

Sutherland to Cronulla Active Transport Link Stage 2

Review of Environmental Factors

November 2021

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Approval and authorisation

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Executive summary

The proposal

The NSW government is proposing to build Stage 2 of the Sutherland to Cronulla Active Transport Link (SCATL).

The proposal involves extending the existing Stage 1 active transport link, that currently terminates just before Kirrawee Station, to Caringbah. The proposal would complete an important link in the existing bicycle network and would enable pedestrians and bike riders to connect to key destinations like public transport interchanges, schools, hospitals and residential and retail precincts.

Most of the active transport link would be off road, and would include:

- About 62 per cent off road shared path
- About 37 per cent separated pedestrian footpath and a bicycle path on the road in some areas
- About one per cent shared zone.

Appropriate road crossing treatments would be provided, including new priority crossings at side streets and improvements to existing signalised crossings (kerb realignment, bicycle lanterns, line marking and lighting).

Need for the proposal

Existing walking and cycling infrastructure in parts of Sutherland Shire offers a limited experience for users. There are few dedicated cycling routes, missing links in the footpath network, and there are limited opportunities to cross wide, major roads. Current active transport facilities do not provide clear separation between pedestrians, cyclists and vehicles to encourage greater take up of active transport. Currently, around 50 percent of trips in the area that are less than two kilometres long are made by car.

By creating a dedicated walking and cycling path separate from road traffic, SCATL provides a safe and attractive alternative to motorised transport. Providing a practical alternative for short trips would reduce local traffic congestion while also delivering important environmental and health benefits for the local community.

Proposal objectives

The objectives of the proposal include providing:

- A five per cent mode shift from private vehicle to cycling and walking for trip distances less than two kilometres for pedestrians and up to eight kilometres for cyclists
- An active transport infrastructure solution, which has a minimum of 40 per cent improvement in safety.

Options considered

Six options were progressed from an initial long list to more detailed evaluation, including:

- Three alignments within the rail corridor these options primarily follow the existing Illawarra T4 Cronulla sub-branch (Sutherland and Cronulla).
- One out-of-corridor alignment this option departs from the rail corridor using existing road reserves to provide greater opportunity to connect directly to key attractors.

 Two hybrid alignments – these options combine both in-corridor and out-of-corridor segments.

The options evaluation concluded that the preferred option (on which this proposal is based) is a link between Kirrawee Station and Cronulla Town Centre using the existing road network north of the rail corridor (Option 2a). The proposed option:

- Provides more direct connections to key destinations such as, schools, higher education facilities, health, town centres, hospitals, employment centres, commercial and retail precincts, and parks and recreational facilities
- Provides a spine for an active transport network in the region and would be the catalyst for Sutherland Shire Council to build a local connecting network
- Provides easy access with customers able to join and leave the active transport link as they like, making it a more attractive option for local trips. This also means it is easier to connect to the existing and future cycling network.
- Provides a more enjoyable journey with customers able to ride along leafy suburban streets to exercise or reach their destination
- Aligns with the Sutherland Shire Council's existing and proposed bicycle network
- Provides safety and security as customers are more visible to passers-by, other users and the wider community
- Has less complicated construction and is not dependent on track possession when compared to in corridor options
- Has minimal utilities impact compared to in-corridor options, which helps minimise the delivery timeframe.

Figure E-1 details the key design features of the proposal.





E-1 Key features of the proposal

Statutory and planning framework

The proposal is categorised as development for the purpose of a road and road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of State Environmental Planning Policy (Infrastructure) 2007 the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

A referral to Australian Government Department of Agriculture, Water and the Environment under the EPBC Act is not required.

Community and stakeholder consultation

There is a high level of community and stakeholder interest in the Sutherland to Cronulla Active Transport Link, and this has been sustained over a number of years.

Between 19 April 2021 and 17 May 2021, Transport sought feedback from the community on an earlier Stage 2 concept design. Community information sessions were held on 15 April 2021 at Caringbah and on 5 May 2021 at Miranda. A Facebook Livestream was held on Thursday 22 April to answer questions and hear what others had to say about the proposal. This event was attended by over 800 people, was recorded and is available for viewing via the Facebook event. The main issues raised were:

- Alternative routes desire from some respondents to construct the active transport link within the rail corridor
- Safety concern that if the path runs along the road and across busy side streets, driveways and intersections it will be unsafe
- Parking and traffic parking is for the community, especially small businesses
- Trees and vegetation trees are highly valued.
- Connectivity the path should be well connected and should not stop at Gannons Road.

These issues are addressed in this REF and a full Consultation Report is available on the Transport website at transport.nsw.gov.au/SCATL.

This REF will also be placed on public exhibition for stakeholder and community comment. All comments received will be considered when finalising the proposal design. The community would be kept informed of any further changes to the proposal resulting from this and any future consultation process.

Following the public display of the REF, all comments received would be recorded and addressed in a submissions report detailing how each issue raised would be considered in finalising the proposal design. The Submissions Report would be made available to the public on the project webpage on the Transport for NSW website. A community update will be distributed to advise the availability of the submissions report.

Environmental impacts

Detailed technical investigations have been carried out to identify, assess, manage and minimise the proposal's potential impacts. The following outlines the proposal's main impacts on the environment and surrounding community. The safeguards and mitigation measures identified in this REF would help minimise the expected adverse impact.

Traffic and transport

There is the potential for some delays to traffic on the Kingsway and the local roads due to short-term lane closures and reduced speed limits during construction. Any lane closures on the Kingsway would be scheduled so as to minimise delays to traffic, especially during peak periods.

Pedestrians and cyclists may experience short delays during construction resulting from minor diversions or directives from traffic controllers. Cyclists would have the option of continuing their journey on-road.

Once completed, the proposal would improve amenity and connectivity for pedestrians and cyclists. Measures to maintain safety for pedestrians and cyclists, particularly at road crossings, have been incorporated into the design.

Landscape character and visual

The proposal would introduce new visual elements that would slightly affect existing visual character and views, but which are consistent with other active transport projects, either completed or under construction in the Sydney region.

Landscape character impacts range from negligible (Miranda Shopping Centre) to moderatelow (Kirrawee Shopping Centre, Kirrawee/Gymea residential, Kingsway residential). Visual impact levels did not exceed a moderate-low rating.

While the use of alternative path / pavement types has allowed the retention of a large number of trees (refer to Section 2.6), the concept design identifies 127 trees located wholly within the construction footprint of the proposal that may need to be removed. Of these:

- 5 are of high retention value.
- 34 medium retention value
- 88 are of low retention value

It is expected that the number of trees requiring removal would reduce as the detailed design progresses.

The preliminary urban and landscape design has been prepared which identifies replacement plantings (at a ratio of four trees for every tree removed). The preliminary urban and landscape design, which is included in the Urban Design and Landscape Character and Visual Impact Assessment (Appendix D), would be further refined as part of the detailed design process.

Noise and vibration

Some construction activities would result in temporary high noise levels at some locations. Management of these impacts would include a range of measures including consultation with affected people, selection of less noisy machinery, modified work practices and implementing noisy work respite periods.

Individual receivers would be affected for relatively short periods as construction moves along the alignment. Evening and night works would only be required in limited circumstances where necessary to ensure safety or avoid delays to traffic (along the Kingsway).

Construction plant would also be selected to ensure compliance with target levels for continuous and impulsive vibration. Where necessary, compliance would be confirmed through vibration monitoring.

During operation, noise from the proposal would typically be associated with pedestrians and cyclists using the active transport link. Raised voices or loud conversations may occur, however, these noise events would be sporadic and would likely have a negligible effect on the typical noise levels at receiver locations adjacent to the link.

Biodiversity

The proposal is not likely to significantly impact threatened species, ecological communities or migratory species.

A small area of the NSW listed Sydney Turpentine-Ironbark Forest threatened ecological community would be affected but there is unlikely to be an adverse effect on the extent of the ecological community such that its local occurrence would to be placed at risk of extinction.

Urban tolerant threatened hollow-dependent microchiropteran bats have the potential to occupy those hollow-bearing plants that would be cleared along the route, but the loss of these trees would not limit or significantly reduce the overall extent of roosting opportunities available in this portion of the Sutherland Shire.

Non-Aboriginal heritage

The proposal runs adjacent to two locally significant heritage items (Item 2403 'House' near the Oak Road / President Avenue intersection and Item 1507 'Hazelhurst garden and grounds (including cottage)' on the Kingsway). It would also encroach the curtilage of two street tree listings (Item 1506 on the southern side of the Kingsway and Item 3102 on Kiora Road).

The proposal would not substantially change the streetscape or alter the setting of adjacent items and therefore impacts on the heritage values of these items would be negligible. While works would occur within the curtilage of listed street trees, the trees themselves would not be affected. Measures have been proposed to address potential impacts on these trees during construction.

Socio-economic

The proposal would potentially have some negative socio-economic impacts during construction including:

- Disruption associated with minor property adjustments (fences, driveways)
- Impacts on the amenity of properties (residences and businesses)
- Impacts on access, connectivity and on-street parking

Following completion of the proposal, there are expected to be minimal adverse social economic impacts. Socio-economic benefits from the proposal would include:

- Enhanced connectivity and safety for pedestrians and cyclists due to the new shared path and cycleway connections
- Increased accessibility for non-drivers
- Health benefits safe active transport infrastructure with appropriate space allocation would encourage people to take a break, enjoy the open space and improve their mental wellbeing.
- Improved public domain with more space for pedestrians
- Increase in passing trade from some types of street level businesses along the route

The minor loss of on-street parking at some locations (about 12 spaces in total) may reduce convenience for some residents, visitors and customers driving to local business.

Soils, contamination and water

Potential water quality impacts would mainly relate to soil loss from erosion of exposed soils and stockpiles, and potential discharge of sediment to surrounding land and the stormwater system. The construction contractors will be required to implement erosion and sediment controls to control these impacts.

The overall risk of contamination was assessed to be low or low-medium.

Sustainability

The development of the concept design for the Proposal has been undertaken in accordance Transport for NSW Sustainable Design Guidelines – Version 4.0 (Transport for NSW, 2017). The guidelines seek to deliver sustainable development practices by embedding sustainability initiatives into the planning, design, construction, operations and maintenance of transport infrastructure projects. The proposal is targeting a silver rating under the guidelines.

Display of the review of environmental factors

This REF is on display for comment between Wednesday 17 November and Sunday 19 December 2021. Communication and consultation activities planned to coincide with the public display of the REF include a community update, online community consultation and advertising in local newspaper.

Internet

The documents are available as pdf files on the Transport for NSW website at:

transport.nsw.gov.au/SCATL

Copies by request

Printed and electronic copies are available by contacting the project team on 1800 684 490.

How can I make a submission?

Transport for NSW is interested in local knowledge, insight and general feedback on the proposal.

Please provide your feedback via the following:

- Leave your feedback or questions on the feedback form on the project webpage: transport.nsw.gov.au/SCATL
- Email projects@transport.nsw.gov.au
- Write to Associate Director Environmental Impact (SCATL), PO Box K659, Haymarket NSW 1240

Submissions must be received by the close of consultation.

What happens next?

Transport for NSW will collate and consider the submissions received during public display of the REF.

After this consideration, Transport for NSW will determine whether or not the proposal should proceed as proposed and will inform the community and stakeholders of this decision. If the proposal is determined to proceed, Transport for NSW will continue to consult with the community and stakeholders prior to and during construction.

The next steps in the planning and assessment process for the proposal are shown below in Figure E-2.



E-2 Next steps

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Appendices

Appendix A – Consideration of clause 228(2) factors and matters of national environmental significance and Commonwealth land

- Appendix B Statutory consultation checklists and correspondence
- Appendix C Greater Metropolitan Regional Environmental Plan Principles
- Appendix D Landscape Character and Visual Impact Assessment
- Appendix E Noise and Vibration Assessment
- Appendix F Ecological Investigation
- Appendix G Phase 1 Preliminary Site Investigation

1 Introduction

1.1 Proposal identification

The NSW government is proposing to build Stage 2 of the Sutherland to Cronulla Active Transport Link (SCATL), a walking and cycling path to help make walking and bike riding a more convenient, safer and enjoyable transport option (the proposal).

The proposal is the second stage of the Sutherland to Cronulla Active Transport Link. Stage 1 opened in April 2020, delivering a 1.3 kilometre active transport link between Sutherland and Kirrawee. A potential future stage between Caringbah and Cronulla is subject to further planning and investigation would be the subject of a separate assessment and planning approval process.

The proposal involves an active transport link connecting the Stage 1 path which terminates before Kirrawee Station, with existing bike paths in Kirrawee. Most of the active transport link would be off road, and would include:

- About 62 per cent off road shared path
- About 37 per cent separated pedestrian footpath and a bicycle path on the road in some areas
- About one per cent shared zone.

Appropriate road crossing treatments would be provided, including new priority crossings at side streets and improvements to existing signalised crossings (kerb realignment, bicycle lanterns, line marking and lighting).

The proposal is located within the Sutherland Shire and traverses the suburbs of Kirrawee, Gymea, Miranda and Caringbah, about 20 kilometres south of the Sydney CBD.

Important regional features include Botany Bay and Georges River to the north, and Port Hacking to the south, with Kamay Botany Bay National Park, Towra Point Nature Reserve and the Royal National Park also nearby. The area is served by Sydney Trains T4 Eastern Suburbs & Illawarra Line, with Sutherland station functioning as the gateway to the stations on the east-west rail corridor between Sutherland and Cronulla.

The location of the proposal is shown in Figure 1-1 and an overview of the proposal is provided in Figure 1-2. Chapter 3 describes the proposal in more detail.







Figure 1-2: The proposal

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by Hills Environmental on behalf of Transport for NSW. For the purposes of these works, Transport for NSW is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in the context of clause 228 of the Environmental Planning and Assessment Regulation 2000, the factors in Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979 (Is an EIS required? guidelines) (DUAP, 1995/1996), Roads and Related Facilities EIS Guideline (DUAP 1996), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the REF helps to fulfil the requirements of:

 Section 5.5 of the EP&A Act including that Transport for NSW examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- The potential for the proposal to significantly impact any other matters of national environmental significance or the environment of Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of the Agriculture, Water and the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2 Need and options considered

2.1 Strategic need for the proposal

2.1.1 Strategic plans and policy

The proposal is consistent with a number of strategic plans and policy documents as outlined in the following sections.

Future Transport Strategy 2056

The NSW Future Transport Strategy 2056 (Transport for NSW, 2018) outlines a clear framework to address transport challenges in NSW over the next 40 years and is an update of the NSW Long Term Transport Master Plan released in 2012. It integrates planning for roads, freight and all other modes of transport and sets out initiatives, solutions and actions to meet NSW transport challenges.

Future Transport 2056 outlines six state-wide outcomes to guide investment, policy and reform and service provision. They provide a framework for planning and investment aimed at harnessing rapid change and innovation to support a modern, innovative transport network. The proposal supports all six outcomes as discussed in Table 2-1.

Outcome	Vision	Comment
Customer focused	Customers' experiences and their end-to-end journeys are seamless, interactive and personalised, supported by technology and data.	The proposal prioritises customer experience by providing a safe and attractive journey that connects key attractors. It responds to a growing interest in active transport and promotes a healthier lifestyle through physical activity. It also allows mobility in the area to adapt to emerging technologies such as e-bikes and integrates them with other modes of transport.
Successful places	The liveability, amenity and economic success of communities and places are enhanced by transport	The proposal supports safe, efficient, sustainable, and reliable journeys while enhancing the liveability and amenity of places. It would support centres, active street life, and the success of local businesses, and would help improve social and economic participation.
A strong economy	In 2056, the transport system powers NSW's \$1.3 trillion economy and enables economic activity across the State.	Improved accessibility would support local economic growth, mitigate congestion costs and support emerging industries (such as use of active transport for urban cargo deliveries).
Safety and performance	Every customer enjoys safe travel, regardless of transport mode or location, across a high-performing, integrated and efficient network.	The proposal would provide appropriate distancing between motorised and non- motorised vehicles, which increases safety for all road users and makes active transport a more attractive option.

Table 2-1: Alignment with Future Transport Strategy 2056 outcomes

Outcome	Vision	Comment
Accessible services	Transport enables everyone to get the most out of life, wherever they live and whatever their age, ability or personal circumstances.	The proposal would support accessibility for seniors, families with prams and people with disability.
Sustainability	The transport system is economically and environmentally sustainable, affordable for customers and supports emissions reductions	Walking and cycling produce almost no pollution and encouraging short trips by active transport rather than by car helps to reduce greenhouse gas emissions and mitigate global warming.

The proposal would also provide the missing link to connect Sutherland and Cronulla identified as part of the Principal Bicycle Network discussed in Chapter 8 of the Strategy.

Greater Sydney Regional Plan: A Metropolis of Three Cities

The Greater Sydney Region Plan: A Metropolis of Three Cities (Greater Sydney Commission, 2018) sets out the Greater Sydney Commission's vision for Sydney to 2056. The plan divides the Sydney Metropolitan Area into three cities being Western Parkland City, Central River City and Eastern Harbour City. It provides directions, metrics and objectives in order to achieve the vision for Sydney 2056.

Relevant objectives of the Plan are discussed below:

- Objective 12 (Great places that bring people together) notes that walkable places are designed, built and managed to encourage people of all ages and abilities to walk or cycle for leisure, transport or exercise. The proposal supports the development of walkable places.
- Objective 14 (A Metropolis of Three Cities integrated land use and transport creates walkable and 30-minute cities). The proposal would improve connectivity and promote mode-shift, both of which support the objective of a 30-minute city.
- Objective 33 (A low-carbon city contributes to net-zero emissions by 2050 and mitigates climate change). Walking and cycling produce almost no pollution and encouraging short trips by active transport rather than by car helps to reduce greenhouse gas emissions and mitigate global warming.

South District Plan

The South District Plan (Greater Sydney Commission, 2018) is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision of Greater Sydney. It is a guide for implementing the Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission, 2018), at a district level and is a bridge between regional and local planning.

The South District Plan sets a number of planning priorities, objectives and actions. The proposal supports Planning Priority S1 (Planning for a city supported by infrastructure) and the following associated objectives:

- Objective 1 Infrastructure supports the three cities The proposal supports this objective by improving the connectivity of the active transport network
- Objective 3 Infrastructure adapts to meet future needs The proposal responds to a
 growing interest in active transport and allows mobility in the area to adapt to emerging
 technologies such as e-bikes. It also supports the growing use of on demand services
 (such as food delivery) and parcel delivery services which would benefit from the
 improved accessibility provided by the new infrastructure.

The proposal also supports Planning Priority N12 (Delivering integrated land use and transport planning and a 30-minute city) by facilitating active transport connectivity between the strategic centres of Sutherland and Miranda.

The proposal is specifically referenced in the South District Plan as a shared two-way

pedestrian and bicycle path between Sutherland and Cronulla, that aims to address the current heavy reliance on motor vehicle transport for short trips in the Shire by improving walking and cycling opportunities. The proposal is identified as providing a practical connection to residential and commercial areas, as well as hospitals, schools and transport links.

Transport for NSW Walking and Cycling Program

The Transport for NSW Walking and Cycling Program (Transport for NSW, 2019) is a funding program with an emphasis on NSW Government's commitment to delivering more walking and cycling infrastructure. The proposal strongly aligns strongly aligns with the key objectives of the 2020/21 Walking and Cycling Program:

- Ensure walking and cycling are the most convenient option for short trips to key destinations and within centres
- Reduce congestion on our roads and public transport networks by delivering projects that encourage walking and cycling mode shift
- Enable efficient, safe and reliable journey times by prioritising infrastructure that supports pedestrian or cycling movement on certain corridors, consistent with the Movement and Place Framework
- Deliver projects that make walking and cycling safe, comfortable and convenient transport modes that are accessible to a wide range of users
- Enable positive health, wellbeing, social and environmental outcomes.

NSW State Health Plan: Towards 2021

The NSW State Health Plan: Towards 2021 (NSW Ministry of Health, 2014) includes several directions, the first of which is 'Keeping People Healthy'. The proposal is consistent with this direction because it would contribute to keeping people healthy by supporting a healthier and more active lifestyle. Physical activity has many health benefits, including reduced risk of cardiovascular disease, ischemic stroke, type 2 diabetes, colon cancers, osteoporosis, and depression. Regular physical activity is associated with enhanced health and reduced risk for all-cause mortality.

Road Safety Plan 2021

The Road Safety Plan 2021 (Transport for NSW, 2018) outlines how the NSW Government will work towards the State Priority Target of reducing fatalities by 30 per cent by 2021 (compared to average annual fatalities over 2008–2010). It also aligns the Towards Zero vision with Future Transport 2056, which aims to have a NSW transport network with zero trauma by 2056.

The proposal includes and objective to achieve a minimum of 40 per cent reduction in crash risk compared to an on-road solution and therefore strongly aligns with Road Safety Plan 2021 target for reducing fatalities.

Sydney's Green Grid

The NSW Government Architect has identified a network of high-quality green space that connects town centres, public transport hubs, and major residential areas – the Sydney Green Grid. The Sydney Green Grid documentation (for South District) acknowledges that walking and cycling are becoming increasingly important recreation and transport choices, and that

increased opportunities for physical activity contribute significantly to greater health within the community, reducing health costs and increasing quality of life. In this context, the provision of the Sutherland to Cronulla Active Transport Link is specifically identifies as a green grid project opportunity.

The Sydney Green Grid documentation also emphasises the need to establish a vibrant, pedestrian friendly public realm at key centres, transport interchanges and urban renewal areas, with places for gathering and good connections to open space. The proposal supports this direction by improving pedestrian and cyclist amenity.

NSW Premiers Priorities – Great public spaces

The NSW Premier has set a priority to achieve great public spaces. This includes improving streets to become places where people can walk, ride a bike, socialise and add vitality to neighbourhoods. By providing better active transport infrastructure, the proposal supports this Premiers priority.

2.1.2 Need for the proposal

Existing walking and cycling infrastructure in some areas of the Sutherland Shire offers a limited experience for customers. There are few dedicated cycling routes, missing links in the footpath network, limited opportunities to cross wide, major roads and a lack of amenity. Current active transport facilities do not provide adequate distancing from on road vehicles to encourage greater take up of active transport.

The current situation has resulted in a higher reliance on private vehicles than the average for Greater Sydney. With the growth in population, economic and social activities, traffic is increasing and congestion in Sydney is deteriorating. Furthermore, the extensive reliance on private motor vehicles is a major contributor to lack of physical activity.

There is a need in the Sutherland Shire to enable a shift away from private vehicles in order to reduce traffic congestion and improve health outcomes. Active transport, which includes cycling and walking, is a viable option to lessen congestion by diverting short distance commuting away from private vehicles.

The need for the proposal is best framed in terms of identified problems and opportunities. These are discussed in the following sections.

Problem – Active transport infrastructure gap

There is currently no linear off-road connected route linking Sutherland and Cronulla, a key movement corridor within the region. Existing active transport infrastructure in this area is often limited, narrow and discontinuous. An east-west spine that links Sutherland to Cronulla reflects Sutherland Shire Council's Local Bicycle Plan.

Problem – High vehicle dependency and traffic congestion

Private vehicles continue to be the main mode of transport in the Sutherland Shire with 76 per cent of trips made by car (either as driver or passenger) compared to an average of 71 per cent in Greater Sydney (Transport for NSW, 2013). Furthermore, almost nine in 10 commuters within the Sutherland Shire uses a private vehicle (Ruby Cha Cha, 2019).

Traffic on weekends is becoming worse than during the week due to dispersed destinations, complex chain trips, kid's sport and recreational users. Parking availability is also reducing due to higher density residential developments with lower parking provision.

Car dependence coupled with high levels of car ownership have led to increased traffic congestion. Without active transport intervention, there is a high risk of increasing congestion in the Sutherland Shire.

Opportunity – Travel patterns in the area support mode shift to walking and cycling

Compared to similar local government areas, the Sutherland Shire has good employment selfcontainment (41 per cent of the working population live and work in the area compared to 22 in Georges River local government area). The high proportion of people who live and work in the Shire lends itself to more journey to work trips by walking and cycling. Active transport can provide an attractive alternative travel mode for commuting than private car, particularly for short trips.

In addition, residents in the Sutherland Shire have a higher percentage of social and recreational travel than the average in Greater Sydney (28 per cent against 24 per cent) which can be shifted to active transport (Transport for NSW, 2013).

Further supporting this opportunity is a strong openness to active transport, with nearly 50 per cent of surveyed residents willing to abandon their cars and use improved active transport infrastructure to make some trips (Ruby Cha Cha, 2019).

Opportunity – Infrastructure investment increases safety and patronage

The statistics for pedal cycle and pedestrian crashes between 2015 and 2019 along Kingsway in the Sutherland that there is an average of three pedal cycle and five pedestrian crashes per year. Almost 70 per cent of pedestrian crashes involved a serious injury and eight per cent were fatal.

Dedicated active transport infrastructure provides appropriate distancing between motorised and non-motorised vehicles which increases safety for all road users. It also supports mode shift away from private vehicles by making active transport more attractive.

Opportunity – Develop a wider active transport network

The provision of active transport infrastructure between Sutherland and Caringbah could serve as a catalyst to further develop the network within the Shire as well as connections to the broader strategic cycling network. Provision of a complete network of safe and comfortable bicycle routes generates a 'network effect' due to greater connectivity resulting in greater cycling patronage and return on investment.

Opportunity – Health benefits from walking and cycling

Walking and cycling provide regular and routine moderate to vigorous physical activity opportunities which can help reduce the risk of cardiovascular disease, ischemic stroke, type 2 diabetes, colon cancers, osteoporosis, and depression. Walking and cycling for commuting also lowers carbon emissions, localised air pollutants and noise pollution, with consequent health benefits. The proposal would provide safe and convenient active transport opportunities for residents, thereby enabling the achievement of these health and wellbeing benefits.

Opportunity – Place-making, increased amenity and sustainability outcomes delivered by active transport infrastructure

Dedicated active transport infrastructure supports safe, efficient, sustainable and reliable journeys while enhancing the liveability and amenity of places. Neighbourhoods designed for walking and cycling provide better opportunities for people to meet and develop strong social ties. Active transport infrastructure also supports centres, active street life, and the success of local businesses, and improves social and economic participation (Greater Sydney Commission, 2018).

Provision of active transport infrastructure also increases the distance people will walk or cycle and can therefore expand the catchment areas around stations and major attractions. Walking and cycling produce almost no pollution. Encouraging short trips by active transport rather than by car would improve sustainability outcomes by helping to reduce greenhouse gas emissions.

Opportunity – Emerging technologies that encourage active transport

Personal mobility or micro mobility devices such as electric assist bicycles (e-bikes), escooters, cargo bikes (which can carry loads up to 200 kilograms and two to three passengers) and share bikes present an opportunity to encourage use of active transport. The provision of safe active transport space supports the adoption of these new technologies and the realisation of associated benefits.

2.2 Limitations of existing infrastructure

Limitations of existing infrastructure at the proposal site and in the locality include:

- Lack of dedicated active transport infrastructure which results in cyclists sharing the road with other vehicles. This situation creates safety risks with other road users and discourages inexperienced or less confident riders.
- Limited availability of footpaths in the locality (in some locations footpaths are not provided or are only available on one side of the road)
- Insufficient width of existing footpaths (not wide enough to facilitate multiple people walking side-by-side or allow customers to pass in the opposite direction).

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The objectives of the proposal include:

- A five per cent mode shift from private vehicle to cycling and walking for trip distances less than two kilometres for pedestrians and eight kilometres for cyclists.
- An active transport infrastructure solution, which has a minimum of 40 per cent improvement in safety.

2.3.2 Development criteria

The development criteria for the proposal include:

- Designing the proposal in a manner that is informed by environmental investigations to minimise any adverse impact while maximising environmental benefits
- Satisfying the technical and procedural requirements of Transport for NSW and other stakeholders with respect to the design of the proposal
- Optimising the design to ensure that the proposal can be practically and efficiently constructed and maintained while meeting all other proposal objectives
- Planning temporary arrangements that minimise disruption to local and through traffic
- Developing, implementing and maintaining effective management systems for quality, work health and safety, environmental, proposal reporting, risk management, value management and value engineering, constructability assessment, safety audits and community participation.

2.3.3 Urban design principles

Urban design

The following urban design principles have been established for the proposal:

- Identity Designs shall maximise benefits to the public to create successful, vibrant, safe, inclusive, accessible connected places for all people through placemaking and city building
- **Timeliness** Designs shall enable the provision of a reasonable journey time given the distance travelled, in order to be a competitive alternative to private vehicle use for short trips
- **Stakeholder and community** Designs are to be responsive to stakeholder and community needs, with stakeholder feedback considered at all stages of the design
- **Connectivity** Designs are to provide a convenient experience for customers, delivering easy connections that encourage interchange between modes and connectivity to key attractors and surrounding bike networks
- **Comfort** Designs are to include adequate shade in the form of tree planting in an effort to mitigate increases in temperature.
- Accessibility Designs are to ensure ease and convenience of physical access and navigation though the system (cyclist, residents and pedestrians including those with impairments and restricted mobility)
- **Cleanliness** Designs should be easy to maintain and operate that promotes a well maintained and clean environment
- **Safety and security** Designs should ensure customers feel safe and secure across the length of the alignment as a result of physical design features and the behaviour of other customers. Customers include cyclists, residents and pedestrians including those with impairments and restricted mobility.
- **Information** Design should be intuitive and easy to use by customers. Customer wayfinding, orientation and navigation to and from their door-to-door journey should be easy.

Crime prevention through environmental design

The following crime prevention through environmental design principles have been adopted for the proposal:

- Surveillance
 - Maximise opportunities for passive surveillance across the alignment by minimising visual barriers between the SCATL alignment and surrounding properties and public domain
 - Maintenance and pruning of existing and proposed vegetation to reduce physical obstructions and allow for passive surveillance with surrounding public domain
 - Provide unobstructed sight lines between the route and adjoining properties and public domain.
- Access control
 - Utilise fencing, lighting and wayfinding signage to guide customers to public spaces, particularly around town centres.
- Territorial reinforcement

- Ensure a high level of permeability to the SCATL alignment from surrounding streets and public areas to encourage customers to access the route
- Ensure transitions between the SCATL alignment and adjoining public and private areas are clearly demarcated.
- Space Management and Maintenance
 - Utilise materials that can be resistant to graffiti and vandalism, and that are easily replaced or repaired as required
 - Provide a clear and effective maintenance program to ensure the route is consistently well utilised and cared for, supporting a sense of ownership and safety.

Vegetation

The following principles specific to vegetation have been established for the proposal:

- Consider material and plant selection to contribute to local character, sense of place and strengthen existing areas of biodiversity.
- Maintain and enhance the existing landscape character of the area by retaining mature trees and supplementing with new trees, which are in keeping with established vegetated species.
- Provide new or retain existing street planting and street trees along the alignment to maximise shade, increase canopy cover and a reduced urban heat island effect.
- Incorporate endemic trees that require low water use should be leveraged to enhance the character of each section along the alignment.
- Retain existing trees where possible by considering different construction techniques and materials, ie. alternative pavement details, bridging over tree roots, decking.

Interfaces

The following principles for interfaces have been established for the proposal:

- Maximise distance between the alignment and residential boundaries with a landscape buffer.
- Where possible, provide a minimum one metre buffer/verge from active transport link to higher order roads such as main roads or collector roads.
- Consider community safety and experience within town centres by maximising the distance between path and shop fronts with an adequate footpath width to ensure safe movement of pedestrians who are not using the proposal.
- Connect to existing and proposed community amenities, parks, open spaces and green links.
- Ensure clear visibility to and from existing driveways and intersections, pedestrian paths and the proposal alignment.
- Provide customer safety at interfaces with clear signage and fencing where necessary.
- Provide additional linemarking, pavement hatching and early warning signage to manage conflict between cyclists, pedestrians and vehicles where SCATL traverse between public and private domain.

Access and wayfinding

The following principles for access and wayfinding have been established for the proposal:

- Support easy access and permeability with access to the proposal via intuitive wayfinding signage to aid navigation and orientation for customers, particularly at connections to north-south links, noting connections local attractors and regional bike networks.
- Support easy access and permeability with access to the proposal from via adjacent streets and cul-de-sac as frequently as possible with designated SCATL materials and wayfinding.
- Providing a raised and paved intersection treatment with kerb build outs, and access points for bikes to access and egress the bike path.
- Provide clear signage at decision points, including areas separating cyclists and pedestrians, ramps and bridges, slow zones and areas in close proximity to vehicles (ie car parks, parallel streets and road intersections).

Active transport elements

A number of principles for materials and design elements including paths, street furniture, lighting, fencing, wayfinding and signage and landscaping have also been adopted. These principles are detailed in Chapter 3 of the Urban Design and Landscape Character and Visual Impact Assessment (refer to Appendix D of this REF).

2.4 Alternatives and options considered

2.4.1 Methodology for selecting the preferred option

The methodology for selecting the preferred option initially involved a consideration policy and regulatory, governance and better-use reforms as alternatives to the proposal. This was followed by development of a short-list of infrastructure options for detailed evaluation.

A workshop based multi-criteria analysis process was used to aid the selection of the preferred option from the short list. This involved workshop participants scoring each short-list option against weighted criteria. The weighted criteria used for evaluation are described in Table 2-2.

Table 2-2: Option evaluation criteria

No	Criteria	Description	Weight
1	Alignment with Government priorities and Program Objectives	 Does the option align with Government priorities and program objectives: Increase mode shift to active transport. Improve safety for current and new active transport users. 	20%
2	Customer experience and place criteria	 Journey time provides a competitive alternative to private vehicle use for short trips. Permeability for easy access/egress and connectivity to key attractors and exiting active transport links. Active transport users are safe and secure on all parts of the alignment. Convenience of physical access and navigation along the alignment. Create successful, vibrant, safe, inclusive and accessible connected places for all people. 	35%

No	Criteria	Description	Weight
3	Construction complexity	 Availability of the required rail and road possession for construction. Ability of construction works to be completed without need for road/rail possessions. Interface with existing services and utilities. Level of design complexity and environmental management during construction. Amount of new infrastructure required along the alignment. 	5%
4	Deliverability and risk	 Impact and change required on local road network. Affordability – capital cost and ongoing operational and maintenance cost impact. Property acquisitions required to deliver the option. Ability to stage sections between key attractors. 	20%
5	Community and stakeholders	Ability of the option to respond to community expectations.Minimise adverse impacts to the local community.	20%

2.4.2 Policy and regulatory, governance and better-use reforms

The following regulatory, governance and better use reforms were reviewed as potential alternatives to the proposal:

- Reducing the speed limit on the Kingsway to provide additional safety for cyclists
- Providing subsidies to encourage take up of bicycles and other active transport equipment
- Pay or provide a rebate every time people ride a bike to work
- Regulate for commercial building to install end of trip facilities
- Regulate to remove untimed/free parking spaces around commercial areas including on street parking spaces to encourage active transport
- Regulate for new green field developments to incorporate and build active transport links
- Reforms which encourage resident and workers to reconsider their travel choices by remoding, retiming or reducing travel.

While some of the above could be worthwhile complementary measures, none were considered adequate alternatives to the proposal. None of the above measures would adequately address the safety concerns of new users (including less confident or less experienced cyclists) or achieve significant mode shift to active transport.

2.4.3 Identified options

Six options were progressed from an initial long list to more detailed evaluation, including:

- Three in-corridor alignments these options primarily follow the existing Illawarra T4 Cronulla sub-branch line between Sutherland and Cronulla.
- One out-of-corridor alignment this option departs from the rail corridor using existing road reserves to provide greater opportunity to connect directly to key attractors.

• Two hybrid alignments – these options combine both in-corridor and out-of-corridor alignments.

Each of the options that were evaluated are described in Table 2-3 and shown on Figure 2-1 to Figure 2-3.

Table 2-3: Description of short-listed options

No	Name	Туре	Description
1a	Kirrawee to Cronulla	In corridor	Links Kirrawee and Cronulla Stations, using space beside the railway track. Spanning 8.3 kilometres, the shared path would run along the southern side of the track between Kirrawee and Caringbah, cross the Kingsway and continue along the north of the track along Denman Avenue, to Cronulla town centre. Four bridges and one road underpass would be required to provide uninterrupted travel with minimal delays for customers at intersecting road crossings.
1b	Kirrawee to Caringbah	In corridor	Follows the same alignment as Option 1a, terminating at Gannons Road, about one kilometre east of Caringbah Station. This option includes three bridges and one road underpass.
1c	Gymea variation	In corridor	Follows the same alignment as Option 1a connecting Kirrawee to Cronulla with a 700 metre deviation at Gymea. The deviation uses an existing pedestrian link, about 120 metres south of the rail corridor that allows for a further connection to open/recreational space. The option includes four bridges and one underpass.
2a	North Kingsway	Out of corridor	Links Kirrawee Station to the Cronulla Town Centre using the existing road network north of the rail corridor. Spanning 9.1 kilometres, the route combines different facility types (shared path, separated cycleway and shared zone) No bridges or underpasses are included in this option.
3a	In Corridor to Sylvania Road	Hybrid	Uses residual space within the rail corridor and the local street network parallel to the corridor from Kirrawee Station to Sylvania Road between Gymea Station and Miranda Station. From Sylvania Road, this option exits the rail corridor, travels north to Kingsway and follows the same alignment as Option 2a. This option includes one underpass at Gymea Station, but no bridges.
3b	In Corridor through Miranda	Hybrid	From President Avenue, Kirrawee, this option uses low traffic streets on the southern side of the rail line, past Gymea to Wandella Road. From Wandella Road, this option enters the rail corridor and uses space on the south of the track between Miranda and Caringbah Station. The alignment exits on Kingsway and travels along the south side of Denman Avenue and local streets to Cronulla Town Centre. This option includes two bridges at Miranda.



Figure 2-1: Out of corridor options



Figure 2-2: In corridor option



Figure 2-3: Hybrid options

2.4.4 Analysis of options

Based on the multi-criteria analysis, the out-of-corridor option (Option 2a) was determined to be the best alignment. The ranking of the options against each criterion and the overall ranking (taking inter account weightings) is shown in Table 2-4.

Criteria	1a	1b	1c	2a	3a	3b
Alignment with Government priorities ranking	1	1	1	1	1	1
Customer experience and place ranking	1	2	2	2	1	1
Construction complexity ranking	2	3	3	1	3	3
Deliverability and risk ranking	2	2	2	1	3	3
Community and stakeholders ranking	1	2	2	3	3	3
Overall ranking	2	3	3	1	4	4

Table 2-4: Weighted rankings for each option

The out-of-corridor option (Option 2a) was selected because it:

- Provides more direct connections to key destinations such as, schools, higher education facilities, health, town centres, hospitals, employment centres, commercial and retail precincts, and parks and recreational facilities
- Provides a spine for an active transport network in the region and would be the catalyst for Sutherland Shire Council to build a local connecting network
- Provides easy access with customers able to join and leave the active transport link as they like, making it a more attractive option for local trips. This also means it is easier to connect to the existing and future cycling network.

- Provides a more enjoyable journey with customers able to ride along leafy suburban streets to exercise or reach their destination
- Aligns with the Sutherland Shire Council's existing and proposed bicycle network
- Provides safety and security as customers are more visible to passers-by, other users and the wider community
- Has less complicated construction and is not dependent on track possession when compared to in corridor options
- Has minimal utilities impact compared to in-corridor which minimise the delivery timeframe.

2.5 Preferred option

The evaluation concludes that the preferred option is Option 2a (out of corridor alignment). The preferred option involves a link between Kirrawee Station and Cronulla Town Centre using the existing road network north of the rail corridor. The preferred option would deliver important benefits (refer to Section 2.4) while being deliverable with only short-term and minor environmental and community impacts (refer to Chapter 6).

The principles of ecologically sustainable development encourage the integration of present and future economic, social development and environmental considerations into the decisionmaking process for all developments. The development of the proposal is consistent with these principles as demonstrated by the proposal objectives and assessment criteria, and the alignment of the preferred option with those objectives.

The preferred option (and subsequent refinements – refer to Section 2.6) is the basis for the proposal, which is described in detail in Chapter 3.

2.6 Design refinements

Connection to active transport link at Gannons Road

Sutherland Shire Council has recently completed an active transport link at Gannons Road, Captain Cook Drive and Bate Bay Road. This includes new on road cycle lanes and shared paths that connect to recreational Woolooware Bay and Kurnell cycling routes and the Botany Bay Walking Trail. The following benefits of connecting to the existing active transport link at Gannons Road (as opposed to continuing to the Cronulla Town Centre) were identified:

- Reduced delivery complexity and shorter construction timeframe (by about 12 months).
- Lower construction cost
- Avoidance of impacts to street trees along Denman Avenue, east of Gannons Road.
- Better use of existing infrastructure
- Increased attractiveness of the route with the link to existing active transport at the Esplanade along the Cronulla beach front and the Kamay Botany Bay National Park in Kurnell.
- Extension of the active transport network beyond Sutherland Shire through a link with the proposed Kamay Ferry Wharf Project (including the proposed reinstatement of a ferry service between Kurnell and La Perouse)

As a result of these benefits, the preferred option was refined to include the out-of-corridor option to Gannons Road with a connection to the existing active transport link at that location. The refined preferred option is shown in Figure 2-4.



Figure 2-4: Refined preferred option

Reduced impact on street trees

As part of the detailed design process design / construction strategies and treatments have been adopted with a focus on those trees assessed as having a high retention value. Minor alignment adjustments around medium retention value trees have also been adopted where the SCATL form and function would not be compromised (i.e. Denman Avenue where the path has been split to minimise impacts to a row of medium retention value trees).

In addition to minimising tree impacts (while maintaining required clearances) in designing the horizontal alignment, alternative path types have been used to minimise impacts on tree roots. This approach has allowed the retention of large numbers of otherwise impacted trees. The decision process for path selection is summarised below:

- Concrete pavement (Type 1 125-millimetre concrete on 100 millimetre subbase) used wherever possible including areas where the SCATL can be lifted so structural tree roots are below the total pavement profile.
- Localised sections of an articulated pavement (Type 2 which include joints that allow for moisture penetration) over structural tree roots where it is not feasible to lift the SCATL due to level constraints (driveways, utilities etc).
- Boardwalk (Type 3) where structural tree roots are present above the existing surface level and there are constraints (driveways, utilities etc) limiting the ability to lift the SCATL pavements.
- If the existing constraints prevent the use of a boardwalk (Type 3) and lifting the SCATL is not an option to achieve pavement Type 1 or Type 2 then trimming of structural tree roots, removal of the tree, or a localised reduction to the SCATL width has been proposed.

Further site investigations at selected locations would be considered during the design stage to fine tune the proposed treatments and identify the depth of structural tree roots. Subject to evaluation of trip hazards and ongoing maintenance requirements in consultation with Sutherland Shire Council, consideration may also be given to the use of other types of porous pavements (such as resin bonded pavements or proprietary products) at selected locations.

2.7 Bath Road / Avery Avenue option

An alternative route for the western part of the proposal is currently being investigated. The alternative route uses President Avenue, Bath Road and Avery Avenue as shown in Figure 2-5. A decision on whether to adopt the alternative route will be made following consideration of community feedback and environmental assessment.



Figure 2-5: Bath Road / Avery Avenue option
3 Proposal description

3.1 The proposal

Transport for NSW proposes to build Stage 2 of the Sutherland to Cronulla Active Transport Link, a walking and cycling path to help make walking and bike riding a more convenient, safer and enjoyable transport option (the proposal). The proposal is shown in Figure 1-2 and Figure 3-1 to Figure 3-7.

Key features of the proposal would include:

- 2.5 metre wide shared path (with grass or hard surface verges either side) between President Avenue and Oak Road at Kirrawee
- 2.4 metre wide two-way cycleway and widening of existing footpath on Oak Road between the railway bridge and Flora Street. This would include adjustments to Oak Road realignment of the kerb and centreline.
- 2.5 metre wide shared path (with a buffer to the road) along the southern side of Flora Street, eastern side of Bath Road North, southern side of Clements Parade, eastern side of Hotham Road
- Retention of the existing 2.5 metre wide path along the southern side of Kingsway between Hotham Road and Talara Road and between Gymea Bay Road and Chapman Street
- 2.5 metre wide two-way cycleway and widening of existing footpath on the southern side of Kingsway between Talara Road and Gymea Bay Road, between Chapman Street and west of Paddison Avenue, and between Miranda Road and Carramar Crescent
- 2.5 metre wide shared path along the southern side of Kingsway between west of Paddison Street and Miranda Road, and between Carramar Crescent and Banksia Road
- 2.5 metre wide two-way cycleway at road level along Banksia Road, separated by a 400 millimetre concrete buffer to on street parking
- 2.5 metre wide shared path along the southern side of Denman Road between Banksia Road and Glassop Street
- Off road cycleway along the southern side of Denman Road between Glassop Street and Gannons Road (including a mixture of 2.5 metre wide two-way cycleway and split one-way cycle paths)
- Retaining wall to replace grassed embankment along the Kingsway frontage of Sutherland Hospital
- New raised and at-grade crossings of local roads
- New street furniture such as outdoor seating, bike racks, bollards and drinking fountains.

Additional features of the proposal include:

- Pavement works, kerb ramps, line marking and traffic signal improvements (bicycle lanterns)
- Drainage adjustments (including kerb and gutter works, pipes to accommodate existing overland flow where needed and adjustments to kerb inlets)
- Utility adjustments and or protection
- Temporary facilities including compounds / storage areas, within the south-west portion of Miranda Park and within an area of vacant land on Hunter Street at Kirrawee.

- Temporary safety barriers and fencing
- Landscaping.

As noted in Section 2.7, an alternative route for the western part of the proposal is currently being investigated which uses President Avenue, Bath Road and Avery Avenue. A decision on whether to adopt this alternative route will be made following consideration of community feedback and environmental assessment.



Figure 3-1: Proposal alignment and footprint – map 1



Figure 3-2: Proposal alignment and footprint – map 2



Figure 3-3: Proposal alignment and footprint – map 3



Figure 3-4: Proposal alignment and footprint – map 4



Figure 3-5: Proposal alignment and footprint – map 5



Figure 3-6: Proposal alignment and footprint – map 6



Figure 3-7: Proposal alignment and footprint – map 7

3.2 Design

3.2.1 Design criteria

Design guides and policies used during the development of the proposal included:

- Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021)
- Transport for NSW Cycleway Design Toolbox Designing for cycling and micormobility (2021)
- Sutherland Shire Specification Stormwater Management (2009)
- Sutherland Shire Council Public Domain Manual
- Sutherland Shire Council Street Tree Guide.

Design criteria adopted for the proposal are identified in Table 3-1.

Table 3-1: Key design criteria

Design aspect	Criterion
Path widths and separation	2.5-metre-wide shared path
	2.4-metre-wide cycle path
	1.0 metre buffer to vehicle parking lane (nearside same direction)
	0.4 metre buffer to vehicle parking lane (nearside opposite direction)
	1.0 metre buffer to traffic travel lane (nearside opposite direction)
	0.4 metre buffer to traffic travel lane (nearside same direction)
	0.2 metre clearance to obstacles
Pavement thickness	Minimum 125 millimetres plus 100-millimetre base material

Typical cross sections and visualisations are shown in Figure 3-8 to Figure 3-11.



Figure 3-8: Typical cross section – Oak Road



Figure 3-9: Visualisation – Oak Road



2 TYPICAL CROSS SECTION - CLEMENTS PDE/ HOTHAM ROAD (MC10 - CH1220 APPROX.) 0 1 2 3m

Figure 3-10: Typical cross section – Clements Parade



Figure 3-11: Visualisation – The Kingsway



Figure 3-12: Visualisation – Banksia Avenue



Figure 3-13: Typical cross section – Denman Avenue, split cycleway and footpath



Figure 3-14: Visualisation- Denman Avenue, split cycleway and footpath

3.2.2 Engineering constraints

The proposal has several engineering related constraints as detailed below:

- Need to minimise land acquisition
- Need to maintain pedestrian and cyclist access during construction
- Need to maintain access to and from residences during construction
- Need to minimise impacts on utilities.

3.3 Construction activities

3.3.1 Work methodology

The general sequence of construction activities is identified below in Table 3-2. The sequence is indicative and may need to be modified following the appointment of a construction contractor. Examples of pathway construction including site demarcation are shown in

Table 3-2: Indicative construction sequenc
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No1	Stage	Key activities	Duration
1	Enabling works including site establishment	 Site laydown and amenities to be established Site survey of proposed alignment Service search and utilities mark-up on-site Demarcate a proposed section of works with temporary fencing Commence the relocation/protection of infrastructure in proposed alignment. 	About 3 months
2	Pathway construction	 Continuation of the relocation/protection of infrastructure in proposed alignment Tree/trimming removal Demolition of existing pathway Excavation to design height Prepare sub-base including placement and compaction of material Install formwork and reinforcement Place and compact concrete Installation of construction joints Removal of temporary fencing and landscaping Line-markings and signage as required. 	About 6 months



Figure 3-15: Example of pathway construction



Figure 3-16: Example of pathway construction – adjacent lane used for as laydown area

3.3.2 Construction workforce

Construction of the proposal is expected to require up to 20 workers during peak construction times. Workers would be distributed between the worksite and the site compound depending on the activities occurring and the time of day.

Construction procurement would be consistent with the NSW Government's Aboriginal Participation in Construction (APiC) policy which is designed to encourage the construction industry to create opportunities for Aboriginal people, Aboriginal owned businesses and Aboriginal communities.

3.3.3 Construction hours and duration

Subject to approval, construction is anticipated to commence in mid 2022 and take about nine months to complete, weather permitting.

Construction work would be carried out primarily during standard hours, where possible:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sunday: No work
- Public holidays: No work

However, to minimise disruption to traffic, some work may need to be carried out outside these hours. For work required outside standard hours, feasible and reasonable work practices to minimise noise nuisance (nominally set at 5 dB(A) above background noise levels) would be planned and implemented through a construction noise management plan. This would include notifying potentially affected residents and businesses. For further details refer to section 6.3.5 of this REF.

3.3.4 Plant and equipment

Plant and equipment to be used for construction would be confirmed during the construction planning process, but an indicative list of equipment expected to be used on site during construction is provided in Table 3-3.

Stage	Plant and equipment
Site establishment	Medium rigid vehicles
	Low loaders
	Semi-trailer
	Utility vehicles
	Hand tools
Pathway construction	Chainsaws
	Mulcher
	Concrete saw
	Jackhammer
	Excavator
	Dump trucks
	Water cart
	Hand compactors
	Bobcat / small excavator

Stage	Plant and equipment
	Concrete trucks
	Line marking truck
	Milling and paving machines
	Hand tools

3.3.5 Earthworks

Earthworks would generally be limited to excavation for pathway construction and low retaining walls. The estimated quantities of materials associated with earthworks are provided in Table 3-4.

Table 3-4:	Indicative	earthworks	quantities
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Proposal element	Approximate quantity (or area)
Cut volume	2,783 cubic metres
Fill	50 cubic metres
New pavements (area)	12,392 square metres
Boardwalks	2,075 square metres

3.3.6 Source and quantity of materials

The proposal would require moderate quantities of concrete and select materials. The quantities of material required would not result in a regional or local supply shortage, and none are likely to be in short supply in the foreseeable future. Materials would be sourced from local commercial suppliers where available.

Non-renewable resources such as petroleum fuels would not be used in large quantities.

3.3.7 Traffic management and access

The proposal is expected to generate up to five heavy and ten light construction vehicle movements per day at the peak of construction activity, mainly associated with:

- Movement of construction workers
- Delivery of construction materials
- Spoil and waste removal
- Delivery and removal of construction equipment and machinery.

Access to the proposal footprint would generally occur directly from the adjacent public road.

Should lane closures would occur in accordance with a Traffic Management Plan (TMP) and, where necessary, a Road Occupancy Licence (ROL). Approvals would be required from the Transport Management Centre in relation to the Kingsway and from Sutherland Shire Council in relation to local roads.

Standard traffic management measures would be used to minimise the short-term traffic impacts during construction. These measures would be identified in TMP for the proposal and would be developed in accordance with the Traffic Control at Works Sites Technical Manual (Roads and Maritime Services, 2018) and Transport for NSW Specification G10 – Control of Traffic.

During all stages of construction, access to adjacent residences and businesses would be maintained. Pedestrian and cyclist routes would be managed daily to suit construction activities.

3.4 Ancillary facilities

The proposal includes temporary facilities including compounds / storage areas, within the south-west portion of Miranda Park (about 7,345 square metres) and within an area of vacant land on Hunter Street at Kirrawee (about 7,045 square metres). These areas would be used for the following during construction:

- Site offices
- Worker amenities
- Equipment and materials storage
- Temporary stockpiling.



Figure 3-17: Kingsway / Sylvania Road compounds



Figure 3-18: Hunter Street compound

3.5 Public utility adjustment

The proposal would have some impacts on utilities. Consultation with asset owners is continuing regarding protection and/or adjustment requirements. The main impacts on utilities are summarised below:

- Ausgrid power poles These would be avoided where possible, although a number are expected to require relocation out of the pathway alignment
- Communications conduits Potential relocation
- Optus network cable Inter-city Optus network cable located under the proposed alignment along Kingsway. This asset may need to be protected during construction.
- Jemena high-pressure gas main Located near the proposed alignment along Kingsway. This asset may need to be protected during construction
- Traffic control signals addition of bicycle lanterns

3.6 Property acquisition

No acquisition of residential property is required for the proposal. Transport for NSW is exploring opportunities to widen the path at some locations and is discussing potential property acquisition with some non-residential landowners.

4 Statutory planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent. Road infrastructure facilities include 'road related areas', which in turn includes footpaths and areas open for use by cyclists.

As the proposal is for a road and road infrastructure facilities and is to be carried out by Transport for NSW, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act* 1974 and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005.

Part 2 of ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in Chapter 5 of this REF.

Greater Metropolitan Regional Environmental Plan No 2—Georges River Catchment

The Greater Metropolitan REP No.2 – Georges River Catchment (Georges River REP) remains in force as a deemed SEPP and is relevant to the proposal. While the planning controls at Clause 11 of the Georges River REP do not prohibit or impose development consent requirements in respect of the proposal, the general and specific planning principles set out in Part 2 are a mandatory consideration in the assessment of activities under Part 5 of the EP&A Act. A review of the proposed works in the context of these principles is provided at Appendix C.

4.1.2 Local Environmental Plans

Sutherland Local Environmental Plan 2015

Table 4-1 identifies the objectives for each of the affected zones under the Sutherland Local Environmental Plan 2015 (Sutherland LEP) and considers the consistency of the proposal with those objectives.

Zone	Objective	Comment
SP2 Infrastructure	 To provide for infrastructure and related uses. To prevent development that is not compatible with or that may detract from the provision of infrastructure. 	The proposal relates to the provision of infrastructure and is therefore consistent with the first SP2 zone objectives.

Table 4-1: Consistency with zone objectives - Sutherland LEP

Zone	Objective	Comment
R2 Low Density Residential	 To provide for the housing needs of the community within a low density residential environment. To enable other land uses that provide facilities or services to meet the day to day needs of residents. To protect and enhance existing vegetation and other natural features and encourage appropriate bushland restoration particularly along ridgelines and in areas of high visual significance. To allow the subdivision of land only if the size of the resulting lots retains natural features and allows a sufficient area for development. To ensure the single dwelling character, landscaped character, neighbourhood character and streetscapes of the zone are maintained over time and not diminished by the cumulative impact of multi dwelling housing or seniors housing. 	The proposal would support improved pedestrian and cyclist amenity within the R2 zone. The proposal would not prevent zone objectives being achieved.
R3 Medium Density Residential	 To provide for the housing needs of the community within a medium density residential environment. To provide a variety of housing types within a medium density residential environment. To enable other land uses that provide facilities or services to meet the day to day needs of residents. To encourage the supply of housing that meets the needs of the Sutherland Shire's population, particularly housing for older people and people with a disability. To promote a high standard of urban design and residential amenity in a high quality landscape setting that is compatible with natural features. To allow development that is of a scale and nature that provides an appropriate transition to adjoining land uses. 	The proposal would support improved pedestrian and cyclist amenity within the R3 zone. The proposal would not prevent zone objectives being achieved.
RE1 Public Recreation	 To enable land to be used for public open space or recreational purposes. To provide a range of recreational settings and activities and compatible land uses. To protect and enhance the natural environment for recreational purposes. 	The proposal supports recreation and is therefore consistent with the first two zone objectives.
B2 Local Centre	 To provide a range of retail, business, entertainment and community uses that serve the needs of people who live in, work in and visit the local area. To encourage employment opportunities in accessible locations. 	The proposal would encourage walking and cycling and is therefore consistent with the third zone objective.

Zone	Objective	Comment
	 To maximise public transport patronage and encourage walking and cycling. To create an attractive, vibrant and safe public domain that has both a high standard of urban design and public amenity that is designed to cater for the needs of all ages and abilities. To encourage housing suitable for the needs of an ageing population. To allow for residential dwellings while maintaining active land uses at street level. To provide a mix of compatible land uses and building forms that act as a transition to the surrounding residential neighbourhood. 	
B3 Commercial Core	 To provide a wide range of retail, business, office, entertainment, community and other suitable land uses that serve the needs of the local and wider community. To encourage appropriate employment opportunities in accessible locations. To maximise public transport patronage and encourage walking and cycling. To strengthen the viability of existing commercial centres through increased economic activity, employment and resident population. To create an attractive, vibrant and safe public domain with a high standard of urban design and public amenity. To enhance commercial centres by encouraging incidental public domain areas that have a community focus and facilitate interaction, outdoor eating or landscaping. To provide for pedestrian-friendly and safe shopping designed to cater for the needs of all ages and abilities. 	The proposal would encourage walking and cycling and is therefore consistent with the third zone objective. The proposal also contributes to pedestrian- friendly areas that cater for the needs of all ages and abilities (seventh proposal objective).
B4 Mixed Use	 To provide a mixture of compatible land uses. To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling. To permit light industrial uses that are compatible with the desired future residential amenity of the zone. To facilitate the re-vitalisation of the Kirrawee town centre and the Kirrawee railway station precinct. To ensure that any expansion of retail activity in the zone maintains the role and function of Kirrawee town centre and does 	The proposal would encourage walking and cycling and is therefore consistent with the third zone objective.

Zone

Objective

Comment

not adversely impact on the sustainability of other centres in the Sutherland Shire.

Development for the purposes of roads is permitted with development consent in the above zones. As noted above, the ISEPP operates to remove these consent requirements.

4.2 Other relevant NSW legislation

4.2.1 Protection of the Environment Operations Act 1997

Part 3.2 of the *Protection of the Environment Operations Act 1997* (POEO Act) requires an environmental protection licence for scheduled development work and the carrying out of scheduled activities (as set out in Schedule 1 of the POEO Act), which includes road construction. The proposal does not trigger these requirements.

Section 148 of the POEO Act requires immediate notification of pollution incidents causing or threatening material harm to the environment to each relevant authority. An Incident Management Plan would be included in the environmental management documentation for the proposal, to be prepared during the detailed design phase.

4.2.2 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides protection for items of state heritage significance that are listed on the State Heritage Register. Under Section 57(1) of the Heritage Act, the approval of the Heritage Council of NSW is generally required for development within a site included on the State Heritage Register, including works to the grounds or structures. The proposal would not affect a State Heritage Register listed item.

An excavation permit is required to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic. Relics are not expected to be affected by the proposal. Refer to Section 6.5 for further details.

4.2.3 National Parks and Wildlife Act 1974

The harming or desecrating of Aboriginal objects or places is an offence under Section 86 of the *National Parks and Wildlife Act 1979*. Under Section 90, an Aboriginal Heritage Impact Permit (AHIP) may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

Aboriginal objects are not likely to be affected by the proposal. Refer to Section 6.6 for further details.

4.2.4 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) seeks to conserve biological diversity and promote ecologically sustainable development; to prevent extinction and promote recovery of threatened species, populations and ecological communities; and to protect areas of outstanding biodiversity value.

The BC Act provides a listing of threatened species, populations and ecological communities, areas of outstanding biodiversity value, and key threatening processes.

Part 7 of the BC Act requires that the significance of the impact on threatened species, populations and endangered ecological communities listed under the BC Act or *Fisheries*

Management Act 1994, are assessed using a five-part test. Where a significant impact is likely to occur, a Species Impact Statement or Biodiversity Development Assessment Report (BDAR) must be prepared.

An assessment of the potential impact on biodiversity is provided in Section 6.3.

4.2.5 Biosecurity Act

Under the *Biosecurity Act 2015*, which came into effect on 1 July 2017 and repealed the *Noxious Weeds Act 1993*, 'all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable'.

The potential impacts and relevant safeguards in relation to weeds are discussed further in Section 6.4. Appropriate biosecurity controls would be put in place for the proposed works to minimise the risk of weed transfer.

4.2.6 Contaminated Land Management Act 1997

Part 3 of the *Contaminated Land Management Act 1997* empowers the Environment Protection Authority to regulate contaminated sites that pose a significant risk of harm to human health and/or the environment. While there are no registered contaminated sites in the proposal footprint, the Act would require Transport for NSW to immediately notify the Environment Protection Authority if it suspected that the work has resulted in ground contamination or encountered/remobilised existing ground contamination. The proposal is unlikely to result in ground contamination.

4.2.7 Roads Act 1993

Under Clause 5(1), Schedule 2 of the Roads Act 1993, Transport for NSW does not need the consent of the relevant roads authority to dig up, erect a structure or carry out work in, on or over a road. For classified roads the relevant roads authority is Transport for NSW and for unclassified roads it is the Sutherland Shire.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix A and Chapter 6 of the REF.

A referral is not required for proposed road activities that may significantly affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of Chapter 6 of the REF and Appendix A.

Findings – matters of national environmental significance

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of Agriculture, Water and the Environment under the EPBC Act.

4.3.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affecting native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act a future act includes proposed public infrastructure on land or waters that affects native title rights or interests.

A search of the Native Title Tribunal Native Title Vision website was undertaken on 28 June 2021, with the following Native Title claimants identified:

 NC2017/003 – South Coast Peoples (registered 31 January 2018). This claim covers the western part of the proposal footprint in Kirrawee and Gymea.

Transport for NSW would provide a notice of the proposal to NTSCORP under section 24KA of the Act and would invited comment on the proposal.

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of ISEPP the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

Transport for NSW is the determining authority for the proposal. This REF fulfils Transport for NSW's obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

A referral to Australian Government Department of Agriculture, Water and the Environment under the EPBC Act is not required.

5 Consultation

5.1 Consultation strategy

The consultation strategy for the proposal involves several engagement tools which would be used to consult with the community and identified stakeholders. These include:

- Project notifications and project updates for nearby residents, businesses and stakeholders
- Letters, emails, social media posts and targeted correspondence
- Updates on the Transport for NSW website: transport.nsw.gov.au/SCATL

The REF will be displayed on the Transport for NSW website.

A community update will be letterbox dropped to residents and businesses across seven suburbs along the proposed route including: Sutherland, Kirrawee, Gymea, Miranda, Woolooware, Caringbah and Cronulla. Stakeholders and registered mailing list recipients will receive email updates with links to the project website and all project documentation.

During the consultation period there will be two live online information sessions held on Thursday 9 December and Monday 13 December 2021. Key members of the project team will be online to present information on the project including information on the design, environmental impacts, community consultation and engineering elements. Attendees will be invited to register and send questions to the project team prior to the event starting.

The display period for the REF will be four weeks from Monday 17 November to Sunday 19 December. Submissions will be accepted via the project email

(projects@transport.nsw.gov.au), project hotline (1800 684 490) or by post (Level 7, 27 Argyle Street, Parramatta NSW 2150). All submissions will be allocated an identification number as a reference for responses to submissions in the determination report.

5.2 Community involvement

There is a high level of community and stakeholder interest in the Sutherland to Cronulla Active Transport Link, and this has been sustained over a number of years.

5.2.1 2015/2015 Review of Environmental Factors consultation

Between November 2015 and February 2016 an REF for a previous concept design was publicly displayed and comments were invited. The REF considered an alignment between Sutherland and Cronulla primarily to the south of the railway line, with some sections located within the rail corridor. Feedback was received from 362 stakeholders and indicated that while people supported the active transport link, there were concerns about the alignment of some sections of the route, the appearance of the link and how it would interact with the existing landscape.

5.2.2 Stage 1 Review of Environmental Factors consultation

Following consideration of feedback on the 2015/2016 REF, the Sutherland to Cronulla Active Transport Link Stage 1 – Stage 1 REF was publicly displayed between Monday 15 October to Sunday 4 November 2018. A total of 110 submissions were received by Transport for NSW in response to the public display of the Stage 1 REF in 2018, including three organisations (Sutherland Shire Council, Bicycle NSW and the Central and North Miranda Precinct Residents Association). The main issues raised were:

• Support for the proposal

- Removal of trees
- Loss of parking during construction and longer term
- Construction noise
- Safety and access
- Connectivity with regional cycling routes and other destinations
- Design features e.g. storage facilities and material used to construct the path
- Route location e.g. rail corridor or Flora Street
- Cost.
- Future stages timing and alignment.

After considering community feedback, Transport decided to proceed with Stage 1 of the Sutherland to Cronulla Active Transport Link (between Sutherland and Kirrawee) on 10 December 2018. Construction of Stage 1 was completed in April 2020.

5.2.3 Stage 2 consultation

Between 19 April 2021 and 17 May 2021, Transport sought feedback from the community on an earlier Stage 2 concept design. A Facebook Livestream was held on Thursday 22 April to answer questions and hear what others had to say about the proposal. This event was attended by over 800 people, was recorded and is available for viewing via the Facebook event. Additionally, two community drop in sessions in Caringbah and Gymea were held on 26 April and 5 May 2021. Feedback about the proposal was received from over 500 respondents, with the main issues and Transport responses summarised in Table 5-1. A full Consultation Report is available on the Transport website at transport.nsw.gov.au/SCATL.

Issue raised	Response / where addressed in REF
Alternative routes Desire from some respondents to construct the active transport link within the rail corridor	 While the rail corridor provides a direct link between Sutherland and Cronulla, it is inferior in meeting some key project objectives, for example: Less connections to key attractors (schools, shops, TAFEs, hospitals etc) Less accessibility and permeability Less visibility and security Significantly more expensive Less suited to users of all abilities. Other issues with the rail corridor option include: Longer and more complicated construction Higher maintenance costs Path closure during railway work Parking loss around stations Impacts to existing mature trees Requires significant utility relocations.
	1 3 3

Table 5-1: Summary of issues raised by the community – initial concept design

Issue raised	Response / where addressed in REF
Safety Concern that if the path runs along the road and across busy side streets, driveways and intersections it will be unsafe	Most of the link will be fully separated from the road and located within the verge. The path will be set back from the kerb to leave an area for existing established trees, power poles and signage. Small sections of the link on local roads will need to be 'on- road' where there is not enough room in the footpath. In these cases, separation from traffic will be achieved with a raised kerb buffer, and in most cases a parking lane as well. Several side street crossing treatments will be used including raised crossings or threshold treatments that clearly highlights the path. Paths that cross driveways are commonplace in NSW and motorists are currently required to check and give way to path users including children on bikes. Measures to treat the busiest driveways (i.e. at shopping centres etc., will be investigated during detailed design).
Parking and traffic Parking is for the community, especially small businesses.	There will be minimal impact to formal parking spaces for the entire route between Kirrawee and Caringbah. Parking changes are likely to be limited to making room for safe side street crossings. Parking in shopping areas is likely to experience little to no impact. Removal of traffic lanes will not be required, although there may be reduction in lane widths and readjustments of median and kerbs to provide space for path construction. Further information on parking impacts is provided in Section 6.1 of this REF.
Trees and vegetation Trees are highly valued.	The design of the proposal has sought to minimise the impact on trees to the greatest extent possible without compromising safety. This has been achieved through localised narrowing of the path, adjustments to pavement depth/path type or splitting the path into one direction each way around trees.
Connectivity The path should be well connected and should not stop at Gannons Road.	The proposed route provides better connectivity to shops, employment and education centres, sporting and recreational facilities. It also has great connectivity to the existing cycle network. The proposal will connect with the existing shared path at Gannons Road that travels towards Captain Cook Drive and then on to Cronulla. Transport for NSW will continue to work with Sutherland Shire Council, key stakeholders and the community to progress additional connections.

5.3 Aboriginal community involvement

The proposal has been considered against the requirements of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011). This procedure is generally consistent with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Department of Environment, Climate Change and Water, 2010). An outline of the procedure is presented in Table 5-2.

Table 5-2: Summary of Procedure for Aboriginal	Cultural Heritage Consultation and Investigation
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Stage	Description
Stage 1	Initial Transport for NSW assessment
Stage 2	Site survey and further assessment
Stage 3	Formal consultation and preparation of a cultural heritage assessment report
Stage 4	Implement environmental impact assessment recommendations

There is low potential for intact Aboriginal archaeological deposits within the proposal area and therefore no requirement to proceed to Stage 2 of the PACHCI.

5.4 **ISEPP** consultation

Sutherland Shire Council has been consulted about the proposal as per the requirements of clauses 13 (council infrastructure and services) of the ISEPP. Responses were received on 10 September 2021 and 1 October 2021. A summary of issues raised by Council and how those issues have or will be addressed is covered in Table 5-3. These letters are included in Appendix B.

Category	Issues raised	Response / where addressed in REF?
Preferred option	As resolved at its meeting held on 24 May 2021, Council has a preference for the route to be contained within the rail corridor wherever possible.	Section 2.4 (Alternatives and options considered) Section 5.2 (Community involvement)
Comments on design drawings	Council made a number of comments on design drawings provided for review. The types of issues raised included: Footpath widths Paving types Kerb ramps Shared zone Drainage requirements Sight distances Clearance to structures Retaining and fencing requirements Cycle safe grates Utility adjustments Property agreements (Westfield frontage)	Transport has reviewed Council comments on the design and has provided a detailed response to the issues raised. Transport will continue work with Council during the detailed design process.

	Table 5-3: Issues	s raised	through	ISEPP	consultation
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Category	Issues raised	Response / where addressed in REF?
Opens space impacts	The proposed route alignment represents a missed opportunity to utilise Council's open space (at 168 Oak Road) in-lieu of affecting Pollard Park and the Sydney Turpentine Ironbark Forest. No further impacts on Sydney Turpentine Ironbark Forest are acceptable and appropriate treatments will be required to maintain the long-term health of the existing flora.	The design has now been refined to minimise further impact (beyond that approved for separately proposed intersection adjustments) on Sydney Turpentine Ironbark Forest canopy trees within Pollard Park. Replacement plantings will occur for any understorey species immediately adjacent to the pathway.
Safety at driveway crossing and car park entry on Oak Road	The entry/exit to the public car park and the mid-block vehicular entry/exit to 165-171 Oak Road are a safety concern. On Oak Road the kerb is to be extended to the new parking alignment with the bi- directional cycle lanes provided on the footpath area, offset 400 millimetres from the face of kerb. An offset of at least 900 millimetres is required to prevent passengers in vehicles opening their doors into the path of southbound cyclists.	At both these crossings pedestrians and cyclists will have right of way. Motorists are currently required to check and give way to path users including children on bikes. Measures to treat the busiest driveways (i.e. at shopping centres etc., will be investigated during detailed design). A 400 millimetre buffer to the parking lane has been provided to maximise the vehicle traffic lane widths while providing 200 millimetre clearance to existing street trees and light poles along Oak Road. The pathway is next to passenger side door rather than driver (noting parked vehicles will not always have passengers) and passenger side occupants would have vision of oncoming cyclists when opening door.
Safety and functionality at side road crossings adjacent to The Kingsway	Crossing side streets adjacent to the Kingsway is not ideal with at grade crossing suggesting that cyclists will need to give way.	Several side street crossing treatments will be used along SCATL including raised crossings or threshold treatments that clearly highlights the path.

Category	Issues raised	Response / where addressed in REF?
Proposed crossing at Willarong Road	The proposed crossing at Willarong Road will result in loss of multiple short term parking spaces outside commercial premises including parking for funeral vehicles. This is also poor corner for right turn movements from Kingsway (westbound) to Willarong Rd (northbound). A crossing at this point would further exacerbate the issue that Council currently has at School peak times when large numbers of school children from Caringbah High filter across the Banksia Road crossing causing extensive delays at what is already a complex intersection on Kingsway.	Two spaces would be removed on the eastern side of Willarong Road would be removed to accommodate a raised crossing for new shared path set back from the intersection. While on-street parking demand is high at this location, the loss of up to six spaces in the context of available parking on the wider local road network is considered acceptable given the benefits of the proposal. There may be less convenient access to the adjacent commercial premises. The No Parking (funeral vehicles excepted) zone would not be affected. The design of this crossing and any future changes to the intersection will be considered in consultation with Council.
Loss of parking on the southern side of Denman Avenue near Gannons Road	Loss of overflow parking within 100 metres of Gannons Road (south side) is an issue on Monday afternoons in summer (Austag at Jenola Hockey Fields) and weekends in summer (soccer at Jenola Hockey Fields).	The informal parking that occurs along Denman Avenue is noted. Transport will continue work with Council to minimise impacts on parking along the alignment.
Impacts on Council's natural assets	 Council has raised in relation impacts on street trees including: Tree assessment and prioritisation Canopy value and assessment Australian standards for tree protection and pruning Root assessment Non-destructive exploration Sensitive construction methods Footpath width Tree removal and offset plantings 	Transport is continuing to review tree impacts in consultation with Council. Section 2.6 summarises the approach to minimising impacts on street trees as part of the design process while Section 6.2.3 summarised the expected residual impacts on street trees. Replanting of trees at a 4:1 ration is proposed with details to be included in the Urban Design Plan (including detailed urban design drawings and landscape plans). Refer to Section 6.2.5.

5.5 Government agency and stakeholder involvement

Briefings and discussions with Sutherland Shire Council have been ongoing throughout the planning process with the main issues raised by Council considered above in Section 5.4 Transport for NSW will continue to liaise with Council throughout the design and construction phases of the proposal.

The main issues raised by other stakeholders are summarised in Table 5-4.

Agency	Issues raised	Response / where addressed in REF?
St Luke's Anglican Church	Mandatory stop signs may need to be installed. The new pathway should prevent bike riders from having a stop-start journey. Required property adjustments must be known and with a transparent process.	Several side street crossing treatments will be used including raised crossings or threshold treatments that clearly highlights the path and gives priority to path users. Paths that cross driveways are commonplace in NSW and motorists are currently required to check and give way to path users including children on bikes. Measures to treat the busiest driveways (i.e. at shopping centres etc., will be investigated during detailed design). A detailed property adjustment plan has been prepared for St Luke's Anglican Church property.
Miranda Public School	The current pathway is sloping and dangerous and needs to be upgraded. The planned path width may not be wide enough to accommodate heavy foot traffic during peak pedestrian times.	The proposal would deliver a new path consistent with contemporary standards. The width of the path has been optimised to ensure a high level of functionality while minimising impacts on adjacent Council assets and street trees.
Westfield Miranda	Final details must be received outlining path width, location and any interference with bus transit. The new path must provide appropriate safety for bike riders considering high car volumes in driveways. New signage must be part of the upgrade where signs are not currently adequate Existing trees may create issues for new pathways Pedestrian and bike movements may need to be altered by using limiting speeds (i.e. 10km/hr) or including road humps	Transport will continue to consult with Westfield Miranda during the detailed design process. Signage would be provided as required to enhance wayfinding and safety. Impacts on trees are considered in Section 6.2.3.
Sutherland Hospital	Ensuring new infrastructure will be properly designed. Having access to all relevant documentation and reviews for investigation works taking place.	The proposal would deliver a new path consistent with contemporary standards. The exhibition of the REF will provide a further opportunity for input from key stakeholders including Sutherland Hospital.

Table 5-4: Summar	/ of main issues rai	sed by other stakeholders

Agency	Issues raised	Response / where addressed in REF?
Bicycle NSW	Ensuring all information is provided in a timely and transparent manner. Safety of local road and driveway crossings.	The exhibition of the REF will provide a further opportunity for input from key stakeholders including Bicycle NSW.
		Several side street crossing treatments will be used including raised crossings or threshold treatments that clearly highlights the path.
		Paths that cross driveways are commonplace in NSW and motorists are currently required to check and give way to path users including children on bikes. Measures to treat the busiest driveways (i.e. at shopping centres etc., will be investigated during detailed design).

5.6 Ongoing or future consultation

This REF will be placed on public exhibition for stakeholder and community comment. All comments received will be considered when finalising the proposal design. On receipt of any formal submission, an identification number will be provided for easy reference to responses in the determination report. The community would be kept informed of any further changes to the proposal resulting from this and any future consultation process.

Following the public display of the REF, all comments received would be recorded and addressed in a submissions report detailing how each issue raised would be considered in finalising the proposal design. The Submissions Report would be made available to the public on the project webpage on the Transport for NSW website. An update notification will be distributed to advise the availability of the submissions report.

If the proposal is approved, ongoing consultation activities would occur with the affected community including nearby landholders, businesses and road users during detail design and construction. Ongoing communications and notifications may include:

- Community/construction updates
- Media announcements
- NSW LiveTraffic updates and social media updates
- Stakeholder meetings as required
- Web page updates
- Work notification letters (as required).

6 Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPBC Act
- The factors specified in the guidelines Is an EIS required? (Department of Planning, 1995) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000 and the Roads and Related Facilities EIS Guideline (Department of Urban Affairs and Planning, 1996). The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix A.

Site-specific safeguards and management measures are provided to mitigate the identified potential impacts.

6.1 Transport and traffic

This section describes the existing transport environment and assesses the potential construction and operation transport impacts of the proposal.

6.1.1 Methodology

The approach to the assessment of traffic and transport impact involved the following:

- Review of the proposal alignment and identification of relevant aspects of the existing environment including the road network, active transport, buses and parking
- Qualitative assessment of potential impacts during both construction and operation
- Identification of safeguards and mitigation measures to address potential impacts.

6.1.2 Existing environment

Road network

The key characteristics of key roads used by the proposal (from west to east) are provided below:

- President Avenue President Avenue is a classified secondary road. It has separated carriageways and generally two lanes in each direction with additional turning lanes at major intersections. Near the signalised Oak Road intersection, no parking is generally allowed. The posted speed limit is 60 kilometres per hour. Footpaths are provided on both sides of the road.
- Oak Road Oak Road between President Avenue and Flora Street is a local road, with generally one through lane in each direction and a posted speed limit is 50 kilometres per hour. North of the railway bridge there is one through lane in each direction, parking lanes (one hour limit) on both sides of the road with adjacent marked on road cycle lanes. Footpaths are provided on both sides of the road and there is a raised pedestrian crossing at the northern end of the railway bridge. The intersection with Flora Street is signalised.
- Flora Street, Bath Road, Clements Parade and Hotham Street These are all local roads with posted speed limit is 50 kilometres per hour, except near Kirrawee Public School where a school zone operates (school days 8-9:30am and 2:30-4pm). Except for the northern side of Flora Street, footpaths are provided on both sides of these roads. Parking

is mostly available on both sides of these roads, with time restrictions limited to those parts of Flora Street closest to Kirrawee Railway Station.

- Kingsway Kingsway is a classified main road (Main Road 227) which forms a regional link between Cronulla and the Princes Highway. Posted speed limits are between 60 and 70 kilometres per hour along various sections. It is characterised by a dual carriageway with three lanes in each direction. The kerbside lane in both directions is used for parking (both timed and untimed) along most of its length but clearways do operate on short sections between Miranda and Woolooware as follows:
 - In both directions between Willarong Road and Taren Point Road
 - On the south side outside Sutherland Hospital
 - On the north side between Kareena Road and Taren Point Road.
- Banksia Road and Denman Avenue Banksia Road and Denman Avenue are part of an east-west local road route that extends between Caringbah Station and the eastern extent of the proposal. The posted speed limit is 50 kilometres per hour. It is mostly two lanes in each direction with the kerbside lane in both directions used for untimed on-street parking. The on-street parking spaces on the eastern end of Denman Avenue are used by commuters boarding at Caringbah Station. This also overspills onto the verge of Denman Avenue between Glassop Street and Kitchener Street.

Walking

Sutherland Shire Council has a well-established pedestrian network, which provides access to a range of facilities along the proposal alignment. In most cases, footpaths are provided on both sides of the roads along the alignment.

Key shortfalls of the pedestrian network along the proposal alignment are:

- No signalised crossing on the south leg of the Gannons Road/Denman Avenue intersection
- Limited opportunities for pedestrians to cross Kingsway; a dual carriageway road with two travel lanes and kerbside parking in each direction, particular outside the Miranda retail centre
- Denman Avenue has no pedestrian footpath on the southern side, with only a 1.2 metre wide footpath on the northern side.

Cycling

The existing cycle network within the Sutherland Shire Council area is shown in Figure 6-1. Key sections close to the proposal alignment include:

- Shared path on the southern side of the Princes Highway and Kingsway between Oak Road and Talara Road
- Shared path along the northern side of President Avenue between the Princes Highway and the western extent of the proposal (SCATL Stage 1)
- A 0.9 metre wide on-road cycle lane on both sides of Oak Road between the intersection with Flora Street and the pedestrian crossing outside Kirrawee Station. These cycle lanes are adjacent to parked on-street parking spaces which presents a risk of bike users colliding with opening car doors.
- Shared path along the eastern side of Gannons Road, which connects to shared paths and cycleways along Captain Cook Drive.



Figure 6-1: Existing bicycle network
There is minimal cycling infrastructure servicing destinations such as Westfield Miranda, Sutherland Hospital and the local centres around the railway stations. However, a substantial amount of cycling infrastructure is planned as part of the Sutherland Shire Development Control Plan 2015. The proposal is intended to provide a 'central spine' to which Council can plan and deliver connections.

The major east-west route for cyclists is known to be Kingsway. Denman Avenue and Burraneer Bay Road are also used, although to a lesser extent. The use of north-south routes appears to be limited.

Bicycle racks are provided at Miranda Westfield and at Kirrawee, Gymea, Miranda and Caringbah railway stations (as well as Woolooware and Cronulla stations to the east of the proposal). Bike lockers are provided at Miranda Station while a bike shed is provided Caringbah Station.

Buses

Bus routes traverse the proposal footprint at various location. Bus routes and bus stops are shown in Figure 6-2. The main routes are listed in Table 6-1.

Route	Description
477	Miranda to Rockdale
478	Miranda to Rockdale via Ramsgate
961	Barden Ridge to Miranda
962	East Hills to Miranda
967	Como West to Miranda via Oyster Bay
968	Bonnet Bay to Miranda via Kareela
969	Cronulla to Sutherland
970	Miranda to Hurstville
972	Sylvania to Miranda via Sylvania Waters
974	Miranda to Gymea Bay (Loop Service)
975	Miranda to Grays Point (Loop Service)
976	Sutherland to Grays Point (Loop Service)
977	Miranda to Lilli Pilli (Loop Service)
978	Miranda to Dolans Bay via Port Hacking (Loop Service)
985	Cronulla to Miranda via Woolooware Bay
988	Cronulla to Caringbah servicing Burraneer
993	Miranda to Woronora Heights (Loop Service)

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Figure 6-2: Bus routes and bus stops

Parking

Commuter parking and on-street parking is provided in various areas along the proposal alignment. Off street parking is also provided as part of retail/commercial premises, including Westfield Miranda. The main areas of on-street parking are:

- Parking lanes (one hour limit 8am-6pm Monday to Friday, 8:30am-12:30pm Saturday) on both sides of the Oak Road
- Flora Street, southern side (one hour limit 8am-6pm Monday to Friday, 8:30am-12:30pm Saturday)
- Flora Street northern side parking bays (one hour limit 8:30am-6pm everyday)
- Flora Street (eastern extent), Bath Road, Clements Parade and Hotham Road (unrestricted)
- Kingsway (timed and unrestricted parking at various locations)
- Banksia Road and Denman Avenue (mainly unrestricted parking, both sides)
- Local road network, including streets connecting to Kingsway.

6.1.3 Potential impacts

Construction

Construction vehicles and lane closures

There is the potential for some delays to traffic on the Kingsway and the local roads due to short-term lane closures and reduced speed limits. Any lane closures on the Kingsway would be scheduled so as to minimise delays to traffic, especially during peak periods.

As noted in Section 3.3.7 the proposal is expected to generate up to five heavy and ten light construction vehicle movements per day at the peak of construction activity. The number of movements is sufficiently low so as to have a negligible effect on the traffic network, even during peak periods. Impacts on network performance due to construction traffic would therefore be minor.

Pedestrians and cyclists

Pedestrians and cyclist access through the proposal site would be maintained during construction in accordance with a traffic management plan. Pedestrians and cyclists may experience short delays resulting from minor diversions or directives from traffic controllers. Cyclists would have the option of continuing their journey on-road.

Buses

Buses are likely to be affected similarly to general traffic. During the night period when any lane closures are expected, buses would generally be running at a lower frequency, and it is expected that construction would have a minor impact on the overall operation of these services and the customers using them. No temporary relocation of bus stops is required.

Emergency vehicles

Impacts on emergency service vehicles are expected to be minor provided a traffic management plan is implemented. Traffic management arrangements during construction would be designed to ensure larger NSW Fire and Rescue vehicles can negotiate the worksite during construction.

Parking

The proposal would result in the permanent removal of up to 12 on-street car spaces on various local streets near their connections with Kingsway. There may be some additional

temporary loss of parking to allow for construction, however this would be very short-term and implemented in a way that minimises any potential impacts on nearby businesses.

Operation

Pedestrians and cyclists

The proposal provides an important link, enabling pedestrians and cyclists to connect to key destinations like public transport interchanges, schools, hospitals and residential and retail precincts.

Measures to maintain safety for pedestrians and cyclists have been incorporated into the design and include:

- Full separation of the path from the road for most of the route
- Separation from traffic with a raised kerb (and in most cases a parking lane) where the path does use the road (which would only occur on local roads, not busy roads such as Kingsway)
- Raised crossings which clearly highlight the path and gives priority to path users
- Measures (which may include line-marking and signage) to clearly identify the path alignment at major driveway crossings
- Painting of bike lanes green at all vehicle interaction points.

Traffic

The proposal would not reduce the capacity of the road network and does not involve new pedestrian/cyclist crossings of Kingsway (which would have added crossing cycle times at the new crossing locations). There could be short-term delays where the new path is given right of way at the intersection with local roads. This would assist in mitigating speeds of motorists exiting the Kingsway (70km zone) to the local street network (50/40km zones).

The proposal would deliver benefits to the operation of the road network by helping to reduce car dependence in the locality.

Buses

Buses are not expected to be affected by the proposal, with no proposed changes to capacity of the road network. No changes to bus stop locations are required for the proposal.

Emergency vehicles

Emergency vehicles would not be affected by the proposal.

Parking

The proposal would result in the permanent loss of up to 12 on-street car parking spaces. Loss of parking is primarily at local street intersections with Kingsway and estimates of parking loss take into account the existing requirement not to park within 20 metres of a signalised intersection and within 10 metres of an unsignalised intersection. The removal of the nominated parking spaces is necessary to maintain adequate sight lines and maintain safety for path users. Details of anticipated parking impacts are provided in Table 6-2.

Table 6-2: Loss of on street parking

Location	Parking loss	Comment
Talara Road / Kingsway intersection	2 spaces (for sight distances and to accommodate raised crossing)	While on-street parking demand is high at this location, the loss of two spaces in the context of available

Location	Parking loss	Comment
		parking on the wider local road network is considered minor.
Chapman Street / Kingsway intersection	2 spaces (for sight distances)	While on-street parking demand is high at this location, the loss of two spaces in the context of available parking on the wider local road network is considered minor.
Premier Street / Kingsway intersection	2 informal spaces (for conversion of access road to shared zone)	While on-street parking demand is high at this location, the loss of two spaces in the context of available parking on the wider local road network is considered minor.
University Road / Kingsway intersection	2 spaces (for sight distances)	While on-street parking demand is high at this location, the loss of two spaces in the context of available parking on the wider local road network is considered minor.
Sylva Avenue / Kingsway intersection	2 spaces (for sight distances)	While on-street parking demand is high at this location, the loss of two spaces in the context of available parking on the wider local road network is considered minor.
Willarong Road / Kingsway	2 spaces (eastern side of Willarong Road). These spaces are restricted to 1 hour 8:30am-6pm Monday to Friday and 8:30am-12pm Saturdays.	Parking to be removed accommodate raised crossing for new shared path set back from the intersection. This improved crossing would also benefit students from Caringbah North Public school who frequently cross Willarong Road at this location. While on-street parking demand is high at this location, the loss of two time limited spaces in the context of available parking on the wider local road network is considered acceptable given the benefits of the proposal. There may be less convenient access to the adjacent commercial premises. The No Parking (funeral vehicles excepted) zone would not be affected.

Note: Vehicles currently park informally along the Denman Avenue Road verge. There would be limited opportunity for this practice to continue following the construction of the proposal.

By helping to reduce car dependence, the proposal would also help moderate parking demand at key centres along the route.

6.1.4 Safeguards and management measures

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Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	 A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Traffic Control at Work Sites Manual (Roads and Maritime, 2018) and QA Specification G10 Control of Traffic (Roads and Maritime, 2008). The TMP will include: Confirmation of haulage routes Measures to maintain access to local roads and properties Site-specific traffic control measures (including signage) to manage and regulate traffic movement Measures to maintain pedestrian and cyclist access Requirements and methods to consult and inform the local community of impacts on the local road network Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads A response plan for any construction traffic incident Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic monitoring, review and amendment mechanisms. 	Contractor	Pre- construction	Section 4.8 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
Local community notification	Undertake consultation with potentially affected residences prior to the commencement of and during works in accordance with the Transport for NSW's Community Involvement and Communications Resource Manual. Consultation should include but not be limited to door knocks, newsletters or letter box drops providing information on the proposal, working hours and a contact name and number for more information or to register complaints.	Transport for NSW	Pre- construction / construction	Additional measure Section 2.2 of QA G10 Traffic Management
Community information	Provide road users and local communities with timely, accurate, relevant and accessible information about changed traffic arrangements and delays owing to construction activities.	Contractor	Construction	Additional measure
Access	Maintain access to properties during construction. Where that is not possible or necessary, provide temporary alternative access arrangements in consultation with affected landowners and the relevant local road authority.	Contractor	Pre- construction / construction	Additional measure
Impacts to pedestrians and cyclists	Maintain pedestrian and cyclist access throughout construction. Where that is not possible or necessary, provide temporary alternative access arrangements in consultation with affected landowners and the local road authority.	Contractor	Construction	Additional measure
Emergency services vehicles	Traffic management measures will be implemented to ensure emergency services vehicles can negotiate the intersection during construction.	Contractor	Construction	Additional measure
Public transport network changes during construction	Maintain access for public transport services. Consult with bus operators, Transport for NSW, the Sutherland Shire Council (as relevant), and inform the community of any temporary changes to bus stop operation.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Operational traffic and safety	Treatments to enhance safety at major driveway crossings will be investigated during detailed design.	Transport for NSW	Detailed design	Additional measure

6.2 Landscape character and visual amenity

A Landscape Character and Visual Impact Assessment for the proposal was carried out by Spackman Mossop Michaels. The main findings of that assessment are summarised below while the full report is included in Appendix D. This section has also been informed by an Arboricultural Impact Assessment.

6.2.1 Methodology

The methodology used for the visual impact assessment is consistent with the Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (Transport for NSW, 2020).

The guidelines establish an assessment process with reference to the sensitivity of an area and magnitude of the proposal in that area.

		MAGNITUDE		
	HIGH	MODERATE	LOW	NEGLIGIBLE
HIGH	HIGH	HIGH - MODERATE	MODERATE	NEGLIGIBLE
MODERATE	HIGH - MODERATE	MODERATE	MODERATE - LOW	NEGLIGIBLE
LOW	MODERATE	MODERATE -LOW	LOW	NEGLIGIBLE
NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

Figure 6-3: Landscape character and visual impact assessment matrix

Landscape character assessment

The landscape character assessment determines the impact of the proposal on the area's character and sense of place by:

- Identifying the site's landscape character zones
- Assessing how sensitive the landscape character zones are to the proposed changes and the capacity to absorb change
- Assessing the magnitude of change
- Providing an overall assessment based on the measures of sensitivity and magnitude, as shown in Figure 6-3.

Visual impact assessment

The visual impact assessment determines the impact of the proposal on key existing views by:

- Selecting the key views within the visual catchment
- Assessing how sensitive the views are considering the capacity to absorb change, type and number of viewers and length of exposure to that view
- Identifying changes to each view as a result of the proposal
- Assessing the magnitude of change

• Providing an overall assessment based on the measures of sensitivity and magnitude, as shown in Figure 6-3.

6.2.2 Existing environment

General setting

The topography of the Sutherland Shire is characterised by plateaus, exposed ridges, slopes and coastal and estuarine environments. The proposal is located between the Georges River and Botany Bay to the north and Port Hacking to the south. The Kingsway traverses a narrow, undulating ridge separating the low-lying areas around Woolooware Bay to the north and the gullies associated with a number of bays of Port Hacking, including Gymea Bay and Yowie Bay

Land use in the localities surrounding the proposal site includes residential, commercial, light industrial, retail and special uses. Residential land uses include low and medium density spread throughout the suburbs of Kirrawee, Gymea, Miranda and Caringbah. High density apartments occur along the southern side of the Kingsway at Gymea and Miranda. Notable land uses near the proposal site include Kirrawee Public School, Gymea TAFE, Hazelhurst Arts Centre, Miranda Public School, Port Hacking High School, Westfield Miranda and The Sutherland Hospital.

Landscape character zones and viewpoints

Six landscape character zones were identified for the proposal site based on the interplay of existing natural and built features. The landscape character locations are shown in Figure 6-4. The sensitivity of each zone is discussed below.

- LCZ1 Kirrawee Shopping Centre The sensitivity of this area is considered moderate. The Kirrawee shopping strip is a small-scale retail area with a 'village' character that is highly regarded by local residents.
- LCZ2 Kirrawee Commercial The sensitivity of this zone is considered low noting the heavily commercial and light industrial land uses.
- LCZ3 Kirrawee/Gymea Residential The sensitivity of this area is considered moderate. This zone is a cohesive established residential area near the Kirrawee town centre
- LCZ4 Kingsway Residential The sensitivity of this area is considered moderate. The Kingsway is a major east-west traffic route that has a pleasant 'parkway' character, with the majority of land uses along the road being residential.
- LCZ5 Miranda Shopping Centre The sensitivity of this area is considered low. The Miranda shopping centre is a medium scale retail area on a busy main road that has undergone a number of upgrades in recent years.
- LCZ6 Caringbah Residential The sensitivity of this area is considered moderate. The Caringbah residential zone is a generally cohesive established residential area with a mix of building types and an extensive coverage of street trees.

The extent from which the proposal would be visible from adjoining areas, or visual envelope, varies along the length of the proposal alignment. It is influenced by topography, vegetation, and buildings. The visual envelope is shown by Figure 6-4.

Within the visual envelope, key viewpoints have been identified along the road corridor and at public domain areas. This involved the analysis of views from the proposal alignment to identify the extent to which houses, and other buildings were visible. Locations and directions of chosen viewpoints are representative of the range of viewpoints both within and beyond the proposal alignment. The location of viewpoints is shown in Figure 6-4, while each viewpoint is described in Table 6-4.



Figure 6-4: Landscape character zones visual envelope and viewpoints

Table 6-4: Description of assessed viewpoints

ID	Description	Image	Sensitivity
V01	President Avenue at Pollard Park, Kirrawee. View east.		Considerable sensitivity due to the Sydney Turpentine - Ironbark Forest vegetation. Despite being on a busy road, this valued fragment of remnant vegetation has HIGH sensitivity to any changes.
V02	Oak Road at Kirrawee shopping centre. View north.		Local shoppers, pedestrians and cyclists would be affected by the changes. The view, of a typical post war suburban retail shopping strip has MODERATE sensitivity to any changes.
V03	Clements Parade, Kirrawee at the entry to Kirrawee Public School, looking south-east.		View would be seen by people entering and exiting the school, and other pedestrians using the



n he footpath, who would be considered to have MODERATE sensitivity to any changes.

The Kingsway, at the intersection with V04 Gymea Bay Road, Gymea, looking east.



Pedestrians and cyclists would be affected by the changed view, however, due to its location on a busy main road, the sensitivity to change would be LOW.

ID Description

V05 Access road, parallel to the Kingsway, near the corner of Premier Street Gymea, looking west.



Sensitivity

The sensitivity of this view to change is MODERATE, given that residential viewers generally have a high sensitivity, however, its location on a main road slightly reduces the rating.

V06 Southern verge of the Kingsway, about 30 metres east of Jackson Avenue, looking west.



Pedestrians and cyclists would be affected by the changed view, however, due to its location on a busy main road, the sensitivity to change would be LOW.

V07 Malvern Road, Miranda, next to Logeman Court, looking north-west.



View is from a group of residences on the southern side of Malvern Road and would be seen by people entering and exiting their residence, and other pedestrians, who would have MODERATE sensitivity to any changes

V08 Bus stop next to the main entrance to The Sutherland Hospital on the Kingsway, looking north-west.



People waiting at the bus stop, and pedestrians and cyclists would be affected by the view. Due to its location on a busy road, they would have LOW sensitivity to change.

ID	Description	Image	Sensitivity
V09	Banksia Avenue, at the corner of the Kingsway, looking south-east.		Park viewers generally have high sensitivity, however, due to their generally low numbers and street outlook, the rating is assessed to be MODERATE.
V10	Denman Avenue, Caringbah, about 20 metres east of Nullaburra Road, looking east.		The sensitivity rating is assessed as MODERATE due to the pleasant outlook from this treed residential street.

Street trees

Inspection of the proposal footprint was carried out by an AQF5 qualified arborist during July and August 2021. A total of 741 individual trees (diameter of 100 millimetre or more when measured at 500 millimetres above ground level) were identified and recorded during the site inspection. Of these:

- 394 trees are local natives
- 258 are natives
- 78 were exotics
- 7 were weed species
- 4 were unknown
- 234 trees were assessed as having **Low** retention value
- 277 trees were assessed as having **Medium** retention value
- 230 trees were assessed as having High retention value

The retention value of a tree or group of trees is determined using a combination of environmental, cultural, physical and social values.

- **Low**: These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
- **Medium**: These trees are moderately important for retention. Their removal should only be considered if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
- **High**: These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to

accommodate the setbacks as prescribed by Australian Standard AS4970 Protection of trees on development sites.



Figure 6-5: Example low retention value tree



Figure 6-6: Example medium retention value tree



Figure 6-7: Example high retention value tree

6.2.3 Potential impacts

Construction

The proposal would result in a temporary visual impact along the proposal alignment due to construction activities. The viewpoints for road users, residential properties near the site and users of nearby public domain area would be impacted by:

- Compound facilities and stockpile/material storage
- Construction plant and equipment
- Temporary safety barriers and traffic control equipment including signage
- Temporary construction lighting.

The temporary impacts on visual amenity during construction activities would be confined to the road corridor and immediately adjacent areas. Following the completion of construction, the impacts associated with construction equipment and facilities would be removed and disturbed areas restored.

Some of the longer-term operational impacts (such as those associated with tree removal) would occur during the early stages of construction.

Operation

Landscape character impacts

The landscape character impacts proposal are summarised in Table 6-5. Impacts range from negligible to moderate-low.

Table 6-5: Lands	cape character	assessment summa	ſγ
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Zone	Sensitivity	Magnitude	Impact
LCZ1 Kirrawee Shopping Centre	MODERATE	Scale of the proposal within this established shopping strip would be small, and, with the proposed public domain improvements and planting, would result in the LOW magnitude of change.	MODERATE-LOW
LCZ2 Kirrawee Commercial	LOW	The proposal would provide a slight improvement to the landscape character of the existing commercial streetscape, resulting in the LOW magnitude of the visual effect.	LOW
LCZ3 Kirrawee/Gy mea Residential	MODERATE	The proposal would be in scale with this quiet residential street and the proposed street tree planting would provide a slight improvement to the landscape character of the zone, resulting in the LOW magnitude visual effect.	MODERATE-LOW
LCZ4 Kingsway Residential	MODERATE	The scale of the proposal along the busy main road of the Kingsway is small, resulting in a LOW magnitude of change.	MODERATE-LOW
LCZ5 Miranda Shopping Centre	LOW	The proposal generally occurs within the existing footpath alignment using existing pavement, except for the section at the eastern end this zone, resulting in the NEGLIGBLE magnitude of change.	NEGLIGBLE
LCZ6 Caringbah Residential	MODERATE	The proposal generally occurs within a treed verge where there would be minimal vegetation removal, except for the section along Banksia Road, resulting in a LOW magnitude of change.	MODERATE-LOW

Visual impacts

The assessed level of visual impact for viewpoint is summarised in Table 6-6. Impacts levels range from low to moderate-low.

Table 6-6: Visual impact assessment outcomes

View	Sensitivity	Magnitude	Impact
V01	HIGH	LOW	MODERATE. The magnitude of change within this view would be low after considering the separately planned kerb realignment on the Oak Road frontage. After the kerb realignment works (separate proposal), it is not expected that any additional trees would need to be removed. Additional groundcover planting using Sydney Turpentine - Ironbark Forest species would be provided next to the shared path.
V02	MODERATE	LOW	MODERATE-LOW. As the proposal would replace an existing paved road space with another form of pavement for transport, the magnitude of change would be low, despite the relative scale of the change within the view being moderate in size.
V03	MODERATE	LOW	MODERATE-LOW. The proposal would introduce a new 2.5 metre wide shared path replacing the existing 1.2 metre wide concrete footpath to the right side of the view. Two trees in the centre of the view would be removed to accommodate the shared path and would be replaced with similar species. It is proposed to provide small garden beds containing native grasses around the base of the existing and proposed street trees. Turf would be provided to the edge of the shared path to tie in with the existing verge treatment. This results in a low visual effect from this location.
V04	LOW	LOW	LOW. The proposal would introduce a new 2.4 metre wide two-way cycleway on the far side of Gymea Bay Road through part of the existing 'gateway' garden bed planting. This would require the removal of some of the understorey planting, which would be replaced to enhance the 'gateway' planting. The foreground deciduous tree may need to be pruned to ensure safe head clearance for cyclists. The existing high quality paving on both sides of the intersection would be retained as would the paths next to the building line and adjacent to the road that leads to the existing bus stop on the Kingsway. The existing 'Gymea Village' sign would be relocated and other street furniture, including timber benches, bike racks and bollards may be provided. The magnitude of the visual effect is likely to be low.
V05	MODERATE	LOW	MODERATE-LOW. The proposal would introduce a new 2.4 metre wide two way cycleway and would replace the existing 1.2 metre wide concrete footpath with a 1.5 metre wide path next to the property boundary on the far side of Premier Street, with the path continuing across Premier Street to the left of the view. The existing access road would be retained and would be designated a shared zone with the incorporation of formalised parking, signage and line marking. As most of the changes occur on the other side of Premier Street, the magnitude of change within this view would be low.

View	Sensitivity	Magnitude	Impact
V06	LOW	LOW	LOW. The proposal would introduce a new 2.5 metre wide boardwalk to the centre of the view. The trees in the view would be retained, subject to arborist advice. The existing footpath to the left of the view would be retained. And small garden beds containing native grasses would be provided around the base of the existing street trees. Turf would be provided to the edge of the cycleway to tie in with the existing verge treatment. The magnitude of the visual effect is likely to be low.
V07	MODERATE	LOW	MODERATE-LOW. The proposal would introduce a new 2.4 metre wide two way cycleway that would replace the existing 1.2 metre wide concrete footpath and a new 1.5 metre wide path next to the kerb on the northern side of Malvern Road. Small garden beds containing native grasses would be provided around the base of the existing street trees extending between the cycleway and the footpath. Turf would be provided to the edge of the cycleway to tie in with the existing verge treatment. The distance from the view and the ground level scale of the changes visible from this viewpoint would result in a low visual effect.
V08	LOW	LOW	LOW. The shared path would require the removal of the grassed embankment that would be replaced with a retaining wall at the base of the existing fence. Turf would be provided to the edge of the cycleway to tie in with the existing verge treatment. Despite the introduction of the retaining wall, the magnitude of the visual effect is likely to be low.
V09	MODERATE	LOW	MODERATE-LOW. The shared path would transition, via a kerb ramp about 10 metres before the telegraph pole, to an on-road cycleway, separated from the traffic by a castellated median kerb. This would require the adjustment of the centre line so as to maintain existing on street parking. Groundcover planting would be provided in the verge, to replace that impacted by construction, using species sympathetic to those used in Highfield Park. Overall, the magnitude would be considered low.
V10	MODERATE	LOW	MODERATE-LOW. The proposal would introduce a new 2.4 metre wide two-way cycleway on the right side of Denman Avenue. This would split to two one-way cycleways just beyond the bus stop in the centre of the view. It is envisaged that most existing trees would be retained, subject to arborists advice, through tree sensitive construction techniques. Some existing trees may need to be pruned to ensure safe head clearances for cyclists. Additional trees, suitable for planting under powerlines, would be provided for shade and additional screening of the railway line. Native grasses and groundcovers would also be planted to provide visual and physical separation of cyclists and traffic. The proposal would initially have a moderate visual effect on the existing view, however, over time this would reduce to low.

Street trees

While the use of alternative path / pavement types as has allowed the retention of a large number of trees (refer to Section 2.6), the concept design identifies 127 trees within the construction footprint of the proposal which may require removal. Of these:

- 5 are of high retention value.
- 34 are of medium retention value.
- 88 are of low retention value.

Details of the five high retention value native trees to be removed are provided in Table 6-7, while Figure 6-8 shows the categorisation of all trees that may require removal. It is expected that the number of trees requiring removal will reduce during detailed design.

Table 0-7. Thigh retention value trees requiring remova	Та	able	6-7:	High	retention	value	trees	requiring	remova
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ID	Species	Height	Health	DBH
214	Eucalyptus nicholii	18m	Good	600mm
509	Eucalyptus nicholii	12m	Good	400mm
546.1	Angophora costata	14m	Fair	300mm
557	Angophora costata	10m	Fair	750mm
661	Eucalyptus haemastoma	14m	Fair	800m



Figure 6-8: Low, medium and high priority trees potentially requiring removal



Figure 6-9: High retention value street trees – removed and retained



Figure 6-10: Impacts on medium and low retention value street trees

6.2.4 Urban design strategy

The urban design objectives and principles for the proposal are detailed in Section 2.3.3. A preliminary urban and landscape design, including plans, sections and photomontages is included in the Urban Design and Landscape Character and Visual Impact Assessment (refer to Appendix D of this REF). The preliminary urban and landscape design (which was based on an earlier design) translates the urban design principles and objectives into an overall urban design approach, to achieve an integrated outcome for the proposal. The preliminary urban and landscape design process.

6.2.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and visual impact	 An Urban Design Plan (including detailed urban design drawings and landscape plans) will be prepared to support the final detailed project design. The Urban Design Plan will present an integrated urban design for the project, providing further practical detail on the application of design principles and objectives identified in this REF. The Plan will confirm design treatments for: Location and identification of existing vegetation and proposed landscaped areas, including species to be used Details of the staging of landscape works taking account of related environmental controls such application and proposed landscape works taking 	Transport for NSW	Detailed design	Standard measure
	 Details of replacement tree planting (at a ratio of four trees to one tree removed – along the route or at other locations nominated by Council) using species selected in consultation with Sutherland Shire Council Procedures for monitoring 			
	and maintaining landscaped or rehabilitated areas. The Urban Design Plan will be prepared in accordance with relevant guidelines, including:			
	 Beyond the Pavement: Urban design approach and procedures for road and infrastructure planning. 			

Table 6-8: Landscape and visual environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
	 design and construction (Roads and Maritime, 2020) Landscape Guideline (Roads and Maritime Services, 2019). 			
Visual impacts	Where reasonable and feasible trees will be retained in design.	Transport for NSW	Detailed design	Additional measure
Visual impacts	Following the completion of construction works, plant/equipment will be removed, and disturbed areas will be revegetated, turfed or otherwise restored as appropriate.	Contractor	Construction	Additional measure
Visual impacts	Construction facilities will be contained within the construction works zone boundary and occupy the minimum area practicable for their intended use.	Contractor	Construction	Additional measure
Visual impacts	Provide suitable barriers to screen views from adjacent areas during construction	Contractor	Construction	Additional measure
Visual and landscape impacts	Opportunities to support the Five Million Trees for Greater Sydney initiative and the greening our city Premier's priority will be explored during detailed design and as part of the development of the landscape design for the proposal. This would occur in consultation with the Sutherland Shire.	Transport for NSW	Detailed design	Additional measure
Impacts on street trees	Tree protection zones would be implemented to minimise the impact to street trees where possible. Any pruning of trees (or tree roots) is to occur under the supervision of an AQF5 qualified arborist and in accordance with a pre-agreed methodology. Vehicles, plant or equipment would not be parked or stored within the tree protection zone, if parking or storage is required additional mitigation measures would be implemented to minimise the impact to the vegetation.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Impacts on street trees	All proposed works within the tree protection zone must be carried out under the supervision of the project arborist	Contractor	Construction	Additional measure
Impacts on street trees	Any underground services proposed within the tree protection zone will be installed using tree sensitive methods such as horizontal directional drilling boring, non-destructive excavation and carried out under the supervision of the project arborist.	Contractor	Construction	Additional measure
Impact from lighting	Temporary site lighting will be installed and operated in accordance with AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting, and an approved Traffic Management Plan.	Contractor	Construction	Additional measure
Impacts from lighting	The design of new street lighting will consider potential light spill impacts on adjacent properties.	Transport for NSW	Detailed design	Additional measure

6.3 Noise and vibration

A noise and vibration noise assessments for the proposal were carried out by Muller Acoustic Consulting. The main findings of the assessment is summarised below while the full reports are included in Appendix E.

6.3.1 Methodology

The noise and vibration impact assessment methodology involved:

- Identifying and classifying sensitive receivers. Receivers were classified using a combination of recent aerial and ground photography, web-based information sources and cadastral data.
- Adoption of suitable 'representative noise environment' background noise levels from the Transport for NSW Maintenance and Construction Noise Estimator as a substitute for sitespecific data from background noise monitoring (which was not collected due to changes to the noise environment associated with COVID-19 restrictions)
- Establishing proposal specific construction noise management levels in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009)
- Modelling of construction noise using construction sound power levels as per the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and construction scenarios which assume worst-case scenarios for construction activities, such as sources operating concurrently, minimum offset distances between source and receiver and no mitigation measures

- Consideration of operation noise impacts associated with people using the new active transport link
- Assessment of construction and operational noise predictions against applicable criteria
- Identification of feasible and reasonable environmental management measures.

6.3.2 Existing environment

Two broad noise catchment areas (NCA) in the area surrounding the proposal footprint, being the area surrounding the Kirrawee compound site (NCA 1) and the area surrounding the pathway alignment (NCA 2).

NCA 1 is a residential neighbourhood with the noise environment dominated by traffic noise from the local road network and distant traffic from Kingsway and Princes Highway, general urban hum and environmental noise. NCA 2 is mainly residential and commercial with the noise environment dominated by Kingsway, which carries a traffic volume greater than 20,000 vehicles daily. The adopted background noise levels for each NCA are provided in Table 6-9.

Location	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
NCA 1	45	40	35
NCA 2	50	45	40

Table 6-9: Adopted background noise levels

6.3.3 Criteria

Construction noise criteria

Noise management levels (NMLs) for the proposal were established in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) (ICNG). The ICNG contains procedures for establishing NMLs at sensitive receiver locations based on the existing background noise in the area. Where an exceedance of the noise management levels is predicted, the ICNG advises that receivers can be considered 'noise affected' and the proponent should apply all feasible and reasonable work practises to minimise the noise impact.

Residential receivers

Table 6-10 details the method for determining NMLs for residential receivers potentially affected by the proposal. Often works that may cause inconvenience within the community (e.g. traffic congestion) or safety concerns are done outside of standard work hours. NMLs during these periods are presented in the table for works 'Outside recommended standard hours'.

Time of day	Noise Management Level L _{Aeq (15min)} 1	How to apply
Recommended Standard hours: Monday to Friday 7:00am to 6:00pm Saturday 8:00am to 1:00pm	Noise affected rating background level: RBL + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level.

Table 6-10: Recommended	l construction NMLs a	t residential receivers	outlined in the ICNG
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Time of day	Noise Management Level L _{Aeq (15min)} 1	How to apply
No work on Sundays or public holidays		The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected: 75 dBA	The Highly Noise Affected (HNA) level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account: Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid- morning or mid-afternoon for works near residences. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected rating background level: RBL + 5 dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practises have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

Note 1: LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community.

The project specific NMLs for the residential and non-residential receivers identified for the proposal are provided in

Table 6-11.

Table 6-11: Project specific noise management levels

Receiver	Assessment period	RBL (db LA ₉₀)	NML (db LA _{eq})
NCA 1 residences	Standard hours	45	55
NCA 1 residences	Out-of-hours Period 1 ¹	40	45
NCA 1 residences	Out-of-hours Period 2 ²	35	40
NCA 2 residences	Standard hours	50	60
NCA 2 residences	Out-of-hours Period 1 ¹	45	50
NCA 2 residences	Out-of-hours Period 2 ²	40	45

¹ Out-of-hours Period 1: Monday to Friday 6pm-10pm, Saturday 7am-8am and 1pm-10pm, Sunday / Public Holiday 8am-6pm ² Out-of-hours period 2: Monday to Friday 10pm-7am, Saturday 10pm-8am, Sunday / Public Holiday 6pm-7pm

Non residential receivers

A number of non-residential land uses have been identified in the study area. These include other sensitive land uses such as educational institutes, medical facilities, outdoor recreational areas and commercial properties. The ICNG also provides guidance for these types of receivers. Noise management levels recommended in the ICNG for non-residential receivers have been reproduced in Table 6-12. No separate criteria for out-of-hours construction works is provided for non-residential sensitive receivers as it is assumed that the buildings would be vacated during the evening and night time.

For certain receiver types, criteria presented in Table 6-12 is specified as an internal noise level. As the noise model predicts external noise levels, it has been conservatively assumed that all schools and places of worship have openable windows and external noise levels are 10 dB higher than the corresponding internal level, which is representative of windows being partially open to provide ventilation. Hospital wards are assumed to have fixed windows with 20 dB higher external levels.

Non-residential land use	Noise Management Level LAeq(15minute) ¹ (when property is in use) – dB(A)
Classrooms at schools and other education institutions	45 (Internal noise level)
Hospital wards and operating theatres	45 (Internal noise level)
Places of Worship	45 (Internal noise level)
Active recreation areas	65 (External noise level)
Passive recreation areas	60 (External noise level)
Community centres	Refer to the recommended 'maximum' internal levels in AS 2107 for specific uses
Commercial (offices, retail outlets and small commercial premises)	70 (External noise level)

Table 6-12 Recommended construction NMLs at non-residential receivers outlined in ICNG

Note 1: LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community.

Sleep disturbance

The maximum noise level assessment (sleep disturbance) criterion of 65dB LA_{max} referred to in Environmental Impact Assessment Procedure: Preparing an Operational Traffic and Construction Noise and Vibration Assessment Report (Roads and Maritime Services, 2016) and the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) has been adopted for the assessment of sleep disturbance.

Construction traffic noise criteria

When construction related traffic moves onto the public road network, vehicle movements are regarded as additional road traffic and are assessed under the Road Noise Policy (RNP) (Department of Environment Climate Change and Water, 2011). An initial screening test is applied by evaluating if noise levels would increase by more than 2 dB (an increase in the number of vehicles of approximately 60 per cent) due to construction traffic or a temporary detour due to a road closure.

Construction vibration criteria

Vibration arising from construction activities can result in impacts on human comfort, impacts on the building contents (such as sensitive equipment) or the damage to the physical structure of the building. For human comfort the relevant criteria are contained in Assessing Vibration: a technical guideline (Department of Environment and Conservation, 2006). Structural damage vibration limits are contained in British Standard (BS) 7385 and German Standard DIN 4150.

As a guide, safe working distances for the proposed items of vibration intensive plant are provided in the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). Safe working distances to achieve the DIN 4150.3 criteria for heritage structures are about double the safe working distance for cosmetic damage.

Plant item	Rating / description	Cosmetic damage (BS7385)	Heritage item (DIN 4150)	Human response
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5m	10m	15m to 20m
	< 100 kN (Typically 2-4 tonnes)	6m	12m	20m
	< 200 kN (Typically 4-6 tonnes)	12m	24m	40m
	< 300 kN (Typically 7-13 tonnes)	15m	30m	100m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2m	4m	7m
Jackhammer	Hand held	1m nominal	2m	2m

Table 6-13	: Minimum	working	distances	for rel	levant	vibration	intensive	plant
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6.3.4 Potential impacts

Construction

The construction scenarios included in this assessment are described in Table 6-14. The specific locations and types of equipment used for construction are not known at this stage. It is also unlikely that all plant and equipment would operate simultaneously but may be used sequentially across each part of the construction area. On that basis, the assessment provides a broad representation of the likely worst-case impacts from each component of the construction work.

Individual receivers would be affected for relatively short periods as construction moves along the alignment. Evening and night works would only be required in limited circumstances where necessary to ensure safety or avoid delays to traffic (along the Kingsway).

Table 6-14: Construction scenarios

ID	Name	Description
1	Compound site establishment	Survey set out, establishment of environmental controls and establishment of compound sites.
2	Alignment formation	Excavation or importation of fill to form alignment. Subbase layers placed and compacted.
3	Pavement formation	Installation of formwork, concrete pouring and finishing.

ID	Name	Description
4	Kerb realignment	Concrete sawing and kerb removal.
5	Line marking and furniture installation	Line marking and installation of signage and facilities.

Construction noise assessment – establishment of compound site

Table 6-15 shows $L_{Aeq(15min)}$ noise emissions are predicted to be above the NMLs for nearby residential receivers and active recreation areas during establishment of the compound sites.

Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Residential NCA 1	Day	55	Approx. 30 metres
	Evening	45	Approx. 105 metres
	Night	40	Approx. 195 metres
	Highly affected	75	Approx. 10 metres
Residential NCA 2	Day	60	Approx. 30 metres
	Evening	50	Approx. 130 metres
	Night	45	Approx. 205 metres
	Highly affected	75	Approx. 10 metres
Active recreation	When in use	65	Approx. 20 metres

Table 6-15: Affected distances – Compound establishment

Note 1: Distance up to which the NML would be exceeded.

Construction noise levels – earthworks and alignment formation

Table 6-16 shows $L_{Aeq(15min)}$ noise emissions for earthworks and alignment formation are predicted to be above the NMLs for nearby residential receivers up to two rows of houses back from the proposal site, as well as places of worship, passive and active recreation areas and commercial receivers immediately adjacent to the proposal footprint. Given the proximity of adjacent buildings to the proposal footprint, noise emissions are also expected to exceed the highly noise affected NML of 75dB LAeq(15min) for receivers within approximately 12m of the proposal site.

Table 6-16: Affected distance	- earthworks and alignment formation
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Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Residential NCA 2	Day	60	Approx. 65 metres
	Evening	50	Approx. 190 metres
	Night	45	Approx. 330 metres
	Highly affected	75	Approx. 12 metres

Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Places of worship	When in use	70	Approx. 20 metres
Passive recreation	When in use	60	Approx. 65 metres
Active recreation	When in use	65	Approx. 45 metres
Commercial	When in use	70	Approx. 20 metres

Note 1: Distance up to which the NML would be exceeded.

Construction noise levels – pavement formation

Table 6-17 shows $L_{Aeq(15min)}$ noise emissions for pavement formation are predicted to be above the he relevant NMLs for nearby residential receivers up to two rows of houses back from the proposal site, as well as The Sutherland Hospital, places of worship, passive and active recreation areas and commercial receivers immediately adjacent to the proposal footprint.

Table 6-17: Affected distances – pavement formation

Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Residential NCA 2	Day	60	Approx. 90 metres
	Evening	50	Approx. 270 metres
	Night	45	Approx. 440 metres
	Highly affected	75	Approx. 15 metres
Hospital wards	When in use	70	Approx. 23 metres
Places of worship	When in use	70	Approx. 23 metres
Passive recreation	When in use	60	Approx. 90 metres
Active recreation	When in use	65	Approx. 35 metres
Commercial	When in use	70	Approx. 23 metres

Note 1: Distance up to which the NML would be exceeded.

Construction noise levels – kerb realignment including concrete sawing

Table 6-18 shows $L_{Aeq(15min)}$ noise emissions are predicted to be above the relevant NMLs for all receiver types. Modelling indicates that during the night-time (should works be occurring), residential receivers up to 1.1 kilometres from the proposal footprint may experience noise levels above the NMLs. Receivers within about 45 metres would potentially be exposed to noise levels above the highly noise affected NML of 75dB LA_{eq(15min)}.

Table 6-18: Affected distances – kerb realignment

Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Residential NCA 2	Day	60	Approx. 220 metres

Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Residential NCA 2	Evening	50	Approx. 570 metres
Residential NCA 2	Night	45	Approx. 1,100 metres
Residential NCA 2	Highly affected	75	Approx. 45 metres
Hospital wards	When in use	70	Approx. 70 metres
Places of worship	When in use	70	Approx. 70 metres
Passive recreation	When in use	60	Approx. 200 metres
Active recreation	When in use	65	Approx. 135 metres
Commercial	When in use	70	Approx. 70 metres

Note 1: Distance up to which the NML would be exceeded.

Construction noise levels – line marking and road furniture

Table 6-19 shows $L_{Aeq(15min)}$ noise emissions are predicted to be above the relevant NMLs for nearby residential receivers directly adjacent to the proposal site. Places of worship (St Stylianos Greek Orthodox Parish), passive and active recreation areas, and commercial receivers immediately adjacent to the proposal footprint may also experience noise levels above the relevant NMLs.

Receiver type	Period	NML (dB LA _{eq})	Affected distance ¹
Residential NCA 2	Day	60	Approx. 50 metres
	Evening	50	Approx. 145 metres
	Night	45	Approx. 240 metres
	Highly affected	75	<10 metres
Hospital wards	When in use	70	Approx. 20 metres
Places of worship	When in use	70	Approx. 20 metres
Passive recreation	When in use	60	Approx. 50 metres
Active recreation	When in use	65	Approx. 40 metres
Commercial	When in use	70	Approx. 20 metres

Table	6-19:	Affected	distances -	line	marking	and	road	furniture
Table	0-13.	Ancolou	uistances –		marking	ana	rouu	i ui i iitui c

Note 1: Distance up to which the NML would be exceeded.

Construction noise levels – sleep disturbance

Out of hours construction activities occurring during the night-time have the potential to generate noise emissions that may cause sleep disturbance at receivers near the proposal footprint. Modelling identified that noise emissions have the potential to be above the

maximum noise trigger level at residential receivers located within about 70 metres of the proposal footprint.

Construction traffic noise

The proposal would generate up to five heavy and ten light construction vehicle movements per day at the peak of construction activity. These volumes are small in the context of daily traffic, particularly on Kingsway, and are not expected to result in perceptible increase in road traffic noise levels over the construction period.

Construction vibration

The main potential source of construction vibration would be vibratory rollers and hydraulic hammers. The use of hydraulic hammers would potentially occur during demolition of the existing pavement, while rolling may take place along the alignment prior to any road resurfacing. Peak levels of vibration from rolling typically occurs as the roller stops to change direction and a resonance is created as the roller (and vibrator) is stationary.

Construction plant would be selected to ensure minimum safe working distances set by the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) (refer to Section 6.3.3) are complied with where possible, for cosmetic damage and human response to vibration. If safe working distances cannot be complied with, additional measures including vibration monitoring would be implemented.

Operation

Operational noise from the proposal would typically be associated with pedestrians using the active transport link. Raised voices or loud conversations may occur, however, these noise events would be sporadic and would likely have a negligible effect on the $LA_{eq(15min)}$ noise levels at receiver locations adjacent to the link.

The proposal alignment generally runs immediately adjacent to the busy Kingsway, with the noise environment dominated by road traffic noise. It is expected that operational noise from the proposal would be significantly masked by existing road traffic noise. For quieter sections of the alignment, the Maximum Noise Level Assessment criterion of 65dB LA_{max} could be exceeded at receivers with about eight metres should users be shouting.

6.3.5 Safeguards and management measures

 Table 6-20: Noise and vibration environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP.	Contractor	Pre- construction	Section 4.6 of QA G36 Environment Protection
	The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and identify:			
	 Key potential noise and vibration generating activities associated with the activity 			

Impact	Environmental safeguards	Responsibility	Timing	Reference
	 Feasible and reasonable mitigation measures to be implemented A monitoring program to assess performance against relevant noise and vibration criteria A review process scheduling and assessing out-of-hours activities including consideration of alternatives to out-of-hours work, plant selection, work locations and screening to minimise impacts A working schedule which records respite periods for extended out-of-hours works Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria. 			
Construction vibration	Where vibration intensive plant such as vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures (including heritage fabric). This includes adhering to the recommended minimum working distances for vibration intensive plant identified in Section 7.1 of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). If recommended minimum working distances cannot be met by selecting smaller plant, vibration monitoring will occur to quantify and help manage vibration. If necessary, trial vibration measurements will be conducted to further assess any possible impacts and buffer distances that may be required.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction noise and vibration	 All sensitive receivers likely to be affected will be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: The proposal The construction period and construction hours Contact information for project management staff Complaint and incident reporting How to obtain further information. 	Contractor	Pre- construction	Standard measure
Construction hours and scheduling	Where feasible and reasonable, construction will be carried out during the standard daytime working hours and work generating high noise levels will be scheduled during less sensitive time periods.	Contractor	Construction	Additional measure
Construction respite period during normal hours and out of hours	The duration and respite of high noise generating activities will be carried out in accordance with the Construction Noise and Vibration Guideline, and in consultation with the community. As a guide, high noise generating activities near receivers will be carried out in blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The duration of each block of work and respite will be flexible to accommodate the usage and amenity at nearby receivers.	Contractor	Detailed design / pre- construction / construction	Additional measure
Plant noise levels	The noise levels of plant and equipment will have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix F of the Construction Noise and Vibration Guideline. A noise monitoring audit program will be implemented to ensure equipment remains within the more stringent of the manufacturer's specifications or	Contractor	Detailed design / pre- construction / construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Appendix F of the Construction Noise and Vibration Guideline. Only the necessary size and power of equipment will be used.			
Equipment selection	Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor	Detailed design / pre- construction / construction	Additional measure
Use and siting of plant	The offset distance between noisy plant and adjacent sensitive receivers will be maximised. Plant used intermittently will be throttled down or shut down. Noise-emitting plant will be directed away from sensitive receivers. Only have necessary equipment on site.	Contractor	Detailed design / pre- construction / construction	Additional measure
Plan work sites and activities to minimise noise.	Locate compounds away from sensitive receivers and discourage access from local roads where possible. Parking and loading/unloading areas will be planned to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noisy activities will be scheduled for normal working hours. If the work cannot be undertaken during the day, it should be completed before 11:00pm where possible.	Contractor	Detailed design / pre- construction / construction	Additional measure
Non-tonal and ambient sensitive reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) will be fitted and used on all construction vehicles and mobile plant regularly used on site and for out of hours work. The use of ambient sensitive alarms that adjust output relative to the ambient noise level will be considered.	Contractor	Detailed design / pre- construction / construction	Additional measure

6.4 Biodiversity

An ecological investigation and assessment for the proposal was carried out by Lesryk Environmental. The main findings of that assessment are summarised below while the full report is included in Appendix F.

6.4.1 Methodology

The methodology for the ecological investigation and assessment included the following:

- Review of available previous studies conducted and relevant databases to identify the diversity of ecological communities, flora and fauna species known for, or potentially occurring in, the study region. The identification of those known or potentially occurring native species and communities within this portion of the Sutherland Shire, particularly those listed under the EPBC Act and/or BC Act.
- Field survey conducted on 6 July 2021. The survey methods employed during the field investigation were:
 - The identification of flora or fauna species, particularly any that are listed, or currently being considered for listing, under the EPBC Act and/or BC Act
 - The identification of any native vegetation communities, particularly any Threatened Ecological Communities listed, or currently being considered for listing, under the EPBC act and/or BC Act
 - Identification of any hollow-bearing trees or other important habitat features
- Assessment of potential biodiversity impacts and recommendation of safeguards and management measures.

6.4.2 Existing environment

Plant community types

At the western extent of the proposal footprint, within Pollard Park, there is small patch of remnant open forest dominated by Red Mahogany (*Eucalyptus resinifera*), White Stringybark (*E.globoidea*) and Grey Ironbark (*E.paniculata*). There is a moderately dense shrub layer that includes Hickory Wattle (*Acacia implexa*), Straight Wattle (*A. stricta*), Blackthorn (*Bursaria spinosa*) and Hop Bush (*Dodonaea triquetra*) and a groundcover of the natives Weeping Grass (*Microlaena stipoides*), Paspalidium distans, Blue Flax-lily (*Dianella caerulea*), Kidney Weed (*Dichondra repens*) and the twiner *Glycine tabacina*, along with weeds such as Parramatta Grass (*Sporobolus africanus*), Panic Veldt Grass (*Ehrharta erecta*) and Fireweed (*Senecio madagascariensis*).

The vegetation within Pollard Park conforms to the BC Act listed Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion Critically Endangered Ecological Community. The vegetation does not however meet the 0.5 hectare threshold required for it to be considered as the equivalent EPBC Act threatened ecological community.

Elsewhere, the proposal footprint is dominated by a highly modified urban streetscape environment. Roadside plantings of varying ages are present, these including both exotic and native species such as Brush Box (*Lophostemon confertus*), Tallowwood (*Eucalyptus microcrys*), Blackbutt (*E. pilularis*) and other non-local eucalypts, Bottlebrush (*Callistemon spp*) and Banksias (*Banksia spp*).

Remnant native trees also occur in various locations including the south side of Denman Avenue where there are numerous Red Bloodwood (*Corymbia gummifera*), Smooth-barked Apple (*Angophora costata*) and Scribbly Gum (*Eucalyptus haemastoma*). There is also a group of remnant Grey Ironbark to the north-east of the corner of The Kingsway and Sylvania
Road and a large Red Mahogany at the south-western corner of Bath Road and Flora Street, Kirrawee.

Flora species

Several native and exotic plants were recorded during the field surveys. Refer to the ecological investigation and assessment in Appendix F for a list of species.

Of those native flora species recorded, none are listed, or currently being considered for listing, as threatened on the EPBC Act or the BC Act.

Fauna species and habitat

Several native fauna species were recorded during the field surveys. Refer to the ecological investigation and assessment in Appendix F for a list of species. None of the native animals recorded within the proposal area are listed, or currently being considered for listing, as threatened under the EPBC Act or BC Act.

A total of 27 trees potentially containing hollows were identified during field investigations. The location of these trees is shown on Figure 6-11.

Though considered and targeted, no distinctive scratching's that would suggest the use of several of the identified hollow trees by the Common Brushtail Possum (*Trichosurus vulpecula*) were noted on any of the smooth barked eucalypts. Similarly, no distinctive droppings indicative of this urban tolerant arboreal mammal were seen at the base of these plants. No roadkill individuals of this, or any other species, were noted.

One large stick nest was observed during the course of the field investigation, this seen within an Ironbark that is present north-east of the intersection of the Kingsway and Sylvania Road. During the site inspection, an Australian Raven, a common to abundant native species, was observed entering and exiting this nest.

No other obvious bird nests, particularly large stick nests, or possum dreys, were seen during the field investigation.

Considering the diameters of the tree hollows observed or predicted to be present, animals that are likely to utilise the plants recorded include hollow-dependent microchiropterans and a variety of small to medium sized birds.

There are no aquatic habitats within or adjacent to the proposal footprint.



Figure 6-11: Hollow bearing trees within/adjacent to the proposal

6.4.3 Potential impacts

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

The proposal is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the EPBC Act.

Given the small area of Sydney Turpentine-Ironbark Forest affected, there is unlikely to be an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction. While the affected remnant of this community may assist in its long-term survival locally, the area affected (understory adjacent to the path) represents a small proportion of the local occurrence. The loss of a small area of understorey of this community adjacent to the path is not likely unlikely to contribute to isolation or fragmentation.

Urban tolerant threatened hollow-dependent microchiropteran have the potential to occupy those hollow-bearing plants that would be cleared, but the loss of these would not limit or significantly reduce the overall extent of roosting opportunities available in this portion of the Sutherland Shire. The potential loss a small number of the 27 hollow bearing trees recorded would not adversely affect the lifecycle of any of those hollow-dependent microchiropterans potentially present near the proposal footprint such that the viability of their local populations would be placed at risk of extinction. No major components threatened microchiropteran habitat would be further isolated or fragmented.

A number of threatened species could fly over the proposal area on occasion, some even occasionally foraging within/above the stands of vegetation, such as the Grey-headed Flying-fox (*Pteropus poliocephalus*), Square-tailed Kite (*Lophoictinia isura*), Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) and White-throated Needletail (*Hirundapus caudacutus*). However, the proposal would not have a direct or indirect impact on the lifecycle requirements of these animals, would not fragment or isolate any of these species' habitats, would not present a barrier to their movement patterns and would not result in the limiting of their habitat areas.

The native fauna species recorded within the proposal area are protected, as defined by the BC Act, but are common to abundant throughout the surrounding region. These species have been recorded in association with a range of woodland habitats, as well as urban environments. These species recorded would not be solely reliant upon those habitats present within or near the proposal area, such that the removal or further disturbance of these would threaten the 'local' occurrence of these animals. The species recorded are all expected to be present within both the proposal area and surrounding locality post-work.

6.4.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity impacts	Biodiversity Management Plan is to be prepared and included with in the CEMP.	Contractor	Pre- construction	Additional measure
	 The plan would include A site walk over with an ecologist as part of the pre- clearing surveys 			
	 A map showing vegetation clearing boundaries and 			

Table 6-21: Biodiversity environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
	 sensitive area/no go area or trees to be protected Incorporation of management measures identified as a result of pre-clearing survey reports, completed by an ecologist A detailed cleaning process in accordance with Biodiversity Guidelines (2011) Identify controls/mitigation measures to prevent impacts on sensitive location or no go zones or tree protection zones A stop work procedure in the event of identification of unidentified species, habitat or populations. 			
Biodiversity impacts	 Pre-clearing survey will be conducted in accordance with Biodiversity Guidelines, Guide 1 (Roads and Maritime, 2016) and will: Confirm (with the assistance of a surveyor) clearing boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work Identify, in toolbox talks, where biodiversity controls are located on the site. 	Contractor	Pre- construction	Additional measure
Injury to fauna	A suitably qualified ecologist or experienced wildlife handler would be engaged to survey and handle any fauna.	Contractor	Pre- construction Construction	Additional measure
Spread of weeds	 Weed management will occur in accordance with Biodiversity Guidelines, Guide 6 (Roads and Maritime, 2016) and include: The Identification of weeds on site (confirmed during preclearing survey) Weed management priorities and objectives Exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site 	Contractor	Pre- construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	 The location of weed infested areas Weed control methods Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements A monitoring program to measure the success of weed management Communication with local Council noxious weed representative. 			
Spread of weeds	Reuse of topsoil free from weeds or pathogens would be used as part of habitation/landscaping works, where reasonable and feasible.	Contractor	Construction	Additional measure
Spread of diseases affecting plants	Management measures will be implemented to control and/or prevent the introduction and/or spread of disease-causing agents such as bacteria and fungi in accordance with the Biodiversity Guidelines, Guide 7 (Roads and Maritime, 2016).	Contractor	Construction	Additional measure
Unexpected threatened species finds	If unexpected flora or fauna are discovered on site stop work immediately and implement the Roads and Maritime Unexpected Threatened Species Find Procedure in the Biodiversity Guidelines, Guide 1 (Roads and Maritime, 2016).	Contractor	Construction	Additional measure
Loss of trees	The loss of trees due to the proposal will be offset consistent with the Vegetation Offset Guide (Transport for NSW, 2020)	Transport for NSW	Construction	Additional measure
Protect native flora and fauna, minimise edge effects and avoid inadvertent impacts	Site-specific training will be given to personnel when working in the vicinity of areas of identified biodiversity value that are to be protected.	Contractor	Construction	Additional measure
Minimise risks to native flora and fauna	Consult with an arborist to confirm the depth and extent of existing tree root systems in the vicinity of the works and to	Contractor	Detailed design / pre- construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
during construction	advise if the proposed works would cause any harm to the tree roots.			
Minimise risks to native flora and fauna during construction	Protect trees nominated for retention in line with Australian Standard AS 4970-2009 Protection of Trees on Development Sites (Standards Australia, 2010). Exclusion zones will be established in area of construction and ancillary sites and identified in CEMP. Vehicle parking, machinery, construction compounds and material stockpiles will be located in cleared or disturbed areas.	Contractor	Construction	Additional measure

6.4.5 Biodiversity offsets

With reference to Table 1, within Section 4.2 of the Guideline for Biodiversity Offsets (Roads and Maritime Services, 2016) it is noted that the proposal would not result in impacts to greater than one hectare of a threatened ecological community or habitat for threatened species which cannot withstand a loss. Offsets under the Guideline for Biodiversity Offsets are therefore not required.

Where possible, the loss of trees due to the proposal would be offset consistent with the Vegetation Offset Guide (Transport for NSW, 2020) which aims to:

- Offset 100 per cent of any native vegetation cleared
- Achieve an 'improved or maintained' ecological outcome when offsetting impacts on native vegetation
- Offset the heritage, public amenity and/or visual landscape value of any trees removed where they may not have ecological value.

Opportunities for offset planting are currently being explored in the local area, and would be undertaken with consultation with Council.

6.5 Non-Aboriginal heritage

6.5.1 Methodology

The methodology for the assessment included a search of relevant heritage databases and statutory lists. This included a review of the following:

- Commonwealth Heritage Database (Including the National Heritage List)
- NSW Heritage Database (including the State Heritage Register)
- Transport for NSW Heritage and Conservation Register
- Sutherland LEP.

6.5.2 Historical context

Prior to European settlement, the Sutherland Shire was used extensively by the Gweagal people (Dharawal speaking clan).

The Sutherland Shire remained largely unsettled by Europeans for the first 100 years after the arrival of the First Fleet. The first European landowner in Sutherland Shire was Captain James Birnie in 1806, a mercantile trader who was promised a portion of land to develop a farm on. In 1841, Thomas Holt, a leading figure in Sydney's commercial world, purchased 12,000 acres of land within the Sutherland Shire. Holt used this land for an array of activities, including establishing oyster culture, which involved the excavation of the flats at the head of Gwawley Bay into channels. Holt also endeavoured to develop sheep farms and timber leases. Holt's many activities led to the formation of the Holt-Sutherland Estate Co. Ltd in 1880 (Sutherland Shire Council, 2021).

In the 1870s, John Sutherland, a Minister for Works, proposed to 'open up Port Hacking District' (now known as the Sutherland Shire) by extending the existing Illawarra Railway across Georges River between Como and Heathcote. For more than 12 years, Sutherland argued his proposal in Parliament. The railway started construction in the early 1880s, which included a 'railway stopping place' between Como and Heathcote, named Sutherland Railway Station. The southern end of the railway was extended to Scarborough in 1886, officially connecting it to the Illawarra Railway (Sutherland Shire Council, 2021).

Sparsely settled well into the twentieth century due to the establishment of the railway and continual release of Crown Lands, the Sutherland Shire maintained a rural character with orchards, market gardens, poultry, dairy farms and piggeries (Sutherland Shire Historical Society, 2021). Cronulla served as a holiday and fishing centre for Sydney dwellers. The Sutherland-Cronulla steam tram service was inaugurated in 1911 by the Railway Commissioner, used as a 'light railway' to provide a passenger and goods service between the two places (Sutherland Shire Council, 2021).

A rush of post war migration after 1946 led to closer settlement and the transformation into a denser urban environment. As land prices soared, demands for inexpensive land exceeded the supply, bringing many to the Sutherland Shire. In 1939, the Sutherland Shire population was approximately 19,600. The post war migration saw this figure climb to 40,000 by 1950. This increased the industrial, commercial and residential development of the Sutherland Shire. Modern shopping centres were established, more family homes were developed, roads and bridges were built to improve connectivity between suburbs, an oil refinery and watermill were built, and factories were established (Sutherland Shire Council, 2021).

6.5.3 Existing environment

Listed heritage items

Four non-Aboriginal heritage items are located within or immediately adjacent to the proposal footprint. These items are identified (with significance information from the State Heritage Inventory) in Table 6-22 and shown in Figure 6-12.

Table 6-22: Non-Aboriginal heritage items

ID	Name and description	Significance	Listings
2403	House Old house adopting a traditional Georgian form. Historical significance as a pre-1900 house. One of the oldest in the Shire. Rare surviving Holt-Sutherland estate house. Architectural interest compromised by additions and alterations but retains most essential fabric. New work	Local	Sutherland LEP

ID	Name and description	Significance	Listings
	maintains the traditional form and building makes a valuable streetscape contribution.		
1507	Hazelhurst garden and grounds (including cottage). Demonstrates the development of community life as an Art Gallery of Sutherland in the late Twentieth Century. The place has an identified association with Ben and Hazel Broadhurst, significant persons in the Sutherland Shire. The site is a fine example of the Interwar style, house and garden, despite additions.	Local	Sutherland LEP
	The building is a rare example of an important typology in the area; an Interwar Style house and garden on its original lot. The building has a high level of integrity. The site includes a remnant vegetation community.		
1506	Street plantings, <i>Eucalyptus racemosa</i> (Narrow Leaved Scribbly Gum) and <i>Eucalyptus pilularis</i> (Blackbutt Gum) and wide grassed verge. Representative early example of streetscape planting in a main suburban thoroughfare. The plantings have some significance for their ability to demonstrate successful streetscape avenue plantings from the late 1950s.	Local	Sutherland LEP
3102	 Street trees, alternate planting of <i>Lophostemon confertus</i> (Brush Box) and <i>Cinnamomum camphora</i> (Camphor Laurel). Avenue of alternating Camphor Laurel and Brush Box trees along North Kiora Avenue which has significance for demonstrating the planting palette used for street plantings in the inter-war period, and particularly in the early 1930s. Their social significance derives from the use of funds and labour provided for such purposes by the Unemployment Relief Funds made available through the Depression period of 1929 – 1933, and community appreciation of their statuesque and enhancing presence. The use of these trees in combination has some aesthetic value and is rare. 	Local	Sutherland LEP



Figure 6-12: Heritage items near proposal area

6.5.4 Potential impacts

The potential impacts on heritage items due to the proposal are reviewed in Table 6-23. Table 6-23: Potential heritage impacts of the proposal

ID	Name and description	lmpact type	Comment
2403	House	Indirect	Negligible impact Works would occur on the opposite side of Oak Road and would not substantially change the streetscape or the setting of this item.
1507	Hazelhurst garden and grounds (including cottage).	Indirect	Negligible impact The proposal would not substantially alter the existing frontage of this item, which already includes a 2.5 metre wide concrete path that would be retained as part of the proposal. Vegetation along the boundary of the property limits visual access between the property and Kingsway.
1506	Street plantings, <i>Eucalyptus racemosa</i> (Narrow Leaved Scribbly Gum) and <i>Eucalyptus pilularis</i> (Blackbutt Gum) and wide grassed verge.	Direct	While works would occur within the curtilage of this item, the trees themselves would not be affected. Measures have been proposed to address potential impacts on these trees during construction. The proposal would not substantially alter the setting of this item, which already includes a concrete path between Kingsway and the property boundary.
3102	Street trees, alternate planting of <i>Lophostemon confertus</i> (Brush Box) and <i>Cinnamomum camphora</i> (Camphor Laurel).	Direct	While works would occur within the curtilage of this item, the trees themselves would not be affected. The alternating plantings start about 60 kilometres to the north of the Kingsway / Kiora Road intersection.

6.5.5 Safeguards and management measures

Table 6-24: Non-Aboriginal heritage environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non- Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime Services, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered.	Contactor	Construction	Section 4.10 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Work will only re-commence once the requirements of that Procedure have been satisfied.			
Non- Aboriginal heritage	Prepare and implement a Non- Aboriginal Heritage Management Plan (NAHMP) as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage.	Contractor	Detailed design / pre- construction	Additional safeguard
Site induction	Train all personnel working on site to ensure they are aware of the requirements of the NAHMP and relevant statutory responsibilities. Provide site- specific training to personnel when working in the vicinity of identified non-Aboriginal heritage items.	Contractor	Pre- construction	Additional safeguard

6.6 Socio-economic

6.6.1 Methodology

The socio-economic assessment was prepared in accordance with the Environmental Impact Assessment Practice Note: Socio-economic assessment (Transport for NSW, 2020). The proposal is anticipated to have some short-term localised impacts (and longer term benefits) to the communities surrounding the bus interchange site and therefore a basic level of socio-economic assessment was carried out.

The socio-economic assessment:

- Identified the existing socio-economic characteristics of the locality through desktop research including reference to 2016 Census data and local council websites.
- Identified the types and locations of social infrastructure that could be affected by the proposal
- Identified the location of businesses that could be affected by the proposal
- Considered the outcome of other assessments containing relevant socio-economic themes, namely traffic/transport (Section 6.1), landscape/visual (Section 6.2), non-Aboriginal heritage (Section 6.5), and noise/vibration (Section 6.3).

Consistent with the practice note, the socio-economic assessment has evaluated the significance of impacts by reference to sensitivity (vulnerability to change and capacity to adapt) and magnitude (scale, duration, intensity and scope of the proposed works).

6.6.2 Existing environment

Population and demography

Key population and demographic information for the Sutherland SA4 statistical area is summarised in Table 6-25.

Table 6-25: Key population and demographic information (2016 Census)

Indicator	Sutherland SA4 area
Population	217,880
Age 0-14 years	19.1%
Age 15-65 years	64.0 %
Age 65 and over	16.9%
Aboriginal and/or Torres Strait Islander	1.1%

People with disability

The number of people who need assistance in their day to day lives (self-care, body movements or communication) because of a disability, long-term health condition, or old age is summarised was recorded as 9,329 (4.2%). The percentage of people requiring assistance for the Greater Sydney Region is recorded as 4.9 per cent and for NSW the percentage is 4.6 per cent.

Travel to work

Travel to work data for the Sutherland SA2 Statistical Area is as follows:

- Car as driver 60.5%
- Train 11.5%
- Worked at home 4.5%.

Income and employment

Key income and employment information for Sutherland SA4 statistical area is summarised in Table 6-26.

Table 6-26: Key income and employment data (2016 Census)

Indicator	
Median household income (weekly)	\$1,979
Unemployment	3.5%
Major employment industries	Hospitals (except Psychiatric Hospitals) 3.5% Primary Education 2.9% Air and Space Transport 2.3%, Secondary Education 2.0% Banking 2.0%

Community values

The Sutherland Shire Council Community Strategic Plan (Sutherland Shire Council, 2017) identifies the following community values:

- Our access to our beautiful beaches, parks and natural reserves
- Our sense of community we are a place of locals
- Our location it's near to the city without being too close

- Our lifestyle and quality of life
- Our peace and quiet
- Our safety.

Consultation has not occurred regarding community values during the preparation of the REF, however based on an understanding of the locality characteristics it is expected that other community values held by local residents and workers would include:

- Employment security for local residents and workers
- Continued viability for local businesses
- Maintained heritage values
- Maintained local character and amenity
- Maintained/improved community safety and security
- Continued/improved recreational opportunities
- Continued/improved access and connectivity to facilities and services.

Social infrastructure

Social infrastructure within or near the proposal site includes:

- Kirrawee Public School (Clements Parade, Kirrawee)
- Hazelhurst Regional Gallery & Arts Centre (782 Kingsway, Gymea)
- Port Hacking High School (637 Kingsway, Miranda)
- Miranda Public School (3 Sylva Ave, Miranda)
- The Sutherland Hospital (Kingsway, Caringbah)
- Kareena Private Hospital (86 Kareena Road, Caringbah).

Business and industry

Businesses within or near the proposal site includes:

- Retail within Westfield Miranda
- Small scale retail on Oak Road, Kirrawee includes take away food, bakeries, cafes, Australia Post and personal services
- Supermarkets on Flora Street, Kirrawee
- Industrial units on Flora Street, Kirrawee
- Street level retail on Kingsway between Wandella Road and Kiora Road
- Service station and automotive services at the Port Hacking Road / Kingsway intersection
- Street level medical services on Kingsway between Hinkler Avenue and Taren Point Road
- Service station, real estate, personal services and funeral services at Kingsway / Willarong intersection
- Veterinary hospital on southern side of Banksia Road

6.6.3 Potential impacts

Construction

Construction activities are associated with the proposal and would be localised and extend over a period of up to about nine months. No substantial impacts on community values or changes to way of life or health and wellbeing are expected during construction given the short term nature of the works at each location along the alignment. The potential socio-economic impacts that could occur during construction are assessed in Table 6-27.

Issue	Comment	Sensitivity	Magnitude	Significance
Property impacts	The proposal does not require acquisition of any properties with residences or businesses. Transport for NSW is exploring opportunities to widen the path at some locations and is discussing potential property acquisition with some non- residential landowners. There are no expected impacts associated with property acquisition such as relocation, severance and/or reduced community cohesion. Minor property adjustments (fences, driveways to be carried out in consultation with landowners)	Low High capacity to absorb change.	Negligible	Negligible
Local amenity	During construction there would be some temporary socio-economic impacts related to noise and loss of amenity. Measures to address these impacts have been detailed in Section 6.2 (visual), Section 6.3 (noise) and Section 6.8 (air quality).	Moderate Some ability to absorb adapt over the duration of the works.	Moderate Noise impacts over the construction period due to proximity of receivers and night works contribute to this rating.	Moderate
Access and connectivity	During construction there would be temporary pedestrian/cyclist diversions to ensure safety around the construction site.	Low High ability to absorb adapt over the duration of the works	Low Diversions would be relatively short.	Low
Business impacts (access changes)	During construction there may be some temporary changes to business access (such as on the western side of Oak Road where footpath widening, and two-way cycle path is proposed). Access to	Low High ability to absorb adapt over the duration of the works.	Low Any changes would minor and confined to outside centre	Low

 Table 6-27: Potential socio-economic impacts – construction.

Issue	Comment	Sensitivity	Magnitude	Significance
	businesses for customers and staff would be maintained at all times.		operating hours where possible.	
Business impacts (reduced amenity)	Noise, vibration, visual impacts or dust generated at construction sites may impact businesses which are more reliant on a specific type of working environment or external environment. Businesses most likely to be impacted are those that have more sensitive uses such as educational establishments, health facilities, therapists or those that are more reliant on a quiet outside environment such as cafes and restaurants. Key areas of impact would be Oak Road and Kingsway frontage (south side) between Wandella Road and Kiora Road.	Moderate Some ability to absorb adapt over the duration of the works.	Moderate Works would be short term. Some works may occur outside business operating hours.	Moderate
Social infrastructure	There are not expected to be direct impacts on the social infrastructure identified in Section 6.5.2.	Moderate Some ability to absorb adapt over the duration of the works.	Low Due to set back distances amenity impacts (primarily noise) are expected to be manageable.	Moderate-Low

Operation

Following completion of the proposal, there are expected to be few adverse social economic impacts. Socio-economic benefits from the proposal would include:

- Enhanced connectivity and safety for pedestrians and cyclists due to the new shared path and cycleway connections
- Increased accessibility for non-drivers
- Health benefits safe active transport infrastructure with appropriate space allocation would encourage people to take a break, enjoy the open space and improve their mental wellbeing.
- Improved public domain with more space for pedestrians
- Increase in passing trade from some types of street level businesses along the route.

The loss of parking (two 1 hour time restricted spaces) at the southern end of Willarong Road would mean some people accessing adjacent businesses would need to look elsewhere for parking and this may be less available / convenient. Alternatively, people may switch to other transport modes. The adjacent businesses (real estate, professional services) are destination

based and, while still affected, are likely to be less sensitive to parking loss compared to businesses that have a greater reliance on passing trade.

The proposal would incorporate measures to minimise security and public safety risks as much as practicable, including implementation of the principles from Crime Prevention Through Environmental Design. These principles as they relate to the proposal are reviewed in Table 6-28.

Table 6 20, Crime	Dravantian	Through	Environmentel	Deelan	nrinainlas
i able o-zo: Crime	e Prevention	inrouan	Environmental	Design	principles

Principle	Comment
Natural surveillance Greater opportunities for people to see what others are doing thereby deterring potential offenders from committing crime in areas with high levels of surveillance	Parts of the alignment on Oak Road and Kingsway have or would have high levels of activity and corresponding high levels of natural surveillance both from passing motorists, adjacent residences, adjacent businesses, and other path users. Where the alignment uses the local road network, the proposal would contribute to increased levels of activity (pedestrians and cyclists). In these areas natural surveillance would be from adjacent residences and other path users. The proposal has been designed to maintain clear visibility lines and adequately wide paths to avoid blind spots. Opportunities to improve lighting along the route would be explored during detailed design.
Access control Physical and symbolic barriers can be used to attract, channel or restrict the movement of people, and in turn, minimise opportunities for crime.	The proposal would be well signed posted and would service to increase levels of activity along the route. As the proposal sites within the public domain and aims to encourage high levels of usage by pedestrians and cyclists, physical and symbolic barriers to restrict movement and improve security were not needed.
Territorial reinforcement Users of spaces or areas feeling that they have some ownership of public space and therefore are more likely to gather and enjoy that space. Increased likelihood of reporting of crime in these areas.	The proposal would be well signed posted and the path would be marked. These measures would serve to clearly reinforce the path as part of the public domain.
Space management Public space that is attractive and well maintained is more likely to become a well used space.	Maintenance of the path would help ensure it remains attractive for use by the community.

6.6.4 Safeguards and management measures

Table 6-29: Socio-economic environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Community engagement	A Community and Stakeholder Engagement Plan (CSEP) will be prepared and will include:	Transport for NSW	Pre- construction	Standard measure
	 Procedures and mechanisms that would be implemented in response to the key social 			

Impact	Environmental safeguards	Responsibility	Timing	Reference	
	 impacts identified for the proposal Procedures and mechanisms that would be used to engage with affected landowners, business owners, and the wider community to identify potential access, parking, business visibility, and other impacts and develop appropriate management measures Procedures to keep the community informed about construction and any associated changes to conditions (e.g. detours or lane closures) such as through advertisements in local media and advisory notices or variable message signs Procedure for the management of complaints and enquiries, including a contact name and number for complaints. 				
Community engagement	Notify local residents and potentially affected businesses before the work starts regarding the timing, duration and likely impact of construction activities, including interruptions to utility services.	Contractor	Construction	Additional measure	
Safety and security	The safety of people using the path would be further considered in detailed design in accordance with crime prevention through environmental design principles.	Transport for NSW	Detailed design	Additional measure	
Access	Access to businesses will be maintained during construction. Where temporary changes to access arrangement are necessary, the contractor will advise owners and tenants and consult with them in advance with regards to alternative access arrangements.	Contractor	Pre- construction / construction	Additional measure	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Access	Access to bus stops will be maintained during construction. Where changes to access arrangement are necessary, the contractor will advise those impacted.	Contractor	Pre- construction / construction	Additional measure

Other safeguards and management measures that would address socio-economic impacts are identified in Section 6.1.4 (transport and traffic), Section 6.3.5 (noise and vibration), Section 6.2.4 (landscape and visual) and Section 6.8.2 (air quality).

6.7 Soils, contamination and water

6.7.1 Methodology

Soils information was sourced from available reference material including soil landscape maps, salinity mapping and acid sulfate soil risk mapping. Emphasis was placed on identifying relevant limitations that would affect the construction or operation of the proposal.

The assessment of contamination was informed by the Phase 1 Preliminary Site Investigation conducted by Hazmat Services (Appendix G).

6.7.2 Existing environment

Soils

Soil landscape mapping shows that the proposal site traverses two soil landscapes and disturbed terrain identified in Soil landscapes of the Wollongong 1:100 000 Sheet (Hazelton & Tille, 1990). Relevant characteristics of these soil landscapes are provided in Table 6-30.

Soil landscape	Main limitations	Soil erodibility
Gymea	Localised steep slopes, high soil erosion hazard, rock outcrop, shallow highly permeable soil, very low fertility.	Topsoils composed of coarse sand grains and have very low erodibilities. Subsoils are moderate or highly erodible.
Blacktown	Moderately reactive, highly plastic subsoils, low soil fertility.	Moderate
Disturbed terrain	Limitations are dependent on nature of fill material.	Unknown

Table 6-30: Soil landscapes

Salinity

Salinity is the accumulation of salts in soil and water to levels that impact on people and the environment. Salinity occurs where salt in the landscape is mobilised and redistributed closer to the soil surface and/or into waterways by rising groundwater. Rising groundwater is commonly caused by removal of deep-rooted vegetation such as trees and perennial pasture. It is also caused by changes in soil permeability and structure which restrict groundwater movement. Compaction and cut / fill works can be contributors.

Salinity is not an identified limitation of the Gymea or Blacktown soil landscapes, within the proposal footprint.

Acid sulfate soils

Acid sulfate soils include those where the sulfides in the soils have been exposed to air and acid is being generated (actual acid sulfate soil) and those which may form actual acid sulfate soil when drained or exposed to oxidisation processes (i.e. the exposure of iron sulfate minerals such as pyrite to oxygen). Acid sulfate soil occurs predominantly on coastal lowlands, with elevations generally below five metres. The proposal site is not mapped as having a risk of acid sulfate soil occurrence.

Contamination

A search of the Environment Protection Authority Contaminated Land Register for the Sutherland Shire identified records for 15 sites. The following site is located near the proposal footprint:

 Woolworths service station at 455 Kingsway, Miranda, which is located upgradient of the proposal site and has previously had hydrocarbons identifies in groundwater. A Notice to Cease Approval of Voluntary Management Proposal was issued 14 December 2018 (ceased as the Environment Protection Authority was satisfied that the actions implemented through the voluntary management proposal had been satisfactory).

The proposal footprint area is primarily road verges consisting of turfed areas and existing pathways. For the purposes of assessment, the proposal footprint was considered in the following five sections:

- Section 1 President Avenue to Hotham Road
- Section 2 Kingsway from Hotham Road to Wandella Road
- Section 3 Kingsway from Wandella Road to Port Hacking Road
- Section 4 Kingsway from Port Hacking Road to Banksia Road
- Section 5 Banksia Road and Denman Avenue.

Potential areas and chemicals of environmental concern are described in Table 6-31.

Table 6-31:	Areas	of	Environmental	Concern	(AEC)
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Section	AEC	Potential contaminating activity	Contaminants of concern*	Risk of contamination
1	Road verges / Footpaths	Importation of fill of unknown origin	Heavy metals, TRH, BTEX, PAH, OCP, PCB, asbestos	Low
1	Flora Street	Potential hazardous materials used in utility pits	Asbestos	Low to medium
2	Road verges / Footpaths	Importation of fill of unknown origin	Heavy metals, TRH, BTEX, PAH, OCP, PCB, asbestos	Low
		Potential hazardous materials used in utility pits	Asbestos	Low to medium

Section	AEC	Potential contaminating activity	Contaminants of concern*	Risk of contamination
2	Corner of Kingsway and Gymea Bay Road	Potentially contaminated soil and groundwater due to adjacent operational service station	Heavy metals, TRH, BTEX, PAH	Low
3	Road verges / Footpaths	Importation of fill of unknown origin	Heavy metals, TRH, BTEX, PAH, OCP, PCB, asbestos	Low
		Potential hazardous materials used in utility pits	Asbestos	Low to medium
3	Kingsway, adjacent the east of the Westfield Miranda shopping centre	Leakages and spillages of oils and fuels associated with automotive repair workshops	Heavy metals, TRH, BTEX, PAH	Low to medium
3	Kingsway, opposite the Caltex Woolworths service station at the intersection of Port Hacking Road	Potentially contaminated groundwater plume emanating from service station	Heavy metals, TRH, BTEX, PAH	Low to medium
4	Road verges / Footpaths	Importation of fill of unknown origin	Heavy metals, TRH, BTEX, PAH, OCP, PCB, asbestos	Low
		Potential hazardous materials used in utility pits	Asbestos	Low to medium
4	Corner of Kingsway and Willarong Road	Potentially contaminated soil and groundwater due to adjacent operational service station	Heavy metals, TRH, BTEX, PAH	Low
5	Road verges	Importation of fill of unknown origin	Heavy metals, TRH, BTEX, PAH, OCP, PCB, asbestos	Low
		Potential hazardous materials used in utility pits	Asbestos	Low to Medium

* Heavy metals = arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc; TRH = Total Recoverable Hydrocarbons, BTEX = Benzene, Toluene, Ethylbenzene and Xylenes; PAH = Polycyclic Aromatic Hydrocarbons; OCP = Organochlorine Pesticides; PCB = Polychlorinated Biphenyls; OPP = Organophosphorus Pesticides

Hydrology, groundwater and water quality

The eastern and western extents of the proposal footprint are within the Port Hacking Catchment. The central section of the proposal footprint is within the Georges River Catchment.

Surface water from rainfall events either accumulates in pools on the Site, infiltrates through the ground surface (where unpaved), or flows via the urban stormwater system to either Port Hacking (North West Arm, Yowie Bay or Burraneer Bay) or the Georges River (at Sylvania Waters).

Groundwater beneath the proposal footprint is anticipated to be present in either confined or semi-confined aquifers within weathered bedrock at depths greater than ten metres below ground surface. Groundwater beneath the site is anticipated to flow generally to the south or south-east.

The quality of the water entering local waterways near the proposal area would be largely a function of the contaminants on roads and activities on adjacent areas discharged via the stormwater system. Common road runoff pollutants include gross pollutants and litter, sediment and suspended solids, toxic organics, nutrients, heavy metals and hydrocarbons.

6.7.3 Potential impacts

Construction

Water quality

Potential water quality impacts would mainly relate to soil loss from erosion of exposed soils and stockpiles, and potential sedimentation of surrounding land and waterways. Work activities with the potential to expose soils include:

- Earthworks within the construction impact area
- Drainage works
- Vehicle movements
- Removal and placement of general fill material
- Stockpiling
- Vegetation removal
- Landscaping.

These activities would potentially cause:

- Erosion and sedimentation of exposed soils
- Erosion, leaching and dust generation from stockpiled materials
- Loss of soil quality and condition from material stockpiling
- Associated soil quality impact as a result of accidental spills and leaks caused by:
 - Use of fuels and oils outside of bunded and/or contained areas
 - Leaks from poorly maintained vehicles, machinery and equipment
- Temporary storage and management of spoil and waste.

Unmitigated potential impacts associated with the sedimentation of eroded material include:

 Increased sedimentation and elevated turbidity levels of nearby drainage channels from exposed soil during site disturbance and movement of construction vehicles, particularly following rainfall events

- Increased sedimentation in receiving watercourses, which reduces light penetration, smothers aquatic life, alters fluvial geomorphology and affects the ecosystems of downstream sensitive waterways
- Increased levels of nutrients, metals and other pollutants, transported via sediment receiving watercourses.

Contamination

The risk of contamination for most of AECs was assessed as low or low to medium. There is potential for complete exposure pathways to human and ecological receptors should soil and surface water contamination exist. Potential sources, pathways and receptors of contamination are summarised in Table 6-32.

Source	Pathway	Receptor	Pathway complete?	Comment
Potentially contaminat ed fill	Ingestion and dermal contact	Current and future site users	Potentially complete	There is potential for site users to encounter contaminated fill, therefore a complete pathway potentially exists.
	Inhalation of dust and vapours	Current and future site users and surrounding site users	Potentially complete	There is potential for site users and surrounding land users to be exposed to dust and vapours from the site, therefore a complete pathway potentially exists.
	Leaching of contaminants into shallow soils	Soil biota, native plants and transitory wildlife across the site	Potentially complete	There is potential for surface and shallow soils to be present which may be impacted by contaminating activities, therefore a complete pathway potentially exists to ecological receptors.
	Leaching of contaminants into groundwater	Groundwater beneath the site and Port Hacking	Incomplete	Given that contaminated soils, if present, are likely to be in surface or shallow soils, and the groundwater beneath the Site is anticipated to at depths greater than 10m below ground surface, a potentially complete pathway exists.
	Surface water runoff	Drainage channels and Port Hacking	Incomplete	No drainage channels intersect the site, and Port Hacking is located at least 1.6 kilometres from the site.
Potentially hazardous materials in utility pits	Ingestion and dermal contact	Current and future site users	Potentially complete	There is potential for site users to come into contact with contaminated waste, therefore a complete pathway potentially exists.

Table 6-32: Potential sources	, pathways and	d receptors of	contamination
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Source	Pathway	Receptor	Pathway complete?	Comment
	Inhalation of dust and vapours	Current and future site users and surrounding site users	Potentially complete	There is potential for site users and surrounding land users to be exposed to dust and vapours due to the presence of dumped waste on the site, therefore a complete pathway potentially exists.
Operational services stations	Ingestion and dermal contact	Current and future Site users.	Potentially complete	There is potential for site users to come into contact with soils contaminated from operational service stations located adjacent to the site.
	Inhalation of dust and vapours.	Current and future site users and surrounding site users.	Potentially complete	There is potential for site users and surrounding land users to be exposed to dust and vapours from operational service stations located adjacent to the site
	Leaching of contaminants into ground surface.	Soil biota, native plants and transitory wildlife	Potentially complete	There is potential for soils on the site to be impacted by operational service stations located adjacent to the site.
	Leaching of contaminants into groundwater.	Groundwater beneath the site and Port Hacking	Potentially complete	While groundwater is anticipated to be at depths greater than 10 metres below ground surface and Port Hacking is located at least 1.6 kilometres from the site, a contaminated groundwater plume was previously identified emanating from one service station upgradient of the site.
	Surface water runoff.	Groundwater beneath the site and Port Hacking	Incomplete	No drainage channels intersect the site, and Port Hacking is located at least 1.6 kilometres from the site.
Automotive repair workshops	Ingestion and dermal contact	Current and future site users.	Potentially complete	There is potential for site users to come into contact with soils contaminated from automotive repair workshops located adjacent to the site.
	Inhalation of dust and vapours.	Current and future site users and surrounding site users.	Potentially complete	There is potential for site users and surrounding land users to be exposed to dust and vapours from automotive repair workshops located adjacent to the site.

Source	Pathway	Receptor	Pathway complete?	Comment
	Leaching of contaminants into ground surface.	Soil biota, native plants and transitory wildlife across the site	Potentially complete	There is potential for soils on the site to be impacted by automotive repair workshops located adjacent to the site.
	Leaching of contaminants into groundwater	Groundwater beneath the site and Port Hacking.	Incomplete	Contaminated soils, if present, are likely to be in surface or shallow soils, and the groundwater beneath the site is anticipated to at depths greater than 10 metres below ground surface.
	Surface water runoff.	Drainage channels and Port Hacking.	Incomplete	No drainage channels intersect the site, and Port Hacking is located at least 1.6 kilometres from the site.

Operation

There is expected to be minimal impact on soils and water quality following completion of construction, once disturbed areas have been stabilised. The additional paved areas proposed are relatively small in the context of the broader road network and the receiving catchment and therefore changes in water quality due to road runoff are expected to be negligible.

It is not expected that the proposal would have any ongoing contaminated land impacts after the completion of construction because any identified contaminated material would be removed off site to be legally disposed of or managed safely onsite.

The proposal would result in a small increase in impermeable surfaces (and therefore some additional runoff). The drainage design is adequate to address these issues.

6.7.4 Safeguards and management measures

Table 6-33: Soils.	contamination	and water	environmental	management	measures
	containination	and water	citvitorinicitat	management	measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction. The SWMP would include: • Stockpile management plan • Dewatering plan which includes process for monitoring flocculants and dewatering water from site	Contractor	Detailed design Pre- construction	Section 2.1 of QA G38 Soil and Water Management

Impact	Environmental safeguards	Responsibility	Timing	Reference
	 A process to routinely monitor the Bureau of Meteorology weather forecast Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. Inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sediment controls The SWMP will address: Transport for NSW Code of Practice for Water Management The Blue Book- Managing Urban Stormwater: Soils and Construction, Volume 1 and 2 Transport for NSW Technical Guideline – Temporary Stormwater Drainage for Road Construction 			
Soil and water	A site specific Erosion and Sediment Control Plan/s will be prepared and implemented in accordance with the Managing Urban Stormwater: Soils and Construction, Volume 1 and 2 (Landcom, 2004) as part of the Soil and Water Management Plan	Contractor	Detailed design Pre- construction	Section 2.1 of QA G38 Soil and Water Management
Soil and water	All stockpiles would be designed, established, operated and decommissioned in accordance with the Transport for NSW Stockpile Management Procedures.	Contractor	Construction	Additional measure
Soil and water	Controls would be implemented at construction zones exit points to minimise the tracking of material onto the road.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Contamination	 A Detailed Site Investigation ("DSI") will be undertaken prior to construction works, targeting the AECs where exposure pathways are potentially complete. The DSI should include, but not be limited to: Sampling of soil and along the road verges adjacent to the BP service station on the corner of Kingsway and Gymea Bay Road, and the 7-Eleven service station on the corner of Kingsway and Willarong Road Sampling of shallow soils (to approximately 0.5m depth) along the public road verges adjacent to the automotive repair workshops on Flora Street and Kingsway Observation of open service utility pits for presence of hazardous materials including asbestos in pit linings; and Field screening at open utility pits for presence of volatile organic compounds at pits in close proximity to service stations and mechanical workshops. 	Transport for NSW	Detailed design	Additional measure
Contamination	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Environment Manager and/or EPA.	Contactor	Detailed design Pre- construction	Section 4.2 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
Accidental spills	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Contactor	Detailed design Pre- construction	Section 4.3 of QA G36 Environment Protection
Removal of excavated material	Classify all waste material excavated and removed from the proposal area in accordance with the NSW Waste Classification Guidelines (EPA, 2004)	Contactor	Pre- construction	Additional measure
Existing condition of ancillary sites	Undertake a pre-construction land assessment prior to land being used for ancillary construction purposes (compounds, storage, parking, etc) to identify the presence of any pre-existing wastes or stored materials. The assessment should be prepared in accordance with the Transport for NSW Management of road construction and maintenance wastes (Roads and Maritime Services, 2016).	Contactor	Pre- construction	Additional measure

6.8 Other impacts

6.8.1 Existing environment and potential impacts

Table 6-34: Existing environment and potential impacts – other issues

Environmental factor	Existing environment	Potential impacts
Aboriginal heritage	A search of the Aboriginal Heritage Information Management System was carried out on 15 June 2021. The search returned no sites near the proposal footprint. The proposal site is within a highly urbanised and disturbed context and does not include landscape features with higher archaeological potential / sensitivity, namely: within 200m of waters, or located within a sand dune system, or located on a ridge top, ridge line or headland, or located within 200m below or above a cliff face, or within 20m of or in a cave, rock shelter, or a cave mouth. 	Due to the high level disturbance due to previous road construction and utilities provision, and the absence of any known Aboriginal sites, Aboriginal cultural heritage impacts are not expected.
Air quality	 Sensitive receivers for air quality include known or likely future locations where people are likely to work or reside. This includes but is not limited to dwellings, schools, hospitals, offices or public recreational areas. Sensitive receivers include: Users of the public domain along the route Occupants of residences along the route Customers and employees of businesses along the route Kirrawee Public School and Port Hacking High School. 	Potential impacts associated with the proposal include minor emissions from machinery (e.g. delivery vehicles, construction plant) and dust. Emissions from construction vehicles/ equipment would be minor and short term. Dust could be generated from a variety of activities including: Clearing vegetation Earthworks Stripping, stockpiling and managing topsoil Transportation and handling of soils and materials Line marking.

Environmental factor	Existing environment	Potential impacts
	There are no Environment Protection Authority air quality monitoring stations near the proposal footprint. The main influence on existing air quality would be road traffic.	The total amount of dust would depend on the silt and moisture content in the soil, prevailing weather conditions and the types of activities being carried out. Depending on wind speed and direction, short-term impacts could be experienced at some nearby sensitive receivers, although these would be highly localised.
		Nuisance dust can be expected to impact on residential and commercial areas when annual average dust deposition levels exceed 4g/m ² /month. The mobilisation of dust associated with the proposal is expected to be below nuisance levels through the implementation of appropriate mitigation measures. The proposal would not generate operational stage emissions but may deliver benefits due to reduced car dependence (and a corresponding reduction in vehicle related emissions).
Climate change and greenhouse gases	The Australian climate is likely to experience a greater frequency and severity of extreme weather events due to climate change. Increased average temperatures and reduced annual rainfall are also expected (Intergovernmental Panel on Climate Change, 2013).	 The following construction activities would result in the release of greenhouse gas emissions: Fossil fuel combustion relations to use of plant, equipment and vehicles Electricity use Embedded emissions from manufacture and delivery of materials A Climate Change Risk Register has been developed for the proposal. The Climate Change Risk Register identifies risks and recommends adaptation measures to mitigate impacts of climate change on the asset. The main climate change impacts identified were: Decrease in cold nights Increased average temperature Increased fire weather Increased flooding

Environmental factor	Existing environment	Potential impacts
		 Increased intensity of storm events Increased rainfall variability
		 Sea level rise.
		Identified adaptation measures include:
		 Maintenance / enhancement of tree canopy cover
		 Use of materials that are resilient on hot days
		 Use of higher albedo (surface reflects solar energy) materials
		 Increase design temperature criteria to account for climate change.
		 Design for a 30 per cent increase in storm events and an increase in wet weather days
		 Specify low water use and native plants
		 Maximise the permeability of the alignment to allow as many access points for ambulance and emergency services as possible.
		 Ensure every section of alignment has spaces for users to seek cover in hail and heavy rain storms
		 Increase provision for maintenance
		With adaption measures, most risks for the proposal were ranked as low and no risks were ranked as high. The following risks were ranked as medium:
		 Increase of hail events causing injury to pathway users
		 Increase in high wind events causing trees and branches and/or light poles to fall and potentially injure users
		 Heat stress on users while riding/walking along the path and possible fainting or heat stroke requiring immediate medical attention.

Environmental factor	Existing environment	Potential impacts
Waste and resource use	 Transport for NSW is committed to ensuring the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the <i>Waste Avoidance and Resource Recovery Act 2001</i>. These resource management hierarchy principles, in order of priority are: Avoid unnecessary resource consumption as a priority Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) Disposal is undertaken as a last resort (in accordance with the <i>Waste Avoidance and Resource and Resource Recovery Act 2001</i>). By adopting the above principles, Transport for NSW aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development. 	 The proposal is not expected to generate large quantities of waste materials. The following waste streams have been identified: Spoil Removed vegetation Waste concrete / asphalt General garbage and refuse.
Hazards and risk	Existing hazards and risks are associated with operation the road network and include the risk of crashes, including those involving pedestrians / cyclists. The proposal site is not near bushfire or flood prone land.	 Hazards and risks associated with the construction of the proposal would potentially include: Carrying out work within or next to a busy road and areas with high pedestrian activity Carrying out work near existing services and utilities (e.g. power lines and gas mains) The use and storage of hazardous materials The use of heavy machinery Unexpected excavation of contaminated land Sparks and/or hot works causing fire, particularly during dry, hot periods Unauthorised access to the construction work site. Construction hazards and risks are manageable through the application of standard mitigation measures, which

Environmental factor	Existing environment	Potential impacts
		would be developed by the construction contractor prior to construction.
		Hazards or risks associated with the operation of the proposal would be limited new road and driveway crossings. The safety of pathway users is a key design consideration with measures being included to minimise risks. Refer to Section 6.1.

6.8.2 Safeguards and management measures

Table 6-35: Safeguards and management measures – other issues

Environmental factor	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime Services, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of	Contractor	Construction	Section 4.9 of QA G36 Environment Protection
	that Procedure have been satisfied.			
Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:	Contactor	Construction	Section 4.4 of QA G36 Environment Protection
	 Potential sources of air pollution (including site compound operation) 			
	 Air quality management objectives consistent with any relevant published EPA guidelines 			
	 Mitigation and suppression measures to be implemented 			

Environmental factor	Environmental safeguards	Responsibility	Timing	Reference
	 Methods to manage work during strong winds or other adverse weather conditions. The AQMP will include the following requirements: Plant and equipment will be maintained in good condition and in accordance with manufactures specifications Plant and machinery will be turned off when not in use Work activities will be reprogrammed if the management measures are not adequately restricting dust generation Disturbed areas will be minimised in extent and rehabilitated progressively Dust will be suppressed on stockpiles and unsealed or exposed area using methods such as water trucks/hoses, temporary stabilisation methods, soil binders or other appropriate practices No burning of material on site will be undertaken to verify the effectiveness of controls and enable early intervention Vehicles transporting materials and equipment will have their loads covered. 			
Climate change risk	Climate change adaptation strategies identified in the Climate Change Risk Register will be considered during detailed design.	Contractor	Detailed design	Additional measure
Waste	 A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: Measures to avoid and minimise waste associated with the project 	Contactor	Detailed design / pre-construction	Section 4.2 of QA G36 Environment Protection

Environmental factor	Environmental safeguards	Responsibility	Timing	Reference
	 Classification of wastes and management options (re-use, recycle, stockpile, disposal) Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions Procedures for storage, transport and disposal Monitoring, record keeping and reporting. 			
Waste	 The following resource management hierarchy principles will be followed: Avoid unnecessary resource consumption as a priority Avoidance will be followed by resource recovery (including reuse of materials reprocessing and recycling and energy recovery Disposal will be undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001 	Contractor	Detailed design Construction	Additional measure
Waste	 Prepare and implement a design resource plan. As a minimum, the plan is to include the following information: Quantities and type of materials that will be produced by the project Steps taken during detailed design to minimise the generation of material (such as excavated material) How the design maximises the on-site reuse of any excavated materials How detailed design maximises the opportunities for the use of recycled materials (ensuring that the material are fit for purpose and meet engineering performance standards) Details of the quantities and type materials that cannot be reused onsite. 	Contractor	Detailed design	Additional measure

Environmental factor	Environmental safeguards	Responsibility	Timing	Reference
Waste	Housekeeping at construction sites will be addressed regularly. This will include collection and sorting of recycling, general waste and green waste. Waste will be disposed regularly at a licensed waste facility or recycling facility where available.	Contractor	Construction	Additional measure
Hazards and risks	 A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: Details of hazards and risks associated with the activity Measures to be implemented during construction to minimise these risks Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials A monitoring program to assess performance in managing the identified risks Contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice and EPA publications. 	Contractor	Construction	Additional measure

6.9 Sustainability

The following key sustainability themes and objectives have been identified as having the most important contribution towards the achievement of positive social, economic and environmental outcomes for the proposal:

- Energy management: Reduce energy use and greenhouse gas emissions through design.
- Biodiversity: Protect and create biodiversity and habitat connectivity whilst ensuring appropriate land use development and enhancement of land.
- Pollution control: Minimise adverse impacts to local air, water and land quality.
- Heritage: Identify, protect and avoid impacts to aboriginal, state and local heritage sites and items.
- Climate change resilience: Plan and design infrastructure and operations to cope, adapt and improve in response to current and future climate risks.
- Liveable communities: Improvement of community experience through the delivery of transport and integration with surrounding land uses. This includes urban design and placemaking outcomes.
- Resource management: Minimise the demand on new resources (potable water and new materials) and maximise opportunities for re-use (use of recycled water and materials).
- Corporate sustainability and procurement: Established governance arrangements which support resource efficiency, social return on investment as well as promoting continuous improvement in environment and sustainability performance.

The development of the concept design for the proposal has included the identification of several sustainability opportunities and initiatives to consider during detailed design. These opportunities and initiatives are identified in Table **6-36**.
Table 6-36: Summary of sustainability initiatives

Sustainability objective	Requirement	Comment
Energy management	Build in low energy lighting into the new pavement (LED strip lighting, LED pavers).	Opportunity. Consider during detailed design.
Energy management	Charging provision for electric bikes / scooters.	Opportunity. Consider during detailed design.
Energy management	Glow paths to minimise lighting requirements.	Opportunity. Consider during detailed design.
Energy management	Solar powered LED lighting for way finding and security.	Opportunity. Consider during detailed design.
Energy management	Adopt LED lighting as a minimum.	Opportunity. Consider during detailed design.
Energy management	 Prepare a renewable energy strategy that investigates opportunities for: Onsite renewable energy generation potential (e.g. photovoltaic cells along the alignment) Offsite generation potential Energy efficient lighting Carbon offsets Purchase of GreenPower 	Opportunity. Consider during detailed design.
Energy management	Undertake feasibility study to purchase offsets for 100% of operational energy emissions	Opportunity. Consider during detailed design.
Energy management	Investigate using 100% GreenPower or renewable energy for construction electricity.	Opportunity. Consider during construction procurement.
Energy management	Target to offset 100% of the electricity needs for all new operational energy requirements.	Opportunity. Consider during detailed design.

Sustainability objective	Requirement	Comment
Energy management	Use sustainable construction site facilities that use energy efficient fittings and appliances.	Opportunity. Consider during construction procurement.
Energy management	Use at least 10% alternative fuels to reduce greenhouse gas emissions in construction vehicles.	Opportunity. Consider during construction procurement.
Energy management	Minimise land clearing.	Consider during detailed design.
		Tree removal has been minimised through design refinements. Refer to Section 2.6.
Energy management	All vehicles, plant and equipment are selected and operated for optimum energy efficiency	Opportunity. Consider during construction procurement.
Biodiversity	Investigate opportunities for green infrastructure (vegetation planting, water sensitive urban design, green roofs, green walls, green facades, living walls, living retaining walls or rockfall barriers, land-bridges).	Opportunity. Consider during detailed design.
Biodiversity	Use non-intrusive devices to keep existing trees e.g. flexible platforms around trees. Design	Consider during detailed design.
	pavements around existing mature trees.	Tree removal has been minimised through design refinements. Refer to Section 2.6.
Biodiversity	Lower surface and air temperatures by planting trees and other vegetation.	Opportunity. Consider during detailed design.
Biodiversity	Use light-coloured surfaces to reflect light and heat.	Opportunity. Consider during detailed design.
Biodiversity	Investigate the use of permeable surfaces to manage storm-water run-off.	Opportunity. Consider during detailed design.
		This is being proposed via composite decking along the alignment.

Sustainability objective	Requirement	Comment
Biodiversity	Replace any trees and vegetation in accordance with the Transport for NSW Vegetation Offset Guide.	Replacement tree planting is proposed (at a ratio of four trees to one tree removed – along the route or at other locations nominated by Council) using species selected in consultation with Sutherland Shire Council.
Pollution control	torm water harvesting to irrigate green infrastructure. Opportunity. Consider duridetailed design.	
Pollution control	Ensure waste is recycled / disposed of safely.	Adopted. Refer to Section 6.8.
Pollution control	Incorporate water sensitive urban design.	Opportunity. Consider during detailed design.
Pollution control	Include education signage/interactive elements around water sensitive urban design initiatives and/or involve the community in the design and/or construction phases.	Opportunity. Consider during detailed design.
Heritage Historical/cultural facts about the community (indigenous/ non-indigenous) on placards along the route. Integrate public art.		Opportunity. Consider during detailed design.
	Aboriginal names, storylines and/or local knowledge inbuilt into the wayfinding.	Opportunity. Consider during detailed design.
	Implement measures to minimise adverse impact to heritage during construction and operation.	Adopted. Refer to Section 6.5.
	Undertake heritage interpretation and design to promote local heritage values.	Opportunity. Consider during detailed design.
Climate change resilience	Design for forecast climatic conditions including potential extreme weather events, increased flood events and increases in annual average temperatures and heatwave events.	Refer to discussion of climate change risk in Section 6.8.

Sustainability objective	Requirement	Comment
	Identify and assess adaptation options to treat all very high and high priority climate change risks and implement treatment measures in order that no very high or high residual climate change risks remain.	Refer to discussion of climate change risk in Section 6.8.
	Incorporate climate change risks into the overall project risk register and risk management processes.	Adopted
	Integrate processes to actively identify and manage climate change impacts into the planning, delivery and operations of active transport links, including emergency management plans and water drainage networks	Refer to discussion of climate change risk in Section 6.8.
Liveable communities	able communities Intelligent traffic signals (based on actual traffic) e.g. sensors that accurately sense cyclists and pedestrians, possibly visual sensors via video cameras or similar.	
	Information panels to include weather, other links in the area, time to and from, public transport timetable information.	Opportunity. Consider during detailed design.
	Integrate exercise equipment route into the design. Near local businesses and rest stops.	Consideration for a future stage.
	Make the path attractive, and promote the existence of the path, easy intuitive wayfinding.	Adopted
	Minimise stopping and maximise cycling and pedestrian priority at intersections.	Adopted
	Consider placemaking opportunities (e.g. seating and or rest stops, public art installations etc).	Consideration for a future stage.
	Provide bike bins (bins angled for cyclist use whilst on the move).	Consideration for a future stage.
	Provide bicycle parking and/or repair stations.	Consideration for a future stage.
	Provision of trees and landscaping to cool the path in summer and provide scenic changes along the route (low water demand plants).	Adopted
	Separation of bikes, pedestrians and motor vehicles where possible.	Adopted

Sustainability objective	Requirement	Comment	
	Water bubblers / water bottle refill stations.	Consideration for a future stage.	
	Provide linkages to existing pedestrian and cycle pathways.	Adopted	
	Enhance community connectivity through active transport / recreational and biodiversity enhancements.	Opportunity. Consider during detailed design.	
	Develop and implement an urban and landscape design plan which has been independently reviewed.	Opportunity. Consider during detailed design.	
	Incorporate ongoing management requirements into urban design and landscape management plans.	Opportunity. Consider during detailed design.	
	Actively engage with local communities, potential customers and other stakeholders in the development and implementation of the project.	Opportunity. Consider during detailed design.	
Resource management	Pavement from recycled asphalt, glass, plastics or similar. Trial new materials.	Opportunity. Consider during detailed design.	
	Pavement type to use glass or colour embedded (no additional paint needed).	Opportunity. Consider during detailed design.	
		This is being proposed via composite decking along the alignment (recycled plastic)	
	Develop designs that demonstrate a reduction in material lifecycle impacts from business as usual practices. Therefore, reducing embodied carbon emissions	Opportunity. Consider during detailed design.	
	Minimise material consumption.	Opportunity. Consider during detailed design.	
	Prioritise the use of low carbon materials.	Opportunity. Consider during detailed design.	

Sustainability objective	Requirement	Comment
	Maximise recycled content of and/or recycled construction materials such as crushed glass sand aggregate and recycled materials in road pavements.	Opportunity. Consider during detailed design and construction procurement.
	Use supplementary cementitious materials to replace Portland cement	Opportunity. Consider during construction procurement.
	Elevate durability requirements to maximise asset life and minimise early retirement of plant, equipment and materials.	Opportunity. Consider during detailed design.
	Adopt modular design and prefabrication / offsite construction methodologies to minimise waste and minimise use of formwork.	Opportunity. Consider during construction procurement.
	Use recycled steel, including in concrete reinforcing.	Opportunity. Consider during construction procurement.
	Beneficially reuse 100 per cent of spoil.	Opportunity. Consider during construction.
	Set water use reduction targets from business as usual for construction and operation.	Opportunity. Consider during detailed design.
	Harvest rainwater and maximise reuse of stormwater in landscaping.	Opportunity. Consider during detailed design.
	Incorporate water metering devices which allow real-time consumption monitoring during construction where feasible.	Opportunity. Consider during construction.
	Use non-potable water or alternative methods for dust suppression.	Opportunity. Consider during construction.
	Implement rainwater harvesting and reuse systems at construction sites.	Opportunity. Consider during construction.

Sustainability objective	Requirement	Comment
	Establish targets for non-potable water use.	Opportunity. Consider during detailed design.
	Use landscape species which do not require significant quantities of water once established.	Opportunity. Consider during detailed design.
	Maximise water re-use.	Opportunity. Consider during detailed design and construction.
	Prepare a waste management strategy that addresses minimising waste produced and diverting construction and office waste from landfill.	Adopted. Refer to Section 6.8.
	Use components or pre-fabricated units that can be easily separated on disassembly / deconstruction into material types for recycling or reuse.	Opportunity. Consider during detailed design.
	Retain and refurbish structures where feasible.	Opportunity. Consider during detailed design.
	Set waste reduction targets during construction.	Opportunity. Consider during construction.
	Monitor all wastes during construction.	Opportunity. Consider during construction.
		To be included in construction environmental management documents.
Corporate Sustainability	Achieve a Gold sustainability rating using the Transport for NSW Sustainable Design Guidelines sustainability rating tool.	Adopted.
	Ensure environmental, social and economic risks and opportunities are assessed. Capture environmental, social and economic risks in the project's risk register.	Adopted.
	Ensure multi-criteria analysis is used to assess options.	Adopted.

Sustainability objective	Requirement	Comment
	Develop a mitigation plan for all high social, ethical and environmental risks associated with delivery and operation.	Opportunity. Consider during detailed design and construction procurement.
	Share sustainability knowledge beyond the project and Transport for NSW boundaries.	Opportunity. Consider during detailed design.
	Incorporate sustainability criteria into project contracts and tender evaluation criteria.	Opportunity. Consider during construction procurement.
	Assess tenders based on criteria that include environmental and social impacts/risks, quality, durability and whole-of-life costs.	Opportunity. Consider during construction procurement.
	Prioritise local suppliers to support local employment.	Opportunity. Consider during detailed design and construction.
	Develop a workforce diversity culture to encourage industry to develop an inclusive workforce that addresses issues such as employment inclusiveness, diversity, capability development and safety.	Opportunity. Consider during construction.
	Offer apprenticeship opportunities initiate skills development programs.	Opportunity. Consider during construction procurement.
	Develop a sustainable procurement approach (or policy) for construction, operation and maintenance phases.	Opportunity. Consider during construction procurement.
	Require supply chain and product certifications for key materials such as timber and steel to ensure they are sourced from legal and well-managed sources with independent third-party certification.	Opportunity. Consider during construction procurement.
	Ensure suppliers and contractors undertake due diligence of their supply chain to ensure environmental and human rights standards are not contravened.	Opportunity. Consider during construction procurement.
	Require contractors and suppliers to develop and implement sustainable procurement policies and strategies based on ISO 20400: Sustainable Procurement.	Opportunity. Consider during construction procurement.

Sustainability objective	Requirement	Comment
	Align procurement and reporting requirements for contractors and suppliers with the Commonwealth <i>Modern Slavery Act 2018</i> and NSW <i>Modern Slavery Act 2018</i> .	Opportunity. Consider during construction procurement.
	Provide the community with opportunities to participate in the project's planning and delivery.	Adopted. Refer to Chapter 5.
	Create opportunities for local business involvement during the construction and operation of the project.	Opportunity. Consider during construction procurement.
	Share information with the community in a timely manner.	Adopted. Refer to Chapter 5.
	Develop a Sustainable Workforce Strategy.	Opportunity. Consider during detailed design.

During detailed design the proposal will be considered in accordance with the Transport for NSW Sustainable Design Guidelines – Version 4.0 (Transport for NSW, 2017). The guidelines introduce a range of sustainability outcomes initiatives to improve the sustainability performance of transport infrastructure and reinforce an ongoing commitment to sustainability. More specifically, the guidelines seek to deliver sustainable development practices by embedding sustainability initiatives into the planning, design, construction, operations and maintenance of transport infrastructure projects, grouping sustainability into seven key themes:

- Energy and greenhouse gases
- Climate resilience
- Materials and waste
- Biodiversity and heritage
- Water
- Pollution control
- Community benefit.

Proposals are rated using the reporting tool that accompanies the guidelines, with scoring based on a weighted points-based system. The proposal will target a Silver rating.

6.9.1 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Sustainability	The design and delivery of the proposal will address the requirements of the Transport for NSW Sustainable Design Guidelines – Version 4.0 (Transport for NSW, 2017). The proposal will target a Silver rating.	Transport for NSW	Detailed design Construction	Additional measure

Table 6-37: Safeguards and management measures - sustainability

6.10 Cumulative impacts

6.10.1 Study area

A cumulative impact occurs when two or more projects are carried out concurrently and near to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was carried out in isolation.

A search of the Department of Planning, Industry and Environment's Major Projects Register was carried out in September 2020 for the Sutherland Shire. The Sutherland Shire development application tracking site was also reviewed (with a focus on larger developments with the potential for cumulative impacts). The results are discussed in Section 6.10.2. Noting the relatively small scale of the proposal at any given location, the study area for consideration of cumulative impacts was generally confined to immediate adjacent land parcels.

6.10.2 Other projects and developments

Table 6-38 identifies those projects with the potential to have consecutive or cumulative impacts in association with the proposal. The timing of other projects in the locality is uncertain and would need to be investigated during detailed construction planning.

Table 6-38: Relevant past, present and future projects

Project / development	Construction impacts	Operational impacts
President Private Hospital (369 – 381 President Avenue, Kirrawee) Being assessed. Alterations and additions including demolition of existing single storey buildings and construction of a new three storey building with two basement car park levels.	 Construction traffic using President Avenue Construction noise and vibration (limited to nearby receivers on President Avenue, Hotham Rad, North West Arm Road and Bidurgal Avenue) Water quality risks associated with construction disturbance 	 Limited operational impacts. Traffic noise levels on President Avenue and Hotham Road already exceed Road Noise Policy criteria.
President Avenue / Oak Road intersection upgrade. Construction pending Widening of the northern intersection leg to accommodate an additional southbound lane. Pathway adjustments.	 Construction traffic accessing site Construction noise and vibration Water quality risks associated with construction disturbance 	Limited operational impacts.
165-171 Oak Road, Kirrawee Approved Demolition of existing two storey mixed use building, construction of five storey mixed use building containing four commercial units and 18 residential units and strata subdivision.	 Construction traffic accessing site Construction noise and vibration Water quality risks associated with construction disturbance 	 Negligible increase in traffic generation Trees on Oak Rod frontage to be retained.
Sutherland Hospital Operating Theatre Upgrade. Being assessed. Redevelopment of Sutherland Hospital operating theatre complex including alterations to an existing building, earthworks for services, tree removal and site remediation.	 Construction traffic Construction noise and vibration Water quality risks associated with construction disturbance 	 Low to moderate visual impacts Additional traffic (net increase of approx. 78 AM peak and 113 PM peak) No adverse road traffic noise impacts expected Noise from cooling tower plant to meet criteria
489 Kingsway, Miranda Approved Demolition of existing structures, construction of multi-dwelling development containing four units and strata subdivision.	 Construction traffic Construction noise and vibration Water quality risks associated with construction disturbance 	 Changes to streetscape on Junction Street and Kingsway frontages Small increase in traffic generation

Project / development	Construction impacts	Operational impacts
		 Limited impact on street parking with eight off-street spaces to be provided.
506 Kingsway, Miranda Under construction Demolition of existing structures, consolidation of 3 lots into 1 lot and the construction of a residential flat building containing 36 units	 Construction traffic Construction noise and vibration Water quality risks associated with construction disturbance 	 Additional 3-4 vehicles trips per hour Streetscape changes including new footpaths along the Kingsway and Higherdale Avenue frontages
1 Hinkler Avenue, Caringbah Under construction Demolition of existing structures, construction of a six storey mixed development with three levels of basement car parking.	 Construction traffic Construction noise and vibration Water quality risks associated with construction disturbance Basement excavation is not expected to encounter the groundwater Tree removal 	 Changes to streetscape on Kingsway and Hinkler Avenue frontages Additional traffic (net increase of approx. 52 AM peak and 51 PM peak)

6.10.3 Potential impacts

Table 6-39 reviews the potential cumulative impacts for both the construction and operation stages of the proposal.

Table 6-39	: Potential	cumulative	impacts
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Environmental factor	Construction	Operation
Noise and vibration	There is the potential for the proposal to occur concurrently with and near construction works associated with other projects.	No cumulative operation stage noise impacts are expected as a result of the proposal.
	There is the potential for cumulative noise impacts (i.e. a higher noise level than for any individual project) where works are carried out at the same time, and both are predicted to exceed noise management levels at the same receivers.	
	Cumulative noise impacts, if they occur, would only be experienced for short periods at a time, with the implementation of appropriate management measures and respite.	
	There is also the potential for consecutive impacts, where a receiver is affected by one project and then by another project shortly after. This can be	

Environmental factor	Construction	Operation
	minimised through coordination between projects.	
Traffic and transport	Multiple projects which generate construction traffic, and / or which involve traffic lane closures or pedestrian / cyclist diversions can combine to result cumulative delays and affect people's ability to access places of employment, services, family and friends. Construction traffic generated by the proposal would occur primarily outside of peak periods. There are not expected to be broader network impacts even with construction traffic generated by adjacent projects. Where lane closures and pedestrian diversions are needed, coordination with other projects would reduce the potential for cumulative impacts (i.e. the number of closure/diversion periods).	The proposal would not generate an operational stage vehicular traffic and would therefore not affect the operation of the road network. The proposal would improve amenity and connectivity for pedestrians and cyclists, which would contribute to cumulative benefits associated with the development of the wider active transport in the Sutherland Shire.
Non-Aboriginal heritage	Heritage impacts associated with the proposal are indirect and minimal. In this context, no cumulative impacts are expected.	No operational stage cumulative heritage impacts are expected.
Visual	Visual impacts would affect individual locations for short periods. Cumulative impacts are not expected.	There is the potential for some cumulative impacts associated with tree removal across the locality. The proposed offset plantings would help minimise this impact in the medium term.
Biodiversity	The biodiversity assessment did not identify any construction stage cumulative impacts associated with the proposal.	The biodiversity assessment did not identify any operational stage cumulative impacts associated with the proposal.

Minimising impacts attributable to the proposal is the best way to address any potential cumulative effects and various measures have been proposed throughout this chapter. These measures are summarised in section 7.1.

A coordinated approach to the management and construction of the proposal and nearby concurrent projects would ensure that cumulative and consecutive impacts are minimised.

6.10.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Cumulative impacts	Public domain treatments proposed as part of adjacent development projects will be considered during detailed design.	Design contractor	Detailed design	Additional measure
Cumulative impacts	 Current and upcoming projects with the potential to interact with the proposal will be monitored. Where potential cumulative impacts are identified, the scheduling of works will be coordinated with interacting projects to minimise potential impacts. This will include: Scheduling works to allow suitable respite periods for construction noise Scheduling of works to minimise consecutive construction noise impacts, where feasible Coordinating lane closures and pedestrian/cyclist diversions to minimise the overall number of occasions where disruption occurs. 	Transport for NSW Project Manager	Construction	Additional measure

Table 6-40: Cumulative impacts environmental management measures

7 Environmental management

7.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Transport for NSW Environment Officer, Greater n Sydney Project Office, prior to the commencement of any on-site work. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G40 – Clearing and Grubbing, QA Specification G10 – Traffic Management.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.

Table 7-1: Summary of safeguards and management measures

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
GEN1	General – minimise environmental impacts during construction	 A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: Any requirements associated with statutory approvals Details of how the project will implement the identified safeguards outlined in the REF Issue-specific environmental management plans Roles and responsibilities Communication requirements Induction and training requirements Procedures for monitoring and evaluating environmental performance, and for corrective action Reporting requirements and record-keeping Procedures for emergency and incident management Procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity. 	Contractor Transport for NSW project manager	Pre- construction Detailed design	
GEN2	General – notification	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	Contractor Transport for NSW project manager	Pre- construction	

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular 'toolbox' style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk.	Contractor Transport for NSW project manager	Pre- construction	
TT1	Traffic and transport	 A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Traffic Control at Work Sites Manual (Roads and Maritime, 2018) and QA Specification G10 Control of Traffic (Roads and Maritime, 2008). The TMP will include: Confirmation of haulage routes Measures to maintain access to local roads and properties Site-specific traffic control measures (including signage) to manage and regulate traffic movement Measures to maintain pedestrian and cyclist access Requirements and methods to consult and inform the local community of impacts on the local road network Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads A response plan for any construction traffic incident Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic monitoring, review and amendment mechanisms. 	Contractor	Pre- construction	Section 4.8 of QA G36 Environment Protection
TT2	Local community notification	Undertake consultation with potentially affected residences prior to the commencement of and during works in accordance with the Transport for NSW's Community Involvement and Communications Resource Manual.	Transport for NSW	Pre- construction / construction	Additional measure Section 2.2 of QA G10 Traffic Management

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		Consultation should include but not be limited to door knocks, newsletters or letter box drops providing information on the proposal, working hours and a contact name and number for more information or to register complaints.			
TT3	Community information	Provide road users and local communities with timely, accurate, relevant and accessible information about changed traffic arrangements and delays owing to construction activities.	Contractor	Construction	Additional measure
TT4	Access	Maintain access to properties during construction. Where that is not possible or necessary, provide temporary alternative access arrangements in consultation with affected landowners and the relevant local road authority.	Contractor	Pre- construction / construction	Additional measure
TT5	Impacts to pedestrians and cyclists	Maintain pedestrian and cyclist access throughout construction. Where that is not possible or necessary, provide temporary alternative access arrangements in consultation with affected landowners and the local road authority.	Contractor	Construction	Additional measure
TT6	Emergency services vehicles	Traffic management measures will be implemented to ensure emergency services vehicles can negotiate the intersection during construction.	Contractor	Construction	Additional measure
TT7	Public transport network changes during construction	Maintain access for public transport services. Consult with bus operators, Transport for NSW, the Sutherland Shire Council (as relevant), and inform the community of any temporary changes to bus stop operation.	Contractor	Construction	Additional measure
ТТ8	Operational traffic and safety	Treatments to enhance safety at major driveway crossings will be investigated during detailed design.	Transport for NSW	Detailed design	Additional measure
LCV1	Landscape character and visual impact	An Urban Design Plan (including detailed urban design drawings and landscape plans) will be prepared to support the final detailed project design. The Urban Design Plan will present an integrated urban design for the project, providing further practical detail on the	Transport for NSW	Detailed design	Standard measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		application of design principles and objectives identified in this REF. The Plan will confirm design treatments for:			
		 Location and identification of existing vegetation and proposed landscaped areas, including species to be used 			
		 Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage 			
		 Details of replacement tree planting (at a ratio of four trees to one tree removed – along the route or at other locations nominated by Council) using species selected in consultation with Sutherland Shire Council 			
		 Procedures for monitoring and maintaining landscaped or rehabilitated areas. 			
		The Urban Design Plan will be prepared in accordance with relevant guidelines, including:			
		 Beyond the Pavement: Urban design approach and procedures for road and infrastructure planning, design and construction (Roads and Maritime, 2020) 			
		• Landscape Guideline (Roads and Maritime Services, 2019).			
LCV2	Visual impacts	Where reasonable and feasible trees will be retained in design.	Transport for NSW	Detailed design	Additional measure
LCV3	Visual impacts	Following the completion of construction works, plant/equipment will be removed, and disturbed areas will be revegetated, turfed or otherwise restored as appropriate.	Contractor	Construction	Additional measure
LCV4	Visual impacts	Construction facilities will be contained within the construction works zone boundary and occupy the minimum area practicable for their intended use.	Contractor	Construction	Additional measure
LCV5	Visual impacts	Provide suitable barriers to screen views from adjacent areas during construction	Contractor	Construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
LCV6	Visual and landscape impacts	Opportunities to support the Five Million Trees for Greater Sydney initiative and the greening our city Premier's priority will be explored during detailed design and as part of the development of the landscape design for the proposal. This would occur in consultation with the Sutherland Shire.	Transport for NSW	Detailed design	Additional measure
LCV7	Impacts on street trees	Tree protection zones would be implemented to minimise the impact to street trees where possible. Any pruning of trees (or tree roots) is to occur under the supervision of an AQF5 qualified arborist and in accordance with a pre-agreed methodology. Vehicles, plant or equipment would not be parked or stored within the tree protection zone, if parking or storage is required additional mitigation measures would be implemented to minimise the impact to the vegetation.	Contractor	Construction	Additional measure
LCV8	Impacts on street trees	All proposed works within the tree protection zone must be carried out under the supervision of the project arborist	Contractor	Construction	Additional measure
LCV9	Impacts on street trees	Any underground services proposed within the tree protection zone will be installed using tree sensitive methods such as horizontal directional drilling boring, non-destructive excavation and carried out under the supervision of the project arborist.	Contractor	Construction	Additional measure
LCV10	Impact from lighting	Temporary site lighting will be installed and operated in accordance with AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting, and an approved Traffic Management Plan.	Contractor	Construction	Additional measure
LCV11	Impacts from lighting	The design of new street lighting will consider potential light spill impacts on adjacent properties.	Transport for NSW	Detailed design	Additional measure
NV1	Construction noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the	Contractor	Pre- construction	Section 4.6 of QA G36 Environment Protection

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and identify:			
		 Key potential noise and vibration generating activities associated with the activity 			
		 Feasible and reasonable mitigation measures to be implemented 			
		 A monitoring program to assess performance against relevant noise and vibration criteria 			
		 A review process scheduling and assessing out-of-hours activities including consideration of alternatives to out-of- hours work, plant selection, work locations and screening to minimise impacts 			
		 A working schedule which records respite periods for extended out-of-hours works 			
		 Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures 			
		 Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria. 			
NV2	Construction vibration	Where vibration intensive plant such as vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures (including heritage fabric). This includes adhering to the recommended minimum working distances for vibration intensive plant identified in Section 7.1 of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). If recommended minimum working distances cannot be met by selecting smaller plant, vibration monitoring will occur to quantify and help manage vibration. If necessary, trial vibration measurements will be conducted to further assess any possible impacts and buffer distances that may be required.	Contractor	Construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
NV3	Construction noise and vibration	 All sensitive receivers likely to be affected will be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: The proposal The construction period and construction hours Contact information for project management staff Complaint and incident reporting How to obtain further information. 	Contractor	Pre- construction	Standard measure
NV4	Construction hours and scheduling	Where feasible and reasonable, construction will be carried out during the standard daytime working hours and work generating high noise levels will be scheduled during less sensitive time periods.	Contractor	Construction	Additional measure
NV5	Construction respite period during normal hours and out of hours	The duration and respite of high noise generating activities will be carried out in accordance with the Construction Noise and Vibration Guideline, and in consultation with the community. As a guide, high noise generating activities near receivers will be carried out in blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The duration of each block of work and respite will be flexible to accommodate the usage and amenity at nearby receivers.	Contractor	Detailed design / pre- construction / construction	Additional measure
NV6	Plant noise levels	The noise levels of plant and equipment will have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix F of the Construction Noise and Vibration Guideline. A noise monitoring audit program will be implemented to ensure equipment remains within the more stringent of the manufacturer's specifications or Appendix F of the Construction Noise and Vibration Guideline. Only the necessary size and power of equipment will be used.	Contractor	Detailed design / pre- construction / construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
NV7	Equipment selection	Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor	Detailed design / pre- construction / construction	Additional measure
NV8	Use and siting of plant	The offset distance between noisy plant and adjacent sensitive receivers will be maximised. Plant used intermittently will be throttled down or shut down. Noise-emitting plant will be directed away from sensitive receivers. Only have necessary equipment on site.	Contractor	Detailed design / pre- construction / construction	Additional measure
NV9	Plan work sites and activities to minimise noise.	Locate compounds away from sensitive receivers and discourage access from local roads where possible. Parking and loading/unloading areas will be planned to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noisy activities will be scheduled for normal working hours. If the work cannot be undertaken during the day, it should be completed before 11:00pm where possible.	Contractor	Detailed design / pre- construction / construction	Additional measure
NV10	Non-tonal and ambient sensitive reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) will be fitted and used on all construction vehicles and mobile plant regularly used on site and for out of hours work. The use of ambient sensitive alarms that adjust output relative to the ambient noise level will be considered.	Contractor	Detailed design / pre- construction / construction	Additional measure
FF1	Biodiversity impacts	Biodiversity Management Plan is to be prepared and included with in the CEMP. The plan would include	Contractor	Pre- construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 A site walk over with an ecologist as part of the pre-clearing surveys 			
		 A map showing vegetation clearing boundaries and sensitive area/no go area or trees to be protected 			
		 Incorporation of management measures identified as a result of pre-clearing survey reports, completed by an ecologist 			
		 A detailed cleaning process in accordance with Biodiversity Guidelines (2011) 			
		 Identify controls/mitigation measures to prevent impacts on sensitive location or no go zones or tree protection zones 			
		 A stop work procedure in the event of identification of unidentified species, habitat or populations. 			
FF2	Biodiversity impacts	 Pre-clearing survey will be conducted in accordance with Biodiversity Guidelines, Guide 1 (Roads and Maritime, 2016) and will: Confirm (with the assistance of a surveyor) clearing 	Contractor	Pre- construction	Additional measure
		boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work			
		 Identify, in toolbox talks, where biodiversity controls are located on the site. 			
FF3	Injury to fauna	A suitably qualified ecologist or experienced wildlife handler would be engaged to survey and handle any fauna.	Contractor	Pre- construction Construction	Additional measure
FF4	Spread of weeds	 Weed management will occur in accordance with Biodiversity Guidelines, Guide 6 (Roads and Maritime, 2016) and include: The Identification of weeds on site (confirmed during pre- clearing survey) Weed management priorities and objectives Exclusion 	Contractor	Pre- construction	Additional measure
		zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site			

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 The location of weed infested areas Weed control methods Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements A monitoring program to measure the success of weed management Communication with local Council noxious weed representative. 			
FF5	Spread of weeds	Reuse of topsoil free from weeds or pathogens would be used as part of habitation/landscaping works, where reasonable and feasible.	Contractor	Construction	Additional measure
FF6	Spread of diseases affecting plants	Management measures will be implemented to control and/or prevent the introduction and/or spread of disease-causing agents such as bacteria and fungi in accordance with the Biodiversity Guidelines, Guide 7 (Roads and Maritime, 2016).	Contractor	Construction	Additional measure
FF7	Unexpected threatened species finds	If unexpected flora or fauna are discovered on site stop work immediately and implement the Roads and Maritime Unexpected Threatened Species Find Procedure in the Biodiversity Guidelines, Guide 1 (Roads and Maritime, 2016).	Contractor	Construction	Additional measure
FF8	Loss of trees	The loss of trees due to the proposal will be offset consistent with the Vegetation Offset Guide (Transport for NSW, 2020)	Transport for NSW	Construction	Additional measure
FF9	Protect native flora and fauna, minimise edge effects and avoid inadvertent impacts	Site-specific training will be given to personnel when working in the vicinity of areas of identified biodiversity value that are to be protected.	Contractor	Construction	Additional measure
FF10	Minimise risks to native flora and fauna during construction	Consult with an arborist to confirm the depth and extent of existing tree root systems in the vicinity of the works and to advise if the proposed works would cause any harm to the tree roots.	Contractor	Detailed design / pre- construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
FF11	Minimise risks to native flora and fauna during construction	Protect trees nominated for retention in line with Australian Standard AS 4970-2009 Protection of Trees on Development Sites (Standards Australia, 2010). Exclusion zones will be established in area of construction and ancillary sites and identified in CEMP. Vehicle parking, machinery, construction compounds and material stockpiles will be located in cleared or disturbed areas.	Contractor	Construction	Additional measure
NAH1	Non-Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime Services, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contactor	Construction	Section 4.10 of QA G36 Environment Protection
NAH2	Non-Aboriginal heritage	Prepare and implement a Non-Aboriginal Heritage Management Plan (NAHMP) as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage.	Contractor	Detailed design / pre- construction	Additional safeguard
NAH3	Site induction	Train all personnel working on site to ensure they are aware of the requirements of the NAHMP and relevant statutory responsibilities. Provide site-specific training to personnel when working in the vicinity of identified non-Aboriginal heritage items.	Contractor	Pre- construction	Additional safeguard
SE1	Community engagement	 A Community and Stakeholder Engagement Plan (CSEP) will be prepared and will include: Procedures and mechanisms that would be implemented in response to the key social impacts identified for the proposal Procedures and mechanisms that would be used to engage with affected landowners, business owners, and the wider community to identify potential access, parking, business 	Transport for NSW	Pre- construction	Standard measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		visibility, and other impacts and develop appropriate management measures			
		 Procedures to keep the community informed about construction and any associated changes to conditions (e.g. detours or lane closures) such as through advertisements in local media and advisory notices or variable message signs 			
		 Procedure for the management of complaints and enquiries, including a contact name and number for complaints. 			
SE2	Community engagement	Notify local residents and potentially affected businesses before the work starts regarding the timing, duration and likely impact of construction activities., including interruptions to utility services.	Contractor	Construction	Additional measure
SE3	Safety and security	The safety of people using the path would be further considered in detailed design in accordance with crime prevention through environmental design principles.	Transport for NSW	Detailed design	Additional measure
SE4	Access	Access to businesses will be maintained during construction. Where temporary changes to access arrangement are necessary, the contractor will advise owners and tenants and consult with them in advance with regards to alternative access arrangements.	Contractor	Pre- construction / construction	Additional measure
SE5	Access	Access to bus stops will be maintained during construction. Where changes to access arrangement are necessary, the contractor will advise those impacted.	Contractor	Pre- construction / construction	Additional measure
SW1	Soil and water	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction. The SWMP would include: • Stockpile management plan	Contractor	Detailed design Pre- construction	Section 2.1 of QA G38 Soil and Water Management

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 Dewatering plan which includes process for monitoring flocculants and dewatering water from site A process to routinely monitor the Bureau of Meteorology weather for acad. 			
		 Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. 			
		 Inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sediment controls 			
		The SWMP will address: • Transport for NSW Code of Practice for Water Management			
		The Blue Book- Managing Urban Stormwater: Soils and Construction, Volume 1 and 2			
		 Transport for NSW Technical Guideline – Temporary Stormwater Drainage for Road Construction. 			
SW2	Soil and water	A site specific Erosion and Sediment Control Plan/s will be prepared and implemented in accordance with the Managing Urban Stormwater: Soils and Construction, Volume 1 and 2 (Landcom, 2004) as part of the Soil and Water Management Plan	Contractor	Detailed design Pre- construction	Section 2.1 of QA G38 Soil and Water Management
SW3	Soil and water	All stockpiles would be designed, established, operated and decommissioned in accordance with the Transport for NSW Stockpile Management Procedures.	Contractor	Construction	Additional measure
SW4	Soil and water	Controls would be implemented at construction zones exit points to minimise the tracking of material onto the road.	Contractor	Construction	Additional measure
SW5	Contamination	A Detailed Site Investigation ("DSI") will be undertaken prior to construction works, targeting the AECs where exposure pathways are potentially complete. The DSI should include, but not be limited to:	Transport for NSW	Detailed design	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 Sampling of soil and along the road verges adjacent to the BP service station on the corner of Kingsway and Gymea Bay Road, and the 7-Eleven service station on the corner of Kingsway and Willarong Road Sampling of shallow soils (to approximately 0.5m depth) along the public road verges adjacent to the automotive repair workshops on Flora Street and Kingsway Observation of open service utility pits for presence of hazardous materials including asbestos in pit linings; and Field screening at open utility pits for presence of volatile organic compounds at pits in close proximity to service stations and mechanical workshops. 			
SW6	Contamination	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Environment Manager and/or EPA.	Contactor	Detailed design Pre- construction	Section 4.2 of QA G36 Environment Protection
SW7	Accidental spills	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Contactor	Detailed design Pre- construction	Section 4.3 of QA G36 Environment Protection
SW8	Removal of excavated material	Classify all waste material excavated and removed from the proposal area in accordance with the NSW Waste Classification Guidelines (EPA, 2004)	Contactor	Pre- construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
SW9	Existing condition of ancillary sites	Undertake a pre-construction land assessment prior to land being used for ancillary construction purposes (compounds, storage, parking, etc) to identify the presence of any pre- existing wastes or stored materials. The assessment should be prepared in accordance with the Transport for NSW Management of road construction and	Contactor	Pre- construction	Additional measure
		maintenance wastes (Roads and Maritime Services, 2016).			
AH1	Aboriginal heritage	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime Services, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place.	Contractor	Construction	Section 4.9 of QA G36 Environment Protection
		Work will only re-commence once the requirements of that Procedure have been satisfied.			
AQ1	Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:	Contactor	Construction	Section 4.4 of QA G36 Environment
		 Potential sources of air pollution (including site compound operation) 			Protection
		 Air quality management objectives consistent with any relevant published EPA guidelines 			
		Mitigation and suppression measures to be implemented			
		 Methods to manage work during strong winds or other adverse weather conditions. 			
		The AQMP will include the following requirements:			
		 Plant and equipment will be maintained in good condition and in accordance with manufactures specifications 			
		 Plant and machinery will be turned off when not in use 			
		 Work activities will be reprogrammed if the management measures are not adequately restricting dust generation 			

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 Disturbed areas will be minimised in extent and rehabilitated progressively Dust will be suppressed on stockpiles and unsealed or exposed area using methods such as water trucks/hoses, temporary stabilisation methods, soil binders or other appropriate practices No burning of material on site will be undertaken Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention Vehicles transporting materials and equipment will have their loads covered. 			
CC1	Climate change risk	Climate change adaptation strategies identified in the Climate Change Risk Register will be considered during detailed design.	Contractor	Detailed design	Additional measure
WM1	Waste	 A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: Measures to avoid and minimise waste associated with the project Classification of wastes and management options (re-use, recycle, stockpile, disposal) Statutory approvals required for managing both on and off- site waste, or application of any relevant resource recovery exemptions Procedures for storage, transport and disposal Monitoring, record keeping and reporting. 	Contactor	Detailed design / pre- construction	Section 4.2 of QA G36 Environment Protection
WM2	Waste	The following resource management hierarchy principles will be followed:Avoid unnecessary resource consumption as a priority	Contractor	Detailed design Construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 Avoidance will be followed by resource recovery (including reuse of materials reprocessing and recycling and energy recovery Disposal will be undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001) 			
WM3	Waste	 Prepare and implement a design resource plan. As a minimum, the plan is to include the following information: Quantities and type of materials that will be produced by the project Steps taken during detailed design to minimise the generation of material (such as excavated material) How the design maximises the on-site reuse of any excavated materials How detailed design maximises the opportunities for the use of recycled materials (ensuring that the material are fit for purpose and meet engineering performance standards) Details of the quantities and type materials that cannot be reused onsite. 	Contractor	Detailed design	Additional measure
WM4	Waste	Housekeeping at construction sites will be addressed regularly. This will include collection and sorting of recycling, general waste and green waste. Waste will be disposed regularly at a licensed waste facility or recycling facility where available.	Contractor	Construction	Additional measure
HR1	Hazards and risks	 A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: Details of hazards and risks associated with the activity Measures to be implemented during construction to minimise these risks 	Contractor	Construction	Additional measure

No.	Impacts	Environmental safeguards	Responsibility	Timing	Reference
		 Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials A monitoring program to assess performance in managing the identified risks Contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice and EPA publications. 			
S1	Sustainability	The design and delivery of the proposal will address the requirements of the Transport for NSW Sustainable Design Guidelines – Version 4.0 (Transport for NSW, 2017). The proposal will target a Silver rating.	Transport for NSW	Detailed design Construction	Additional measure
CU1	Cumulative impacts	Public domain treatments proposed as part of adjacent development projects will be considered during detailed design.	Design contractor	Detailed design	Additional measure
CU2	Cumulative impacts	 Current and upcoming projects with the potential to interact with the proposal will be monitored. Where potential cumulative impacts are identified, the scheduling of works will be coordinated with interacting projects to minimise potential impacts. This will include: Scheduling works to allow suitable respite periods for construction noise Scheduling of works to minimise consecutive construction noise impacts, where feasible Coordinating lane closures and pedestrian/cyclist diversions to minimise the overall number of occasions where disruption occurs. 	Transport for NSW Project Manager	Construction	Additional measure

7.3 Licensing and approvals

Table 7-2 provides a summary of the licensing and approval requirements relevant to the proposal.

Table 7-2: Summary of licencing and approvals required

Instrument	Requirement	Timing
Roads Act 1993 (section 138)	Road occupancy licence	Prior to start of activity

8 Conclusion

8.1 Justification

The proposal is consistent with a number of strategic plans and policy documents and has been developed to improve safety and amenity for pedestrian and cyclists, reduce congestion, create opportunities for improved health and provide placemaking opportunities.

A 'do nothing' approach was not considered appropriate as it does not address the identified need and does not meet the proposal's objectives.

While there would be some environmental impacts as a consequence of the proposal including visual impacts, traffic and transport impacts, construction noise, vegetation removal and potential soil and water impacts, they have been avoided or minimised wherever possible through the site specific safeguards summarised in section 7.

The benefits of the proposal are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal.

8.2 Objectives of the EP&A Act

Table 8-1 reviews the consistency of the proposal with the objects of the EP&A Act.

Table 8-1: Objects of the EP&A Act

Environmental factor	Construction
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal would improve social welfare through the provision of improved active transport infrastructure. Environmental impacts have been minimised.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The principles of ecological sustainable development are considered in Section 8.2.1.
1.3(c) To promote the orderly and economic use and development of land.	The proposal is consistent with a range of strategic plans and policy initiatives including Future Transport Strategy 2056 and the Transport for NSW Walking and Cycling Program.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities, and their habitats.	The proposal would have some potential impacts on native animals and plants, ecological communities, and their habitats. Impacts have been assessed as not significant.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Impacts on Aboriginal and non-Aboriginal heritage have been assessed as part of this REF (Section 6.8 and Section 6.5 respectively). Safeguards and mitigation measures have been proposed to address impacts.

Environmental factor	Construction
1.3(g) To promote good design and amenity of the built environment.	The proposal would improve amenity for pedestrians and cyclists. The urban design objectives for the proposal are provided in Section 2.3.3.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	The proposal has been developed with the involvement of various stakeholders including the Sutherland Shire Council.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation carried out to date and proposed ongoing consultation is outlined in Chapter 5.

8.2.1 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the proposal.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

The precautionary principle

The precautionary principle deals with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This principle was considered during options development (refer to Chapter 2). The precautionary principle has guided the assessment of environmental impacts for this assessment and the development of mitigation measures.

Best available technical information, environmental standards and measures have been used to minimise environmental risks and conservative 'worst case' scenarios were considered while assessing environmental impact.

8.2.2 Intergeneration equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The impacts of the proposal have been identified primarily short term and manageable. Benefits to pedestrians and cyclists in terms of improved connectivity and amenity would be realised over the short and longer term.
8.2.3 Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and ecological integrity have been a consideration during the design and assessment process with a view to identifying, avoiding, minimising and mitigating impacts.

The proposal is not expected to have significant biodiversity impacts.

8.2.4 Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by a project, including air, water, land and living things.

While it is often difficult to place a reliable monetary value on the residual, environmental and social effects of the proposal, the value placed on environmental resources within and around the corridor is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent adverse environmental impacts.

8.3 Conclusion

The proposed Sutherland to Cronulla Active Transport Link Stage 2 is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some visual, construction noise, traffic and socio-economic impacts. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would help reduce congestion and improve local active transport connectivity and amenity at the subject location. On balance the proposal is considered justified and the following conclusions are made.

8.3.1 Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

8.3.2 Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999.* A referral to the Australian Department of the Agriculture, Water and the Environment is not required.

9 Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Start Hill

Stuart Hill Environmental Planner Hills Environmental Date: 12 November 2021

I have examined this review of environmental factors and accept it on behalf of Transport for NSW.

Crontinini

Nanthini Easwaran Project Manager Central and Southern Sydney Project Office Infrastructure and Place Date: 12 November 2021

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Terms and acronyms used in this REF

Term / Acronym	Description
BC Act	Biodiversity Conservation Act 2016 (NSW).
AEP	Annual Exceedance Probability
CEMP	Construction environmental management plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
Heritage Act	Heritage Act 1977 (NSW)
ICNG	Interim Construction Noise Guideline
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NCA	Noise Catchment Area
NML	Noise management Level
NPW Act	National Parks and Wildlife Act 1974 (NSW)
POEO Act	Protection of the Environment Operations Act 1997(NSW)
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.

Appendix A

Consideration of clause 228(2) factors and matters of national environmental significance and Commonwealth land

Clause 228(2) Checklist

In addition to the requirements of the Is an EIS required? guideline (DUAP 1995/1996) and the Roads and Related Facilities EIS Guideline (DUAP 1996) as detailed in the REF, the following factors, listed in clause 228(2) of the Environmental Planning and Assessment Regulation 2000, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
a) Any environmental impact on a community? The proposal would have impacts during construction (visual, noise, traffic disruption) but would improve public domain and public transport efficiency over the longer term.	Short-term negative Long-term positive
b) Any transformation of a locality? The proposal would alter the streetscapes along the route through the provision of new pathways and removal of some trees. Over the longer term there would be substantial improvements in amenity for active transport users.	Short-term negative Long-term positive
c) Any environmental impact on the ecosystems of the locality? The proposal would have some potential impacts native animals and plants, ecological communities and their habitats. Impacts have been assessed as not significant.	Negative (not significant)
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?The proposal would have some visual impacts associated with new pathways and the removal of some trees. These would reduce over time with appropriate landscaping and urban design treatments.	Short-term negative
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal is not expected to affect Aboriginal or non-Aboriginal heritage. Safeguards have been proposed to address this impact.	Nil
 f) Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)? There would be some impact on habitat for native species. These species would not be solely reliant on the areas of affected habitat. 	Minor short-term negative
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger animals, plants or other forms of life.	Nil
h) Any long-term effects on the environment? The proposal would improve the pedestrian and cyclist amenity and connectivity.	Long-term positive
j) Any risk to the safety of the environment? The proposal does not represent a risk to the safety of the environment.	Nil
 k) Any reduction in the range of beneficial uses of the environment? The proposal would not reduce the range of beneficial uses of the environment. 	Nil

Factor	Impact
 Any pollution of the environment? No pollution of the environment is expected to result from the proposal with the implementation of the proposed safeguards and mitigation measures. 	Nil
m) Any environmental problems associated with the disposal of waste? Waste generated during construction would be removed from the site and disposed of legally. No environmental problems are anticipated for the disposal of waste.	Nil
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal would not increase demand for resources, which are, or are likely to become, in short supply.	Nil
 o) Any cumulative environmental effect with other existing or likely future activities? There are potential cumulative noise and traffic impacts associated with other planned developments in the area. These potential impacts can be adequately addressed through the proposed safeguards and management measures, including coordination with other projects where required. 	Short-term negative
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not influence coastal processes and/or coastal hazards.	Nil

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act 1999, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of Agriculture, Water and the Environment.

A referral is not required for proposed actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a) Any impact on a World Heritage property? The proposal would not have any impact on a World Heritage property.	Nil
b) Any impact on a National Heritage place? The proposal would not have any impact on a National Heritage Place.	Nil
c) Any impact on a wetland of international importance? The proposal is partly within the catchment of the Towra Point Nature Reserve. With the implementation of the proposed safeguards for water quality the proposal is not expected to have any impacts on this wetland of international importance.	Nil
d) Any impact on a listed threatened species or communities? Some Commonwealth listed threatened species have the potential to occur in the local area. The nature, scale and location of the proposal is such that direct impacts on these species or their habitats are not expected. Indirect impacts are also not expected.	Not significant
e) Any impacts on listed migratory species? Some Commonwealth listed migratory species have the potential to occur in the local area. The nature, scale and location of the proposal is such that impacts on these species or their habitats are not expected. Indirect impacts are also not expected.	Not significant
f) Any impact on a Commonwealth marine area? The proposal would not have any impact on a Commonwealth marine area.	Nil
g) Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land? The proposal would not impact Commonwealth land.	Nil



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