NORTHERN BEACHES HOSPITAL
CONNECTIVITY AND NETWORK
ENHANCEMENTS:
CONCEPT PROPOSAL AND STAGE 1

Urban Design Report and Landscape Character and
Visual Impact Assessment - FINAL

OCTOBER 2014
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NORTHERN BEACHES HOSPITAL
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Urban Design Report and Landscape Character and
Visual Impact Assessment - FINAL

Prepared for:

NSW Transport
Roads & Maritime Services
SMEC

Prepared by:

SPACKMAN MOSSOP + MICHAELS
PO Box 880 Darlinghurst, NSW 1300
P (02) 9361 4549 • F (02) 9361 4569
www.sm2group.com.au
ABN 65 065 578 985
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I. INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF THIS REPORT

Roads and Maritime Services (Roads and Maritime) is seeking approval for the Northern Beaches Hospital – Connectivity and Network Enhancements Project. The approval is sought under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The project comprises road upgrades to enhance arterial and sub-arterial road network connectivity for the Northern Beaches Hospital (NBH) precinct at Frenchs Forest, within the Warringah Local Government Area (LGA) on Sydney’s Northern Beaches.

Spackman Mossop Michaels (SMM) has been commissioned to undertake an urban and landscape contextual analysis and a landscape character and visual impact assessment as part of the Environmental Impact Assessment (EIS). SMM have also provided urban design and landscape input to the concept design for the proposed road network upgrades.

The assessment follows an earlier urban design framework report and responds to requirements setout by the Secretary Environmental Assessment, which has lead to the development of mitigation measures that have informed the concept design.

A Reference Design, which responds to, and builds upon, the detailed design contained within the EIS, is to be prepared as the next design development stage for the Concept Proposal. An EIS is to be prepared for Stage 2 of the concept proposal following preparation of the Reference Design. Following approval of the EIS and finalisation of the Reference Design, a Tender Design is to be prepared for construction of the concept proposal. The reference design will finalise the basis for the Tender Design in terms of alignment, impact mitigation and urban design finishes, based on guidance contained in the EIS.

Assessment and design of the Northern Beaches Hospital site is a separate project undertaken by others.
1.2 LOCATION

The proposal is located on the Northern Beaches of Sydney, in the suburb of Frenchs Forest about 17 kilometres (km) north of the Sydney CBD and five km west of Dee Why. The surrounding road network comprises Warringah Road (between Maxwell Avenue and Courtley Road), Frenchs Forest Road, which runs parallel with Warringah Road and connects Allambie Road to the east with Forest Way in the west and Wakehurst Parkway, which intersects with both Frenchs Forest Road and Warringah Road. The NBH site is situated between the block formed by Frenchs Forest Road, Warringah Road with Wakehurst Parkway.

The location of the concept proposal and the Stage 1 project is shown in Figure 1-1.
1.3 THE STUDY AREA

The suburbs of Frenchs Forest and Forestville further to the west of the proposal site, are straddled by Garrigal National Park, Davidson National Park and Middle Harbour and are dotted with playing fields, parks and remnant bushland, which afford its residents plentiful recreational resources, open space and visual amenity. Colloquially known as the Forest, the suburbs are centrally located between the beaches of Dee Why and Curl Curl and metropolitan Chatswood.

The study area for the concept proposal comprises both the Stages 1 and 2 projects and the immediate surrounding area.

The Stage 1 project comprises Frenchs Forest Road and Naree Road between Warringah Road in the east and Forest Way in the west. It also comprises a sections of Warringah Road, Allambie Road, Wakehurst Parkway and Forest Way.

The Stage 2 project is centred on Warringah Road, between Fitzpatrick Avenue in the west and Allambie Road in the east and would be the subject of a separate study and report.

The location of the concept proposal and the Stage 1 project is shown in Figure 1-2.
Figure 1-2: The study area and project staging
1.4 STAGED PROJECT APPLICATION

The Northern Beaches Hospital Connectivity and Network Enhancements Project is proposed to be assessed in stages under section 115ZD of the EP&A Act. The EIS provides an assessment of the concept proposal for the whole of the project and a more detailed assessment of the Stage 1 works.

The Concept Proposal for the whole Northern Beaches Hospital Connectivity and Network Enhancements Project includes two stages:

• Stage 1 Hospital Connectivity Works (the project) which aim to enhance the existing road network to facilitate the opening of the proposed Northern Beaches Hospital by 2018.

• Stage 2 Network Enhancement Works is directed towards broader network capacity enhancement particularly along Warringah Road.

The EIS assesses both stages at a concept proposal level and provides more detailed environmental assessment of the Stage 1 works. This would enable Stage 1 to proceed to construction (subject to approval).

The need for the remainder of the infrastructure, which is directed towards broader network capacity enhancement (Stage 2 Network Enhancement Works), particularly along Warringah Road, has been identified at a strategic level and developed as a concept proposal only (so far).

The staged approval approach would enable construction of the Stage 1 Connectivity Works to commence (subject to planning approval) in a timely fashion providing adequate connectivity to the hospital by mid 2018, while the design of the Network Enhancement Works is being refined and assessed.
The Northern Beaches Hospital – Connectivity and Network Enhancements Project aims to:

• Assist in the management of journeys in connection with anticipated future intensification of medical, commercial and residential land uses surrounding the new hospital.

• Alleviate future increase in traffic congestion on the Warringah Road and Wakehurst Parkway arterial road corridors and their principal feeder roads from the Northern Beaches Hospital.

• Enhance access arrangements by car, bus and active transport for the NBH’s employees, patients, outpatients and visitors.

• Facilitate improved access to the NBH and the surrounding employment precincts.

• Have key infrastructure components in place for the proposed hospital opening in 2018.

The strategic design of the Northern Beaches Hospital Connectivity and Network Enhancements Project in its entirety - referred to in this EIS as the Concept Proposal. The Concept Proposal is proposed to be carried out generally within the following parts of Frenchs Forest:

• Warringah Road from its intersection with Maxwell Parade to its intersection with Courtley Road.

• Forest Way from around Adams Street to its intersection with Warringah Road.

• Naree Road/Frenchs Forest Road from its intersection with Forest Way to its intersection with Warringah Road.

• Wakehurst Parkway from about 500 metres north of Frenchs Forest Road to about 500 metres south of Warringah Road.

• Allambie Road from its intersection with Frenchs Forest Road East to its intersection with Aquatic Drive.

• Rodborough Road from its intersection with Warringah Road to its intersection with Allambie Road.

• A new connection of Aquatic Drive with Wakehurst Parkway (left in left out).

The first stage of the Concept Proposal, the Stage 1 Hospital Connectivity Works (the project), comprises the provision of essential road works to enhance connectivity to the hospital. Further design development would inform a more detailed description and assessment of the project for Stage 2, comprising network enhancement works to improve the broader network capacity. An assessment of the Stage 2 concept design would be the subject of a separate EIS.

A strategic design for the Concept Proposal is described in Table 1-1. An indication of the staging of key project elements is also included.

Both Stage 1 and Stage 2 of the project would also include drainage works, landscaping, property acquisition and adjustments, utility relocations (which may be required to extend into surrounding streets), as well as ancillary works during construction including but not limited to, construction compounds, sedimentation basins, batch plants, and stockpile sites.

For the purposes of this report, the scope of the project would not include on-going maintenance works.

Refer to the concept road alignment drawings for further detail.
<table>
<thead>
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<th>KEY FEATURE</th>
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<tr>
<td><strong>STAGE 1 PROJECT</strong></td>
</tr>
<tr>
<td>Widening and intersection upgrades along sections of Forest Way between Warringah Road and the vicinity of Adams Street</td>
</tr>
<tr>
<td>Upgrade of the existing bus stop fronting the Forest Way shopping centre on Forest Way, to accommodate two buses within the bay.</td>
</tr>
<tr>
<td>Widening of Naree Road, Frenchs Forest Road West and a section of Frenchs Forest Road East from the Wakehurst Parkway intersection to Skyline Place.</td>
</tr>
<tr>
<td>Provision of a new signalised intersection on Naree Road and Frenchs Forest Road West, on Frenchs Forest Road West as a new access to the hospital, on Frenchs Forest Road East and Romford Road, and on Frenchs Forest Road East, Patanga Road and Allambie Road.</td>
</tr>
<tr>
<td>Provision of dedicated kerb side bus lanes along approaches and departures to the Frenchs Forest Road West and East intersection with Wakehurst Parkway.</td>
</tr>
<tr>
<td>Widening and upgrades to the intersection of Frenchs Forest Road and Wakehurst Parkway.</td>
</tr>
<tr>
<td>Widening of Wakehurst Parkway from about 450 metres north of the intersection with Frenchs Forest Road to the intersection with Warringah Road.</td>
</tr>
<tr>
<td>Widening of Allambie Road to the north of the intersection with Warringah Road.</td>
</tr>
<tr>
<td>Widening and upgrade to the Warringah Road and Allambie Road intersection.</td>
</tr>
<tr>
<td>Widening of Warringah Road around 500 metres west of the intersection with Allambie Road to the vicinity of Courtley Street in the east.</td>
</tr>
<tr>
<td><strong>STAGE 2 PROJECT</strong></td>
</tr>
<tr>
<td>Widening and upgrades along Warringah Road, including grade separated pedestrian facilities.</td>
</tr>
<tr>
<td>Grade separation of Warringah Road via an underpass at the intersection with Forest Way.</td>
</tr>
<tr>
<td>Grade separation of Warringah Road via an underpass at the intersection with Wakehurst Parkway.</td>
</tr>
<tr>
<td>Connecting Aquatic Drive with Wakehurst Parkway.</td>
</tr>
<tr>
<td>Grade separation of Warringah Road via an underpass at the intersection with Hilmer Street.</td>
</tr>
<tr>
<td>Widening and upgrades along sections of Wakehurst Parkway from about 140 metres north of the intersection with Warringah Road to about 500 metres south of the intersection.</td>
</tr>
<tr>
<td>Widening and upgrades of Allambie Road between Warringah Road and Rodborough Road.</td>
</tr>
<tr>
<td>Minor upgrades of Rodborough Road between Warringah Road and Allambie Road.</td>
</tr>
</tbody>
</table>
1.6 SECRETARY ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The Secretary has set out the following requirements (refer Table 1-2) that must be addressed in relation to urban design. The requirements have been determined by the NSW Department of Planning and Environment. An assessment of the concept proposal under the Environmental Planning and Assessment Act 1979 Part 5.1 is required.

Refer to Secretary Environmental Assessment Requirements for Northern Beaches Hospital Connectivity and Network Enhancement Works (SSI 14_6434) (NSW Department of Planning and Infrastructure, 17.04.14).

Table 1-2: SECRETARY ENVIRONMENTAL ASSESSMENT’S REQUIREMENTS – URBAN DESIGN

<table>
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<tr>
<th>NO.</th>
<th>STAGE 1 VISUAL AMENITY, BUILT FORM AND URBAN DESIGN REQUIREMENT</th>
<th>ENVIRONMENTAL ASSESSMENT REQUIREMENT</th>
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<tr>
<td>1.1</td>
<td>Development of urban design objectives and principles for the proposal, including consistency with existing (and desired) built (under- and over-pass structures), natural and community character of the area; and</td>
<td>Urban design objectives and principles have been outlined in the urban design framework plan and further developed during the concept design stage and are described in this report. Refer Table 1-3 in Section 1 of this report</td>
</tr>
<tr>
<td>1.2</td>
<td>A broad framework for consideration of design and safety measures, for pedestrian, cycle and bus connectivity and access in the vicinity of the proposal.</td>
<td>Pedestrian, cycle and bus connectivity has been addressed during concept design through an integrated design process and incorporation of broader strategic policy including Warringah Council’s bicycle. Refer Section 3 of this report</td>
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<tr>
<td>2.0</td>
<td>STAGE 1 HOSPITAL CONNECTIVITY WORKS</td>
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<tr>
<td>2.1</td>
<td>Rationale for the overall design of enhancement works and key elements within the framework of the concept proposal in terms of:</td>
<td>Urban design guidance has been developed in order to inform the scale, materiality and aesthetic quality of infrastructure elements. Refer Section 4 of this report</td>
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<tr>
<td></td>
<td>Scale, length, height, width, materials, lighting and relationship of elements that affects the form and appearance of the proposal in its context for users and the community</td>
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<td></td>
<td>Views to and from the proposal</td>
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<tr>
<td>2.2</td>
<td>An assessment of the visual and amenity impacts of the proposal (including a visual impact assessment) on the local and regional area, particularly on:</td>
<td>A visual impact assessment has been prepared in accordance with Roads and Maritime guidelines. A strategy has been developed that mitigates physical and visual impacts for local residents and workers, road users and other selected viewpoints in terms of context. Refer Section 4 of this report</td>
</tr>
<tr>
<td></td>
<td>Existing and future residential properties adjacent to the proposal alignment</td>
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<tr>
<td></td>
<td>The proposed Northern Beaches Hospital and The Forest High School</td>
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<td></td>
<td>Character precincts</td>
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<td></td>
<td>Landscape, particularly trees and vegetation along the Wakehurst Parkway corridor</td>
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<td></td>
<td>Adjoining commercial, industrial, educational, cultural and recreational land uses</td>
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<tr>
<td>2.3</td>
<td>Consideration of design, including safety aspects, for pedestrian, cycle and bus connectivity and access and related facilities as part of and within the vicinity of the proposal</td>
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<td></td>
<td>The concept design prepared by Roads and Maritime has been developed to improve access and connectivity for motorists, bus services, cyclists and pedestrians. Urban design has participated in this design process to ensure that cyclists and pedestrians are well connected to study area destinations, residential areas and local landmarks. Refer Section 3 of this report.</td>
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<tr>
<th>2.4</th>
<th>Safety and security for users of the Forest High School during construction, based on Crime Prevention Through Environmental Design (CPTED) principles</th>
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<tr>
<td></td>
<td>Consideration of student safety, as well as the safety of all site stakeholders and users would be paramount during construction and has been considered during design. Particular consideration would be paid to site fencing and staging of the works to ensure site security is maintained during construction. Safe pedestrian connectivity would be maintained during construction through the provision of roadside barriers. A new road between the NBH and Forest High School will assist student and teacher safety by increasing access and visibility of the site and by creating a new eastern frontage to the school. Refer Section 4 of this report.</td>
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<tr>
<th>2.5</th>
<th>Landscape needed to protect or repair affected trees and vegetation, mitigate proposal impacts and blend the proposal into the adjacent environment, and consistency with the landscape and urban design concepts of the proposed Northern Beaches Hospital</th>
</tr>
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<tr>
<td></td>
<td>Landscape design objectives and principles have been developed based on an assessment of existing vegetation communities and corridors, in order to mitigate vegetation loss necessary for constructing the design proposal. The landscape proposal aims to generate a consistency to the streetscape and provide screening of impacted views and to provide gateway statements. Refer Section 3 of this report.</td>
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<th>2.6</th>
<th>Incorporation of water sensitive urban design (WSUD)</th>
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<td></td>
<td>WSUD, in the form of bioretention swales, is referred to in the proposal for potential locations including verges and larger traffic islands. Bioretention swales assist the overall drainage strategy through slowing runoff, drawing down nutrients, capturing sediment and improving water quality prior to release into sensitive catchments or to stormwater. The drainage proposal is outlined in the Drainage Investigation Report undertaken by Lyall &amp; Associates (July 2014)</td>
</tr>
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<tr>
<th>2.7</th>
<th>Visual impact assessment of the construction and operation impacts of the proposal and how visual and amenity impacts are to be mitigated.</th>
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<td></td>
<td>A high level assessment has been made of impacts during construction and how these impacts can be mitigated during Stage 1. As precise staging of works is not currently known, this would be subject to further development during later design stages and during construction. Refer Section 4 of this report.</td>
</tr>
</tbody>
</table>
1.7 URBAN DESIGN GUIDANCE

The following documents, guidelines and policy framework are important references for the continuing design development for the project and have been considered in the preparation of this urban design report and associated concept design and mitigation measures (refer Plates 1-1 and 1-2):

• Beyond the Pavement (Roads and Maritime, 2013)
• EIA N04 Practice Note: Guidelines for Landscape Character and Visual Impact Assessment V2.0 (Roads and Maritime, 2013)
• Bridge Aesthetics (Roads and Maritime, 2012)
• Noise Wall Guidelines (Roads and Maritime, 2006)
• Shotcrete Design Guidelines (Roads and Maritime, 2005)
• Landscape Guidelines (Roads and Maritime, 2008)
• Northern Beaches Hospital Precinct Supporting Road Network - Urban Design Framework (KI Studio, September 2013)
• Northern Beaches Hospital Connectivity and Network Enhancements Preliminary Environmental Investigation (SMEC, 2014)
• Warringah Local Environmental Plan (Warringah Council, 2011)
• Frenchs Forest Significant Site Study (now discontinued) (Department of Planning & Environment, 2010)
• Frenchs Forest Structure Plan (Warringah Council, 2014) – this document is currently in progress and may inform the proposal at a later date
  http://shoroc.com/frenchs-forest/
• Shaping our future, transport and health investment (SHOROC, 2010)
  http://shoroc.com/shapingourfuture/

Plate 1-1: Cover page of Urban Design Framework report (KI Studio, September 2013)
1.8 URBAN DESIGN AND LANDSCAPE OBJECTIVES AND PRINCIPLES

OBJECTIVES

The over-arching aim of the urban design proposal is to ensure that the project is physically and visually integrated with its surrounding environment and where possible, maximises engagement of the road user with local context in order to provide a more enjoyable and interesting driving experience. Urban and landscape design work in combination in order to provide a dialogue with the existing landscape, a consistency of visual outcomes along the upgrade and to satisfy requirements that have been determined by the Secretary for Environmental Assessment.

In order to meet these aims, a set of key urban design objectives and related design principles has been developed. These objectives and principles reference Roads and Maritime’s Beyond the Pavement and other key guidelines. These objectives and principles are also based on an understanding of the key existing landscape and urban values of the study area and the landscape and urban design issues that affect, or are affected by, the project.

These urban design objectives have been developed in order to:

• Retain and reinforce the parkway character of Warringah Road and Wakehurst Parkway and distinguish the ecological character of Wakehurst Parkway from the more formal and urbanised parkland character of Warringah Road
• Reinforce the lush and green character of the area and express the bushland character
• Deliver an integrated approach to traffic (including pedestrian and cycle), public transport and land use
• Retain the privacy and amenity residents in the local streets in the immediate area, and provide opportunities for urban restructuring and redevelopment
• Define the address of the hospital locality as well as expressing the area as a gateway to the Northern Beaches.
• Create a clear structural framework for streetscapes that enhances the legibility, way-finding and functioning of the precinct
• Design integrated urban infrastructure/landscape design elements that allow the landscape to dominate built forms to recede.

These objectives address the main outcomes that must be achieved in terms of Roads and Maritime’s high level urban design policy Beyond the Pavement in terms of sensitivity to accessibility and connectivity and the public domain.
PRINCIPLES

A series of urban design principles has been developed to ensure that the urban and landscape design objectives are achieved by the highway upgrade. The purpose of these principles is to integrate sound urban design practice into all aspects of the concept design development, and also inform the detailed design and construction phases of the project.

The urban design principles relate to three broad areas of design influence:

- **Road alignment design** - The design of the location and geometry of the proposal
- **Road elements design** - Input into the design of structures, fences and furniture that are necessary to achieve the road alignment or are required for the effective operation of the road.
- **Landscape design** - The design of new planting or revegetation areas in order to integrate the proposal with the existing local landscape character and natural patterns, and to provide interest to the road users and pedestrians.

**Table 1-3** on the following page describes the interrelationship between the urban design objectives, their associated urban design principles and the areas of the proposal that they influence. The mitigation measures that respond to the principles and impacts identified are located in **Section 4** of this report.
URBAN DESIGN OBJECTIVES & RELATED PRINCIPLES

1F Improve facilities for all road users – including motorists, pedestrians and cyclists.

2 Reinforce the lush and green character of the area and express the bushland character

2A Use native vegetation in the application of landscape design strategies to reinforce the character of the area

2B Evaluate opportunities of introducing street trees along Forest Way

2C Reinforce the definition of the intersection of Warringah Road and Wakehurst Parkway through strategic landscape measures such as revegetating impacted areas where applicable

2D Minimise impacts to existing vegetation and utilise it as green buffers/visual foils to new built form, and urban infrastructure

3 Deliver an integrated approach to traffic (including pedestrian and cycle), public transport and land use

3A Provide user friendly pedestrian crossings at Warringah Road and Forest Way

3B Ensure good connectivity to public transport modes, particularly along Warringah Road.

4 Retain the privacy and amenity residents in the local streets in the immediate area, and provide opportunities for urban restructuring and redevelopment

4A Utilise existing vegetation as visual screening within new developments to retain green character and minimise visual impacts

4B Apply landscape strategies that complement the future character and scale of built form elements of the precinct

4C Minimise pedestrian and vehicular conflicts and noise impacts for residents along Frenchs Forest Road West as much as practical

4D Enhance pedestrian facilities and crossing points along Frenchs Road West to enhance pedestrian safety for school children.

5 Define the address of the hospital locality as well as expressing the area as a gateway to the Northern Beaches.

5A The opportunity exists to make the hospital site a strong visual marker along the journey, reinforcing the sense of place.

6 Create a clear structural framework for streetscapes that enhances the legibility, way-finding and functioning of the precinct

6A Consider separating regional from local traffic to enhance the legibility and way-finding around the precinct

6B If possible, avoid the introduction of noise barriers that visually bisect the community/precinct. If these elements would be required integrate these with fencing elements and soften their appearance

6C Minimise impacts to existing vegetation and utilise it as green buffers/visual foils to new built form, and urban infrastructure
<table>
<thead>
<tr>
<th>URBAN DESIGN OBJECTIVES &amp; RELATED PRINCIPLES</th>
<th>AREAS OF DESIGN INFLUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6D Reinforce/formalise the existing pedestrian link between hospital site and school</td>
<td>Road alignment design: ●</td>
</tr>
<tr>
<td>6E Ensure existing pedestrian links are retained and proper connectivity is achieved to road crossings, particularly for Warringah Road</td>
<td>●</td>
</tr>
<tr>
<td>6F Create a buffer zone between road and path to increase pedestrian safety and articulate the paved surfaces</td>
<td>●</td>
</tr>
<tr>
<td>6G Avoid as much as practical the introduction of barriers</td>
<td>●</td>
</tr>
<tr>
<td>6H Evaluate opportunities to introduce pedestrian crossings as overpasses, acting as legible markers to both drivers and pedestrians</td>
<td>●</td>
</tr>
<tr>
<td>6I Ensure hospital access/entry point allows proper connectivity to major arterial roads</td>
<td>●</td>
</tr>
<tr>
<td>6J Apply CPTED (Crime Prevention Through Environmental Design) principles in the design resolution of the Stage 1 Project</td>
<td>●</td>
</tr>
<tr>
<td>7 Design integrated urban infrastructure/landscape design elements that allow the landscape to dominate built forms to recede</td>
<td>Road alignment design: ●</td>
</tr>
<tr>
<td>7A Consider the use of natural materials in built form elements to reinforce the setting’s character</td>
<td>●</td>
</tr>
<tr>
<td>7B Consider, if practical, under grounding power lines particularly on the high ridge area, and in constrained areas, to enhance opportunities for planting</td>
<td>●</td>
</tr>
<tr>
<td>7C Use colour schemes that complement the area’s character or that help recede built form elements</td>
<td>●</td>
</tr>
<tr>
<td>7D Apply landscape strategies that complement the future character and scale of built form elements of the precinct</td>
<td>●</td>
</tr>
<tr>
<td>7E Apply darker colours in areas where structures should visually recede</td>
<td>●</td>
</tr>
<tr>
<td>7F Introduce stepped retaining walls (where possible) with planted benches to reinforce the green character of the setting</td>
<td>●</td>
</tr>
<tr>
<td>7G Consider widening the road corridor in strategic areas to allow better greening opportunities</td>
<td>●</td>
</tr>
<tr>
<td>7H Introduce vegetated batters where practical to conceal the apparent height of structures</td>
<td>●</td>
</tr>
<tr>
<td>7I Introduce water sensitive design and minimise hard surface engineered drainage concepts.</td>
<td>●</td>
</tr>
</tbody>
</table>
2. EXISTING ENVIRONMENT

The following section of the report provides a summary of existing landscape context and cultural influences on the concept proposal study area and Stage 1 project area. The purpose of this background information is to inform the development of mitigation measures that respond to impacts that have been identified in the Secretary Environmental Assessment’s requirements.

Further detail can be obtained by reviewing the relevant specialist consultant’s reports.

2.1 GEOLOGY

The proposal study area is underlain by Hawkesbury Sandstone, and Triassic Wianamatta Group Shales, which comprise the Liverpool Sub-Group of Minchinbury Sandstone and Bringelly and Ashfield Shales (1:250,000 Geological Series Sheet S1 56-5 Sydney). The sandstone geology has weathered to leave exposed stone outcroppings, while the shale geology consists of shale with sandstone lenses. Many locations have been disturbed by development.

An existing cutting located on Wakehurst Parkway south of the intersection with Warringah Road, provides a good example of the underlying sandstone formation. Further south along Wakehurst Parkway, good examples of sandstone outcropping are present.

The study area is within the Lucas Heights soil landscape, overlying shale at 3-5 m thick and Hawkesbury Sandstone at about 10-11 metres deep. Pockets of clay are common, while bands of iron-rich sands and ironstone gravels can also be found.

The main soil types to be expected within the Stage 1 area are sandstone derived soils associated with ridgelines, as well as pockets or ironstone gravels and shaly clays.

Urban design considerations:
- Geology and soil types closely relate to vegetation communities present, therefore dictating the landscape approach that would be proposed
- Opportunity to reveal exposed rock in proposed cuttings or re-use rock material in the proposal
- Understanding the drainage properties of soils is crucial to ensure appropriate species are selected and sensitive catchments are protected.

2.2 CLIMATIC FACTORS

The Frenchs Forest to Terry Hills area is relatively high in a local context and known to be more exposed to heavy rainstorms and colder temperatures than the nearby coastal suburbs. According to Bureau of Meteorology data, Frenchs Forest has a total mean annual rainfall of 1,348.8 millimeters (mm), with the highest mean monthly rainfall falling in the months of January to April (129.5 to 155.5 mm per month). At Collaroy Beach 2.8 km to the north of Dee Why, reduced mean rainfall of 119.7 to 109.4 mm is recorded for the same period.
Frenchs Forest has a mean average annual temperature of 21.6 degrees Celsius (C), with the warmest months being December to February (about 28° C) and the coldest months of June to August (about 15 to 16°C).

Urban design considerations:
- Seasonal impacts on construction activities, specifically landscape implementation
- Planting and revegetation species would need to be adaptable to expected climate.

2.3 LANDFORM AND TOPOGRAPHY

The study area comprises a series of ridges, plateaus and gullies, with the major roads ie Warringah Road, generally following ridgelines. Elevations range from 115 to 164 metres (m) above sea level (a.s.l). The Stage 1 area centred on Frenchs Forest Road is immediately to the north of the major ridgeline (Refer Figure 2-1).

The proposed NBH site, which fronts Frenchs Forest Road on one side, is situated at the intersection of two ridgelines that Warringah Road and Wakehurst Parkway follow. At the intersection of Warringah Road and Wakehurst Parkway, the topographic height is about 110 m a.s.l with deep gullies either side.

The ridgeline associated with Warringah Road continues in an easterly direction towards Dee Why via the Governor Phillip Lookout at Beacon Hill, which at about 150 a.s.l, is a local highpoint and landmark. From Beacon Hill the ridgeline continues on to form the headland at North Curl Curl between Dee Why and Curl Curl beaches.

The Warringah Road ridge dissects the ridgeline associated with the southern section of Wakehurst Parkway. The northern section of Wakehurst Parkway descends into a valley associated with Deep Creek and Narrabeen Lakes, a tidal lagoon.

Frenchs Forest Road is steeply undulating between Forest Way and Rabett Street as well as on approach to the Wakehurst Parkway in both directions. The other sections of Frenchs Forest Road and a short length of Forest Way are relatively flat or exhibit minor undulations only.

Urban design considerations:
- Prominent ridgeline position from all approaches
- Strong topographic form typical of region
- Vertical and horizontal alignment design challenges.
Figure 2-1: Landform and topography of the study area
2.4 HYDROLOGY AND DRAINAGE

The catchments formed by the Warringah Road and Wakehurst Parkway ridges define deep gullies either side, which contain 2 and 3 order creek systems that ultimately drain into either estuarine lagoons or Middle Harbour (Refer Figure 2-2).

Trefoil Creek 100 metres to the north east of the study area is the closest water body and is a tributary of Middle Creek, which drains into Narrabeen Lagoon a further five kilometres to the north east. To the south of Warringah Road lies Curl Curl Creek, a tributary of Manly Dam, a former water supply. Further downstream of this catchment is Manly Lagoon. To the south west is the Middle Harbour catchment at Bantry Bay, an important geographical feature of European settlement of the area.

The Stage 1 area drains into the Middle Creek catchment and ultimately Narrabeen Lakes. A bushland corridor follows this watercourse and suburban pockets are well-vegetated.

Urban design considerations:
• Sensitive broader catchments, comprising bushland creeks, recreational water bodies and coastal lagoons.
• The study area is generally well drained due to the ridge top location and presence of nearby gullies.
Figure 2-2: Hydrology and drainage of the study area
2.5 **BIODIVERSITY**

**HABITAT**

The study area includes remnant stands of vegetation on ridgelines and in gullies, riparian corridors and grasslands. Hollow-bearing trees, rock platforms, boulders and coarse woody debris and sandstone caves, which all provide certain types of habitat for native fauna, can be found in around the study area, including the Stage 1 area. Wakehurst Parkway follows an important vegetation corridor connecting bushland between the Manly/ Seaforth area with Oxford Falls and Narrabeen Lakes. The corridor contributes to fauna connectivity, particularly along the various creek lines. Native and exotic planting within commercial and residential areas also contributes to habitat.

**VEGETATION**

Dense stands of indigenous vegetation remain in the study area, however residential and commercial land uses and roads have substantially impacted and continue to impact the remaining areas, creating a patchwork in various states of intactness. The more important areas of vegetation are consistent with Duffys Forest Ecological Community.

Dominant canopy tree species include Smooth-barked Apple (*Angophora costata*), Silver-topped Ash (*Eucalyptus sieberi*) and Red Bloodwood (*Corymbia gummi*). Also common are Broad-leaved White Mahogany (*Eucalyptus umbra*) and Red Mahogany (*Eucalyptus resinifera*), while Brown Stringybark (*Eucalyptus capitellata*) and White Stringybark (*Eucalyptus globoidea*) occur less frequently. Vegetation communities and sub-communities typically indicate soil types present in the study area.

The Stage 1 area forms part of and is influenced by, the Duffys Forest Ecological Community, with potential locations of the associated Endangered Ecological Communities found in the Stage 1 area including the NBH site. Substantial tree and shrub planting is associated with the commercial sites, the Forest High School, street trees and residential ‘back yards’, which contribute to the overall density of vegetation found in the Stage 1 area.

The vegetation communities are shown in Figure 2-3.

**Urban design considerations:**

- Clearing of Duffys Forest Ecological Community should be avoided, particularly in key Endangered Ecological Communities locations
- Vegetation retention strategies should be employed wherever possible, including seed harvesting, particularly of Duffys Forest Ecological Community, soil translocation and Bushland Reconstruction techniques
- Indigenous vegetation should not be cleared for ancillary work such as site compounds or temporary water quality basins.
VEGETATION COMMUNITIES
A number of vegetation communities including endangered ecological communities (EECs) exist around the study area, in particular, the Duffys Forest Ecological Community is intersected by the Stage 1 area (refer Figure 2-3). The Endangered Ecological Communities are registered with the Department of Environment, Protected Matters (EPBC Act) and/or the Threatened Species Conservation Act (TSC Act).

The key vegetation communities are:
- Blue Gum High Forest of the Sydney Basin Bioregion
- Coastal Upland Swamp in the Sydney Basin Bioregion
- Duffys Forest Ecological Community (DFEC)
- Eastern Suburbs Banksia Scrub of the Sydney Region
- Littoral Rainforest and Coastal Vine Thicket of Eastern Australia
- Turpentine-Ironbark Forest in the Sydney Basin Bioregion.

THREATENED SPECIES
There are 23 flora species and up to 37 threatened fauna species that have been identified as having a moderate to high potential of occurring in the study area, with many assessed as having the potential to exist within the Stage 1 area. These fauna species consist of frogs and reptiles, various birds including cockatoos, the Little Lorikeet and the Little Eagle and owls, small mammals including Koala, gliders, flying-foxes and bats.

Stage 1
The Stage 1 area forms part of or is influenced by the Duffys Forest Ecological Community with potential locations of the associated Endangered Ecological Communities. Substantial tree and shrub planting is associated with the commercial sites, street trees and residential ‘back yards’ and whilst visual benefits are afforded, there is also a contribution to habitat. Four endangered flora species have previously been recorded in the study area. Recent surveys have failed to find evidence of threatened fauna species with the Stage 1 area, however the potential for their existence remains.

Urban design considerations:
- Construction work and associated clearing are to be strictly managed in order to minimise impacts on threatened vegetation communities and fauna species.
- Loss of specific habitat such as hollow-bearing trees should be replaced or relocated, as outlined in the Environmental Management Plan.
Figure 2.3: Existing vegetation communities of the study area
2.6 TRANSPORT AND PEDESTRIAN NETWORK

Warringah Road is the main arterial road in the region and in combination with Boundary Road in Willoughby to the south of the study area, links Chatswood and the Pacific Highway with the Northern Beaches. Wakehurst Parkway, in this immediate area, consists of a bushland corridor that provides an alternative route from Seaforth, Manly and the Spit Bridge to Narrabeen and the Northern Beaches. Forest Way connects Warringah Road with Mona Vale Road, an important regional arterial road that connects Mona Vale and Terry Hills in the north to St Ives and the Pacific Highway.

All of these routes provide important connections for people of the Northern Beaches with either the City or the Pacific Highway and are heavily congested in the peak travel hours. Frenchs Forest Road and Naree Road in Stage 1 comprise an important secondary east-west connection between Forestway and Wakehurst Parkway.

Government and private (Forest Coach Lines) bus services operate in the study area, connecting Manly, Warringah Mall, Dee Why, Forestway Shopping Centre, Roseville, Terry Hills and Chatswood Rail Interchange. Buses also provide access to the Forest High School adjacent to the NBH site. Several bus stops are located within the Stage 1 area on Frenchs Forest Road; these are associated with the government and school bus route.

There are no rail or light rail services in the area, which places reliance on private vehicle and bus usage. Several studies have been undertaken with regards to bus rapid transport and there is potential for this to be realised post-completion of the NBH. There are no formal bicycle facilities aside from use of roads, bus lanes, verges and footpaths. Warringah Road is the designated Warringah Council bicycle route, with smaller lengths of bicycle routes associated with the Forest High School.

Frenchs Forest Road, Forest Way and Wakehurst Parkway form critical routes and intersections for the functioning of the future NBH as well as ongoing connectivity for local residents. Buses, bicycle and pedestrian routes are present in the Stage 1 area. An important pedestrian connection exists between Forest High School and Forest Way Shopping Centre, which would be reinforced with the addition of the NBH. Pedestrian footpaths are located on both sides of Frenchs Forest Road, providing various connections, all of which are to be maintained and improved (refer Figure 2-4).

Urban design considerations:

- Heavy vehicle congestion in peak hours and weekends, likely to worsen upon completion of the NBH
- Bus services and pedestrian connectivity to the NBH is important
- High levels of pedestrian activity during school opening and closing times
- Improved bicycle and pedestrian connectivity and safety is needed
- Consideration of local vehicle, bicycle and pedestrian routes between residential areas, institutional and commercial facilities eg at Hilmer Street and along Frenchs Forest Road
- Relationship to regional road network in terms of connectivity and visual consistency.
Figure 2-4: Existing transport network


2.7 HISTORICAL CONTEXT

ABORIGINAL HERITAGE

Historical context of the study area represents Aboriginal heritage, non-Aboriginal heritage and other notable site features that contribute to the history of the site (refer Figure 2-5).

For at least 20,000 years prior to European settlement in 1788, local Aboriginal people, largely of the Guringai and Gai-Manjagal, lived out a subsistence existence utilising the abundant source of food from densely forested areas, grasslands as well as nearby water bodies. The ridgetops and creeklines provided travel routes within the study area and to surrounding areas including the coast.

Exposed rock platforms found in and around the study area are considered suitable as surfaces for engraving and sharpening of stone axes/tools, or for shelter. No examples have been found within the Stage 1 area or the broader study area, however examples of rock engravings have been recorded outside of the study area. Many examples of Aboriginal culture that would have previously existed have since been destroyed by previous land uses and in some cases vandalism.

No Aboriginal sites or deposits have been identified, nor are they likely to be uncovered during construction due to previous disturbance.

Design Considerations:
- Careful management during construction to assess potential for Aboriginal deposits or evidence of rock engravings, middens, burial sites or cave shelters.

NON-ABORIGINAL HERITAGE

Europeans first discovered the Frenchs Forest area shortly after settlement in 1788. Governor Arthur Phillip explored the area for the purpose of finding arable land and water sources for the colony. He noted that the area was not particularly suitable for agricultural uses and that there was dense bushland and areas of native grassland.

Settlement of the coastal villages such as Manly and Narrabeen began prior to the 1830s. Formalised land grants of 100-200 acres commenced in the Frenchs Forest around the 1840s-50s and consisted of small farms divided from the larger grants. One such grant was known as ‘Pearce’s 200 Acres’ and later Rodborough, which comprises much of the study area and virtually all of Stage 1. Further subdivisions occurred, with smaller 8-10 acre residential lots available from the 1870s, often these were divided from the earlier, larger grants.

During these early times there were limited roads, and access from the city was via boat to Manly, a pier in Bantry Bay, or via the Spit punt (now Spit Bridge). An unsealed road (probably the Allambie Road route) from Manly pier, about 6 kilometres away, or the closer wharf at Bantry Bay, accessed by what we now know as Bantry Bay Road (cleared in 1859), would have been the main routes to Frenchs Forest. By 1943, as evidenced by Roads and Traffic Authority (RTA) mapping, Warringah Road was not as formalised as Wakehurst Parkway, which was sealed in 1946. Later, Warringah Road would become the primary route.

This intersection of these two roads forms a gateway to ‘the Forest’ district and is considered a local landmark by many due its location. The intersection was formally known colloquially as...
the ‘blinking light’, a reference to the suspended signal light that marked the intersection and which was one of very few traffic signals in the northern beaches. The ‘blinking light’ remained until the early 1970s.

HERITAGE LISTED ITEMS
There are no items of significance within the study area on the world, national, state or Roads and Maritime registers, however there are some items registered as having local significance on the Warringah Council Local Environmental Plan or considered to have potential significance and which are currently nominated for listing, including:

• Remnant orchard trees along Warringah Road in front of the Forest High School (one remains in the verge, several have been propagated on the school grounds)
• Former Methodist Church on the corner of Forestway and Naree Road
• Betty Maloney Gardens at 18 Hurdis Avenue, Frenchs Forest, which whilst overgrown contains a number of important indigenous species and plant groupings
• Several local residences in Frenchs Forest relating to early settlement.

Other locations considered important to the history and development of the area (at least in an urban design sense) are:

• Brick Pit Reserve on Bantry Bay Road (former brick quarry run by Hews)
• The intersection of Warringah Road and Wakehurst Parkway (location of the “Blinking Light”)
• The pedestrian overbridge at the intersection of Warringah Road and Forestway, which is an early example of a concrete pedestrian bridge with an elegant form and integrated haunching and substructure.

The key heritage considerations for Stage 1 are the former Methodist Church on the corner of Forest Way and Naree Road and local residences to the west of Forest Way.

Urban design considerations:
• Construction activities in the study area should avoid items of heritage significance and be managed in accordance with best practice
• Items such as the orchard trees and the ‘blinking light’ may be considered as sources of design inspiration for future urban and landscape design treatments associated with the roadwork.
Figure 2.5: Historical context of the study area.
2.8 LAND USE AND SETTLEMENT PATTERNS

A review of existing and former land uses in the study area has provided an understanding of how settlement patterns have influenced cultural patterns on the landscape (refer Figure 2-6).

Early settlement of the area began in the 1820s with 100-200 acre land grants for timber harvesting and farming. Other early land uses included timber getting from the 1840-50s, the brick quarry on Bantry Bay Road (1885) and the orchard on the Forest High School site (1906). More substantial residential settlement of the area (primarily Forestville) began about 1916 and continued during the years following World War I in the form of 5 acre lot returned soldier settlements, however progress was relatively slow due to the isolation of the area and scattered nature of the community.

Access improved with the construction of the first Roseville Bridge in 1924 (providing a connection to Willoughby and Chatswood) and the replacement of the Spit punt with a bridge in the same year. About 500 people lived in the area at the time, with the main occupations being related to rural activities but also brick-makers, labourers and the like. Rural activities consisted of dairy, poultry and pig farming as well as market gardening and orchards. Despite the above, the area remained largely rural until the mid nineteenth century.

After the second world war, the 1950-60s saw substantial low-density suburban development and road and infrastructure construction, as well as the construction of the villages of Forestville and Belrose to the west of the study area and isolated pockets of commercial development along Warringah Road. The Forest High School next to the NBH site was opened in 1961 and ‘Arndale’ shops (now Forestway Shopping Centre) was opened in the 1960s. The Spit Bridge was widened in 1958 and Roseville Bridge replaced in 1966, both bridges remain to this day. Bus services became more frequent, with the “Royale” line linking Terry Hills with the city via Frenchs Forest.

Remnants of the major original land grants are still discernable, with many of the major roads and subdivisions typically following cadastral boundaries. Frenchs Forest Road, Warringah Road and Fitzpatrick Avenue, all running parallel, are the major east-west cadastral boundary lines in the study area. Today, Warringah Road deviates between the three parallel alignments and early tracks correlating with this are visible in aerial photography taken in 1943. The study area has been extensively cleared during the previous history of land uses, with the NBH site and another block to the east being examples of very few uncleared blocks of land.

By the 1960s, the intersection of Wakehurst Parkway and Warringah Road had became somewhat of a landmark due to its historical uses, topographical location and the fact that it was an important junction of a relative few arterial roads in the region. During the next 20 years land uses that occurred around the intersection were the former ‘skyline’ outdoor movie cinema (demolished in the early 1980s) to the east (now the Parkway Hotel and Skyline Business Park) as well as the ‘Arndale’ shops (now Forestway Shopping Centre), the Forest High School and the Warringah Aquatic Centre.

The key land uses present in the Stage 1 project area include commercial ‘business park’ developments and the Forest High School, residential development, the Forest Alliance Church and the Skyline Shops at the corner of Frenchs Forest Road East and Allambie Road. Residential development is primarily found on northern verges, however is found on both verges between the western edge of Forest High School and Forest Way. Some residences
have been converted to medical suites, which pose the potential of further expansion in the context of the NBH. The Police Station and church are other notable land uses. A popular weekend market is held on the grounds of the Parkway Hotel on Frenchs Forest Road East.

Urban design considerations:
• Visual, noise and character impacts on nearby land uses, particularly residences in the Stage 1 area
• Regeneration of indigenous vegetation in areas previously disturbed by development.
• Possible expansion of medical suites to residences and commercial sites within the study area.
• Contribution of land uses to determination of landscape character.
Figure 2.6: Land use of the study area
2.9 KEY STAKEHOLDER SITES

OVERVIEW
The study area consists of several stakeholder sites where strategic urban design measures would be required in order to mitigate the impacts of the proposal. These impacts include functional issues such as access and parking, as well as visual amenity issues such as screening.

Understanding the location and nature of these key stakeholders is a key urban design consideration in order to ensure mitigation measures adequately address the needs of these stakeholders.

These stakeholders are:
- Skyline Shops
- Business parks and Parkway Hotel
- Forest High School
- Forest Alliance Church
- Forestway Shopping Centre.

SKYLINE SHOPS
Skyline Shops are located on the corner of Allambie Road and Frenchs Forest Road East (refer Plate 2-1). The existing intersection arrangements are complex due to the close proximity of a side street to this intersection, as well as on street parking located within the intersection. A vacant lot is located next to the shops, which is occasionally used for informal parking on the unsealed surface. In addition to the onstreet parking, a mail zone is located on Frenchs Forest Road.

As a result of the widening of Allambie Road and signalisation of the intersection, the proposal would to rectify the intersection arrangements, parking and pedestrian circulation. An opportunity exists to improve pedestrian amenity and to provide bicycle parking. The mail zone would be reinstated.

Plate 2-1: Skyline shops existing character
BUSINESS PARKS

Several business parks and the Parkway Hotel exist along Frenchs Forest Road in the block formally known as Pearce’s 200 acres or Rodborough, part of which was formerly the site of the Skyline outdoor cinema. These sites are accessed via Frenchs Forest Road, although many also front Warringah Road. The largest setbacks comprise a combination of landscape lawn areas with clustered tree planting and car parks (refer Plate 2-2). The vegetation contributes to the overall sense of place inherent to the local area and helps to screen the buildings from the road.

Widening of Frenchs Forest Road East would see some vegetation removal and impact on some of the access arrangements. The main impact is at the proposed signalisation of Romford Road, which would require the removal of one branch of an existing access driveway.

The proposal would provide landscape improvements, covering for vegetation removal and ensure access conditions are improved.

FOREST HIGH SCHOOL

The Forest High School (refer Plate 2-3) is located west of the Wakehurst Parkway intersection and is accessed via Frenchs Forest Road. It occupies land between Frenchs Forest Road and Warringah Road in a similar fashion to the business parks along Frenchs Forest Road East. The school frontage comprises several gated entries for vehicular and pedestrian access, due in part to the angled geometry of the school buildings and resultant skewed car parking spaces and internal footpaths.

The front carpark is considered the primary carpark for the school, however it has poor access, constrained turning movements and has insufficient capacity for the school’s needs. This contributes to the need for onstreet parking on Frenchs Forest Road and side streets, which competes with the parking needs of local residents and bus commuters.
A single lane service road enters the school off Frenchs Forest Road and runs parallel with the school’s eastern boundary. The primary function of the road is to allow access to the gymnasium and canteen for refuse and delivery vehicles, as well as a smaller carpark, the primary function of which is to service the gymnasium, which is open after hours to a variety of user groups.

Another entry is located at the western edge of the school providing access to the playing fields and secondary carpark. The playing field is used throughout the week by students and on weekends by local sporting groups.

The proposal would ensure safe and convenient access is provided to the school for vehicles and pedestrians, legibility of access points is to be improved, service access maintained and improved and compensatory parking provisions provided.

FOREST ALLIANCE CHURCH

The Forest Alliance Church is located on a rock outcrop at the corner of Naree Road and Forest Way at the western end of Stage 1. The grounds include several buildings and a small carpark. One of the buildings is known as the Former Methodist Church building (refer Plate 2-4) and is identified on the Warringah Local Environment Plan 2011 as an item of heritage significance.

The widening of Forest Way and Naree Road would require acquisition of the church as well as modified vehicular and pedestrian access. The Former Methodist Church building would be the subject of further investigation as its proximity to the widened road corridor is potentially unsafe. The proposal would ensure that legible, convenient and safe access is maintained and satisfactory parking capacity is maintained. Assessment of the Former Methodist Church building is to be undertaken in accordance with heritage protocols and in consultation with the Forest Alliance Church and Warringah Council.
FORESTWAY SHOPPING CENTRE

Forestway Shopping Centre (refer Plate 2-5) comprises a multi-level shopping mall and carparking structure, located at the corner of Forest Way and Russell Avenue. Access to the carparking structure is via Forest Way at the southern end of the site or from Russell Avenue. Pedestrian access to the shops is also via these locations as well as other entries not associated with the proposal. A bus stop servicing a number of routes is located half way along the carpark structure on Forest Way.

The widening of Forest Way would require part property acquisitions which may reduce land that is available to pedestrian access and landscape screening. Vegetation removal would likely expose the carpark structure to viewers on Forest Way. The proposal would ensure that legible, safe and convenient access is provided for pedestrians, particularly from Forestway Shopping Centre and NBH. Landscape and architectural screening would be considered along the Forest Way frontage of the car park structure.
PRIVATE RESIDENCES AND CONVERTED RESIDENTIAL BUILDINGS

The study area consists of several enclaves of private residences (refer Plate 2-6). Within the Stage 1 project area, private residences line Frenchs Forest Road East for virtually all of its northern edge apart from Skyline Shops. On Frenchs Forest Road West, private residences line both sides of the road apart from the Forest High School and the NBH Site. Residences are also located on Warringah Road and Forest Way, as well as side streets associated with the Stage 1 project. There are no private residences along this section of Wakehurst Parkway, which is an important consideration for the pedestrian access strategy.

Within these residential areas, many businesses operate within former private residences, including a residential scale police station building. Consideration of these user groups would be similar to private residents.

Residents will be in close proximity to road widening along Frenchs Forest Road and Forest Way and to a lesser extent on Warringah Road at the eastern end of the Stage 1 area. In Frenchs Forest Road East, where the least amount of change would occur, many houses do not have front fencing. On Frenchs Forest Road West, most houses (apart from opposite the Forest High School) have front boundary fencing/screening and vegetation, which in some cases would be removed.

Plate 2-6: Existing residence on Frenchs Forest Road West
3. URBAN DESIGN AND LANDSCAPE CONCEPT

3.1 URBAN DESIGN AND LANDSCAPE STRATEGY

OVERVIEW

In Section 1 of this report a series of urban design objectives and principles were developed for the concept proposal and Stage 1 project and an outline of landscape context provided in order to satisfy the Secretary Environmental Assessment requirements. The following section describes the urban design strategy that has led to the development of an urban and landscape concept design for the Stage 1 project, which in turn would inform the Stage 1 project detailed design. A summary of the strategy, which aims to identify specific direction for the project, is outlined below in Table 3-1 and represented graphically in Figure 3-1.

Prepared in parallel with the concept design is the impacts analysis and subsequent mitigation measures outlined in Section 4.

The urban design and landscape strategy expands on the following topics:

• Road design elements
• Structures
• Landscape formations
• Drainage and water quality
• Road furniture
• Landscape treatments.

Table 3-1: SUMMARY OF URBAN DESIGN AND LANDSCAPE STRATEGY

<table>
<thead>
<tr>
<th>FRAMEWORK OBJECTIVE AND PRINCIPLE</th>
<th>CONCEPT DESIGN STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Retain and reinforce the parkway character of Warringah Road and Wakehurst Parkway and distinguish the ecological character of Wakehurst Parkway from the more formal and urbanised parkland character of Warringah Road</td>
<td>Due to widening of Frenchs Forest Road, some vegetation loss would be unavoidable at the intersection with Wakehurst Parkway.</td>
</tr>
<tr>
<td>1A Ensure that parkway character of both Warringah Road and Wakehurst Parkway are retained through ensuring adequate retention and protection of the existing trees and vegetation. In particular, ensure vegetation is retained on both sides of the roadway, along Warringah Road, where higher impacts are planned</td>
<td>Due to widening of Warringah Road in the eastern section of Stage 1, street trees located in the existing verge would be removed. In combination with replacement street tree planting, existing trees located in the front of commercial and residential properties would assist in maintaining the vegetation corridor parkway character.</td>
</tr>
<tr>
<td></td>
<td>Framework Objective and Principle</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>1B</td>
<td>Minimise earthworks in order to maximise vegetation retention</td>
</tr>
<tr>
<td>1C</td>
<td>Carefully locate shared paths so not to require removal of critical trees eg locate shared user path if practical along the southern verge of Warringah Road</td>
</tr>
<tr>
<td>1D</td>
<td>Encroach any required new road work into the southern verge of Warringah Road</td>
</tr>
<tr>
<td>1E</td>
<td>Apply an informal bush landscape character with large scale boulders and informal planting along Wakehurst Parkway, and a more urbanised parkway landscape concept along Warringah Road.</td>
</tr>
<tr>
<td>1F</td>
<td>Improve facilities for all road users – including motorists, pedestrians and cyclists.</td>
</tr>
<tr>
<td>2</td>
<td>Reinforce the lush and green character of the area and express the bushland character</td>
</tr>
<tr>
<td>2A</td>
<td>Use native vegetation in the application of landscape design strategies to reinforce the character of the area</td>
</tr>
<tr>
<td>2B</td>
<td>Evaluate opportunities of introducing street trees along Forest Way</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Widening of Forest Way would require property acquisitions along front boundaries making it unlikely that street tree planting would be possible along a majority of the road. Where opportunities exist, tree planting would be undertaken on both road reserve and private properties with landowner consent. Landowners would be encouraged to plant trees in the front of their properties.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2C</th>
<th>Reinforce the definition of the intersection of Warringah Road and Wakehurst Parkway through strategic landscape measures such as revegetating impacted areas where applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Due to widening of Frenchs Forest Road, some vegetation loss would be unavoidable at the intersection with Wakehurst Parkway. Clearing associated with construction activities would be revegetated in accordance with the associated vegetation community. Street tree selection for all Stage 1 roads would comprise native species.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2D</th>
<th>Minimise impacts to existing vegetation and utilise it as green buffers/visual foils to new built form, and urban infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In Stage 1, there would be some impact to existing vegetation due to reconfiguration of the Forest High School car park and internal access road. New planting would be undertaken to assist with mitigating visual impacts. Vegetation would be provided along northern verge of Frenchs Forest Road and landowners would be encouraged to plant trees in the front of their properties.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRAMEWORK OBJECTIVE AND PRINCIPLE</th>
<th>CONCEPT DESIGN STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Delive an integrated approach to traffic (including pedestrian and cycle), public transport and land use</td>
<td>In the Stage 1 Project, pedestrian crossings of Warringah Road would be associated with signalised intersections. New pedestrian crossing facilities would be provided at the following signalised intersections: - Forest Way and Naree Road - Frenchs Forest Road West at Naree Road and Rabett Street - Frenchs Forest Road West at Gladys Avenue - Frenchs Forest Road East at Romford Road Existing pedestrian crossing facilities would be upgraded or reconfigured at the following signalised intersections: - Frenchs Forest Road East at Patanga Road - Frenchs Forest Road East at Allambie Road - Frenchs Forest Road and Wakehurst Parkway (southern side only) - On Allambie Road (north) at the Warringah Road intersection - On Warringah Road at the Allambie Road intersection.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>3A</th>
<th>Provide user friendly pedestrian crossings at Warringah Road and Forest Way</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In the Stage 1 Project, pedestrian crossings of Warringah Road would be associated with signalised intersections. New pedestrian crossing facilities would be provided at the following signalised intersections: - Forest Way and Naree Road - Frenchs Forest Road West at Naree Road and Rabett Street - Frenchs Forest Road West at Gladys Avenue - Frenchs Forest Road East at Romford Road Existing pedestrian crossing facilities would be upgraded or reconfigured at the following signalised intersections: - Frenchs Forest Road East at Patanga Road - Frenchs Forest Road East at Allambie Road - Frenchs Forest Road and Wakehurst Parkway (southern side only) - On Allambie Road (north) at the Warringah Road intersection - On Warringah Road at the Allambie Road intersection.</td>
</tr>
</tbody>
</table>
A potential pedestrian crossing has been identified on Frenchs Forest Rd East, to the west of Romford Road, which would provide pedestrian connectivity via an existing footpath and to a bus stop. Crossing of Warringah Road would be maintained by footbridge replacement at Forest Way and a new footbridge at Hilmer Street. Crossings of Forest Way would be designed to connect widened footpaths and minimise pedestrian journey lengths between the hospital and the Forest High School with Forestway Shopping Centre. Pedestrian crossing locations, even where signalised, are to be located close to existing crossing locations. There is to be a net gain in pedestrian crossings throughout the concept proposal.

Widening of Frenchs Forest Road is associated with a major bus route upgrade under consultation with TfNSW. A range of bus transport improvements have been included in the Stage 1 Project consistent with TfNSW Sydney Bus Future Bus connections into Frenchs Forest Road from Warringah Road would be maintained by the right turn provision east of from Warringah Road into Allambie Road and associated widening of Frenchs Forest Road and Naree Road. Widening associated with bus requirements is to minimise, through careful alignment design, impacts on bicycle and pedestrian connectivity, as well as physical impacts on the public domain and residential screening requirements.

### FRAMEWORK OBJECTIVE AND PRINCIPLE

<table>
<thead>
<tr>
<th>FRAMEWORK OBJECTIVE AND PRINCIPLE</th>
<th>CONCEPT DESIGN STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Retain the privacy and amenity residents in the local streets in the immediate area, and provide opportunities for urban restructuring and redevelopment</td>
<td>New developments along Frenchs Forest Road and Warringah Road may be possible in the future in line with the planned Warringah Council Structure Plan and following the construction of the NBH. New developments should retain existing vegetation to the greatest extent possible in order to assist with visual impact mitigation.</td>
</tr>
<tr>
<td>4A Utilise existing vegetation as visual screening within new developments to retain green character and minimise visual impacts</td>
<td>Existing built form is primarily single storey residential and one and two storey commercial buildings. The NBH development will be substantially bigger in scale than the existing built form. Road verges are to be planted wherever possible, with street trees and shrubs.</td>
</tr>
<tr>
<td>4B Apply landscape strategies that complement the future character and scale of built form elements of the precinct</td>
<td></td>
</tr>
</tbody>
</table>

3B Ensure good connectivity to public transport modes, particularly along Warringah Road.
<table>
<thead>
<tr>
<th>4C</th>
<th>Minimise pedestrian and vehicular conflicts and noise impacts for residents along Frenchs Forest Road West as much as practical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pedestrian and vehicular conflicts would be managed through signalisation of pedestrian crossings and provision of pathways along both sides of Frenchs Forest Road.</td>
</tr>
<tr>
<td></td>
<td>A widened pathway, connecting hospital and school users with Forestway Shopping Centre in the west, and Skyline Shops in the east.</td>
</tr>
<tr>
<td></td>
<td>The pathways would connect with the broader region via new pathways and shared pathways along Frenchs Forest Road and Warringah Road in Stages 1 and 2.</td>
</tr>
<tr>
<td></td>
<td>Noise impacts are not expected to substantially increase.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4D</th>
<th>Enhance pedestrian facilities and crossing points along Frenchs Road West to enhance pedestrian safety for school children.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pedestrian crossings points would be rationalised in accordance with the road widening and signalisation, however these new and existing crossings would be upgraded to improve safety.</td>
</tr>
<tr>
<td></td>
<td>New signalised crossings would be provided at the NBH entry road and Rabett Street.</td>
</tr>
<tr>
<td></td>
<td>One crossing would be removed due to the need for road widening, safety and vehicle movements in peak times as well as increased bus movements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRAMEWORK OBJECTIVE AND PRINCIPLE</th>
<th>CONCEPT DESIGN STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Define the address of the hospital locality as well as expressing the area as a gateway to the Northern Beaches.</td>
</tr>
<tr>
<td>5A</td>
<td>The opportunity exists to make the hospital site a strong visual marker along the journey, reinforcing the sense of place.</td>
</tr>
<tr>
<td>6</td>
<td>Create a clear structural framework for streetscapes that enhances the legibility, way-finding and functioning of the precinct.</td>
</tr>
<tr>
<td>6A</td>
<td>Consider separating regional from local traffic to enhance the legibility and way-finding around the precinct.</td>
</tr>
<tr>
<td>6B</td>
<td>If possible, avoid the introduction of noise barriers that visually bisect the community/precinct. If these elements would be required integrate these with fencing elements and soften their appearance.</td>
</tr>
<tr>
<td></td>
<td>Environmental studies including noise monitoring and assessment have indicated that it is unlikely that noise walls would be proposed as part of the Stage 1 Project works. Noise is to be managed by the use of acoustic pavement if required.</td>
</tr>
<tr>
<td>6C</td>
<td>Minimise impacts to existing vegetation and utilise it as green buffers/visual foils to new built form, and urban infrastructure</td>
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</tr>
<tr>
<td></td>
<td>Due to demands on the corridor it has been necessary to remove some existing vegetation to allow for road widening. Where front-line vegetation such as street trees would be removed, this would be mitigated by revealing second-line vegetation and replacement with new planting. Landowners would be encouraged to plant trees in the front of their properties where applicable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6D</th>
<th>Reinforce/formalise the existing pedestrian link between hospital site and school</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A widened pathway is proposed along the southern verge of Frenchs Forest Road connecting the hospital with The Forest High School and Forestway Shopping Centre. A signalised crossing would be provided in order to ensure safe pedestrian movements. Other pedestrian connections would form part of potential private property adjustments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6E</th>
<th>Ensure existing pedestrian links are retained and proper connectivity is achieved to road crossings, particularly for Warringah Road</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A widened pathway is proposed along the southern verge of Frenchs Forest Road West connecting the hospital and The Forest High School with Forestway Shopping Centre. Pedestrian access would be maintained along both sides of Warringah Road between Allambie Road and Courtley Road as part of Stage 1. Pedestrian pathways are to be maintained along both sides of Frenchs Forest Road, Naree Road, Forest Way and Warringah Road.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6F</th>
<th>Create a buffer zone between road and path to increase pedestrian safety and articulate the paved surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In order to provide wider paths and provide vegetative screening along boundary lines, a vegetated buffer would not be possible along the southern verge kerb line of Frenchs Forest Road. Along the northern verge of Frenchs Forest Road, a vegetative strip would be provided between the path and property boundaries to assist with visual mitigation. Landowners would be encouraged to plant trees in the front of their properties. On Warringah Road, a turf strip would be provided adjacent to the kerb in order to provide greater separation of vehicles and pedestrians. Where screening is not required or not feasible along property boundaries, pedestrian footpaths are to be set back from the kerb and separated by landscape.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6G</th>
<th>Avoid as much as practical the introduction of barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Barriers would not be required for the Stage 1 Project. Barriers would be required for the concept proposal where pedestrian access is provided next to the intersection of Warringah Road and Forest Way or next to distinct level change that would pose a safety risk.</td>
</tr>
</tbody>
</table>
6H. Evaluate opportunities to introduce pedestrian crossings as overpasses, acting as legible markers to both drivers and pedestrians.

An assessment of the Stage 1 Project indicated limited justification for footbridge crossings. In the Stage 2 Project, a footbridge crossing would be retained or replaced at Warringah Road and Forest Way intersection. Another location being considered is adjacent to The Forest High School in the vicinity of Hilmer Street.

6I. Ensure hospital access/entry point allows proper connectivity to major arterial roads.

The primary access to the hospital would be via a new signalised intersection of Frenchs Forest Road. Another access will be provided off Warringah Road.

6J. Apply CPTED (Crime Prevention Through Environmental Design) principles in the design resolution of the Stage 1 Project.

CPTED has informed the design of the hospital access and boundary treatments next to The Forest High School. Sightlines and safety would be maintained at all times during construction for motorists and pedestrians through careful staging and provision of temporary barriers. Security would be maintained at all times during construction through the provision of temporary fencing along school boundaries and following construction through reinstatement of permanent security fencing. Any new access points would require security gates to be installed.

<table>
<thead>
<tr>
<th>FRAMEWORK OBJECTIVE AND PRINCIPLE</th>
<th>CONCEPT DESIGN STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7</strong></td>
<td>Design integrated urban infrastructure/landscape design elements that allow the landscape to dominate built forms to recede</td>
</tr>
<tr>
<td><strong>7A</strong></td>
<td>Consider the use of natural materials in built form elements to reinforce the setting’s character</td>
</tr>
<tr>
<td></td>
<td>In Stage 1, retaining walls including those facing Frenchs Forest Road or facing properties along Naree Road are to be finished in natural materials such as sandstone cladding or sandstone block sourced from regionally local quarries. On arterial roads, depending on their scale, walls facing the road may need to be faced with a high quality concrete panel. However, in all cases a stone finish is preferred. Wall finishes are to be designed to a high level of finish generally, as is required of an urban setting such as this.</td>
</tr>
<tr>
<td><strong>7B</strong></td>
<td>Consider, if practical, under grounding power lines particularly on the high ridge area, and in constrained areas, to enhance opportunities for planting</td>
</tr>
<tr>
<td></td>
<td>Substantial underground utilities exist across the concept proposal area, particularly in Stage 1, making it difficult to accommodate additional underground services. The undergrounding of overhead services is to be considered during detailed design.</td>
</tr>
<tr>
<td><strong>7C</strong></td>
<td>Use colour schemes that complement the area’s character or that help recede built form elements</td>
</tr>
<tr>
<td></td>
<td>Colour schemes are to be selected during detailed design in consideration of local textures and colours of the surrounding bushland in accordance with the urban design framework.</td>
</tr>
<tr>
<td>7D</td>
<td>Apply landscape strategies that complement the future character and scale of built form elements of the precinct</td>
</tr>
<tr>
<td>7E</td>
<td>Apply darker colours in areas where structures should visually recede</td>
</tr>
<tr>
<td>7F</td>
<td>Introduce stepped retaining walls (where possible) with planted benches to reinforce the green character of the setting</td>
</tr>
<tr>
<td>7G</td>
<td>Consider widening the road corridor in strategic areas to allow better greening opportunities</td>
</tr>
<tr>
<td>7H</td>
<td>Introduce vegetated batters where practical to conceal the apparent height of structures</td>
</tr>
</tbody>
</table>
Figure 3-1: Urban design strategy plan
3.2 ROAD DESIGN ELEMENTS

<table>
<thead>
<tr>
<th>71</th>
<th>Introduce water sensitive design and minimise hard surface engineered drainage concepts.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Because of the nature of the works proposed under the Stage 1 Project, and being confined to a narrow road corridor, there are no opportunities to introduce water sensitive urban design landscape treatments.</td>
</tr>
<tr>
<td></td>
<td>There may be opportunities on private property and in the Stage 2 Project for consideration of water sensitive urban design. This would be further explored in future design stages.</td>
</tr>
</tbody>
</table>

OVERVIEW

The general approach to the design of road elements would be undertaken in such a way as to satisfy the functional requirements for the safe and efficient operation of the road, while also being appropriate to their location. In all cases, the design and implementation of the road elements would need to satisfy the requirements of Austroads and Roads and Maritime design guidelines and practice notes, as well as local government policies, if necessary.

It is also important that in detailed resolution, that the visual expression of the road elements is true to their function as items of contemporary road infrastructure that are consistent with other road upgrades in the region.

The following categories of urban design elements have been identified for the Stage 1 proposal, as follows:

- Structures eg bridges, underpasses and retaining walls
- Landscape formations eg cuttings and embankments.
- Roadside furniture including shelters, safety barriers and noise attenuation walls.

PRINCIPLES SPECIFIC TO ROAD DESIGN ELEMENTS

The development of principles and recommendations has been guided by the following specific design criteria:

- Simplicity in the design expression of the elements relating to the highway, in order to allow the existing natural and cultural landscapes to provide the primary interest to the motoring experience.
- Practicality for ease of construction and reduced long-term maintenance.
- Site-specific design that acknowledges and responds to the character of the local area, while not necessarily replicating existing features.
- Consistency with other road upgrades in the region, by using elements that are identifiably part of the road-user experience in this region.
3.3 STRUCTURES

OVERVIEW
The design of structures is required as a response to the inter-relationship between road alignment and levels with the existing landscape that results in earthworks (cutting and filling). The concept proposal will require substantial structures including footbridges, underpasses and walling associated with grade-separated interchanges. Design of these elements would be in accordance with the urban design framework and the relevant Roads and Maritime guidelines.

Structures are required as part of the Stage 1 project proposal, however these are reduced in scale and complexity and primarily in the form of retaining walls in cut and fill.

RETAINING WALLS
Retaining walls would be required as part of the proposal of the intersection at Wakehurst Parkway and Frenchs Forest Road. A retaining wall with a maximum height of 2 metres would be required either side of the western approach to the intersection on Frenchs Forest Road. One side would be associated with the NBH, while the other would be associated with the front curtilage of an existing residential property.

Cutting is also required on Naree Road on approach to Forest Way (southern verge), due to widening associated with the intersection upgrade. This widening would impact on the carpark of the Forest Alliance Church. Along the northern verge of Naree Road, retaining walls in fill would be required, facing private residential properties.

A retaining wall facing the road (in cut) of a maximum height of approximately 1 metre would be required along the eastern edge of Wakehurst Parkway between Frenchs Forest Road and Warringah Road. An existing textured block wall would be removed to make way for widening and is to be replaced.

All walls are to be finished in materials and colours that are complimentary to the urban bushland setting. A combination of sandstone cladding and stone block construction is recommended where either facing the road or where associated with residential properties. Due to the urban nature of the project, retaining wall finishes are to be of a high quality and visible shotcrete is not to be employed as a finished material.

DRAINAGE AND WATER QUALITY STRUCTURES
Apart from the cutting at the intersection of Frenchs Forest Road West and Wakehurst Parkway and low fill required at the intersection of Naree Road and Forest Way, the Stage 1 project design closely follows the existing contours. Drainage is currently proposed to be managed through connection to the existing drainage network that discharges into three major natural drainage lines.

Impact mitigation and water quality improvement is required due to the increase in hard surfaces associated with the road network and also the NBH. In terms of the Stage 1 project, this will primarily be reliant upon existing detention ponds located outside of the Stage 1 area. Incorporation of water sensitive urban design measures into the Stage 1 project would be limited, however this would be reviewed during the detailed design stage.
3.4 LANDSCAPE FORMATIONS

OVERVIEW
The design of earthworks is required as a response to the inter-relationship between road alignment and levels with the existing landscape that results in cutting and filling. Where cut and fill embankments are not retained by walling structures, they remain in the landscape as formations. Surface treatments of these formations would include retention of exposed rock (where the geotechnical properties allow) or revegetation and planting. In some instances, shotcreting of exposed rock may be assessed as being required however, a shotcrete avoidance strategy would be developed during detailed design to minimise this and ensure finishes are of a high quality.

CUTTINGS
Cutting is required where the vertical alignment of the road is not able to follow existing raised topography. Treatment of the cutting faces would be exposed rock if hard, or revegetated if soft. In most cases associated with the concept proposal, retaining walls would be employed (refer Structures).

Cutting would be required due to the upgrading of the intersection between Wakehurst Parkway and Frenchs Forest Road. The intersection is to be widened, resulting in cuttings on the south west corner (the NBH site) and western verge of Wakehurst Parkway, the north west corner next to an existing residence and along the south eastern corner and eastern verge of Wakehurst Parkway. In order to minimise the bulk and scale of cuttings, these would preferably be terraced with planted benches and upper slopes laid back in order to integrate with the surrounding landscape.

An existing cutting would be widened along Wakehurst Parkway, south of Warringah Road, due to widening of Wakehurst Parkway and a new intersection with Aquatic Drive.

Due to limited road corridor widths, existing vegetation and a desire to minimise the footprint of the proposal, retaining wall systems would need to be employed to stabilise the cut surfaces. Refer to the Retaining Walls section of this report.

Cutting in other sections of the proposal would be in limited locations and be of a small scale.

FILL EMBANKMENTS
Filling is required where the vertical alignment of the road is not able to fall at the same rate as existing topography or where the road traverses a siding. Treatment of the embankment faces would be planting in order to reduce the potential for erosion. In most cases associated with the concept proposal, retaining walls would be employed (refer Structures).

The intersection of Wakehurst Parkway and Frenchs Forest Road is to be partly raised in order to improve vertical alignment, which would require fill embankments and retaining walls at the north eastern corner next to the Trefoil Creek catchment.

Filling in other sections of the proposal would be in limited locations and be of a small scale.
3.5 ROADSIDE FURNITURE

OVERVIEW
Roadside furniture comprises furniture, fittings and fixtures associated with the safe and functional operation of the road upgrade.

BUS SHELTERS
Locations would be redesigned to suit planned bus route upgrades by Transport for NSW (TfNSW). Shelter designs would be designed to Warringah Council requirements.

FENCES AND BARRIERS
Some fencing would need to be replaced, modified or repaired as a result of the Stage 1 project. These fences would primarily be associated with strips of private property that would be acquired for road widening. Suitable fencing materials would timber, brick and pressed steel fencing in colours suited to the local area. Where possible vegetative screening would be provided to mitigate the visual impact of fencing.

Barriers would most likely not be required as part of the proposal due to reduced speed limits, full kerb profiles, appropriately set back non-frangible tree planting and virtually no fill embankments. This would be subject to further assessment during detailed design stages.
3.6 LANDSCAPE TREATMENTS

OVERVIEW

The general approach to the landscape design is to provide a well-vegetated road corridor that aims to integrate the proposal with the surrounding landscape, minimise visual and physical impacts for local residents and to reinforce a sense of place. In order to achieve this, the landscape revegetation must strike a balance between screening the proposal from the sensitive views from surrounding areas and maintaining key views from the proposal to the surrounding landscape.

Landscape implementation methods would be developed to support the urban design mitigation measures and to restore the vegetative qualities of the place. Several treatments would be required to suit the existing conditions and to integrate the proposal with the surrounding landscape, thereby assisting to minimise the potential visual and ecological impact of the new works.

The planting and revegetation design also aims to minimise the potential ecological impacts of the proposal by stabilising earthworks to prevent erosion, and reinforce existing habitats and ecological corridors through indigenous species selection.

The scale of the project and minimal curtilage may prevent the use of translocation and bushland reconstruction techniques, however this is to be explored during later design stages. Felled tree material should be incorporated into the works eg coarse woody debris and seed used along bushland edges and mulch used in planting areas.

PRINCIPLES SPECIFIC TO LANDSCAPE TREATMENTS

The following landscape design principles would be applied to the proposal:

- Revegetation is to be undertaken to all areas affected by construction work.
- The revegetation technique is to be determined by a combination of surrounding landscape character, as well proximity to existing ecological habitats and wildlife corridors
- Use of bush reconstruction and regeneration as a revegetation technique is to be employed for areas next to endemic bushland
- Revegetation in the form of seeding would be used in areas that are not visible to road users and local residents and also in areas adjoining stands of existing vegetation
- Revegetation of fill embankments and shallow cut batters is to be undertaken in order to stabilise the earthworks, minimise visual impact and integrate them with the character of the surrounding landscape
- Provision of planting and revegetation to screen the proposal from sensitive surrounding land uses
- Limited use of ‘feature’ planting at key intersections and important cultural areas along the highway to provide visual landmarks and enhance local identity.
- Use of provenance plant material (plants grown from locally collected seeds) wherever possible and if not available, use of bioregionally sourced seed and plants.
- Seed is to be sourced from areas of DFEC, particularly any areas of DFEC that have been cleared for the road upgrade.
PLANTING

Planting would be employed in the form of indigenous street trees and mass shrub planting to assist with screening the proposal and reducing scale. Feature planting is to be employed in gateway locations in conjunction with exposed rock. In all cases, due to the relatively small scale of the works and the urban setting, larger mature potted stock would be employed.

REVEGETATION

Seeding techniques would likely comprise hydromulching only as the treatment would be limited to key areas that are potentially (but preferably not) visible to road users or local residents and workers. Seeding is to be used where in close proximity to existing bushland and indigenous species used. Seeding techniques employing soil binders and mulch would be employed due to the need to ensure comprehensive erosion control.

LANDSCAPE TREATMENT SUMMARY

The following table summarises potential landscape treatments that would be employed in the Stage 1 project.

Table 3-2: LANDSCAPE TREATMENT SUMMARY

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>LOCATION FOR USE</th>
<th>ROADS AND MARITIME DOCUMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revegetation/</td>
<td>Fill embankments or batter-to-boundary areas</td>
<td>Specifications R176 (seed procurement) and R178 (revegetation)</td>
</tr>
<tr>
<td>Seeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting</td>
<td>Fill embankments, wall terraces, verges, private property, gateways</td>
<td>Specification R179 (planting)</td>
</tr>
<tr>
<td>Turfing</td>
<td>Verges, private property</td>
<td>Specification R179 (planting)</td>
</tr>
</tbody>
</table>