Shoulder</td>
<td>Sun - Thu</td>
<td>10:00pm to 5:00am</td>
</tr>
<tr>
<td>Working司 - Frenchs Forest Road</td>
<td>Shoulder</td>
<td>Sun - Thu</td>
<td>10:00pm to 5:00am</td>
</tr>
</tbody>
</table>
The Department acknowledges that should the construction programmes between these major projects overlap, that an increased impact would likely be experienced by road users across the road network.

Access to properties in close proximity to the construction zone (particularly those adjoining the roads to be upgraded) is also to be maintained during construction, which the Department confirms in its recommendation unless alternate arrangements are agreed to by the relevant property owner.

RMS proposes to implement a range of controls and procedures to manage the potential construction-related traffic impacts. These measures would be described in a Construction Traffic and Access Management Plan (CTAMP) for the project to be prepared in consultation with key stakeholders. The CTAMP would include:

- Traffic Control Plans showing the access arrangements and the detail of required signs and devices;
- Pedestrian and cyclist management plans;
- Consultation strategy for access requirements to adjacent properties including The Forest High School and Frenchs Forest Public School;
- Hours of operation, including prohibitions on queuing outside sites prior to commencement of work;
- Road safety audit requirements; and
- Any localised improvements/adjustments to existing traffic management arrangements.

The Department is satisfied that the RMS’s commitment to maintain peak network capacity, in combination with the preparation and implementation of the CTAMP and road safety audits (which has been reinforced through the Department’s recommended conditions), coupled with a Community Communication Strategy, would adequately manage traffic impacts associated with construction and inform the public and key stakeholders of required road closures and changes to public transport arrangements.

**Operation**

The key design objectives of the project relate to network performance, to address the existing and forecast traffic congestion by increasing road capacity and efficiency, while also facilitating access to the NBH.

**Network Performance**

The EIS predicts the changes in traffic network performance due to the Stage 2 project including an analysis of intersection performance, a key safety indicator for road users. The network performance modelling undertaken by the RMS also considers the proportion of vehicles that are unable to enter the network from feeder roads during peak periods, or ‘unreleased demand,’ which leads to congestion in the surrounding roads.

The modelling undertaken for the project considered three scenarios for the morning and evening peak periods for the years 2018 and 2028, and compared these predictions with the 2012 base case. The three scenarios are:

- Do Minimal - the minimum level of additional infrastructure to cater for access to the NBH including hospital entrances from Frenchs Forest Road West. The Department notes the construction of Stage 1 road upgrades is currently underway, however comparisons with the Do Minimal scenario are still relevant for the overall network;
- Stage 1 – all works associated with the Stage 1 project approval (i.e. without Stage 2 upgrades); and
- Project Case – all works associated with both the Stage 1 and Stage 2 projects (i.e. the works subject of this assessment).

The ‘Do Minimal’ scenarios provide a predicted increase in traffic against the 2012 year and of what relative background traffic levels would be without the construction of the NBH.
roadworks projects. A summary of key modelling results for the three scenarios is shown in Table 6 and Table 7.

Table 6: Modelled network performance measures for 2018 during AM and PM Peaks

<table>
<thead>
<tr>
<th>Network Performance</th>
<th>2012</th>
<th>2018</th>
<th>2018</th>
<th>2018</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
</tr>
<tr>
<td>Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Traffic Demand (vehicles)</td>
<td>38,734</td>
<td>45,094</td>
<td>43,252</td>
<td>49,995</td>
<td>43,283</td>
</tr>
<tr>
<td>Unreleased demand (proportion of total (%))</td>
<td>672 (2%)</td>
<td>973 (2%)</td>
<td>5,971 (14%)</td>
<td>6,002 (12%)</td>
<td>4,068 (9%)</td>
</tr>
<tr>
<td>Average speed (km/h)</td>
<td>21.9</td>
<td>28.4</td>
<td>17.1</td>
<td>20.0</td>
<td>21.6</td>
</tr>
<tr>
<td>Average Delay (sec)</td>
<td>320</td>
<td>210</td>
<td>449</td>
<td>360</td>
<td>327</td>
</tr>
</tbody>
</table>

*vehicles unable to enter the main road network from side streets

Table 7: Modelled network performance measures for 2028 during AM and PM Peaks

<table>
<thead>
<tr>
<th>Network Performance</th>
<th>2012</th>
<th>2028</th>
<th>2028</th>
<th>2028</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
</tr>
<tr>
<td>Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Traffic Demand (vehicles)</td>
<td>38,734</td>
<td>45,094</td>
<td>45,346</td>
<td>52,025</td>
<td>44,952</td>
</tr>
<tr>
<td>Unreleased demand* (proportion of total (%))</td>
<td>672 (2%)</td>
<td>973 (2%)</td>
<td>4,753 (10%)</td>
<td>8,871 (17%)</td>
<td>2,881 (6%)</td>
</tr>
<tr>
<td>Average speed (km/h)</td>
<td>21.9</td>
<td>28.4</td>
<td>15.4</td>
<td>16.9</td>
<td>20.4</td>
</tr>
<tr>
<td>Average Delay (sec)</td>
<td>320</td>
<td>210</td>
<td>503</td>
<td>468</td>
<td>349</td>
</tr>
</tbody>
</table>

*vehicles unable to enter the main road network from side streets

Under the ‘Do Minimal’ scenario, congestion in the surrounding network is predicted to worsen compared with the 2012 conditions. During the 2018 modelled year it is predicted to increase from 2% to 14% of vehicles in the morning peak and from 2% to 12% of vehicles in the evening peak. During the 2028 modelled year it is predicted to increase from 2% to 10% of vehicles in the morning peak and from 2% to 17% of vehicles in the evening peak.

The modelling predicts the Stage 1 project would improve this situation compared with the ‘Do Minimal’ scenario and this would further improve due to the Stage 2 project, for the 2018 and 2028 modelled years. While the congestion levels are slightly higher than the 2012 scenario, they represent a marked improvement over the predicted levels due to traffic growth without the Stage 1 and Stage 2 upgrades (i.e. the Do Minimal scenario).

During the morning and evening peak periods for both the 2018 and 2028 years, the assessment predicts the Stage 2 project would reduce average delays compared with the ‘Do Minimal’ and Stage 1 only scenarios. Similarly, the average speeds in the ‘Do Minimal’ scenario are predicted to worsen compared with 2012, with the Stage 1 and the Stage 2 projects both modelled to improve the average speeds.

Therefore the assessment concludes that the Stage 2 project would generally improve the performance of the traffic network around the NBH and along the key arterial roads.

The Department’s consultant found that the indicative predictions and outcomes for network performance are acceptable and achievable, and that traffic generated by the operation of the NBH has been adequately modelled as part of the proposed infrastructure upgrades within Stage 1 and Stage 2.
RMS proposes to review the performance of the network during operation including the traffic/intersection performance of Stage 2, and determine any additional necessary mitigation measures to manage residual impacts, to be described in an Operational Traffic Performance Review (OTPR). The peer review recommended monitoring of both Stage 1 and Stage 2 road performance in relation to hospital traffic generation.

The Department considers that the recommended monitoring would address discrepancies or errors in the model. Should it be found that the road upgrades are not adequately managing traffic generation then additional measures would need to be implemented to improve efficiency in consultation with Health Infrastructure and Warringah Council. Consequently the Department has recommended the OTPR be prepared in consultation with the Transport Management Centre, Health Infrastructure and Council.

The Department also notes the concerns raised with respect to ‘rat-running’ through local roads. Whilst the Department considers the performance of local roads to be the responsibility of local councils, the Department considers congestion relief, coupled with the operational benefits of Stage 2 (and reduction in unreleased demand), would allow for more opportune access and egress to the network from local roads and reduce the impetus for motorists to ‘rat run.’ Notwithstanding, the Department has considered Council and the community’s concerns regarding ‘rat running’ and has recommended that the RMS be required to specifically address the issue within the OTPR. This review would require the RMS to monitor local streets that are likely to exhibit increases in traffic and rat-running and mitigate appropriately in consultation with Council.

The Department considers the proposal is critical to accommodate expected growth in the area as a result of the NBH and improve the flow of commuters and goods and services in the region. The Department considers that based on the results of the modelling (and in particular the predicted improvements to intersection LoS and average speeds) the works associated with the Stage 2 design would provide improved traffic conditions, and would build upon improvements resulting from Stage 1.

Intersection Performance

The traffic assessment modelled the performance of intersections to be used by project vehicles in terms of the Level of Service (LoS), which is based on the average delay per vehicle, and ranges from LoS A “very good” to LoS F “unsatisfactory”, and compares the performance of the key intersections within the Stage 1 and Stage 2 corridor (refer Table 8).

Four of the eleven intersections in the study area currently operate with an unsatisfactory LoS F during the AM and/or PM peak periods. With the construction of an additional two intersections due the NBH and the project, the assessment predicts eleven of thirteen intersections would operate with a LoS F during the 2018 and 2028 ‘Do Minimal’ scenarios.

Under the 2018 project case scenario, six intersections in the study area would operate with a LoS F during the AM and/or PM peak periods, which reduces to four under the 2028 project case scenario. This demonstrates a noticeable improvement over the ‘Do Minimal’ scenario for the equivalent years (which would result in 11 intersections operating with a LoS F), and an improvement over the 2012 conditions at three intersections to a satisfactory level (LoS A-D), including the Warringah Road/Wakehurst Parkway, Warringah Road/Forest Way intersections.

The peer review (and submissions from the community and Warringah Council) noted that the proposed restriction of the left-turn movement from Warringah Road into Fitzpatrick Avenue may potentially be problematic for westbound vehicles. The RMS advises that better access of vehicles into Hilmer Street via improved intersections and turning lanes would provide a safer alternative for access into Fitzpatrick Avenue East. The Department notes
that the recommended road safety audit would further assess the safety performance of the intersection and recommend management measures to improve the safety if required.

Table 8: Summary of Intersection Performance during the AM and PM Peak Period

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2012 Base Year</th>
<th>2018 Do Minimal</th>
<th>2018 Project Case</th>
<th>2028 Do Minimal</th>
<th>2028 Project Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warringah Road/ Forest Way</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>A-D</td>
</tr>
<tr>
<td>Warringah Road/ Hilmer Street</td>
<td>A-D</td>
<td>F</td>
<td>A-D</td>
<td>F</td>
<td>A-D</td>
</tr>
<tr>
<td>Warringah Road/ Wakehurst Parkway</td>
<td>F</td>
<td>F</td>
<td>E</td>
<td>F</td>
<td>A-D</td>
</tr>
<tr>
<td>Warringah Road/ Allambie Road</td>
<td>E</td>
<td>F</td>
<td>E</td>
<td>F</td>
<td>E</td>
</tr>
<tr>
<td>Warringah Road/ Ellis Road/ Government Road</td>
<td>A-D</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Forest Way/ Adams Street</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Forest Way/ Naree Road</td>
<td>A-D</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Frenchs Forest Road West/ Rabbett Street</td>
<td>E</td>
<td>F</td>
<td>A-D</td>
<td>F</td>
<td>A-D</td>
</tr>
<tr>
<td>Frenchs Forest Road West/ Hospital Entrance/ Glenys Avenue</td>
<td>NA 2</td>
<td>A-D</td>
<td>A-D</td>
<td>E</td>
<td>A-D</td>
</tr>
<tr>
<td>Frenchs Forest Road/ Wakehurst Parkway</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Frenchs Forest Road East/ Romford Road</td>
<td>A-D</td>
<td>F</td>
<td>A-D</td>
<td>F</td>
<td>E</td>
</tr>
<tr>
<td>Frenchs Forest Road East/ Patanga Road/ Allambie Road</td>
<td>A-D</td>
<td>A-D</td>
<td>A-D</td>
<td>A-D</td>
<td>A-D</td>
</tr>
<tr>
<td>Allambie Road / Aquatic Drive</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
</tbody>
</table>

Note1: Warringah Road/ Forest Way Intersection predicted to operate at LOS F under system-wide network performance for the base condition and Stage 1 project scenarios.

On-street Car Parking

On-street parking is not permitted along Warringah Road or Wakehurst Parkway within the study area. The widening of Warringah Road would remove up to 38 on-street spaces on Bantry Bay Road, Hilmer Street and Fitzpatrick Avenue East.

The majority of these spaces (24) are on Bantry Bay Road, which primarily service the Bantry Bay shops which would be acquired as part of the project and no longer generate the demand for parking.

Eight spaces would be removed on Hilmer Street, which primarily serve the adjoining properties. Six spaces would be removed on Fitzpatrick Avenue East to accommodate the shared path and slot portal, with the assessment stating that car-parking demand here appears to be low and any shortfall could be accommodated further down Fitzpatrick Avenue East.

The operation of the Stage 2 road upgrades would not impact parking availability for the Forest High School or Frenchs Forest Public School, which was assessed as part of the Stage 1 project.

Whilst any loss of parking in these areas may be adequately absorbed in the surrounding streets, additional people may also park in this vicinity to access the new pedestrian bridge to the NBH. Given the impacts of this on the availability of on-street parking are unknown until the NBH is operational, the Department has recommended this potential impact should be reviewed as part of the OTPR. This is to be undertaken within six months of commencement of operation of Stage 2 (inclusive of the Stage 1 and Stage 2 project areas), and again during operation of the NBH.
Pedestrian and Cyclist Safety and Connectivity
The assessment found that existing pedestrian infrastructure in the area is adequate to meet current demand but is of poor quality and does not promote pedestrian activity.

A number of new and shared footpaths are proposed as part of Stage 2 that would be linked into the Stage 1 improvements, such as:
- shared paths (pedestrian/cyclist) between Fitzpatrick Avenue East and Allambie Road, parts of Wakehurst Parkway, Allambie Road and Forest Way;
- replacing the existing pedestrian Bridge across Warringah Road (west of Forest Way) with a new pedestrian/cycle bridge; and
- a new pedestrian/cycle bridge across Warringah Road approximately 100 m west of Hilmer Street.

Pedestrian and cyclist connectivity is expected to improve as a result of these measures, particularly for residents south of Warringah Road accessing the Forestway shopping centre, Forest Way High School, Frenchs Forest Public School and NBH.

The Department acknowledges the concerns raised in public submissions and by Warringah Council, in regards to pedestrian and cyclist connectivity and the requests for improved consideration of cyclists.

In this respect the Department notes that the pedestrian and cyclist infrastructure proposed within Stage 1 and Stage 2 would provide a network of shared paths along the majority of the road corridors. In particular the Stage 2 works would provide for a shared path on the majority of Warringah Road (both sides) as well as the provision of a new pedestrian/cycle bridge across Warringah Road (west of Hilmer Street) and the replacement of the existing pedestrian bridge across Warringah Road (west of Forest Way). The Stage 2 works would also increase the quality of the signalised intersections with the provision of bicycle lanterns, which would provide suitable signalised crossings for pedestrian and cyclists.

The Department considers the replacement of the existing footbridge and the addition of a new footbridge to be appropriate, and that connectivity is expected to improve, particularly for residents south of Warringah Road wishing to access the Forestway shopping centre, Forest Way High School, Frenchs Forest Public School and NBH.

Nevertheless, the Department has recommended that all signalised crossings and intersections within Stage 2, be monitored for performance and accessibility in accordance with the recommended OTPR. This includes the connectivity of pedestrian and cycle facilities at the project area fringes with other proposed non-project facilities. Where the monitoring results demonstrate a need for further changes, such as signalling changes or physical changes, steps are to be taken to improve and rectify pedestrian safety and connectivity at these locations.

Public Transport
Buses provide the only source of public transport within the study area. Approximately 17 bus routes utilise all or part of the roads subject of the Stage 2 works. Existing bus priority measures within Stage 2 include dedicated bus lanes at the intersections with Forest Way and Wakehurst Parkway.

Transport for NSW is currently reviewing the bus network that services the wider Northern Beaches area, including the Northern Beaches Bus Rapid Transit project (BRT). The delivery of the BRT does not form part of the Stage 2 project.

The reduced congestion and traffic flow benefits to the road network due to the Stage 1 and Stage 2 works, as noted previously, would also occur for the bus network, which is likely to result in increased average bus speeds throughout the network.
Key design measures of the project relating to the bus network include:

- removing the westbound bus stop south of the intersection of Fitzpatrick Ave East and Warringah Road, the provision of an extended bus bay to cater for two buses at the southbound bus stop on Forest Way and the provision of an indented bus bay at the existing bus stop on Wakehurst Parkway (southbound) north of Aquatic Drive;
- the provision of a bus lane on the approach and departure side of the Warringah Road/Forest Way intersection (eastbound), which replaces a chevron line marked area;
- the provision of a bus lane southbound at the intersection of Warringah Road and Wakehurst Parkway, which also allows left turn for other vehicles;
- the provision of a short section of bus lane (of about 20 m) in the eastbound direction at the intersection of Warringah Road and Wakehurst Parkway extending to around 70m on the departure side of the intersection; and
- the provision of a bus lane (of about 20 m) in the westbound direction at the intersection of Warringah Road and Wakehurst Parkway.

The Department considers the proposed improvements to the road network in combination with the addition of bus priority measures (such as bus lanes, indented or extended bus bays) would have a positive impact on public transport in the study area. Average speeds for buses heading both westbound and eastbound along Warringah Road are predicted to improve when compared to the ‘Do Minimal’ scenario.

The Department further notes the removal of the bus stop south of the intersection of Fitzpatrick Ave East and Warringah Road would result in residents who utilise this bus stop having to walk further south towards Maxwell Parade. The Department acknowledges this section of road is a merge point of the surface road travel lanes from Warringah Road and those exiting out of Forest Way and the slot road. Retaining the bus stop is considered to have safety impacts, and so its removal is considered acceptable.

To monitor the effectiveness of these measures during Stage 2, the Department has recommended that bus performance including average travel speeds for buses through the project area be monitored as part of the OTPR.

**Conclusion and Key Recommendations**

The Department notes the consequences for the local and regional road networks within the ‘Do Minimal’ scenario where only basic access arrangements to the NBH are provided. In this scenario, network and intersection performance has been shown to deteriorate, demonstrating a need for more substantial upgrade works.

By comparison, the Department acknowledges the overall benefits associated when both Stage 1 and Stage 2 becomes operational. The Stage 1 and Stage 2 works would facilitate safe and efficient access to the NBH.

The Department is satisfied that the pedestrian and cyclist environment would be improved in comparison to the existing environment. Connectivity and safety would be enhanced and would result in the increased attractiveness of active transport. The provision of local bus priority measures would also improve average bus speeds through in the area.

The Department recognises that traffic and transport impacts during construction would be considerable, yet is satisfied that the commitments and mitigation measures proposed, would ensure that impacts are adequately managed. The implementation of a CTAMP, prepared in consultation with Council, The Forest High School Working Group, Health Infrastructure and other key stakeholders, would also make provision for adequate mitigation.

Overall, the Department is satisfied that the Stage 2 works would relieve congestion on the regional and local road network and facilitate the required access to the NBH. The
Department considers the traffic and transport impacts are reasonable subject to the mitigation measures proposed and the following requirements stipulated in the recommended conditions of approval:

- implementation of a CTAMP in consultation with key stakeholders, to detail controls and procedures to be utilised in minimising traffic impacts during construction;
- requirements to undertake design and road safety audits;
- undertaking an OTPR, six months after Stage 2 operation or commencement of NBH operations; and
- property access to be maintained during construction and operation.

5.2. Noise and Vibration

Issue
The key elements of the project with the potential to have noise and vibration impacts on surrounding receivers include:

- enabling work activities such as vegetation clearing, demolition and retaining walls;
- construction along Warringah Road, including the main corridor works, eastbound resurfacing, construction of new westbound lanes and the slot;
- construction of new road connections and pedestrian/cyclist bridges;
- once constructed, the operation of the roads has the potential to cause noise impacts on surrounding receivers, including potentially higher noise traffic due to the proximity of westbound lanes to residences compared with existing conditions; and
- cumulative impacts of the Northern Beaches Hospital and Stage 1 construction.

Proposed Mitigation
RMS proposes a range of mitigation measures to manage construction noise including the use of temporary acoustic barriers and screens and avoiding the simultaneous use of noisy plant and equipment where possible.

RMS also proposes to install noise barriers along the southern side of Warringah Road to manage noise during operation of the road, and would prioritise the installation of these as soon as possible to assist in mitigating construction noise on the residences along this section. RMS also proposes to consult with surrounding residents during construction and use respite periods or similar mitigation, including during examination periods at the schools and undertaking noisy activities outside of school hours.

Construction activities would be generally undertaken during the standard hours of 7am to 6pm Monday to Friday and 8am to 1pm on Saturdays. However, a number of construction activities would be required outside of the standard hours. The key reasons for these activities would be to minimise unacceptable traffic disruptions to the road network, disturbance to surrounding businesses and commercial properties through disruptions to local traffic flows, and safety risks of construction workers, motorists and the general public.

RMS proposes to schedule the noisier activities during standard daytime construction hours where reasonable and feasible. Proposed out of hours works include the main corridor work, slot construction, intersection work, new road connections, pedestrian/cyclist bridges, Warringah Road resurfacing work and minor works at site compounds. A summary of the proposed out of hours works and their justification is provided in Table 9.

The proposed mitigation measures would be further developed during detailed design and their implementation would be described in a Construction Noise and Vibration Management Plan (CNVMP) for the project.
Table 9: Out of hours work activities and justification

<table>
<thead>
<tr>
<th>Activity</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of tie-ins and temporary diversions and traffic switches</td>
<td>To minimise traffic disruption and conflict between construction personnel and traffic</td>
</tr>
<tr>
<td>Delivery of large components</td>
<td></td>
</tr>
<tr>
<td>Erection of slot cover planks and deck units</td>
<td></td>
</tr>
<tr>
<td>Erection of shared pedestrian/cyclist bridges</td>
<td></td>
</tr>
<tr>
<td>Pavement work, temporary medians and line-marking</td>
<td></td>
</tr>
<tr>
<td>Project support and site compound operation</td>
<td>Required to support out of hours works</td>
</tr>
<tr>
<td>Refueling and maintenance</td>
<td>To maximise plant and machinery operations during standard hours</td>
</tr>
</tbody>
</table>

The existing ambient noise environment is variable, with road noise being the primary contributor. Surrounding sensitive receivers include residential, educational, hotels, places of worship, childcare centres and commercial.

To quantify the existing ambient noise environment across the project area, the RMS carried out baseline noise surveys in December 2013, June 2014 and October/November 2014. Noise monitoring was undertaken at sixteen locations across the project area.

The baseline noise surveys assisted in the determination of Rating Background Levels (RBLs) for the ICNG daytime, evening and night-time periods across the project area. The RBLs are summarised in Table 10 and have been used as a basis for setting construction Noise Management Levels (NMLs). Noise levels during the night-time period (10:00 pm to 7 am) were determined to be lower than the daytime period (7 am to 10 pm), which is consistent with similar noise environments. The day time levels range from 44 dBA to 61 dBA across the noise catchment areas with the night time levels ranging from 29 dBA to 36 dBA.

Table 10: Locations and Results of Background Noise Surveys

<table>
<thead>
<tr>
<th>Noise Monitoring ID and Location</th>
<th>ICNG Time Periods</th>
<th>RNP Time Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime RBL (dBA)</td>
<td>Evening RBL (dBA)</td>
</tr>
<tr>
<td>NM1 – 605 Warringah Road</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>NM2 – 43 Forest Way</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>NM3 – 5 Naree Way</td>
<td>44</td>
<td>40</td>
</tr>
<tr>
<td>NM4 – 17 Forest Way</td>
<td>55</td>
<td>51</td>
</tr>
<tr>
<td>NM5 – 36 Holland Crescent</td>
<td>52</td>
<td>47</td>
</tr>
<tr>
<td>NM6 – 46 Epping Drive</td>
<td>48</td>
<td>46</td>
</tr>
<tr>
<td>NM7 – 126 Frenchs Forest Road</td>
<td>48</td>
<td>41</td>
</tr>
<tr>
<td>NM8 – 7 Bantry Bay Road</td>
<td>51</td>
<td>45</td>
</tr>
<tr>
<td>NM9 – East of 63 Bantry Bay Road</td>
<td>53</td>
<td>48</td>
</tr>
<tr>
<td>NM10 – Opposite 92 Bantry Bay Road</td>
<td>49</td>
<td>43</td>
</tr>
<tr>
<td>NM11 – 26 Frenchs Forest Road</td>
<td>50</td>
<td>42</td>
</tr>
<tr>
<td>NM12 – 266 Warringah Road</td>
<td>53</td>
<td>46</td>
</tr>
<tr>
<td>NM13 – The Forest High School</td>
<td>48</td>
<td>45</td>
</tr>
<tr>
<td>NM14 – North of 34 Karingal Crescent</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td>NM15 – Brick Pit Reserve</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>NM16 – Frenchs Forest Public School</td>
<td>50</td>
<td>46</td>
</tr>
</tbody>
</table>

* ICNG Governing Periods – Day: 7:00am to 6:00pm Monday to Saturday, 8:00am to 6:00pm Sunday; Evening: 6:00pm to 10:00pm; Night: 10:00pm to 7:00am Monday to Saturday, 10:00pm to 8:00am Sunday.
* RNP Assessment Time Periods – Day: 7:00am to 10:00pm; Night: 10:00pm to 7:00am.

The noise assessment divided the project area into 19 Noise Catchment Areas (NCAs), based on similar land uses. The individual NCAs are depicted in Figure 13.
Figure 13: Noise Catchment Areas
Submissions
Three public submissions raised concerns with impacts of noise and vibration on surrounding residences, including a group submission from the residents of Karingal Crescent. Two submissions raised construction noise as an issue, one of which also raised concerns with potential vibration impacts.

The EPA advised that community concerns may arise from noise impacts associated with the early arrival and idling of construction vehicles at the development site, and in the area surrounding the site, and recommends that construction vehicles must not arrive at the project site or in surrounding areas outside the approved construction hours.

The EPA also recommended the RMS undertake a safety risk assessment of construction activities to determine whether it is practicable to use audible movement alarms of a type that would minimise the noise impact on surrounding noise sensitive receivers, without compromising safety.

Warringah Council notes that existing dwellings in the Bantry Bay Road sub precinct, that back onto the road reserve, would be able to have first floor dwellings that are greater in height than the proposed noise barriers and the Codes SEPP does not make any provision for certifiers to impose construction conditions to address noise (e.g. double glazing). Council also supports the use of noise barriers that are designed to a high level of quality and appearance.

Department’s Consideration
The EIS includes a noise impact assessment in accordance with the NSW Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009) (ICNG) and NSW Road Noise Policy (RNP). Potential vibration impacts were assessed in accordance with the ICNG, Assessing Vibration: A Technical Guide (AVATG), and German Standard DIN 4150-Part 3 – Effects on structures.

The RMS established construction NMLs for residential receivers within each NCA (five of which do not contain residential receivers), as well as determining the sleep disturbance criteria for the Stage 2 construction works. These NMLs are outlined in Table 11.

Table 11: Noise Management Levels for Stage 2 Construction Works - Residential Receivers

<table>
<thead>
<tr>
<th>NCA No.</th>
<th>Standard Construction Hours (RBL +10dBA)</th>
<th>Out of Hours (RBL +5dBA)</th>
<th>Sleep Disturbance Criteria (RBL + 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Daytime</td>
<td>Evening</td>
<td>Night-time</td>
</tr>
<tr>
<td>NCA01</td>
<td>67</td>
<td>62</td>
<td>59</td>
</tr>
<tr>
<td>NCA02</td>
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<tr>
<td>NCA04</td>
<td>67</td>
<td>62</td>
<td>57</td>
</tr>
<tr>
<td>NCA05</td>
<td>54</td>
<td>49</td>
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</tr>
<tr>
<td>NCA06</td>
<td>54</td>
<td>49</td>
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<td>NCA08</td>
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<td>NCA09</td>
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<td>NCA12</td>
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<td>NCA18</td>
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<tr>
<td>NCA19</td>
<td>61</td>
<td>56</td>
<td>49</td>
</tr>
</tbody>
</table>

* Omitted NCAs 03, 10, 11, 15 and 16 do not contain any residential receivers
Construction Noise
The noise assessment predicts exceedances of the NMLs of up to 37 dB during standard construction hours at the nearest receivers, due to enabling works including vegetation clearing and retaining wall works, and up to 36 dB during slot construction.

Receivers that are subjected to construction noise levels in excess of 75 dBA (during standard hours) are considered to be ‘highly noise-affected’ and is representative of the point at which there may be strong community reaction to noise emissions. Table 12 outlines the number of residential receivers within each NCA predicted to be highly noise-affected during Stage 2 construction works.

Table 12: Highly Noise Affected Residential Receivers - Stage 2 Construction Works

<table>
<thead>
<tr>
<th>Construction Scenario</th>
<th>NCA 02</th>
<th>NCA 06</th>
<th>NCA 07</th>
<th>NCA 01</th>
<th>NCA 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Corridor Works</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Vegetation Clearing</td>
<td>9</td>
<td>16</td>
<td>0</td>
<td>59</td>
<td>7</td>
</tr>
<tr>
<td>Demolition Works</td>
<td>4</td>
<td>10</td>
<td>0</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Retaining Wall Works</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Slot Construction</td>
<td>18</td>
<td>13</td>
<td>2</td>
<td>49</td>
<td>14</td>
</tr>
<tr>
<td>Intersection Works</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>New Road Connections</td>
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<td>4</td>
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<tr>
<td>Pedestrian/Cyclist Bridges</td>
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<td>0</td>
<td>15</td>
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<tr>
<td>Warringah Road Resurfacing Works</td>
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<tr>
<td>Site Compounds</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

For the Forest High School, the greatest noise impact is predicted to occur during construction of the slot, with the main corridor work and vegetation clearing also providing noisy periods. Existing noise levels at the undercover areas are approximately 73-76 dBA (up to a maximum of 98 dBA), consistent with the worst case construction noise predictions for the area of up to 77 dBA. For the undercover assembly area, worst case construction noise levels of up to 71 dBA are predicted and therefore the noise levels are not predicted to alter significantly as a result of the Stage 2 Project.

For the Frenchs Forest Primary School, the greatest noise impact is predicted to occur during construction of the slot, with vegetation clearing and construction of the retaining wall, underpass and Forest Way pedestrian bridge also providing noise periods. Existing noise levels in the main play area are approximately 55-60 dBA (up to a maximum of 91 dBA). The worst case construction noise prediction for the main play area is 48 dBA to 69 dBA during construction of the slot and so the noise levels are not predicted to alter significantly as a result of the Stage 2 Project.

Out of Hours Work
Modelling of the proposed out of hours works predicts the worst-case noise would occur during the construction of the slot, with exceedances of up to 54 dB at the nearest residential receivers immediately adjacent to the works, 23 dB at commercial receivers and 36 dB at other sensitive receivers. Table 13 summarises the receivers with exceedances of the NML during out of hours works (2,827 receivers in total).

As noted above, a large number of sensitive receivers would be subject to construction noise levels well above the noise management levels for the project, with the RMS further advising that around 20% of the upcoming works program for Stage 2 would need to be conducted out-of-hours.
Table 13: Number of receivers with exceedance of NML during Out of Hours Works

<table>
<thead>
<tr>
<th>ICNG Period</th>
<th>Number of Receivers per NCA with a Predicted Exceedance of NMLs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01</td>
</tr>
<tr>
<td>Daytime</td>
<td></td>
</tr>
<tr>
<td>OOHW</td>
<td>37</td>
</tr>
<tr>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td>OOHW</td>
<td>53</td>
</tr>
<tr>
<td>Nighttime</td>
<td></td>
</tr>
<tr>
<td>OOHW</td>
<td>69</td>
</tr>
</tbody>
</table>

The Department accepts that out-of-hours work is required for technical, operational or safety reasons and that such work is justified.

The Department also recognises that there would be circumstances where flexibility in working hours is warranted. Consequently, similar to the approach for Stage 1, it has recommended a condition of approval which details a process for works outside of the standard construction hours (to be detailed within the recommended out of hours work protocol).

The Environment Protection Licence (EPL) issued for the Stage 1 Project limits night work to 4 nights (and up to 3 consecutive nights) per week in any Noise Catchment Area. The RMS proposes to seek a variation of the Stage 1 EPL to accommodate the out of hours works required for the Stage 2 Project and to abide by the same restrictions.

The Department acknowledges sensitive receivers close to the works are likely to experience high construction noise impacts. Although construction noise levels would exceed the noise management levels recommended in the ICNG, the Department recognises that these levels should be considered as triggers for the implementation of feasible and reasonable mitigation measures rather than strict criteria for compliance. Accordingly, the Department has recommended a condition of approval requiring the RMS to construct the project with the aim of achieving the recommended noise management levels and implement mitigation measures to reduce noise impacts.

This approach is consistent with other major road projects in urban areas where NMLs cannot be achieved. The Department also notes that the noise levels are conservative and assume a range of high-noise generating activities occurring simultaneously in close proximity to sensitive receivers. Therefore, it is unlikely that the maximum noise generating activity would be experienced at any single sensitive receiver for the entire duration of the project, as the majority of construction works would progressively move along Warringah Road. However, it is acknowledged that there would be residual impacts but that these impacts are unavoidable due to the close proximity of sensitive receivers to the proposed works.

The Department also considers that the most appropriate tool for managing construction noise impacts would be through the CNVMP which details the proposed mitigation measures, the monitoring of noise and the implementation of a complaints handling procedure which includes measures for responding to construction noise complaints, and has recommended a condition to this effect.

**Construction Traffic Noise**

The majority of project construction traffic, including the heavy vehicles, would travel between the site compounds and primary roads such as Warringah Road, Wakehurst Parkway and Allambie Road. The assessment estimates that compliance with the recommended traffic noise goal of a 2 dBA increase in construction traffic noise levels would
be achieved during day-time working hours. During night-time works, construction traffic is predicted to exceed the recommended traffic noise goal at Frenchs Forest West and Naree Road.

The assessment concludes that given the predictions are based on estimated volumes (and is conservative assuming all construction traffic will utilise the roads), additional assessment for night-time truck movements is proposed to be undertaken during detailed design during the preparation of the traffic management plan to be presented in the CNVMP.

**Construction Vibration**

Construction vibration can generate impacts on human comfort and the structural integrity of adjacent buildings. The Department is satisfied that the RMS has sufficiently identified the vibration generating activities that are likely to cause discomfort to the surrounding community and/or structural damage. The extent of these impacts depends on the proximity of receivers, the type of construction equipment, structural characteristics of the building and local geology.

The assessment notes that the separation distance between the proposed works and nearest receivers would generally be sufficient to ensure nearby buildings are unlikely to experience cosmetic damage from most of the construction equipment. However, there would be instances where the operation of construction equipment occurs within recommended safe working distances.

Certain equipment (such as rollers, pile drivers, large hydraulic hammers and jackhammers) may be operated within the recommended safe working distances for cosmetic damage and human comfort. Particularly within NCAs 3-6, 10, 12, 16-19 during the construction of pavements, retaining walls, excavation work, footpaths and kerb and gutter work may cause vibration impacts for short periods which the RMS further advises could be up to 3 months during road formation works for the slot construction.

The required locations of vibration intensive equipment would be reviewed during detailed design, and attended monitoring is proposed to ensure that levels remain below the applicable criterion. Dilapidation surveys are also proposed to be undertaken on any potentially affected buildings. This approach is consistent with the construction of other road infrastructure and the Department has reinforced these commitments through the recommended environmental management framework, CNVMP and vibration goal criteria.

The Department is satisfied that the RMS’s proposed mitigation measures in conjunction with the recommended conditions of approval would minimise the vibration impacts generated by the proposed construction works, and that appropriate mechanisms are in place to confirm and re-evaluate the need for any further mitigation.

**Operational Noise**

The noise assessment includes noise modelling of both the project ('build') and general background traffic growth ('no build') scenarios for the combined Stage 1 and Stage 2 projects, for the opening year (2018) and ten years after opening (2028).

The assessment concludes that once operational, fewer receivers would experience noise levels above the RNP criteria due to the project, compared with not undertaking the project. Minor decreases in traffic noise levels are predicted during the daytime at the majority of receivers, and a less than 1 dBA increase in noise levels during the night-time (refer Figure 14).

Where existing noise levels are above the noise assessment criteria, the RNP’s primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. The second objective is to protect against excessive decreases in amenity as the result of a project.
In considering reasonable and feasible noise mitigation measures to impacted receivers, the RNP lists the following measures for consideration (in order of priority) should the project result in predicted exceedances of the base criteria:

1. road design and traffic management;
2. quieter pavement surfaces;
3. in-corridor noise barriers/mounds; and/or
4. at-property treatments or localised barriers/mounds.

The noise assessment notes that the proposed road design for Stage 2 includes a subsurface slot road, which would partially mitigate its own noise emissions on nearby receivers. This is consistent with the primary mitigation measure of the RNP for mitigating road noise.

The assessment discounted the use of low noise road pavements as the posted speed is less than 70 km/hr, when quieter pavements are not cost effective (as engine noise dominates at lower speed limits rather than tyre noise).

The assessment of the project design without mitigation such as noise barriers predicts that 366 receivers (306 residential receivers and 60 non-residential receivers) across the Stage 1 and 2 study areas would be eligible for consideration of noise mitigation.

The operational noise is predicted to exceed the relevant criteria at a large number of residences adjoining the southern side of Warringah Road. Therefore the RMS proposes to construct three barriers between 3 m and 4 m high along this section of road (refer Figure 15 for the locations).

The assessment found that the noise barriers would reduce road noise at 33 receivers to within the trigger levels for considering additional mitigation. Therefore, 333 receivers (for Stage 1 and Stage 2 study area in total, as shown in Table 14) would be eligible for additional mitigation, including at-property architectural treatments such as:

- fresh air ventilation systems (where external noise levels are up to 10 dB above the criteria and existing windows and vents have to be closed to achieve internal habitable criteria); and
- upgraded windows, doors and/or seals (where external noise levels are 10dB above the criteria and the closing of existing windows and vents will not achieve internal habitable criteria).
Table 14: Summary of architectural property treatments per NCA

<table>
<thead>
<tr>
<th>NCA</th>
<th>Does project increase noise levels by more than 2 dB?</th>
<th>Are the noise levels at sensitive receivers above cumulative limit?</th>
<th>Number of properties eligible for consideration of noise mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>Yes</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td>Yes</td>
<td>19</td>
</tr>
<tr>
<td>4</td>
<td>No</td>
<td>Yes</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>Yes</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td>Yes</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>Yes</td>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>No</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Yes</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Yes</td>
<td>Yes</td>
<td>16</td>
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<tr>
<td>12</td>
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<td>13</td>
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<td>14</td>
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<td>15</td>
<td>Yes</td>
<td>Yes</td>
<td>8</td>
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<tr>
<td>16</td>
<td>No</td>
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<tr>
<td>17</td>
<td>No</td>
<td>Yes</td>
<td>26</td>
</tr>
<tr>
<td>18</td>
<td>No</td>
<td>Yes</td>
<td>41</td>
</tr>
<tr>
<td>19</td>
<td>No</td>
<td>Yes</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>333</strong></td>
</tr>
</tbody>
</table>

Submissions raised concerns with the location and height of the noise barriers, and in particular the residents of Karingal Crescent (NCA-07) requested a maximum four metres high noise barrier (with the uppermost portion being transparent), with the windows of all residences adjoining Karingal Reserve having architectural treatment.

The assessment concludes the proposed noise barriers would reduce traffic noise to levels below the criteria at most of the properties along Karingal Crescent, with only 4 properties identified as potentially requiring additional architectural treatment (see Table 14). A proposed design principal for the noise barriers is for the upper panels to comprise translucent panels to allow solar access to private property.
In terms of noise impacts at the Forest High School, the assessment notes exceedences of the cumulative limits are predicted as well as a noise level greater than 2dB at the ground floors of A-D Blocks. All of these buildings and identified floors are identified as eligible for consideration of mitigation.

For the Frenchs Forest Public School, exceedences of the cumulative limits are not predicted, however a change in noise level greater than 2dB is predicted with the assessment concluding that all buildings are eligible for consideration of mitigation.

The RMS has further advised that during detailed design the cumulative limit with respect to internal noise levels is to be investigated, which may show a change to the number of non-residential receivers that may be eligible for consideration of treatment.

The Department has recommended conditions of approval requiring the RMS to consult with owners of properties eligible for architectural treatment and stipulated timeframes for implementation of treatments.

**Operational Noise Review**

To ensure that the operational noise performance is consistent with predicted performance, the Department has recommended a two-stage approach, with the submission of a review of the operational noise predictions and suitability of the mitigation measures at least 6 months prior to completion of construction, and operational noise monitoring within 12 months of the commencement of operation. The operational noise monitoring would assess actual noise against the predicted operational noise levels and the performance and effectiveness of applied noise mitigation measures and provides for the identification of any additional feasible and reasonable measures that would be implemented, if required.

The operational noise review and monitoring would also verify the number of sensitive receivers eligible for architectural noise treatment following construction of the noise barriers.

**Conclusion and Key Recommendations**

Whilst the Department notes that construction noise may have a negative impact on a large number of neighbouring residential receivers, it is satisfied that RMS has considered all reasonable and feasible mitigation measures to reduce this noise. Key measures include the scheduling of works, early installation of noise barriers and avoiding simultaneous use of noisy equipment.

The noise assessment predicts that once operational, fewer receivers would experience road noise levels above the relevant RNP criteria due to the project, compared with not undertaking the project. With the installation of road noise barriers, the assessment found that up to 333 receivers may be eligible for architectural treatments as a result of the Stage 1 and Stage 2 projects. The Forest High School and Frenchs Forest Public School may also be eligible for architectural treatment.

To address the anticipated noise and vibration impacts from the project, the Department recommends the following key conditions of approval:

- the preparation and implementation of a CNVMP to detail how construction noise and vibration impacts will be minimised and managed. The CNVMP would identify sensitive receivers and relevant feasible and reasonable measures to be implemented to minimise and manage construction noise and vibration impacts (including construction traffic noise);
- The Forest High School shall be consulted to ensure noise generating construction works in the vicinity of affected buildings are not timetabled during examination periods (where practicable), unless other reasonable arrangements are made;
• the preparation of an Operational Noise Review including a review of operational noise mitigation measures to be undertaken by a suitably qualified acoustic specialist and to be approved by the Secretary; and
• undertake operational noise monitoring

The Department is satisfied that the mitigation measures proposed by the RMS should provide the necessary mitigation to reduce, wherever possible, the construction and operational noise impacts generated by the project.

5.3. Water Resources

Issue
The key potential impacts of the project on surface and groundwater resources include:
• subsurface excavation of the slot road intercepting the groundwater table;
• increased impervious areas associated with road widening would reduce the infiltration of rainfall into groundwater and change the flow regime into surrounding creeks, including potential scouring at stormwater outlets;
• discharge of polluted water from the site during construction activities and due to spillages from vehicles using the roads once operational; and
• excavation potentially mobilising contaminants in soil or perched groundwater.

The SSI footprint is located on a ridge line within the catchments of Middle Creek, Bantry Bay and Curl Curl creeks (refer Figure 16), with land sloping down to the north from Frenchs Forest Road and south from Warringah Road. This footprint intersects six drainage lines, including creeks or tributaries, which drain to Narrabeen Lagoon, Bantry Bay and Manly Dam.
The area surrounding the Stage 2 project comprises grassed/vegetated and impervious surfaces typical of urban areas, and would also include the hospital site once developed. Currently, approximately 46% of the catchments are impervious.

The Department notes that the project involves the widening of an existing sealed road with kerb and gutter, which currently captures rainfall and surface water flows that discharge to downstream waterbodies via stormwater drains and channels.

**Table 15** details the catchments and the dominant land uses and receiving waterways of each catchment.

<table>
<thead>
<tr>
<th>Catchment</th>
<th>Sub-catchments</th>
<th>Dominant Land Uses</th>
<th>Receiving Water Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Creek (Trefoil Creek)</td>
<td>1 (Middle Creek) 2 (Trefoil Creek) 3 (unnamed tributary)</td>
<td>Residential, commercial, industrial</td>
<td>Narrabeen Lagoon</td>
</tr>
<tr>
<td>Bantry Bay</td>
<td>4 (unnamed tributary) 5 (unnamed tributary)</td>
<td>Education, residential, commercial</td>
<td>Bantry Bay</td>
</tr>
<tr>
<td>Curl Curl Creek</td>
<td>6 (unnamed tributary)</td>
<td>Skyline Business Park, commercial, industrial, recreation, residential</td>
<td>Manly Creek, Manly Dam</td>
</tr>
</tbody>
</table>

**Submissions**
The Department received seven submissions from the public relating to surface and groundwater resources. The submissions raised concerns regarding waterway and catchment health and alteration of natural flow regimes, and associated impacts on downstream biodiversity. Of particular concern were the health of Manly Dam and the reliance of local fauna on consistent natural flows. Submissions also raised concerns regarding polluted runoff and the impact on local creeks and waterways.

**DPI Water** indicated its preference for a lined slot road to reduce groundwater inflows, unless strong justification is provided for an alternate design. DPI Water noted the uncertainties with the groundwater system and recommended ongoing monitoring of effects on groundwater due to the slot, including a comparison of the actual conditions with the EIS predictions. DPI Water also supports the development of management plans for surface water and groundwater and monitoring during construction to review the impact predictions and establish appropriate mitigation measures.

**EPA** noted the sensitivity of the receiving environment and potential erosion and sedimentation risks, and recommended conditions in relation to water quality management and monitoring.

**Warringah Council** noted the proposed new stormwater drainage infrastructure for the roads would connect with its stormwater system and requested clarification regarding the maintenance responsibilities and ease of access for proposed pollution control devices. Council also sought to be consulted during the detailed design of drainage infrastructure and the preparation of water management plans for the SSI.

**Department’s Consideration**

**Groundwater**
The EIS assessed the hydrogeology of the area surrounding the project and the likelihood for groundwater interception in accordance with the *NSW Aquifer Interference Policy*, to understand the potential impacts of the slot excavation on the groundwater system.

To aid its assessment of the potential impacts of the project on the regional groundwater, the Department commissioned an expert peer review of the groundwater assessment by the
Water Research Laboratory (WRL) of the University of NSW. A copy of the peer review report is attached at Appendix C.

The site geology is characterised by Wianamatta Shale overlying Hawkesbury Sandstone, with weathering gradually decreasing with depth. Groundwater typically flows through joints and fractures to low permeability siltstone and shale layers, creating flows that match the stratigraphy of the geology.

Groundwater levels typically match the surface topography, with a high point located to the north of the NBH and The Forest High School sites (refer Figure 17) and decreasing (flowing) towards the south towards the Bantry Bay and Curl Curl Creek catchments.

Groundwater was found to be present between 2.9 m and 6.2 m below the ground surface, rising to a shallow point between 0.3 m to 2.8 m south of Warringah Road. Two water tables are present at the NBH site which flow to the south east. Investigations revealed existing groundwater was slightly acidic and brackish and hydrocarbons were detected to the south of Warringah Road near the service station site.

The site is located within the Groundwater Sharing Plan for the Greater Metropolitan Region Groundwater Sources. There are in excess of 60 registered groundwater bores used for water supply purposes within 5 km of the project site, including eight registered groundwater bores within 2 km and three wells within 1 km of the project. Groundwater uses includes domestic, stock, recreational, farming and irrigation purposes. RMS is exempt from the requirement to hold a water access licence for construction and maintenance under the Water Management (General) Regulation 2011.

The key potential groundwater impacts from Stage 2 include interception of groundwater flows due to the subsurface construction of the slot road, with associated groundwater drawdown and seepage. These drawdown impacts could possibly affect surrounding water users, and reduce groundwater flows into the receiving catchments and associated habitat for Red-crowned Toadlet and other groundwater dependent species.

The excavations may also mobilise contaminants in soils or perched groundwater to deeper soils or the surrounding aquifers. With regard to contamination risks, the EIS includes a Phase 2 contamination assessment, which outlines measures to control existing contamination and manage the risks of mobilisation during construction, as discussed further in Section 6.

The proposed design includes separate groundwater collection and surface runoff collection systems, to capture groundwater seepage into the slot and to direct this to two subsurface storages for treatment prior to discharge to surface catchments. The storages would be located near the corner of Warringah Rd and Fitzpatrick Avenue and below Aquatic Drive near the Wakehurst Parkway intersection. The water treatment system would be designed to meet background water quality conditions of receiving waterways and would be based on the ANZECC (2000) Freshwater Quality guidelines.

Predicted drawdown
The EIS predicts that the maximum groundwater inflows into the slot during construction would occur towards the completion of slot excavations, to a radius of 800 m around the construction site, with a maximum drawdown of 11 m at the hospital site, upslope of the Stage 2 project.

The maximum slot flows at this time are simulated to range between 26 m$^3$/day (0.3 L/s) and 52 m$^3$/day (0.6 L/s) depending on rainfall and recharge conditions. Under long term conditions, following the completion of construction drawdown, inflows fall for the low recharge scenario to be between 6 and 14 m$^3$/day (0.07 L/s and 0.16 L/s) but remain high for the high rainfall scenario at around 42 m$^3$/day (0.5 L/s).
Figure 17: Groundwater levels
The EIS groundwater model predicts that the project would:

- result in drawdown of less than one metre in the closest surrounding groundwater bores, within the minimal impact criteria of the NSW Aquifer Interference Policy;
- increase runoff (discussed further in the surface water assessment), reducing annual groundwater recharge over the footprint of the project by between 0.14 mm to 7 mm (estimated by WRL to be 0.02 to 1.2 m³/d);
- intercept less than 0.6 L/s (52 m³/day) of groundwater in the slot and discharge this to Curl Curl Creek and/or Bantry Bay tributary; and
- reduce groundwater baseflow to:
  - Curl Curl Creek by between 0.9 to 27 m³/day;
  - Bantry Bay tributary by between 0.5 m³/day to 15.5 m³/day;
  - Middle Creek South West tributary by between 0.6 to 9.7 m³/day;
  - Treefoil Creek by between 0.2 to 3.0 m³/day;

The maximum drawdown across the Red-crowned Toadlet habitat to the south (Curl Curl Creek) and north (Treefoil Creek) may up to two metres in localised areas closest to the Stage 2 Project. The predicted drawdown in the majority of the Red-crowned Toadlet habitat in Treefoil Creek and Curl Curl Creek is less than one metre.

Actual flows would be dependent on local groundwater conditions including the location and extent of fractures, and the model has conservatively assumed a higher level of hydraulic conductivity. The EIS predicts the overall seepage would potentially be less than the low end simulated values.

During construction of the slot, RMS proposes to regularly monitor for observed seepage into the construction and, in the event a significant seep is identified, to use grouting or similar method to seal the local seep. The detailed design parameters for a threshold level of groundwater inflow and response mechanism would be developed in a water management plan for the project to be prepared in consultation with DPI Water and Council.

The groundwater assessment predicts the drawdown impacts downstream of the slot, including on receiving waterways, are likely to be localised due to the proposed recharge system. RMS proposes to monitor flows and water quality in Curl Curl Creek prior to and following the commencement of slot construction to determine the influence of groundwater flows and any changes due to the project. This monitoring would include locations between the slot and the recharge zone, and further downstream.

The groundwater assessment considers that the vegetation surrounding the site is not sensitive to groundwater table depth due to the fluctuations in groundwater levels, and therefore has a low dependence on groundwater.

With regard to potential impacts on Red-crowned Toadlet habitat, the EIS considers groundwater provides a relatively minor contribution to sustaining this habitat and that while Red-crowned Toadlets may take advantage of in stream moisture provided by groundwater flows during dry periods, they were unlikely to depend on it for survival.

WRL's review considered that while select species and ecosystems might not be groundwater dependent, some opportunistic groundwater use of deeper groundwater might still occur, and the project may result in short term impacts on vegetation due to reduced access to this groundwater during drought periods, when shallow soil moisture was unavailable.

To address this risk, the Department has recommended the development of an Ecological Monitoring Program, discussed further in Section 5.4, which would include consideration of changes in habitat usage, including that of the Red-crowned Toadlet, and whether these changes are attributable to the project.
The Water Management Plan would also detail how mitigation measures would be reviewed based on monitoring results to provide an iterative approach to managing potential risks of groundwater drawdown.

The WRL review found the proposed management measures are acceptable and recommended they be refined or expanded further in consultation with the government agencies during the preparation of the Water Management Plan.

The Department considers that the predicted level of groundwater drawdown is an acceptable consequence of the slot design, given the scale of the proposal and its surrounding geology, provided the Proponent implement a Water Management Plan that pro-actively manages risks encountered during delivery of the project.

Surface Water
The EIS includes a surface water quality assessment which takes into account the following guidelines and studies:
- Australian and New Zealand Environment Conservation Guidelines for Fresh and Marine Water Quality (ANZECC 2000);
- Warringah Council Creek Management Study (MWH, 2004);
- Middle Creek Management Plan 2009; and
- Office of Water Guidelines for Riparian Corridors on Waterfront Land.

Construction
To manage the potential risks of erosion and sedimentation during construction, RMS proposes to implement mitigation measures consistent with the requirements of the relevant Soils and Construction – Managing Urban Stormwater guidelines (DECC, 2008). This includes the construction of sediment retention basins or sumps in key areas along the southern side of Warringah Road, where feasible, to assist controlling the discharge of flows from the site. Furthermore, RMS proposes to implement industry standard water quality control measures to contain and respond to potential spills during construction activities.

These measures would be described in a Construction Soil and Water Management Plan (CSWMP) to be developed for the construction of Stage 2. The Department is satisfied that if these plans are implemented appropriately, the potential erosion and sedimentation and water quality impacts would be managed to a satisfactory level. To reinforce these commitments the Department has recommended the CSWMP be prepared prior to the commencement of construction and in consultation with DPI Water and Council.

The construction of Stage 2 may also mobilise contaminated soil or groundwater, which was considered in a Phase 2 contamination assessment prepared for the project. The contamination assessment recommends further remediation activities and RMS proposes to incorporate the findings of the Phase 2 contamination assessment in a Contaminated Land Management Plan to be prepared and implemented prior to commencing construction. The CLMP would and include identification of areas requiring remediation or isolation, management of contaminated spoil and groundwater and the preparation of a validation report upon completion of construction to ensure identified contamination has been appropriately remediated.

Project Design/Operation
The EIS estimates the relative changes in the impervious surfaces due to the project across the catchments within the study area. A summary of these estimates, along with the predicted changes in impervious areas within each catchment is provided in Table 16.

The project would increase the impervious areas in three of the six catchments within the project area, totalling a 7.91 ha increase within the combined catchments, equivalent to a 4% increase in total impervious area compared with the existing scenario.
Table 16: Predicted changes to impervious surfaces due to the project

<table>
<thead>
<tr>
<th>Catchment</th>
<th>Sub Catchment</th>
<th>Existing Conditions</th>
<th>Project Conditions</th>
<th>Change in impervious area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Area (ha)</td>
<td>Impervious Area (ha)</td>
<td>Impervious Area (ha)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impervious Fraction</td>
<td></td>
<td>Impervious Fraction</td>
</tr>
<tr>
<td>Middle Creek</td>
<td>1</td>
<td>93</td>
<td>55%</td>
<td>51.15</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>63</td>
<td>41%</td>
<td>25.83</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>61</td>
<td>56%</td>
<td>34.16</td>
</tr>
<tr>
<td>Bantry Bay</td>
<td>4</td>
<td>34</td>
<td>57%</td>
<td>19.38</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>27</td>
<td>51%</td>
<td>13.77</td>
</tr>
<tr>
<td>Curl Curl Creek</td>
<td>6</td>
<td>135</td>
<td>34%</td>
<td>45.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>413</td>
<td>46%</td>
<td>190.19</td>
</tr>
</tbody>
</table>

The EIS considers the increased impervious areas in each catchment and the associated increase in runoff from the hardstand areas to be relatively small, and unlikely to adversely impact receiving waterways with the proposed controls in place, which are discussed further below.

As part of the design for the project, RMS proposes new or upgraded stormwater drainage systems that would typically discharge to Warringah Council’s existing piped stormwater drainage system. Where discharging to surface waterways such as Curl Curl creek, RMS would construct reinforced concrete pipe and outlet headwalls to mitigate scouring, and to incorporate Council’s requirements during detailed design.

Consistent with the objectives of the Stage 1 design, RMS proposes to design and install subsurface drainage to capture stormwater flows up to 10 year Annual Recurrence Interval (ARI) and for the slot road to be capable of capturing 100 year ARI events. These flows would be directed to subsurface concrete storage tanks prior to entering Council’s existing drainage system.

To manage potential water pollution associated with surface runoff during operation of the roads, RMS proposes to install and maintain in-line pollutant control devices (such as gross pollutant traps) at the headwater of each drainage line to control potential increases in pollutant loads.

The Department has recommended conditions requiring RMS to achieve these design principles where reasonable and feasible, and that existing flooding is not worsened as a result of the project. The Department has also recommended that all relevant information be provided to Warringah Council and the NSW State Emergency Service to assist in the preparation of flood related documentation.

Water Quality
RMS would be required to comply with requirements of the Protection of the Environment Operations Act 1997 during construction of the project, and has indicated it would seek a variation of the Environment Protection Licence issued for the Stage 1 project to accommodate the Stage 2 project, which would outline the discharge water quality requirements to be achieved.

Consistent with the Stage 1 infrastructure approval and the key recommendations of Council’s Creek Management Study 2004, the Department has recommended that the detailed design of the drainage system and pollutant load mitigation measures incorporate...
Water Sensitive Urban Design principles where feasible and reasonable, to be developed in consultation with DPI Water and Council.

RMS also proposes to monitor the water quality of discharges and receiving waters, to be described in a Water Quality Monitoring Program for the project, which would include ongoing monitoring of waterways throughout construction and during the first three years of operation.

The Department has recommended the development of a Water Management Plan which incorporates these measures and includes contingency plans to respond to any exceedances of the water quality and flow criteria established for the catchment. The Water Management Plan would also include details of how results of monitoring would be reported to key stakeholder agencies.

With the implementation of these measures, the Department is satisfied that the potential water quality and flow impacts of the Stage 2 infrastructure can be managed to an acceptable level of risk.

**Conclusion and Key Recommendations**

The Department notes the ecological and recreational values of surrounding waterways and the increasing pressure associated with population growth in the region.

While the proposal is likely to impact both groundwater and surface water flows during construction and operation, these impacts would be effectively managed through the implementation of the water management plan framework envisaged in the Department’s recommended conditions of approval.

To confirm the Proponent’s commitment to the suite of management measures presented in the EIS and response to submissions, the Department has recommended that this framework encompass detailed information about construction and operational impacts developed during detailed design of the project.

To achieve adequate management of surface water and groundwater impacts, in addition to RMS commitments, the Department has recommended the following conditions be incorporated into the instrument of approval to further mitigate and monitor surface water hydrology and quality impacts associated with the proposal:
- establishing water quality objectives for the proposed surface water and groundwater recharge system;
- preparation of a detailed Water Management Plan in consultation with DPI Water and Council, which includes monitoring and reporting requirements;
- achievement of a hydrologic standard of a 10 year ARI across surface roads and 100 year ARI in key locations within the slot road; and
- preparation of a Construction Soil and Water Management Plan to manage construction water quality risks.

Through the recommended conditions of approval, it is considered that the wider catchment and waterway health would be addressed by RMS during construction and operation of the project.

**5.4. Biodiversity**

**Issue**

The key elements of the project with the potential to impact biodiversity include clearing of vegetation to support the road widening and associated works and movement of construction vehicles and personnel. Injury and mortality to fauna species during operation is also an issue for consideration.
The EIS includes an assessment of the potential biodiversity impacts of the project in accordance with the framework for Biodiversity Assessment and incorporates desktop reviews and flora and fauna field surveys.

To facilitate these surveys the corridor was divided into 16 ecological sampling units comprised of sub-units as illustrated in Figure 18. The surveys commenced in March 2013 and were completed in April 2014.

The assessment identified the area contains the Duffys Forest Ecological Community, which is an endangered ecological community under the NSW Threatened Species Conservation Act 1995 (TSC Act). No threatened flora species were identified.

The assessment also identified 77 fauna species within the area, 5 of which were threatened or migratory including the:

- Red-crowned Toadlet (*Pseudophryne australis*);
- Powerful Owl (*Ninox strenua*);
- Swift Parrot (*Lathamus discolor*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*); and
- White-bellied Sea-eagle (*Haliaeetus leucogaster*).

It is estimated that 240 hectares (16%) of DFEC remain of what was estimated as an original extent of 1450 hectares. The Department also notes that DFEC clearing associated with the construction of Stage 1 is estimated to be 1.2 hectares, and construction of the NBH has removed an additional 5 hectares further diminishing the remaining DFEC area. The RMS is seeking approval for the removal of approximately 6.13 hectares of vegetation, including 6.1 hectares of DFEC (primarily linear strips along the existing road network along Warringah Road) (with the remaining 0.03 hectares being exotic/native and weeds), during works associated with Stage 2.

The RMS undertook an assessment of significance which determined the cumulative impact of the loss of 12.3 hectares of the community within the immediate area from Stage 1, Stage 2 and the construction of the NBH is likely to have a significantly impact, such that its local occurrence is likely to be placed at risk of extinction.

Approximately 1.3 hectares of habitat identified as potential foraging habitat for the Red-crowned Toadlet is also proposed to be removed as well as 65 hollow bearing trees containing approximately 103 hollows. The loss of the hollows was not considered to be a significant impact and the project is not proposed to significantly impact the toadlet or any other identified threatened fauna species.

The RMS identified the plant pathogen *Phytophthora cinnamomi* within the study area. Also, the pathogen *myrtle rust* is potentially present.

Fragmentation of the wildlife corridor and potential increases in road mortality and injury rates was also identified in the assessment.

**Submissions**
A number of public submissions discussed the impacts of clearing for the project, including a further reduction in a significant wildlife corridor, clearing of the Duffys Forest Ecological Community and impacts to native animals. The Red-crowned Toadlet and the threats to its habitat and groundwater regime were also raised, as were concerns for further weed invasion in the area.
Figure 18: Ecological Sampling Units
Office of Environment and Heritage (OEH) supported the proposed measures to enhance habitat connectivity in the east-west direction, however it sought more information on the measures to maintain habitat connectivity in the north-south direction along the Wakehurst Parkway corridor. OEH also recommended that offsets be established for both Stage 1 and Stage 2 roadworks and secured within 12 months of Stage 2 approval and comprise Duffy’s Forest Ecological Community (DFEC), or that the RMS provide suitable justification for not including DFEC within the offset site/s.

DPI Water provided matters for clarification with respect to riparian impacts and on groundwater dependent ecosystems.

Warringah Council recommended further consideration of ground, surface and stormwater management design, and potential impacts on riparian habitat, particularly that of the Red Crowned Toadlet.

Department’s Consideration

Duffy’s Forest Ecological Community
The Department notes the concerns raised in submissions and acknowledges the limited extent of remaining DFEC in the area and the resulting impact of the cumulative loss of DFEC on this existing population.

Whilst the Department considers the RMS has designed the project in a manner that generally avoids impacts where feasible, given the project area is limited by site constraints such as road geometry and the adjoining urban development, impacts to DFEC are unavoidable in facilitating the delivery of the project.

In this respect whilst the RMS has included proposed mitigation measures such as establishing exclusion zones around the DFEC and locating construction access and ancillary facilities in previously cleared areas, the Department supports the preparation of the Biodiversity Offset Strategy (BOS) as a mechanism for offsetting impacts of the project to DFEC. The BOS provides broad options, including offset sites, biobank credits and supplementary measures, for the offsetting of significant impacts on threatened species including DFEC, consistent with the NSW offset principles for major projects.

The Department notes the Biobanking Assessment Report (BAR) calculates the required biobanking offsets to be 237 credits (25.5 hectares of required habitat). The BAR was undertaken in accordance with the Biobanking Assessment Methodology (BBAM) and the securing of credits will need to be clearly demonstrated in a Biodiversity Offset Package (BOP).

RMS has commenced investigations to locate a suitable biodiversity offset site for the Stage 1 project in consultation with OEH and the Department, and these investigations have included the predicted scope required to offset the impacts of the Stage 2 project.

In this respect, the Department has recommended that a final Biodiversity Offset Package (BOP) be prepared and implemented within 12 months of commencement of construction to account for all vegetation loss to DFEC within Stage 1 and Stage 2 of the proposal. This BOP is to take into account the location and scale of the DFEC offsets for the NBH and those of other developments within the area.

Plant Pathogens and Weeds
The Department notes that the plant pathogens Phytophthora cinnamomi and myrtle rust present direct and indirect risks to the native vegetation, and subsequent resident fauna, in the area unless managed adequately (particularly during the movement of vehicles and equipment during construction).
Of particular concern also is the potential for spread of noxious weeds such as Blackberry, Lantana, Large-leaved and Small-leaved Privet, Ochna and Asparagus Fern. Also the Red-crowned Toadlet is susceptible to potential risks associated with the spreading of the amphibian chytrid fungus.

The Department notes that risks of damage to native flora and fauna as a result of the project can be adequately managed. In this respect the Department notes the proposed mitigation measures (such the preparation of a weed management plan and potential pathogen management strategies such as vehicle and boot wash down) and recommends the implementation of a Pathogen and Weed Management Strategy (PWMS) as a component of the Construction Flora and Fauna Management Plan (CFFMP).

**Red-crowned Toadlet and Other Fauna**

The RMS undertook assessments of significance for the threatened and migratory species identified in the ecological sample units throughout the Stage 2 study area. As shown in **Table 17**, none of these species were assessed as likely to be significantly impacted.

<table>
<thead>
<tr>
<th>Threatened Species</th>
<th>Likely Significant Impact?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red-crowned Toadlet (<em>Pseudophryne australis</em>)</td>
<td>No</td>
</tr>
<tr>
<td>Powerful Owl (<em>Ninox strenua</em>)</td>
<td>No</td>
</tr>
<tr>
<td>Swift Parrot (<em>Lathamus discolor</em>)</td>
<td>No</td>
</tr>
<tr>
<td>Grey-headed Flying-fox (<em>Pteropus poliocephalus</em>)</td>
<td>No</td>
</tr>
<tr>
<td>White-bellied Sea-eagle (<em>Haliaeetus leucogaster</em>)</td>
<td>No</td>
</tr>
</tbody>
</table>

Approximately 1.3 hectares of habitat identified as potential foraging habitat for the red-crowned toadlet is proposed to be removed, with the BAR calculating the required biobanking offsets to be 17 credits (3 hectares of required habitat). The Department supports the inclusion of this vegetation loss in the BOP, with the securing of the credits also clearly demonstrated.

In addition, the Department recommends that the Red-crowned Toadlet population known to exist within ecological sample units 8 and 12 be monitored during construction and operation of the project to determine if further mitigation is required. The Department has recommended the inclusion of the Red-crowned Toadlet within the proposed Ecological Monitoring Program (EMP). The recommended Surface Water Quality Monitoring Program (SWQMP) will also be used to verify water quality impacts on the Red-crowned Toadlet.

The Department also notes that 65 hollow bearing trees (with a total of 103 hollows) are to be removed for Stage 2 along Wakehurst Parkway and Warringah Road. The RMS undertook an assessment of significance which determined the loss of the hollows was not a significant impact. Nevertheless, to address and minimise potential impacts, the Department has recommended that habitat tree and hollow bearing tree management measures be implemented as part of a CFFMP.

**Wildlife Connectivity and Road Mortality and Injury**

A Priority 1 Wildlife Corridor extends from Oxford Falls to the north of the Project area to Manly Dam to the south. This wildlife corridor is the last such corridor in the region providing vegetative connection between these two remnant native vegetation areas. However, the corridor is heavily impacted and fragmented by the existing road network. The Department notes that the widening of the road network, the resulting increase in volume of vehicle movements and the construction of an underpass along Warringah Road will further impact on wildlife movement along the north-south corridor.

Stage 2 would result in a further reduction in vegetation around the Warringah Road / Wakehurst Parkway intersection (Ecological Sampling Units (ESUs) 7 and 8), increasing the
distances between vegetation patches either side of Warringah Road by up to 50 metres. The assessment of significance concluded however that due to the presence of an existing physical barrier, being the existing road network, the Stage 2 project is not likely to affect connectivity to the extent that it will result in a significant impact to threatened fauna.

Nevertheless, evidence exists of the Long-nosed Bandicoot utilising the roads to move through the corridor, and the assessment did not rule out other small mammals (such as the Swamp Wallaby) may also be using this corridor as well.

The BAR discusses measures to maintain fauna connectivity, which are further detailed within the Wildlife Connectivity Strategy. This includes measures aimed at facilitating the movement of fauna through crossing structures (such as rope bridges, culverts and fauna bridges) or roadkill prevention through movement barriers (such as fauna fencing).

The OEH supports these measures, however raised concern that the proposed measures were only to support east-west movement, with a lack of measures to support north-south connectivity.

In this respect, the RMS has committed to undertake further investigations to facilitate wildlife movement and improve connectivity, to be considered in consultation with Warringah Council and OEH. The Department accepts this approach, and has recommended the preparation of an updated Wildlife Connectivity and Road Risk Minimisation Strategy in consultation with OEH. The updated strategy should describe the measures to be implemented during design, construction and operation of the SSI to minimise risks to fauna and include the number, general location and timing of installation of the habitat connectivity measures such as culverts and rope bridges.

Conclusions and Key Recommendations
The Department notes the existing urban constraints of the Stage 2 area and is satisfied that the project has been designed in a manner that generally avoids biodiversity impacts where feasible. The Department concludes that there are a number of biodiversity issues that can be further addressed and managed through the recommended conditions, including:

- a Biodiversity Offset Package;
- a Flora and Fauna Management Plan (and Pathogen and Weed Management Plan within this);
- an Ecological Monitoring Program;
- a hollow bearing tree management measures within a FFMP; and
- a Wildlife Connectivity and Road Risk Minimisation Strategy.

The Department is satisfied that the provision of a BOP is acceptable for the predicted impacts to DFEC and the Red-crowned Toadlet. The Department has recommended the BOP be implemented in consultation with OEH. The biobanking calculations undertaken by the RMS provide an indication of the credits required once detailed design is complete. The Department supports the biobanking method as a mechanism for offsetting and concludes that offset credits of these values are acceptable for the impacts to DFEC and the Red-crowned Toadlet if all other mitigation measures have been exhausted.

The Department concludes that with the mitigation measures committed to by the RMS and the Department’s recommended conditions, the removal of the vegetation and impacts upon fauna are acceptable when balanced with the necessity of the provision of enhanced connectivity throughout the project area and to the NBH.
5.5. Urban Design and Visual Amenity

Issue
The Stage 2 area contains visual and landscape qualities that are consistent with the northern beaches region of Sydney, such as stretches of bushland, low density residential, commercial development and open space. Whilst being highly urbanised, the area is also well vegetated with remnant native vegetation and street trees heavily influencing the visual character of the area, particularly adjoining Warringah Road and Wakehurst Parkway.

The strong topographic and established urban form has resulted in vertical and horizontal design challenges in relation to the location of the road, design responses and available mitigation measures.

The RMS has undertaken a landscape character and visual impact assessment providing impact ratings by considering the magnitude of change and sensitivity of an area to change. Whilst the overall area (Stage 1 and Stage 2) was divided into seven landscape character zones (LCZs) (refer Figure 19), five of these identified the key landscape characteristics for Stage 2 (LCZ 3 – LCZ 7), with eleven visual assessment precincts (VAPs) (refer Figure 20). The assessment considered the visual impacts experienced by both road viewers (for example residences, businesses and schools surrounding the project area) and road users (passing through the project area). The result of the landscape character and visual impact assessment are presented in Table 18 and Table 19.

Table 18: Landscape Character Zones

<table>
<thead>
<tr>
<th>Landscape Character Zone (LCZ)</th>
<th>Landscape Character Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCZ 3 Wakehurst Parkway</td>
<td>High to Moderate</td>
</tr>
<tr>
<td>LCZ 4 Warringah Road East</td>
<td>Moderate</td>
</tr>
<tr>
<td>LCZ 5 Warringah Road (West)/ Forestway</td>
<td>High</td>
</tr>
<tr>
<td>LCZ 6 Karingal Crescent/Bantry Bay Road</td>
<td>High</td>
</tr>
<tr>
<td>LCZ 7 Aquatic Drive/Allambie Road (South)</td>
<td>Moderate to low</td>
</tr>
</tbody>
</table>

Table 19: Visual Impact Assessment

<table>
<thead>
<tr>
<th>Visual Assessment Precinct (VAP)</th>
<th>Road Viewer Visual Impact</th>
<th>Road User Visual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAP 1 Public School</td>
<td>High to Moderate</td>
<td>Moderate to low</td>
</tr>
<tr>
<td>VAP 2 Karingal A</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>VAP 3 Karingal B</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>VAP 4 Forest Way</td>
<td>High to Moderate</td>
<td>Moderate to low</td>
</tr>
<tr>
<td>VAP 5 The Forest High School</td>
<td>High to Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>VAP 6 Bantry Bay Road shops</td>
<td>High</td>
<td>High to Moderate</td>
</tr>
<tr>
<td>VAP 7 Brick Pit Reserve</td>
<td>High</td>
<td>High to Moderate</td>
</tr>
<tr>
<td>VAP 8 Skyline Business Park</td>
<td>Moderate to low</td>
<td>Low</td>
</tr>
<tr>
<td>VAP 9 Aquatic Business Park A</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>VAP 10 Aquatic Business Park B</td>
<td>Moderate to low</td>
<td>Low</td>
</tr>
<tr>
<td>VAP 11 Warringah Aquatic Centre</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>VAP 12 Wakehurst Parkway Footbridge</td>
<td>Moderate to low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Submissions
The Department received three submissions from the public relating to urban design and visual amenity. The issues raised in these submissions included visual impacts associated with the removal of trees, new pedestrian bridges, noise barriers and retaining walls.

Warringah Council supports the use of noise barriers that are designed to a high level of quality and appearance.
Figure 19: Location and scope of Landscape Character Zones
Figure 20: Visual assessment precinct plan
Department’s Consideration
The Stage 2 project area is visually dominated by native vegetation and street trees associated with verge planting, and open spaces associated with The Forest High School.

Elements of the Stage 2 project that may impact on road users and road viewers are:
- widening of the road pavement;
- introduction and widening of signalised intersections;
- introduction of an open slot underpass;
- two new footbridges (one replaced);
- new built form and landscape treatments;
- footpath widening; and
- road and noise barriers.

Construction
The greatest visual impacts during construction would occur following the removal of vegetation and prior to landscaping works, particularly for adjoining residences and businesses with views of the construction works.

The RMS advises that landscaping is to be progressively introduced to provide screening between the residences and the adjacent road corridor to mitigate visual impacts. The Department supports this approach and has recommended that, where practicable, local community groups and residents are involved in this process.

Operation
The Department accepts that the Stage 2 Project may result in substantial changes to both the landscape character and visual amenity of the area, and in particular the Warringah Road corridor, compared to what is currently experienced by adjoining residents and road users.

Extensive road widening on the southern side of Warringah Road is proposed as well as significant upgrade works associated with the intersections of Warringah Road with Forestway and Wakehurst Parkway (as well as a new intersection at Wakehurst Parkway/Aquatic Drive), slot lane, underpasses and pedestrian bridges. All of these improvements are proposed to alter the character of the area through substantial widening and removal of large stands of existing vegetation and replacement with hard surfaces. To mitigate this, the RMS has proposed a number of measures such as:
- incorporating an informal bush landscape character with natural looking materials and informal plantings along Wakehurst Parkway and a more urbanised landscape concept along Warringah Road;
- the replacement of street tree planting; landscape tree planning and landscaped verges;
- retain exposed rock in cuttings where permissible;
- introduce stepped retaining walls with planted benches to re-inforce the green character setting;
- ensure fences complement existing character and materials;
- design unobtrusive furniture from natural materials and incorporate new planting;
- designing the pedestrian bridges with colours appropriate to the urban bushland setting; and
- applying Crime Prevention Through Environmental Design principles inclusive of sightlines, security and safety of pedestrians on footpaths and shared pedestrian bridges.

The residents of Karingal Crescent will be substantially impacted (and to a lesser extent some residents in Hilmer Street and Bantry Bay Road), which is reflected in the ‘high’ visual impact rating for VAP 2,3 6 & 7. The widening of Warringah Road and loss of trees would remove views to Karingal Reserve inclusive of trees adjoining the rear fences of these residences, to be replaced with a noise barrier up to 4.0m in height. Whilst the Department notes there is likely to be a detrimental change in visual outlook for these residents the Department also accepts that the land adjacent to these residents forms a critical component in allowing the expansion of the road.
to proceed. Given the distance between vehicles and residents will be substantially reduced, the noise barrier also forms a necessary component in reducing any noise impact on these residents.

Whilst some submissions have recommended the noise barriers be placed adjoining Warringah Road, rather than the rear of properties, the Department accepts the RMS’s rationale that placing the noise barriers on the rear property boundary provides a superior urban design outcome by allowing the adjacent shared path and landscaping area to be in open view of all road users travelling along Warringah Road. Placing the noise barrier behind the kerb would close in the shared path and landscaping area from the adjacent road which may make it a less safe area that could be prone to antisocial behaviour.

Planting is also proposed to be provided in order to integrate the barriers into the landscape setting and the upper panels of the barriers are to comprise translucent panels in order to allow solar access to private property. A detailed landscaping plan is also to be prepared.

Overall the Department considers that the urban design and visual amenity impacts that may result from the proposed works are equivalent to those experienced at other road corridors in urbanised environments within the Sydney region. Based on this experience, and noting the existing nature of the established road corridor, the Department is satisfied that such impacts can be minimised and managed through detailed design. The RMS has committed to the preparation of a landscape plan, and the Department has recommended the preparation of an Urban Design and Landscape Plan undertaken in consultation with the community.

To ensure no unacceptable impacts on solar access occur to residences adjoining the noise barriers, the Department has also recommended a condition that the RMS design and construct the noise barriers to minimise the shadowing effects of the structures during Winter. This is occur in consultation with the affected residences, with the final noise barrier design to result in shadowing impacts no greater than the existing environment, where reasonable and feasible.

**Conclusion and Key Recommendations**

Whilst the Stage 2 works would alter the character and visual appearance of the local area, the Department notes that the changes are in line and consistent with infrastructure associated with a major hospital precinct.

The Department therefore acknowledges that the character of the streetscape would change as a result of the Stage 2 works but considers the proposed mitigation measures and the development of a comprehensive Urban Design and Landscape Plan (UDLP) would assist in balancing the existing and future character of the area as a supporting road network for the NBH.

The Department is therefore satisfied that the visual appearance of the Stage 2 works can be appropriately addressed through the implementation of the identified UPLP and urban design objectives and principles and recommended conditions of approval.

The Department is also satisfied that RMS proposes to design and construct the noise barriers in consultation with adjoining residences and include translucent sections to reduce the potential impacts of shadows on the adjoining residences.

**5.6. Social, Economic and Land Use**

**Issue**

Land uses within the Stage 2 area comprise residential, retail, commercial/light industrial, open space and bushland reserves. Retail uses include the Forestway Shopping Centre and the Bantry Bay Road shopping strip. The range of goods and services currently available within the Bantry Bay Road shopping strip include a hair salon, restaurants, chemist, real estate agent, café, funeral parlour, medical centre, fishing tackle shop and service station.
Forestway Shopping Centre also provides a greater variety of services including government services, supermarket, banking, child care and travel agency.

Commercial and light industrial uses are contained in three distinct business park precincts, bounded by Frenchs Forest Road East/Warringah Road, Rodborough Road (eastern end), Aquatic Drive/Allambie Road and Wakehurst Parkway. These precincts are characterised by two to three storey office buildings, many of which are attached to high ceiling warehouses. A number of schools, medical centres, churches and recreation/open space are also located in these areas.

A wide range of social infrastructure is also located within or adjacent to the Stage 2 project area including the Forest High School and Frenchs Forest Public School, two childcare centres, one Medical Centre, the future Northern Beaches Hospital, the Brick Pit reserve and Karingal Reserve.

Construction and operational impacts associated with Stage 2 include noise, vibration, dust, traffic and potential loss of car parking and disrupted access to property, educational establishments, public transport and retail outlets. Construction activities are also likely to result in amenity impacts to sensitive land uses, including residential dwellings, loss of local businesses and acquisition of properties.

The RMS has committed to implement measures to manage and mitigate construction and operational impacts to businesses, pedestrians and cyclists, and sensitive receivers. Such measures include ongoing consultation, provision of noise mitigation, traffic management, landscape and urban design, signage, maintaining connectivity to community services, pedestrian and cyclist facilities.

Land acquisition of approximately 31,713 m$^2$ is required to accommodate the construction of Stage 2 across 35 separate properties. This includes residential properties, Council land along Warringah Road, Crown land on Aquatic Drive, the 12 businesses located at the Bantry Bay shops and land at the Northern end of the Aurora Business centre and Forestridge Business Park.

Submissions
The Department received two submissions during the exhibition period relating to the impacts of acquisition of the business premises and strategic need and justification of the project.

Warringah Council commented on pedestrian and cyclist connectivity.

Department’s Consideration

Acquisition
Stage 2 requires the acquisition of seventeen lots and partial acquisition of 18 lots. This includes the Bantry Bay Shops, land at the northern end of the Aurora Business Centre, and an area of Forestridge Business Park.

Land would be acquired through negotiation where possible, otherwise land would be compulsorily acquired under the Land Acquisition (Just Terms Compensation) Act 1991. Once acquired, services, public utilities and fences would be adjusted at the RMS’s expense.

The most significant socio-economic impact that may result from the Stage 2 acquisition process would be the removal of the Bantry Bay Road Shops, which also contributes approximately 40 to 55 full time equivalent jobs. The Department notes that the impacts to the business owners as a result of this removal would be unavoidable and would require compensation as a consequence of land acquisition.
The Department also notes that the local community would lose access to a limited range of goods and services provided in this location. It is noted that the nearby Forest Way Shopping Centre and Skyline Shops provide similar goods and services. In addition, the Department notes the presence of other nearby major retail centres including Warringah Mall, Dee Why, Chatswood and Forestville.

The area of the Aurora Business centre and Forestridge Business Park to be acquired is landscaped vegetation and so any direct impact on the operation of these businesses is proposed to be avoided, inclusive of impacts to buildings or car spaces.

The Department acknowledges that anxiety, stress and other impacts to social wellbeing have the potential to arise during acquisition processes. The Department is satisfied that the provision of compensation, in accordance with the Land Acquisition (Just Terms Compensation) Act 1991, the preference by the RMS for negotiated outcomes with landowners and the requirement for ongoing consultation with stakeholders within the recommended conditions, would adequately mitigate social and economic impacts resulting from property acquisitions.

Construction
Construction would result in potentially disruptive impacts to local businesses, primarily pedestrian and vehicular access to shops, offices and warehouses. The disruption would be temporary and would be reduced or eliminated following completion of work.

The amenity of residences and schools could also be affected by construction activities if not managed appropriately. The impacts include noise, vibration and dust generated by construction plant and equipment, noise from increased traffic and out of hours activities, visual impacts of construction machinery, compounds and works, changed/restricted access to community services and road closures and/or reduced speed limits.

The RMS has committed to carry out ongoing communication with residents and businesses regarding the duration, location, timing and potential impacts of construction. A draft Community Consultation Framework has been prepared to guide engagement and consultation with stakeholders as well as a process to gather and manage feedback and information about the construction of the proposal. In addition, the Department requires construction mitigation measures to be implemented through the recommended CEMP.

The RMS also notes positive aspects of the construction include the generation of retail expenditure by the construction workforce of up to $736,500 per annum or $2.21 million over the three year construction period. Some of this expenditure would inevitably be spent in shops in the study area, particularly those which would service the immediate needs of the workers such as food outlets.

Operation
Concerns were raised within public submissions that the new slot road would further divide the connectivity for pedestrians and fauna. In addition the residents of Karingal Crescent raised concerns with the loss of the existing pedestrian access directly to Warringah Road.

The RMS has acknowledged that pedestrian arrangements would change, however the new pedestrian bridge west of Hilmer Street, new shared pathways and new signalised intersections seek to improve on the existing situation. The existing connection from Karingal Crescent to Warringah Road, through the proposed noise barrier, would also be retained.

The Department acknowledges the concerns raised by the community in relation to community severance and accessibility, but notes that the existing road network already significantly reduces connectivity and accessibility. Furthermore, the Department considers that the design features under this proposal would address and enhance connectivity through
the provision of improved pedestrian and cycle facilities, new and additional pedestrian bridges and new signalised intersections. Safety would also be improved by separating pedestrian, cyclist and vehicular traffic. The Department has also recommended an independent safety audit of the detailed design.

Conclusion and Key Recommendations
The Department acknowledges that the project is likely to result in changes for the surrounding local community that would result in short-term impacts, particularly during its construction, in conjunction with long term changes in the location of some surrounding goods and services.

Whilst the alignment of the Stage 2 works would result in the removal of the Bantry Bay Road Shops, the Department considers that other local neighbourhood centres could provide similar services. The Department is also satisfied with the range of mitigation and management measures that have been proposed by the RMS to address impacts to local businesses.

On balance, the Department considers that the broader network upgrades would provide significant benefits to local and regional road users inclusive of improved east-west movements along Warringah Road within the study area and improved pedestrian and cyclist safety and connectivity, and are therefore acceptable.

6. ASSESSMENT OF OTHER ISSUES

Aboriginal Heritage
The RMS undertook a comprehensive assessment of Aboriginal heritage including archaeological field surveys, stakeholder consultation with Aboriginal communities, literature reviews, and heritage database searches.

No Aboriginal archaeological sites or areas of potential archaeological deposit were identified within the Stage 2 Project area, and the assessment concludes therefore that no impact to Aboriginal archaeological heritage exists from construction and operation of the Stage 2 project.

Nevertheless the RMS has identified a number of mitigation measures with respect to Aboriginal heritage such as unexpected heritage find procedures and general awareness of Aboriginal heritage and legislative obligations which would be incorporated into a construction Heritage Management Plan for the project. The Department has also recommended a condition to this effect.

Non-Aboriginal Heritage
There is one local heritage item listed under the Warringah Local Environmental Plan, identified as the former Holland’s Orchard and Commemorative Grove that is located within the Stage 2 project area. This consists of a single pear tree located on the road verge adjacent to Warringah Road, and a number of pear trees located on the grounds of The Forest High School which were propagated from the remnant pear tree in 2005. The former Hews Brick Pit, whilst not a listed heritage item but has some heritage significance, is also located within the Brick Pit Reserve located within the Stage 2 project area.

All utility adjustments required for both Stages 1 and 2 were included in the Concept and Stage 1 proposal assessment. The submitted Statement of Heritage Impact concluded that the Former Holland’s Orchard and Commemorative Grove would be impacted during these utility relocations. It was also concluded that the tree is in an inappropriate setting and that relocation would be preferable pending arborist confirmation that the tree could survive relocation. In addition, should detailed design for Stage 1 result in impacts being avoided, the Stage 2 assessment concludes that any widening to Warringah Road to the north or widening of the footpath could impact on the item. In addition, given its proximity to
Warringah Road, the item may be exposed to a higher potential of damage through road accidents.

The widening of Warringah Road is also proposed to encroach on the curtilage of the former Hews Brick Pit. Investigations undertaken as part of the Stage 2 assessment concluded that the extent of any archaeological remains is uncertain, and whilst there is potential for some original footings to be present, they are most likely located outside of the construction impact zone. In combination with the disturbance of the site through recreational use and erosion the archaeological potential of the Former Hews Brick Pit was assessed as being low to nil, and corresponding impact from construction activities as being low.

**Air Quality**

The closest receivers to the Stage 2 Project that may be sensitive to air quality impacts include:

- the Forest High School;
- Frenchs Forest Primary School;
- The Making a Difference child care centre;
- the Forest Alliance Church;
- commercial, retail and business areas located along and adjacent to the project;
- residential properties located along the roads to be upgraded; and
- the proposed Northern Beaches Hospital.

While increases in the capacity of the road network within the Stage 2 area would contribute to emissions, the relief of congestion across the road network, including an increase in average speeds, reduction in average delay and number of stops per vehicle along Warringah Road, would reduce the number of idling vehicles resulting in potential localised air quality improvements. Nevertheless given the revised road alignment would result in vehicles being in closer proximity to residences, the air quality impact assessment considered the impacts to air quality from NO\(_2\), PM\(_{10}\) and PM\(_{2.5}\).

PM\(_{10}\) and PM\(_{2.5}\) concentrations are not predicted to exceed their respective maximum 24-hr mean or annual criteria at any of the sensitive receivers. NO\(_2\) emissions are also not predicted to exceed the one-hour or annual mean criteria at the most affected sensitive receivers. Due to the expected increase in traffic volumes however the mean NO\(_2\) levels for the 2018 ‘Build’ scenario are expected to rise slightly by up to 7.4µm/m\(^3\) when compared to the ‘No Build’ scenario.

Construction related air quality impacts would predominantly result from the generation of dust during earthworks, stockpiling and other construction activities. RMS has proposed a range of construction air quality management measures which would be documented in a CEMP including maintaining construction plant and equipment in good working order and where practicable, vehicles would be fitted with pollution reduction devices.

In its submission, the EPA recommended an Air Quality Management Plan be developed and implemented to address all significant construction related emission sources. The EPA also recommends the environmental impacts associated with heavy vehicles including off road diesel equipment and plant be addressed through compliance with relevant standards, strategies for minimising air emissions and confirmation that all off road diesel equipment would meet best available diesel emission standards. The RMS has indicated this would be managed through an Air Quality Management Plan that would form part of the CEMP. The Department considers this to be an acceptable response to these matters and has recommended the CEMP include measures for reducing, managing and monitoring air quality impacts.

The Department has also considered the possible overlapping of construction activities for the Stage 1, Stage 2 and NBH. Although the hospital construction activities would generally
be limited to the hospital site on Frenchs Forest Road West, there is potential for cumulative construction air quality impacts to occur, which would be primarily related to dust.

The RMS has outlined a number of mitigation measures to be incorporated in a Construction Air Quality Management Plan, which the Department supports. These include:

- air quality and dust management objectives consistent with the DECCW guidelines;
- identifying potential sources and impacts of dust and all dust-sensitive receptors;
- mitigation measures to minimise dust impacts to sensitive receivers and to the environment;
- a monitoring program to assess compliance with the identified objectives; and
- contingency plans to be implemented in the event of non-compliances and/or complaints about dust.

The Department is satisfied that the proposed measures, in conjunction with the Department’s recommended conditions, are appropriate in managing air quality related impacts during construction.

Contamination
There is potential for contaminated land to occur due to existing and previous potentially contaminating land uses located within the vicinity of the Stage 2 project construction area. These include uncontrolled fill sites (particularly one at the northwest corner of Warringah Road and Forest Way intersection and two on the southern side of Warringah Road), service stations and the historic brickworks. There is potential for contaminated land to be disturbed during Stage 2 works, particularly activities associated with construction of the slot and intersections.

Stage 2 soil and groundwater sampling was undertaken that identified localised soil and groundwater impacts within shallow fill material of various sampling sites within the proposed excavation areas associated with the road construction work. Concentrations of lead, fill material containing asbestos and volatile hydrocarbons were identified as well as various groundwater contaminants. It is also noted that access to the 7 Eleven petrol station was not granted for the purpose of soil and groundwater sampling, however sampling was undertaken on the adjacent footpath.

The identified contaminants may present a risk to workers, however mitigation measures outlined by the RMS are to be explored during the preparation of a Contaminated Land Management Plan and Asbestos Management Plan to mitigate any potential impacts during preliminary works or construction activities. An unexpected finds protocol is also proposed to be incorporated into the CEMP to address the potential for previously unidentified contamination to be encountered during the Stage 2 works.

The Department is satisfied that the proposed measures are appropriate in managing contamination related impacts during construction. The Department also notes that a remediation validation report is also proposed to be prepared following construction which is proposed validate the remediation or removal of the contaminants. Following this and the stabilisation of all land at the completion of construction activities, no ongoing impacts or residual risk to users are expected.

Waste
The types and quantities of wastes that would be generated from the Stage 2 works were identified by the RMS and were used as the basis for the preliminary classification in accordance with the NSW Waste Classification Guidelines (DECCW 2009).

Waste generated during construction would primarily be from civil works associated with site preparation, demolition and excavation works associated with the proposed slot road. Waste streams attributable to Stage 2 would include non-reusable surplus soil from bulk earthworks, contaminated soils requiring offsite disposal, material from demolition works, surplus
construction and packaging material, vegetation waste, plant and vehicle maintenance waste, general office wastes and sewage waste.

The estimated excavated material from Stage 2, predominantly from the construction of the underpass, is predicted to be approximately 180,000 cubic metres of material with 7,500 cubic metres of spoil to be reused as fill. To manage waste, the RMS has committed to transport these materials for beneficial re-use off-site in accordance with a relevant EPA resource recovery exemption or disposed of at a licensed waste facility. The Department notes that final cut and fill volumes would be confirmed during detailed design and that waste classification would be undertaken to determine appropriate soil management and disposal methods.

Small quantities of waste would also be generated during operation, inclusive of spills and leakage from vehicles, road repair and road maintenance.

The RMS has identified a number of mitigation and management measures inclusive of the preparation of a Resource and Waste Management Plan and Spoil Management Strategy. The Department is satisfied with the mitigation measures proposed and has reinforced these with recommended conditions that ensure no waste generated offsite is received at the project site, reuse and recycling of waste is maximised, liquid and non-liquid waste is appropriately assessed in accordance with the Waste Classification Guidelines (2009), and that all waste removed from the site is received by a lawfully permitted waste management facility or premises.

7. CONCLUSION AND RECOMMENDATIONS

Need and Justification
The existing road network within Frenchs Forest frequently becomes heavily congested causing extensive delays for both local residents and motorists moving through the area along Warringah Road connecting the Northern Beaches with Chatswood and the Sydney CBD. Background population and employment growth in the region and within Frenchs Forest will place further pressure on this network.

The development of the NBH, consisting of 488 beds, 1430 on site car parking spaces and generating up to 900 vehicle movements per hour in peak periods, will be a catalyst for change in Frenchs Forest culminating in a specialised health precinct. With the NBH road users would experience delays, reduced average travel speeds and increasing unreliable travel times resulting in social, economic and environmental impacts. To mitigate the traffic and access impacts of the NBH, and to provide congestion relief in the locality, road upgrade works will be required.

The Stage 2 project would provide key infrastructure improvements to the road network by increasing capacity and reducing congestion, a key objective of the NSW Government’s transport policies. The Stage 2 Project would also further build on the improvements to be delivered by the Stage 1 Project in supporting the activation of the NBH Precinct.

The Stage 2 Project is also consistent with the strategies and policies within the NSW Long Term Transport Master Plan, NSW 2021: A plan to make NSW number one (2011), NSW State Infrastructure Strategy 2012-2032, State Significant Strategy Update 2014, and A Plan for Growing Sydney 2014.

Key considerations
The Department has assessed the state significant infrastructure application, EIS, Response to Submissions and submissions on the project in accordance with the relevant statutory requirements. The Department has also commissioned independent experts to review the project’s potential traffic and groundwater impacts.
The Department's assessment of the project found that its key impacts would be noise associated with the construction and operation of the project, impacts of construction activities on traffic flows as well as changes to access arrangements for local roads and properties, potential impacts on the public transport network, and changes in pedestrian and cyclist routes. Impacts to biodiversity would also result with a further reduction in the Duffys Forest Ecological Community, visual changes to the character of the immediate area and socio-economic impacts of land acquisition.

The Department considers that the potential environmental impacts associated with the construction and operation of the proposal would be managed to an acceptable level subject to the implementation of appropriate mitigation measures identified in the EIS and further development of a CEMP. The Department has recommended the implementation of these measures through conditions of approval (Appendix D).

The Department concludes, on balance, the project would meet the project’s objectives of providing benefits to the community by improving peak period travel speeds, reliability and network performance (and in particular improved through traffic performance along Warringah Road in proximity to the NBH) whilst supporting the development and activation of the NBH precinct. In addition the proposal will improve pedestrian and cyclist connectivity and safety and provide an upgraded stormwater drainage system. Noise attenuation treatment may also be available to approximately 333 receivers experiencing acute noise exceedances and project (for both Stage 1 and Stage 2) related noise impacts.

The Department considers that the project’s benefits outweigh the potential residual impacts which can be managed and would not, subject to the recommended conditions, result in any long term adverse or irreversible effects. It is therefore in the public interest that the project is approved.

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Appendix A - Accompanying Documents and Submissions

The following documents are available on the Department’s website at http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6622

- Environmental Impact Statement;
- submissions to the EIS; and
- Proponent’s Response to Submissions.
Appendix B - Independent Traffic Peer Review

See the Department’s website at:

Appendix C – Independent Groundwater Peer Review

See the Department’s website at:

Appendix D – Recommended Conditions of Approval