

Executive Summary

This is Part B of a two-part Impact Assessment Study (IAS) for the extension of the Gold Coast passenger rail line from Robina to Coolangatta. Part B looks at the section from Stewart Road to Gold Coast Airport Station in Coolangatta while Part A of the IAS covered the northern section of the extension from Robina Station to Stewart Road.

The IAS was 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*.

Additional investigations may be required in the future depending on the likely timing of construction of the project, and to account for any future statutory requirements. The scope included in this document has been adapted from the Terms of Reference to suit the likely timing for construction of the project which is anticipated to be in the longer term. This project is currently not in the South East Queensland Infrastructure Planning Program (SEQIPP).

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 (Gold Coast Airport).

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. In 1999, GHD were also commissioned to conduct a review of the Coolangatta and Tugun Stations to consider their respective roles, given their proximity. This study recommended that the Tugun Station could be best developed to provide for park and ride requirements, while the Coolangatta 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.

The Tugun Bypass EIS completed in 2005 significantly acknowledged and considered the rail extension south of Stewart Road as the bypass and the rail extension share a common corridor for much of this section.

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) and the Gold Coast City Planning Scheme (last amended in 2007). 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 planning scheme contains an activity centres strategy and lists a series of Desired Environmental Outcomes (DEO's) for areas adjacent to the corridor.

Also relevant is the South East Queensland Regional Plan (SEQRP) 2005 – 2026 which was recently updated in December 2008. The latest draft of SEQRP provides statutory backing for managing the region's anticipated growth until 2031. 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 SEQRP, as is proposed development and land use in South East Queensland.

SEQRP identifies specific proposals for the Gold Coast region including:

- extension of the Gold Coast rail way line
- implementing other public transport and active transport related infrastructure and projects such as the Gold Coast Rapid Transit project, bus priority on Smith Street and a sub-regional cycle network.

The TransLink Network Plan is also relevant to this project. It provides direction to improve public transport services and infrastructure in South East Queensland. The TransLink Network plan comprises a ten year plan to enhance the existing 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 TransLink Network 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 along the corridor. These include the Pacific Beach Estate development near the Tugun station and the Cobaki development in New South Wales to the south-west of the Tugun station. The Gold Coast Airport Master plan is also of relevance as it allocates a large section of the airport site as commercial development.

Project need and justification

On 30 June 2006 the Gold Coast City's population was estimated at 466,651 and this is expected to grow at about 2.1% per annum to reach 633,972 in 2021 (*source: Gold Coast City Council*). Furthermore, the Gold Coast is also projected to see significant growth in employment, with approximately 130,000 new jobs planned by 2026 (Gold Coast City Council Draft Local Growth Management Strategy, 2007).

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 draft South East Queensland Regional Plan 2009 - 2031 (SEQRP) , the South East Queensland Infrastructure Plan and Program 2008 - 2025 (SEQIPP), the Gold Coast City Transport Plan (CTP) and the TransLink Network Plan
- be a fundamental component of the public transport system 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
- to encourage public transport usage for access to Gold Coast Airport

- maintain a future option for extension of passenger rail into New South Wales.

The patronage on the rail extension has been estimated using a public transport model developed for Part A of the Robina to Tugun Rail Impact Assessment Study. The model was built into the Gold Coast City Council's EMME/2 transport model. The results of the modelling are:

Location/Scenario	Year 2011 (no rail extension)	Year 2011 (with rail extension)
Pacific Highway just north of Reedy Creek Road	63,900	63,200
Pacific Highway at Tallebudgera Creek	64,800	64,100
Pacific Highway at Currumbin Creek	60,150	60,000
Pacific Highway plus Tugun Bypass north of Boyd Street	102,700	97,300

Overall the rail extension could increase public transport mode share by approximately 0.4%. 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.

Project description

At Stewart Road the rail alignment lies to the west of the Tugun Bypass and both the bypass and the rail alignment pass under Stewart Road. The rail alignment then goes into tunnel at Tugun Heights in order to cross the Tugun Bypass and emerges at grade just north of Boyd Street on the eastern side of the Tugun Bypass. The rail alignment then continues at grade to Tugun station. The Tugun station is located to the north east of the Tugun Bypass and access to the station is via Boyd Street. The length of the rail tunnel north of Boyd Street necessitates a second tunnel for emergency evacuation purposes. Therefore this section of the rail alignment is dual tracked. However, south of the Tugun station the rail alignment is single tracked. This is due to the cost of providing twin tunnels for the railway under the airport runway extension.

The rail alignment remains to the east of the Tugun Bypass and both alignments descend into tunnels as they pass under the Gold Coast Airport runway extension. A roof slab has already been put in place for this rail tunnel as part of the Tugun Bypass early works. This roof slab allows for the uninterrupted operation of the airport runway while the rail tunnel is constructed at a later date.

Beyond the runway extension the rail alignment diverges from the Tugun Bypass alignment to curve northward to the Gold Coast Airport station located next to the airport terminal building. Beyond the runway extension the railway is on structure. The rail line also traverses the Southern Cross University campus, so that university buildings lie on either side of the rail line.

The Gold Coast Airport station is located close to the terminal building in order to allow for pedestrian access between the two.. A grade separated solution is required in order to minimise the impact on the land use at the airport and to resolve connectivity issues within the airport. While an underground station option was explored for the Gold Coast Airport station it was considered infeasible due to the significantly higher construction costs required to cater for the underground waterways present on the airport land.

Cost estimate

A preliminary cost estimate has been prepared based on preliminary drawings and 2009 dollar unit-rates. It should be noted that a risk and range analysis has not been carried out for the cost estimate. The capital cost for implementation of the rail line from Stewart Road to the Gold Coast Airport station is estimated at \$569,700,000 (excluding GST). This does not include the purchase of additional rolling-stock, nor does it include the cost of the concrete slab that was constructed under the Gold Coast Airport runway extension as part of the Tugun Bypass early works.

Legislative framework

The rail alignment traverses land under Queensland, New South Wales and the Commonwealth (i.e. Gold Coast Airport) jurisdiction. Therefore the approvals processes involved are complex. A cooperative assessment process agreement between the relevant Commonwealth and State parties will allow for a transparent and robust assessment of the proposal. Elements should be combined where possible and conditions of approval should be consistent. The key outcomes could be:

- joint EIS guidelines produced that reflect the requirements of the New South Wales *Environment Planning and Assessment Act*, the Queensland *Integrated Planning Act 1997* and *State Development and Public Works Organisation Act 1971*, and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*.
- liaison between the Queensland Department of Transport and Main Roads, the Commonwealth Department of Environment, Water, Heritage and the Arts, the Commonwealth Department of Infrastructure, Transport Regional Development and Local Government, the New South Wales Department of Planning, the New South Wales Department of Natural Resources and QR Ltd.

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. Strategies have been prepared for land use planning, traffic access, public bus services and access, and pedestrian and cyclist access.

Tugun Station

Key elements of the Tugun station strategy are:

- to provide for 'Integrated Business' and 'Industry 2 (Low Impact)' land uses near the station. Situating the 'Integrated Business' use near the station allows for the development of a more active, pedestrian friendly environment
- the introduction of a new bus service to connect the proposed Cobaki Lakes development to the station. An alteration to an existing route has also been suggested in order to connect the station to areas immediately to the north-east
- to ensure the station is served by cycle and pedestrian links.

Gold Coast Airport Station

Given that the Gold Coast Airport station is governed by the requirements of the Gold Coast Airport Masterplan and any future updates thereto, key elements of the Gold Coast Airport station strategy are:

- to ensure close liaison between the government and Gold Coast Airport Pty Ltd so that land uses are as compatible as possible with accepted planning practices around stations
- a requirement for high frequency bus services to connect the surrounding suburbs to the station
- a cycle and pedestrian link is suggested to connect the station to the existing coastal route.

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
- development roads be considered to be located adjacent to the rail line to provide a buffer between the rail line and development.

It should be noted that the majority of the land use surrounding the alignment between Tugun station and the Gold Coast Airport station is governed by the Gold Coast Airport Masterplan and therefore there is limited potential to change the land use in this area.

Impacts and Mitigation – Stewart Road to Coolangatta

Property and land use planning

The most significant land use impacts will be improved accessibility and the potential for land use intensification near stations. It is assumed that all privately owned land affected by the rail alignment has already been acquired during the Tugun Bypass land acquisitions.

Social and community

While the study area is small in size and population, it contains key transport infrastructure. The area is most noted for the airport, health facilities and proximity to leisure facilities.

While the project would have both negative and positive impacts, the benefit is increased public transport and accessibility into the future.

Greater understanding of the community's values, needs and expectations is essential to managing project expectations (i.e. timeframes for construction) during further studies and construction. This will be achieved through ongoing community and stakeholder consultation. Mitigation measures which address concerns that may be raised by the community, while meeting the project expectations and requirements, should be developed in cooperation with local stakeholders.

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 along Boyd Street due to the Tugun station, and the effect of local congestion on access to John Flynn Hospital. The phasing at traffic signals along Boyd Street may need to be revisited in order to cater for the additional traffic generated by the station's park and ride facility. The park and ride facility is also likely to create localised congestion around the station during peak hours. Measures must be implemented to ensure this congestion does not hinder emergency vehicle access to the John Flynn Hospital.

As previously mentioned, the results from the traffic modelling carried out during Part A of the IAS revealed that the rail extension can remove 7,000 vehicles from the road network. This should assist in relieving traffic congestion levels.

Economic

The rail project is expected to have a net positive impact on the local economy through improved access to centres such as Tugun and Coolangatta. 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 and vibration

A noise assessment was conducted on the corridor in 2004 to determine the noise impacts arising during construction and operation of the project.

The Southern Cross University has a campus located within the Gold Coast Airport site that straddles the rail extension. It is expected that noise impacts will exceed maximum noise level criterion within 20m of the rail corridor. It is anticipated the maximum noise criteria can be achieved using noise barriers or enclosures in these sections. Based on the rail noise assessment predictions, noise impacts during the operation of the rail extension are predicted to comply with the rail noise planning levels in other sections of the rail alignment.

Construction of the rail line between Stewart Road and Coolangatta will cause a temporary increase in ambient noise levels within the vicinity of the 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 piling and tunnel boring machines. 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. The Australian Standard AS 2346-1681, Guide to Noise Control on Construction, Maintenance and Demolition Sites should be used to determine the noise management measures to employ during the construction of the rail extension. The Environmental Management Plan should include restrictions to standard working hours and best practice environmental management strategies to minimise environmental harm from construction noise.

Air quality

The majority of air pollutants identified were emitted by the existing road network and associated traffic. Given that trains using the proposed railway will be electric, their impact to the local air environment will be minimal.

During the construction period, earthworks, machinery and haul vehicles may contribute to local pollution levels, and potentially affect vegetation and air quality immediately within the vicinity. However, during operations, the emissions from major roads such as the Gold Coast Highway, Pacific Highway and Tugun Bypass will be of much greater local significance. In comparison, the project's air quality impacts are not expected to be significant, given also that adequate control measures will be implemented to minimise these during the construction phase. Overall, none of the limits recommended by relevant health guidelines for air pollutants and particulate matter should be exceeded.

Any emissions generated by the electric trains during the operational period will be negligible. Low levels of fugitive dust and particulate matter may occur depending on the type and number of trains, train speed and wind speed. The low levels of dust and particulate matter will be limited to that which naturally occurs in the environment but becomes suspended as a result of wind turbulence generated by passing trains. These suspended particulates and dust will settle out relatively quickly after the train has passed any given point. However, these too will be within relevant health guidelines for dust and particulate matter.

Visual amenity

The corridor was divided into eleven landscape units for the assessment. The majority of the alignment is adjacent to the Tugun Bypass, and while there will be some changes to the landscape associated with earthworks and structure, the rail alignment would not be out of place for most of the alignment.

The railway's visual impact is likely to be most significant where it is on structure as it traverses airport land, and where it will be visible from the Tweed Heads industrial/residential area. However, the design response will be to keep structures as low as possible. Landscape design will be sensitive to and will need to compliment the existing landscape design applied to the Tugun Bypass.

Soils and geology

Soils

Removal of vegetation is likely to increase erosion of soils along the railway corridor and mitigation measures must be implemented to counter the effects of wind and water erosion. Recommended mitigation measures include:

- preparing and implementing a detailed sediment and erosion control plan prior to commencing construction
- regular monitoring for erosion during construction and until vegetation cover has been fully established
- installing site drainage controls to protect exposed soils from storm water run-off.

Contaminated soils

The following areas/land uses were identified as potentially containing soil contamination in the vicinity of the rail alignment:

- current sand mining operation
- wash out from the construction of the Tugun Bypass
- potential airport dumping grounds
- drum storage area (of unknown contents, origin and reason for storage location)
- Tugun landfill
- former quarry
- previous airport landfills
- decommissioned sewage treatment plant
- former sand mining areas (Gold Coast Airport and surrounding areas)
- night soil tip (Gold Coast Airport).

Mitigation measures for these contaminated lands have been suggested and include:

- Investigating the contamination status of the groundwater and soil at the Tugun landfill and re-capping exposed areas of waste, and disposing of leachate and solid waste material in an appropriate manner. A management plan should be prepared detailing safe working practices for construction workers involved in the excavation and transport of the solid waste.
- Carrying out a soil investigation at the decommissioned quarry in accordance with the requirements of the Queensland Environmental Protection Agency Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998) and Australian Standard AS4482.1-2005, Guide to the Sampling and Investigation of Potentially Contaminated Soil – Part 1: Non-volatile and Semi-volatile compounds. The extent of contamination found will determine appropriate treatment methods if required. Treatment methods available include removal and disposal to a licensed landfill, containment and capping.

Acid Sulfate Soils and Potential Acid Sulfate Soils

Generally, soil formations within coastal lowland areas below 5 m AHD have the potential to comprise acid sulfate soils (ASS). The topography of the railway corridor is relatively flat in the section south of Boyd Street with ground levels less than 5 m AHD.

Some of the likely impacts of the proposed rail extension and suggested mitigation measures include:

- soil excavated during construction, in particular in the area of the tunnels and their approaches, are likely to require ASS treatment and control
- heaving of soil under the load of construction equipment, or placement of embankment materials of greater than 500 m³ with an average depth of 0.5 m may lead to the displacement of soil from the anaerobic zone below the water table into the aerobic zone and allow oxidation of potential acid sulfate soils (PASS) to occur. Good construction practises should be implemented to ensure minimal volumes of disturbed soil and acid generation.
- groundwater draw down is likely to be necessary during the construction of the two rail tunnels. Reducing the groundwater table may result in the exposure of previously submerged PASS which could oxidise resulting in acid generation. In addition groundwater extracted during the construction of the rail tunnels is likely to be slightly acidic and contain iron and aluminium levels exceeding the ANZECC guidelines for fresh water environments. Extracted groundwater must be tested prior to release to ensure that it meets the standard of the guidelines. A dewatering management plan will need to be developed.
- concrete structures are susceptible to sulfate attack. Reference should be made to the relevant Australian Standards and Cement and Concrete Association technical notes for exposure classifications and appropriate modifications to cement mixtures to prevent sulphate attack.

ASS and PASS are likely to form a large portion of the excavated material. Successful management of these stockpiles will minimise impact upon the environment. Due to the impact that excavated PASS or ASS may have upon the environment additional techniques to prevent acid release have been recommended.

If groundwater levels need to be lowered during the construction phase, the underlying sediments should be assessed for the presence of ASS and PASS. If groundwater levels are reduced below the level of PASS, acid generation may result. Re-submersing these soils may not prevent the continuing production of acid after construction is complete. Oxidation not only produces acid, it also allows different species of iron to form, e.g. Fe³⁺. In an anaerobic environment, these species can continue to decompose sulfides, releasing acid into the system.

Hydrology and water quality

The main impact during the construction of the rail extension is from the construction of the tunnel under the runway extension at the Gold Coast Airport. The tunnel lies below the water table and will require dewatering during construction. Dewatering can reduce ground flow to the nearby wetlands which can result in changes to ground water quality. Dewatering can also activate the potential acid sulfate soils in the area and generate acid.

A dewatering management plan should be developed prior to commencing construction and monitoring should be carried out to ensure the effectiveness of the mitigation measures employed.

Possible impacts during the operation of the rail include reduced flood plain storage, and restricted groundwater flow due to the proposed tunnel through the Gold Coast Airport land.

The impact of the proposal on stream hydrology can be minimised by installing, where possible, culverts at locations where streams naturally cross the alignment. Stormwater discharges during the operational phase can be directed to three separate receiving waters; Cobaki Broadwater, Currumbin Creek and Coolangatta Creek. The stormwater treatment measures required for the three

areas differ based on a number of factors such as the contributing route catchment size and value of the receiving environment.

Other mitigation measures suggested include:

- assessing drainage requirements early in the design phase and early installation of permanent drainage systems
- undertaking construction in flood prone areas during dry months and undertaking planning and staging of works to reduce down time following periods of heavy rain
- monitor changes in ground water levels, pH and water quality during construction
- The use of drains (incorporated into the tunnel design) to allow groundwater movements pass the tunnel once construction is complete. This will equilibrate groundwater levels on either side of the tunnel. The bores used for monitoring during construction can be used for monitoring during the operation of the rail line.

Flora and fauna

The proposed rail extension between Stewart Road and the Gold Coast Airport will primarily be constructed parallel to the recently built Tugun Bypass except in its southernmost sector where it deviates from the Tugun Bypass in a large loop turning east and then north to end adjacent to the terminal building at the airport. The majority of the proposed line runs adjacent to the highway where edge and barrier effects already exist. The northern portion of the proposed corridor is contained within residential or commercial development areas that are already cleared. The greatest impacts of the project are likely to occur within areas where the proposed rail corridor dissects natural bushland, particularly in the airport area to the east of the current runway and south of the terminal building. Fauna species of particular interest, which have been confirmed as occurring in the area include Wallum Froglet (*Crinia tinnula*); Wallum Sedge Frog (*Litoria olongburensis*); Long-nosed Potoroo (*Potorous tridactylus*) and Common Planigale (*Planigale maculata*).

In terms of flora, fifteen species of legislative significance were recorded within the proposed railway alignment. Of particular note is the presence of Swamp Orchid (*Phaius australis*) colony sites and *Geodorum densiflorum* individuals whose locations sites are kept confidential for security reasons (to discourage pilfering). A further 41 flora species of legislative significance have been assessed as having potential or may occur in this area. Further detailed investigations are needed to adequately assess the potential impact on these species.

In comparison to the large-scale development (e.g. residential subdivisions), lineal developments, such as a railway can have a relatively small 'footprint' impact at any one point in the landscape. Their effect may therefore be relatively small or easily mitigated at the local level. However, on the regional level they have a range of broader potential environment impacts that need to be assessed and mitigated through incorporation of appropriate and specific design and amelioration measures. These may include fauna underpasses, fauna fencing etc.

As this assessment is primarily based on desktop and historic data, further field based assessments relating to ecological values are recommended before the development of the rail line. It is considered that detailed and targeted surveys and assessments of the impact to the ecological values are necessary to re-evaluate the values as part of the development process. While potential impacts are unlikely to be considered as "show stoppers," they may significantly impact detailed

design requirements. Clarity on the extent of impact and degree of mitigation required will only be confirmed following further detailed and targeted ecological field assessments.

Upon the completion of these investigations, design, construction and operational strategies (including mitigation) can be better formulated to reduce or eliminate the potential impacts on flora and fauna species within the area. Special consideration will need to be made to ensure that fauna impact mitigation strategies compliment those mitigation strategies already applied to the Tugun Bypass.

Cultural heritage

The area in which the proposed rail is to be constructed has seen considerable ground disturbance associated with previous development and road building projects, including the recently constructed Tugun Bypass as much of the proposed alignment will run within the existing road reserve created by the bypass.

However some sections appear to have been subject to less disturbance and exhibit existing remnant vegetation. Further, the number of known sites in the broader area illustrates that the rail corridor is potentially rich in cultural material, and accordingly there is potential for further cultural heritage sites to be present, whether they be intact, disturbed or displaced. The area has also been identified as having high cultural/social significance to the Traditional Owners.

The Eastern Yugambah Group has previously raised concerns that they have not been adequately consulted on matters regarding Aboriginal Cultural Heritage. Concerns have also previously been raised by the group relating to management of any Aboriginal cultural heritage. The group should be included in all future cultural heritage consultation relating to the project.

The rail alignment passes through Queensland, New South Wales and Commonwealth land, and as such any cultural heritage management process will need to comply with legislative requirements under all three jurisdictions. Compliance with the Queensland Aboriginal Cultural Heritage Act 2003 and the New South Wales National Parks and Wildlife Act will be required. For the section of the alignment within the airport land, approval under Part 5 of the Airports Act will be required.

Emergency services

The section of the rail alignment south of Stewart Road does not require any road closures and therefore there are no impacts to the movement of emergency vehicles. The rail alignment has been designed to allow sufficient access for emergency vehicles to respond to rail-related incidents during the operation of the rail extension.

During the construction of the rail extension, the cross-corridor vehicle capacity is generally maintained and therefore the construction phase is not expected to have significant adverse impacts on the movement of emergency vehicles. Where construction work is required along cross-corridor links (such as at Stewart Road), it is expected that appropriate timing of works and traffic management measures such as temporary lights and police on duty will be in place, which should mitigate the effect on emergency vehicle movements. Emergency services should be consulted when any road closures are proposed and, in particular, before carrying out works along Boyd Street, which is used for emergency vehicle access to John Flynn Hospital. Measures will be required to ensure access of emergency vehicles to the construction site, including the tunnels. .

Environmental Management Plan

The EMP sets the overall principles and philosophy (general environmental requirements, outcomes and performance indicators) behind the design, construction and maintenance of the project. Due to the limit of available information at the planning phase, it is not possible to provide specific details on individual conditions/requirements that may be imposed as part of the statutory permit/licence/approval application process. Specific details contained in the statutory permits/licences/approvals will not be known until they are granted by the relevant administering authority at a time closer to and prior to construction/operations.

The overall environmental management of the project is to be controlled under a series of environmental management plans (EMPs); the EMP (Design), EMP (Construction) and EMP (Operation). These EMPs will be developed prior to commencement of the construction phase of the project. Under this process environmental considerations will be managed covering all items of each of the sub EMPs. Each EMP will outline a set of specific actions appropriate to the relevant stages of the project.

Compliance with the provisions of the EMPs for construction and operations (including compliance with any statutory permit/licence/approval conditions) will be monitored by auditing activities undertaken by the construction contractor and the rail manager. Compliance by the design consultant with the provisions of the EMP (Design) will be monitored under the Design Consultants Quality Management System and documented in an Environmental Design Report (EDR).

The EMP will require that a program of monitoring and measurement of performance during construction and operation be maintained to assess performance against the project's environmental objectives and targets.

Conclusions and recommendations

The extension of heavy rail is justified on the basis of achieving regional planning objectives, and reducing the impacts of private vehicle use within the corridor. Modelling work carried out previously indicates that the rail extension is expected to remove approximately 7,000 daily car trips from the road network.

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

- a cooperative assessment approach between the Commonwealth, New South Wales and Queensland should be adopted for the approvals process. A cooperative assessment approach will avoid undertaking three separate assessments.
- air quality impacts during construction, such as dust emissions, should be mitigated by adopting appropriate control measures (such as spraying water to reduce dust emissions from dirt roads)
- visual impacts will be mitigated by dense vegetated buffers, and the use of recessive colours on structures to reduce their impact on the surroundings. For the area within the Gold Coast Airport, the planting schemes should be designed so as to not attract additional birdlife as this would be a hazard to the airport.
- water quality impacts will be minimised through the inclusion of sedimentation ponds and other construction management methods. In addition, specifications, as stipulated in the Dewatering Management Plan, will be developed prior to any dewatering activities taking place

- flood inundation impacts will need to be revised following completion of Gold Coast City Council's studies for Tallebudgera and Currumbin Creeks. Drainage impacts will be managed through the provision of culverts and bridges of suitable design and size so as to provide unobstructed water flows during flood periods
- a detailed Acid Sulfate Soil Management Plan will be developed to address the management of impacts associated with ASS
- the Eastern Yugambah Group should be included in all future cultural heritage consultation relating to the project.

Based on the above, it is recommended that:

- the rail corridor between Stewart Road and the Gold Coast Airport be preserved for heavy passenger rail
- strategies to increase public transport patronage are implemented before the rail extension is built, such as enhancement of bus services in the corridor
- the associated land use and transport strategies outlined in this report are implemented
- the project proceed on the basis that it is needed and that all environmental impacts can be managed by appropriate mitigation measures
- additional investigations may be required in the future depending on the likely timing and construction of the project and to account for any future statutory requirements.