

# ***Executive summary***

## **Introduction**

This Impact Assessment Study (IAS) is for the extension of the Gold Coast passenger rail line south from the existing Robina Rail Station to Stewart Road. This is Part A of a two part study report. Part B is for the rail extension between Stewart Road and Boyd Street. The Queensland Department of Main Roads is preparing a concurrent Environmental Impact Statement (EIS) for the Tugun Bypass between Stewart Road and Boyd Street. (Stage 1), and between Boyd Street and Kennedy Drive, Coolangatta for Stage 2 of the bypass. This document also includes rail corridor requirements for corridor protection purposes only. The rail corridor impact assessment from Stewart Road to Boyd Street, Tugun will be addressed in Part B of the IAS following completion of the road bypass study. The proposed rail extension and road bypass alignments are shown in Figure A.

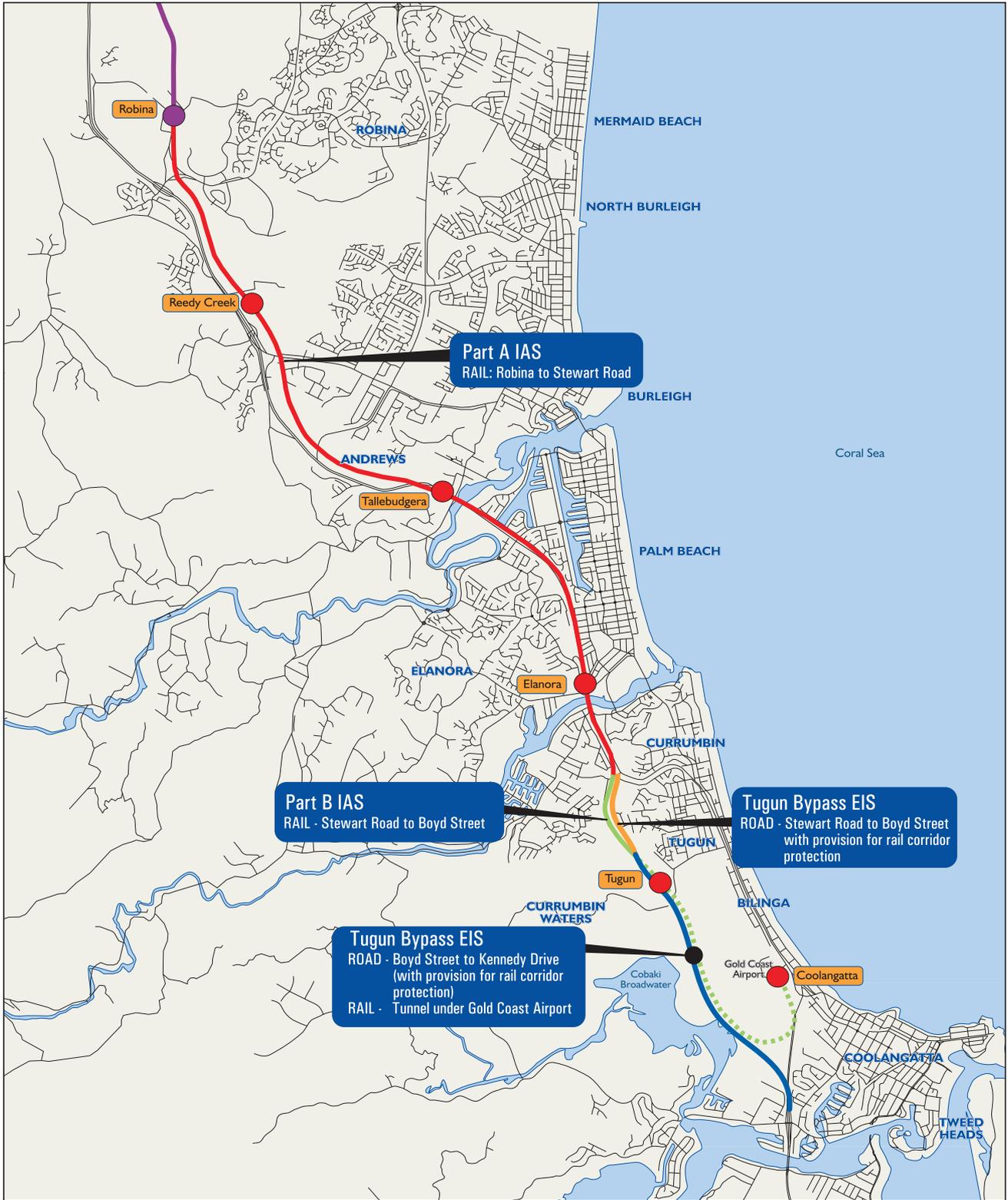
This IAS responds to the Terms of Reference for the Study (November 2000). It has been initiated pursuant to the then applicable Section 29A(2) of the State Development and Public Works Organisation Act 1971 and prepared in accordance with the procedures set out in Impact Assessment of Development Projects in Queensland (Coordinator General's Department 1979) and in accordance with the Integrated Planning Act 1997.

The objectives of the IAS (Parts A and B) are to:

- investigate the potential social, cultural, economic and environmental impacts of the development proposal during the planning, construction and operational phases;
- consult with relevant stakeholders, including Advisory Bodies, interested community groups, individuals or property owners affected by the proposal and the general community to ensure their needs/concerns are identified;
- recommend a preferred rail alignment, location of railway stations accompanied by planning layouts and a detailed impact assessment for the alignment;
- propose measures to mitigate potentially adverse impacts of the proposal on the social, cultural, economic and natural environment values for the area, including modifications to alignment or design of the routes, for the planning, construction and operation stages of the project; and
- propose management strategies to monitor and record impacts of the project during the planning, construction and operational stages, whilst assigning responsibilities for these actions.

The study was divided into four phases, namely, review and concept development, option development and assessment, strategy development and impact assessment. Following completion of the study (Part A), the Part A IAS is expected to be considered by government in 2005.





North arrow pointing up.  
Not to Scale

Figure A  
Robina to Tugun Rail and Road Proposal

- Existing Rail Alignment
- Proposed Rail Alignment (Part A)
- Proposed Rail Alignment (Part B)
- ⋯ Future Rail Extension to Gold Coast Airport
- Proposed Tugun Bypass (Stage 1)
- Proposed Tugun Bypass (Stage 2)
- Proposed Station Location
- Existing Station Location



## Background

Significant work has been completed on the Robina to Coolangatta Corridor. The Integrated Regional Transport Plan (IRTP) for South East Queensland, released in 1997, formalised the planning process and triggered investigations into the Robina to Coolangatta Rail extension.

The Southern Gold Coast Tweed Corridor Study (SGCTCS), initiated in 1997, investigated alternative modes of transport, alternative rail alignments between Robina and Coolangatta as well as alternative alignments for the Tugun Bypass. The SGCTCS identified the need and justification for both the rail and road alignments. It recommended stations at Reedy Creek, Tallebudgera (known previously as Andrews), Elanora, Tugun and Coolangatta.

In late 1998, Gutteridge Haskins and Davey (GHD) were commissioned to further investigate rail patronage estimates and to determine the optimum number of stations along the rail corridor to maximise this patronage. An alternative station option to the Elanora Rail Station (near The Pines Shopping Centre) was suggested at Palm Beach on a site owned by the State Government. In 1999, GHD were also commissioned to conduct a review of the Coolangatta and Tugun Rail Stations to consider their respective roles, given their proximity. This study recommended that the Tugun Rail Station could be best developed to provide for park and ride requirements, while the Coolangatta Rail Station could be best developed to suit the requirements of Gold Coast Airport as well as beach access and integration with the primary public transport route along the Gold Coast Highway.

Following this study Geoffrey Walker Urban Design was commissioned in 1999 to produce preliminary concept designs for the Elanora and Palm Beach site options and to demonstrate options for how these sites could function. This study recommended that the Elanora site (near The Pines Shopping Centre) be selected over the Palm Beach site due to its strategic location near The Pines Shopping Centre. No decision was made and both station location options were retained for consideration in this IAS.

In 1999, Connell Wagner prepared the Pacific Highway at Tugun Route Selection Report, which reaffirmed the need and justification for the Tugun Bypass and recommended the "C4" alignment option to be pursued. This study did not specifically consider the needs of heavy rail within the same corridor.

Since the commencement of the SGCTCS, a number of other planning studies which have an influence on the Robina to Coolangatta rail/road corridor have been commenced or completed. These include the Gold Coast City Transport Plan (1998), the draft Gold Coast City Planning Scheme (ongoing) and Transport 2007, An Action Plan for South East Queensland (2001). The City Transport Plan (CTP) includes a road network strategy, public transport strategy and local bikeway strategies which are directly relevant to the corridor. The draft planning scheme contains an activity centres strategy and lists a series of Desired Environmental Outcomes (DEO's) for areas adjacent to the corridor. Transport 2007 outlines new rail, busway and cycleway corridors or upgrades that link directly into the corridor.

Of recent relevance is the SEQ Regional Plan, which was finalised on 30 June 2005 and The SEQ Infrastructure Plan and Program which was released in April 2005. The SEQ Regional Plan has replaced the non-statutory Regional Framework for Growth Management, which was established through voluntary arrangements between State and local government authorities, and provides statutory backing for managing the region's anticipated growth until 2026. It overrides all other planning instruments with regard to strategic land use decisions. Strategic documents and schemes are to be amended to be in accordance with the Regional Plan. Proposed development and land use in South East Queensland is also to be in accordance with the Regional Plan.

The Regional Plan identifies specific proposals for the Gold Coast Region, including:

- Extension of the rail line between Brisbane and the Gold Coast, south of Robina into Coolangatta.
- The Regional Plan further identifies the upgrades of the existing rail network in the Gold Coast, including the staged duplication of the track and development of new stations.
- The SEQ Infrastructure Plan and Program establishes infrastructure priorities that support the objectives of the draft SEQ Regional Plan. The priorities relate to the timely and appropriate infrastructure development for the next ten years, with a 20 year planning horizon.

General regional directions to improve Gold Coast City transport over the following 20 years include:

- ensuring public transport supports the preferred pattern of development; and
- increasing public transport infrastructure to encourage greater usage.

The Infrastructure Plan identifies increasing trips on the south coast rail line. This is to be achieved through selected track duplications and extensions to the existing rail line to Reedy Creek and subsequently Elanora. This is a component of the phase one (2005-06 to 2008-09) priority actions required to achieve the Infrastructure Plan's objectives.

Also relevant is the draft TransLink Network Plan (2005), which was prepared by the State Government and provides direction to improve public transport services and infrastructure in South East Queensland. The draft TransLink Network plan comprises a ten year plan to enhance the exiting public transport network and a three year program relating to the improvements and planning studies for public transport services and infrastructure. One of the key objectives for the draft TransLink Plan is to provide the Gold Coast with a rail line and transport services which extend south from Robina to Coolangatta.

There are also a number of current and pending development approvals as well as recently completed developments along the corridor. These include Stages 2 and 3 of Varsity Lakes near Reedy Creek Rail Station, the Old Burleigh Town development near the Tallebudgera Station and Cobaki Lakes near the Tugun Rail Station. Also of relevance is the Gold Coast Airport Master Plan, which outlines a large amount of commercial development on the airport site, including extension of the runway.

## **Project Need and Justification – Robina to Coolangatta Rail Extension**

Gold Coast City's population is expected to grow by about 2.2 percent per annum from 418,490 in 2004 to approximately 520,000 in 2011 (medium series projections), matched by significant growth in the northern Tweed. Furthermore, the Gold Coast is an important employment centre in South East Queensland and is expected to account for 121,000 jobs or 20% of the SEQ expected employment growth in 2011 (Connell Wagner, 1998a).

The extension of passenger rail from Robina to Coolangatta is needed to:

- service Robina – designated as a Principal Activity Centre (Queensland Government 2005 - SEQRP),
- meet IRTP objectives of providing quality public transport, shaping urban communities, encourage the concentration of employment, increasing the proportion of trips made by public transport;
- achieve the objectives of the South East Queensland Regional Plan 2005 (SEQ Regional Plan), Infrastructure Plan and Program 2005 (SEQ Infrastructure Plan), Gold Coast City Transport Plan (CTP) and draft TransLink Network Plan;

- be a fundamental component of the Gold Coast's public transport system structure for the southern Gold Coast;
- reduce the number of car trips and through encouraging the consolidation of land use, reduce the length of car trips;
- maintain a corridor for the rail extension from Robina to Coolangatta so that it is not precluded or adversely affected by future development;
- to encourage public transport usage for access to Gold Coast Airport; and
- maintain a future option for extension of passenger rail into New South Wales.

The justification for the rail extension has not been based on the typical criteria of the exceedance of a Benefit-Cost Ratio (BCR) of 1.0. Rather, the justification has been based on the criteria that the percentage of recovery of operational costs for the rail extension is at least as good as the average operational cost recovery for the remainder of the CityTrain network. On this basis, the rail extension is justified to be constructed to Reedy Creek by 2008 and to be progressively constructed to Elanora station by 2011.

The patronage on the rail extension has been estimated using a public transport model. The results are:

Line Segment	Year 2011 Patronage	Year 2021 Patronage
Helensvale to Nerang	7,420	9,050
Nerang to Robina	4,040	5,930
Robina to Reedy Creek	3,870	5,740
Reedy Creek to Tallebudgera	3,680	5,780
Tallebudgera to Elanora	3,730	5,830
Elanora to Tugun	2,970	4,910
Tugun to Coolangatta	1,240	2,120

Overall in 2011 the rail extension could increase daily public transport trips by around 8,800 in the region which is equivalent to an approximately 0.4% increase in mode share by public transport. This indicates both new rail and bus trips. The rail from Robina to Coolangatta will make a significant contribution to the achievement of Gold Coast mode share targets. It is estimated that the rail extension could remove about 7,000 daily car trips in 2011 from the road network which parallels the Gold Coast to Brisbane rail line. This is equivalent to approximately 9 percent of the projected year 2011 Pacific Motorway volume south of Robina.

## Option Development and Assessment

### Localised Options

The preferred route and stations were selected following the SGCTCS, the Pacific Highway Route Selection Report and supplementary studies. The options considered in this Part A IAS relate to local refinements of the rail alignment and station location options. Options in the Part A IAS area were evaluated for:

- the location of Reedy Creek Station and Elanora Station;
- crossing of the rail alignment under Robina Town Centre Drive;
- the location of the rail crossing of Reedy Creek Road;

- the location of the rail alignment between the Reedy Creek Road crossing and the Pacific Highway crossing at Tallebudgera; and
- the configuration of the alignment between Palm Beach Avenue and Guineas Creek Road.

### **Option Assessment Process**

A multi-criteria assessment process was used to assess the options considering environmental, engineering, community, transport and land use impacts. Under these categories, a range of quantitative and qualitative criteria were identified. Each criteria was scored on a range of 1 (profound impact) to 10 (no impact) based on the relative impact of the option compared to the other options. Each criteria was also weighted against its importance relative to other criteria, as determined through consultation with advisory bodies, key stakeholders and the community.

Each option was evaluated using the criteria and weightings.

### **Mode Assessment**

The purpose of the mode assessment was to determine the most appropriate mode for the Robina to Coolangatta public transport corridor, considering staging opportunities. The assessment compared conventional line haul public transport systems, including:

- heavy passenger rail;
- light rail;
- busway; and
- transit lanes (bus and high occupancy vehicle lanes).

Heavy passenger rail was selected as the preferred mode due to the relatively long distances of travel, obviating the need for a physical interchange at Robina Station (as would be required with the other options), encouraging of nodal rather than linear development along the corridor and preserving the potential for future extension into northern New South Wales.

### **Consultation**

#### **Objectives**

The public consultation and community involvement plan was designed to address the requirements of Queensland Transport's Public Consultation Policy, Standards and Guidelines and to achieve the following objectives:

- conduct an open and transparent public consultation and community involvement process;
- facilitate a consultation process which balances the community's need for information with opportunities to provide input into the decision-making process;
- ensure that community feedback is included in the decision-making process during the course of the study;
- ensure that opportunities for community input are maximised; and
- ensure that the public consultation and community involvement process supports the study objectives and the decision-making process.

Consultation on the proposal was conducted with advisory bodies, local, state and federal elected representatives, special interest groups, local community groups, residents and businesses located within, and adjacent to, the study corridor and the broader community.

## Activities

*Key activities were:*

- preparation of the public consultation and community involvement plan;
- review of the outcomes of previous consultation processes undertaken for transport planning projects in the southern Gold Coast area;
- launch of the study and release of the draft Terms of Reference for the IAS;
- distribution of newsletters and public displays associated with the launch and the Draft Terms of Reference;
- briefing of elected representatives and consultation with key stakeholders;
- holding discussions with property owners affected by the alternative options;
- preparing media articles, a newsletter (including mail-back questionnaire) and display of the options being considered;
- meeting with community groups, the steering committee and other stakeholders regarding the options;
- conduct of a community attitude survey;
- meetings with property owners and stakeholders affected by the preferred options;
- meeting with the steering committee (referral agencies) regarding the preferred options;
- newsletter, media release, community open days and displays of the draft IAS;
- documentation of public comments received on the draft IAS;
- follow-up activity to respond to selected comments; and
- respond to general correspondence about the project.

## Key Issues

Prior to the display of the draft IAS, the study team had received 229 hotline calls, 29 e-mails and 249 submissions using other contact methods. As well as this, Parsons Brinckerhoff (PB) received 1,703 reply-paid coupons, indicating that participants were keen to remain informed about the study, express their views, and provide specific comments. These comments included issues associated with the proposed Tugun Bypass project.

The results and key issues outcome from the above activities were assessed and reported. The key issues were:

<b>Issue</b>	<b>Participant Mentions*</b>
Route location	48
Station location	47
Timing	20
Noise	18
Tugun Bypass	10
The relocation of Elanora State School	10
Impacts on property values	10
Cynicism about the project	7
Impacts on the environment generally	5
Vibration	5
More information needed about the project	5

\* Only issues with more than 5 participant - mentions have been included

Feedback from the community and stakeholders provided very valuable information that informed and assisted in the decision making process in many areas including station locations and environmental issues amongst others.

### **Consultation on the Draft IAS**

The draft IAS was released for public display on 17 March 2003 and comments were accepted through 17 April 2003. Two community displays were also held to provide the public and key stakeholders with opportunities to acquire information about and provide feedback on the draft study. The release of the draft as well as the community displays were advertised in the March edition of the project newsletter which was distributed to 46,000 residents and businesses in the study area. Advertisements were also prepared and placed in local and regional newspapers to coincide with the public launch of the draft IAS which provided the study team's contact details and the details of the staffed and static community displays.

Additionally, Queensland Transport sent letters to all potentially affected property owners that were identified during the SGCTCS indicating that the draft IAS had been prepared, and outlining the details of the static and staffed community displays.

Approximately 300 people visited the two displays. Fourteen written submissions were also received from the community in relation to the draft IAS report. Generally, comments indicated a good support for the rail extension to Coolangatta. In fact, many visitors attended the Tugun Village display to confirm that the C4 alignment had not changed. Very few visitors to the display opposed either the rail extension to Coolangatta or the Tugun Bypass projects.

Following receipt of comments on the draft IAS, officers from QT and Education Queensland (EQ) met with the Elanora State School P&C to discuss their issues with the draft IAS report (Part A). As a result of this meeting, the following changes were made to the final IAS (Part A):

- the Elanora State School P&C is mentioned separately as a key stakeholder in the consultation section of the report;

- a diagram illustrating how the rail works will look adjacent to the school is included in the document; and
- updated research work on ultra-fine air particles is included.

## **Project Description**

### **Robina Station to Stewart Road**

The rail alignment which is the subject of this Part A IAS is shown in Figure B

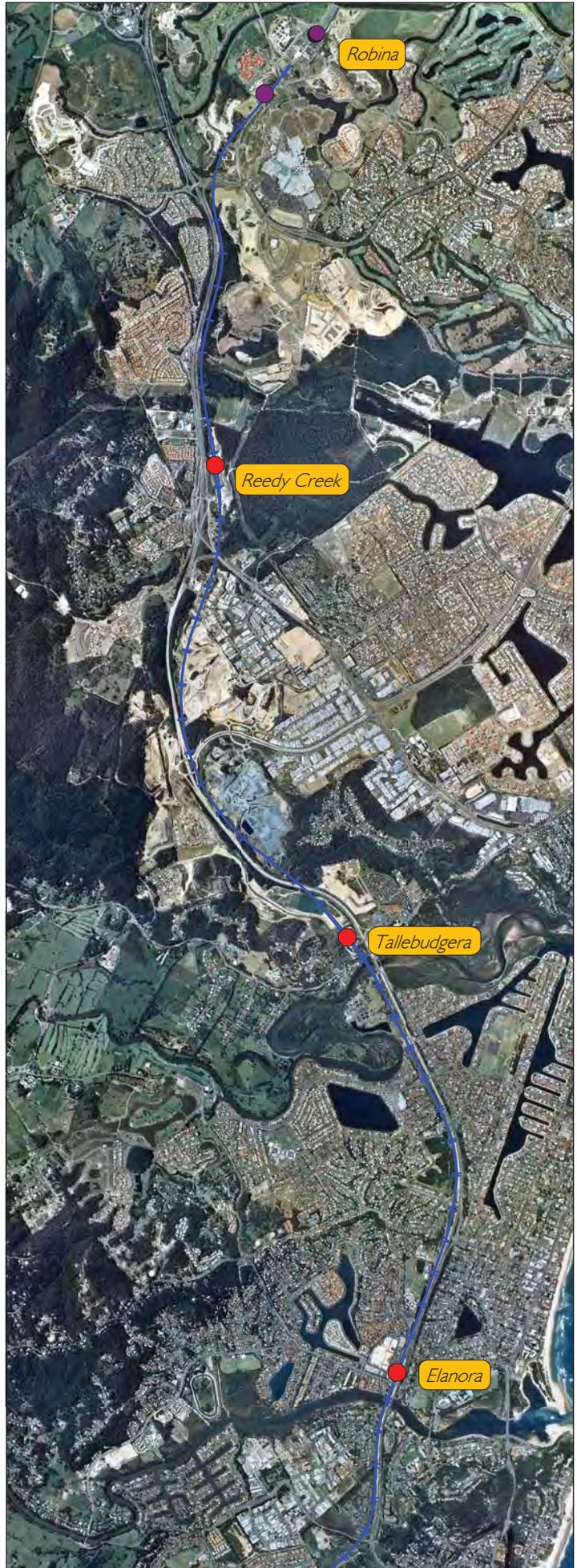


**Figure B**  
**Rail Alignment -**  
**Robina Station to Stewart Road**



Not to Scale

-  Proposed Rail Alignment
-  Proposed Station Location
-  Existing Station





The rail alignment passes under Robina Town Centre Drive immediately to the south of Robina Station. Southwards from here the alignment follows adjacent to, and to the west of Lavers Road then crossing under Robina Parkway. From here the alignment is located adjacent to, and to the east of the Pacific Highway. The rail corridor crosses Coromandel Lane at grade, requiring this road to be closed and access to the Powerlink Substation achieved via an extension of Scottsdale Drive to the Reedy Creek Road interchange.

The preferred location for the Reedy Creek station is immediately to the south of the Powerlink substation with access being provided in the vicinity of the eastern roundabout attached to the Reedy Creek overpass. A grade separated crossing of Reedy Creek Road is proposed, where the rail passes over Reedy Creek Road and partly over the ramps to/from this road. The alignment to the south of Reedy Creek Road follows adjacent to, and to the east of the Pacific Highway.

The crossing of Bermuda Street consists of locating the rail alignment as close as possible to the Pacific Highway to minimise land requirements on sites either side of Bermuda Street. This requires the roundabout to be crossed by a single, long and relatively high rail bridge. The rail alignment then runs to the east of and parallel to the Pacific Highway until it crosses the highway to the north of Tallebudgera. The rail alignment approaches the highway crossing as straight as possible (relative to the highway) to minimise land requirements. It includes a long, skewed bridge structure with piers on either side of the highway as well as a central pier within the highway. The structure continues after the bridge on to Tallebudgera Rail Station.

Tallebudgera Station is proposed to be constructed when demand is warranted. It is proposed to be located immediately to the west of the Tallebudgera Creek Road on/off ramp and to the north of this road. Access is proposed off the on/off ramp connection road with an alternative access potentially located off Tallebudgera Creek Road to the west of the rail alignment.

Southwards from the Tallebudgera Station site, the alignment crosses Tallebudgera Creek Road and the over the Gold Coast City Council Sewerage Treatment Plant. The alignment is proposed to be bridged over the treatment plan plus car park. Further to the south, the alignment crosses an existing weir and a low bridge crossing is proposed in this location. There is sufficient clearance, both vertically and horizontally for the alignment to pass under 19th Avenue and to the west of the Pacific Highway. From here the alignment rises to its crossing of the Pacific Highway on ramp, immediately to the north of Palm Beach Avenue.

The preferred option between Palm Beach Avenue to K.P. McGrath Drive consists of the rail on an elevated structure for the entire section with a service road provided beneath the structure where required. This layout was chosen to minimise the footprint of the rail line through this constrained area. The Elanora Station is adjacent to the Pacific Highway and north of Guineas Creek Road, within a relatively narrow strip of unused road reserve. There is limited parking on this site, requiring an additional deck of parking to be constructed at the Pines Shopping Centre. A pedestrian overpass from the car park to the station across K.P. McGrath Drive is required. The parking area would be accessed by existing shopping centre accesses.

The alignment in this location crosses Currumbin Creek to the west of the Pacific Highway, maintaining its alignment at a similar level to the Pacific Highway south to Stewart Road.

Services are proposed to commence at 30 minute frequencies in the peak period increasing to 15 minute peak period frequencies as demand warrants.

## Cost Estimates and Staging and Implementation Program

The capital cost for implementation of the rail line from Robina to Elanora Station is estimated at \$277,000,000. This includes \$10,000,000 for construction of Tallebudgera station, which currently has no designated implementation timeframe, but is exclusive of rolling stock costs, which are estimated at an additional \$16,200,000 for two three-car sets.

As the rail extension is proposed by 2008/09 (to Reedy Creek with progressive construction to Coolangatta Station after 2011), the current bus connection between Coolangatta and Robina Station should be maintained and enhanced if possible in the interim. This service would need timetable integration with services to/from Robina Station.

Key implementation activities will include:

- approval of the IAS;
- preliminary design;
- detailed design and documentation; and
- construction and commissioning.

Whilst these activities are occurring, associated activities will include progressive property acquisition, amendment of local area plans to reflect transit-supportive development, modification of transport strategies and operational plans to reflect the presence of the rail stations and ongoing discussions with land owners surrounding the stations regarding potential development integration.

## Transport and Land Use Strategies

Transport and land use strategies have been prepared for the areas surrounding the proposed station locations as well as along the rail alignment between the proposed station locations. Strategies have been prepared for land use planning, traffic access, public bus services and access, and pedestrian and cyclist access.

### Reedy Creek Rail Station

Key elements of the Reedy Creek Station strategy are:

- changes from industrial and detached dwelling land use designations to mixed business and residential choice designations;
- a new bus route from the Kingsmore development through the station and re-direction of services in the area to pass through the station;
- station access via the extension of Scottsdale Drive and the Reedy Creek interchange with the Pacific Highway; and
- new/improved cycle routes along the Scottsdale Drive extension and across the Reedy Creek overpass.

### Tallebudgera Rail Station

Key elements of the Tallebudgera Station strategy are:

- changes from park residential to residential choice land use designations surrounding the station;

- a new bus route to/from the east is proposed; and
- access to be achieved via the highway on/off ramps and Tallebudgera Creek Road.

*Tallebudgera Station is not expected to be required prior to year 2011.*

## **Elanora Station**

Key elements of the Elanora Station strategy are:

- changes from detached dwelling to residential choice land use designations for properties along Guineas Creek Road and Sarawak Avenue near the station;
- new bus services proposed from the station to the Currumbin Valley and increasing the frequency of existing services passing by the station site to match train timetables;
- provision of off road and on road cycling facilities on Guineas Creek Road and K.P. McGrath Drive in the vicinity of the station; and
- provision of new footpaths between the station site and Elanora School and a new overpass between the station site and a new car park to be located in the south-east corner of The Pines Shopping Centre.

## **Rail Alignment Between Stations**

To ensure that future development does not exacerbate rail-related impacts and that future development is sympathetic to heavy rail, the following development principles are proposed:

- *lower density residential development be encouraged in areas which are adjacent to the rail alignment but away from stations;*
- *park or open space requirements be provided as a buffer between residential development and the rail alignment;*
- *industrial or commercial development be encouraged adjacent to the rail line and away from stations;*
- *noise and/or visual barriers to the rail corridor be considered as part of the development, as appropriate; and*
- *development roads be considered to be located adjacent to the rail line to provide a buffer between the transport corridor and development.*

## **Impacts and Mitigation – Robina to Stewart Road**

### **Property and Land Use Planning**

The most significant land use impacts will be mitigated via the future acquisition of land from some of the 36 directly affected properties. Positive impacts include improved accessibility and land use intensification potential near rail stations.

### **Social and Community**

Suburbs along the alignment have a variety of demographic compositions from low car ownership/high elderly population areas to areas with relatively large family sizes and high car ownership. The rail extension will need to recognise the range of needs by providing park and ride facilities as well as areas designated for bus and taxi arrivals and departures.

Due to the demographic structure of the study area, access to schools, sporting grounds, health centres and community services through public transport is important. Access to community infrastructure and services will be made easier by the introduction of the rail extension.

Whilst many of the amenity-related impacts can be mitigated by physical measures, psychological impacts, or perceived amenity impacts related to anxiety will need to be mitigated via providing sufficient and timely information to those affected.

### **Traffic Infrastructure and Transport**

Traffic impacts will mostly occur during the construction phase with minimal impacts during the operational phase. Construction impacts will include temporary partial or full road closures and the impact of heavy vehicles using local streets for access to construction sites. These impacts will be mitigated by ensuring that road closures for major routes only occur at night and that access to the construction sites is achieved via major roads and the rail corridor itself, rather than using local roads. These items are incorporated into the Environmental Management Plan for the project.

The operational period impacts include the closure of Coromandel Lane and the additional traffic generated around the Guineas Creek Road/K.P. McGrath Drive intersection due to the rail station. The closure of Coromandel Lane will be mitigated by the extension of Scottsdale Drive to the Reedy Creek interchange providing an alternative access to the Powerlink Sub-Station. Elanora Station is expected to generate less than 100 vehicle trips in the year 2019 rail-peak hour which, when considering the role of the station, is not likely to coincide with the shopping centre or school peaks which currently cause congestion in this area. This traffic volume will be readily accommodated by the existing street system and access arrangements.

### **Economic**

The rail project is expected to have a net positive impact on the local economy through improved access to centres such as Elanora and Robina. Possible negative impacts on land values adjacent to the corridor and away from stations are expected to be offset by the positive impacts of the stations at these locations.

### **Noise Quality**

Noise assessment was conducted on the corridor to determine the noise impacts arising during construction and operation of the project.

Construction of the rail line between Robina Station and Stewart Road will cause a temporary increase in ambient noise levels within the vicinity of alignment. The noise levels generated by construction will vary depending upon the number and duration of specific construction activities taking place, which may include the use of pavement breakers, heavy plant and equipment, and piling. Peak facade noise levels at the nearest residential and commercial areas in excess of 80 dB(A) may be generated by the use of such equipment adjacent to the alignment. It is anticipated that potential adverse noise impacts during construction may occur in the vicinity of Elanora State School.

The Environmental Protection (Noise) Policy 1997 does not specify any noise criteria for construction, however mitigation of construction noise may be achieved by construction of operational noise mitigation treatments prior to commencement, or at early stages in the rail construction process.

Areas most sensitive to operational noise impacts include residential development or schools adjacent to the Pacific Highway. Significant noise impacts will be mitigated using noise control barriers in seven locations. Following the implementation of noise mitigation measures, all sensitive receptors were predicted to receive façade noise levels compliant with the Environmental Protection (Noise) Policy.

## **Air Quality**

Air quality monitoring has been undertaken at Elanora State School and regional air quality results have been considered in the assessment of the cumulative impact of the transport corridor. The assessment has considered Carbon Monoxide, Oxides of Nitrogen, Ozone, Lead, Sulphur Dioxide, Odours and particulate matter (PM10). Ultra-fine particles are not included in Queensland Environmental Protection Policy (Air) and recent work indicates that there is likely to be a large degree of protection from the health impact of ultra-fine particles contained within recommended air quality guidelines for PM10 and PM2.5 (Streeton, 1997). However, following comments received on the draft IAS, additional research was conducted on potential impacts from the rail line related to ultra-fine particles.

The results show that relevant health guidelines for carbon monoxide, nitrogen dioxide, particulate matter and lead would not be exceeded even for the worst case meteorological and traffic conditions. Particulate concentrations from the railway will be additive to levels from the road. However, the road and railway line will be separated, so that levels close to the railway will be associated with lower levels from the road and vice versa. Worst-case emissions from the railway could increase levels to approximately 50 µg/m<sup>3</sup> in the immediate vicinity of the road which is well below the maximum criterion of 150 µg/m<sup>3</sup>. Regarding ultra-fine particles, study results indicate that the Robina to Tugun rail link is not likely to be a significant source of ultra-fine particles and the impact of the project on ambient levels of ultra-fine particles is expected to be negligible.

Airborne dust impacts during construction can be mitigated by applying truck sprays, restricting dust-generating activities, siting the construction compounds away from residences, covering haul vehicle and, prohibiting burning or incineration on site.

## **Visual Amenity**

The corridor between Robina Station and Stewart Road was divided into eleven Landscape Management Units (LMU's) for the assessment. The majority of the alignment is adjacent to the Pacific Highway and, whilst there would be major changes to the landscape associated with earthworks and structure, the rail alignment would not be out of place.

Visual impacts are likely to be most significant between Robina Station and Robina Town Centre Drive, at the Bermuda Street Crossing, at Tallebudgera Station, between the Palm Beach northbound on ramp and Currumbin Creek and at Elanora Station. Mitigative measures are based on the planting of dense vegetation buffers to screen the rail line from surrounding residences as well as from drivers on the Pacific Highway in specific locations.

## Soils and Geology

The greatest potential soil impact between Robina Station and Stewart Road is the presence of Acid Sulfate Soils (ASS) below Australian Height Datum (AHD) 5 metres. Regions below AHD 5 metres in the study area include Tallebudgera Creek and surrounding area, and Currumbin Creek and surrounding area. Testing for the presence of ASS will need to be undertaken during construction to identify their presence. Stockpiles of excess material should not be kept in locations with AHD less than 5 metres.

Erosion of cut and fill embankments is also a potential impact. Cut and fill areas should have defined surface flow channels to control runoff from the site and direct it to sedimentation ponds. Sediment fences should also be used during construction and batters seeded where possible.

## Hydrology and Water Quality

The Nerang River, Tallebudgera Creek and Currumbin Creek are the major watercourses impacted on by the project. The rail line will affect the time of concentration of sub-catchments and hence could affect the peak flow characteristics downstream of the rail line. This could be mitigated by maintaining existing cross-drainage paths through using culverts and bridges and through the construction of local detention basins where changes to drainage paths cannot be avoided. Hydrodynamic modelling would be required to investigate the effects of the rail line on flood inundation. Gold Coast City Council are currently updating the hydrology for Tallebudgera and Currumbin Creeks. As such, it is suggested that hydrodynamic modelling be completed when this information is available and as part of the ongoing design refinement process.

Water quality impacts during construction will be due to sedimentation and/or construction debris entering rivers. Dust suppression, early revegetation, bunding and sediment fences and ponds are all methods proposed for mitigating these impacts. During the operation of the rail line, its runoff will be relatively benign and is not expected to introduce any significant impacts. Sediment runoff from table drains is another source of impact which may be mitigated by grassing, stabilisation or adequate sizing to minimise flow velocities. The greatest impact on water quality is likely from station car park areas, however the appropriate placement of gross pollutant traps and grease and oil traps will overcome this impact.

Impacts on fish are most likely to be caused by additional sediment introduced in creeks and rivers however sediment may be managed through the location of sediment ponds and fences. Fish impacts may also be generated by changes in flow velocity due to culverts and bridges and these would need to be designed with sufficient capacity to prevent significant localised changes in flow velocity. This is particularly the case for the structures in Tallebudgera and Currumbin Creeks.

## Flora and Fauna

The present rail corridor intersects six vegetation remnants consisting of three Regional Ecosystems. Four remnants from one Regional Ecosystem are listed as "Endangered" and two remnants from two separate Regional Ecosystems are listed as 'Of Concern' under the Queensland Vegetation Management Act 1999. One of these latter Regional Ecosystems is mapped by the Queensland Environmental Protection Agency as "Essential Habitat". In addition, the significance of the Burleigh Ridge/Reedy Creek ecological corridor, crossed by the rail corridor, is recognised at the local, regional and State level.

Current desktop reviews recorded five flora and six fauna species of State or Commonwealth significance which have been identified to potentially occur within the study area. Field investigations during 2001 did not record any of these species within the rail corridor. However, it is possible that some threatened species, particularly fauna species could be present within the corridor. In addition the importance of remnant vegetation increases in the landscape over time due to broadscale vegetation clearing. Conversely, habitat degradation through edge effects particularly affects habitat specialists resulting in these species being lost from more highly developed urban environments. Consequently, targeted field investigations to identify the present condition of key habitats and their conservation value in the landscape, including corridor values is recommended prior to implementation of the rail project. Field validation of updated Regional Ecosystem mapping to confirm Regional Ecosystem status and determine clearing areas is also proposed. Consultation with key government stakeholders should continue through the detailed design and development of this project to ensure ecological values, including the Burleigh Ridge/Reedy Creek ecological corridor, are adequately protected and where feasible, enhancements are made.

## **Cultural Heritage**

Consultation was undertaken with the Yugambah people through the Kombumerri Aboriginal Corporation for Culture, the Ngarang-wal and the Moorung Moobah group and searches were undertaken on the National Estate Database register, National Native Title tribunal and archaeological records. Even though there has been significant disturbance to areas proposed to be traversed by the corridor, significant potential exists for artefact scatters to be found during construction, particularly for the area to the north of Tallebudgera Station. The approaches to Currumbin and Tallebudgera Creeks have the potential for middens to occur.

The Eastern Yugambah Group has raised concerns that they were not consulted on the Aboriginal Cultural Heritage. Concerns were also raised by the group relating to management of any Aboriginal cultural heritage. The group will be included in all future cultural heritage consultation relating to the project.

Compliance with the Aboriginal Cultural Heritage Act 2003 will be necessary and Cultural Heritage clearance may be required prior to the commencement of construction activity.

Further fieldwork should be undertaken in these areas, in consultation with traditional owner groups, prior to construction of the rail extension.

## **Emergency Services**

As the rail line only requires the closure of one road, Coromandel Lane (where an alternative access is provided), there are no impacts on the ease of movement to emergency services. The rail corridor has been designed to incorporate sufficient access locations for emergency vehicles in the case of a rail-related incident occurring.

A fire station is also located in Investigator Drive, Robina. This road will be temporarily closed (at one end) during rail construction.

## Electro-Magnetic Radiation

Until recently, it was generally accepted that the electric field of transmission lines is harmless at normal distances from the line. Recently, there has been a proposal that the electric field could act indirectly to create a health hazard by ionising air close to the energised conductors, the ions then blowing away from the line and becoming attached to polluted aerosols. It is further proposed that the ionised polluted aerosols would be more likely to be absorbed by the body when breathed in.

However, the 25 kV overhead lines used for the electrified railway lines in Queensland, are at too low a voltage, given proper design to control corona, to cause much ionisation, so are unlikely to be implicated in the health hazard mechanism noted above. Also, if the minimum distance between the proposed lines and houses, schools, etc., is large enough for noise abatement purposes, it is likely that the magnetic field from the lines would be below background levels, except when trains are passing which are infrequent events.

## Environmental Management Plan

The Environmental Management Plan (EMP) documents the policies, performance criteria, monitoring, reporting and correction actions for impact management in the pre-construction, construction and operational phases of the project. It also defines responsibilities and processes for the implementation of the EMP.

The EMP requirements incorporate all of the impact management measures identified in the Impacts and Safeguards sections of the IAS.

## Conclusions and Recommendations

The extension of heavy rail is justified on the basis of achieving regional planning objectives, reducing the impacts of private vehicle use within the corridor and achieving a level of patronage which exceeds current average cost recovery criteria. Patronage is expected to be approximately 8,800 passenger trips per day in 2011.

The community and stakeholders have been consulted throughout the study and specifically on the development of the study Terms of Reference, the development and assessment of station and alignment options and the preparation of the Draft IAS. The majority of those consulted with were in favour of the rail extension. Community responses to the proposal focussed on the location of the route and stations, the timing of construction and noise impacts.

The key impacts of the proposal, and the mitigative measures proposed are:

- 36 properties are directly affected (28 privately held, and 8 held by government agencies other than Queensland Transport), from which there could be future land requirements;
- cumulative noise impacts in specific locations will be mitigated through design techniques, buffers where appropriate and noise barriers;
- visual impacts will be mitigated by dense vegetated buffers;
- water quality impacts will be minimised through the inclusion of sedimentation ponds and other construction management methods;

- flood inundation impacts will need to be revised following completion of Gold Coast City Council's studies for Tallebudgera and Currumbin Creeks and drainage impacts will be managed through the provision of culverts and bridges;
- Acid-Sulfate Soil Impacts will be mitigated by identification and construction management measures; and
- there are likely to be aboriginal artefacts north of Tallebudgera Station and middens near Tallebudgera and Currumbin Creeks which would require further investigation prior to construction when the actual location of structural elements is being determined. At this stage the preparation of a Cultural Heritage Management Plan is recommended.

The justification assessment, economic assessment, impact assessment studies and consultation activities completed allow the conclusion to be drawn that there is sufficient justification for the project to proceed and that the impacts of the project are able to be managed for the extension of heavy rail between Robina Station and Stewart Road.

Based on the above, it is recommended that:

- the rail corridor between Robina and Tugun be planned and preserved for dual track heavy passenger rail;
- progressively develop rail from Robina to Elanora by 2010 with stations at Reedy Creek and Elanora subject to funding (Tallebudgera station currently has no designated implementation timeframe and construction of this station would be subject to local demand);
- strategies to increase public transport patronage are implemented before the rail extension from Robina to Tugun is built, such as enhancement of bus services in the corridor, and integrated ticketing;
- state and local governments implement the associated land use and transport strategies in this report; and
- the project proceed on the basis that it is needed and that all environmental impacts can be managed by appropriate mitigation measures.

While the draft IAS report (Part A) has made recommendations, the final decision on timing for implementation will be considered by government. The South East Queensland Infrastructure Plan and Program 2005-2026 identifies implementation of the rail extension to Elanora within the period from 2010 to 2015, and further extension to Coolangatta sometime within the period of 2016 to 2026. The project would be subject to available funding and consideration of other transport priorities.

