Preliminary Evaluation

Burleigh Heads to Coolangatta Public Transport Preliminary Evaluation, June, 2023

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Document control options

1.1.1 Departmental approvals

Refer to the appropriate Risk Assessment Tool for relevant reviewer and approver

Date	Name	Position	Action required (Review/endorse/approve)	Due
15/06/2023	Personal information has been removed	Project Owner	Approve	20/06/2023
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1.1.2 Risk level

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1.1.3 Document sign off

The following officers have **approved** this document.

Project Owner

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Position

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Project Director

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The following officers have **endorsed** this document.

Project Endorsement

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Terms and abbreviations

Table 1 Table of terms and abbreviations

Term	Description
ABS	Australian Bureau of Statistics
the Action Plan	Disability Action Plan 2018 – 2022
AGPS	Australian Government Publishing Service
AIP	Australian Industry Participation
ARMIS	A Road Management Information System
ASS	Acid Sulfate Soils
ATAP	Australian Transport Assessment and Planning
AVLS	Automatic Vehicle Location System
BCDF	Business Case Development Framework
GCH MMCS	Gold Coast Highway Multi Modal Corridor Study
BCR	Benefit Cost Ratio
BH2C	Burleigh Heads to Coolangatta Public Transport Study
BIM	Building Information Modelling
BPIC	Best Practice Industry Conditions for Transport Civil Construction Projects
BPPs	Best Practice Principles
BRT	Bus Rapid Transit
BYDA	Before You Dig Australia
C-ITS	Cooperative Intelligent Transport Systems
CAGR	Compound Annual Growth Rate
CAV	Cooperative and Automated Vehicles
CBA	Cost Benefit Analysis
CBD	Central Business District
CHMA	Cultural heritage management agreement
CHMP	Cultural heritage management plan

Term	Description
CHRA	Cultural Heritage Risk Assessment
the City	Council of the City of Gold Coast
CMD	Coastal Management District
CO	Construct Only
CPA	Collaborative Project Agreement
CPI	Consumer Price Index
CPRs	Commonwealth Procurement Rules
CPTED	Crime Prevention Through Environmental Design
CRR	Cross River Rail
Cth	Commonwealth Government of Australia
DA	Development Approval
DBC	Detailed Business Case
DBL	Dedicated Bus Lanes
D&C	Design and Construct
DEPW	Department of Energy and Public Works
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Cth)
DPE	Department of Planning and Environment (New South Wales)
DSAPT	Disability Standards for Accessible Public Transport 2002
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
EBP	Enhanced Bus Provisions
ECI	Early Contractor Involvement
EDD	Extended Design Domain
EHTS	Emergency Help Telephone System
EOI	Expression of Interest
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)

Term	Description
EPP Water and Wetland Biodiversity	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
ESC	Executive Steering Committee
ESCP	Erosion and Sediment Control Plan
ESR	Environmental Scoping Report
ETCS	European Train Control System
FHA	Fish Habitat Areas
FTE	Full Time Equivalent
GC	Gold Coast
GCAMSE	Gold Coast Aimsun Model Southern Extension
GCH	Gold Coast Highway
GCH MMCS	Gold Coast Highway Multi Modal Corridor Study
GCLR	Gold Coast Light Rail
GCSTM	Gold Coast Strategic Transport Model
GCSTM-MM	Gold Coast Strategic Transport Model Multi Modal
GDE	Groundwater dependent ecosystems
GFA	Gross floor Area
GHG	Greenhouse Gas
GIS	Geographic information system
IA	Infrastructure Australia
IAAF	Infrastructure Australia Assessment Framework
I/C	Interchange
ICMS	Integration of Control Monitoring System
ICT	Information and Communications Technology
ILM	Investment Logic Map
IRR	Internal Rate of Return
IS	Infrastructure Sustainability

Term	Description
ISC	Infrastructure Sustainability Council
ITDP	Institute for Transportation and Development Policy
JPT	Joint Project Team
LGA	Local Government Area
LGIP	Local Government Infrastructure Plan
LILO	Left-in/left-out
LUCA	Land Use Case Analysis
LUEWG	Land Use and Economy Working Group
LRT	Light Rail Transit
LRV	Light Rail Vehicles
m	Metres
MaaS	Mobility as a Service
MCA	Multi criteria analysis
MNES	Matters of National Environmental Significance
MOA	Memorandum of Agreement
MSES	Matters of State Environmental Significance
NLTN	National Land Transport Network
NPV	Net Present Value
NSW	New South Wales
NTU	Native Title Unit
OHL	Overhead Line
PAF	Project Assessment Framework
PCB	Project Cost Breakdown
PCEM	TMR Project Cost Estimating Manual
PCG	Project Control Group
PE	Preliminary Evaluation
PEU	Project Evaluation Unit

Term	Description
PFAS	Poly-fluoroalkyl Substances
PfMO	Portfolio Management Office
PHT	Passenger Hours Travelled
PISMP	Preliminary Infrastructure Sustainability Management Plan
PKT	Passenger Kilometres Travelled
PPP	Public-private partnership
PT	Public Transport
PTIIP	Passenger Transport Infrastructure Program
PUG Model	City of Gold Coast's Planning and Urban Growth Model
PUP	Public Utility Plant
PV	Present Value
PWD	People with Disability
QAL	Queensland Airports Limited, operators of Gold Coast Airport
QASSIT	Queensland Acid Sulfate Soil Technical Manual
QMCA	Queensland Major Contractors Association
QIPP	Queensland Indigenous Procurement Policy
QGSO	Queensland Government Statistician's Office
QLD / Qld	Queensland
QPP	Queensland Procurement Policy
QPWS	Queensland Parks and Wildlife Service
QTRIP	Queensland Transport and Roads Investment Program
RARM	Risk Assessment and Ratings Matrix
RBA	Reserve Bank of Australia
RCP	Risk Context Profiling
REC	Regional Economic Cluster
ROW	Right-of-way
RSS	Reinforced Soil Structures

Term	Description
RTMCS	Real Time Monitoring Control System
RTNA	Road Traffic Noise Assessment
SA1	Statistical Area Level 1
SCU	Southern Cross University
SEQ	South East Queensland
ShapingSEQ	South East Queensland Regional Plan 2017
SIA	Significant Impact Assessment
SIE	Social Impact Evaluation
SR	Service Requirements
SRI	Significant residual impact assessment
Strategic Assessment	*Public transport needs in the southern Gold Coast and northern Tweed region Strategic Assessment*
TAU	Transport Analysis Unit
TCP	Transport Coordination Plan
TfNSW	Transport for New South Wales
TIP	Transport Infrastructure Portfolio
TIPDS	Transport Infrastructure Project Delivery System
TMAF	Transport Modelling Assessment Framework
TMR	Department of Transport and Main Roads
TPS	Traction Power Substations
TSPP	Transport System Planning Program
TSPPIP	Transport System Planning Program Investment Program
TSPS	Transit Signal Priority System
WEB	Wider Economic Benefits
WHS	Workplace Health and Safety
WSUD	Water Sensitive Urban Design
VfM	Value for Money

Term	Description
VHT	Vehicle Hours Travelled
VKT	Vehicle Kilometres Travelled

Executive summary

Overview

This Preliminary Evaluation (PE) confirms the need for a strategic intervention to provide a major boost to public transport (PT) connectivity as part of a multi-modal response to transport problems in the southern Gold Coast. It assesses a range of PT options and identifies that a major investment in PT could substantially boost accessibility, change the way people travel, and result in a range of economic, social and environmental benefits for the southern Gold Coast, northern Tweed and the broader region.

The Gold Coast is Australia's sixth largest city with approximately 615,000 residents in 2019[1]. By 2041 the Gold Coast's population is projected to increase by 52 per cent to reach 934,000. As a major tourist destination, the Gold Coast also welcomes more than 12 million visitors per year in 2019[2]. Adjoining the Queensland/New South Wales border, the southern Gold Coast has an attractive lifestyle that will continue to support forecast population, employment and tourism growth. The coastal corridor between Burleigh Heads and Coolangatta is forecast to increase its residential population by 39 per cent to reach 47,500 persons by 2041.

The southern Gold Coast is the home of the Gold Coast Airport which is an international gateway. The Gold Coast Airport is part of the Southern Gateway Regional Economic Cluster (REC) and a major driver of the regional economy, supporting the critically important tourism and hospitality industries. In the year ending June 2019, Gold Coast Airport was one of Australia's fastest growing airports, welcoming over 6.5 million passengers, and directly employing an estimated 2,200 FTE employees, in addition to supporting over 15,000 tourism-related jobs across the Gold Coast.

Population, employment and tourism growth will bring problems and opportunities for future economic activity, and the liveability and sustainability of the southern Gold Coast. The area currently has very high car-dependency and lacks a competitive and attractive PT option. Without intervention, it is forecast that by 2041 only 5.8 per cent of trips in the Burleigh Heads to Coolangatta (BH2C) study area will be made by PT, contributing to congestion and declining travel time reliability on all major traffic routes in peak times, including on the M1. A business-as-usual approach to these problems would lead to declining amenity and liveability, restrict residential and employment growth, and fail to realise the opportunity for sustainable urban consolidation.

With passenger growth forecast to more than double, the Gold Coast Airport will require a vastly improved PT alternative that can drive the opportunity to develop an aviation industry cluster and continued growth in the tourism and hospitality industries, while supporting the economic performance of Coolangatta. The Gold Coast also has an international reputation as an events city, with improved PT connectivity to the Gold Coast Airport supporting the numerous and growing number of major events that the Gold Coast hosts each year, including the Brisbane 2032 Olympic and Paralympic Games. A seamless transport connection to accommodation and competition venues.

The need for improved PT in the southern Gold Coast is highlighted by several Commonwealth, State and local government strategies and plans including the South East Queensland Regional Plan 2017 (*ShapingSEQ*), the SEQ Regional Transport Plans and the Gold Coast City Transport Strategy 2031. Relevant New South Wales plans also prioritise improving PT and cross border connections, including the North Coast Regional Plan 2041[3]. These documents emphasise the catalytic, region-shaping role of high quality PT in supporting urban consolidation, enhancing amenity and liveability, and improving cross-border connectivity to support economic and social integration with northern Tweed. Improving PT is also recognised as an important step toward environmental sustainability through the provision of more efficient and sustainable transport that minimises greenhouse gas emissions, while supporting uptake in active transport.

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[1] *Queensland Governments Statisticians Office (QGSO) 2018 medium series projections, refined by TMR's TAU in 2021 to include Transport for New South Wales (TfNSW) Travel Planning Zone projections for the Tweed area, reflect updated assumptions for the Cobaki Lakes area based on more detailed information and reflect refinements to the Gold Coast airport*

[2] *Tourism Research Australia, Local Government Area Profiles, accessed at: https://www.tra.gov.au/Regional/local-government-area-profiles*

[3] *NSW Department of Planning and Environment, 2022*

934,000

Gold Coast population 2041

Currently, more than **12 million** visitors per year to the Gold Coast

By 2041 the BH2C area will have:

47,500 residents

20,600 jobs

By 2041 the BH2C study area will have over:

68,000 additional trips per day

GOLD COAST AIRPORT

16.6 million passengers in 2037

Entry point to SEQ **2032 Brisbane Olympic and Paralympic Games**

Supports:

8,960 local tourism businesses

$12 billion tourism and hospitality industry

Without a major improvement to public transport in the BH2C area, by 2041:

Public transport use very low **5.6%** of trips in the BH2C study area

$117 million per annum Congestion costs

74% leave the area for work

94% trips to and from the airport by car

Reduced accessibility

Increased Greenhouse Gas Emissions

Worsening amenity

<u>Transport benefits:</u>

- 18,000 car trips removed from the road network each day
- 22,000 extra public transport journeys each day
- 3,000 hrs PT travel time savings
- 5,500 hrs total travel time savings

More than **$2 billion** In economic benefits

580,000 tonnes in reduced carbon emissions

Background

The BH2C PE has been developed as part of a program of planning activities being conducted by the Queensland and New South Wales Governments, the City of Gold Coast (the City) and Tweed Shire Council. The program aims to address future problems and opportunities through a multi-modal response that includes road upgrades, complementary PT enhancements, and active transport infrastructure projects.

This PE focuses on PT options within the jurisdiction of the Queensland Government. The area of focus for these options is the densely populated linear coastal corridor south of Burleigh Heads (refer Figure 1). This corridor is based on the route selection components of the Gold Coast Multi-modal Corridor Studies (2020 and 2021) and primarily follows the Gold Coast Highway.

In the interest of establishing an integrated cross-border public transport system, Transport for New South Wales (TfNSW) is also progressing planning that considers the corridor from Coolangatta to Tweed Heads South.

Figure 1 Study area for the BH2C PE

Strategic context

To accommodate future population growth, *Shaping SEQ* identified that the Gold Coast will require 158,900 new dwellings over the period from 2016 to 2041, with 80 per cent of these dwellings to be provided through urban consolidation. This means that 127,120 new dwellings need to be provided in existing urban areas to meet the *Shaping SEQ* benchmark.

The BH2C study area forms part of a larger 'urban corridor' that is planned to accommodate a significant proportion of the Gold Coast's future population growth through urban consolidation. As defined by *ShapingSEQ*, the corridor extends from Helensvale in the north, to the Gold Coast CBD at Southport, and along the coastline to the Gold Coast Airport and Coolangatta in the south. This corridor is a strategic priority for the Queensland Government and the City of Gold Coast.

The South East Queensland Regional Transport Plans and the Gold Coast City Transport Strategy 2031 both identify the strategic importance of the coastal 'urban corridor' by highlighting the need for improved PT, including between Burleigh Heads and Coolangatta.

Project justification (Need and Priority)

The need for improved PT in the BH2C study area is driven by the problems shown in Figure 2.

Problem theme	Problem
Transport	**Problem 1 – Increasing transport demand**
	Problem 2 – Low public transport mode share
	Problem 3 – Limited cross-border public transport connectivity
	Problem 4 – Transport congestion and safety issues
Economy	**Problem 5 – Limited employment self-containment and connectivity between economic activity centres**
Growth	**Problem 6 – Challenge in meeting future urban consolidation benchmarks**

Figure 2 Problems to be addressed by the BH2C project

Problem 1: Increasing transport demand

Population, employment and visitor growth will substantially increase travel demand in the BH2C study area and place increasing pressure on the road network.

Travel demand in the southern Gold Coast and northern Tweed Shire area is forecast to increase by 32 per cent by 2041. Between 2019 and 2041, the Gold Coast is projected to increase its residential population by a further 319,000 residents or 52 per cent. By 2041 its residential population is estimated to reach 934,000. In 2019 the BH2C study area had an estimated population of 34,220 persons and this is forecast to grow by 39 per cent to 47,503 persons in 2041. Total daily person trips in the BH2C study area are projected to grow by 32 per cent, from 212,997 in 2019 to 281,749 in 2041, an increase of 68,752 trips.

In addition, the Gold Coast Airport straddles the state border, and current forecasts are for growth in passenger throughput of 146 per cent over the 20 years from 2017 to 2037[4]. The resulting 16.6 million passenger movements each year in 2037 will further increase travel demands in the study area and the surrounding parts of the Tweed. Only 5.9 per cent of airport related trips are forecast to be made by PT, resulting in an additional 32,207 daily private vehicle trips to or from the Gold Coast Airport in 2041.

Without intervention, forecast travel demand within and through the BH2C area will place increasing pressure on the road network and will likely result in negative economic, social and environmental consequences.

Problem 2: Low public transport mode share

If unchanged, existing car dependency and low public transport use will result in congestion issues and further constrain the transport network of the BH2C study area.

PT trips comprised only 4.9 per cent of all trips in the BH2C study area in 2019. This low PT use is the result of high car-dependency, the lack of a competitive public transport option, and the abundant availability of free and low cost car parking. While bus services will be an important part of the future transport network for the BH2C corridor area, existing bus services are unable to meet the overall PT task within the BH2C corridor as the public transport and active transport options are not attractive enough to compete with the convenience of car travel.

Without intervention, PT mode share is projected to remain very low in the BH2C study area at only 5.8 per cent in 2041. This would have negative impacts including increased congestion, pressure to continuously expand roads and car parking, reduced road safety, worsening noise and air pollution, and social inequity whereby people who cannot access car transport are further disadvantaged. There would also be significant negative economic impacts caused by the inefficiency of the broader transport system without an increase in PT mode share in the study area.

[4] Gold Coast Airport. 2017 Master Plan. P 46.

Problem 3: Limited cross-border public transport connectivity

Existing public transport services do not adequately connect the population and employment locations either side of the Queensland border, discouraging cross-border movement and contributing to car dependency and congestion.

Separate bus networks either side of the Queensland border create a barrier to cross-border movement which contributes to car-dependency and congestion. The different networks have incompatible systems for fares, ticketing and trip planning, as well as restricted opportunity for transfer and timetables that are not coordinated. The result is a public transport experience that requires a forced transfer, longer travel times and higher travel costs. The lack of PT integration also exacerbates disadvantage for those without access to private vehicles. The experience of the COVID-19 state border closures clearly revealed how closely linked the communities in the border region are in terms of economic and social interactions. Improved connectivity between the Queensland and New South Wales PT systems would provide a more attractive travel option for short cross-border trips and assist to reduce the proportion of cross-border trips being made by private vehicle and support a much more cohesive border community.

Problem 4: Transport congestion and safety issues

High car dependency and low public transport mode share, coupled with a limited ability to expand the road network, will result in significant traffic congestion and increasing travel times, reduced public transport and freight reliability, amenity, liveability and environmental impacts, and constrained economic growth.

The BH2C study area is forecast to experience significant traffic congestion, causing increased travel times, declining road safety, and declining reliability for private vehicles, public transport and freight. Congestion is forecast to result in significant economic costs as well as consequential impacts on the environment and residential amenity. There is little space to build new road corridors or widen existing ones and the ability to further upgrade the sections of the M1 in the study area is limited by a highly constrained corridor. This suggests a clear need for alternative approaches to cater to forecast growth in travel demand. By increasing the emphasis on transport investments to support public and active transport, the relevant governments can achieve improved quality of life in the local region, as well as supporting national, state and local imperatives to reduce greenhouse gas emissions, and support the achievement of net zero emissions by 2050.

Problem 5: Limited employment self-containment and connectivity between economic activity centres

Declining accessibility will restrict economic growth and will not realise the economic potential of the Gold Coast Airport or the broader Southern Gateway REC.

The study area has significantly more residents than jobs, despite the jobs created by the Gold Coast Airport. The study area's largest centre, Coolangatta, has historically underperformed as an economic centre. In 2019, the study area's limited employment self-containment resulted in 79 per cent of commuter trips being made to destinations outside the study area. Existing public transport services in the study area restrict connectivity to economic activity centres, in particular between the Gold Coast Airport and key tourist destinations such as Surfers Paradise, Burleigh Heads and Coolangatta, resulting in approximately 94 per cent of trips to and from the Airport being made by private vehicle. These trends are forecast to continue and will contribute to congestion while negatively impacting the area's economic competitiveness, attractiveness to visitors and liveability.

Part of the Southern Gateway REC, the Gold Coast Airport and neighbouring Southern Cross University (SCU) represent a major opportunity to develop an aviation industry cluster that could support an increase in the quantity of highly skilled jobs in the study area. A major intervention to improve transport accessibility in the study area would boost the economic competitiveness of the southern Gold Coast by providing better and more efficient access to the Gold Coast Airport, supporting the economic performance of Coolangatta and increasing local employment. Improved public transport connectivity to the Gold Coast Airport would also support the Brisbane 2032 Olympic and Paralympic Games by providing connectivity to accommodation and competition venues. More broadly than the Games, the Gold Coast is an event city with an events calendar that expands every year as the city's reputation for world class events grows and includes the Magic millions, Gold Coast 500, several world surfing events and Blues on Broadbeach. High quality transit is essential to service and facilitate existing events and continue to promote the growth in visitation to the Gold Coast.

Without intervention, the southern Gold Coast may become a dormitory area for jobs in other parts of the Gold Coast, South East Queensland, and Northern New South Wales and this results in the area failing to realise its economic potential.

Problem 6: Challenge in meeting future urban consolidation benchmarks

Declining accessibility will negatively impact local amenity, liveability and economic activity, and will not support the residential and employment growth needed to meet government benchmarks for urban consolidation in the BH2C study area.

Without intervention, the BH2C study area is forecast to experience declining amenity and liveability that will not adequately support the achievement of the 80 per cent urban consolidation benchmark set by *ShapingSEQ* for the Gold Coast needed to meet future growth expectations. However, with intervention to enhance connectivity and accessibility of the BH2C area, the area could play a greater larger role in achieving the 80 per cent benchmark. Investment in a sustainable and connected transport system would protect and enhance the liveability of communities within the study area and enable long-term sustainable development.

Service requirements to address the problems / opportunities

These problems / opportunities could be addressed if the service requirements (desired outcomes) identified in Table 2 were achieved.

Table 2 Service requirements of the BH2C project

Service requirement	Description
Efficient, reliable, connected, accessible and safe integrated transport network	A multi-modal transport solution would provide an efficient transport network that meets the needs of various users and supports planned urban consolidation and the economic potential of the study area.
Enhanced public transport connectivity to essential services and key destinations (including across the border)	Improved PT, as the primary means of moving more people more efficiently, is essential to managing forecast travel demand within and beyond the study area, reducing traffic congestion and associated environmental impacts, and increasing uptake in PT services.
Supporting the delivery of reliable and efficient transport between key locations (the airport, venues, key event locations and accommodation) during major events on the Gold Coast (including the 2032 Olympic and Paralympic Games)	Improved PT connectivity between the Gold Coast Airport and major destinations across the Gold Coast as part of the city-wide PT network.
Maximised regional economic growth	Increased employment and economic activity within the BH2C study area, in particular at Coolangatta and the Gold Coast Airport precinct, as part of the Southern Gateway REC, would improve employment self-containment while reducing demand for travel beyond the study area.
Preserved and enhanced liveability and environmental quality	Improved transport accessibility would reduce car-dependency and congestion impacts, enhance community amenity and liveability and support greater demand to live and work in the study area. Prioritising public and active transport in this urban corridor can improve the quality of life in the region, and support the achievement of national and state targets to achieve net zero greenhouse gas emissions by 2050.

Service requirement	Description
Sustainable and attractive urban development	A strategic, city-shaping transport response would accelerate dwelling and employment growth, enabling the study area to realise the opportunity for long-term sustainable urban consolidation.

Options generation and analysis

The options assessment process was undertaken in four phases in accordance with the PAF and the Infrastructure Australia (IA) Assessment Framework (IAAF), which recommends applying a less costly method of analysis to narrow a longlist of options before using more resource intensive methods to assess an options shortlist. The approach to the options assessment process for the BH2C PE is outlined in Figure 3.

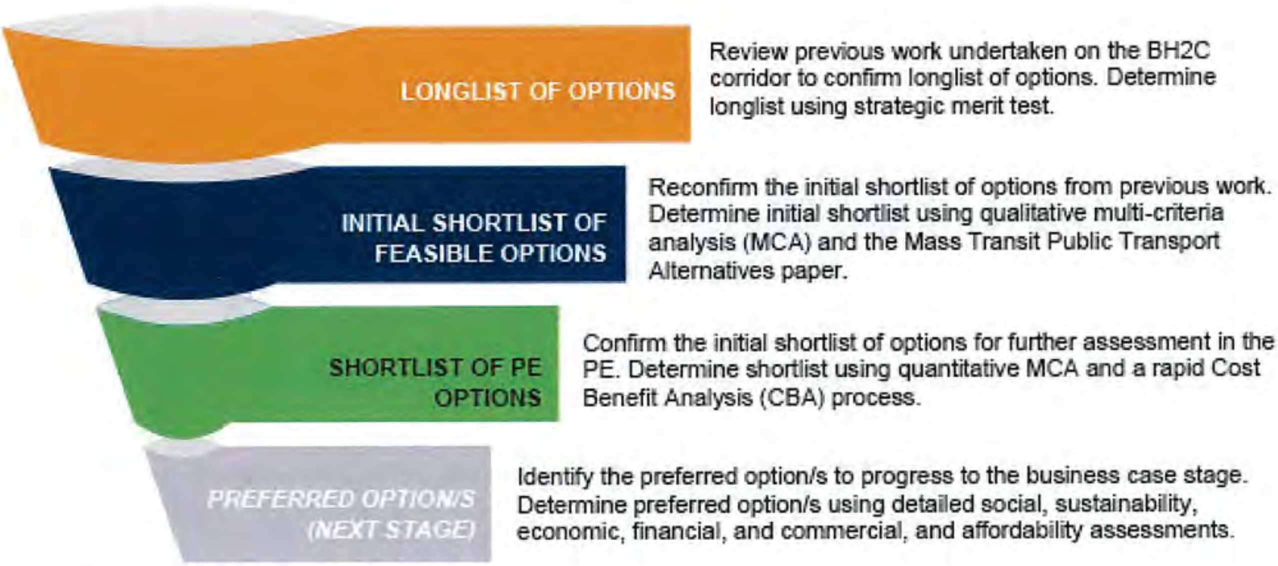

Figure 3 Approach to options assessment for the BH2C PE

Step 1: Longlist of options

The first step was to identify a longlist of options to be assessed. This involved reviewing the initial longlist of options identified by the previous *Public transport needs in the southern Gold Coast and northern Tweed region Strategic Assessment* (Strategic Assessment). The longlist of options considered improvements to existing road networks, augmentation of public transport services and infrastructure assets, road space reallocation, active transport and improving connectivity to the heavy and light rail networks. A strategic review of the initial longlist was completed resulting in a revised longlist of 11 infrastructure and non-infrastructure options for further assessment.

Step 2: Initial shortlist of feasible options

The second step involved a qualitative MCA of the 11 longlist options. The criteria used in the qualitative assessment were developed based on the problems and opportunities outlined in the Investment Logic Map (ILM). Following the qualitative assessment and subsequent options scoping phases, seven feasible shortlisted options were identified for further assessment.

Step 3: Shortlist of PE options

The third step was the rationalisation of the seven initial shortlisted options to identify three options for further detailed analysis. Each of the options were assessed through a quantitative MCA process which was informed by strategic transport modelling, strategic cost estimates, concept designs and land use analysis. The outcomes of the quantitative MCA are outlined in Table 3.

Table 3 Quantitative MCA of Project options results (5-point scoring scale)

Project option number	Project option	Transport outcomes	Land use	Employment and economic activity	Public amenity and acceptance	Operational integration	Weighted score	Rank
1	Bus service enhancements	2.5	1.0	1.6	3.0	5.0	**2.6**	**7**
2	Bus service enhancements with opportunistic infrastructure	2.4	1.0	1.6	3.2	5.0	**2.6**	**5**
3a	Bus lanes on Gold Coast Highway (with bridge widening)	3.4	1.4	1.9	3.5	5.0	**3.1**	**3**
3b	Bus lanes on Gold Coast Highway (without bridge widening)	3.5	1.4	1.9	3.5	5.0	**3.1**	**2**
4	Road upgrades on Gold Coast Highway	2.9	1.0	1.1	3.1	5.0	**2.6**	**6**
5	Bus Rapid Transit	2.9	3.3	3.5	2.6	1.0	**2.7**	**4**
6	Light Rail Transit	3.7	5.0	4.3	3.9	4.0	**4.2**	**1**

Option 6, Light Rail Transit, was the strongest performing option in the quantitative MCA, scoring the highest in four out of five criteria. Following Option 6, the other strongest performing options were Options 3a/b, Bus lanes on the Gold Coast Highway, and Option 5, Bus Rapid Transit. Option 6 and Options 3a/b had similar transport outcomes; however, Option 6 scored higher on land use, employment and economic activity.

A rapid cost benefit analysis (CBA) was also completed on the initial shortlist of options to inform progression of preferred options. Each of the project options will deliver a number of benefits to transport users as well as the community. The outcomes of the rapid CBA for each of the project options are shown in Table 4.

Table 4 **Economic outcomes ($ millions, discounted at 7% real)**

	Bus service enhancements 1	Bus service enhancements with opportunistic infrastructure 2	Bus lanes on Gold Coast Highway (with bridge widening) 3a	Bus lanes on Gold Coast Highway (without bridge widening) 3b	Road upgrades on Gold Coast Highway 4	Bus Rapid Transit 5	Light Rail Transit 6
Economic costs							
Capital costs	0	35	1,002	865	893	1,706	2,227
Operating costs	7	7	53	53	7	183	183
Total costs	**7**	**43**	**1,055**	**919**	**900**	**1,889**	**2,410**
Economic benefits							
Public transport travel time savings	0	2	39	39	1	15	73
Public transport fare revenue benefits	2	3	29	29	3	168	185
Road user travel time savings	1	1	18	15	36	108	103
Road user vehicle operating cost savings	4	2	53	53	-21	288	308
Avoided road user accident costs	0	0	4	5	-1	30	34
Avoided road user environmental impacts	-1	-1	-2	-2	-2	23	28
Avoided road user road maintenance costs	0	1	7	7	-2	48	54
Total benefits	**6**	**8**	**148**	**146**	**13**	**680**	**786**
Rapid CBA results							
Net present value (NPV)	0	-35	-907	-773	-886	-1,209	-1,624
Benefit Cost Ratio (BCR)	1.0	0.2	0.1	0.2	0.0	0.4	0.3

The outcomes of the rapid CBAs showed that Option 1 and 2 represent relatively low cost interventions, with an economic cost of $7 million and $43 million respectively. Accordingly, the benefits of these two options are also relatively marginal, with a net present value of $6 million and $8 million.

Option 3a and 3b achieve very similar economic benefits, with bridge widening provided under Option 3a resulting in an additional $2 million in economic benefits. However, these additional economic benefits come at an additional economic cost of $136 million, resulting in a lower NPV and BCR. Option 4 comes at a present economic cost of $900 million, while only achieving $13 million in economic benefits, resulting in a NPV of -$886 million and a BCR of 0.0.

Option 5 and 6, consisting of a BRT and LRT system from Burleigh Heads to Coolangatta, come at relatively significant economic costs of $1.8 billion and $2.4 billion respectively. These two options also deliver substantial economic benefits, monetised at $680 million and $786 million, resulting in BCRs of 0.4 and 0.3 respectively.

While BRT delivers marginally higher economic outcomes, Option 6 scored the highest on the quantitative MCA across all sensitivities. Option 5, however, scored poorly on the quantitative MCA, particularly against the public amenity and acceptance and operational integrations criteria. In addition to the quantitative outcomes for Options 5 and 6, there are a number of other factors that should be considered in the comparison between LRT and BRT:

- By 2026 there will already be three stages of LRT operating along the coastal urban corridor. A BRT option in the BH2C corridor would introduce a new public transport technology with separate contracting, operating and maintenance requirements, including:
  - Associated development costs to establish a standalone BRT depot, stabling and operating system for Stage 4
  - Significant capital cost to construct the BRT pavement for the length of the corridor and integration of turnaround infrastructure
  - Additional land acquisition to provide a wider cross-section to accommodate BRT and other required modes
  - Additional forced interchanges at Burleigh Heads and increased complexity of incorporating three forms of PT (LRT, BRT and buses) with over 11,000 transfers per day in 2041
  - Training costs for BRT drivers and operators additional to those already incurred for the LRT and buses.
- The SEQ Regional Plan (2017) and the SEQ Regional Transport Plan (2021) both specify LRT in the corridor from Burleigh to Coolangatta by 2041 and the City of Gold Coast City Transport Strategy (2013) specifies LRT from Broadbeach to Gold Coast Airport by 2031
- BRT is nearing capacity in the Stage 4 corridor by 2041 based on the modelling outcomes, with LRT still having sufficient capacity to meet ongoing demand growth
- The Gold Coast Light Rail (GCLR) Stage 1 Business Case included a detailed assessment of LRT and BRT technologies including transport modelling, whole of life cost and financial assessment, risk assessment, and economic assessment. LRT was demonstrated to be a superior solution especially from a customer experience perspective and was ultimately chosen as the preferred option in 2009. BRT was also re-considered in the GCLR Stage 3 DBC, with LRT once again being confirmed as the preferred option.

Given these considerations, BRT does not present a viable alternative to the LRT within the context of this project and the surrounding PT network and did not warrant further consideration in the PE. LRT was confirmed as the preferred high-capacity, high-amenity mass transit solution.

Based on the outcomes of the quantitative MCA and rapid CBA, the preferred project options identified for detailed analysis were:

- Light Rail Transit referred to as Option 1 Dedicated Light Rail (LRT)
- Bus lanes on the Gold Coast Highway (without bridge widening) referred to as Option 2 Dedicated Bus Lanes (DBL)
- Bus service enhancements with opportunistic infrastructure referred to as Option 3 Enhanced Bus Provisions (EBP).

Project options

The three shortlisted project options were developed through a technical design process that defined how the options would integrate with the existing road network and public transport operations. All three options were designed to:

- Generally be contained within the defined project corridor – which was identified in the Gold Coast Highway Multi Modal Corridor Study (GCH MMCS)
- Integrate with existing bus services and light rail services at the future Stage 3 Burleigh Heads Light Rail Station
- Maintain four general traffic lanes (i.e. two traffic lanes in each direction) on the Gold Coast Highway
- Provide facilities for people walking and riding bikes

- Provide safe pedestrian crossings on the Gold Coast Highway
- Minimise impacts on existing on-street car parking
- In the future, buses are likely to be zero emission vehicles, with every new TransLink funded bus added to the fleet to be a zero emission bus from 2025
- Achieve a 10 per cent level of design, consistent with the requirements of TMR's Project Cost Estimating Manual.

The design process sought to minimise potential property impacts as well as potential impacts on the Burleigh Head National Park and the Gold Coast Airport.

Option 1 Dedicated Light Rail

Option 1 Dedicated Light Rail (LRT) proposes an extension of GCLR from Burleigh Heads to the Gold Coast Airport and Coolangatta (i.e. GCLR Stage 4). The LRT alignment generally follows the Gold Coast Highway and Coolangatta Road and includes bus network changes to improve connectivity and accessibility to the light rail. This option involves right-of-way for the light rail along the full corridor with new bridges over Tallebudgera Creek and Currumbin Creek, a new stabling facility and satellite depot at Bilinga and assumes eight new compatible trams to that currently operating on GCLR. Figure 4 illustrates the LRT system.

Option 2 Dedicated Bus Lanes

Option 2 Dedicated Bus Lanes (DBL) proposes new dedicated bus lanes on the Gold Coast Highway (Burleigh Heads to Coolangatta) and Coolangatta Road (to Tweed Heads) in addition to the existing traffic lanes, with the exception of the Tallebudgera Creek and Currumbin Creek bridges where the buses are required to merge into the general traffic lanes. This option includes improvements to the bus network in terms of frequency and connectivity. The kerbside bus lanes are proposed to operate 24/7. The trunk route public buses could be detected through the traffic signal management system and their movements through the intersection expedited where this is practicable. Figure 4 illustrates a bus lane in use.

Option 3 Enhanced Bus Provisions

Option 3 Enhanced Bus Provisions (EBP) proposes short sections of dedicated bus lanes/bus jumps on the Gold Coast Highway approaches (both directions) at key locations to improve bus efficiency and reliability. Additionally, some minor improvements to the existing bus stops and pedestrian access are included in the option.

Figure 4 LRT (Option 1) and DBL (Option 2)

Risk analysis and cost estimate

A risk analysis was undertaken to establish, identify, assess, treat, monitor and review risks associated with the project options. The key risk items identified which may have the potential to impact the project options moving forward were:

- Adverse geotechnical conditions, including the discovery of contaminated material
- Stakeholder interface, including meeting stakeholder expectations, maintaining access during construction, and the impact of vulnerable road users, associated with works in a heavily congested urban environment.

From this analysis, the project team developed risk treatment and mitigation strategies. Several steps can be taken in the subsequent project phases to further refine and mitigate the project risks.

The risk adjusted capital costs shown in Table 5 show that the new infrastructure options Option 1 and Option 2 have the highest capital costs, while Option 3 has a relatively lower capital cost as the option has minimal infrastructure.

Table 5 Summary risk adjusted (P50) capital and operating costs ($ millions)

Cost estimate summary	Option 1	Option 2	Option 3
Total Nominal Capital Cost	4,140	2,978	452
Outturn Operational Expenditure	2,678	646	479

Financial analysis

A financial analysis was completed to determine the financial implications and impact on government of each project option. The analysis assessed the capital costs, operating costs and farebox revenues of the project options over the period of analysis. Table 6 presents the overall net project cost over the entire assessment period (i.e. delivery phase and operating phase) for the project options.

Table 6 Comparison of whole-of-life project cash flows for the shortlisted options (risk adjusted) ($million)

	Option 1		Option 2		Option 3	
	Nominal	PV	Nominal	PV	Nominal	PV
Construction costs	(4,140)	(3,132)	(2,978)	(2,298)	(453)	(333)
Operating costs	(2,678)	(919)	(646)	(203)	(479)	(150)
Farebox revenue	1,615	536	548	179	227	76
Net project value	(5,203)	(3,515)	(3,076)	(2,322)	(705)	(407)

The key outcomes of the financial analysis over the construction program and estimated over the 30-year operating period are as follows:

- The upfront funding requirements to construct and deliver the project options range from $0.5 billion for Option 3 to $4.1 billion for Option 1 in nominal terms at the P50 confidence level
- Option 1 would require the greater funding commitment to deliver the project, with a net whole of life cost of $5.2 billion in nominal terms at P50 confidence levels respectively
- In nominal terms, Option 1 is projected to generate approximately $1.6 billion in incremental farebox revenue across the 30-year analysis period, which is $1.1 billion more than Option 2 or $1.4 billion more than Option 3.

All project options provide the opportunity for staging as they are linear infrastructure with a number of potential interim destinations. Staging of Options 1 and 2 could decrease the upfront capital costs required but may limit the potential increase in patronage or the land use benefits of these options. Staging options should be further considered in the Business Case stage, including consideration of how any staging impacts on benefits that could be realised.

Capital contributions from the Australian Government, Queensland Government and/or the City, and the private sector, may be required to fund the delivery of the project, which would be subject to the development of a detailed funding strategy and construction program as the project becomes more defined at the Business Case stage.

Transport demand modelling and analysis

Modelling analysis has identified a range of transport benefits that could be achieved from a major improvement to public transport in the BH2C study area. These benefits relate not only to the BH2C study area but also to the broader Gold Coast transport network.

Analysis of the three project options shows that:

- Daily public transport mode share across the Gold Coast model area (incl. Northern Tweed) in 2041 would increase from 5.3 per cent in the Base Case to:
  - 6.0 per cent with Option 1 (a 13 per cent improvement)
  - 5.5 per cent with Option 2 (a 3.7 per cent improvement)
  - 5.4 per cent with Option 3 (a 1.8 per cent improvement).
- When considering the BH2C study area, daily public transport mode share in 2041 increases from 5.8 per in the base case to:
  - 11.5 per cent with Option 1 (a 98 per cent improvement)
  - 7.4 per cent with Option 2 (a 27.5 per cent improvement)
  - 6.2 per cent with Option 3 (a 6.8 per cent improvement).

Table 7 presents the 2041 PT patronage and mode share results for the three project options in comparison to the base case.

Table 7 Comparison of 2041 PT boardings and PT mode share

Area	Metric	Base Case	Option 1	Option 2	Option 3
Model area	PT person trips	155,586	176,649	162,033	157,915
	PT mode share	5.3%	6.0%	5.5%	5.4%
BH2C study area	PT person trips	14,550	29,060	18,536	15,476
	PT mode share	5.8%	11.5%	7.4%	6.2%

All options also result in an increase in daily cross-border PT trips, however Option 1 would provide the greatest increase from 4,093 to 8,676 cross-border PT trips in 2041. A similar trend is shown with trips to and from the Gold Coast Airport, with Option 1 seeing a significant increase in PT mode share from 5.8 per cent in the base case to 9.1 per cent of trips in 2041. Option 2 and Option 3 achieve 7.2 per cent and 6.1 per cent respectively.

Improved public transport in the BH2C study area would also result in reduced traffic congestion, in particular for Option 1 where there is a reduction of 6,000 vehicle hours travelled (VHT) in 2041. Options 2 and 3 show negligible differences to the base case VHT in 2041. Option 1 would also see a reduction of 161,000 vehicle kilometres travelled (VKT) in 2041, compared with 35,000 kilometres under Option 2 and 10,000 kilometres under Option 3.

The analysis considered the transport implications of additional population and employment growth that could occur in the BH2C study area as a result of the improved accessibility and attractiveness of LRT (Option 1). It was determined that increased population and employment would result in further increases to public transport patronage within the BH2C study area as well as on GCLR stages 1-3.

Overall, comparison of the three project options concluded that Option 1 is the best performing options as it would result in:

- the greatest increase in public transport trips
- best most significant improvement in use of GCLR stages 1-3

- the greatest increase in cross-border PT trips
- the most significant increase in PT trips to and from the Gold Coast Airport
- the most significant reduction of car trips
- the greatest reduction in greenhouse gas emissions
- the proven ability to support increased population and employment growth in the BH2C study area.

Land use analysis

Detailed analysis has identified that there is a significant land use opportunity associated with the potential extension of LRT to Coolangatta via the Gold Coast Airport (Option 1). This opportunity is the result of the improved accessibility and attractiveness of LRT which increases the demand to live and work in proximity to stations. As identified in Figure 5, by 2041 LRT in the BH2C corridor is forecast to accelerate the provision of dwellings and commercial floor space to result in:

- additional population of 10,127 people in the BH2C study area by 2041 compared to the base case
- 3,898 additional jobs in the BH2C study area by 2041 compared to the base case.

These findings highlight the potential for improved public transport to support the achievement of the 80 per cent urban consolidation benchmark set by *ShapingSEQ* for the City of Gold Coast by the Queensland Government's regional plan. It also demonstrates the potential to improve economic activity in the area including greater local employment. The land use benefits identified as part of this PE are a major driver of the economic benefits of the project, particularly the benefits of increased land values within the walking catchment of stations. The additional population projection does not exceed the ultimate capacity of the current City Plan and can be accommodated within existing City Plan zonings.

A number of elements of the land use analysis were conservative and therefore these potential benefits may be maximised through more detailed analysis as part of the Business Case stage. In particular, it is highlighted that these benefits were identified for the forecast year of 2041 and that more substantial land use benefits would accrue beyond this timeframe, over the longer term.

Note: Range reflects Conservative and Probable Scenarios respectively.

Figure 5 2041 Forecast additional jobs, dwellings and population resulting from Option 1 LRT within the BH2C study area

Land use analysis identified that bus lane options are not expected to unlock additional land use change in the same way as LRT due to the lower vehicle capacity, reliability, ride smoothness and permanency of the bus options. Further, bus lanes are unable to provide the step change in transport amenity or capacity required to catalyse land use change. As such, the land use implications of the bus options (Options 2 and 3) are not expected to be materially different from the base case demographic forecasts.

Economic analysis

The economic analysis identified that each of the project options will generate benefits for public transport users, road network users, the community and the broader economy. Key findings of the economic appraisal results include:

- Total first round economic benefits of the project are estimated to be between $75 million and $969 million (real, discounted at 7 per cent). Option 1 delivers the highest economic benefits of $913 million, followed by Option 2 and lastly Option 3. The project comes at an economic cost of $2,880 million for Option 1, followed by $2,012 million for Option 2 and $318 million for Option 3
- Vehicle operating cost savings represent one of the largest benefit categories across the three options, driven by a mode shift away from private vehicle road travel. In addition, public transport fare revenue is a significant benefit stream across the three options, driven by the increase in patronage (in particular for Option 1) with an increase in fare box revenue of $1.6 billion over the first 30 years of the project operations being forecast
- Option 3 delivers the highest NPV (-$237 million), followed by Option 2 (-$1,782 million) then Option 3 (-$1,785 million). The BCR was calculated to facilitate the ranking of options. Option 1 has the highest first-round BCR (0.38), followed by Option 3 (0.26) and then Option 2 (0.10).

Option 1 is the preferred option from a BCR perspective, while Option 3 is the preferred option on a NPV basis.

When WEBs, road maintenance and disability access benefits, second round benefits from land use change and urban development benefits are included, economic benefits for Option 1 substantially improve to $2,566 million, driven primarily by the unlocking of urban development benefits with land use change. This results in a significant improvement in BCR, from 0.38 to 0.89 and NPV, from -$1,785 million to -$314 million. Option 1 is preferred from a BCR perspective both with and without land use change.

Sensitivity testing demonstrates that Option 1 becomes the preferred option on both an NPV and BCR basis under upside sensitivity tests (i.e. +20 per cent increase in economic benefits). At a 4 per cent discount rate Option 1 has a BCR greater than 1 when first and second round benefits are considered.

In addition to economic costs and benefits monetised as part of the core CBA, a range of benefits have been assessed qualitatively for their expected impact on economic outcomes. This includes consideration of outcomes such as urban amenity improvements from reduced vehicle traffic, increased uptake of active travel, improved tourism experience, reduced need for road upgrades, reliability of road and public transport travel times, and additional transport capacity to support major events such as the Brisbane 2032 Olympic and Paralympic Games. Assessment of qualitative benefits has identified that most benefits are expected to be higher under Option 1 relative to Option 2 and 3 and would result in Option 1 as the preferred option.

Legislative and regulatory review

This section has been removed from this publicly released version as it contains legally privileged information.

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Whole-of-Government policy issues

An assessment was completed to consider relevant state and Commonwealth whole-of-government policy issues that may prevent, impede, or have significant implications for the project options. The specific policy areas considered relate to procurement, employment, tolling, pricing of fares, climate change and sustainability. The whole-of-government policy issues analysis determined that there are no policy issues that would prohibit the project options from proceeding to the Business Case stage.

The Queensland Government has a commitment to achieving net zero emissions by 2050, with an interim target to reduce emissions by 30% below 2005 levels by 2030. Option 1 provides not only the greatest capacity improvement for PT, but also realises the greatest mode shift to PT from private vehicles. Option 1 results in over 18,000 trips per day being removed from the road network by 2041. From fuel emissions alone, Option 1 will realise a reduction in carbon emissions of over 18,000 tonnes per day, compared to only 2,900 tonnes for Option 2 and 1,500 tonnes for Option 1, a 500 per cent and 1,100 per cent reduction respectively. Option 1 will also support a greater degree of urban consolidation, with greater density requiring less provision of infrastructure and more efficient use of resources and aligning to the requirements of *ShapingSEQ* and the targets set by the Queensland government.

A number of policies have the potential to support the delivery of the project and will be considered in future planning. Each of the three short-listed options investigated as part of the PE stage align with whole-of government policies. There are some differences in the level of employment impacts between the project options due to the relative differences in capital expenditure, and some differences in mode shift achieved and network performance which may impact on a more detailed sustainability and climate change assessment in the Business Case stage. It is recommended that policy issues are discussed with stakeholders during development of the Business Case to ensure appropriate consideration is given to any policy related outcomes that may arise from the project's adoption.

Social impact evaluation

The social impact evaluation (SIE) compared the positive and negative social impacts of the three project options. Table 8 presents a summary of these social impact ratings and includes a net social impact rating. Overall, the SIE concluded that:

- For all options, most of the positive impacts are expected to occur during operations of the project while many of the negative impacts are expected to be temporary during construction

- Option 1 had the greatest positive social impact of the project options, and is significantly higher than Option 2 and Option 3
- The negative social impact rating for Option 1 is larger than Options 2 and 3 but only by 12 per cent and 60 per cent respectively
- Option 1 has the highest net social impact rating (positive social impact) followed with a significant margin by Option 2 and Option 3.

Table 8 Summary of social impact rating scores

Project option	Positive social impact rating score (with enhancements)*	Negative social impact rating score (with mitigations)**	Net social impact rating score***	Ranking
Baseline	81	52	29	N/A
Option 1 DLR	300	122	178	1
Option 2 DBL	184	109	75	2
Option 3 EBP	131	72	59	3

** Calculated as the sum of the product of likelihood and consequence for each positive social impact*

*** Calculated as the sum of the product of likelihood and consequence for each negative social impact*

**** Calculated as the difference of positive social impact rating score and negative social impact rating score where positive values represents a positive social impact*

At this stage of assessment, the balance of impacts does not indicate a net social outcome that would prevent the Project from progressing. Option 1 presents a significant positive increase from the baseline indicating its significant potential to realise positive social impacts and outcomes.

Public interest assessment

A public interest assessment also considered the social benefits and potential impacts that may result from the delivery of the project options. This included consideration of the Project's ability to meet the service requirements, public access and equity, accountability and transparency, consumer rights, security, and privacy. The assessment concluded that at this stage there are no public interest issues that would prohibit the project options progressing to the Business Case stage. All project options also provide more travel choices for the community, improving connectivity to local centres, community services, health, education, employment and recreational opportunities.

The community consultation outcomes from the Gold Coast Highway (Burleigh Heads to Tugun) Multi-modal corridor study showed overall support for the recommendations of the study as a potential solution to help improve the liveability and connectivity in and around the local communities. Other results included:

(1) The light rail extension along the Gold Coast Highway between Burleigh Heads and Tugun is a clear preference (58 per cent) over bus lanes (25 per cent), while a heavy rail extension to the airport from Varsity Lakes is highly regarded (87 per cent)

(2) Wildlife protection between Burleigh Head National Park and Burleigh Ridge Park was rated as of key importance (84 per cent of the community), while M1 connectivity was noted as important by 82 per cent of the community and is the biggest overall concern for business respondents (78 per cent)

(3) Development of an Oceanway path is considered important by 81 per cent of the community

(4) The primary benefits of the multi-modal corridor noted by residents include improved walking and cycling paths, reduced traffic congestion and a faster and easier journey for commuters.

Summary evaluation and ranking of project options

Based on the outcomes of the summary evaluation completed in this chapter, Option 1 has emerged as the overall highest performing option across the assessments in the PE with the highest scores across the land use, economic, social impact, Whole of Government and transport modelling assessments. Option 3 was the top performer for cost and risk and financial analysis. IA recommends that at least two options in addition to a "do-minimum" base case, be investigated in the business case. Given this recommendation, Option 3 has emerged as a low-cost alternative that may be considered as a staging option in the Business Case phase.

There is no significant cost saving for Option 2 compared to Option 1 and Option 2 underperformed on most other assessments. For this reason, it was recommended that Option 2 did not progress for further assessment in this PE. Therefore, the remaining assessments of project benefits, market sounding, value for money, and delivery model approach were conducted with regard to only Option 1 and Option 3. The ranking for project option outcomes is illustrated in Table 9.

Table 9 Rank for project option outcomes

Assessment area	Option 1 LRT	Option 2 DBL	Option 3 EBP
Environmental assessment	3rd	3rd	1st
Risk analysis and cost estimate	3rd	2nd	1st
Financial analysis	3rd	3rd	1st
Transport demand and modelling analysis	1st	2nd	3rd
Land use analysis	1st	3rd	3rd
Economic analysis	1st	3rd	2nd
Legislative and regulatory	3rd	2nd	1st
Whole of Government	1st	2nd	3rd
Social impact evaluation	1st	2nd	3rd
Public interest assessment	1st	2nd	3rd

Market Sounding

This section has been removed from this publicly released version as it contains commercially sensitive information, and release could impact future commercial negotiations.

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Value for Money assessment

A qualitative assessment has considered the extent to which a PPP delivery option could provide the state greater Value for Money (VfM) when compared to a traditional delivery model. The assessment identified that:

- Stage 1 of GCLR was delivered through a PPP contract which has subsequently been modified to deliver Stages 2 and 3
- The existing PPP Franchise is due to expire in 2029
- The future re-franchising of the GCLR system will need to be considered in detail in the Business Case
- There is potential for Option 1 (LRT) to be delivered through a PPP encompassing design, finance, build, operate and maintain
- There is limited potential to deliver the capital works scope of Option 3 (EBP) via a PPP
- Bus services as part of Option 3 would most likely be provided under contract with TransLink, as per existing arrangements for provision of bus services
- The Business Case should be a VfM or PPP Business Case and should include detailed analysis of the PPP options that could be used to deliver Option 1.

Delivery options assessment

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Project benefits

A preliminary assessment of the primary transport benefits expected from the project options and associated Key Performance Indicators (KPIs) that TMR would be responsible for measuring during the operational phase was undertaken for the PE. Figure 6 shows the Benefits Map developed for the PE stage and that will be built upon within the Business Case.

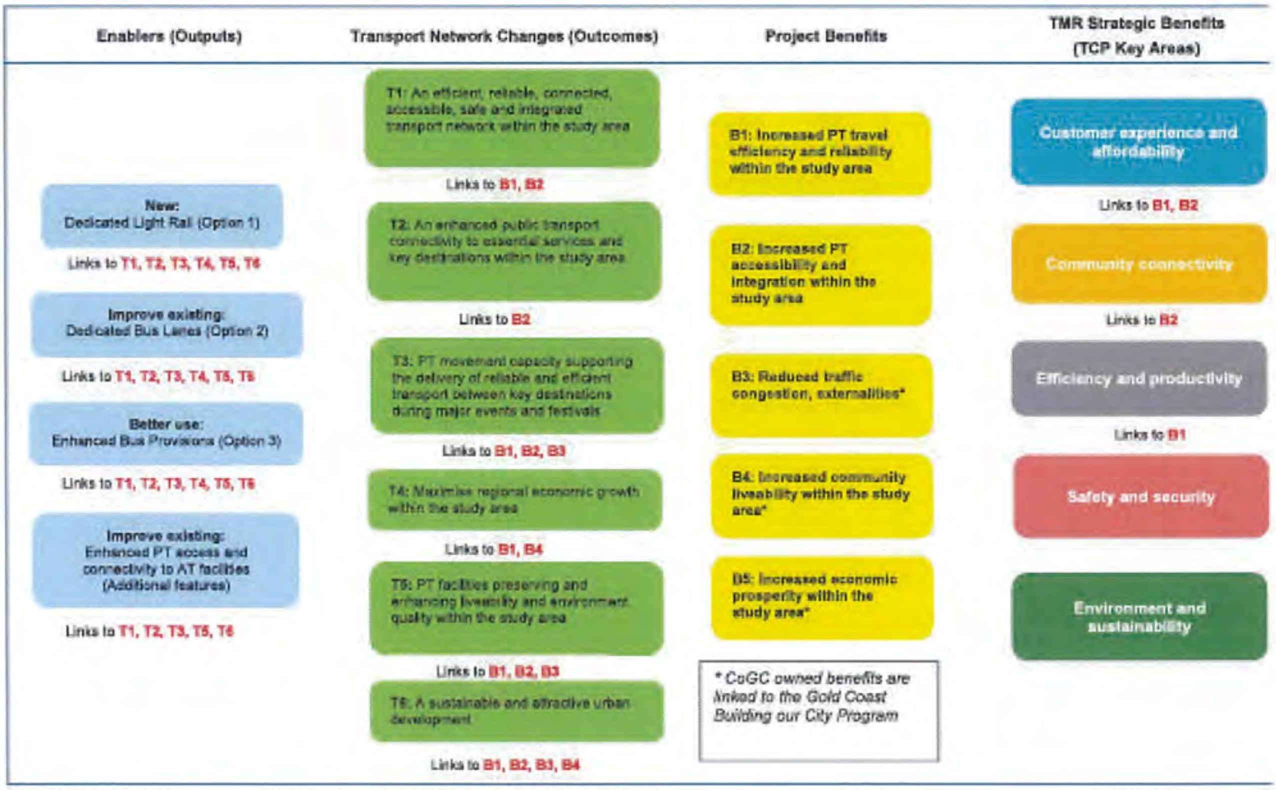

Figure 6 BH2C Benefits Dependency Map

Conclusions and recommendations

Conclusions

Without intervention, the increasing demand on the transport network is forecast to result in road capacity constraints and congestion issues. The ability to expand the road network, given geographic constraints, beyond currently committed projects is limited and therefore continued growth in road transport demand in the absence of attractive, high-capacity public transport will result in unsustainable congestion growth. It is forecast that there will be congestion on all major traffic routes in peak times, including the M1, and the annual cost of road network congestion will increase to $343 million per annum in 2041.

Delivery of this Project will support the development of a multi-modal transport network on the Gold Coast, and promote urban consolidation and sustainable transport usage. *ShapingSEQ* – the Queensland Government's framework for achieving SEQ's vision for growth – identifies catalytic infrastructure as a critical tool to manage population growth and achieve urban consolidation targets, which is set at 80 per cent for the Gold Coast LGA.

Delivery of the project is a region shaping opportunity, with major investment in public transport in this corridor identified in both *ShapingSEQ* and the SEQ Regional Transport Plan. Improved PT connectivity to the Gold Coast Airport will support the numerous major events that the Gold Coast hosts each year, including the Brisbane 2032 Olympic and Paralympic Games. The project will support increased residential densities and employment growth, improve public transport accessibility and efficiency, and connect the Gold Coast Airport to major destinations for tourists.

Delivery of a high-quality mass transit system, which realises a mode shift towards PT, decreased dependence on private vehicles and a more balanced multi-modal network will also support Government's net zero emissions goals, with transport the State's third largest contributor to total greenhouse gas emissions in 2020.[5]

The PE analysis demonstrated that:

- Option 1 delivers significant patronage increases, with over 21,000 additional PT boardings a day in 2041, compared to 6,400 and 2,300 for Options 2 and 3 respectively.
- Option 1 results in a 5.7 per cent increase in PT mode share within the Study Area. This mode shift to PT, also results in a meaningful benefit to continuing road users as it reduces forecast congestion and supports a mature multi-modal transport network. Options 2 and 3 result in minimal congestion reduction and overall have limited impact on PT patronage or overall change to the transport network compared to the base case.
- The delivery of Option 1 will support 1,800 PT trips a day from the Gold Coast Airport by 2041, increasing PT mode share to the Airport by 3.3 per cent to 9.1 per cent, demonstrating the impact that delivery of a high amenity, attractive and dedicated mass transit solution has on mode share and its ability to support transport and economic outcomes.
- Option 1 is forecast to accelerate population and jobs by an additional 10,000 people and 3,500 jobs above the base case in the study area by 2041, supporting the achievement of the objectives and targets of *ShapingSEQ* and a more sustainable and high-amenity built form. This increased attractiveness of the corridor will also generate increased economic productivity, activity and growth of the Southern Gateway REC.
- Option 1 has a BCR of 0.32, 0.10 for Option 2 and 0.24 for Option 3 when WEBs and land use change is not considered. When WEBs and benefits from land use change are considered, the BCR for Option 1 increases to 0.87. Option 1 is preferred from a BCR perspective both with and without land use change.
- The upfront funding requirements to construct and deliver the options range from $0.5 billion for Option 3 to $3.9 billion for Option 1 in nominal terms at the P50 confidence level.
- Option 1 would require the greater funding commitment to deliver the project, with a net whole of life cost of $4.9 billion and $5.5 billion in nominal terms at P50 and P90 confidence levels respectively.
- All options will benefit from improved cross-border coordination of public transport services, and a heavy emphasis should be placed on this in future stages of the project.

Based on the analysis undertaken in the PE it was concluded that Option 2 was not preferred for continued assessment and only Options 1 and 3 proceeded for project benefits, market sounding, value for money, and delivery model considerations.

[5] Queensland Government, *Queensland's 2020 greenhouse gas emissions and targets*, https://www.des.qld.gov.au/climateaction/emissions-targets

Recommendations

Based on the outcomes of this PE, the following recommendations should be considered:

- Option 1, LRT from Burleigh Heads to Coolangatta, is the preferred option and decision makers should approve the project passing through Gate Two and proceeding to the Business Case stage for further assessment.
- Option 3, Enhanced Bus Provisions, was the second highest performing option and should be progressed through Gate Two and proceeding to the Business Case stage as a comparator option to LRT.
- Further detailed technical and environmental assessments are required to better understand the impacts of LRT on the environment to inform the approvals pathway and timeframes.
- Further development of and update to the Active Strategy, including opportunity for further active transport improvements to be considered south of Currumbin.
- Further community and stakeholder consultation, including working with members of the local indigenous community to identify and protect valued and unique cultural heritage sites along the route.
- Ongoing engagement with IA to ensure the requirements of the IA Assessment Framework are fully satisfied.
- Ongoing engagement with New South Wales authorities in respect of planning for cross-border transport improvements and economic development. This includes a possible extension of Option 1 into New South Wales, and for all options, major improvements to the coordination of bus networks.
- Further detailed analysis and monetisation of GHG emissions and ensuring the project makes a maximum contribution to achieving the national and state target of net zero emissions by 2050, including analysis of zero emission buses.
- On-ground investigations should be progressed to better inform key risk areas related to PUP, PFAS, Hydrology and other critical technical risk items to inform a more accurate cost estimate and risk profile.
- Further refinement of the transport modelling framework including:
  - Updates to ensure the model performance accurately reflects the benefits of LRT compared to the existing bus network and greater alignment between modelling results, economics and patronage outcomes
  - Updates to take account of new population and employment forecasting to at least 2046
  - Further investigation of the role and scale of bus interchange facilities including at Thrower Dr Currumbin and the Airport
  - Refinement of bus network changes (including confirmation of the preferred routes for the 760 and 774)
  - Improved base case numbers for visitor travel, which will form a major component of the public transport user base
  - Updated Gold Coast Airport trip generation base, taking into account the latest passenger forecasting data available from the Airport
  - For Option 3, if progressed to Business Case Stage, a full investigation of the viability of bus priority measures at traffic signals, including the feasibility and effectiveness of bus signal pre-emption.
- The methodology for economic assessment of land use uplift in the business case should follow a methodology that is agreed by Infrastructure Australia, TMR and City of Gold Coast prior to procurement of services to complete the work.
- Develop a methodology for economic assessment of tourism benefits, for agreement by Infrastructure Australia, TMR and City of Gold Coast, prior to procurement of services to complete the work.
- A comprehensive market sounding process with the contractor market, potential operations and maintenance providers, light rail vehicle providers, the private finance market and potential PPP partners is recommended to inform the constructability, packaging and delivery model assessment required in the Business Case stage.
- The existing concession with GoldLinQ for Stages 1-3 is due to expire in June 2029 which has implications for any future extension in terms of project delivery, operations as well as the ongoing operations of Stages 1-3. Detailed

commercial, legal and financial advice workstreams investigating these issues would be required to make an informed delivery model decision within the Business Case.

- Given the potential for Option 1 to be delivered as a PPP, the Business Case stage should progress as a PPP Business Case.
- Early engagement with Queensland Treasury is required to determine the requirements of the Business Case if a PPP is to be considered and the role of Queensland Treasury in the Business Case process.

Readiness to proceed to the next stage

The Business Case forms the final step in the evaluation stage of the PAF and is pivotal in providing a comprehensive evidence base for an investment decision. As per the considerations outlined above, it is recommended that Option 1 and Option 3 be progressed to the Business Case stage. Table 10 outlines a summary of the activities and milestones to be completed as part of the Business Case.

Table 10 Summary of business case activities/milestones

Activity/Milestone	Timing
Establish project team and governance arrangements	July 2023
Engage advisors (transport modelling, technical, cost, financial, economics)	September 2023
Completion of reference designs and options impact analysis	November 2024
Completion of transport, financial and economic analysis	December 2024
Completion of commercial, delivery model and value for money assessments	April 2025
Completion of Draft Business Case Report and Appendices	April 2025
Final (post-review) Business Case Report and Appendices	June 2025
Completion of TMR Gate 3 Submission	June 2025
TMR Gate 3 scheduled meeting	July 2025
Infrastructure Australia Gate 3 submission	July 2025

The estimated funding required for the business case and supporting early works investigations is up to $22.5 million These amounts include appropriate contingency provisions. A memorandum of understanding is being negotiated between the State and the City to enable a sharing of the funding across the funding responsibilities.

1. Introduction

The Department of Transport and Main Roads (TMR) in partnership with the Council of the City of Gold Coast (the City) are progressing planning to improve the public transport (PT) network in the southern Gold Coast. In particular, TMR and the City are investigating options along the Burleigh Heads to Coolangatta (BH2C) corridor. TMR and the City have jointly funded and developed this Preliminary Evaluation (PE) to address the problems and opportunities identified by the Strategic Assessment completed in 2021. This PE assesses a range of options to respond to those problems and opportunities and identifies the preferred options to be progressed for further consideration in a Business Case.

This chapter outlines the process for completing the PE including:

- Project Assessment Framework (PAF)
- Purpose of the PE phase
- PE structure
- Methodology.

1.1 Project Assessment Framework

This PE has been developed in accordance with the Queensland Government's PAF. The PAF is used across agencies to ensure a common, rigorous approach to assessing projects at critical stages in their lifecycle, from the initial assessment of the service required, through to delivery. At each stage, the project's progress and quality is assessed to ensure that the project (and associated investment) meets strategic objectives and achieves value for money. Once a project 'clears' a particular stage, it can progress to the next. The PAF provides tools and techniques to assess projects throughout the project lifecycle, defined to include eight project stages, as outlined in Figure 7. This PE follows on from the Strategic Assessment which was developed in accordance with Queensland Government's Business Case Development Framework (BCDF).

Figure 7 PAF project stages

1.2 Purpose of the Preliminary Evaluation

The purpose of this PE is to provide sufficient information to government decision makers, to enable them to make an informed decision as to whether to proceed further with the project by investing in developing a Business Case. The PE stage provides an assessment of a range of options to meet identified project needs, so that the subsequent business case development can focus greater effort on fewer options.

1.3 Preliminary Evaluation structure

This PE has been structured to align with the TMR PE template with some modifications to reflect the nature of this project. The structure of this PE is identified in Table 11.

Table 11 PE document structure

Chapter	Description
Introduction	Outlines the process for completing the PE including details of methodology, governance and stakeholders.
Project background	Describes the project, its history and location.
Project justification	Identifies the service need to be addressed by the project. Provides contextual information including relevant government **policy**, previous studies and related projects.
Options generation and analysis	Outlines findings of the option identification and assessment process.
Project options	Defines the shortlisted project options for more detailed analysis.
Environmental assessment	Summarises the assessment of potential environmental impacts of the shortlisted project options.
Risk analysis and cost estimate	Presents the preliminary cost estimate and assessment of key risks associated with the shortlisted projects.
Financial analysis	Outlines the project's financial implications for government.
Transport demand modelling and analysis	Details the outcomes of traffic modelling and patronage forecasting undertaken to underpin economic and financial analysis.
Land use analysis	Outlines the analysis of potential land use benefits of the shortlisted project options.
Economic analysis	Outlines the expected costs and benefits of the shortlisted project options.
Legislative and regulatory review	Details the legal and regulatory considerations relevant to the project at this stage
Whole of Government policy issues	Identifies and assesses relevant government policy issues that may have implications for the project.
Social impact evaluation	Identifies the potential social impacts of the project to ensure they are considered in future stages of the project.

Chapter	Description
Public interest assessment	Considers project alignment with the public interest to ensure that it can provide equitable outcomes.
Summary evaluation and ranking of project options	Assesses and ranks of the shortlisted options that were evaluated.
Market sounding	Outlines the capacity and appetite of the contractor market to deliver the project and the potential for private sector involvement in project funding and delivery.
Value for Money assessment	Assesses whether there is potential to deliver the project as a Public-Private Partnership (PPP) arrangement to provide the state greater value for money than a traditional delivery model.
Delivery options assessment	Assesses the range of options for procuring, delivering and operating the project.
Project Benefits	Outlines the expected benefits if the project were to proceed.
Conclusions and recommendations	Identifies conclusions regarding the priority and affordability of the project.
Recommendations	Provides recommendations regarding progress to Business Case development.
Readiness to proceed to the next phase	Provides a project plan and resource plan for the Business Case development stage.

1.4 Methodology

The methodology for this PE has been developed in accordance with the Queensland Government's PAF and the Infrastructure Australia (IA) Assessment Framework. The methodology filters the range of project options to a single preferred option or, if not possible, a reduced number of options to be progressed to the Business Case development stage. Figure 8 provides an overview of the options filtering process, while more detail regarding this process is contained in Chapter 4 – Options generation and analysis.

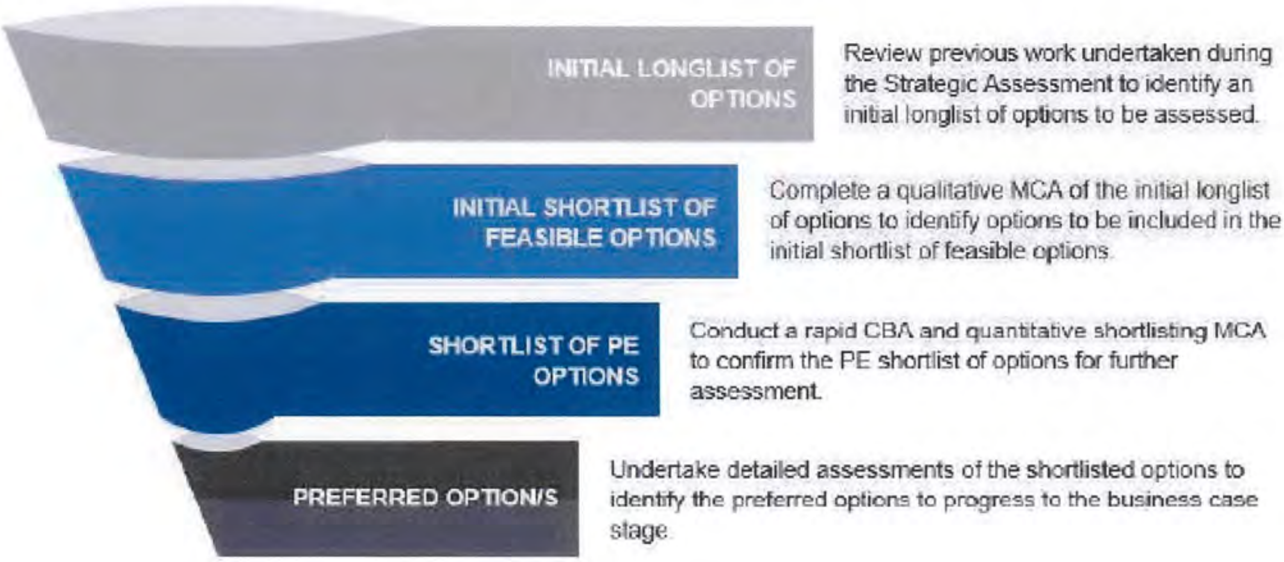

Figure 8 **Overview of options identification and analysis process**

The PE analysis was undertaken following these steps:

- Review previous work:
  - Preparation of Project Management Plan and Stakeholder Engagement Plan
  - Review the Strategic Assessment[6] (Chapter 2)
  - Review and update the Investment Logic Map (ILM) to confirm the service requirements and project need (Chapter 3)
  - Strategic merits test of Strategic Assessment options longlist to identify initial longlist of options (Chapter 4)
  - Options shortlisting assessment (Chapter 4).
- Confirm, assess, and refine initial options shortlist:
  - Qualitative multi criteria analysis (MCA) of longlist options and assessment of contemporary bus and rail-based mass transit technologies to identify an initial shortlist of feasible options (Chapter 4)
  - Assessment of contemporary bus and rail-based mass transit technologies (Chapter 4)
  - Rapid cost benefit analysis (CBA) and quantitative MCA of initial shortlist options to confirm a shortlist of three options for further assessment in the PE (Chapter 4).
- Detailed assessment of shortlisted options:
  - Technical design development of the shortlisted options (Chapter 5)
  - Environmental analysis (Chapter 6)
  - Risk assessment and cost estimates (Chapter 7)
  - Financial analysis (Chapter 8)
  - Strategic transport modelling and patronage forecasting (Chapter 9)
  - Analysis of potential land use benefits (Chapter 10)
  - Economic analysis (Chapter 11)
  - Legislative and regulatory review (Chapter 12)
  - Assessment of whole-of-government policy issues (Chapter 13)
  - Social impact evaluation and public interest assessment (Chapters 14 and 15)
  - Summary of the outcomes of the analysis of shortlisted options (Chapter 16).
- Determine preferred options:
  - Market sounding and delivery options analysis (Chapters 17 and 19)
  - Identification of project benefits (Chapter 20)
  - Identification of preferred options to be progressed to the Business Case phase (Chapter 21 and 22)
  - Preparation of a plan and budget for progressing the Business Case phase (Chapter 23).

More detailed information is provided regarding the approach to certain analysis in the relevant chapters.

1.4.1 Governance

This section outlines the governance arrangements that were in place to guide the development of this PE.

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[6] This reference has been removed as it contains information that is no longer available.

1.4.1.1. Project Governance Framework

As joint project owners, TMR and the City established a joint governance framework[7] to guide a shared program of activities to complete the Strategic Assessment and this PE. The governance framework established forums including a joint TMR/ City Executive Steering Committee (ESC), Project Control Group (PCG) and six Working Groups to support the ESC and PCG. The joint project governance framework is identified in Figure 9.

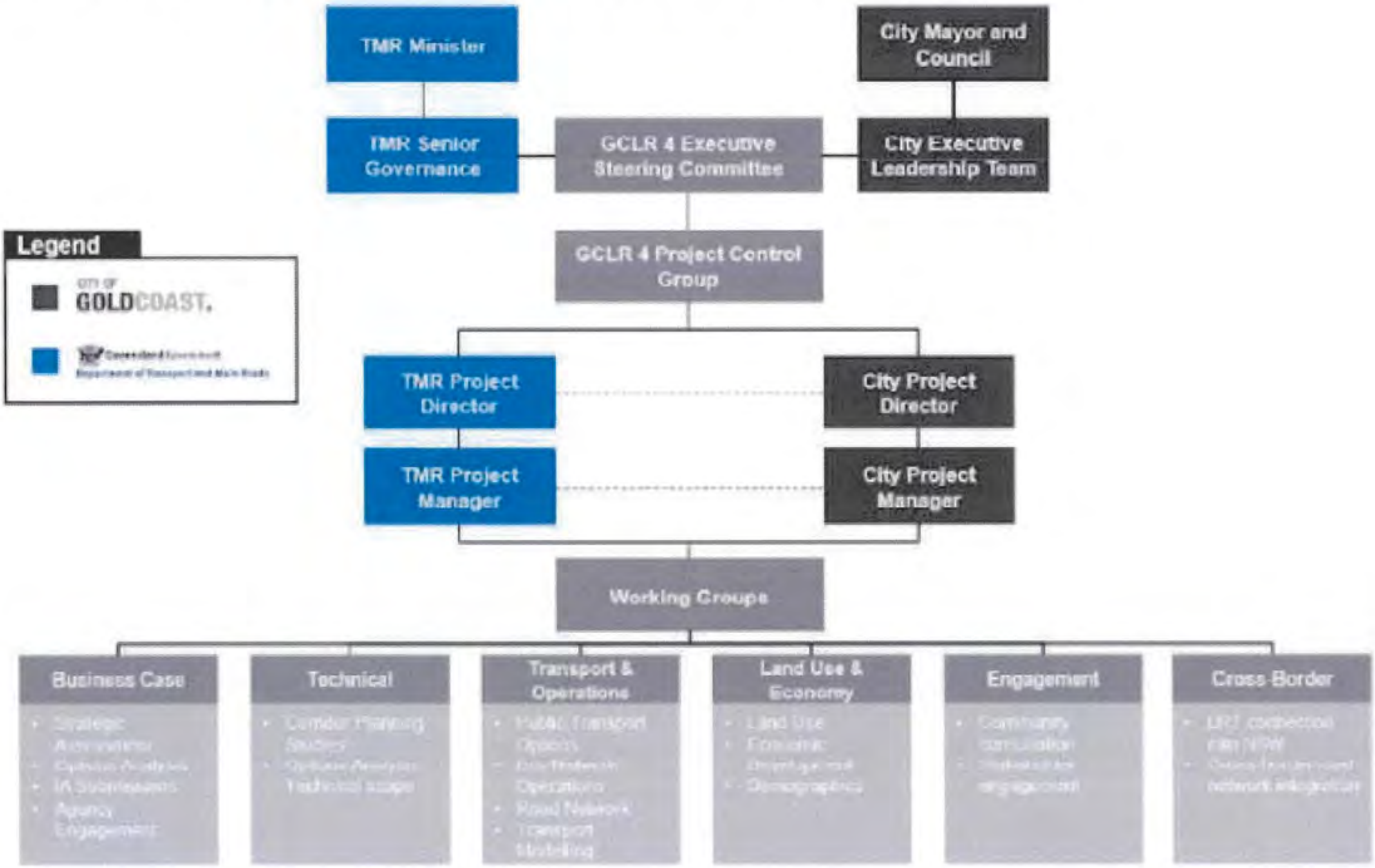

Figure 9 TMR and the City joint project governance framework

1.4.1.1.1. Executive Steering Committee

The ESC provided the primary forum for decision-making and guiding activities to complete this PE. Responsibilities of the ESC included:

- Engagement with the Australian Government
- Cross-government collaboration
- Strategic decision-making, monitoring of risks, and resolution of key issues
- Distribution and sharing of information across government
- Reporting to the City and State Government committees and senior governance.

Membership of the ESC is identified in Table 12.

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[7] This reference has been removed as it contains information that is no longer available.

Table 12 Membership of ESC

Position	Organisation	ESC Role
Director, Transport & Infrastructure	the City	Co-Chair
Regional Director, South Coast Region	TMR	Co-Chair
Director Economy, Planning & Environment	the City	Member
Manager, Transport and Traffic	the City	Member
General Manager Transport Strategy and Planning	TMR	Member
Director Network Planning	TransLink	Member
Program Director, Gold Coast Light Rail	TransLink	Member
Executive Coordinator, Strategic Operations Portfolio	the City	Member
Project Manager Light Rail Interface, Gold Coast Light Rail 4	the City	Member
Specialist Advisor, Gold Coast Light Rail 4	the City	Invitee

1.4.1.1.2. Project Control Group

The PCG was a joint TMR and the City senior officer forum to support the ESC and guide project activities and decisions. The PCG considered matters escalated by the Working Groups and provided direction on matters prior to consideration by the ESC. The PCG was co-chaired by the TMR and the City Project Directors.

1.4.1.1.3. Working Groups

Six working groups were established to provide discipline-specific forums for project officers to report on the progress of activities, collaborate across workstreams, engage with stakeholders, and identify issues that required escalation for PCG or ESC direction or decision-making. The six working groups and their areas of focus are summarised in Table 13.

Table 13 Discipline working groups

Working Group	Focus
Business Case Working Group	Reviewing and providing inputs to the preparation of the PE. Engagement with relevant agencies and oversee preparation of submissions to IA.
Technical Working Group	Conducting transport corridor planning studies and preparation of technical designs and related documentation.
Transport and Operations Working Group	Consideration of potential implications for the transport network including road operations, public and active transport.
Land Use and Economy Working Group (LUEWG)	Consideration of land use and economic development opportunities and preparation of demographic forecasts.
Engagement Working Group	Developing and overseeing activities for community consultation and stakeholder engagement. Coordinating TMR and the City external communications and engagement.

Working Group	Focus
Cross-Border Working Group	Identify and manage issues and opportunities associated with improving PT connectivity across the Queensland / New South Wales border. Engagement with Transport for New South Wales (TfNSW) and Tweed Shire Council.

1.4.1.1.4. Joint Project Team

In addition to the governance forums identified above, a TMR/City Joint Project Team (JPT) was established to provide a forum for regular coordination of project activities to complete the PE. The JPT was chaired by the TMR Project Manager and comprised representatives of the:

- TMR project team
- TMR Project Evaluation Unit (PEU)
- The City project team
- various consulting advisors to TMR and the City who were undertaking PE tasks.

1.4.1.2. Preliminary Evaluation approval processes

The approvals process for this PE includes the following:

- Review by the TMR and the City project teams
- PCG review and endorsement
- ESC review and endorsement
- the City council consideration and approval (City-led)
- Submission to TMR Senior Leadership to seek endorsement and decision regarding progress to Business Case development (TMR-led) Infrastructure Investment Committee Gate 2
- Submission to IA to seek endorsement of Stage 2 submission, for recognition of the project as a potential investment option on the Infrastructure Priority List (TMR-led).

Figure 10 identifies the general sequence of approvals for this PE.

Figure 10 PE approval processes

1.4.2 Stakeholders

Stakeholder engagement was integral to assessing the options considered in this PE. This section identifies:

- the approach to stakeholder engagement
- the project stakeholders, their interests and timing of engagement

- stakeholder needs.

1.4.2.1. Approach to stakeholder engagement

Stakeholder engagement was guided by TMR's Communication and Engagement Plan that identified project stakeholders and their interests. Engagement occurred at various stages through the development of the PE through regular meetings of established governance forums, such as the Land Use and Economy Working Group (LUEWG) and the Engagement Working Group, and as targeted stakeholder engagement activities. The Engagement Working Group provided coordination of project communications and activities across TMR and the City's respective stakeholder engagement functions.

Community engagement on the PE was undertaken by TMR to coincide with the completion of the corridor studies:

- Burleigh Heads to Tugun completed from July to September 2021
- Tugun to Coolangatta in November 2022.

The outcomes of the community consultation activities are outlined in Chapter 15 – Public Interest Assessment.

1.4.2.2. Stakeholder interests and involvement

Various stakeholders were engaged including government agencies, interest groups and members of the community. Table 14 identifies the stakeholders, their interest and involvement in the project.

Table 14 Project stakeholders

Stakeholder	Interest in Potential Project	Involvement	Timing of Involvement		
			Strategic Assessment (Previous Phase)	Preliminary Evaluation (Current Phase)	Business Case Development (Next Phase)
TMR	Transport network	Joint project owner	✓	✓	✓
City of Gold Coast	Transport network, economic and community benefits	Joint project owner	✓	✓	✓
Queensland Treasury	Funding agency	Consultation and ability to provide feedback on process for project evaluation	✓	✓	✓
Department of State Development, Infrastructure, Local Government and Planning (DSDILGP)	Land use and economic development outcomes	Consultation and ability to input into study	✓	✓	✓

Stakeholder	Interest in Potential Project	Involvement	Timing of Involvement		
			Strategic Assessment (Previous Phase)	Preliminary Evaluation (Current Phase)	Business Case Development (Next Phase)
Department of Energy and Public Works (DEPW)	Property resumption	Consultation regarding potential property resumptions	x	x	✓
Other Queensland Government agencies	Portfolio implications	Consultation and ability to input into study	x	x	✓
Transport for New South Wales (TfNSW)	Project integration and cross-border issues	Collaboration on planning to improve the PT network in the southern Gold Coast Consultation and ability to input into planning and design	✓	✓	✓
Tweed Shire Council	Project integration and cross-border issues	Consultation and ability to input into planning and design	✓	✓	✓
IA	Ensuring project follows Assessment Framework	Consultation and ability to provide feedback on process for project evaluation Assessment of submissions to maintain project on the Infrastructure Priority List	✓	✓	✓
Department of Infrastructure, Transport, Regional Development, Communications and the Arts and Cities (DITRDCA)	Funding partner	Properly developed analysis which allows prioritisation of funding for works	✓	✓	✓

Stakeholder	Interest in Potential Project	Involvement	Timing of Involvement		
			Strategic Assessment (Previous Phase)	Preliminary Evaluation (Current Phase)	Business Case Development (Next Phase)
Mayor, the City	Project benefits, impacts, status and timing	Consultation and ability to input into study	✓	✓	✓
Minister for Transport and Main Roads	Project benefits, impacts, status, timing and funding	Consultation and ability to input into study	✓	✓	✓
Minister for State Development, Infrastructure, Local Government and Planning	Project benefits, impacts, status, timing and funding	Consultation and ability to input into study	✓	✓	✓
Local Members of Parliament	Project benefits, impacts, status, timing and funding	Consultation and ability to input into study	x	✓	✓
Local Councillors	Project benefits, impacts, status and timing	Consultation and ability to input into study	x	✓	✓
Queensland Airports Ltd – lessees for Gold Coast Airport	Project benefits and impacts for Gold Coast Airport	Consultation and ability to input into planning and design	x	x	✓

Stakeholder	Interest in Potential Project	Involvement	Timing of Involvement		
			Strategic Assessment (Previous Phase)	Preliminary Evaluation (Current Phase)	Business Case Development (Next Phase)
Existing PT operators	PT operations	Consultation and ability to input into planning and design	x	x	✓
Schools and other social infrastructure	Project impacts including changes to access	Consultation and ability to input into study	x	x	✓
Affected landowners and lessees	Impacts on properties including possibility of acquisition	Equitable treatment where properties are to be impacted or acquired	x	x	✓
PT users	Impact on PT services	Consultation and ability to input into planning and design	x	x	✓
Cycle groups	Impact on cycle network	Consultation and ability to input into planning and design	x	x	✓
Private vehicle users	Impact on road use	Consultation and ability to input into planning and design	x	x	✓

Stakeholder	Interest in Potential Project	Involvement	Timing of Involvement		
			Strategic Assessment (Previous Phase)	Preliminary Evaluation (Current Phase)	Business Case Development (Next Phase)
Road transport operators – freight, taxi, private bus, tourist operators	Impact on road use	Consultation and ability to input into planning and design	x	x	✓
Service/utility authorities	Implications for utility services	Consultation and ability to input into planning and design	x	✓	✓
Business groups	Impacts on access to businesses and opportunities for increased commercial development	Consultation and ability to input into study	x	x	✓
Community groups	Project impacts and benefits for broader community	Consultation and ability to input into study	x	x	✓
Local community	Local impacts	Consultation and ability to input into study	x[8]	x	✓

[8] Community consultation undertaken prior to the Strategic Assessment as detailed in Chapter 15 – Public interest assessment.

Stakeholder	Interest in Potential Project	Involvement	Timing of Involvement		
			Strategic Assessment (Previous Phase)	Preliminary Evaluation (Current Phase)	Business Case Development (Next Phase)
Indigenous groups	Impacts on items and areas of Indigenous cultural significance	Consultation and ability to input into study	x	x	✓
Environmental groups	Environmental impacts	Consultation and ability to input into planning and design including Cultural Heritage Impact Management Plan	x	x	✓
Disability sector	Equitable access	Consultation and ability to input into planning and design	x	x	✓

1.4.3 Alignment with stakeholder needs

Table 15 shows the needs and issues of the project stakeholders identified above.

Table 15 Project stakeholder needs

Stakeholder	Stakeholder needs and issues identified
TMR	• Improved PT network • Cross-border PT • Function of M1 and Gold Coast Highway • Integration with future heavy rail • Interface with Queensland Airports Limited and Commonwealth Government
City of Gold Coast	• Improved PT network • Population growth management • Cross-border PT connectivity • Economic, community and environmental benefits

Stakeholder	Stakeholder needs and issues identified
Queensland Treasury	• Requires understanding of process and methodology to complete the PE • Project evaluation to meet PAF • Project cost to Government
DSDILGP	• Requires understanding of how the project may support economic, employment and population growth in the study area
DEPW	• Requires information regarding potential property impacts including acquisitions
Queensland Rail	• Requires understanding of potential interface with future heavy rail at Gold Coast Airport
Other Queensland Government agencies	• Require understanding of the project in the context of portfolio responsibilities
TfNSW	• Requires detailed understanding of the project • Integration with the Tweed Shire transport network • Cross-border PT
Tweed Shire Council	• Requires detailed understanding of the project • Integration with the Tweed Shire transport network • Cross-border PT connectivity • Economic, community and environmental benefits
Infrastructure Australia	• Requires understanding of process and methodology to complete the PE • Project evaluation to meet IA's Assessment Framework for recognition of project as a potential investment option (Stage 2) on the Infrastructure Priority List
DITRDCA	• Requires understanding of project need and how the project may promote economic development and growth
Mayor, the City	• Clear information regarding the benefits and impacts of the project
Minister for Transport and Main Roads	• Clear information regarding the benefits and impacts of the project
Minister for State Development, Infrastructure, Local Government and Planning	• Clear information regarding the benefits and impacts of the project
Local Members of Parliament	• Clear information regarding the benefits and impacts of the project
Local Councillors	• Clear information regarding the benefits and impacts of the project

Stakeholder	Stakeholder needs and issues identified
Queensland Airports Limited – lessee for Gold Coast Airport	• Understanding of project integration with Gold Coast Airport and future heavy rail • High quality PT connection to Gold Coast Airport • Implications for land uses and operations within Gold Coast Airport site
Existing PT operators	• Require detailed understanding of the project • Understanding of potential changes to existing bus networks • Integration with existing light rail operations • Cross-border PT
Colleges, universities, schools and other social infrastructure	• Clear information regarding changes to existing road, PT and active transport access arrangements
Affected landowners and lessees	• Clear information regarding the extent of property impacts • Clear understanding of timelines and processes
PT users	• Clear information regarding changes to PT services • Cross-border PT
Cycle groups	• Clear information regarding changes to cycle network • Gold Coast Oceanway
Private vehicle users	• Clear information regarding changes to roads and car parking
Road transport operators – freight, taxi, private bus, tourist operators	• Clear information regarding changes to roads including commercial vehicle access, loading zones, taxi zones and bus zones
Service/utility authorities	• Involvement where project may impact existing services or planning for future services
Business groups	• Planning certainty • Understanding of project processes and timing • Improved access to business and employment locations
Community groups	• Certainty regarding the nature and extent of impacts from the project • Project benefits • Timing of the project • Opportunities to provide feedback on the project
Local community	• Certainty regarding the nature and extent of impacts from the project • Timing of the project • Opportunities to provide feedback on the project
Indigenous groups	• Identification of Cultural Heritage and Native Title issues • Management and mitigation of impacts

Stakeholder	Stakeholder needs and issues identified
	• Preservation of Indigenous heritage • Involvement of Indigenous persons and businesses in the development and possible future construction of the project
Environmental groups	• Identification of environmental impacts and proposed mitigations • Burleigh Head National Park estuarine creeks and greenspace
Disability sector	• Confirming compliance with accessibility requirements and applicable guidelines • Accessibility to PT infrastructure and services

2. Project background

This chapter outlines relevant project context including:

- Project description
- Project location and scope definition.

2.1 Project description

This PE considers the need and options for improving PT as part of a multi-modal response to transport problems in the southern Gold Coast along the coastal corridor between Burleigh Heads and Coolangatta.

The southern Gold Coast offers an amenity-based beachside lifestyle with a comfortable climate and attractive urban environment. The area is within one of Australia's fastest growing regions and caters for many tourists and day trippers from other regional centres. The attractive lifestyle of the southern Gold Coast will continue to support ongoing population, tourism and employment growth. While this growth is anticipated by government, it will bring problems and opportunities for future economic activity, and the liveability and sustainability of the southern Gold Coast.

The BH2C (Burleigh Heads to Coolangatta) PE is part of a program of transport initiatives that aim to address these future problems through a multi-modal response that includes road upgrades, complementary public transport enhancements, and active transport infrastructure projects. The transport role of the BH2C project is to:

- address forecast road congestion and decreasing travel time reliability between population and activity centres along the coastal urban area between Burleigh Heads and Coolangatta
- cater to a range of employment, education and recreation trips by residents and visitors within the BH2C area as well as trips beyond the area, including cross-border travel
- support future growth in passenger numbers passing through the Gold Coast Airport
- support the national role of the M1 by reducing its use for local trips.

This PE has been developed as part of planning and assessment activities being conducted by the Queensland and New South Wales Governments, the City and Tweed Shire Council. These activities include multi-modal corridor studies based on an extension of the Gold Coast Light Rail (GCLR) system southwards to Tweed Heads South. A corridor study completed by TMR in 2020 determined the preferred PT route from Burleigh Heads to Tugun, and a further corridor study completed in 2021 addressed the corridor from Tugun to Coolangatta (via the Gold Coast Airport). Further details on the previous planning studies is provided in Section 3.3.1.

These corridor studies included extensive community and stakeholder consultation. The Burleigh Heads to Tugun study assessed five route options and recommend a route for the future light rail along the Gold Coast Highway. The study noted:

"This would allow the light rail to service important cultural and urban attractors including the Burleigh Heads Village Centre, Palm Beach village centre, Currumbin Wildlife Sanctuary, Southern Cross University, the beaches and importantly the Gold Coast Airport. The Gold Coast Highway route was found to be the most direct and fastest of the corridors investigated. It also has the greatest potential for mode shift to public transport as it is close to where people already live, follows the alignment of the existing frequent trunk bus route (700), as well as providing the potential to transform the Gold Coast Highway into the Gold Coast Boulevard through careful design and treatment. Providing a light rail extension down the Gold Coast Highway also means the heavy rail corridor adjacent to the M1 will remain protected for a future extension of the Gold Coast line passenger railway which is intended to fulfil a longer distance regional transport function."[9]

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[9] TMR. 2020. Gold Coast Highway (Burleigh Heads to Tugun) Multi-modal Corridor Study Executive Summary. P 2.

In the interest of establishing an integrated cross-border PT system, Transport for New South Wales (TfNSW) is also progressing a corridor study that considers the corridor from Coolangatta to Tweed Heads South.

Prior to this PE, a Strategic Assessment was completed to consider the transport problems and opportunities in the southern Gold Coast and northern Tweed cross-border urban area. That assessment confirmed the need for a major intervention to improve public transport on the southern Gold Coast as well as a potential extension into the northern section of Tweed Shire.

The BH2C project also considers transport connectivity between Brisbane and the Gold Coast, supporting related initiatives to address congestion in the Brisbane to Gold Coast transport corridor. Figure 11 identifies the location of the BH2C project within the broader Gold Coast and Tweed regional setting.

Figure 11 Project location within regional context

2.2 Project location and scope definition

This PE focuses on PT options within the jurisdiction of the Queensland Government. The area of focus for these options is the densely populated linear coastal corridor south of Burleigh Heads. This corridor is based on the route selection components of the Gold Coast Multi-modal Corridor Studies (2020 and 2021) and follows the Gold Coast Highway. The study area is defined by the boundaries of relevant Australian Bureau of Statistics (ABS) Statistical Area Level 1 (SA1) demographic areas. The study area for the PE is shown in Figure 12.

The study area extends from Tallebudgera Creek in the north to Coolangatta in the south. The area is defined by the M1 and Queensland State border to the west and the Pacific Ocean to the east. The areas in New South Wales that could be influenced by the BH2C project are included in the modelling framework, though the study area itself is wholly contained within Queensland. Bus services within New South Wales and crossing the border into Queensland were also modelled.

Figure 12 Study area

The Gold Coast Highway is the main north-south arterial road within the study area. The M1 transects the western boundary of the core study area. This is the subject of an approved major upgrade to complete the six-laning of the M1 to the Tugun Bypass, provide a service road network, and provide strategic active transport links. The study area includes:

- the Gold Coast International Airport and Southern Cross University (SCU)
- the South East Queensland Regional Plan 2017 (*ShapingSEQ*) designated major regional activity centre of Coolangatta
- the *ShapingSEQ* designated Southern Gateway Regional Economic Cluster (REC) incorporating Coolangatta, the Gold Coast Airport and Tweed Heads
- the John Flynn Private Hospital
- the future Tugun Satellite Hospital (construction underway, estimated completion 2023)
- District centres including Burleigh Heads, Palm Beach and Tugun.

The Pines shopping centre at Elanora is a district centre located immediately adjacent to the study area's western boundary. The study area is also host to a number of major events that support tourism and economic activity.

The project interacts with a number of natural geographic features. Figure 13 shows the key water features relevant to the study area and include the Tallebudgera Creek, Currumbin Creek and Burleigh, Coolangatta and Flat Rock creeks.

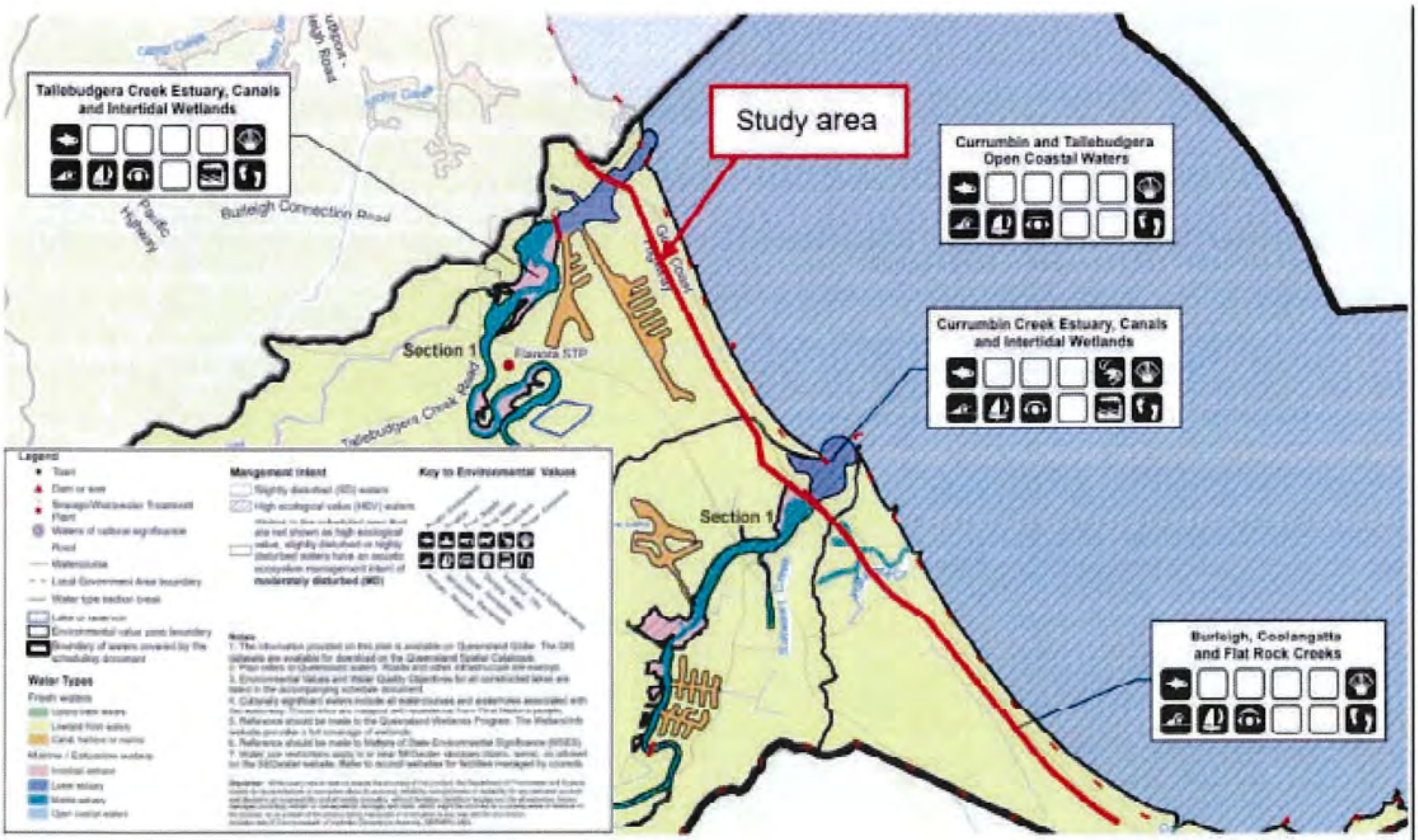

Figure 13 BH2C study area catchment map

Other important geographical features within the study area includes Burleigh Head National Park, Burleigh Hill, Currumbin Hill Conservation Park and Currumbin Hill. Each of these features have been considered throughout the assessment, particularly in the design development and environmental assessment (Chapter 5). Further detail on the potential impacts to these from the project, and how they have been considered, is included in Appendix E: Design Development Report.

3. Project justification (Need and Priority)

This chapter articulates the justification for the Project by explaining the strategic context and the risk of doing nothing. The chapter outlines:

- Review of Strategic Assessment outcomes
- Strategic alignment
- Problems and opportunities
- Service requirements
- Project rationale.

The BH2C PE builds on the Strategic Assessment completed in 2021, as well as the previous consideration of service need undertaken as part of the GCLR Stage 3 project evaluation, completed between 2016 and 2018. Section 3.1 provides an overview of the Strategic Assessment and how its outcomes have been reviewed and revised as part of this PE while Table 18 includes a summary of previous GCLR Stage 3 project evaluation. The Strategic Assessment is presented in Appendix A: Public transport needs in the southern Gold Coast and northern Tweed region Strategic Assessment.

3.1 Review of Strategic Assessment outcomes

3.1.1 Overview of Strategic Assessment

This Strategic Assessment considered the transport problems and opportunities in a broad study area spanning parts of the southern Gold Coast and Northern Tweed region, extending south from Burleigh Heads to Coolangatta and including the areas of Tweed Heads, Tweed Heads South, Cobaki Lakes and Banora Point within New South Wales (refer Figure 14). The Strategic Assessment established service needs and identified project benefits and a range of options to address the service needs.

Figure 14 Broader cross-border study area

An ILM process was undertaken, and this included a workshop to establish and confirm the problems and opportunities in the study area. The ILM process was undertaken in accordance with the Queensland Government's BCDF and Investment Logic Mapping Guide and informed by the Queensland Treasury's PAF and the Infrastructure Australia Assessment Framework (IAAF). The ILM workshop was attended by representatives from TMR and the City, and included selected members from the ESC, PCG and other working groups.

The Strategic Assessment identified the need to develop a connected, accessible, sustainable and integrated transport network in the study area, underpinned by four service needs identified as:

- **Move more people in less vehicles:** Deliver a reliable public transport network for visitors and residents in the southern Gold Coast and northern New South Wales to reduce reliance on private vehicles, protect the nationally important M1 from being overrun by local traffic, and avoid the significant impacts borne from increased congestion and travel times on the constrained road network.

- **Connect the Airport:** Connect the highly strategic Gold Coast International Airport to the rest of the city and to northern New South Wales by quality public transport, providing vital benefits to regional industries, particularly the tourism sector, and supporting the Brisbane 2032 Olympic and Paralympic Games.
- **Support employment growth:** Help realise the considerable potential for regional economic growth in the southern Gold Coast and northern Tweed by providing reliable and frequent integrated cross-border public transport and improving the accessibility of the Airport precinct and Coolangatta/ Tweed Heads major activity centre.
- **Create a greater range of lifestyle alternatives to urban sprawl and thereby reduce environmental impacts:** Support state and local government policies to contain urban sprawl by providing lifestyle alternatives based on consolidating dwelling growth in high amenity communities with sustainable transport connections to jobs and attractions.

3.1.2 Review of ILM

Through this PE process the Strategic Assessment ILM has been reviewed and updated. Key changes to the ILM included the identification of six simplified problems / opportunities, in place of the previous four, and identification of five more focused Project Benefits, in place of the previous ten. The updated ILM informed a review of the previous options longlist, developed as part of the Strategic Assessment. The revised ILM prepared for the BH2C PE is included in Section 3.6.1 .

3.1.3 Review of options analysis from Strategic Assessment

The Strategic Assessment process included the identification of an options longlist comprising a broad range of solution options to address the service needs. This options longlist was developed as part of the ILM workshop process and with the intention to refine and confirm the options as part of the PE phase. Options analysis completed as part of the PE has reviewed the previous options longlist and the findings are presented in Chapter 4 – Options generation and analysis.

3.2 Strategic context

This section provides contextual information describing the future population and employment growth forecast to occur on the Gold Coast and northern Tweed, including a focus on the BH2C study area.

3.2.1 Population growth in the southern Gold Coast and northern Tweed

The Gold Coast is Australia's sixth largest city with approximately 615,000 residents in the Local Government Area (LGA) in 2019[10]. The city has experienced strong population growth in recent years, with a compound annual growth rate (CAGR) of 2.3 per cent in the decade ending 30 June 2019. This is higher than the Queensland average of 1.6 per cent per annum over the same period. Between 2019 and 2041, the Gold Coast is projected to increase its residential population by a further 319,000 residents or 52 per cent. By 2041 its residential population is estimated to reach 934,000.

In 2019 the BH2C study area had an estimated population of 34,220 persons and this is forecast to grow by 39 per cent to 47,503 persons in 2041, with a CAGR of 1.5 per cent. Population growth in the BH2C study area is forecast to be lower than that of the broader Gold Coast growth rate.

Across the border in New South Wales, the Tweed Shire had an estimated resident population of 95,906 in 2019[11]. Between 2019 and 2041, the population of the Tweed Shire[12] is forecast to increase from 97,767 persons to 132,221 persons, an increase of 35 per cent (34,454 persons).

[10] Queensland Governments Statisticians Office (QGSO) 2018 medium series projections, refined by TMR's TAU in 2021 to include Transport for New South Wales (TfNSW) Travel Planning Zone projections for the Tweed area, reflect updated assumptions for the Cobaki Lakes area based on more detailed information and reflect refinements to the Gold Coast airport

[11] . Idcommunity (2023). *Tweed Shire Estimated Resident Population (ERP)*. Accessed at https://profile.id.com.au/tweed/population-estimate#:~:text=The%20population%20estimate%20for%20Tweed,In%20Regional%20NSW%20was%200.83%25.

[12] /idcommunity (2023). *Tweed Shire Council: Population Summary*. Accessed at https://forecast.id.com.au/tweed/population-summary#:~:text=Between%202016%20and%202041%2C%20the,average%20annual%20change%20of%201.39%25.

The northern area of Tweed Shire is one of the fastest growing regional centres in New South Wales, and has significant economic and social connection with the rapidly growing SEQ. This includes connections nationally and internationally through the Gold Coast Airport. Tweed Shire is strategically located to take advantage of employment opportunities and connectivity to local, regional, and international markets. Tweed Shire has strong connections to a potential market of 3.56 million people within a three-hour radius. Due to its location, key opportunities exist for the northern Tweed Shire to maximise its economic potential through cross-border and intra-state partnerships[13]. In 2019 the northern Tweed area, comprising the areas of Tweed Heads, Tweed Heads South and Banora Point, had a population of 44,840 which is forecast to grow by 31 per cent to 58,583 in 2041.

Considerable growth is projected to occur in the BH2C study area and in the neighbouring northern area of Tweed Shire as shown in Table 16.

Table 16 Projected population and dwelling growth 2019 to 2041

Area	2019	2041	Growth 2019 – 2041	% Growth 2019 – 2041	CAGR
Gold Coast LGA	614,993	933,958	318,965	52%	1.9%
BH2C study area	34,220	47,503	13,283	39%	1.5%
Tweed Shire LGA	95,906	132,221	36,315	38%	1.4%
Northern Tweed area[14]	44,840	58,583	13,743	31%	1.2%
Combined cross-border urban area[15]	79,060	106,086	27,027	34%	1.3%

Source: .id profile for Tweed Shire LGA, Gold Coast Strategic Transport Model – Multi Modal (GCSTM-MM) v2.3 for all other areas

Key observations of forecast population growth between 2019 and 2041 include:

- Both the Gold Coast LGA and the BH2C study area are expected to grow significantly between 2019 and 2041 with total growth of 52 per cent and 39 per cent respectively
- Growth in the northern areas of Tweed Shire will result in a population of 58,583 which when combined with the study area population of 47,503 results in a cross-border urban area population of 106,068
- These two rapidly growing areas in New South Wales and Queensland have strong economic and social connections, with the border being largely irrelevant to communities on both sides of it.

3.2.2 Employment growth

The Gold Coast is a significant economic contributor to the Queensland economy and accounted for over 10 per cent of Queensland's Gross State Product (GSP) during the 2021 financial year[16]. As one of Australia's most popular tourist destinations, the Gold Coast economy is built on a strong tourism and hospitality industry, with over 12 million domestic and international visitors in the year ending 30 June 2019[17].

[13] Tweed Shire Council. 2020. Local Strategic Planning Statement, P36.
[14] *The 'Northern Tweed area' comprises the areas of Tweed Heads, Tweed Heads South and Banora Point*
[15] *The 'Combined cross-border urban area' is defined as the area comprising both the BH2C study area and the 'Northern Tweed area'*
[16] .idcommunity (2021). *Gold Coast City Gross product.* Accessed at https://economy.id.com.au/gold-coast/gross-product.
[17] Tourism Research Australia (2021). *Local Government Area Profiles 2019: Gold Coast (C).* Accessed at https://www.tra.gov.au/Regional/local-government-area-profiles.

As the busiest regional airport in Australia[18], the Gold Coast Airport is a key regional economic driver located within the BH2C study area. The airport will be integral to future growth of knowledge-based industries that rely on interstate connectivity for passenger and air freight movements. Elsewhere in the study area, other key industries such as health care and social assistance, construction, accommodation and retail trade, education and training, also help drive the Gold Coast economy.

The projected employment growth from 2019 to 2041 is shown in Table 17. Between 2019 and 2041:

- Gold Coast LGA employment is expected to grow by 154,885 employed persons or 52 per cent
- BH2C study area employment is expected to grow by 7,167 employed persons or 53 per cent
- Tweed Shire LGA employment is expected to grow by 13,973 or 43 per cent, with 41 per cent of this growth occurring in the northern urban area
- Employment growth in the BH2C study area combined with employment growth in the northern areas of Tweed Shire[19] result in a cross-border urban area employment growth of 12,452 employed persons or 32 per cent, generating significant cross-border commuter travel demands.

Table 17 Projected employment growth 2019 to 2041

Area	Employment				CAGR
	2019	2041	Growth 2019 – 2041	% Growth 2019 – 2041	
Gold Coast LGA	299,067	453,952	154,885	52%	1.9%
BH2C study area	13,479	20,646	7,167	53%	1.9%
Tweed Shire LGA	32,696	46,669	13,973	43%	1.6%
Northern Tweed area	18,422	24,144	5,722	31%	1.2%
Combined cross-border urban area	38,712	51,164	12,452	32%	1.2%

Source: id profile for Tweed Shire LGA, Gold Coast Strategic Transport Model – Multi Modal (GCSTM-MM) v2.3 for all other areas

Residents in the study area are generally employed within the services, professional and industry sectors which, as presented in Figure 15, are projected to cumulatively employ 18,938 persons by 2041. Employment growth is expected to be driven by the Gold Coast Airport (aviation), Southern Cross University (education), and the John Flynn Private Hospital (health).

[18] https://www.bitre.gov.au/publications/ongoing/airport_traffic_data
[19] Comprising the areas of Tweed Heads, Tweed Heads South and Banora Point

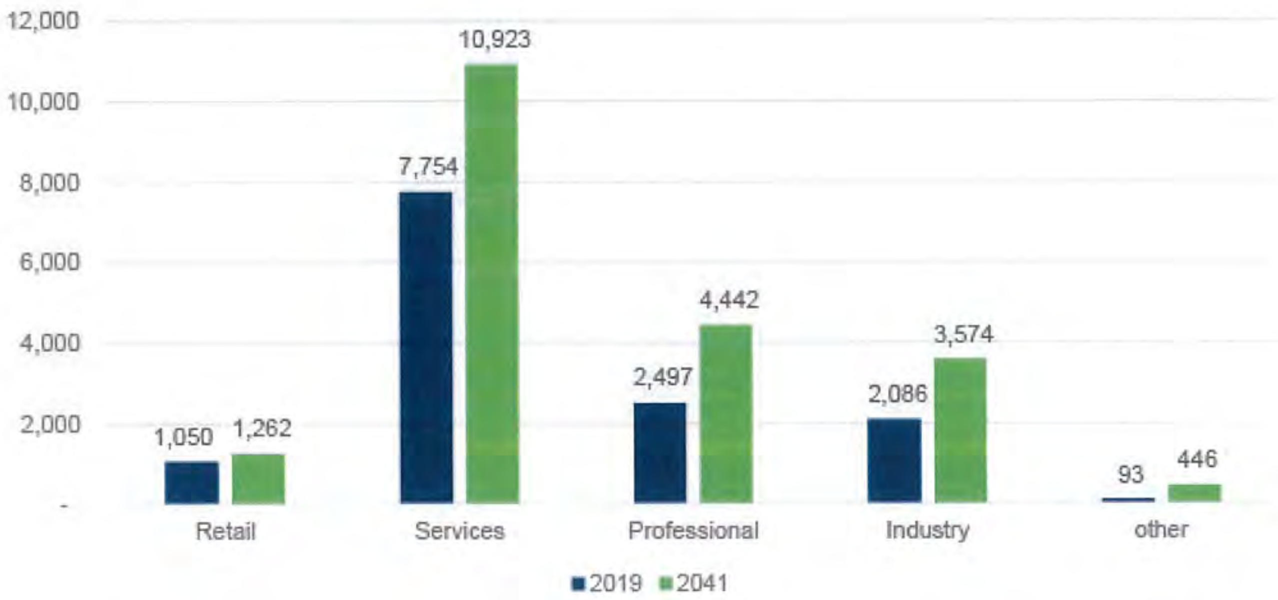

Figure 15 Growth of key employment sectors in the BH2C study area from 2019 to 2041[20]

Key observations of forecast employment growth between 2019 and 2041 include:

- Expected employment growth in the study area (53 per cent) is consistent with employment growth of the Gold Coast LGA (52 per cent)
- Expected employment growth in the study area (53 per cent) is higher than population growth (39 per cent), however still results in a substantially higher population (47,503) than jobs (20,646)
- Expected employment growth in the northern Tweed area (31 per cent) is lower than the study area (53 per cent).

3.3 Strategic alignment

3.3.1 Previous detailed planning studies

Table 18 provides a summary of previous strategic or detailed planning studies relevant to the BH2C PE. The table summarises the scope, issues identified and conclusions and recommendations of relevance to this PE. The aim of the PE is to build on work previously completed which remains of relevance to the Project.

Table 18 Previous strategic or detailed planning studies

Title	Author / Year	Interaction with PE study area
Gold Coast Rapid Transit Concept Design and Impact Management Plan (CDIMP)	TransLink Division, TMR (2009)	The original CDIMP and associated Business Case assessed the entire corridor from Helensvale to Coolangatta. This work provided the foundation for GCLR Stage 1 planning and identified future stages of the GCLR system, including an ultimate extension to Coolangatta. The CDIMP considered a number of alternative modes and determined light rail as the preferred mode for the corridor.
Gold Coast Southern and	TMR (2012)	TMR initiated the Gold Coast Southern and Central Area Transport Study (GCSCATS) in recognition of the need to provide a more

[20] Gold Coast Strategic Transport Model MM V2.3

Title	Author / Year	Interaction with PE study area
Central Area Transport Study (GCSCATS)		sustainable and integrated transport system for the Gold Coast. Specific actions and outcomes recommended in the Preferred 2031 Area Strategy of relevance to the BH2C PE include: • Light rail from Broadbeach to Burleigh Heads, Gold Coast International Airport and Coolangatta CBD centred on the most contestable public transport markets while providing inter-regional connections to passenger rail • The high patronage capacities offered by light rail, when connected to the major centres along the coastal corridor, are likely to provide a variety of benefits including encouraging land use intensification.
This reference has been removed as it contains information that is no longer available.		
Light Rail Southern Gold Coast Consultation Summary Report[21]	The City (2016)	The City conducted public consultation to inform future planning for light rail in the southern Gold Coast and sought feedback on seven route options. A total of 3,606 responses were received (3,580 online and 26 hardcopy) with the most supported route being Broadbeach to Burleigh Heads (79 per cent supportive and 12 per cent opposed), followed by Burleigh Heads to the Gold Coast Airport via Gold Coast Highway (70 per cent supportive and 18 per cent opposition), demonstrating the strong support for the Project in the community.
This reference has been removed as it contains information that is no longer available.		

[21] Council of the City of Gold Coast. (2015). *Light rail southern Gold Coast.* https://gchaveyoursay.com.au/lightrailsoutherngc?tool=survey_tool

Title	Author / Year	Interaction with PE study area
This reference has been removed as it contains information that is no longer available.		
Gold Coast Light Rail Stage 3 Preliminary Business Case Summary[22]	The City (2018)	The Stage 3 PBC acknowledged the City endorsed route from Broadbeach South Station to Coolangatta via the Gold Coast International Airport as Stage 3 of the GCLR in May 2016. It noted that the Stage 3 extension was broken into two sub-stages, with the PBC focusing on the Stage 3A extension from Broadbeach to Burleigh Heads and planning and consultation for a Stage 4 extension (previously referred to as Stage 3B) from Burleigh Heads to Coolangatta unlikely to occur until 2019.
Gold Coast Light Rail Stage 3 Business Case/Cost Benefit Analysis Summary[23]	Building Queensland, TMR, The City (2019)	The Stage 3 (previously referred to as Stage 3A) Detailed Business Case (DBC) reconfirmed the need for the system along the length of the southern urban corridor (Broadbeach to Coolangatta via the Gold Coast International Airport). The DBC recommended detailed investigations for a Stage 4 extension (previously referred to as Stage 3B), between Burleigh Heads and Coolangatta, be undertaken in the future.
Building our City – Light Rail Corridor Baseline and Status Reports[24]	The City, TMR (2013, 2015, 2017, 2019)	The City and TMR acknowledge that a key aim of building a light rail system was to create significant flow-on economic, social and environmental benefits for the City, beyond just the transport improvements. This series of reports examined how the light rail corridor is influencing changes in the Gold Coast. The first report in 2013 provided baseline data prior to service commencement. The subsequent status reports in 2015, 2017 and 2019 identified the changes that have taken place within the light rail corridor post-commencement of operations, quantifying benefits driven by the GCLR system.
Building our City – Southern Transport Corridor 2017 Baseline Report[25]	The City, TMR (2017)	In the same manner that the initial baseline report was prepared for the GCLR Stage 1 Light Rail Corridor, this report was prepared to establish a baseline for the Gold Coast southern corridor between Broadbeach and Coolangatta. The report established a broad range of economic, social and environmental planning indicators to allow future comparisons to be made following the delivery of GCLR Stage 3 and a potential GCLR Stage 4.
Gold Coast Highway Burleigh Heads to Tugun	TMR (May 2021)	This study reviewed previous corridor planning to develop an updated transport strategy for a multi-modal transport corridor between Burleigh Heads and Tugun. The study included assessment of five route options ranging from the M1 corridor to the Gold Coast Highway. It concluded that a public transport route along the Gold Coast

[22] Council of the City of Gold Coast. (2018). *Gold Coast Light Rail Stage 3A*. https://www.goldcoast.qld.gov.au/files/sharedassets/public/pdfs/projects/light-rail-stage-3a-preliminary-business-case.pdf
[23] Building Queensland. (2019). *Gold Coast Light Rail Stage 3A Business case/cost benefit analysis summary*. https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0022/54526/GCLR3A_CBA_Summary.pdf
[24] Council of the City of Gold Coast. (n.d.). *Building our city*. https://www.goldcoast.qld.gov.au/Services/Projects-works/Building-our-city
[25] Council of the City of Gold Coast. (n.d.). *Building our city*. https://www.goldcoast.qld.gov.au/Services/Projects-works/Building-our-city

Title	Author / Year	Interaction with PE study area
Multi-Modal Corridor Study[26]		Highway had the highest potential for mass transit to serve areas of greater development intensity and consolidation as envisaged in SEQ Regional Plan (*ShapingSEQ*), since there is more development intensity along the coast[27]. The study noted the Gold Coast Highway corridor could be transformed into a high amenity, community-focused boulevard with priority given to walking, cycling and a world class light rail system that will enhance the liveability and character of the southern coastal suburbs.
This reference has been removed as it contains information that is no longer available.		
Tugun to Coolangatta Multi-Modal Corridor Study	TMR (2021-22)	Following signing of a Memorandum of Understanding (MoU) between the Queensland and New South Wales Governments in early 2020, two multi-modal corridor studies were completed to assess cross-border regional needs and potential public transport offerings.
Tweed Heads to Tweed Heads South Multi-Modal Corridor Study	Transport for New South Wales (TfNSW) (2021-22)	Both studies investigated the potential route options for a light rail system as the preferred mode of transport between Tugun and Tweed Heads South, to support an integrated cross-border community.

3.3.2 Policy context and strategic alignment

Infrastructure initiatives should align with key Government objectives and priorities. The BH2C project demonstrates strong alignment with several Commonwealth, State and local government strategies and plans. The relevant policies are shown in Table 19.

[26] Jacobs. (2021). *Gold Coast Highway (Burleigh Heads to Tugun) Multi-Modal Corridor Study*. https://www.tmr.qld.gov.au/_/media/projects/g/gold-coast-highway-multi-modal-study/gch-multi-modal-corridor-study-report_reduced.pdf

[27] TMR fact sheet https://hdp-au-prod-app-qldtmr-yoursay-files.s3.ap-southeast- .amazonaws.com/9716/6909/7205/GCLR4_route_selection_factsheet.pdf

Table 19 Government policies and strategies relevant to the BH2C PE

Australian Government	Queensland Government	New South Wales Government	Local Government – City of Gold Coast	Local Government – Tweed Shire Council	Other
Australian Infrastructure Audit 2019 Australian Infrastructure Plan 2021 Smart Cities Plan State of Australian Cities 2014-2015 Urban Transport Strategy 2013 Infrastructure Australia – Infrastructure Priority List National Climate Resilience and Adaptation Strategy (2021-2025) 2021	State Infrastructure Strategy South East Queensland Regional Plan 2017 (*ShapingSEQ*) SEQ Regional Transport Plans Queensland Transport Strategy TMR Strategic Plan 2019-2023 Queensland Climate Action Plan 2020-2030	North Coast Regional Plan 2036 Future Transport Strategy	Gold Coast City Plan Gold Coast Transport Strategy 2031 Gold Coast Public Transport Plan 2018-2028 Gold Coast Active Transport Plan 2017-2027 Economic Strategy Action Plan 2022 – 2027	Community Strategic Plan 2017-2027 Local Strategic Planning Statement	Gold Coast Airport Master Plan

Appendix B: Policy context and strategic alignment provides a description of each policy and strategy identified in Table 19 and assesses the alignment of the BH2C project with these documents. Table 20 addresses the alignment of the BH2C project with the strategic goals and objectives of the key government strategies and plans including:

- Australian Government
  - Australian Infrastructure Audit 2019
  - Australian Infrastructure Plan 2021.
- Queensland Government
  - *ShapingSEQ*
  - SEQ Regional Transport Plans.
- Local government
  - Gold Coast City Plan
  - Gold Coast City Transport Strategy 2031.

Table 20 Strategic alignment of the BH2C project with key government strategies and plans

Document / Description	BH2C project alignment
Australian Government	
Australian Infrastructure Audit 2019 The *Australian Infrastructure Audit 2019* covers transport, energy, water, telecommunications, and social infrastructure. It looks at the major challenges and opportunities facing Australia's infrastructure over the next 15 years and beyond. The audit identified the Gold Coast as a nationally significant hotspot for economic growth. The Australian Infrastructure Audit 2019: Urban Transport Crowding and Congestion Paper (the 2019 Audit) also noted the importance of regional airports, including the Gold Coast Airport, for local tourism and economic development, often acting as multimodal transport hubs and centres for commercial activity. It also estimated that the cost of congestion on Gold Coast roads will quadruple from $243 million in 2016 to $973 million in 2031[28].	A major improvement to public transport in the BH2C corridor would support the economic importance of the rapidly growing Gold Coast, in particular the economic contribution of the Gold Coast Airport. Improved public transport connectivity would also assist to reduce the cost of future congestion.
Australian Infrastructure Plan 2021 The *Australian Infrastructure Plan* (AIP) provides a positive reform and investment roadmap for Australia. The plan sets out the infrastructure challenges and opportunities Australia will face over the next 15 years and the solutions required to drive productivity growth, maintain and enhance the nation's standard of living, and ensure Australian cities remain world class. The AIP identifies a strong need for Australia to upgrade its urban passenger transport networks, so they are more integrated, have higher capacity and can meet the twin demands of population growth and rising expectations for service provisions. In particular, the AIP identified the Gold Coast as a nationally significant hotspot for economic growth, a key region in Australia, and signalled the importance of governments supporting the Gold Coast to grow its population and economy, in addition to providing access to new or upgraded infrastructure to enable strong economic and employment links with Brisbane.	A major intervention to public transport in the BH2C corridor is in line with the goals and objectives outlined in the AIP, as it would: • provide enhanced accessibility to key economic activity centres, supporting new and additional employment opportunities and • extend the Gold Coast's high-capacity passenger transport network, while reducing significant car dependency • support population growth through urban consolidation that reduces urban sprawl which often results in disconnected and isolated residential communities.
Queensland Government	
ShapingSEQ *ShapingSEQ* is the Queensland Government's plan to guide future planning of the SEQ region. It outlines a framework to manage SEQ's projected population growth	The BH2C project is directly aligned with the themes and goals of *ShapingSEQ* as directly identified within the regional plan. A major intervention to improve public transport in the BH2C study area would:

[28] This cost excludes estimated vehicle operating costs.

Document / Description	BH2C project alignment
while protecting the region's natural environment and lifestyle. The plan establishes a 50-year vision and identifies five key themes including: Grow, Prosper, Connect, Sustain and Live. *ShapingSEQ* sets a benchmark that 80 per cent of the Gold Coast's 158,900 new dwellings (127,120 dwellings) between 2016 and 2041 are to be achieved through urban consolidation. The plan identifies the BH2C study area as part of a larger 'urban corridor' to accommodate future growth through urban consolidation. The corridor extends from Helensvale in the north, to the Gold Coast CBD at Southport, and along the coastline to the Gold Coast Airport and Coolangatta in the south. *ShapingSEQ* identifies catalytic infrastructure as critical to promoting urban consolidation including an emphasis on a light rail urban renewal corridor from Helensvale to Broadbeach. Goal 3: Connect, identifies *Infrastructure Priority 9 – Extension of light rail from Broadbeach to Coolangatta* as 'Priority region-shaping infrastructure' to support increased dwelling densities and employment growth. *ShapingSEQ* highlights the economic importance of the Southern Gateway REC, which encompasses the Coolangatta / Tweed major activity centre, the Gold Coast Airport and the cross-border community in Tweed. The plan highlights the opportunity to develop an aviation cluster around the Gold Coast Airport.	• accelerate the provision of residential dwellings in the study area to accommodate population growth through urban consolidation • boost accessibility to the Southern Gateway REC, including the Gold Coast Airport, supporting enhanced economic activity and creating high value employment opportunities • provide an efficient and connected transport network to move people and goods, seamlessly across the state border • contribute to environmental sustainability through the provision of more efficient and sustainable public transport that minimises greenhouse gas emissions, while supporting uptake in active transport • reduce traffic congestion and provide improved public realm outcomes to protect and enhance the amenity and liveability of the area.
SEQ Regional Transport Plans The *Regional Transport Plans* guide the planning of an efficient and responsive transport system in Queensland over the next 15 years. The GCLR Project is referred to as one of the 'SEQ shaping projects' in the South Coast Regional Transport Plan. Planning for future light rail expansion to Coolangatta is noted as a response to the *ShapingSEQ* regional directions, including working with the New South Wales Government investigating a potential light rail extension to Tweed Heads. Associated public transport planning that supports the extension of GCLR is noted under *Priority 1: Grow a transport system that supports a consolidated and sustainable urban structure*. This involves planning for public transport interchanges to support the light rail system, additional park 'n' rides and ensuring public transport route structures meet current and future demands on the corridor. The Plan also emphasises the need for significantly enhanced public transport services to support the Brisbane 2032 Olympic and Paralympic Games, where public and active transport will be the focus for moving	The BH2C project is directly aligned with the South Coast Regional Transport Plan as it responds to specific actions including: • A4.21 Burleigh to Coolangatta light rail planning – Undertake planning to determine a preferred alignment, feasibility and potential timing for staged extension of light rail from Burleigh to Coolangatta and explore future possibilities to work in partnership with TfNSW to undertake strategic planning for a light rail connection between Coolangatta and Tweed Heads. - A4.02 Cross-border passenger transport connectivity - In partnership with TfNSW investigate opportunities for improved cross-border passenger transport connectivity. The BH2C project also demonstrates alignment with the *Regional Transport Plans* as it would: • Support the Brisbane 2032 Olympic and Paralympic Games by providing a seamless transport connection to accommodation and competition venues on the Gold Coast • Provide the opportunity for a major public transport interchange and transport hub at the Gold Coast

Document / Description	BH2C project alignment
spectators and workforce during the Games. Another important need identified in the plan is to ensure cross-border public transport connectivity.	Airport, where regional rail, light rail and buses could provide fully integrated and connected public transport services.
Local Government	
Gold Coast City Plan The *Gold Coast City Plan* is focused on protecting and enhancing the Gold Coast's lifestyle by ensuring appropriate sustainable development occurs through to the planning horizon of 2031. It identifies six 'city shaping' themes that will play an important role in shaping future growth and managing change across the city: • Creating liveable places • Making modern centres • Strengthening and diversifying the economy • Improving transport outcomes • Living with nature • A safe, well-designed city. The *City Plan* focusses a substantial proportion of future urban development in locations for urban consolidation around urban centres and public transport to achieve an economically efficient settlement pattern and minimise urban expansion. Growth and development are planned to be concentrated in a network of well-serviced urban places that have good access to public transport, services and infrastructure, or places where future improvements to public transport will provide a catalyst for higher density living.	A major intervention to improve public transport in the BH2C study area directly contributes to the 'city shaping' theme of 'improving transport outcomes'. It also facilitates 'a safe, well designed city' and 'strengthening and diversifying the economy' through provision of an efficient transport system that enhances connectivity and accessibility to key activity centres in the southern Gold Coast and more broadly, in the cross-border community and north to the central Gold Coast.
Gold Coast City Transport Strategy 2031 The *Gold Coast City Transport Strategy 2031* is a blueprint for the Gold Coast's transport network focused on guiding transport policy and future investment decisions. The strategy was introduced to ensure all transport funding is allocated to its best use to maximise the benefits delivered to the Gold Coast, protect residents' lifestyle and support continued economic growth. The strategy outlines the transport vision for the Gold Coast in 2031, which entails the city enjoying sustainable growth through being connected by an integrated, safe and efficient transport network that allows for sustainable travel choices. A critical aim of this strategy is the development of an integrated high frequency public transport network on the Gold Coast. The strategy identifies an extension of the light rail corridor through to the Gold Coast Airport, with rapid transit buses linking the coastal light rail with the heavy rail inland.	A major improvement to public transport in the BH2C corridor directly aligns with the Gold Coast City Transport Strategy 2031 as it would further expand the city-wide, high-frequency public transport network and contribute to increased use of public and active transport as sustainable transport options that facilitate economic growth.

Document / Description	BH2C project alignment
The strategy's mid-life review summary undertaken in May 2019, confirmed that, to date, the transport network investments made by the City has supported a shift from private vehicle use to sustainable transport choices, largely borne from the successful delivery of Stages 1 and 2 of the GCLR.	

3.3.2.1. Summary

The review of national, state, and local government strategies and plans has highlighted the following key directions for the BH2C study area:

- As identified by the Australian Infrastructure Plan 2021, the Gold Coast is a nationally significant hotspot for economic growth and there is a strong need for high-capacity passenger transport networks to support future population and economic growth and support more sustainable transport and environmental outcomes
- Improved public transport between Burleigh Heads, the Gold Coast Airport and Coolangatta is a common element of multiple government planning documents including Shaping SEQ, SEQ Regional Transport Plans, Gold Coast Transport Strategy 2031, Gold Coast City Plan
- As identified in *ShapingSEQ*, the BH2C study area is part of:
  - an 'urban corridor' that is intended to accommodate a significant portion of the city's future growth through urban consolidation, enabled by public transport to be provided in the future passenger transport corridor between Broadbeach and Coolangatta
  - the Southern Gateway REC, containing the Gold Coast Airport, and a focal area of the Gold Coast's future economy where there is the opportunity to develop an aviation cluster around airport.
- The SEQ Regional Transport Plans emphasise the need for significantly enhanced public transport services to support the Brisbane 2032 Olympic and Paralympic Games, where public and active transport will be the focus for moving spectators and workforce during the Games.
- Improving cross-border connectivity to support economic and social integration with Tweed Heads, is highlighted as a strategic priority of Shaping SEQ and the SEQ Regional Transport Plans
- The SEQ Regional Transport Plans, Gold Coast Transport Strategy 2031 and the Gold Coast Airport Master Plan, recognise the opportunity to create a major transport interchange at the Gold Coast Airport where the extension of light rail in the coastal corridor is planned to connect with the future passenger rail ("heavy rail") line and bus services.

3.3.3 TMR Operational Policy alignment

Table 21 outlines how the BH2C project aligns or considers TMR's Operational Policies.

Table 21 TMR operational policy compliance

Operational Policy	Policy description	Required [Y/N]	Project compliance
Cycling Infrastructure Policy and Active Transport	The *Cycling Infrastructure Policy* (CIP) is an important mechanism to deliver the Queensland Government's vision for more cycling, more often and TMR's vision of a single integrated transport system accessible to everyone. The policy requires	Y	The BH2C project has provided for cycling facilities on the identified principal routes as part of technical design development for the shortlisted options considered as part of this PE. This technical consideration has built upon previous work completed during TMR's multi-

Operational Policy	Policy description	Required [Y/N]	Project compliance
	explicit provision for cycling as part of projects on Principal Cycle Network routes and that this be achieved through typically high-quality solutions. Examples are marked bicycle lanes, dedicated crossing facilities, cycle paths, shared paths, continuous networks and end of trip facilities. The SEQ Principal Cycle Network Plan (PCNP) establishes a long-term plan for the future principal cycle network of SEQ. It identifies 'principal routes' and 'future principal routes' having a focus on the function of routes within a five-kilometre radius around trip destinations within urban areas, primarily regional activity centres. The PCNP identifies the Gold Coast Highway and a number of adjacent road corridors as principal routes within the BH2C study area.		modal corridor planning studies for the Burleigh Heads to Tugun and Tugun to Coolangatta routes. The design of active transport facilities will continue in greater detail as the project progresses.
Smart Motorways and Engineering Policy 149 (Managed Motorways)	This policy requires: 1. All motorway upgrade projects to include the provision for a managed motorway outcome within the planning and design phases; and the supply and installation of necessary infrastructure and equipment within the delivery, operation and ongoing maintenance phases of the project. 2. Operational strategies to be developed, implemented, maintained and regularly reviewed for all motorways. 3. Intelligent Transport System infrastructure to be maintained and reviewed to optimise motorway performance	N	The policy is not applicable as the BH2C project is not a motorway project.
Safer Roads and Road Safety Policy	The *Road Safety Policy* helps the State prioritise the safety of the public in the delivery of infrastructure across Queensland's	Y	The development of technical options for assessment as part of the BH2C project has been undertaken in accordance with the *Road Safety*

Operational Policy	Policy description	Required [Y/N]	Project compliance
	road network, enabling TMR's vision of zero deaths and serious injuries on Queensland roads (Queensland Road Safety Strategy 2015-21). The objective of the *Road Safety Policy* is to implement safe system principles, processes and practices that will deliver reductions in the number of fatal and serious injury crashes on Queensland roads.		*Policy*. In alignment with this policy, the BH2C project aims to reduce road congestion and associated road crashes in the southern Gold Coast. The consideration of safety will be continued as the Project progresses.
Accessibility compliance (Accessibility and Inclusion)	The Transport Standards recognise that access to public transport enables people with a disability, their families, and their carers to fully participate in community life and also benefits many older Australians and parents with infants in prams. The standards establish minimum accessibility requirements to be met by providers and operators of public transport conveyances, infrastructure and premises. The Transport Standards consider the range of disability covered by the Disability Discrimination Act (DDA) and apply to most public transport. Complying with the standards involves adhering to the: Disability Standards for Accessible Public Transport 2002 Disability Discrimination Act 1992.	Y	The development of technical options for assessment as part of the BH2C project has been undertaken in accordance with all relevant accessibility requirements. Accessibility considerations relating to the Project are outlined in Chapter 12 – Public interest assessment.
Sustainability Framework, Environmental Sustainability policy and Climate Change compliance	TMR's Sustainability Framework outlines the Department's committed to sustainable planning, delivery and management of the transport network. The Sustainability Framework is consistent with the Transport Coordination Plan. TMR also has the Infrastructure Sustainability and Climate Change policy, which requires the incorporation of sustainability considerations early in projects to ensure the development of a resilient transport network for the future	Y	During the planning and design stage, the project will adhere to the relevant sustainability standards and guidelines, to ensure compliance. To achieve sustainability benchmarks, TMR has elected to use industry-benchmarks from the Infrastructure Sustainability Council (ISC)'s *Infrastructure Sustainability Rating Scheme for Design and As Built ratings*, which incorporates the project design and construction stages. This process requires meeting a rating scheme under the benchmark to ensure sustainability is

Operational Policy	Policy description	Required [Y/N]	Project compliance
	and enhance the adaptive capacity of a project to avoid and mitigate risks. As required in the TMR Climate Change Methodology and Framework, projects must also consider how climate-related trends may impact future demand and benefit realisation in the PE stage.		incorporated throughout the project lifecycle. ISC will be considered throughout the Project's develop and an ISC rating will be progressed in the PE and completed for the Business Case. The PE also considers the TMR Engineering Policy 170, Climate Change Risk Assessment Methodology.

3.3.4 TMR Transport Infrastructure Portfolio

The Portfolio Management Office (PMO) ensures TMR's portfolio of transport infrastructure investments is positioned to deliver outcomes that support the Government's long-term objectives. To better govern, prioritise and manage the TIP, TMR's infrastructure investments are divided into sub-sets (referred to as Investment Programs) with their own distinct governance, management, and reporting arrangements. This project is aligned to the Passenger Transport Infrastructure Program (PTIIP).

The PTIIP, within the Transport Infrastructure Portfolio (TIP), is responsible for the prioritisation of investment, governance and successful delivery of passenger transport infrastructure in Queensland. It includes upgrades and other minor and major projects on the passenger transport network, excluding the rail and light rail networks.

Importantly, the current project is funded from the Transport System Planning Program (TSPP). The TSPP Investment Program (TSPPIP) is a program of "one integrated transport system" planning and investment proposal activities to deliver the right planning at the right time to achieve better transport outcomes for Queensland and better returns on investments. The TSPPIP is committed for the first two years with indicative funding for years three and four, in line with the Queensland Transport and Roads Infrastructure Program 2022-23 to 2025-26 (QTRIP).

3.3.5 Related projects

Transport planning studies in the southern Gold Coast area over the last 20 years have considered various upgrades, improvements and new infrastructure across the road, public transport and active transport networks. These studies reinforce the role of the BH2C public transport corridor as a vital link in the integrated transport for the southern Gold Coast and Northern New South Wales. The BH2C corridor is also liked to supporting bus network upgrades and the existing and planned extensions of the Gold Coast Railway. Table 22 provides an overview of projects that are relevant to the BH2C project.

Table 22 Related projects

Project	Owner	Interaction with PE study area
Gold Coast Light Rail Stage 3	TMR (construction underway)	GCLR Stage 3 is currently under construction with works having commenced in July 2022 and project completion expected in 2025. Stage 3 extends 6.7 kilometres along the Gold Coast Highway from the existing Broadbeach South station to Burleigh Heads. The extension will create a new light rail terminus at Burleigh Heads where passengers who are travelling south toward the Gold Coast International Airport and Coolangatta will be required to transfer to connecting bus services. Bus service patrons travelling north from the BH2C study area to destinations further north, will also be required to transfer to light rail services at Burleigh Heads.

Project	Owner	Interaction with PE study area
Tweed Multimodal Corridor Study	TfNSW	Tweed Shire Council's *Local Strategic Planning Statement* considers cross-border collaboration a priority, where connecting SEQ and Tweed Heads through a transport hub established at the Gold Coast International Airport and SCU will be important to opening up local employment opportunities. The New South Wales Government through TfNSW recently completed a multi-modal corridor study that involved the identification of a 5-kilometre corridor for a future light rail extension from Coolangatta to Tweed Shire. The study was undertaken concurrent with the TMR *Tugun to Tweed Multimodal Corridor study*. These planning studies considered the significant opportunity to establish an integrated cross-border public transport network that can transport workers from the Tweed Shire to the Study Area and the southern Gold Coast, more broadly.
Robina to Tugun Rail Impact Assessment Study	TMR (2005, 2009)	Planning for a proposed extension of the Gold Coast heavy rail line from Robina to Tugun, and an extension to the Gold Coast International Airport, was completed in 2005 and 2009 respectively. The study highlighted that extending the Gold Coast rail line would improve regional public transport connections to and from the rapidly growing Gold Coast region. The first stage between Robina and Varsity Lakes was completed in 2009. It was noted the second stage, between Varsity Lakes and Elanora, and the third stage to the Gold Coast Airport can be constructed when existing capacity constraints on the Gold Coast rail line north of Beenleigh have been addressed. The *Queensland State Infrastructure Plan* confirms the second stage Varsity Lakes to Elanora extension as part of long-term planning, outside of the current program of works.
Varsity Lakes to Gold Coast Airport Heavy Rail Planning	TMR (2021-22)	This study will identify the alignment for a heavy rail extension to the Gold Coast Airport, including the options to be considered. The outcome of the preferred option(s) will inform the consideration of public transport options in the BH2C corridor.
Pacific Motorway M1 Varsity Lakes to Tugun (VL2T) upgrade	TMR (construction underway)	The VL2T project considered possible future network changes along the Gold Coast Highway and will provide additional north-south traffic capacity for local traffic movements. The $1 billion project will upgrade 10 kilometres of the M1 in a staged delivery process, to be completed by the end of 2023. The stages include: • Varsity Lakes to Burleigh (Package A): construction commenced • Burleigh to Palm Beach (Package B): construction contract commenced • Palm Beach to Tugun (Package C): construction contract commenced. The VL2T project will preserve the corridor for a possible future heavy rail extension south of Varsity Lakes and may impact the BH2C project through changes to the road network around the Study Area.

Project	Owner	Interaction with PE study area
Project LIFT Gold Coast International Airport Redevelopment	Gold Coast International Airport (delivery underway)	The $500 million Let's Invest for Tomorrow (LIFT) Project will address terminal capacity issues, support future passenger growth and improve the customer experience at the Gold Coast International Airport. The Southern Terminal expansion commenced in April 2019 and opened to travellers from September 2022. The Gold Coast International Airport was previously the sixth busiest airport in Australia, with Sydney to Gold Coast the fourth busiest route in the country. It has been reported that passenger traffic through the airport has recovered to levels greater than 2019, prior to the COVID 19 pandemic, with the month of September 2022 seeing a total of 511,637 passengers[29]. The anticipated growth in passenger numbers is likely to increase the need and demand for a high frequency and high-capacity public transport service that connects the Gold Coast International Airport to major accommodation nodes and attractions in the region. This is supported by *ShapingSEQ* which noted that by 2037, the Airport is forecast to grow to 16.6 million passenger movements, compared to 6 million in 2017.
Cobaki planned urban community development	LEDA Manorstead Pty Ltd	The Cobaki planned urban community development is located on the Queensland and New South Wales border approximately 1.5 kilometres west of the Gold Coast International Airport and approximately 6 kilometres inland of Tweed Heads. This mixed residential, commercial and community-use urban development proposes to include up to 5,500 new dwellings and accommodate 10,000 to 12,000 new residents. It will include two public primary schools and approximately 87 hectares of land for active and passive open space areas. The development will primarily be serviced through the north-south connection of Boyd Street, with Piggabeen Road providing an alternative connection into the road network that extends east towards Tweed Heads South. This would generate additional travel demand on the north-south corridor of the southern Gold Coast, exacerbating existing congestion and increasing the need for high capacity and high frequency public transport in the area.
Tweed Road Development Strategy four-laning Tweed Coast Road	Tweed Shire Council (2020-2030)[30]	The Tweed Shire Council has initiated the design process to expand a 4.5-kilometre-long section of Tweed Coast Road, from Morton Street at Chinderah to Grand Parade at Casuarina, to four lanes. This road upgrade aims to ensure the Tweed Shire can accommodate and cater for forecast population growth, with an estimated 187,000 additional trips per day on the Tweed Shire road network by 2041. This will service three major residential developments within the area and the new Tweed Valley Hospital situated on Cudgen Road at Kingscliff. These works are expected to

[29] Gold Coast Airport. (2022). *Management & Governance*. https://www.goldcoastairport.com.au/corporate/about-us#statistics_trigger
[30] Tweed Shire Council. (2021). *Tweed Road Development Strategy four-laning Tweed Coast Road*. https://www.tweed.nsw.gov.au/ConstructionProjects

Project	Owner	Interaction with PE study area
		be delivered within 10 years and are largely contingent on the progress of urban land releases in the region. While Tweed Coast Road is situated beyond the BH2C Study Area, a light rail extension in the southern Gold Coast could accommodate planning for the future Tweed Light Rail and enhance connectivity to employment and services in the cross-border community.
Central Gold Coast East-West Passenger Transport Study	TMR and the City (2021-2023)[31]	TMR and the City are working on the Central Gold Coast East-West Passenger Transport Study. This technical study will make recommendations for the development of the future strategic public transport network in the central Gold Coast area over the next 25 years. The initial phase of the study has delivered the *Central Gold Coast Passenger Transport System Strategy*. This strategy provides the basis for and informs the next phases of the study in the development of the future passenger transport network. Assessment of the preferred corridors and precincts for future high frequency east-west public transport services is currently being undertaken. The five corridors being investigated include: • Nerang to Broadbeach • Merrimac to Mermaid Beach • Robina to Broadbeach • Robina to Miami • Robina to Burleigh. The three precincts being investigated include: • Nerang • Broadbeach • Robina.
Gold Coast Heavy Rail Extension – Varsity Lakes to Gold Coast Airport	TMR (2021-2023)	TMR are undertaking a review of the preserved Gold Coast Heavy Rail Corridor between Varsity Lakes and Gold Coast Airport. The project will confirm the future corridor requirements are compatible and complementary to the South East Queensland (SEQ) rail network and can integrate with other developments and infrastructure within southern Gold Coast. The Gold Coast Heavy Rail Extension—Varsity Lakes to Gold Coast Airport project will update planning previously undertaken by the *'Robina to Tugun Impact Assessment Study – 2009'* to support population and economic growth in the area.
New Gold Coast Stations	Cross River Rail Delivery	The Cross River Rail Delivery Authority is continuing with planning and delivery of three new rail stations on the Gold Coast Line to help

[31] TMR (2022). *Central Gold Coast East-West Passenger Transport Study*. https://www.tmr.qld.gov.au/projects/central-gold-coast-east-west-passenger-transport-study

Project	Owner	Interaction with PE study area
	Authority (2019–2023)	connect South East Queensland's growing population. Stations are being planned for Pimpama, Hope Island and Merrimac The new stations will feature: • Onsite parking and passenger drop-off facilities • Connections to pedestrian and cycle paths • Accessible features such as parking, wayfinding signage and platform access • Integration with the current public transport network and improvements to nearby intersections • Lighting and CCTV throughout the car park and station.

3.3.6 Role and function within transport network

The role of the BH2C project in the Gold Coast transport network is to:

- Connect the southern Gold Coast including the Gold Coast Airport and Coolangatta to major destinations across the city
- Facilitate planned urban consolidation in the coastal 'urban corridor'
- Support the national role of the M1 by reducing the need for local trips to access the M1, by improving the efficiency of the Gold Coast Highway for connected local movement of people
- Improve cross-border accessibility between the northern Tweed Shire and the Gold Coast
- Connect with high-frequency bus services, and the existing and planned extensions of the Gold Coast Railway, to provide an integrated public transport network for the southern Gold Coast and Northern New South Wales
- Transition the Gold Coast Highway to a multi-modal 'community boulevard'.

3.3.6.1. Connecting the southern Gold Coast

The Gold Coast is a linear city that has developed around a coastal corridor that extends some 30 kilometres from Southport to Coolangatta. The Gold Coast comprises a number of activity centres spread across various locations, with Coolangatta and the Gold Coast Airport removed from the concentration of economic activity and urban communities further north. Most recent public transport investment has focused on extension of the regional passenger rail line to Varsity Lakes and the delivery of a light rail system from Helensvale to Broadbeach and Burleigh Heads. These public transport improvements have established the trunk components of a high-frequency network that connects most of the activity centres in the central area of the Gold Coast, leaving the southern Gold Coast reliant on bus services as the only public transport option (refer Figure 30). The challenges associated with this lack of public transport connectivity are discussed further in section 3.4.2.1.

As highlighted by *ShapingSEQ*, the delivery of high-frequency public transport connections is needed to create a region of interconnected communities, specifically to connect the Southport-Broadbeach Regional Economic Cluster with the Gold Coast Airport and Coolangatta (the Southern Gateway REC) to maximise community and economic benefits. In particular, improving connectivity between the Gold Coast Airport and major tourist destinations such as Burleigh Heads, Broadbeach and Surfers Paradise is essential to supporting the long-term contribution of the tourism and hospitality industry to the regional economy.

3.3.6.2. Urban consolidation in the coastal 'urban corridor'

As identified by *ShapingSEQ*, the BH2C study area forms part of a larger 'urban corridor' that extends from Helensvale in the north, to the Gold Coast CBD at Southport, and along the coastline to the Gold Coast Airport and Coolangatta in the south (refer Figure 18). The corridor is a strategic priority for the Queensland Government and the City as it is planned to accommodate a significant proportion of future population growth through urban consolidation. The Gold Coast City Plan reflects this intent through the designation of an 'urban renewal corridor' extending from Southport to Broadbeach.

With this planned concentration of population and economic activity along the coastal corridor, high-capacity public transport has a critical role to play in moving more people more efficiently, while supporting the uptake of residential and commercial development capacity to maximise the opportunity to accommodate future growth, while enhancing the amenity and liveability of coastal communities. In alignment with *ShapingSEQ*, the BH2C project aims to provide a public transport connection that not only provides improved transport capacity but catalyses a significant urban renewal response in the interest of regional planning objectives and connects people and jobs along the key coastal activity centres.

3.3.6.3. Supporting the national role of the M1

The BH2C project is focused on the transport network between Burleigh Heads and Coolangatta. Movement between Burleigh Heads and the New South Wales border is constrained to the Pacific Motorway (M1) and the Gold Coast Highway corridors (refer Figure 16). Limited route choice in this area means these two corridors must meet all transport needs in an efficient manner.

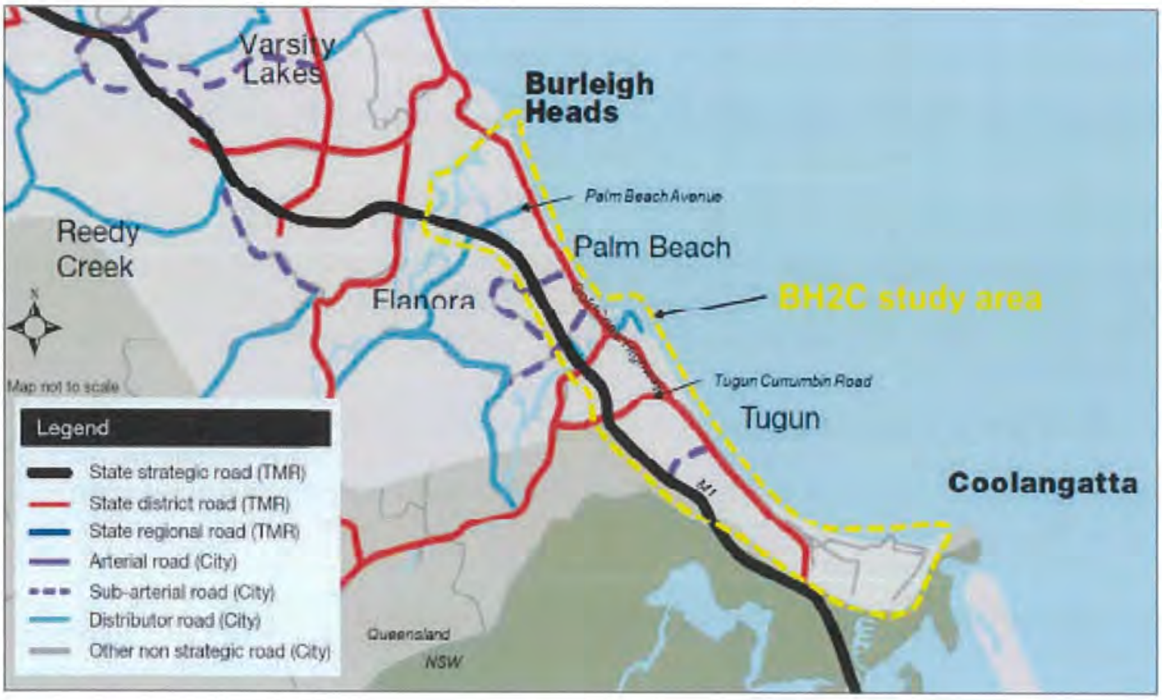

Figure 16 Existing strategic road network of the southern Gold Coast[32]

As part of the National Land Transport Network (NLTN), the primary role of the M1 motorway is to provide road-based access for regional, interstate and national movement including for freight. The M1 is currently undergoing a major upgrade from Varsity Lakes to Tugun to increase its traffic carrying capacity and improve its efficiency including establishing a service road that will assist to remove local trips from the M1. Once complete in 2024, the upgrade will maximise the traffic carrying capacity of the M1 and there will be limited ability for any further capacity increases in this area. By the same token, the M1 upgrade provides the opportunity to remove a significant number of through-trips from the coastal road network centred on the Gold Coast Highway, supporting a considerable improvement in residential amenity in the beachside precincts.

The Gold Coast Highway from Burleigh Heads to Coolangatta performs a multi-modal arterial function, carrying general traffic, high-frequency bus services, and pedestrian and bike riding movements. The section of the Gold Coast Highway between Tugun and Kirra also performs an inter-state road function. This is the result of the M1 tunnel under the Gold

[32] Extract from City of Gold Coast, Gold Coast Road Network Plan 2018 – 2028, figure 8 p20.

Coast Airport runway which restricts the movement of oversize and hazardous goods vehicles, requiring them to be diverted to the Gold Coast Highway. During periods of regular tunnel maintenance, all inter-state traffic is required to use the Gold Coast Highway between Tugun and Kirra. In the absence of an attractive high-capacity PT network, there is no mature multi-modal network to support a sustainable mix of PT and cars. Providing a high-quality efficient public transport alternative in the coastal corridor can ensure the growth of private vehicle trips on the Gold Coast Highway is contained, reducing the need for local trips to access the M1, preserving and supporting the capacity upgrades being delivered on the M1.

3.3.6.4. Improving cross-border accessibility

Transport connectivity in the Coolangatta / Tweed Heads cross-border area is restricted to a limited number of road connections and a single inefficient public transport option. This is the result of constraints including environmentally sensitive areas, major waterways, the location of the Gold Coast Airport, and the regulatory differences either side of the state border. Limited connectivity results in a heavy reliance on the M1 for local trips, poor usage of public transport services, and disadvantage for those without access to private vehicles. The challenges associated with limited cross-border public transport connectivity are discussed further in section 3.4.1.3.

Improving cross-border connectivity is a strategic priority of both the Queensland and New South Wales Governments, highlighted by the SEQ Regional Transport Plans and the New South Wales Northern Rivers Regional Transport Plan. The BH2C project can facilitate improved connectivity by establishing a more attractive public transport option that provides high-quality interchange facility and coordination between connecting services to improve public transport travel times and reliability.

3.3.6.5. An integrated public transport network

As the Gold Coast continues to grow, the evolution of an integrated public transport network is essential to the efficient and sustainable movement of people around the city. The Gold Coast public transport network currently comprises a regional passenger rail line ("heavy rail") between Varsity Lakes and Brisbane, a light rail system between Helensvale and Broadbeach, and a network of bus services.

The network is focused on high-frequency heavy rail and light rail services and a number of bus services that perform a trunk role, providing connections between the heavy and light rail systems and to the city's network of activity centres. The high-frequency network is supported by additional bus services that provide coverage of urban communities and connect passengers to the high-frequency services. The integration of all services in the network is critical to customer experience and maximising the role of public transport.

The Gold Coast City Public Transport Plan 2018 – 2028, identifies an indicative arrangement of the future high-frequency network in 2031 (refer Figure 17).

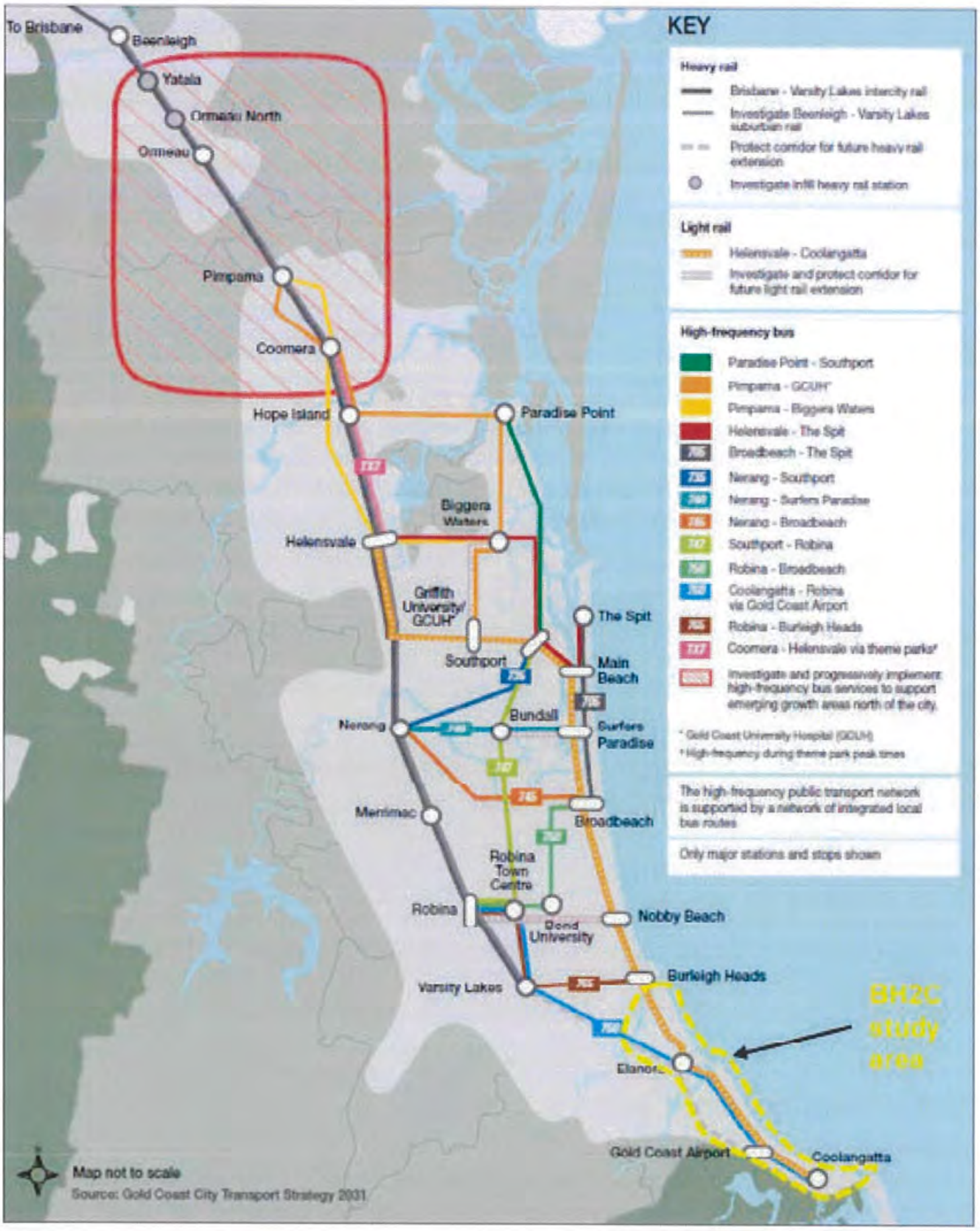

Figure 17 2031 Gold Coast high-frequency public transport network[33]

The southern Gold Coast is currently reliant on bus services as the only form of public transport. This includes high-frequency bus services the 700 (Tweed Heads to Broadbeach South Station), 777 (Airport to Broadbeach South Station) and 765 (The Pines Elanora to Robina Town Centre) that primarily run along the Gold Coast Highway. Other bus services also operate in the corridor and connect to these high frequency routes.

Directly north of the BH2C study area, the construction of GCLR Stage 3 is currently underway between Broadbeach and Burleigh Heads. Upon completion, existing bus services such as the 700 and 777 will be truncated to terminate at Burleigh Heads, creating a new passenger interchange with light rail services.

[33] City of Gold Coast Public Transport Plan 2018 – 2028.

In the longer-term, the Gold Coast heavy rail line is planned to extend south from Varsity Lakes to Elanora and the Gold Coast Airport. This extension will ultimately strengthen the regional connection between Brisbane and the Gold Coast while providing improved intra-city connectivity. Current planning by TMR is considering a preferred alignment for this extension and the location of its terminus at the Gold Coast Airport.

The BH2C project will continue the expansion of the Gold Coast public transport network by extending the high-frequency coastal corridor south from Burleigh Heads to the Gold Coast Airport and Coolangatta. This extension will need to provide optimum network integration by connecting with existing high-frequency bus services and the planned future terminus of the heavy rail line at the Gold Coast Airport. The extension will also need to connect with high-frequency bus services in Tweed Heads to provide continuity for onward travelling passengers.

3.3.6.6. A multi-modal 'community boulevard'

The BH2C project is part of a multi-modal program of transport initiatives that includes road upgrades, complementary public transport enhancements, and active transport projects. While the Gold Coast Highway remains a major traffic carrying route, numerous planning and policy documents have identified the need for the corridor to become the primary 'spine' of the Gold Coast's public transport system to alleviate traffic congestion, connect Regional Economic Clusters, protect the attractiveness of coastal precincts, and support planned urban consolidation. As identified in the Gold Coast City Transport Strategy 2031 (the Strategy), the Gold Coast Highway is to become a 'community boulevard' that gives priority to public and active transport[34]. Specifically, the strategy identifies an implementation action:

> *"Fostering the development of a transit precinct in the Gold Coast Highway corridor from Southport to Coolangatta, with priority access for public transport, pedestrian precincts in the major centres and beachside precincts, and managed supply and cost of car parking. Road investment in this coastal precinct will be limited to eliminating choke points and improving road safety."*[35]

Once complete, the M1 upgrade will enable the Gold Coast Highway corridor to move more people more efficiently by prioritising public and active transport, consistent with its intended multi-modal function.

3.3.7 Integration with land-use planning

While the focus of the BH2C project is improved public transport, the need for the project is also driven by desired growth management outcomes as specified and the regional and local planning documents listed in Section 3.3.2 above. These outcomes seek to maintain improved economic activity, increased urban consolidation, reduced environmental impacts, and enhanced liveability while accommodating the significant planned population and employment growth projected for the southern Gold Coast and northern Tweed Shire.

3.3.7.1. Effects of transport infrastructure on land use

Investment in major transport infrastructure can have profound effects on land uses within the catchment of the infrastructure. These effects are the result of improved accessibility which increase the demand to live and work in proximity to the transport infrastructure. This relationship between transport and land use is particularly important in the context of densely developed urban areas where mass transit performs a central role in carrying a high volume of trips, made by a range of transport users.

This relationship is commonly reflected throughout government planning and policy documents where the intent for intensification of urban land uses is often coupled with the intent for improved public transport performance. Transport and land use integration has become increasingly well-understood in recent times, as reflected by the introduction of specific guidelines[36] that set out how transport planning and investment decisions should measure the land use benefits of transport proposals.

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[34] City of Gold Coast, Gold Coast City Transport Strategy 2031, technical report, p92.
[35] City of Gold Coast, Gold Coast City Transport Strategy 2031, technical report, p114.
[36] E.g.: Australian Transport Assessment and Planning Guidelines (ATAP), O8 Land use benefits of transport initiatives.

3.3.7.2. Land use and transport integration

As outlined in Section 3.3.2 , existing State and Local Government planning has established clear land use and transport intentions for the BH2C study area, demonstrating transport and land use integration at the strategic level. As defined by *ShapingSEQ*, the BH2C study area forms part of a larger 'urban corridor'. The corridor extends from Helensvale in the north, to the Gold Coast CBD at Southport, and along the coastline to the Gold Coast Airport and Coolangatta in the south (refer Figure 18). This corridor is a strategic priority for the Queensland Government and the City as it is planned to accommodate a proportion of the Gold Coast's future population growth through urban consolidation.

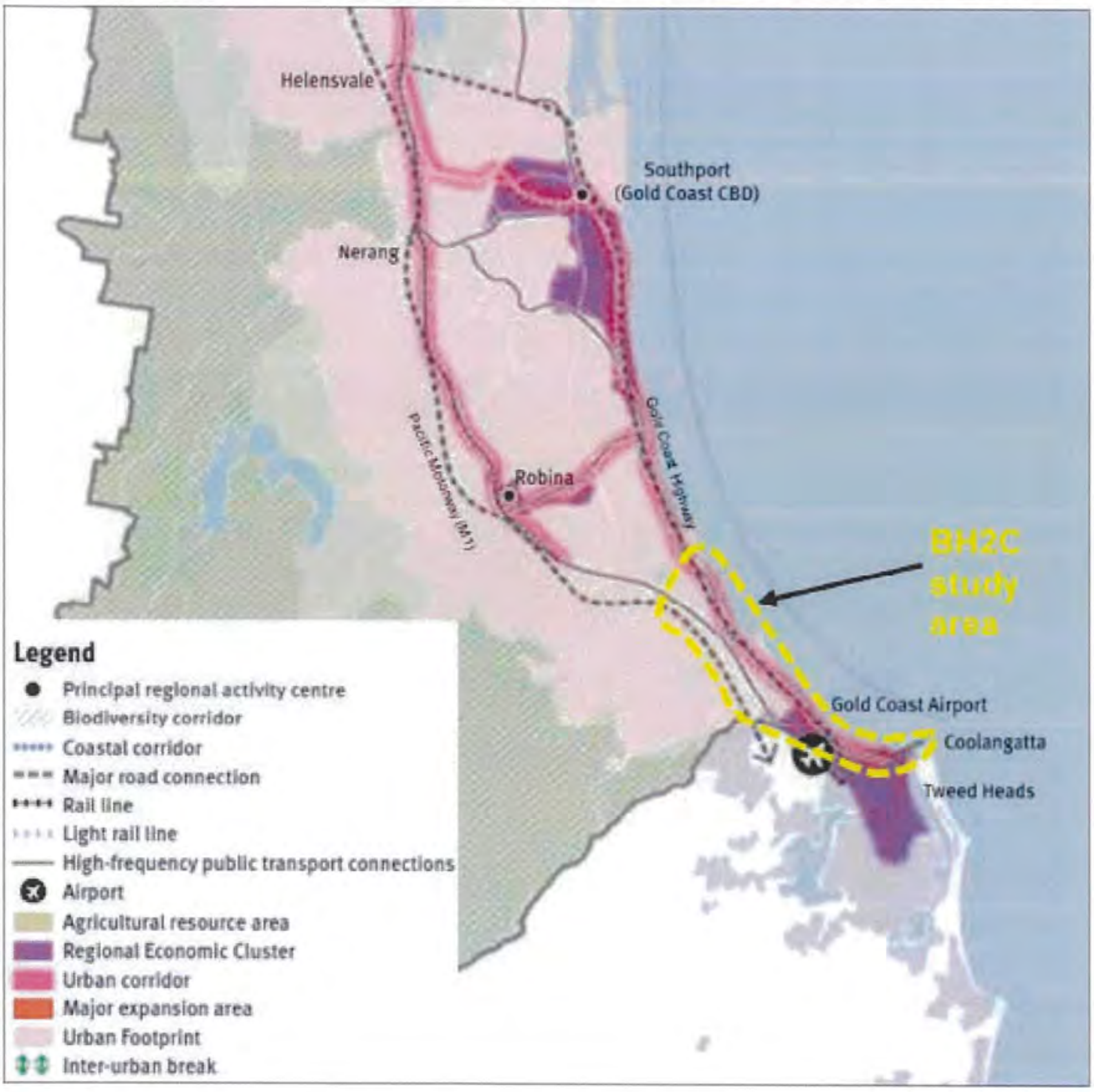

Figure 18 ***ShapingSEQ* 'urban corridors' and major transport routes in the southern sub-region**[37]

This strategic intent is also reflected in the City Plan through land use zoning allocations, density allowances, height limits and the definition of an 'Urban renewal corridor', covering the section of corridor from Southport to Broadbeach. The current zoning of the corridor in the City Plan is shown in Figure 19. As outlined in Section 3.3.6 , this land use planning intent is aligned with the South East Queensland Regional Transport Plans and the Gold Coast City Transport Strategy 2031, where both documents highlight the important role of public transport in supporting land use intent for urban consolidation.

[37] Extract from ShapingSEQ, figure 26, p139.

Figure 19 City of Gold Coast City Plan (2016) Zoning Maps (as at May 2023)

This PE considers land use and transport integration in greater detail through:

- the identification of problems and opportunities (Section 3.4)
- an assessment of the additional population and employment attributable to investment in public transport in the BH2C corridor over the period 2026 to 2041(Refer to Chapter 8).

3.3.7.3. Implications of existing land uses

Existing land uses in the BH2C study area comprise a broad mix and density of residential and commercial development surrounding the Gold Coast Highway corridor. The study area also contains a number of existing land uses that will be relevant project considerations at the site level.

3.3.7.3.1. Burleigh Head National Park

The Burleigh Head National Park is located at the northern end of the BH2C study area east of the Gold Coast Highway, north of Tallebudgera Creek. As a national park this land is protected by the *Nature Conservation Act 1992* (Qld) and will require careful consideration throughout planning, design and delivery of any potential project.

3.3.7.3.2. Gold Coast Airport

The Gold Coast Airport at Coolangatta is located on a large tract of land that is owned by the Australian Government and operates under the Commonwealth *Airports Act 1996*. Project options that traverse airport land will need to consider legislative requirements as well as potential implications on existing ownership and leasing requirements. Aviation operations also require Obstacle Limitation Surfaces (OLS) that limit the maximum height of buildings in the surrounding airspace.

3.3.7.3.3. Property requirements

The Gold Coast Highway is a State-controlled transport corridor that extends along the majority of the BH2C study area. The road reserve varies in width with some sections having a width less than 30 metres (m), notably through Palm Beach. These narrow sections of the corridor may have implications for the project should the project require land additional to what is available within the existing road reserve.

3.3.7.3.4. Land values

This PE considers a range of public transport options in the Gold Coast Highway corridor including the option of light rail. The implementation of light rail systems is known to have a positive effect on property values, particularly within the walking catchment of stations. While this may be considered an economic benefit of the light rail option, this may affect government revenue streams and as such is an important project consideration.

3.4 Problems and opportunities

This section outlines:

- Problems and opportunities
- Risks if the BH2C project is not delivered
- Cost of the problem.

The southern Gold Coast and northern Tweed Shire have high population growth and offer significant potential for improved quality of life and economic activity that will benefit the study area as well as the region, and the states of New South Wales and Queensland. However, in supporting growth and realising that economic potential, a range of transport and land use challenges have been identified. The BH2C project can play a critical role in addressing these problems. Table 23 provides an overview of the problems to be addressed by the BH2C project. Problems are discussed under the three key problem themes of Transport, Economy and Growth.

Table 23 Overview of BH2C problems

Problem	Problem statement
Transport	
Increasing transport demand	Population, employment and visitor growth will substantially increase travel demand in the BH2C study area and place increasing pressure on the road network.
Low public transport mode share	If unchanged, existing car dependency and low public transport use will result in congestion issues and further constrain the transport network of the BH2C study area.
Limited cross-border public transport connectivity	Existing public transport services do not adequately connect the population and employment locations either side of the Queensland border, discouraging cross-border movement and contributing to car dependency and congestion.

Problem	Problem statement
Transport congestion and safety issues	High car dependency, coupled with a limited ability to expand the road network, will result in significant traffic congestion and increasing travel times, reduced public transport and freight reliability, amenity, liveability and environmental impacts, and constrained economic growth.
Economy	
Limited employment self-containment[38] and connectivity between economic activity centres	Declining accessibility will restrict economic growth and will not realise the economic potential of the Gold Coast Airport or the broader Southern Gateway REC.
Growth	
Challenge in meeting future urban consolidation benchmarks[39]	Declining accessibility will negatively impact local amenity, liveability and economic activity, and will not support the residential and employment growth needed to meet government benchmarks for urban consolidation in the BH2C study area.

3.4.1 Transport

The transport challenges facing the BH2C study area have been identified as four separate problems which are the result of various drivers as listed in Figure 20.

Problem theme: Transport	
Problem	**Problem drivers**
Problem 1 – Increasing transport demand	○ Growth in daily trips ○ Tourism and visitor growth ○ Increasing cross border travel
Problem 2 – Low public transport mode share	○ High car dependence ○ Lack of a competitive and attractive public transport option ○ Availability and low cost of car parking ○ An ageing population will need better public transport ○ Desired public transport mode share
Problem 3 – Limited cross-border public transport connectivity	○ Incompatible bus networks
Problem 4 – Transport congestion and safety issues	○ Limited ability to expand the road network ○ Forecast congestion ○ Freight productivity and movement ○ Cost of traffic growth

Figure 20 Transport problems and problem drivers

[38] Refers to the proportion of employed persons who live and work in the same area
[39] Benchmarks for the Gold Coast are established in ShapingSEQ, the SEQ Regional Plan released in 2017

3.4.1.1. Problem 1: Increasing transport demand

Problem statement: Population, employment and visitor growth will substantially increase travel demand in the BH2C study area and place increasing pressure on the road network.

Travel demand in the southern Gold Coast and northern Tweed Shire area is forecast to substantially increase. This will be primarily driven by population and employment growth of an average 1.7 per cent and 1.2 per cent respectively each year to 2041. In addition, the Gold Coast Airport straddles the state border, and current forecasts are for growth in passenger throughput of 146 per cent over the 20 years from 2017 to 2037[40]. The resulting 16.6 million passenger movements each year in 2037 will further increase travel demands in the study area and the surrounding parts of the Tweed Shire.

3.4.1.1.1. Growth in daily trips

Forecast increases in population, employment and visitor growth will continue to increase pressure on the transport network, which without careful management, will impact the liveability and economy of the BH2C area.

Growth in person trips in the study area, compared the Gold Coast LGA, are shown in Table 24. Total daily person trips in the BH2C study area are projected to grow by 33 per cent, from 212,996 in 2019 to 282,987 in 2041, an increase of 69,990 trips.

By 2041, 90 per cent of trips will be intra-regional trips that have at least an origin or destination in the study area or local trips that have both their origin and destination in the study area (254,535 trips). Many of these trips could potentially be taken on public transport. As well as local public transport trips within the study area, trips to the study area from Brisbane could connect with the Gold Coast local public transport system by transferring from the regional heavy rail to light rail at Helensvale, or by transferring from heavy rail to bus services at the present terminus at Varsity Lakes.

Trips passing through the study area are projected to decline by 2,529 trips or 8 per cent between 2019 and 2041. In 2041, there are projected to be 28,453 daily person trips passing through the study area. This decline in through trips is expected to occur as a result of the upgrade to the M1 between Varsity Lakes and Tugun, which will improve traffic flow and draw some movements away from the Gold Coast Highway. Through trips are primarily by private cars and are poorly supported by public transport options.

Table 24 Projected growth in daily person trips 2019 – 2041

Geography	Description	Total person trips 2019	Total person trips 2041	Increase 2019 – 2041	% Increase 2019 – 2041
BH2C study area	Origin or Destination within study area (intra-regional trips)	182,016	254,535	72,519	40%
	Origin and Destination within study area (local trips)	47,683	70,036	22,353	47%
	Trips between study area and GCLR corridor[41]	18,247	23,142	4,895	27%
	Through trips[42]	30,982	28,453	- 2,529	- 8%
	Through trips (incl M1)	109,877	161,028	51,151	47%

[40] Gold Coast Airport. 2017 Master Plan. P 46.
[41] *'GCLR corridor' is defined by the boundaries of travel zones within an 800m radius of light rail stations (including GCLR stage 3 stations)*
[42] Through trips does not include trips on the M1 (i.e. these are trips on the Gold Coast Highway)

Geography	Description	Total person trips 2019	Total person trips 2041	Increase 2019 – 2041	% Increase 2019 – 2041
BH2C study area (all trips)	Origin or Destination within study area and including Through trips	212,996	282,987	69,990	33%
	Including M1	291,893	415,563	123,610	42%
Gold Coast LGA	Origin or Destination within Gold Coast LGA	1,899,761	2,861,916	962,155	50%
Northern Tweed area[43]	Origin or Destination within combined area of Tweed Heads, Tweed Heads South and Banora Point	191,069	249,148	58,079	30%
Combined cross-border urban area[44]	Origin or destination within study area or Northern Tweed area	173,297	239,869	66,572	38%

Source: Gold Coast Strategic Transport Model – Multi Modal (GCSTM-MM) v2.3

3.4.1.1.2. Tourism and visitor growth

As well as a significant local population, the study area contains the Gold Coast Airport and many beachside recreational destinations that attract significant domestic and international overnight visitors and domestic day-trippers, especially from Brisbane to the north. In 2019 the Gold Coast Airport hosted over 7 million passengers, comprising 5,931,934 domestic passengers (84.6 per cent) and 1,081,466 international passengers (15.4 per cent)[45]. This resulted in 20,014 person trips per day to and from the Gold Coast Airport. Approximately 94.3 per cent of these trips were made by private vehicle.

The Gold Coast Airport is forecast to experience major growth in passenger movements, 146 per cent over the 20 years from 2017 to 2037, resulting in 16.6 million passenger movements each year[46]. By 2041 the growth in passenger movements is forecast to result in approximately 54,228 person trips per day to or from the airport, an increase of approximately 171 per cent (34,214 trips) between 2019 and 2041. Only 5.8 per cent of these trips are forecast to be made by PT, meaning that an additional 32,207 trips per day will be made to or from the Gold Coast Airport by car in 2041, contributing negatively to the airport's environmental footprint. The daily person trips to and from the Gold Coast Airport from 2019 to 2041 are summarised in Figure 21.

Major airports, connected to high capacity and frequent PT can achieve PT mode shares of up to 20 per cent, which is a typical target to ensure sustainable access to airport precincts, with some airports in Europe and Asia achieving over 50 per cent PT mode share.[47] As the sixth largest airport in Australia, and the location of visitor accommodation in proximity of the airport and the BH2C corridor, achieving a high proportion of PT mode share for the airport should be achievable and a key objective for the Project.

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[43] *The 'Northern Tweed area' comprises the areas of Tweed Heads, Tweed Heads South and Banora Point*
[44] *The 'Combined cross-border urban area' is defined as the area comprising both the BH2C study area and the 'Northern Tweed area'*
[45] Gold Coast Strategic Transport Model – Multi Modal (GCSTM-MM) v2.3
[46] Gold Coast Airport Master Plan, 2017
[47] Tourism and Transport Forum Australia, 2014. *ACCESSING OUR AIRPORTS, Integrating City Transport Planning with Growing Air Services Demand*

Figure 21 Daily person trips to and from the Gold Coast Airport 2019 and 2041[48]

Forecast growth in trips to and from the Gold Coast Airport will place substantial pressure on the surrounding road network, in particular on the Gold Coast Highway between Tugun and Kirra. This growth in travel demand will also exacerbate demand for car parking on site, requiring costly investments to be made in grade separated parking structures and limiting the use of land for uses that could provide more valuable contribution to the broader airport precinct and the local economy. Further discussion regarding the transport challenge and opportunity at the Gold Coast Airport is provided in Section 3.4 .

The BH2C study area also hosts a number of major annual events that draw large crowds and place stress on the local road network. In 2017, the study area hosted events including the Quicksilver and Roxy Pro (38,592 visitors), Cooly Rocks On (110,846 visitors) and the Swell Sculpture Festival (276,000 visitors) that hosted a combined total of 425,438 visitors[49].

3.4.1.1.3. Increasing cross-border travel

In addition to pressure from local trips generated within the BH2C study area, there is significant cross-border travel between the Gold Coast and Tweed Shire and Byron LGAs undertaken daily, with an estimated 90,617 person trips per day in 2019. By 2041, this is forecast to reach 122,471 person trips.

Commuter travel constitutes over 33 per cent of daily cross-border trips or 30,446 commuter trips per day in 2019. The Tweed Shire forms part of a commuter-belt and a 'satellite' functional economic region[50], with 80 per cent of 'blue collar' and 58.3 per cent of 'white collar' workers in the Tweed Shire traveling to the Gold Coast LGA for work. According to the Australian Bureau of Statistics (ABS, 2016), 22.6 per cent of the Tweed Shire's working residents travel to the Gold Coast LGA for work, while 17.6 per cent of persons employed in the Tweed Shire LGA live in the Gold Coast LGA[51]. Cross-border travel demand is expected to grow further in the future, with major urban development areas in Tweed Shire, such as the Cobaki Lakes and Kings Forest urban communities, and the opening of the major Tweed Valley Hospital at Kingscliff in late 2023. As is the case with current hospitals in the border area, the new hospital is expected to attract patients and staff from the adjoining Gold Coast LGA.

3.4.1.1.4. Summary

Population and employment growth in the BH2C area and adjoining northern Tweed area, combined with forecast growth in passenger movements through the Gold Coast Airport, will significantly increase travel demand within and through the BH2C area and place increasing pressure on the road network. Maintaining the status quo with no significant transport

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[48] Gold Coast Strategic Transport Model MM V2.3
[49] City of Gold Coast, Building our City, Southern Transport corridor 2017 Baseline Report.
[50] Tweed Shire Council and New South Wales Government (2018). *Tweed Shire Regional Economic Development Strategy 2018-2022*. Accessed at https://www.dpc.nsw.gov.au/assets/dpc-nsw-gov-au/REDS/35503076fa/Tweed-REDS.pdf
[51] ABS (2016). Census of Population and Housing: Tweed Shire.

intervention will likely result in negative economic, social and environmental consequences. A well-considered and strategic approach to transport investment is therefore required to manage future travel demand.

3.4.1.2. Problem 2: Low public transport mode share

Problem statement: If unchanged, existing car dependency and low public transport use will result in congestion issues and further constrain the transport network of the BH2C study area.

Public transport trips comprised only 4.9 per cent of all trips in the BH2C study area in 2019. This very low public transport mode share is forecast to reach only 5.8 per cent by 2041 in the Base Case. Problem 2 addresses the following problem drivers:

- high car dependence
- lack of a competitive and attractive public transport option
- availability and low cost of car parking
- an ageing population will need better public transport.

Policy goals in the regional and local transport plans aim to increase public transport use as the region grows as part of achieving a more sustainable transport system.

As well as low public transport mode share, a number of these problem drivers contribute to road network congestion. Congestion issues are discussed as part of Problem 4 (Section 3.4.1.4).

3.4.1.2.1. High car dependence

In 2019, residents and non-residents within the study area were highly reliant on private vehicles, with mode share of daily trips:

- 84.4 per cent by private vehicle
- 10.7 per cent active transport
- 4.9 per cent by public transport.

The high car dependence in the BH2C study area reflects the lack of a competitive and attractive public transport option in the study area and the convenience of car travel.

Table 25 Existing (2019) and forecast (2041) mode share of car, public transport and active transport

Geography	Car mode share 2019	Car mode share 2041	Public transport mode share 2019	Public transport mode share 2041	Active transport mode share 2019	Active transport mode share 2041
Gold Coast LGA	86.6%	84.4%	3.6%	4.9%	9.8%	10.7%
BH2C study area	84.4%	83.1%	4.9%	5.8%	10.7%	11.1%

Residents in the border communities also rely heavily on private vehicles, with 93 per cent of daily cross-border trips taken by private vehicles in 2019. This is partly a result of the existing restrictive cross-border public transport offering (refer Section 3.4.1.3).

3.4.1.2.2. Lack of a competitive and attractive public transport option

Public transport mode share in the BH2C area is limited by the lack of a public transport option that is able to compete with the convenience of car travel. There are no current public transport services operating south of Burleigh Heads that have a dedicated right of way to improve journey times and reliability. This will continue to impact on the ability to attract patrons to public transport as bus services will be constrained by the same traffic congestion as road users.

Figure 22 compares the reliability of bus services in the BH2C corridor with the aggregated GCLR punctuality over the period from June 2015 to February 2021. Over the period, only 71.7 per cent of bus services ran on time during weekday peak hours (AM peak: 7am to 9am, PM peak: 4pm to 6pm), on average, when compared to GCLR services where punctuality is consistently over 95 per cent on time. This suggests a clear need for public transport services to provide greater reliability to users in the BH2C area.

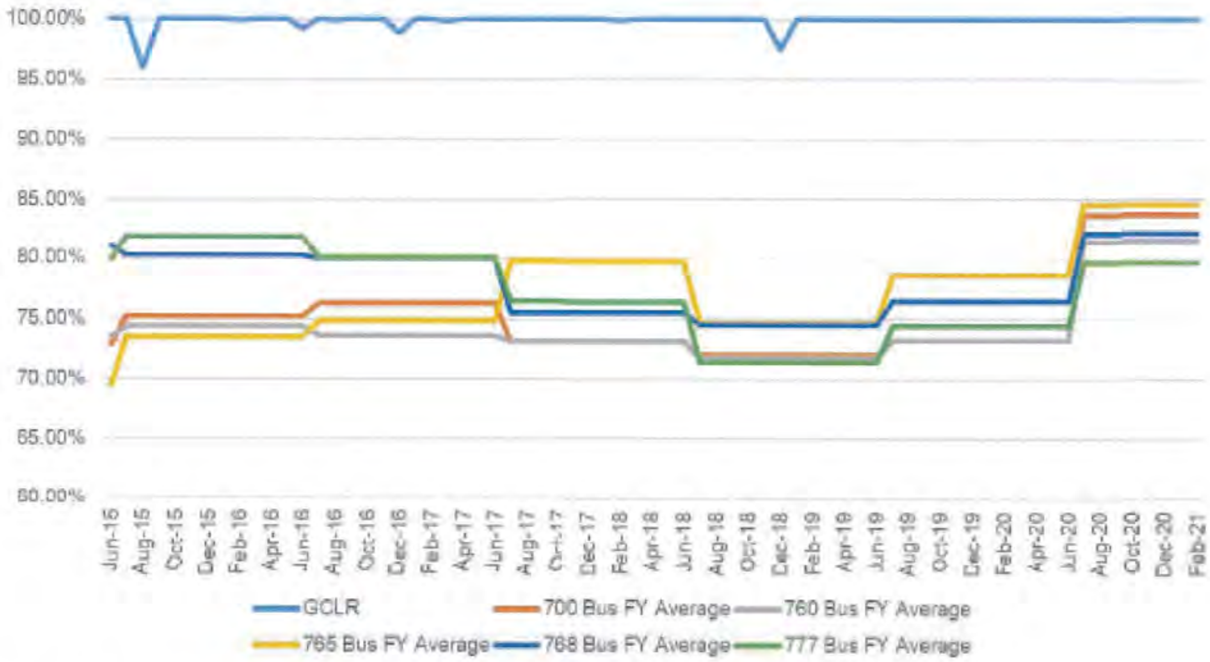

Figure 22 GCLR system punctuality compared to bus reliability data in the study area[52]

Bus services are commonly viewed by commuters as a less attractive or desirable option when compared to alternative public transport options. When compared to train and light rail options, buses operating in general motor traffic suffer a range of disadvantages which reduce their attractiveness to travellers as they are:

- less reliable and can have variable travel times as they rarely have priority and mostly operate in general traffic where they are susceptible to traffic congestion
- illegible as they often follow circuitous routes and stop frequently
- uncomfortable in terms of ride quality and sometimes lacking sheltered bus stop facilities
- inconvenient, sometimes with low frequencies and more restricted operating hours.

A recent survey of community preference for light rail versus the option of dedicated bus lanes in the Burleigh Heads to Tugun corridor identified a 58 per cent preference for light rail and a 24 per cent preference for a bus lane option[53]. This finding is consistent with previous public transport preference surveys undertaken on the Gold Coast, which found that bus is the least preferred of the options of train, light rail and bus[54].

3.4.1.2.3. Availability and low cost of car parking

A key enabling factor for high private vehicle use and the resulting low public transport mode share in the study area is the abundance of public carparks and on-street parking, many of which are available at little to no cost and for extended periods of time. These carparks are utilised by both locals and tourists for short trips to key leisure, entertainment or

[52] GCLR punctuality data ("making sure that there'll be a tram at the station for you when it's scheduled to be there") based on publicly available data accessed at https://ridetheg.com.au/get-up-to-date/
Bus reliability data provided by TransLink shows values prior to 23 July 2018 that were 2 minutes early and 6 minutes late, post 23 July 2018 these became 1 minute early and 5 minutes late.
[53] Gold Coast Highway (Burleigh Heads to Tugun) Multi-modal corridor study Community consultation summary – May 2020, accessed at: https://www.tmr.qld.gov.au/_/media/projects/g/gold-coast-highway-multi-modal-study/multi-modal-corridor-study-community-consultation-summary-0520.pdf
[54] Commissioned by TMR and conducted by PwC in June 2018

tourist destinations, during weekends or major events. Of the 9,000 regulated street parking spaces across the broader Gold Coast, only 17 per cent are paid or metered[55].

Of the six public carparks situated between Palm Beach and Coolangatta, all are available at no cost, and just three are time-restricted between two and three hours. The two carparks situated in Burleigh Heads are the only carparks in the study area with parking fees and time restrictions, with hourly fees ranging between $1.40 and $2.50 per hour from 9am to 5pm every day[56]. Metered parking is often less than the cost of a single public transport fare. For example, the Alex Black Carpark situated on Ocean Street in Burleigh Heads charges car park users a maximum daily fee of $5, which is materially lower than the current $6.74 charged for a two-way bus trip from Burleigh Heads to Coolangatta[57]. There are also over 430 free parking spaces along the Burleigh Heads beachfront between First Avenue and Kelly Avenue[58], further encouraging the use of cars for those travelling to the beach.

These free or cheap public car parks are heavily utilised, with City parking sensor data from the central parking precincts in both Coolangatta and Palm Beach showing over 70 per cent occupancy on average[59].

Palm Beach centre also services the popular surfing beach, which creates high parking demands when beach activity and business activity coincide. Coolangatta, while containing a significant supply of free public car parking, suffers from shortages of parking in busy periods and when the world-renowned surf breaks at Kirra and Snapper Rocks are working.

In October 2015, the City launched the ParkInCentre Scheme (PICS) with the aim of improving the turnover of parking spaces, opening up parking spaces in high demand areas and reducing congestion[60]. However, strong population growth and the continued reliance on cars is expected to counteract PICS and result in increased 'cruising' behaviour of those seeking parking spaces, exacerbating traffic congestion and constraining parking facilities in popular destinations. The management of carparking in Coolangatta and Kirra was also highlighted as a key issue by the community and within the Coolangatta and Kirra Business Centre Place Based Master Plan published by the City in February 2020[61].

Better parking management aims to reduce the need for long stay parking, typically by commuters, in favour of short stay parking by customers. An improved public transport system that better connects people to jobs, combined with tighter restrictions on long stay parking, would provide a solution that reduces pressure on car parking, and ensures adequate availability of spaces for short stay parking by customers.

3.4.1.2.4. An ageing population will need better public transport

One group who cannot readily access car transport are seniors over the age of 65 who suffer from restricted mobility. An ageing population will see increasing levels of disability on the Gold Coast. In 2016, there were approximately 91,400 senior residents aged 65 years and over, representing 16.4 per cent of the total Gold Coast population. The city has a high proportion of senior residents compared with Queensland (15.3 per cent) and Australia (15.4 per cent). The number of senior residents is expected to increase to 195,734 persons or 20.7 per cent of the city's population by 2041[62].

For the BH2C study area 19.7 per cent of the population was aged 65 and over compared to the Gold Coast average of 16.4 per cent and the Queensland average of 15.7 per cent. As the southern Gold Coast's population ages, the need for an accessible and mobility-friendly public transport system in the region will increase substantially. The local bus network, with its deficiencies as described above, will not adequately meet the needs of this ageing population which is increasingly unable to rely on private car transport.

3.4.1.2.5. Desired public transport mode share

The Gold Coast LGA had a public transport mode share of 3.6 per cent in 2019 and based on current forecasts this is expected to reach only 4.9 percent by 2041. While major improvements have been made to the Gold Coast's public

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55 56 This reference has been removed as it contains information that is no longer available.

57 TransLink (2020). *Fares South East Queensland*. Accessed at https://TransLink.com.au/tickets-and-fares/fares-and-zones/current-fares

58 City of Gold Coast (2022). *Burleigh Heads parking*. Accessed at https://www.goldcoast.qld.gov.au/Services/Roads-transport-parking/Parking/Traffic-areas/Burleigh-Heads-parking

59 Data supplied by CoGC 22 October 2022 based on real time parking sensors from 2019,2021 and 2022

60 This reference has been removed as it contains information that is no longer available.

61 City of Gold Coast (2020). *Coolangatta and Kirra Business Centre Place Based Master Plan*. Accessed at https://www.goldcoast.qld.gov.au/documents/ps/coolangatta-kirra-business-centre-placed-based-master-plan-part-a.pdf

62 Queensland Parliament. 2019. Statistics for Seniors.

transport network over the past decade, significant further improvements are required for the Gold Coast to move closer to desired mode share targets.

The Gold Coast City Transport Strategy 2031 established a target to achieve a public transport mode share of 15 per cent by 2040. This is a city-wide target that represents the average mode share of public transport across all areas of the Gold Coast LGA. The target reflects local and state government planning intentions to:

- increase the capacity of key transport corridors and reduce traffic congestion
- assist to manage demand for parking in locations of high demand
- increase productivity and economic performance of activity centres
- improve community accessibility to employment, education, services and recreation
- support more sustainable urban growth through urban consolidation that helps to minimise urban sprawl
- increase levels of walking and cycling as a result of trips to and from public transport stops
- contribute to climate change mitigation by reducing transport greenhouse gas emissions and air pollution.

As can be seen from the effect of introducing GCLR Stages 1 and 2, annual public transport patronage on the Gold Coast grew by 32 per cent in the three years since light rail was first introduced (refer Figure 23). Total annual patronage on the light rail continued to grow from 6,277,774 trips in 2014/15 to 10,743,025 trips in 2018/19, an increase of 61.8 per cent[63]. More recently, light rail patronage levels returned to pre-COVID levels in 2022, when more than 800,000 trips were taken on the light rail in the month of August[64].

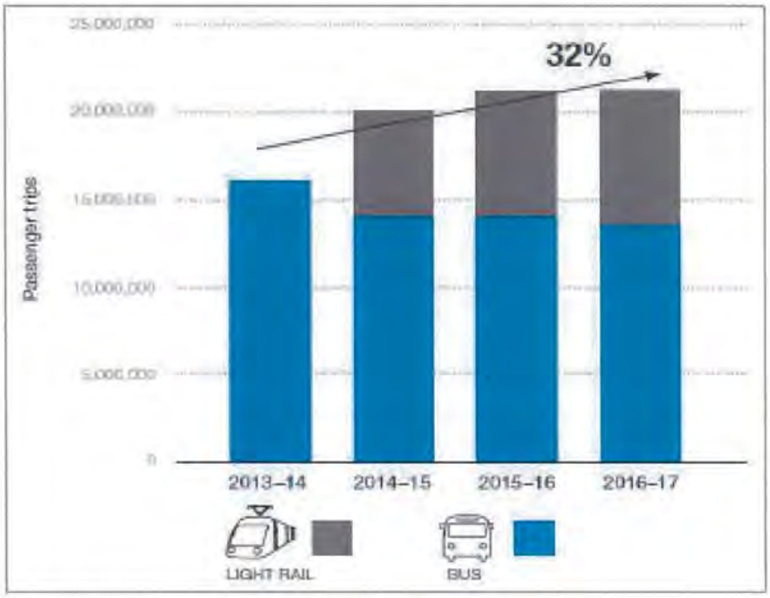

Figure 23 Gold Coast annual public transport patronage growth since the introduction of light rail[65]

This dramatic increase in patronage demonstrates the effect of introducing a public transport option that has dedicated right of way to improve journey times and reliability. Such a change has attracted patrons to use public transport and assisted to improve public transport mode share.

3.4.1.2.6. Summary

While bus services will be an important part of the future transport network for the BH2C corridor area, the existing bus services are unable to meet the overall public transport task within the BH2C corridor. Without intervention, public transport mode share is projected to remain very low in the BH2C study area at only 5.8 per cent in 2041. This would

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[63] City of Gold Coast, Building Our city – Light Rail Corridor 2019 Status Report, p10.
[64] Queensland Government media statement, accessed at: https://statements.qld.gov.au/statements/96406
[65] Extract from City of Gold Coast Public Transport Plan 2018 – 2028, p11.

have negative impacts including increased congestion, pressure to continuously expand roads and car parking, reduced road safety, increased greenhouse gas emissions, worsening noise and air pollution, and social inequity whereby people who cannot access car transport are disadvantaged. There would also be significant economic impacts related to the inefficiency of the broader transport system without an increase in public transport mode share in the study area.

3.4.1.3. Problem 3: Limited cross-border public transport connectivity

Problem statement: Existing public transport services do not adequately connect the population and employment locations either side of the Queensland border, discouraging cross-border movement and contributing to car dependency and congestion.

3.4.1.3.1. Incompatible bus networks

Two separate bus networks currently service the southern Gold Coast and northern Tweed areas. These services are both operated by Kinetic, for TransLink in Queensland and for TfNSW in Tweed Shire. In the southern Gold Coast, the bus network is focused on meeting customer demand in the BH2C corridor, servicing communities on both sides of the M1 and through to key destinations such as the John Flynn Private Hospital and Gold Coast International Airport. In the northern Tweed area, the bus network concentrates on servicing the areas of Tweed Heads, Tweed Heads South, Banora Point and Kingscliff, with supporting connections to Bilambil Heights, Murwillumbah, Fingal Head and Pottsville.

While both services are operated by the same operator, the networks only allow for transfer between Queensland and New South Wales at Tweed Mall just south of the border, requiring a least one transfer to continue the journey. The separate networks also have incompatible systems for fares, ticketing, trip planning and bus operation. In particular, timetables are not coordinated to enable smooth cross-border transfers. Figure 24 displays the two separate bus networks and the single passenger transfer location at Tweed Mall.

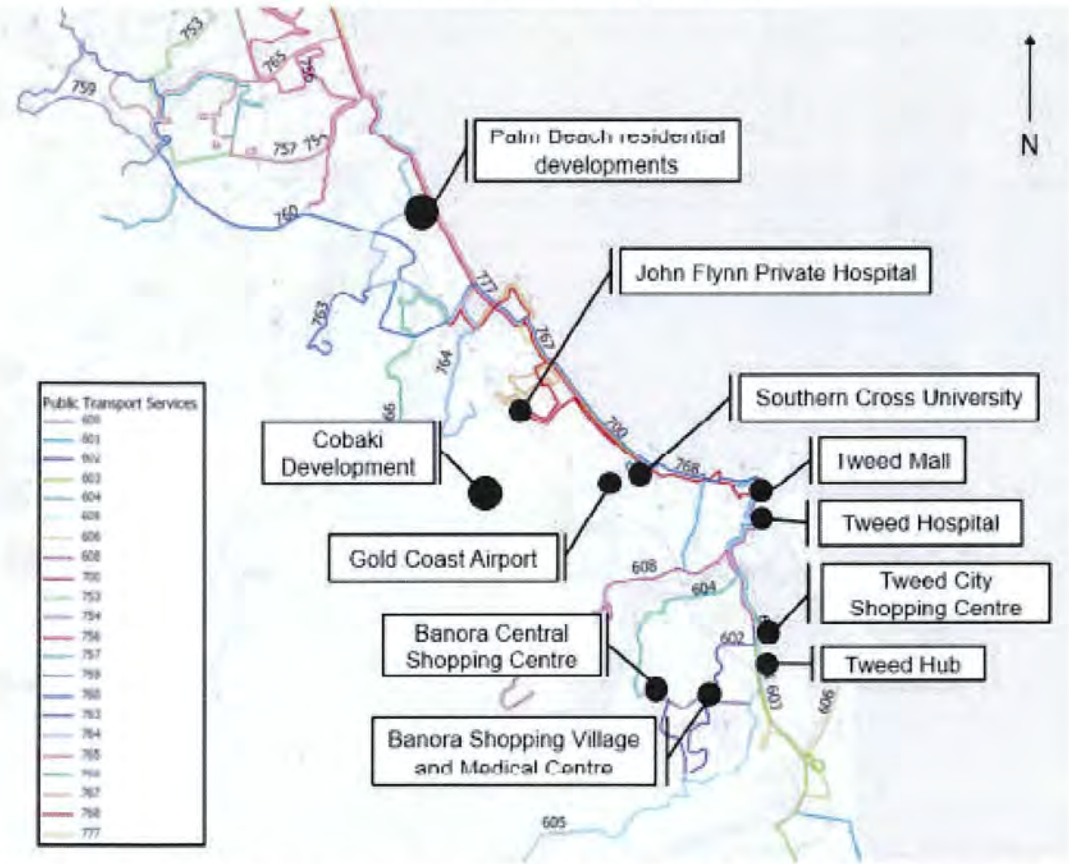

Figure 24 Separate Queensland and New South Wales public transport networks

These existing public transport arrangements create a barrier to cross-border accessibility as cross-border trips require a forced transfer, longer travel times and higher travel costs. This barrier further encourages travel by private motor vehicle and congestion on the road network. In 2019 93 per cent of daily cross-border trips (80,580 trips) were taken by private vehicles.

3.4.1.3.2. Summary

Separate bus networks either side of the Queensland border create a barrier to cross-border movement which contributes to car-dependency and congestion. The lack of integration also results in disadvantage for those without access to private vehicles. Improved connectivity between the Queensland and New South Wales public transport systems would provide a more attractive travel option for short cross-border trips and assist to reduce the current very high proportion of cross-border trips being made by private vehicle.

3.4.1.4. Problem 4: Transport congestion and safety issues

Problem statement: High car dependency and low public transport mode share, coupled with a limited ability to expand the road network, will result in significant traffic congestion and increasing travel times, reduced public transport and freight reliability, amenity, liveability and environmental impacts, and constrained economic growth.

Problem 4 is a result of the cumulative impact of transport problems 1 to 3 as well as the following problem drivers:

- Limited ability to expand the road network
- Forecast congestion
- Freight productivity and movement
- Cost of traffic growth.

3.4.1.4.1. Limited ability to expand the road network

The southern area of the Gold Coast has a natural geography comprising terrain, waterbodies and the coastline which combine to restrict the transport network to a narrow corridor. This narrow corridor includes the M1 and the Gold Coast Highway as the only two major north-south transport routes, providing cross-border connections between the Gold Coast and Tweed Shire. The limited options for north-south travel, together with the presence of the Gold Coast Airport, result in both of these transport corridors performing regional and local transport functions. Geographical and practical constraints on the ability to significantly expand road network capacity in (or near) the southern corridor will contribute to increasing traffic congestion.

The M1 is a vital component of the NLTN that also serves as the primary road corridor connecting Brisbane to the Gold Coast and northern New South Wales. While the M1 is one of the primary road freight routes in the country, and supports interstate and inter-regional travel, the lack of alternative north-south transport corridors results in the M1 also performing a very significant local transport function. Local use of the M1 in conjunction with through-traffic has led to the current M1 being recognised as a 'red spot' by road users in 2019 and 2020 due to the significant volumes of traffic, insufficient road capacity and subsequent traffic congestion[66].

The M1 is currently undergoing a major upgrade from Varsity Lakes to Tugun and once complete there will be limited ability to further increase its traffic carrying capacity. This highlights the critical role of the Gold Coast Highway corridor in catering to forecast travel demand, particularly for local trips within the study area. Coolangatta major centre access has no capacity to be improved from the north, with only three inbound traffic lanes serving a busy commercial and recreational beachside centre.

3.4.1.4.2. Forecast congestion

Between 2016 and 2019, the growth in traffic volumes at localised spots in the study area was estimated to exceed seven per cent per annum[67]. This growth has led to noticeable declines in the level of service on the Gold Coast Highway at Palm Beach, Tugun and Bilinga, adjacent to the Gold Coast Airport.

Although currently undergoing a major upgrade from Varsity Lakes to Tugun, by 2041, the M1 is expected to be close to or exceeding capacity in certain sections. Figure 25 demonstrates the high traffic volume growth expected over the road

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[66] RACQ (2020). *Red Spot Congestion Survey*. Accessed at https://racqi.maps.arcgis.com/apps/View/index.html?appid=1cce015760ed4d17895f153b7a8b306a
[67] Gold Coast Strategic Transport Model MM V2.2

network's capacity by 2041, by comparing the southern Gold Coast's road network's volume on capacity (V/C) ratio in the PM peaks (4pm to 6pm). This is particularly apparent in Tugun and Bilinga, where the road network will operate close to capacity by 2041.

Continued forecast growth in traffic volumes in the study area will lead to prolonged commute times for residents and through traffic. Increased congestion along the Gold Coast Highway will also reduce access to the beachfront, a key destination that typifies the southern Gold Coast's lifestyle. This may constrain the performance and growth of the tourism and hospitality industry and overall amenity and attractiveness of the southern Gold Coast.

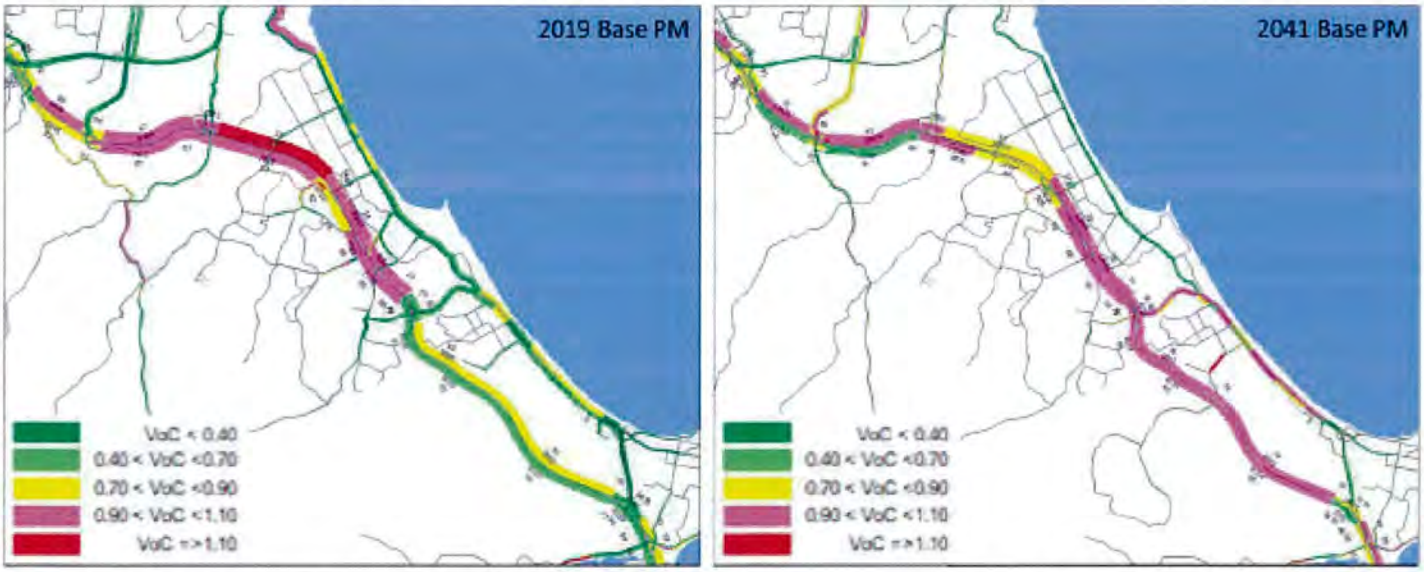

Figure 25 Southern Gold Coast road network V/C ratio in 2019 and forecast 2041 (PM Peak)

Local roads in the study area often experience heightened congestion and parking shortages on weekends and public holidays due to the dramatic increases in residents and visitors. This congestion is not apparent from the Strategic Transport Model at a whole-of-network level and is not reflected in the above projections but is a significant issue in some major local roads and adversely impacts residents and road users. In particular, congestion often experienced along the beachfront areas, such as in Coolangatta, Kirra, Currumbin, Snapper Rocks and Tallebudgera on Saturdays, is due to visitation from domestic day visitors.

3.4.1.4.3. Freight productivity and movement

Queensland's freight system is a key enabler for the economy that connects the state with key regions across Australia. Road transport, more specifically, is pivotal to the continued productivity of freight as, in 2019, it carried close to 65 per cent of all freight tonnages. The importance of the freight industry is expected to continue to grow into the future, with volumes projected to grow by more than 20 per cent over the next decade[68]. The recent shift in consumer preferences towards online shopping and door-to-door deliveries is expected to heighten demand and exacerbate the pressure placed on Queensland's freight industry.

The M1 is the primary freight route for the Gold Coast, as well as the main freight corridor for heavy freight vehicles travelling between Brisbane and southern states and is recognised as a National Key Freight Route by the Australian Government. According to the *Gold Coast City Freight Plan 2018-2028,* heavy commercial vehicles and medium commercial vehicles take up 4.59 per cent of total vehicle volumes in 2016 and are expected to take up 4.94 per cent in 2031.

As freight vehicles share the road network with other users, the significant 32 per cent increase in road network volumes by 2041 will impact freight using the city's arterial, sub-arterial and collector roads to service multiple centres, without

[68] Queensland Government (2019). *Queensland Freight Strategy: Advancing Freight in Queensland.* Accessed at https://www.publications.qld.gov.au/dataset/queensland-freight-strategy-advancing-freight/resource/ae528968-a698-422c-bdc7-2a38a911de45

sufficient increase in road capacity. As presented in Figure 26, the study area includes the M1, the Key Freight Route that is constrained and subject to significant congestion during peak travel times and popular visitation periods.

Figure 26 National Key Freight Route Roads in the study area[69]

It is critical to maintain the road hierarchy and preserve the function of the M1 for freight and inter-regional travel into the future, to support the region's economy and productivity. A public transport solution on the coastal corridor could reduce the number of local trips on the M1, by providing a high-capacity and more efficient mode choice that connects population and activity centres and improving the functionality and reliability of the M1 as a major freight corridor. Reduction in congestion on the M1, delivered by a high capacity and connected public transport network, will support the continued efficiency and productivity of road-based freight movement and enable long-term growth in Queensland's economy.

3.4.1.4.4. Cost of traffic growth

The significant pressure and demand placed on the road network from travel demand and high car dependency, coupled with the fact that cars typically sit idle for 95 per cent of the time[70], is projected to result in greater congestion and extended travel times, reduced safety levels and increasing greenhouse gas emissions. The 2019 Australian Infrastructure Audit paper estimated that the cost of congestion on all roads in the Gold Coast LGA, when travel time only is considered and vehicle operating costs are excluded, will quadruple from $243 million in 2016[71] to $973 million in 2031.

Modelling conducted for this PE shows the increased transport demand, combined with the very high dependence on car travel will see all the major traffic routes including the M1 become congested in peak times (which in this area include weekends and busy holiday periods). This will cost businesses and deter visitors. Without intervention, increased pressure and demand on the road network may also result in reduced road safety levels and the associated social and economic impacts of road crashes. When extra travel time, extra vehicle operating costs, and avoidable crash costs are included, the annual cost of road network congestion in the study area is forecast to increase to $117 million per annum in 2041.

Environmental externalities of traffic growth could also impact the desired lifestyle of residents. According to the Climate Council, transport is Australia's third largest source of greenhouse gas (GHG) emissions, having increased by close to 60

[69] Adapted from DITRDC (2021). *National Key Freight Routes Map*. Accessed at http://maps.infrastructure.gov.au/KeyFreightRoute/
[70] Infrastructure Australia (2019). Australian Infrastructure Audit 2019.
[71] The IA cost of congestion is for 2016, when inflated to 2019 using the CAGR between 2016 and 2019 this cost increases to $287 million.

per cent since 1990. Cars account for half of these transport emissions, meaning that high car dependency in the study area will have detrimental impacts on the environment[72].

A comprehensive range of Australian and international studies undertaken in recent years confirms the relationship between high levels of air pollution and human health impacts as statistically significant[73]. As presented in Table 26, the average private vehicle emits a significantly greater volume of emissions per kilometre compared to public transport systems that are more efficient and sustainable on a per-person basis.

Table 26 CO2 emissions per kilometre by transport mode[74]

Mode of transport	Average emissions per kilometre (gCO_2/km)
Metro train systems	3-21 (per person)
Light rail	4-22 (per person)
Bus rapid transport systems	14-22 (per person)
Average car (private vehicle) sold in 2015	184 (per vehicle)

Failing to provide a sustainable transport system in the study area will lead to continued reliance on cars and consequential impacts on the environment and residential amenity. This specifically includes reduced air quality, due to lower vehicle speeds increasing pollutant concentrations and variable driving speeds increasing vehicle emissions relative to steady speed driving conditions[75]. The continued reliance on private vehicles will mean as population grows, there is a forecast continued climb in vehicle kilometres travelled and a resultant increase in environmental externalities.

The projected population growth in the southern Gold Coast and the continued reliance on cars will also increase the level of discomfort experienced by residents due to increased noise and light during undesired hours, or through expected road upgrades to accommodate growth. Increased exposure to pollutant concentrations and light are strongly correlated with negative health outcomes and will ultimately inhibit the attractiveness of the study area.

Continued growth in congestion will reduce the amenity and liveability of the study area, discouraging visitors and impacting on the economic viability of tourism-related businesses. According to Tourism Research Australia (TRA), the domestic day visitor demographic represented over 60 per cent of all visitors to the Gold Coast in 2019 and spent $102 per person per trip on average[76]. This reflects the significant importance in alleviating congestion along the coastal corridor in Coolangatta and other key destinations[77], including Palm Beach, Tugun and Bilinga which are key population nodes in the study area that experience strong traffic volumes from commuting residents during weekdays.

3.4.1.4.5. Summary

The BH2C study area is forecast to experience significant traffic congestion, causing increased travel times, declining road safety, and declining reliability for private vehicles, public transport and freight. Congestion is forecast to result in significant economic costs as well as consequential impacts on the environment and residential amenity. There is little space to build new road corridors or widen existing ones and the ability to further upgrade the sections of the M1 in the study area is limited by a highly constrained corridor. This suggests a clear need for alternative approaches to cater to forecast growth in travel demand.

[72] Climate Council (2017). *Transport emissions: Driving down car pollution in cities.* Accessed at https://www.climatecouncil.org.au/wp-content/uploads/2017/09/FactSheet-Transport.pdf

[73] Australia State of the Environment (2016). *Health impacts of air pollution.* Accessed at https://soe.environment.gov.au/theme/ambient-air-quality/topic/2016/health-impacts-air-pollution

[74] Climate Council (2017). *Transport Emissions: Driving Down Car Pollution in Cities.* Accessed at https://www.climatecouncil.org.au/wp-content/uploads/2017/09/FactSheet-Transport.pdf

[75] Barth, M. & Boriboonsomsin, K. (2008). *Real-World CO2 Impacts of Traffic Congestion.* Accessed at http://www.accessmagazine.org/wp-content/uploads/sites/7/2016/01/access35_Traffic_Congestion_and_Greenhouse_Gases.pdf

[76] TRA (2019). *Local Government Area Profiles 2019: Gold Coast.* Accessed at https://www.tra.gov.au/Regional/local-government-area-profiles

[77] TRA (2019). *Local Government Area Profiles 2019: Gold Coast.* Accessed at https://www.tra.gov.au/Regional/local-government-area-profiles

3.4.2 Economy

Problem 5 is concerned with the current and future economic conditions of the southern Gold Coast, in particular the economic opportunity surrounding the Gold Coast Airport and the Coolangatta major regional activity centre. Problem 5 addresses the various drivers as listed Figure 27.

Problem theme: Economy	
Problem	**Problem drivers**
Problem 5 – Limited employment self-containment and connectivity between economic activity centres	▫ Lack of economic and employment activity in southern Gold Coast ▫ Coolangatta Major Centre is under-performing ▫ Economic importance of the Gold Coast Airport ▫ Importance of the tourism and hospitality industry to the region ▫ Southern Gateway Regional Economic Cluster ▫ Education industry opportunities based on the Airport ▫ Air freight ▫ Brisbane 2032 Olympic and Paralympic Games ▫ Limited public transport connectivity to regional activity centres ▫ Current public transport connections to the Gold Coast Airport are inadequate

Figure 27 Economy problem and problem drivers

3.4.2.1. Problem 5: Limited employment self-containment and connectivity between economic activity centres

Problem statement: Declining accessibility will restrict economic growth and will not realise the economic potential of the Gold Coast Airport or the broader Southern Gateway REC.

3.4.2.1.1. Lack of economic and employment activity in southern Gold Coast

Between 2016 and 2020 the Gold Coast experienced strong growth in the labour force. It increased by 30 per cent from 260,548 persons to 339,786 persons at a CAGR of 4.9 per cent per annum. This is significantly greater than Queensland's average CAGR of 3.8 per cent per annum over the same period[78]. This has led to the expansion and diversification of the labour force available to businesses, which is pivotal to the continued economic productivity of the region. The Gold Coast is expected to continue to grow and diversify its employment opportunities with more than 453,900 jobs in the region by 2041[79].

However, for the study area there is a disproportionate ratio of population to jobs. In 2019 the study area had a population of 34,220 persons and 13,479 jobs. This trend is forecast to continue to 2041 when the study area is expected to have a population of 47,503 persons and 20,646 jobs. The disproportionate ratio of population to jobs requires a large proportion of residents in the study area to travel to destinations across the Gold Coast and Tweed Shire for employment. In 2019, 79 per cent of commuter trips were to destinations outside the study area for employment. Figure 28 presents the proportion of work trips within the study area compared to work trips to other areas of the Gold Coast LGA and the northern area of Tweed Shire LGA, highlighting the lack of self-containment in the study area.

[78] *QGSO (2021). Queensland Regional Profiles: Gold Coast LGA.* Accessed at https://statistics.qgso.qld.gov.au/qld-regional-profiles
[79] Queensland Governments Statisticians Office (QGSO) 2018 medium series projections, refined by TMR's TAU in 2021 to include Transport for New South Wales (TfNSW) Travel Planning Zone projections for the Tweed area, reflect updated assumptions for the Cobaki Lakes area based on more detailed information and reflect refinements to the Gold Coast airport

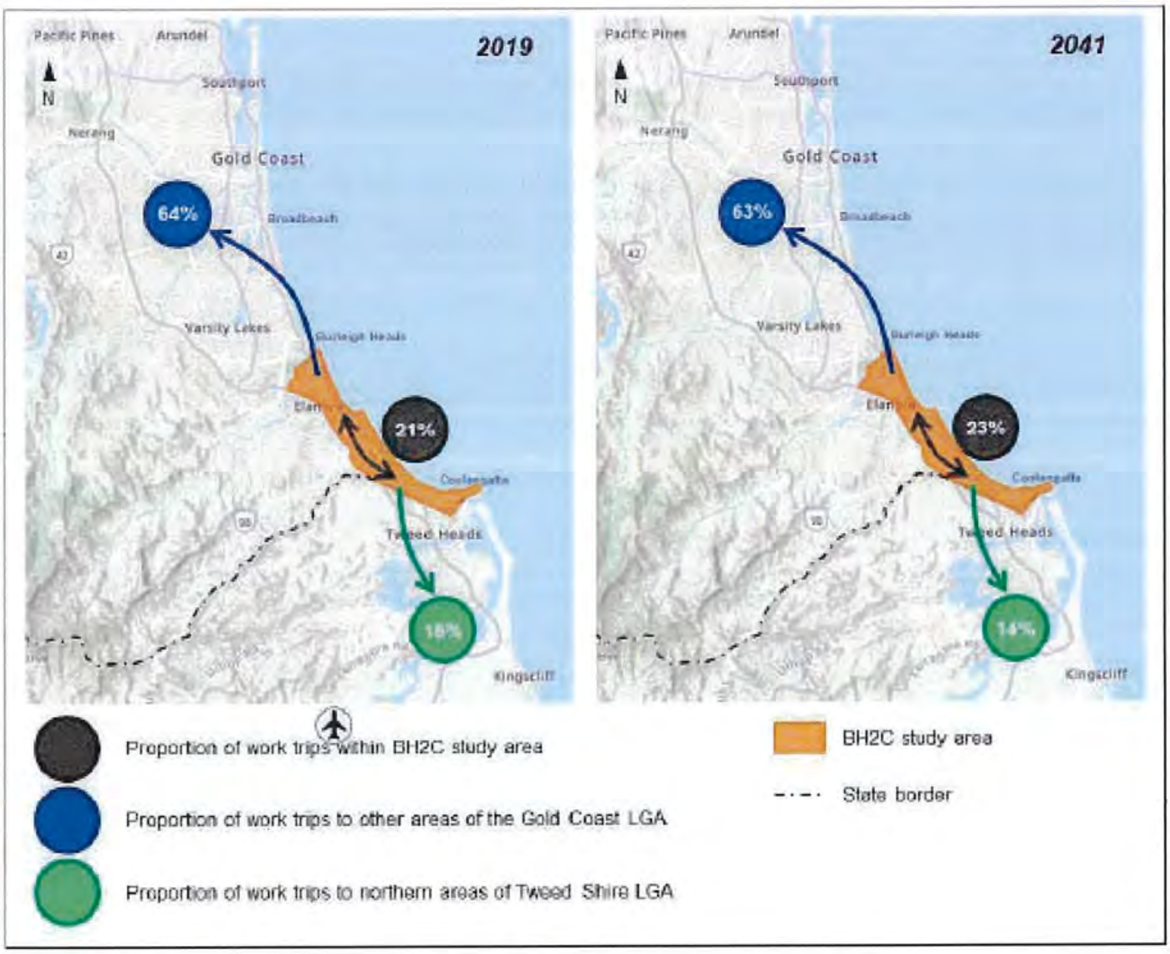

Figure 28 Distribution of work trips from the BH2C study area, 2019 and 2041

3.4.2.1.2. Coolangatta Major Centre is under-performing

Coolangatta has experienced economic and commercial challenges in recent years, resulting in high levels of shop and commercial floor space vacancies due to:

- dependence of centre businesses on volatile tourism activity
- the competing major centre of Tweed City in the same locality
- the comparatively small size of the local residential population catchment (6,500 people)
- local residential expenditure levels due to below average income levels.

An Economic Baseline Study[80] conducted in 2018 provided analysis on Kirra and Coolangatta's office and retail status. This revealed over 23 per cent of Coolangatta's shopfront retail tenancies were vacant, equating to 92 tenancies. Many vacant shops create "dead places of no interest", therefore reducing the vibrancy and vitality of the whole street or area. Industry practice suggests once an area reaches 30 per cent in vacant tenancies, the area will be in considerable distress for an extended period of time[81].

Key drivers of the lack of local economic sustainability are:

- The comparatively small and constrained size of the centre's primary residential catchment

[80] CoGC (2018) Economic Baseline Study of Coolangatta and Kirra, RPS, Gold Coast
[81] A 30% vacancy rate is a national benchmark for distress commercial areas. It was originally based on a definition in the US and has been used as an industry benchmark for some time. At this rate, rental vacancies tend to cascade as the structural and area effects of vacant properties undermine the competitive advantage of the centre as a whole.

- Poor accessibility and connectivity of the centre, which is isolated from the major arterial road network.

Small residential catchment

Current estimates are that Coolangatta had an estimated residential population of 6,541 people in 2021[82]. Under current settings, growth is expected to be moderate over the next 20 years, with the population reaching over 9,509 people by 2041. This is a comparatively small population for a Major Centre as designated under the Gold Coast *City Plan*, which is expected to service a catchment population of 80,000 to 100,000 people[83].

This Coolangatta residential population also yields less in terms of retail and business expenditure than in other catchments. Land use analysis has identified that, compared to the remainder of the study area, residents in the Coolangatta area are generally older with higher unemployment levels and higher dependence on pension and income sources other than employment. The larger portion of the study area, comprising Burleigh Heads, Palm Beach, Elanora, and Currumbin-Tugun, and the Gold Coast Airport is generally more economically diverse and active, with greater concentrations of business and employment activity/capacity as well as younger and more economically active population cohorts.

Table 27 shows personal incomes in Coolangatta were the lowest in 2019/20 of all the statistical areas (SA2s) in the BH2C study area ($57,622 per worker) and is the only area in the study area with incomes below the Gold Coast average. It is also falling behind, with income growth since 2015-16 being the slowest of all statistical areas across the study area.

Table 27 Average Personal Income, Study area SA2s and Gold Coast LGA, 2015/16 to 2019/20[84]

Average Personal Income (SA2)	2015 – 16	2019 – 20	Growth ($)	Growth (%)
Palm Beach	$57,642	$65,451	$7,809	13.5%
Currumbin / Tugun	$58,712	$64,736	$6,024	10.2%
Coolangatta	$54,529	$57,622	$3,093	5.6%
Gold Coast LGA	$56,103	$60,248	$4,145	7.4%

Constrained access

As noted in 3.4.1.4.1, road access to Coolangatta is heavily constrained from the north, with historic Marine Parade providing a highly constrained one lane per direction, and the winding Tweed Street/ Lanham Street and Tweed Street/ Dutton Street accesses providing only a further two lanes per direction, Parking in Coolangatta is heavily utilised, especially in peak surfing periods as noted in 3.4.1.2.3.

A major improvement to public transport provides a key opportunity to address structural challenges in the Coolangatta economy including:

- Increasing the accessibility and attractiveness of the Coolangatta centre to residents and visitors from other parts of SEQ, the Gold Coast and the Tweed Shire, making it easier to get to without the need to find a car park, particularly in busy surfing periods
- Increasing the size and reach of the labour force catchment for local businesses, making skills access for non-tourist business easier and therefore increasing the attractiveness of the location for business establishment and growth
- Accelerating take-up of existing residential development capacity and potentially further increasing residential densities along the public transport route

[82] .idcommunity (2023). Gold Coast City Estimated Residential Population (ERP). Accessed at: https://profile.id.com.au/gold-coast/population-estimate?WebID=200
[83] City of Gold Coast (2021) Gold Coast *City Plan* 6.2.4 Centre zone code,
[84] ABS (2022) Personal Income, Australia, Australian Bureau of Statistics, Canberra

- Improving local amenity through place-making elements of high quality public transport
- Reinforcing Coolangatta's role as part of the cross-border Southern Gateway REC, increasing its catchment reach south of the New South Wales border.

3.4.2.1.3. Economic importance of the Gold Coast Airport

The Gold Coast Airport is the most important economic centre in the southern Gold Coast and is a major driver of the regional economy. In the year ending June 2019 (pre-COVID) it was one of Australia's fastest growing airports, welcoming over 6.5 million passengers, and directly employing an estimated 2,200 FTE employees, in addition to supporting over 15,000 tourism-related jobs across the Gold Coast.

According to the International Air Transport Association (IATA), global aviation demand is expected to return to pre-COVID levels by 2023/24. This has already occurred on the Gold Coast where in December 2022 the airport had a total of 536,254 passengers[85] being greater than 2019 passenger volumes. This return to pre-COVID passenger levels has been supported by a $500 million redevelopment, which includes an expansion of the southern terminal and the development of additional retail space in the Airport in conjunction with the recently opened Rydges Hotel. This redevelopment equips the airport to cater for forecast passenger growth of more than 12 million passengers annually.

Current forecasts are for major growth in passenger throughput of 146 per cent over the 20 years from 2017 to 2037[86], resulting in 16.6 million passenger movements each year. By 2037, the Gold Coast Airport is forecast to contribute of $818 million per annum to the region and support an estimated 20,000 FTEs[87].

The airport supports a number of industries and opportunities for economic growth including:

- Tourism and hospitality industry growth
- Southern Gateway REC
- Education industry opportunities based at the airport
- Air freight
- Major events including Brisbane 2032 Olympic and Paralympic Games.

3.4.2.1.4. Importance of the tourism and hospitality industry to the region

The importance of the tourism and hospitality industry to the Gold Coast / Tweed economy cannot be understated, with over 8,960 local tourism businesses situated in the Gold Coast LGA in 2019[88]. In the year ending 30 June 2019, the industry generated a total economic output greater than $12 billion and added over $5.8 billion in value to the local economy. This represented 30.5 per cent and 29.5 per cent of the Queensland tourism and hospitality industry's economic output and value-added components respectively, signifying the criticality of the Gold Coast's tourism and hospitality industry[89]. Furthermore, the tourism and hospitality industry supported the employment of over 46,000 FTEs in the year ending 30 June 2019.

According to Tourism Research Australia, 12 per cent of total visitors to the Gold Coast visited the southern Gold Coast for the year ending December 2019, an increase from 11 per cent in 2018. This demonstrates the value of enhancing the connectivity of public transport offerings at the Gold Coast Airport, to provide a more seamless journey for visitors. This is evident from many airports around the world with successful rail links that connect into a city centre, in particular, Vancouver's Canada Line attracts over 20 per cent of air passengers[90], and the Docklands Light Railway at London City Airport attracts over 50 per cent rail share and more than 120 million passengers a year[91].

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[85] Accessed at: https://www.goldcoastairport.com.au/corporate/about-us#statistics_trigger
[86] Gold Coast Airport. 2017 Master Plan. P 46.
[87] Gold Coast International Airport (2020). *Airport terminal boost for local contractors*. Accessed at https://www.goldcoastairport.com.au/latest-news/airport-terminal-boost-for-local-contractors#:~:text=Gold%20Coast%20Airport%20is%20on,estimated%2020%2C000%20full%20time%20jobs.
[88] Tourism Research Australia (2020). *Local Government Area Profiles, 2019*. Accessed at https://www.tra.gov.au/Regional/local-government-area-profiles
[89] .idcommunity (2020). *Gold Coast City Tourism and hospitality value*. Accessed at https://www.tra.gov.au/Regional/local-government-area-profiles
[90] Chan. K (2020). *SkyTrain's Canada Line ridership projected to soar this decade*. Accessed at https://dailyhive.com/vancouver/canada-line-ridership
[91] Department of Transport (2019). *Light Rail and Tram Statistics, English: 2018/19*. Accessed at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/809894/light-rail-and-tram-statistics-england-2019.pdf

3.4.2.1.5. Southern Gateway Regional Economic Cluster

The Southern Gateway REC (refer Figure 29) includes a breadth of key economic activity centres that reflect the priority sectors of health and tertiary education, manufacturing (aviation-focused) and tourism. This REC presents an opportunity to strengthen the cross-border community as a significant proportion of residents from both jurisdictions travel to SCU for tertiary education, the Gold Coast Airport for employment and travel purposes and the John Flynn Private Hospital for health services.

According to *ShapingSEQ*, the potential extension of light rail to Coolangatta and the Gold Coast Airport will accelerate economic activity in this REC. This would drive the opportunity to develop an aviation industry cluster around the Gold Coast Airport, supporting growth of a highly skilled and productive workforce, and continued growth in the tourism and hospitality industries.

Figure 29 Southern Gateway REC

3.4.2.1.6. Education industry opportunities based on the Airport

The co-location of SCU with the Gold Coast Airport presents a significant opportunity to support the development of an aviation economic cluster along the Queensland and New South Wales state border, and to open up local employment opportunities and support self-containment in the corridor. SCU is a highly ambitious and rapidly growing university that is ranked in the top 200 young universities globally. By 2026, it is seeking to become established amongst the top 50 universities in the world, double both student enrolments (to 20,000 equivalent full-time student enrolments) and research income, and generate over $500 million in annual revenue[92].

The four key faculties of SCU being: Business, Law and Arts; Science and Engineering; Health; and Education, are aligned with key industries in the Study Area and will generate a skilled workforce capable of supporting the expansion of the Study Area's key industries. This, in conjunction with the recent $15 million funding injection from the Australian Government (distributed over four years from 2021) delivered through the *Job-ready Graduates package*[93], will support SCU in delivering courses in health, teaching, information technology and engineering to a greater number of students.

Highlighted by *ShapingSEQ*, SCU's proximity to the Gold Coast Airport presents an opportunity to establish an aviation cluster, with new professional development and training opportunities in the aviation industry that would otherwise not be available. This is strongly aligned with the *Queensland Aerospace 10-year Roadmap and Action Plan,* which outlines the Queensland Government's plan to capitalise on the opportunities available to Queensland aerospace businesses. The establishment of these development programs and opportunities may accelerate the pace of growth in both the civilian and defence aerospace sectors, and generate high paid, sustainable jobs of the future[94].

By providing improved transport connectivity to SCU and the Gold Coast Airport, the Study Area and Gold Coast LGA's economic productivity will likely experience strong growth for the foreseeable future, owing to a higher-skilled and more-productive labour force. Additionally, increased educational attainment, coupled with sufficient employment opportunities may have a positive impact at the national level through the promotion of inclusive economic growth and reduced income inequalities[95].

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[92] SCU (2019). *Strategic Plan: The New Southern Cross 2020 2026*. Accessed at https://www.scu.edu.au/media/scueduau/about/documents/Southern-Cross-University-Strategic-Plan-2020-2026.pdf
[93] SCU (2021). *Southern Cross University to attract more students with $15m extra funding*. Accessed at https://www.scu.edu.au/engage/news/latest-news/2021/southern-cross-university-to-attract-more-students-with-15m-extra-funding.php
[94] Queensland Government (2019). *Aerospace*. Accessed at https://www.statedevelopment.qld.gov.au/industry/priority-industries/aerospace
[95] ILO (2016). *Education and labour markets: Analysing global patterns*. Accessed at ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_424077.pdf

3.4.2.1.7. Air freight

While most freight on the Gold Coast is transported on the road network, the Gold Coast Airport plays an important role in the industry, with two major freight forwarders on site for both domestic and international markets. Although it will never compete with the major freight hub at Brisbane Airport, freight movements at the Gold Coast Airport are expected to continue to grow in line with forecast aircraft movements with an average annual growth rate of 4.7 percent over the twenty years from 2017 to 2037[96]. With the expected growth in tourism and commercial flights at the Airport, there is opportunity to steadily increase the volume of freight and logistics activities surrounding the Airport.

3.4.2.1.8. Major events and Brisbane 2032 Olympic and Paralympic Games

The Gold Coast is an event city with an events calendar that expands every year as the city's reputation for work class events grows and includes the Magic millions, Gold Coast 500, several world surfing events and Blues on Broadbeach. High quality transit is essential to service and facilitate existing events and continue to promote the growth in visitation to the Gold Coast.

The 2032 Olympic and Paralympic Games will extend beyond Brisbane and to regions including the Gold Coast, Sunshine Coast, Ipswich, Toowoomba, Cairns, Townsville, and the Whitsunday Islands. There are six venues on the Gold Coast identified to host Games events[97], using existing infrastructure that was established for the Gold Coast 2018 Commonwealth Games. The Gold Coast will also be responsible for providing accommodation (including a satellite village) to athletes, volunteers, and spectators. Of the six identified venues, three are currently serviced by the GCLR system, with the extension of light rail recognised as "critical transport infrastructure" in enabling the Gold Coast to support Queensland hosting the Games.

The *2032 SEQ Olympic and Paralympic Games Feasibility Study* (February 2019)[98] identified that the Gold Coast Airport will be a key domestic and international airport to support arrivals and departures of Games clients that plan to stay in the region. This was the case for the Gold Coast 2018 Commonwealth Games, during which a significant number of the Games Family contingent, spectators, and workforce used this airport. A major intervention to improve public transport in the study area would connect the Gold Coast Airport to accommodation and competition venues within the Gold Coast and accommodation options in northern New South Wales.

3.4.2.1.9. Limited public transport connectivity to regional activity centres

The limited attractiveness and competitiveness of public transport in the study area restricts connectivity to regional activity centres such as Southport, Robina, Surfers Paradise and Broadbeach. Transport connectivity to the central area of the Gold Coast is critical to the future economic development of the southern Gold Coast. According to DITRDC's '30-minute city' concept, commutes that extend for 90 minutes or more often lead to residents either adjusting their transport mode or moving residency, demonstrating the importance of efficiently connecting key economic activity centres.

Most economic activity centres in the study area are serviced by one public transport route and are functionally disconnected. Figure 30 shows the level of public transport accessibility of the southern Gold Coast in comparison to the central areas of the Gold Coast. It highlights the reduced level of accessibility compared to areas north of the study area, where additional public transport options exist. This highlights that existing public transport services do not provide adequate connectivity to activity centres within the study area, or between the study area and other centres across the Gold Coast.

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[96] Gold Coast Airport Master Plan 2017
[97] Austadiums, 2021. *Brisbane 2032 Olympic venues revealed.* Accessed at https://www.austadiums.com/news/921/brisbane-2032-olympic-games-venues-revealed
[98] Council of Mayors: South East Queensland, 2019. 2032 SEQ Olympic and Paralympic Games Feasibility Study.

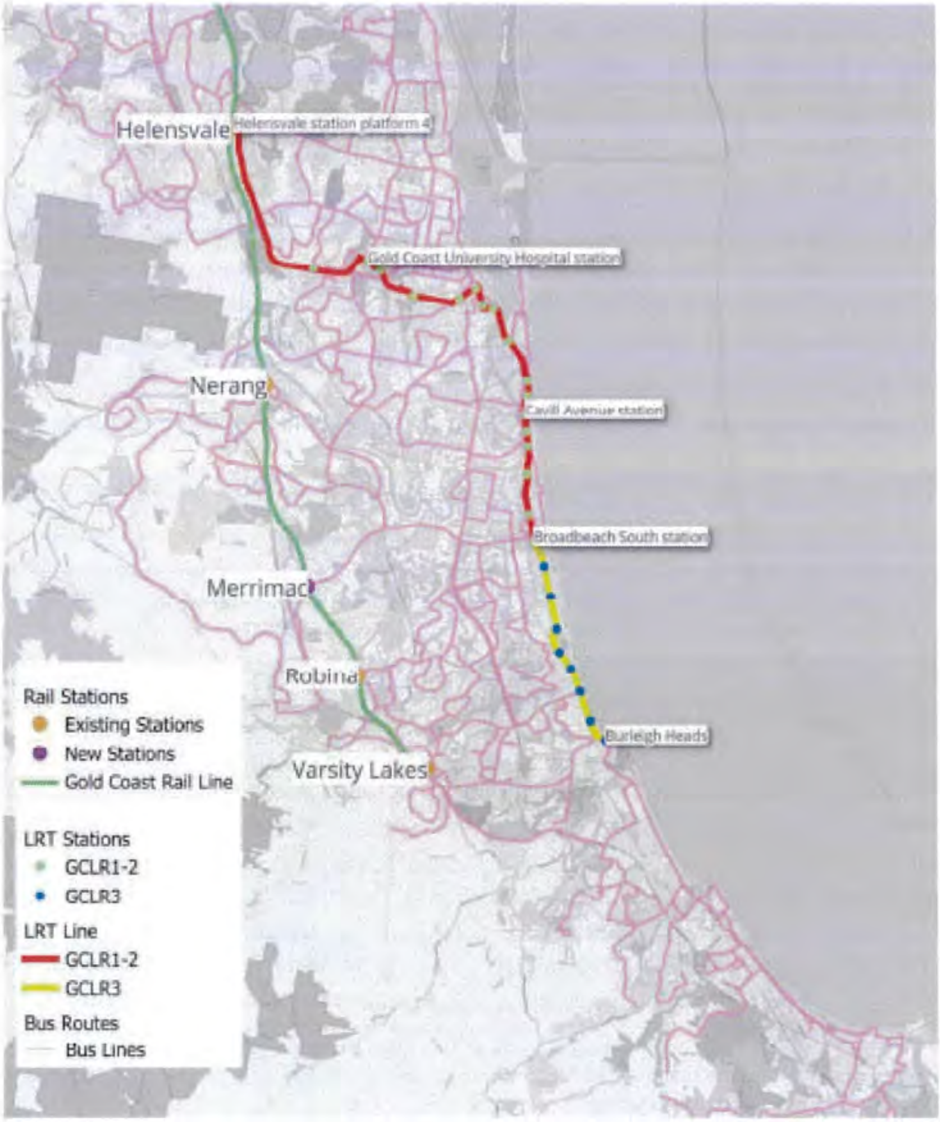

Figure 30 Public transport accessibility of the Gold Coast

The need for competitive public transport offering to access economic activity centres is also evident in the ABS 2016 Census Journey to Work (JTW) data, where a large proportion of residents of the southern Gold Coast travel to the central Gold Coast for employment, and vice versa. The data also showed that:

- the majority of people that reside in the southern Gold Coast and work in central Gold Coast commute from Palm Beach and Elanora to Burleigh Heads, or from Palm Beach and Elanora to Robina
- residents of the central Gold Coast that work in the southern Gold Coast are not concentrated in a single area, with around 25 per cent of these commuters travelling to Currumbin and Tugun for employment.

High quality transport networks often act as critical region-shaping infrastructure that can enhance intra-regional accessibility and economic productivity, as areas with good transport connectivity, accessibility and public transport ridership correlate strongly with areas rich in jobs, services, and community infrastructure[99].

Public transport can connect key economic activity centres with major population nodes across the Gold Coast and northern Tweed Shire to improve the attractiveness of the corridor by providing greater accessibility to employment opportunities and prospects. This can flow on to attracting both skilled workers and business investment to the area.

[99] QGSO (2021). *Queensland Regional Profiles: Gold Coast LGA*. Accessed at https://statistics.qgso.qld.gov.au/qld-regional-profiles

3.4.2.1.10. Current public transport connections to the Gold Coast Airport are inadequate

With the return to pre-COVID passenger levels the airport is experiencing significant growth in trips to and from the airport terminal. With 94 percent of airport visitors travelling by private vehicles this is placing increasing pressure on the surrounding road network and the availability of car parking on site at the airport.

This low public transport mode share is largely due to the current public transport offering at the Airport. It is only serviced by two bus routes being the 777 operating at a 15-minute frequency and the 760 departing half-hourly. These services often require transfers from one service to another and require extended travel times when compared to private vehicle-based trips. These services also do not have the reliability, legibility or attractiveness of mass transit services that operate in a dedicated right of way. There are also no direct bus services to Tweed Shire, with a transfer between services needed at Tweed Mall.

Table 28 outlines the trip length and required transfers from the Gold Coast Airport to popular tourist destinations in the Gold Coast LGA. This demonstrates the transport difficulties experienced by tourists arriving at the Gold Coast Airport, as they are often required to transfer from one mode of public transport to another while also facing extended travel times on public transport when compared to road-based trips. This is a significant problem which may detract from the experience tourists have while visiting the Gold Coast. The lack of a competitive public transport option for accessing the airport will continue the existing trends and pressure for expanding on-site carparking at the airport.

Table 28 Travel time from Gold Coast Airport to key destinations (Weekday leave after 8am)[100]

From Gold Coast Airport	Private vehicles (mins)	Public transport (mins)	Transfers on public transport	Private vehicle time savings
To Burleigh Heads	17.5	20	0	2.5
To Surfers Paradise Boulevard	30	45	1	15
To Coolangatta	7.5	10	0	2.5
To Southport Spit	35	73	2	38
To Pacific Fair	22	36	0	14

To remain viable, major airports must be able to offer a reliable, robust, safe, secure, affordable, integrated and attractive portfolio of ground transport options to grow while minimising their environmental footprint[101]. With passenger growth forecast to more than double, the airport will require improved public transport connections to provide an attractive, reliable alternative transport option that can serve demand on both sides of the border and reduce the Airport's environmental footprint.

Improved access to the airport can be achieved by integrating multiple public transport modes in proximity to the terminal. This would include improved trunk public transport services in the BH2C corridor, local bus services and the future regional passenger rail connection to the airport. This integration of public transport systems would enable passengers to access the Airport from large area of SEQ and would provide improved travel options for airport passengers as well as local residents.

An example of this is at Helensvale where the integration of heavy rail, light rail and bus services has proven an enormous success, opening up a whole range of destinations to passengers on both rail systems that were not previously accessible. With the opening of GCLR Stage 2, it is now possible to catch a direct public transport service from Surfers Paradise to Brisbane, via the regional rail at Helensvale station. Conversely, Brisbane residents and visitors can now

[100] TransLink (2021). *Journey Planner*. Accessed at https://jp.TransLink.com.au/plan-your-journey/journey-planner
[101] Lucy Budd Stephen Ison Thomas Budd. 2016. Improving the environmental performance of Airport Surface Access in the UK: the role of public transport. Research in Transportation Economics, Vol 59.

catch public transport directly to the world class beaches at Surfers Paradise and Broadbeach. Similar opportunities could be realised for the Gold Coast Airport.

3.4.2.1.11. Summary

The study area has significantly more residents than jobs, despite the jobs created by the Gold Coast Airport. The study area's largest centre, Coolangatta, has historically underperformed as an economic centre. In 2019, the study area's limited employment self-containment resulted in 79 per cent of commuter trips being made to destinations outside the study area. Existing public transport services in the study area also restrict connectivity to economic activity centres, in particular between the Gold Coast Airport and key tourist destinations such as Surfers Paradise, Burleigh Heads and Coolangatta, resulting in approximately 94 per cent of trips to and from the Airport being made by private vehicle. These trends are forecast to continue and will contribute to congestion while negatively impacting the area's economic competitiveness and liveability.

Part of the Southern Gateway REC, the Gold Coast Airport and neighbouring SCU represent a major opportunity to develop an aviation industry cluster that could support an increase in the quantity of highly skilled jobs in the study area. A major intervention to improve transport accessibility in the study area would boost the economic competitiveness of the southern Gold Coast by providing better and more efficient access to the Gold Coast Airport, supporting the economic performance of Coolangatta, and increasing local employment. Improved public transport connectivity to the Gold Coast Airport would also support the Brisbane 2032 Olympic and Paralympic Games by providing connectivity to accommodation and competition venues. Without intervention, the southern Gold Coast may become a dormitory suburb for jobs in other parts of the Gold Coast, South East Queensland, and Northern New South Wales and this would fail to realise the economic potential of the area.

3.4.3 Growth

Problem 6 is concerned with the ability of the study area to fulfill its strategic role in accommodating future population growth of the Gold Coast. Problem 6 addresses the various drivers as listed Figure 31.

Problem theme: Growth	
Problem	**Problem drivers**
Problem 6 – Challenge in meeting future urban consolidation benchmarks	○ Strategic context ○ City-shaping opportunity of the southern Gold Coast ○ Urban consolidation targets will not be met due to declining accessibility, amenity and liveability ○ Strategic city-shaping transport response ○ Opportunity to create a coastal lifestyle precinct

Figure 31 Growth problem and problem drivers

3.4.3.1. Problem 6: Challenge in meeting future urban consolidation benchmarks

Problem statement: Declining accessibility will negatively impact local amenity, liveability, and economic activity, and will not support the residential and employment growth needed to meet government benchmarks for urban consolidation in the BH2C study area.

3.4.3.1.1. Strategic context

Approximately 49 per cent of the Gold Coast LGA land is geographically constrained, while 15 per cent is committed to natural resources and rural purposes, leaving approximately one third for existing and future urban land use[102]. Under *ShapingSEQ*, the Gold Coast LGA contained 234,639 dwellings in 2016 with this number projected to grow by 158,900

[102] Based on land use categories identified in Strategic Framework map x....

(or 68 per cent) to reach 393,539 in 2041. The plan set a benchmark that 80 per cent of those 158,900 new dwellings are to be achieved through urban consolidation, by increasing the number of dwellings in existing urban areas. This would mean of total of 127,120 urban consolidation dwellings are required between 2016 and 2041 to meet the *ShapingSEQ* benchmark.

Reducing urban sprawl carries major social, economic, and environmental benefits including:

- a more diverse and affordable range of housing opportunities
- reduced cost of providing infrastructure services and social infrastructure
- reduced time and cost of transport as trips are shorter
- reduced impact on areas of ecological, agricultural and scenic amenity value
- reduced greenhouse gas emissions and improved air quality
- public health benefits as a result of increased mode share of walking, cycling and public transport
- improved productivity resulting from agglomeration of employment opportunities and working population.

Figure 32 identifies the City's strategic urban growth direction for the Gold Coast, clearly identifying the intent to accommodate population and employment growth through urban consolidation, as opposed to a traditional urban expansion settlement pattern.

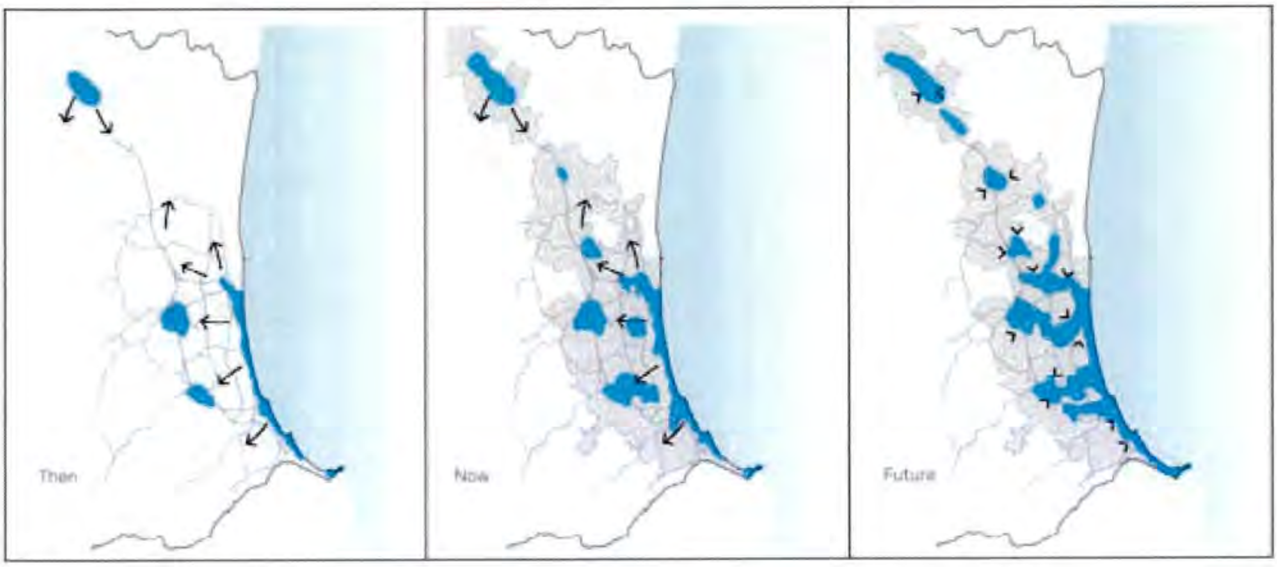

Figure 32 Urban consolidation focus for future growth of the Gold Coast [103]

Despite existing planning policy, current growth trends continue to result in rapid urbanisation of the City's remaining expansion areas. Between 2011 and 2021, outside of the capital cities, the Gold Coast's major greenfield areas grew rapidly, with Coomera having the largest amount of growth and Pimpama having the highest rate of growth in Australia [104]. This highlights the need to focus future growth in existing urban areas and avoid the impacts of urban sprawl.

3.4.3.1.2. City-shaping opportunity of the southern Gold Coast

According to QGSO demographic forecasts, the BH2C study area is planned to provide 22,167 dwellings in 2041, compared to 15,959 dwellings in 2019, an increase of 6,208 dwellings, or 39 per cent. This growth represents five per cent of the total 127,120 new consolidation dwellings required in the Gold Coast LGA by *ShapingSEQ* over the period 2016 to 2041.

[103] City of Gold Coast (2021). *City Plan: Part 3 Strategic Framework*. Accessed at https://cityplan.goldcoast.qld.gov.au/eplan/#Rules/0/61/1/0/0
[104] ABS 2023, Regional population, accessed at: https://www.abs.gov.au/statistics/people/population/regional-population/latest-release#:~:text=Outside%20of%20the%20capital%20cities,highest%20growth%20rate%20(600%25)

The BH2C study area contains significant areas area of land suitable for urban development within a highly attractive coastal setting, proximate to beaches, popular coastal attractions, and a range of existing community services and social infrastructure. The area has strong potential to maintain a highly attractive lifestyle and is therefore capable of attracting significant future urban growth to support the *ShapingSEQ* 80 per cent benchmark for urban consolidation dwellings through medium and higher density residential development.

The ability to realise this opportunity however is dependent on the ability to not only maintain the existing attractiveness of the area, but to enhance the amenity and liveability of the area, ensuring that it is a highly desirable location for people to live and work. Managing congestion, through providing an integrated transport network with improved, high quality sustainable transport options, will play an essential role in maintain and enhancing the area's quality of life.

3.4.3.1.3. Urban consolidation targets will not be met due to declining accessibility, amenity, and liveability

While there is an opportunity for the study area to support a greater proportion of urban consolidation, a business-as-usual approach to transport is likely to restrict residential and employment growth, prevent the achievement of urban consolidation targets and fail to realise the opportunity for additional urban growth in the BH2C area.

As described in preceding sections, by 2041 the transport network of the BH2C area will experience substantial road congestion, and existing public transport services will be unable to provide a competitive alternative transport option. Without intervention, the BH2C area will suffer from an overall decline in transport accessibility, the result of worsening road congestion, longer travel times and reduced public transport reliability.

Forecast traffic congestion will also lead to a number of other negative impacts including worsening noise, air and light pollution, reduced road safety, and social inequity whereby people who cannot access car transport are disadvantaged. These impacts will result in declining amenity and liveability of the study area.

The risk with negatively impacted amenity and liveability in the study area is that it is likely to negatively impact market demand for housing and employment and inhibit the City and the Queensland Government in meeting population, dwelling and employment benchmarks by 2041. A flow-on effect is that there would be added pressure to accommodate growth through less sustainable urban expansion. Figure 33 identifies how a business-as-usual approach to transport would affect the study area.

Figure 33 Forecast outcomes of a business-as-usual approach

If the study area cannot provide the required dwellings to accommodate the projected new residents by 2041, housing affordability will be reduced due to the imbalanced supply and demand for dwellings in consolidation and expansion land capacity. This will reduce the attractiveness of the southern Gold Coast and its lifestyle and may ultimately result in skilled workers and residents selecting other areas to live and hindering the diversification and expansion of the labour force proximate to local businesses in the study area.

While a traditional response to forecast congestion, such as road network upgrades, may improve road network efficiency and congestion levels, this improvement would only last for the short to medium term as it would promote continued car-dependency and low levels of public transport use, seeing an eventual return of congestion. Critically, this type of response does not prioritise the amenity and liveability of the area or the desired urban structure of the area.

Figure 34 Forecast outcomes of a traditional transport response

This highlights the need for a transport response that provides an efficient and competitive alternative to private motor vehicles, improves amenity and liveability, and supports *ShapingSEQ* objectives for urban consolidation.

3.4.3.1.4. Strategic city-shaping transport response

The accessibility effects of strategic transport initiatives can change a city's development patterns and growth trajectory by influencing the decisions people and businesses make about where to locate. As noted by ATAP[105]:

"Clearly, strategic transport investments can be a powerful policy lever for determining a city's structure, with land use regulation playing a supplementary role in managing urban development. This means that strategic transport initiatives need to be conceptualised within the context of a preferred urban structure rather than a traditional approach where transport investment simply responds to demonstrated demand.

In some instances, it may make more economic sense to prioritise strategic transport infrastructure that will reshape the city in permanently advantageous ways over initiatives that solve evident congestion problems."

Improved connectivity and accessibility would be a direct outcome of a major strategic investment in public transport in the study area and this would positively influence the amenity and liveability of the area, increasing demand to live and work in the area, and accelerating uptake of existing land use capacity.

The increased transport capacity and improved amenity and liveability would also enable the opportunity for additional urban development to maximise the benefits of urban consolidation. Figure 35 identifies the outcomes of a strategic city-shaping transport response in the form of a major public transport improvement.

105 Australian Transport Assessment and Planning guidelines. Section 6. https://www.atap.gov.au/framework/integrated-transport-land-use-planning/6-strategic-or-city-shaping-infrastructure

Figure 35 Strategic, city-shaping transport response

A major improvement to transport can not only boost transport accessibility but can improve the amenity and liveability of areas in proximity of the public transport system. Since the inception of GCLR Stage 1 in 2014, the City has monitored a broad range of urban indicators in adjoining communities. Key observations of the period from 2014 to 2019 include:

- Traffic: decreases in traffic volumes on roads adjacent to the light rail (e.g. 17 per cent reduction on the Gold Coast Highway at Broadbeach from 40,845 vehicles per day in 2011-12 to 33,992 vehicles per day in 2018-19)
- Cycle infrastructure: 50 per cent increase in bicycle routes from 83.3 kilometres to 125.4 kilometres
- Active building edges: almost 2 kilometres of additional active frontages created predominantly through the construction of new buildings and renovation of old buildings
- Connections: 15 new pedestrian crossings, 4 new pedestrian/cycle bridges, 12 new mid-block links (24 hour and non-24 hour access links)
- Pedestrian movement: a 180 per cent increase in pedestrian movement between the Broadbeach South station and the Pacific Fair shopping centre (from 5,796 to 16,200 movements)
- Safety cameras: Collective increase from 215 to 413 cameras across the areas of Southport, Surfers Paradise and Broadbeach
- Car ownership: 50 per cent of dwellings in the light rail corridor have either none or only 1 motor vehicle, compared to 39.8 per cent of dwellings across the Gold Coast LGA, highlighting reduced car-dependency
- Public art: an increase from 144 to 212 pieces of public art in the corridor.

Collectively, these changes highlight the ability of a major investment in public transport to support improved amenity and liveability.

3.4.3.1.5. Opportunity to create a coastal lifestyle precinct

There is a major opportunity to capitalise on the upgrade of the M1 to provide an integrated strategy of improved public and active transport, consolidated around a major improvement to public transport along the Gold Coast Highway. The M1 Varsity Lakes to Tugun business case recognised this opportunity. According to Infrastructure Australia:

"The proponent states the project, once delivered, will be sufficient to satisfy traffic demand until at least 2041. This additional capacity is expected to attract vehicles away from the Gold Coast Highway, the main alternative route, with up to 13,000 fewer vehicles using that route each day. The project will also divert traffic from much of the surrounding arterial network, thereby relieving congestion on local roads." [106]

This provides a unique opportunity to reprioritise the present-day Gold Coast Highway as an attractive urban boulevard, consistent with the approach endorsed in the Gold Coast City Transport Strategy 2031[107]:

".... redesignating the Gold Coast Highway as 'Gold Coast Boulevard', giving priority to public transport, walking and cycling, with a focus on light rail and bus".

This would dramatically improve the amenity and liveability of the BH2C area and support the achievement of urban consolidation targets.

3.4.3.1.6. Summary

Without intervention, the BH2C study area is forecast to experience declining amenity and liveability that will not adequately support the achievement of the 80 per cent urban consolidation benchmark set by *ShapingSEQ* for the Gold Coast. However, with intervention to enhance connectivity and accessibility of the BH2C area, the area could play a greater larger role in achieving the 80 per cent benchmark. Investment in a sustainable and connected transport system

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106 Infrastructure Australia. 2019. Project Evaluation Summary M1 Pacific Motorway (Varsity Lakes to Tugun). P 3.
107 City of Gold Coast. 2013. Gold Coast City Transport Strategy 2031. P 9.

would protect and enhance the liveability of communities within the study area and enable long-term sustainable development.

3.5 Risks if BH2C project is not delivered

Without a major transport intervention in the BH2C corridor, continued population growth and increasing travel demand, combined with existing car dependency and low public transport use, will place growing pressure on the transport network. This will cause significant road capacity constraints and congestion issues that will result in a number of transport, social, economic and environmental issues. Table 29 identifies the key risks and opportunities that may be lost without any major transport intervention in the BH2C study area.

Table 29 Risks and opportunities lost if the BH2C project is not delivered

	Risks / Opportunities lost
Transport	A significant portion of the southern Gold Coast road network will be congested and approaching or exceeding capacity by 2041. Congestion will result in increasing travel times and reduced road network reliability. Public transport services will experience decreasing reliability as a result of operating within traffic congestion. Public transport use will continue to remain low due to decreasing competitiveness as a travel option. There will be pressure to expand the road network and increase car parking, which would negatively impact the amenity and liveability of the area and likely result in a status quo situation. Increased use of the M1 for local trips will compromise its function as part of the NLTN. Lost opportunity to improve connectivity and accessibility in a geographically constrained growing urban area.
Social	Continued car-dependency and declining competitiveness of public transport will result in social inequity for those that do not have access to a private vehicle and for the growing proportion of ageing population that will depend on public transport. Increasing travel times will increase the average amount of time spent travelling and this will impact liveability for residents in the area. Increasing traffic congestion will negatively impact the amenity of the area through noise, air quality, light and visual impacts, decreasing the overall attractiveness of the area. Reduced accessibility to social infrastructure and services will continue to impact liveability of the area. Impact of increased road crashes and associated trauma. Poor cross-border connectivity will continue to restrict movement between cross-border communities and their access to employment and services, affecting liveability.

	Risks / Opportunities lost
Economic	Increasing congestion and decreasing accessibility will negatively impact economic activity. The annual cost of road network congestion in the study area is forecast to reach $117 million per annum by 2041. Opportunity lost: The Gold Coast Airport will not perform an optimum role in supporting the region's economy and the Brisbane 2032 Olympic and Paralympic Games. Economic development, access to services and social amenity in the southern Gold Coast will be adversely and significantly impacted undermining local and state government and private sector intentions including: • improving the commercial viability of the Coolangatta major activity centre • addressing the potential industry growth surrounding the Gold Coast Airport. Increased use of the M1 for local trips will affect the reliability of this route for freight. Lost opportunity to accelerate urban growth and activity.
Environmental	The Gold Coast Airport's environmental footprint will increase due to more private vehicle traffic. The objectives of the SEQ Regional Plan to consolidate urban development within existing urban areas will not be realised for the southern Gold Coast. Continued reliance on cars and consequential impacts will include increased greenhouse gas emissions and reduced air quality. Targets for urban consolidation in the study area will not be met and this will contribute further pressure for less sustainable growth through urban expansion.

3.5.1 Monetised cost of the problem / value of the opportunity

A core component of the IAAF is the estimation of the cost of the problem and value of the opportunity to indicate whether a problem or opportunity is considered nationally significant. The benchmark used by IA to determine national significant is a monetised outcome of greater than $30 million per year (nominal). This section evaluates the monetised component of the cost of the problem and value of the opportunity, before incorporating monetised elements of cost of the problem into a holistic monetised, quantitative, and qualitative narrative. The methodology that underpins the monetisation is provided in Appendix C: COTP report.

3.5.1.1. Methodology

Problems and opportunities defined in the ILM guided the identification of monetisable elements of cost of the problem and opportunity. Monetisable elements of problems and opportunities, and their relationship to overarching problem and opportunity statements, are shown in Figure 36. Some problems and opportunities underpin all monetisable elements. "Increasing transport demand (population growth)" for instance, underpins growth in monetised cost of the problem over the appraisal period.

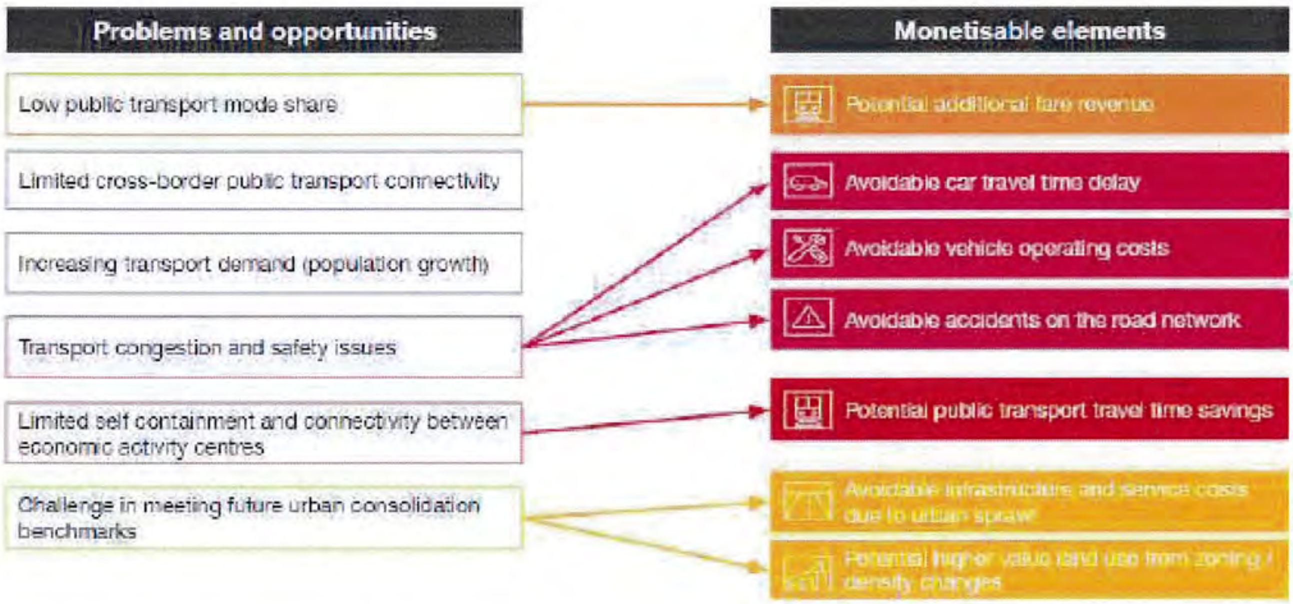

Figure 36 Relationship between the ILM and monetised cost of the problem

The monetised cost of the problem outcomes by element are summarised in Table 30, while a more holistic perspective on cost of the problem, is summarised in Table 31.

Table 30 Monetised cost of problem elements (undiscounted annual value, $ millions, nominal)

Problem or opportunity	Near term (FY27)	Medium term (FY31)	Long term (FY41)
Potential additional fare revenue	$26	$32	$53
Avoidable car travel time delay	$8	$12	$30
Avoidable vehicle operating costs	$31	$41	$79
Avoidable accidents on the road network	$5	$5	$8
Potential public transport travel time savings	$5	$6	$12
Avoidable infrastructure and service costs due to urban sprawl	$13	$14	$18
Potential higher value land use from zoning / density changes	$171	$189	$142
Total	$258	$299	$343

Table 31 IA Stage 1 cost of the problem summary

Problem / opportunity	Quantitative and qualitative evidence	Monetised annual cost ($millions, nominal)		
		Short term	Medium term	Long term
Low public transport mode share	• Public transport mode share of 4.9 per cent in the BH2C study area, which is only anticipated to increase to 5.8 per cent by 2041 in the Base Case • A lack of competitive and attractive public transport results in lost potential public transport benefits, including fare revenue.	• Potential additional fare revenue $26	$32	$53
Limited cross-border public transport connectivity	• There is significant cross-border commuter travel undertaken daily between the Gold Coast and Tweed and Byron LGAs, with 86,909 person trips per day in 2019 • Two bus networks currently service the southern Gold Coast and northern Tweed areas. However, the networks only allow for transfer between Queensland and New South Wales at Tweed Mall just south of the border, meaning at least on transfer is required to complete a cross-border journey.	n/a	n/a	n/a
Increasing transport demand (population growth)	• Forecast increase in population, employment and visitor growth will continue to increase pressure on the transport network, with total daily person trips in the BH2C study area projected to grow by 32 per cent, from 212,997 in 2019 to 281,749 in 2041, which is an increase of 68,752 trips per day.	n/a[108]	n/a	n/a
Transport congestion and safety issues	• Between 2019 and 2016, the growth in traffic volumes at localised spots in the study area was estimated to exceed seven per cent per annum • Further, although the M1 is currently undergoing a major upgrade from Varsity Lakes to Tugun, by 2041 it is estimated the M1 will be close to or exceeding capacity in certain sections	• Avoidable car travel time delay • Avoidable vehicle operating costs • Avoidable accidents on the road network		

[108] This problem / opportunity drives growth in cost of the problem over time, and is captured under all other monetised costs.

Problem / opportunity	Quantitative and qualitative evidence	Monetised annual cost ($millions, nominal)		
		Short term	Medium term	Long term
	• The significant pressure and demand placed on the road network will result in reduced safety levels. The annual crash costs on the road network within the study area were estimated as $80 million in 2019, forecast to increase by 52 per cent in 2041.	$44	$58	$117
Limited self-containment and connectivity between economic activity centers	• Despite the Gold Coast experiencing strong growth in the labour force, there is a disproportionate ratio of population to jobs in the study area. In 2019, 79 per cent of commuter trips were to destinations outside the study area for employment • Economic activity centers in the study area are also functionally disconnected, with most economic activity centers connected by one public transport route • These trends negatively impact the area's economic competitiveness and liveability.	• Potential public transport travel time savings		
		$5	$6	$12
Challenge in meeting future urban consolidation benchmarks	• *ShapingSEQ* has set an 80 per cent urban consolidation benchmark for the Gold Coast • Without intervention, the BH2C study area is expected to experience declining amenity and liveability that will not adequately support the 80 per cent benchmark.	• Avoidable infrastructure and service costs due to urban sprawl • Potential higher value land use from zoning / density changes		
		$184	$203	$160

This analysis clearly shows that the cost of the problem the Project is attempting to resolve is nationally significant, with a cost to society in the absence of intervention of $258 million per year in 2026, $299 million per year in 2031 and $343 million per year in 2041. The cost of the problem over the short, medium and long term is over IA's threshold for national significance of $30 million per year.

The present value cost of the problem has also been monetised to determine the appropriate scale of intervention (Table 32), demonstrating that a significant level of intervention would be appropriate to address this identified problem and opportunity.

Table 32 IA Stage 1 present value of problems and opportunities ($millions, discounted at 7% over a 30-year appraisal period to FY23)

Problem / opportunity	Value
Low public transport mode share	$367
Limited cross-border public transport connectivity	Not monetised
Increasing transport demand (population growth)	Not monetised[109]
Transport congestion and safety issues	$702
Limited self-containment and connectivity between economic activity centres	$72
Challenge in meeting future urban consolidation benchmarks	$936
Total	**$2,078**

3.6 Service requirements to address the problems / opportunities

3.6.1 Revised ILM

This PE has reviewed and updated the ILM completed as part of the Strategic Assessment. This review was undertaken in accordance with TMR's ILM guidance (DRAFT) and to align with TMR's Transport Coordination Plan (TCP) Key Areas and Objectives. The review included an ILM workshop on 7 April 2022 that was attended by representatives of TMR and the City. The attendees represented a range of transport, land use planning and economic development professionals with relevant experience and knowledge of the BH2C corridor and the southern Gold Coast. The revised ILM prepared for the BH2C PE is identified in Figure 37 (overleaf).

[109] This problem / opportunity drives growth in cost of the problem over time, and is captured under all other monetised costs.

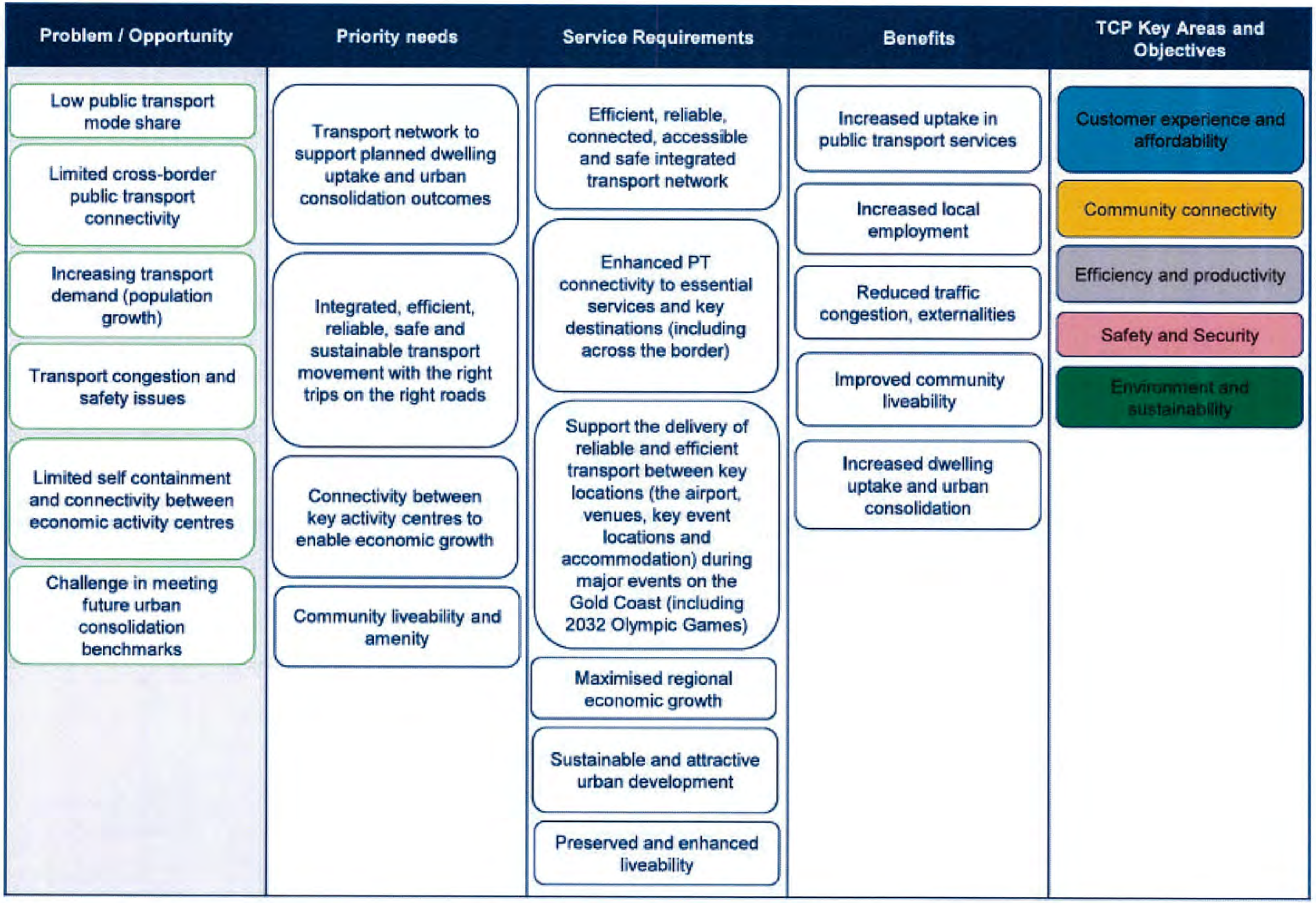

Figure 37 Revised ILM completed as part of the BH2C PE

3.6.2 Service requirements

The problems / opportunities described in Section 3.4 could be addressed if the service requirements in Table 33 were achieved.

Table 33 Service requirements and alignment with problems

Service Requirements	Problems					
	1. Increasing transport demand	2. Low public transport mode share	3. Limited cross-border public transport connectivity	4. Transport congestion and safety issues	5. Limited employment self-containment and connectivity between	6. Challenge in meeting future urban consolidation benchmarks
Efficient, reliable, connected, accessible and safe integrated transport network A multi-modal transport solution would provide an efficient transport network that meets the needs of various users and supports planned urban consolidation and the economic potential of the study area.	✓	✓				
Enhanced public transport connectivity to essential services and key destinations (including across the border) Improved public transport, as the primary means of moving more people more efficiently, is essential to managing forecast travel demand within and beyond the study area, reducing traffic congestion and associated environmental impacts, and increasing uptake in public transport services.		✓	✓	✓	✓	✓
Supporting the delivery of reliable and efficient transport between key locations (the airport, venues, key event locations and accommodation) during major events on the Gold Coast (including the 2032 Olympic and Paralympic Games) Improved public transport connectivity between the Gold Coast Airport and major destinations across the Gold Coast as part of the city-wide public transport network.				✓	✓	
Maximised regional economic growth Increased employment and economic activity within the BH2C study area, in particular at Coolangatta and the Gold Coast Airport precinct, as part of the Southern Gateway REC, would improve employment self-containment while reducing demand for travel beyond the study area.					✓	

Service Requirements	Problems 1. Increasing transport demand	2. Low public transport mode share	3. Limited cross-border public transport connectivity	4. Transport congestion and safety issues	5. Limited employment self-containment and connectivity between	6. Challenge in meeting future urban consolidation benchmarks
Preserved and enhanced liveability and environmental quality Improved transport accessibility would reduce car-dependency and congestion impacts, enhance community amenity and liveability, and support greater demand to live and work in the study area. Prioritising public and active transport in this urban corridor can improve the quality of life in the region and support the achievement of national and state targets to achieve net zero greenhouse gas emissions by 2050.						✓
Sustainable and attractive urban development A strategic, city-shaping transport response would accelerate dwelling and employment growth, enabling the study area to realise the opportunity for long-term sustainable urban consolidation.						✓

3.7 Project rationale

The southern Gold Coast is a major domestic and international entry point to Queensland. The Gold Coast Airport and the M1 provide key transport functions for the rest of SEQ and are reflected by their designation as part of the Southern Gateway REC.

By 2037, the Gold Coast Airport is forecast to host 16.6 million annual passenger movements[110] and contribute $818 million per annum to the region, supporting an estimated 20,000 FTEs[111]. Adjoining the Queensland border, the BH2C study area has strong economic and social ties with the neighbouring northern area of Tweed Shire, which combined with the BH2C study area is forecast to have a population of 106,000 people by 2041.

Recognising the major challenge that the Gold Coast faces to accommodate future growth, *ShapingSEQ* sets a benchmark for 80 per cent of new dwellings in the city to be provided through urban consolidation. The BH2C study area has an important role to play, highlighted by its *ShapingSEQ* designation as part of a larger 'urban corridor', intended to accommodate future growth around public transport. This intent is supported by other state and local government transport plans that highlight the role of high-quality public transport in supporting urban consolidation and accelerating economic activity in the Southern Gateway REC.

[110] Gold Coast Airport. 2017 Master Plan. P 46.
[111] Gold Coast International Airport (2020). *Airport terminal boost for local contractors*. Accessed at https://www.goldcoastairport.com.au/latest-news/airport-terminal-boost-for-local-contractors#:~:text=Gold%20Coast%20Airport%20is%20on,estimated%2020%2C000%20full%20time%20jobs

As a narrow coastal strip, the BH2C study area has a transport network that is restricted to two primary movement corridors, the M1 and the Gold Coast Highway. Despite its economic importance, the area has limited public transport connectivity to the remainder of the Gold Coast. Lack of a competitive and attractive public transport option supports high car-dependency, increasing congestion, declining travel time reliability and low uptake of public transport. The area also has poor cross-border public transport connectivity.

Population and employment growth, combined with growth in passenger movements through the Gold Coast Airport, is forecast to dramatically increase travel demand. By 2041 it is forecast that only 5.8 per cent of trips in the BH2C study area will be made by public transport. It is forecast that there will be congestion on all major traffic routes in peak times, including the M1, and the annual cost of road network congestion will increase to $117 million per annum in 2041. Growing congestion is expected to cause increased use of the M1 for local trips, which may compromise its function as part of the NLTN. A business-as-usual approach to these problems would lead to declining amenity and liveability in the BH2C area, restrict residential and employment growth, and fail to realise the opportunity for urban consolidation.

Given the area's economic importance, and the clear intentions of Government planning and policy, a well-considered strategic intervention is required to provide a major boost to public transport connectivity. This response should be based on a multi-modal approach that has high-quality public transport as the primary means of moving more people more efficiently.

This chapter has demonstrated the need for a major intervention to address identified problems and avoid the risks of not acting. Delaying this response would prolong and entrench existing travel behaviours, leading to economic, social and environmental impacts of increased congestion, while substantially reducing the opportunity to accelerate economic activity in the Southern Gateway REC and facilitate urban consolidation. A delayed response would also forfeit the opportunity to provide a seamless public transport experience to and from the Gold Coast Airport during the Brisbane 2032 Olympic and Paralympic Games.

4. Options generation and analysis

This chapter summarises the options generation and analysis process that determined the three options to be investigated in detail in this PE. The chapter includes:

- Overview
- Status quo options
- Non-asset based options
- Existing asset options
- New asset options
- Technical evaluation of options
- Conclusions.

The options assessment report in Appendix D: Options assessment report provides further details on the options generation and analysis process.

4.1 Overview

The outcome of the options assessment is to identify the preferred option/s to be progressed to the business case stage. The options assessment process has been divided into four steps. The first three steps are documented in this chapter. Details on each stage of the options assessment approach are shown in Figure 38. In undertaking the options assessment, a review was undertaken of the previous options considered at the Strategic Assessment stage, and considering the findings of the previous Multi-modal Corridor Studies.

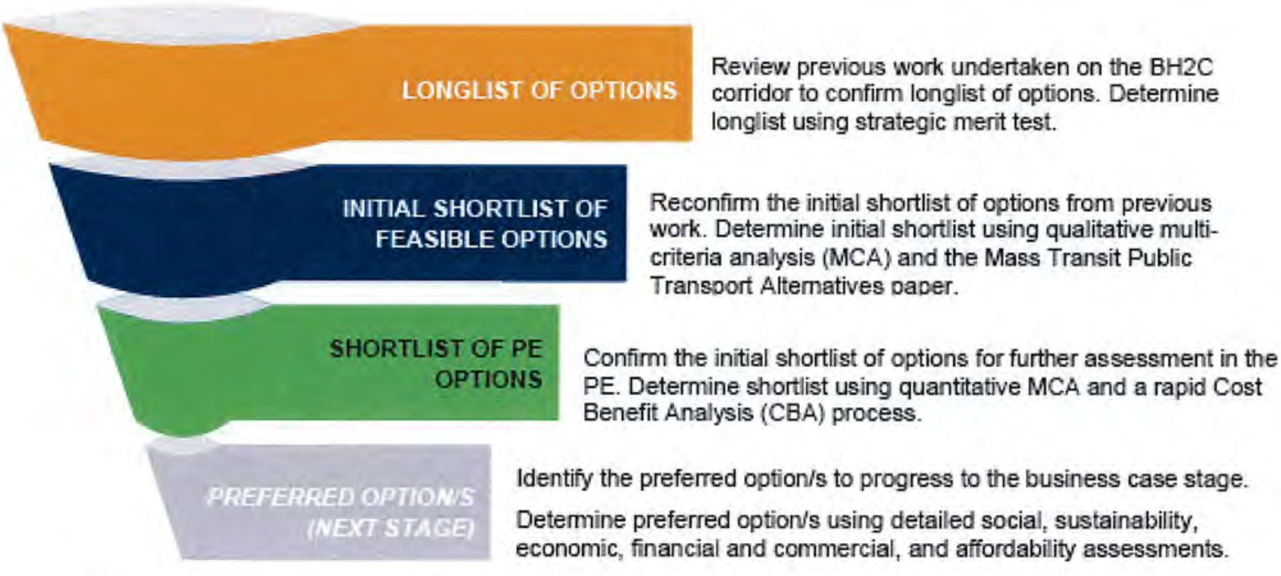

Figure 38 Options assessment approach for PE

The options assessment approach was developed in accordance with the IA Assessment Framework, which applies a less costly method of analysis to narrow a longlist of options before using more resource intensive methods to assess an option shortlist.

4.1.1 Longlist of options

The first step in the options generation and analysis process was to review the strategic fit and feasibility of the options identified through previous work on the BH2C corridor to identify a longlist of options to be assessed in the PE. As determined by the Queensland Government in its Burleigh Heads to Tugun Multi-modal Corridor Study 2020 and the Tugun to Coolangatta Multi-modal corridor study 2022, the options were focused on a corridor centred on the Gold Coast Highway extending from Burleigh Heads along the coast to Coolangatta town centre, via the Gold Coast Airport.

The longlist of options considered a broad range of infrastructure and non-infrastructure options consistent with the requirements of TMR's Network Optimisation Framework (NOF) including; improvements to existing road networks, augmentation of public transport services and infrastructure assets, road space reallocation, active transport and improving connectivity to the heavy and light rail networks. The Strategic Assessment identified an initial longlist of 13 options shown in Table 34. Additional detail on each of these options is included in Appendix A: Public transport needs in the southern Gold Coast and northern Tweed region Strategic Assessment. Additional detail on each of these options is included in Appendix A: Public transport needs in the southern Gold Coast and northern Tweed region Strategic Assessment.

Table 34 Options longlist from the Strategic Assessment

Longlist Option number	Option	Description
Status quo		
Base Case	Let the corridor evolve without intervention	This option is to maintain and manage the existing asset and is a do-minimum scenario with the continuation of the current infrastructure with regular maintenance and safety strategies. This option assumes that the current committed and funded projects and the forecast population growth and employment projections all go ahead.
Non-asset based		
2	Introduce network demand management to reduce the amount of travel and re-route, re-time and re-mode trips	This option will include implementing new technologies and other non-built solutions to improve network efficiency, such as active traffic management, road space reallocation, travel behaviour change initiatives, travel information tools or road user pricing.
3	Develop Mobility as a Service (MaaS) and support Cooperative and Automated Vehicles (CAV)	This option will involve developing MaaS and CAV. MaaS provides a total door-to-door mobility solution that combines multiple transport modes which are treated as a single service. This integrated transport system provides mobility choice and allows individuals to compare and utilise different transport modes, such as public or active transport, as opposed to private vehicles. CAVs use Cooperative Intelligent Transport Systems (C-ITS) to allow vehicles to communicate with other vehicles, roadside infrastructure, transport management systems and personal mobile devices, to keep drivers safe and alert of traffic changes.
4	Amend City Plan / develop and implement an Economic Development Implementation Plan to support	This option will involve reviewing or amending the City Plan to reflect the vision for the study area and development and implementation of an economic development plan. This could

Longlist Option number	Option	Description
	employment growth and industry attraction to the southern Gold Coast	include consideration of the key industry growth opportunities in the area and planning of a definitive spine around which urban and commercial development would occur to support an optimal urban and economic growth outcome.
5	Establish cross-border integrated ticketing and network planning	This option will involve undertaking network planning to review and improve service provision and the integration between travel modes in Queensland and northern New South Wales. By further progressing cross-border network planning and establishing an integrated ticketing system, this option will provide seamless transport experience for public transport users in the cross-border communities, as well as visitors to the region via the Gold Coast Airport.
Existing asset based		
6	Implement bus lanes on the Gold Coast Highway	This option will implement bus lanes on the Gold Coast Highway within the Coastal Corridor by replacing existing road lanes and adding bus lanes where space permits. Dedicated bus lanes can support the expansion of public transport offerings and may generate public transport travel time savings for services during peak periods. Bus lanes have been implemented across the Gold Coast on local roads and motorways.
7	Consider changes to service delivery models	This option provides an opportunity for government agencies to consider further integration of public transport services delivery across the Gold Coast. Bus services are currently delivered by a private operator (Kinetic) and the GCLR Stage 1 and 2 system has adopted franchise arrangements for the delivery of transport infrastructure and services. This option could consider augmentations to the franchise arrangement for future extensions of the GCLR system or as part of the whole of network transport solutions in the region.
8	Improve the existing public and active transport network through service upgrades and expanding service frequency	This option will review the current bus and heavy rail offerings and assess whether the services are connecting people to the right place at the right time. Improving public transport services through upgrades and expanding service frequency may enhance mobility along the BH2C corridor and encourage an increase in density around bus stops.
9	Improve existing asset options through modernising bus fleet or trains	This option will include the modernisation of the current services provided by Kinetic (which are provided through an agreement with TransLink) and Queensland Rail. The Queensland Government has made a commitment that every new bus in Southeast Queensland will be zero emission from 2025.

Longlist Option number	Option	Description
10	Increase priority for investment in major road network upgrades	This option will consider the potential to further relieve congestion through major road upgrades and could include widening of the Gold Coast Highway and improving key intersections. The current M1 upgrade is a complementary project that is due to completion in 2024. Any strategic road upgrades will be on the Gold Coast Highway urban arterial road corridor.
New asset		
11	Extend mass transit to the Airport and Coolangatta (Coastal Corridor) with potential cross-border connections	This option will involve the design and construction of new mass transit infrastructure from Burleigh Heads to the Gold Coast Airport and Coolangatta. The existing GCLR Stage 1 and 2 system, and the Stage 3 system currently under construction, could be extended or supplemented by further mass transit services along the BH2C corridor. This could include Bus Rapid Transit (BRT), trackless trams or light rail technologies.
12	Develop heavy rail to the Airport with supporting bus links with consideration of staging options	This option will consider a heavy rail alternative to bus services for the Coastal Corridor with connecting bus services.
13	Develop high frequency and high capacity east-west inland transit links from Burleigh Heads to Varsity Lakes	This option considers the missing east-west link in the southern Gold Coast and a potential transport solution that connects the planned GCLR Stage 3 terminus at Burleigh Heads to the heavy rail station at Varsity Lakes.

The TMR and the City project team completed a strategic review of the initial longlist, and two options were excluded from further analysis in the PE: Longlist Option 12 and Longlist Option 13.

Longlist Option 12, Develop heavy rail to the airport with east-west bus links with consideration of staging options, was excluded from the longlist because it does not address the problems and opportunities identified in the ILM as heavy rail primarily services different types of trips (for example, long distance trips between Brisbane and Gold Coast), with the focus of this Project being trips within the Study Area and to adjacent regions. While the heavy rail to the airport is an important project for the region, it is considered out-of-scope for this PE and is considered a complementary project within a mature public transport network, not an alternative option.

The extension of the Gold Coast Railway from Varsity Lakes to the Gold Coast Airport (heavy rail) is being assessed separately by the Department of Transport and Main Roads (TMR) in a corridor study for the Gold Coast Heavy Rail Corridor between Varsity Lakes and the Gold Coast Airport. The SEQ Regional Transport Plans 2021 do not list the construction of this extension in any of the short-term priority actions and identifies it a longer-term priority. TMR's website notes: "The Cross River Rail project is the Queensland Government's highest priority infrastructure project which will increase capacity at the core of the rail network and provide the necessary additional capacity to allow for other growth projects on SEQ's rail network, including the potential extension of the rail line between Varsity Lakes and Gold Coast Airport."[112]

[112] https://www.tmr.qld.gov.au/projects/gold-coast-heavy-rail-extension-varsity-lakes-to-gold-coast-airport. Accessed 23/03/2023.

An action in the SEQ Regional Transport Plans (2021) provides: A4.29 Varsity Lakes to Gold Coast Airport public transport planning (short-term action) - Continue to undertake planning for the Varsity Lakes to Gold Coast Airport heavy rail investigation corridor to determine and preserve corridor land. The SEQ Regional Transport Plan notes at p 141: "As planning progresses for extension of the light rail to Coolangatta, upgrades to the Pacific Motorway, the ongoing operation of the Gold Coast Highway and the eventual extension of the heavy rail line to the Gold Coast Airport, it is important to understand the individual roles and interdependencies of these corridors. [113]

Longlist Option 13, Develop high frequency and high capacity east-west inland transit links from Burleigh Heads to Varsity Lakes, was excluded from the longlist because it is outside the geographical scope of the project. Similar to Longlist Option 12, Longlist Option 13 would not address the problems and opportunities identified in the ILM. The confirmed longlist of options progressed to the PE is shown in Table 35 and included a range of solutions across the State Infrastructure Strategy and NOF categories and requirements.

Table 35 Confirmed longlist of options

Longlist Option number	Option
Status quo	
Base Case	Let the corridor evolve without intervention
Non-asset based	
2	Introduce network demand management to reduce the amount of travel and re-route, re-time and re-mode trips
3	MaaS and support CAV
4	Amend City Plan / develop and implement an Economic Development Implementation Plan to support employment growth and industry attraction to the southern Gold Coast
5	Establish cross-border integrated ticketing and network planning
Existing asset based	
6	Implement bus lanes on the Gold Coast Highway
7	Consider changes to service delivery models
8	Improve the existing public and active transport network through service upgrades and expanding service frequency
9	Improve existing asset options through modernising bus fleet or trains
10	Increase priority for investment in major road network upgrades
New asset	
11	Extend mass transit to the Airport and Coolangatta (Coastal Corridor) with potential cross-border connections

[113] Transport and Main Roads. 2021. SEQ Regional Transport Plans. P 141.

4.1.2 Initial shortlist of feasible options

A qualitative multi criteria analysis (MCA) was conducted on the longlist of options to determine the initial shortlist of feasible options for progression to the quantitative MCA. The qualitative MCA was developed in accordance with the IA Assessment Framework.

The criteria used in the qualitative assessment were developed based on the problems and opportunities outlined in the ILM. The criteria were re-confirmed in the qualitative MCA workshop with participants from TMR and the City. The scoring scale applied in the qualitative assessment is presented in Figure 39.

Figure 39 Qualitative MCA scoring scale

Options that were expected to have a direct impact on a criterion were scored more favourably if they were considered more likely to address the problems and opportunities identified in the ILM. The options were scored against each of the criteria based on the relative merits of the option as agreed by consensus with workshop participants, including specialist advisors and representatives from TMR and the City. The total score was calculated as the sum of the score for each criterion with higher total scores representing a more positive (or less negative) impact. Table 36 outlines the criteria used in the qualitative MCA. The criteria were developed from the problems and opportunities outlined in the ILM. The criteria were re-confirmed in the qualitative MCA workshop.

Table 36 Qualitative MCA criteria

Criteria		Description
A	Transport network and car dependency	High car dependency, lack of reliable and efficient PT services, and limited scope to expand road network capacity is resulting in congestion issues and constraining the transport network in the southern Gold Coast.
B	Urban development	Development growth within the southern Gold Coast is lagging behind the anticipated uptake of development capacity and will mean that dwelling, population and employment growth targets are not achieved.
C	Lifestyle and amenity	The lifestyle and amenity preferences favoured by the local community in the southern Gold Coast will be negatively impacted without investment in a more sustainable transport system.
D	Cross-border integration	A historical lack of cross-border transport planning has resulted in a lack of connectivity and integration between the Gold Coast and the growing population and increased employment opportunities in the Tweed Shire.
E	Employment and community	Improved connectivity to key economic activity centres for employment opportunities and enhanced accessibility to community infrastructure across the wider region will enhance the attractiveness of the southern Gold Coast.
F	Economic growth	The Gold Coast Airport and the Southern Gateway Regional Economic Cluster (REC), supported by transport system improvements, will drive greater employment and support key industry sectors fundamental to tourism and wider economic growth.

Table 37 presents the scoring and outcomes of the qualitative MCA. Refer to Appendix D: Options assessment report for the detailed justification from the qualitative MCA.

Table 37 Qualitative MCA summary[114]

Longlist Option number	Option description	Transport network and car dependency	Urban development	Lifestyle and amenity	Cross-border integration	Employment and community	Economic growth	Total score	Rank
1	Let the corridor evolve without intervention	1	2	1	1	1	1	**7**	**9**
2	Introduce network demand management to reduce the amount of travel and re-route, re-time and re-mode trips	3	1	2	1	1	1	**9**	**8**
3	Develop MaaS and support CAV	2	2	2	2	3	2	**13**	**5**
4	Amend City Plan/develop and implement an Economic Development Implementation Plan to support employment growth and industry attraction to the southern Gold Coast	2	3	2	3	3	2	**15**	**4**
5	Establish cross-border integrated ticketing and network planning	2	2	2	3	2	2	**13**	**5**

[114] Refer to Appendix D: Options assessment report for the detailed justification from the qualitative MCA

Longlist Option number	Option description	Transport network and car dependency	Urban development	Lifestyle and amenity	Cross-border integration	Employment and community	Economic growth	Total score	Rank
6	Implement bus lanes on the Gold Coast Highway	3	2	2	3	3	3	**16**	**3**
7	Change the service delivery model	2	2	2	2	1	1	**10**	**7**
8	Improve the existing public and active transport network through service upgrades and expanding service frequency	3	3	3	3	3	3	**18**	**2**
9	Improve existing asset options through modernising bus fleet or trains	2	2	2	2	2	2	**12**	**6**
10	Increase priority for investment in major road network upgrades	2	3	1	2	3	4	**15**	**4**
11	Extend mass transit to the Airport and Coolangatta with potential cross-border connections	5	5	4	5	4	4	**27**	**1**

Longlist Option 11, Extend mass transit to the airport and Coolangatta, had the highest score on all criteria (tied first with Longlist Option 10 for Economic growth).

The justification and comments for the highest and lowest scoring options are in Table 38. The rationale for the score of each option for each criterion is captured in Appendix D: Options assessment report.

Table 38 Longlist qualitative assessment justification of highest and lowest scoring option/s

Criterion	Justification and comments
Transport network and car dependency	Highest scoring option: Option 11 • This option will fundamentally improve the connectivity, accessibility and capacity of the transport network • The option will result in significant increase in attractiveness of PT offering and therefore maximising mode shift throughout the Study Area. Lowest scoring option: Option 1 • This option will not address this criterion, and unlikely to shift greater PT mode share at the current provision of PT services • The Base Case includes the Varsity to Tugun (V2T) project that will improve near term congestion issues, however, the M1 and the Gold Coast Highway will experience capacity constraints again by 2041.
Urban development	Highest scoring option: Option 11 • Through enhanced connectivity to key locations, the option will attract more population to the Study Area, and support increased uptake of development opportunities in the Study Area • This option also supports effective land use change along the Coastal Corridor. Lowest scoring option: Option 2 • The option will likely result in a shift of residents to live closer to their employment, which may negatively impact population growth in the Study Area given the proportion of residents who work outside the Study Area • The option may also hinder access to local businesses and compromise urban development • This option is unlikely to enhance attractiveness of the Study Area from a development and employment perspective if overall movement of people and goods is made harder or more expensive.
Lifestyle and amenity	Highest scoring option: Option 11 • The option will support reduced traffic flow through the communities, while providing improved connectivity for residents to key activity centres - this will improve the attractiveness of the Study Area through greater lifestyle and amenity choices • Mass transit vehicles also provide greater mobility for all ages, including mobility scooter and wheelchair users • However, this option may increase development density that may not be desired by some members of the community. Lowest scoring option: Option 1 and Option 10

Criterion	Justification and comments
	• In the short term, doing nothing will retain some of the current lifestyle attractiveness. However, with the development growth that is already occurring without investment, congestion will occur on the transport network regardless • Option 1 will not address Criteria C, as doing nothing will not improve lifestyle and amenity preferences favoured by the local community • Any road upgrades (Option 10) will result in increased private vehicle mode share, reducing amenity with a potential need for property acquisition.
Cross-border integration	Highest scoring option: Option 11 • This option will better connect key population nodes to key economic activity centres, and support the development of an integrated cross-border community • The option will likely allow for the future development and integration with the Tweed Light Rail • The option is also supported by various local and state government policies across Queensland and New South Wales. Lowest scoring option: Option 1 and Option 2 • Option 1 will not address Criteria D, as it will not encourage or improve further cross-border integration needed to service the growing population and employment opportunities • Option 2 will not enhance connectivity or integration between the Gold Coast and Tweed Shire.
Employment and community	Highest scoring option: Option 11 • This option will create a single connected journey for PT users, and a sense of a connected economic region and community, supporting mutual economic and employment growth • Through increased connectivity to key economic centres and community infrastructure, this option will enhance the attractiveness of the southern Gold Coast • The option may also further support the development of the southern Gold Coast economic precincts, attracting businesses to relocate to the region given the accessibility the option provides. Lowest scoring option: Option 1, Option 2 and Option 7 • Option 1 will not address Criteria E, as it will not improve connectivity to employment nodes or other community infrastructure for residents. • Option 2 is unlikely to alleviate traffic issues in the wider region and therefore will not improve connectivity to key economic activity centres • While Option 2 may increase mobility for existing residents, the option may be less effective on the urban road network than on motorways, limiting the potential to improve transport links within local communities and will not support employment growth opportunities in the area • Option 7 will not address Criteria E, as it is unlikely to create a positive impact to connecting residents to employment or services.
Economic growth	Highest scoring option: Option 10 and Option 11

Criterion	Justification and comments
	• Option 10 may alleviate congestion in the corridor in the short to medium term and support the movement of people and goods from the Gold Coast Airport and the Southern Gateway REC • While road upgrades have historically stimulated economic growth, the scope of road upgrades is likely to be constrained in the long term, particularly on the M1 • The extent of impact created by Option 10 is limited by the capacity to upgrade the road network in the Study Area, including considerations of expanding the Gold Coast Highway and Tugun Bypass etc • Option 11 will connect the Gold Coast Airport with the broader Coastal Corridor • By alleviating the growing congestion in the southern Gold Coast road network, the option may attract skilled workers from the broader region to the Study Area to live and/or to work • Option 11 will also support the development of the existing aviation economic precinct/cluster, and further support other industries in the Southern Gateway REC. Lowest scoring option: Option 1, Option 2 and Option 7 • Option 1 will not address Criteria F, as doing nothing will not drive industry development in the Study Area • With the expected population growth in the corridor, in the absence of any intervention, the impacts of congestion and the constrained transport network will undermine the economic viability of the Study Area and wider region • Option 2 will not provide sufficient support to leverage the potential growth of key industry sectors in the Study Area • Option 7 will not address Criteria F, as the option will not positively impact industry development in the Study Area.

The sequential ranking of the options longlist, confirmed in the qualitative MCA workshop, is presented in Table 39. The qualitative assessment determined that Longlist Option 11, Extend mass transit to the airport and Coolangatta, was most likely to address the problems and opportunities identified in the ILM.

Table 39 Qualitative MCA options ranking overview

Longlist option number	Option	Total score	Rank
11	Extend mass transit to the Airport and Coolangatta with potential cross-border connections	27	1
8	Improve the existing public and active transport network through service upgrades and expanding service frequency	18	2
6	Implement bus lanes on the Gold Coast Highway	16	3
10	Increase priority for investment in major road network upgrades	15	4
4	Amend City Plan/develop and implement an Economic Development Implementation Plan to support employment growth and industry attraction to the southern Gold Coast	15	4
3	Develop MaaS and support CAV	13	5

Longlist option number	Option	Total score	Rank
5	Establish cross-border integrated ticketing and network planning	13	5
9	Improve existing asset options through modernising bus fleet or trains	12	6
7	Change the service delivery model	10	7
2	Introduce network demand management to reduce the amount of travel and re-route, re-time and re-mode trips	9	8
1	Let the corridor evolve without intervention	7	9

After considering the outcomes of the qualitative MCA the four highest scoring options were considered for the PE options shortlist: Longlist Options 11, 8, 6 and 10.

Longlist Options 10 and 4 had the same score but only Longlist Option 10 was progressed because it provided a 'counter factual' of whether the problem and opportunities identified in the ILM are better addressed through investment in the road network as opposed to public transport. Therefore, the inclusion of Longlist Option 10 broadens the multi-modal assessment. Option 4 was considered a complementary option that shall be progressed by the City as a business-as-usual process to encourage development and economic activity in the corridor.

The four highest scoring options from the qualitative assessment were progressed for further scope refinement. This included potential to package, bundle and/or combine non-infrastructure options with those that improve existing or involve new infrastructure. The refined shortlist, shown in Table 40, was developed through the options scoping workshop and the outcomes of the Mass Transit Public Transport Alternatives Paper, which identified Light Rail Transit (LRT) and BRT as the most appropriate mass transit options along this corridor. Based on this scoping workshop, a range of shortlist options were developed based on the highest ranked longlist options. The PE options shortlist included a range of NOF Smarter Solution aligned options including bus priority measures (Option 2), bus lanes (Option 3a/b), and the inclusion of interventions such as parking charge changes and bus network optimisation within the new infrastructure options (Options 5 and 6). No non-infrastructure solution was considered to meet the service requirements as a standalone solution.

It is likely that Longlist Options 2, 3, 4, 5 and 9 would be implemented in parallel with the infrastructure options in the options shortlist. These options represent complementary initiatives that would likely be delivered by the City or TMR as population grows, technology advances and to ensure the benefits of the Project are maximised and realised.

Table 40 Overview of project options (initial shortlist of feasible options)

Longlist Option number	Longlist option description	Shortlist Option number	Shortlist option description
Status quo			
Base Case	Let the corridor evolve without intervention	Base Case	Let the corridor evolve without intervention
Non-asset based			
8	Improve the existing public and active transport network through service upgrades and expanding service frequency	1	Bus service enhancements with no infrastructure
		2	Bus service enhancements with opportunistic infrastructure

Longlist Option number	Longlist option description	Shortlist Option number	Shortlist option description
Existing asset based			
6	Implement bus lanes on the Gold Coast Highway	3a	Bus lanes on Gold Coast Highway (with bridge widening)
		3b	Bus lanes on Gold Coast Highway (without bridge widening)
10	Increase priority for investment in major road network upgrades	4	Road upgrades on Gold Coast Highway
New asset			
11	Extend mass transit to the Airport and Coolangatta with potential cross-border connections	5	Bus Rapid Transit
		6	Light Rail Transit

4.2 Status quo – the base case

The Base Case in this PE is the "do-minimum" case from which all other options are assessed. It is required to measure what will happen without a major intervention. The base case defines what would be undertaken in the absence of the project being implemented and it reflects the continued operation of the network or service under good management practices or 'business as usual". The Base Case modelling for this PE options process is consistent with Infrastructure Australia's guidelines[115]. It assumes Queensland Government Statistician's Office (QGSO) demographic projections and includes committed and funded projects only. The Base Case option includes minor changes to posted speeds and the inclusion of traffic signals to ensure vehicle and pedestrian safety is not compromised as traffic volumes increase along the corridor as population grows into the future. Bus network design is based on TransLink planning for bus operations post opening of the GCLR Stage 3 to Burleigh Heads, and opening of the new regional passenger rail stations at Pimpama, Hope Island and Merrimac. For the purposes of the MCA, it was assumed that all buses would be zero emissions based on TransLink's policy that after 2025 all new buses will be zero emissions and the existing fleet will be phased out when they reach end-of-life and will then be replaced by zero emissions buses. For the Rapid CBA, due to data and information constraints within relevant guidelines buses were assumed to be as per current power systems. These assumptions are consistent across all shortlist options.

4.3 Non-infrastructure options (reform and better use)

4.3.1 Option 1 – Bus service enhancements with no infrastructure

Option 1, bus service upgrades with no infrastructure, is a non-infrastructure option that will improve the frequency and connectivity of the bus network in the southern Gold Coast between Burleigh Heads and Coolangatta. This option includes increasing frequency of existing routes, extending routes to key centres and increasing service spans. This option represents a comparatively minimum cost alternative to the other progressed options.

[115] Infrastructure Australia Assessment Framework. 2021. Stage 2: Identifying and analysing options. P 23.

The key features/assumptions of Option 1 are:

- No new infrastructure except for additional stops and stop upgrades, which are required to improve the frequency and connectivity of the bus network
- Enhancements to existing bus services including higher frequencies and service span increases where practicable
- Optimise signal coordination and phasing on the Gold Coast Highway
- Buses procured by separate process.

The bus service enhancements for Option 1, 2 and 4 are shown in Figure 40.

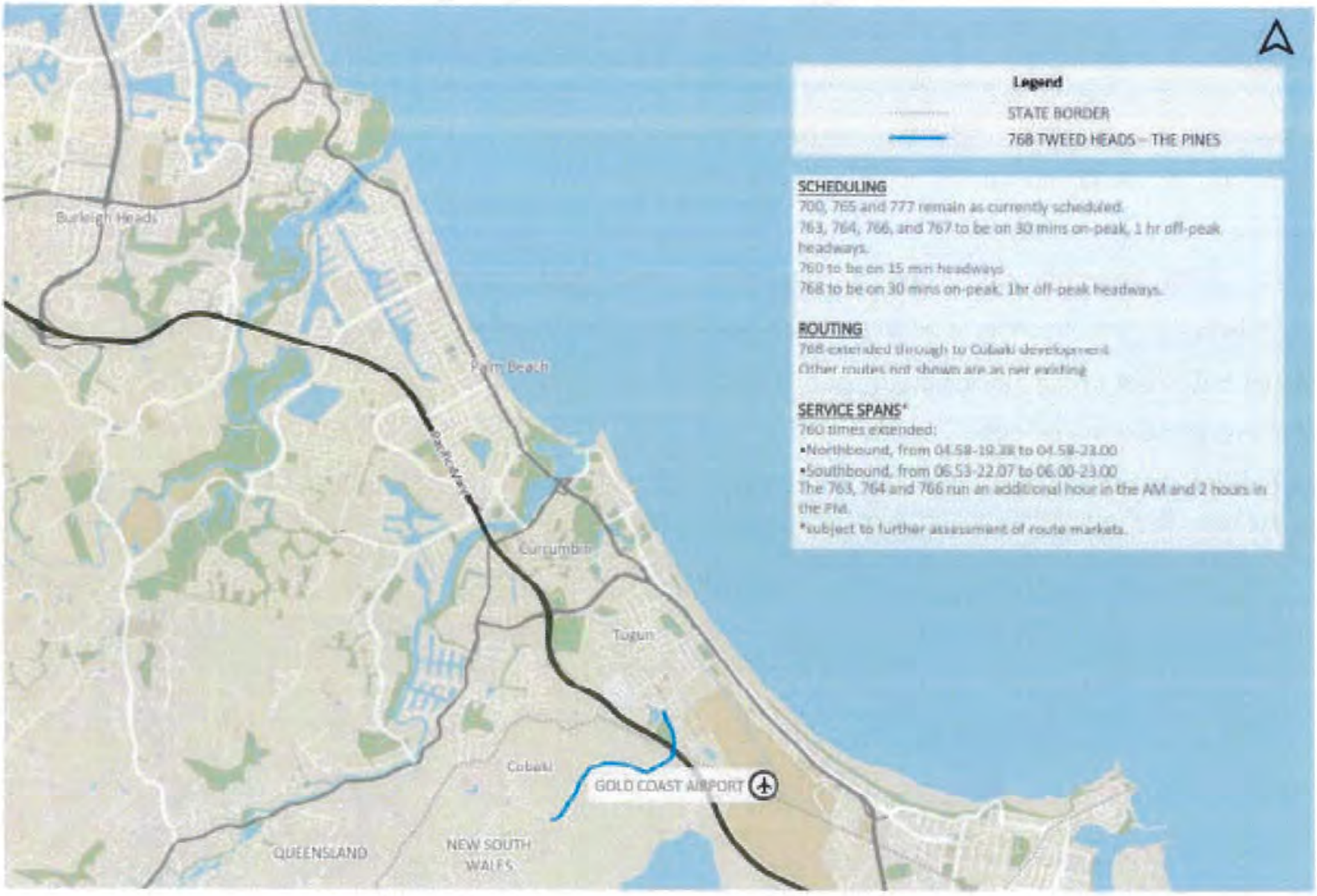

Figure 40 Option 1, 2 and 4 bus service enhancements

4.4 Existing infrastructure options

4.4.1 Option 2 – Bus service enhancements with opportunistic infrastructure

Option 2, bus service upgrades with opportunistic infrastructure, builds on the bus enhancements proposed in Option 1 with opportunistic infrastructure to improve performance. The key features/assumptions of Option 2 are:

- Bus queue jumps at signalised intersections (use parking lanes where necessary, noting that new pavements are required for parking lanes used for bus jumps)
- Assumes current 12.5 m buses, planning to allow for future larger buses and zero emission fleet
- No major infrastructure items such as standalone bridges
- Optimised signal coordination and phasing on the Gold Coast Highway
- Bus service enhancements as per Option 1

- Buses procured by separate process.

4.4.2 Option 3a/b – Bus lanes on Gold Coast Highway (with/without bridge widening)

Option 3a/b, bus lanes on the Gold Coast Highway, includes the implementation of bus lanes on the Gold Coast Highway and improvements to the frequency and connectivity of the bus network in the southern Gold Coast between Burleigh Heads and Coolangatta. Bus lanes are implemented in addition to the current road lanes on the Gold Coast Highway.

Option 3a assumes new two-lane bridges on LRT alignments consistent with Option 6 at the Tallebudgera and Currumbin Creek crossings. Option 3b assumes the existing bridges along the Gold Coast Highway remain at the current width with no dedicated bus lanes across these two creeks. New bridges to provide additional width across the creeks in Option 3a are significantly more costly than Option 3b and require buses in one direction to make a cross movement of all general traffic lanes to the new bridge. The key features/assumptions of Option 3a/b are:

- Bus lanes (kerbside) operating 24 hours and 7 days per week (24/7)
- Bus priority measures where practicable
- Indented bus bays to allow for buses to pass stopping buses, where these can be accommodated
- Current 12.5 m buses, with planning to allow for future larger buses and zero emission fleet
- Requires new pavement where parking lanes used
- Buses procured by separate process.

The initial bus network improvements at the time of the Strategic Assessment are outlined in Figure 41.

Figure 41 Option 3a/b bus lanes and service changes

4.5 New infrastructure options

4.5.1 Option 4 – Road network upgrades along the Gold Coast Highway

Option 4, road network upgrades, includes widening of the Gold Coast Highway between Burleigh Heads and Coolangatta. This option considers the ability to make enhancements and investment in the road network to alleviate congestion and improve the transport functionality within the study area. The key features/assumptions of Option 4 are:

- Additional traffic lane each way on Gold Coast Highway (end-to-end) but not extended into Coolangatta
- Six-lane creek bridges (assume new two-lane bridges)
- Parking lanes used where necessary
- Bus service enhancements as per Option 1
- Buses procured by separate process.

4.5.2 Option 5 – Bus Rapid Transit

Option 5 Bus Rapid Transit (BRT), involves the design and construction of a new BRT system from Burleigh Heads to the Gold Coast Airport and Coolangatta following the alignment shown in Figure 42. BRT represents the development of a dedicated high-quality bus-based public transport spine in the BH2C corridor through the provision of high-quality vehicles and stations in line with the Institute for Transportation and Development Policy's (ITDP) Bus Rapid Transit Standard[116]. According to this international recognised BRT Standard, the five essential features that define BRT, and differentiate it from the regular bus services, include:

- Dedicated right-of-way (ROW)
- Busway alignment to the centre of roadway or a bus-only corridor consistent with Option 6
- Off-board fare collection or tap and go payments
- Intersection treatments that prohibit turns for traffic across the busway
- Platform-level boarding that is fully accessible for wheelchairs, passengers with a disability and strollers.

Based on this internationally recognised specification, the key features and assumptions for Option 5 BRT are:

- BRT in ROW 24/7
- Busway is not mixed use and cannot be used by other buses (enables better traffic signal coordination)
- High frequency bus feeder services
- Same alignment and stations as LRT including new creek bridges
- Layouts to suit Brisbane Metro BRT vehicle specifications (i.e. side platforms only)
- Electric fleet (supercapacitor battery charging) with 6 minute charge at end of run and deep charging overnight
- Same headway and timetable as LRT
- Upgraded or standalone bridges over creeks
- 20 new BRT vehicles with distinctive design, low floor or high platform for fast boarding and alighting

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116 ITDP (2017). *Bus Rapid Transit Standard*. Accessed at: https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/

- The design vehicle was based on the Brisbane City Council's prototype metrobus, a 25 m bi-articulated bus with 100% on board battery power. Passenger capacity of these vehicles assumed to be 150.

- New stabling and maintenance depot.

4.5.3 Option 6 – Light Rail Transit

Option 6, Light Rail Transit, includes the extension of the existing GCLR system from Burleigh Heads to the Gold Coast Airport and Coolangatta. This option also includes amendments to the bus network to maximise the connectivity and access to the light rail.

The key features/assumptions of Option 6 include:

- LRT in ROW 24/7
- High frequency bus feeder services
- New creek bridges
- Based on alignments from the Burleigh Heads to Tugun and Tugun to Coolangatta multi-modal corridor studies
- Same vehicles, operational assumptions, and technology as existing LRT system, 44 m tram with passenger capacity of 309
- 20 additional compatible trams[117]
- New stabling at Bilinga.

The indicative BRT/LRT alignment and supporting bus network used in the modelling of these two options are shown in Figure 42.

[117] Note: This was subsequently updated to 8 trams following the detailed analysis completed in the remainder of the PE

Figure 42 Option 5 and 6 BRT/LRT alignment and bus network

4.6 Technical evaluation of options

4.6.1 Methodology for refinement of shortlist options

Each shortlist option was assessed through a quantitative MCA and rapid CBA to determine the preferred project options for further detailed analysis in the PE. Both an MCA and rapid CBA were used, as the CBA is not able to fully capture all the potential impacts of each project option, particularly in relation to land use and amenity outcomes. Where possible, the benefits captured in the MCA seek not to double count with the CBA.

4.6.2 Quantitative MCA

4.6.2.1. Criteria

The seven shortlist options were assessed against a range of criteria to assess their ability to deliver the service requirements, as outlined in the ILM. The criteria, identified in collaboration with the City and TMR, ensured that each option was assessed against the underlying priority needs outlined in the ILM and key project objectives. The criteria were designed to be mutually exclusive and comparative across options. The criteria and sub-criteria used for the quantitative MCA are outlined in Table 41. For the core assessment, all criteria were weighted equally.

Table 41 Quantitative MCA criteria

Criteria	Sub-criteria	Description	Scoring
Transport outcomes		The relative potential of the option to deliver the strategic transport outcomes defined by the Service Needs and objectives of the City and Queensland Government.	Average of the sub-criteria scores.
	Maximise travel time competitiveness	The relative difference between public transport (PT) and private vehicle door-to-door travel times between key locations in the Study Area in the AM and PM peaks based on the Gold Coast Strategic Model Multi Modal (GCSTM-MM) output.	Measured by the difference in 2-way travel time by PT and private vehicles via the Gold Coast Highway (average across AM and PM) for trips between (and vice-versa): • Burleigh Heads interchange (I/C) – Palm Beach Avenue • Burleigh Heads I/C – Gold Coast Airport • Burleigh Heads I/C – Coolangatta • Palm Beach Avenue – Toolona Street, Tugun • Toolona Street, Tugun – Coolangatta • Gold Coast Airport – Coolangatta.
	Maximise PT boardings	The total number of PT boardings within the GCSTM-MM modelled zones and the Study Area to assess the relative impact of each option on the overall PT boardings/trips.	Measured by PT person-trips in: • GCSTM-MM modelled zones • Study area.
	Maximise PT mode share	The PT modal split for trips within the Study Area to assess the relative impact of each option on the PT mode share in the Study Area.	Measured by PT person-trips as a percentage of total person-trips in the Study Area.
	Minimise transfers	The relative impact of each option on the number of transfers required across the GCSTM-MM modelled zones.	Measured by total transfer movements (off and on).
	Minimise PT travel time	The travel time between key locations in the study area in the AM and PM peaks to assess the relative impact of each option on PT travel time.	Measured by the two-way travel time by PT via the Gold Coast Highway (average across AM and PM peak) for trips between (and vice-versa): • Burleigh Heads I/C – Palm Beach Avenue

Criteria	Sub-criteria	Description	Scoring
			• Burleigh Heads I/C – Gold Coast Airport • Burleigh Heads I/C – Coolangatta • Palm Beach Avenue – Toolona Street, Tugun • Toolona Street, Tugun – Coolangatta • Gold Coast Airport – Coolangatta.
	Minimise time spent in excessive congestion	The relative impact of each option on the time spent in excessive congestion, defined as links where travel speed was greater than 70 per cent of free-flow speed for highways and 55 per cent for all other roads.	Measured by congested vehicle-hours.
Land use		The impact of the option on the land use outcomes in the corridor and the extent to which it supports meeting the SEQ Regional Plan urban consolidation benchmarks.	Measured by Land use consultant assessment of: • Service frequency • Vehicle size • Catchment • Travel time savings • Reliability • Stop amenity • Vehicle amenity • Asset life. Refer to Technical Note 3a – Modal Comparison (Appendix I: Land use report) for a detailed description of sub-criteria.
Employment and economic activity		The ability of the option to impact the economic activity, employment and employment accessibility within the southern Gold Coast and promote cross-border activity.	Average of the sub-criteria scores.
	Maximise the number of people choosing PT for travel to work	Percentage of home-based work trips made by PT within the GCSTM-MM modelled zones, covering the Gold Coast LGA (Local Government Area) and parts of the Tweed Shire.	Measured by the number of home-based work trips made by PT within the GCSTM-MM modelled zones.
	Accessibility	Population within 30 minutes PT access of major employment and	Measured by population within 30 minutes PT access of major

Criteria	Sub-criteria	Description	Scoring
		economic precincts at Burleigh Heads centre, Palm Beach centre, Gold Coast Airport and Coolangatta Central Business District (CBD) in the AM Peak.	employment and economic precincts at Burleigh Heads centre, Palm Beach centre, Gold Coast Airport and Coolangatta.
	Cross-border connectivity	The number of PT trips to/from New South Wales.	Measured by land use outcomes.
	Additional jobs potentially added by 2041	The relative impact of each option on the attractiveness for business and the impact on employment and economic activity.	Measured by the number of PT trips to/from New South Wales.
Public amenity and acceptance		The relative impact on public amenity and community and stakeholder acceptance of the option.	Average of the sub-criteria scores.
	Community acceptance	Community acceptance of the option.	Informed by community engagement and surveys undertaken as part of the multi-modal corridor study for Burleigh Heads to Tugun.
	Land acquisition	Relative land impacts of the option.	Area (m^2) of properties impacted by each option as measured by design layouts.
	Road amenity	Relative reduction in vehicle volumes on the Gold Coast Highway in the study area.	VKT on Gold Coast Highway based on GCSTM-MM.
Operational integration		The ease of the operational integration for each option to the existing Gold Coast network.	Scored qualitatively.

4.6.2.2. Scoring approach

The sub-criteria were scored on a 5-point scale (1-5). For quantitative criteria, the scoring was undertaken as follows:

- The worst performing option was assigned a score of 1
- The best performing option was assigned a score of 5
- All other options were assigned a score on a linear scale between 1 and 5 based on their relative performance compared to the best and worst performing options based on the quantified outcome for each of the above metrics.

For all quantitative criteria the assessment was based on relative assessment on how well each option performed against the base case (e.g. travel time change for each option against the base case). For qualitative criteria, the options were scored on their perceived relative performance against the base case, based on the views of the workshop attendees and the rationale and drivers for their relative performance documented.

4.6.2.3. Assessment approach

The assessment was informed by:

- Transport modelling undertaken by using the Gold Coast Strategic Model Multi Modal (GCSTM-MM)

- 10 per cent designs drawings (layouts and cross-sections) for each option
- Category 1 cost estimates as per the TMR Project Cost Estimating Manual (PCEM)
- Land use analysis.

4.6.2.4. Quantitative MCA scores

The quantitative MCA scores for each criterion and sub-criterion (where relevant) are shown in Table 42. Refer to Appendix D: Options assessment report for further justification of the quantitative MCA scores and reference data.

Table 42 Quantitative MCA scores

Criteria	Project option	Bus service enhancements	Bus service enhancements with opportunistic infrastructure	Bus lanes on Gold Coast Highway (with bridge widening)	Bus lanes on Gold Coast Highway (without bridge widening)	Road upgrades on Gold Coast Highway	Bus Rapid Transit	Light Rail Transit
	Option number	**1**	**2**	**3a**	**3b**	**4**	**5**	**6**
Transport outcomes		**2.5**	**2.4**	**3.5**	**3.5**	**2.9**	**2.9**	**3.7**
	Maximise travel time competitiveness[118]	3.3	3.5	5.0	5.0	3.4	1.0	1.0
	Maximise public transport (PT) boardings[2]	1.1	1.1	1.1	1.1	1.0	4.6	5.0
	Maximise PT mode share	1.1	1.0	1.0	1.0	1.0	4.7	5.0
	Minimise transfers	4.4	3.7	4.1	4.1	3.7	1.0	5.0
	Minimise PT travel time[2]	4.0	4.0	4.9	4.9	3.4	1.0	1.0
	Time spent in excessive congestion	1.0	1.1	4.8	4.8	5.0	5.0	5.0
Land use		**1.0**	**1.0**	**1.4**	**1.4**	**1.0**	**3.3**	**5.0**
Employment and economic activity		**1.6**	**1.6**	**1.9**	**1.9**	**1.1**	**3.5**	**4.3**

[118] This measure is an average of multiple sub-items scored from 1 to 5.

Criteria	Project option	Bus service enhancements	Bus service enhancements with opportunistic infrastructure	Bus lanes on Gold Coast Highway (with bridge widening)	Bus lanes on Gold Coast Highway (without bridge widening)	Road upgrades on Gold Coast Highway	Bus Rapid Transit	Light Rail Transit
	Option number	**1**	**2**	**3a**	**3b**	**4**	**5**	**6**
	Maximise the number of people choosing PT for travel to work	1	1	1.2	1.2	1	4.5	5
	[119]Accessibility[2]	3.4	3.2	3.8	3.8	1.4	1.8	2.1
	Cross-border connectivity	1.1	1	1.1	1.1	1	4.8	5
	Additional jobs potentially added by 2041	1	1	1.5	1.5	1	3	5
Public amenity and acceptance		**3**	**3.2**	**3.5**	**3.5**	**3.1**	**2.6**	**3.9**
	Community acceptance	3	3	2	2	1	2	5
	Land acquisition	5	4.9	3.8	3.8	4.1	1	1.7
	Road amenity	1	1.8	4.8	4.8	4.2	4.9	5
Operational integration		**5**	**5**	**5**	**5**	**5**	**1**	**4**
Overall score		**2.6**	**2.6**	**3.1**	**3.1**	**2.6**	**2.7**	**4.2**
Overall rank		**7**	**5**	**3**	**2**	**6**	**4**	**1**

[119] This measure is an average of multiple sub-items scored from 1 to 5.

4.6.2.5. Outcomes of the quantitative MCA

The outcomes of the quantitative MCA are outlined in Table 43. The summary includes an overview of the scoring of each of the options as well as an overall score and ranking.

Table 43 Quantitative MCA of Project options results

Project option number	Project option	Transport outcomes	Land use	Employment and economic activity	Public amenity and acceptance	Operational integration	Weighted score	Rank
1	Bus service enhancements	2.5	1.0	1.6	3.0	5.0	2.6	7
2	Bus service enhancements with opportunistic infrastructure	2.4	1.0	1.6	3.2	5.0	2.6	5
3a	Bus lanes on Gold Coast Highway (with bridge widening)	3.4	1.4	1.9	3.5	5.0	3.1	3
3b	Bus lanes on Gold Coast Highway (without bridge widening)	3.5	1.4	1.9	3.5	5.0	3.1	2
4	Road upgrades on Gold Coast Highway	2.9	1.0	1.1	3.1	5.0	2.6	6
5	Bus Rapid Transit	2.9	3.3	3.5	2.6	1.0	2.7	4
6	Light Rail Transit	3.7	5.0	4.3	3.9	4.0	4.2	1

Option 6, Light Rail Transit, was the strongest performing option in the quantitative MCA, scoring the highest in four out of five criteria. Following Option 6, the other strongest performing options were Options 3a/b, Bus lanes on the Gold Coast Highway, and Option 5, Bus Rapid Transit. Section 4.7.4 discusses the BRT option progression in more detail.

Option 6 and Options 3a/b had similar transport outcomes; however, Light Rail Transit scored higher on land use, employment and economic activity. To test the robustness of the results from the quantitative MCA, several sensitivity analyses were run using alternative scenarios across these criteria, shown in Table 44.

Table 44 **Quantitative MCA results and sensitivities**

No.	Option	Core result	Pairwise comparison weighting	Operational integration weighting > other criteria weighting	Transport, outcomes weighting > other criteria weighting	Removed land use criterion
1	Bus service enhancements	7	6	6	6	6
2	Bus service enhancements with opportunistic infrastructure	5	7	4	7	4
3a	Bus lanes on Gold Coast Highway (with bridge widening)	2	3	2	3	3
3b	Bus lanes on Gold Coast Highway (without bridge widening)	3	4	3	2	2
4	Road upgrades on Gold Coast Highway	6	5	5	5	5
5	Bus Rapid Transit	4	2	7	4	7
6	Light Rail Transit	1	1	1	1	1

Option 6, Light Rail Transit, remained the highest performing option under all sensitivity tests undertaken. Options 3a/b, Bus lanes on the Gold Coast Highway, remained in the top four options under all sensitivity tests. The ranks of Option 2, Bus service enhancements with opportunistic infrastructure, and Option 5, Bus Rapid Transit, varied across the sensitivity tests but in the Operational integration and Transport outcomes sensitivities it was the lowest ranked option.

4.6.3 Rapid CBA

As part of the options assessment process for the BH2C PE, a rapid CBA was completed on the initial shortlist of options to inform progression of preferred options. In accordance with IA guidelines, a rapid CBA includes only key material economic costs and benefits that differentiate between options.

4.6.3.1. Approach and key assumptions

The purpose of an economic appraisal is to assess potential costs against benefits associated with investment by applying discounted cash flow techniques, consistent with Queensland and national guidance. Figure 43 shows the key steps of this rapid economic appraisal.

Figure 43 Approach to rapid economic assessment

The key parameters and assumptions used in the rapid economic appraisal are set out in Table 45.

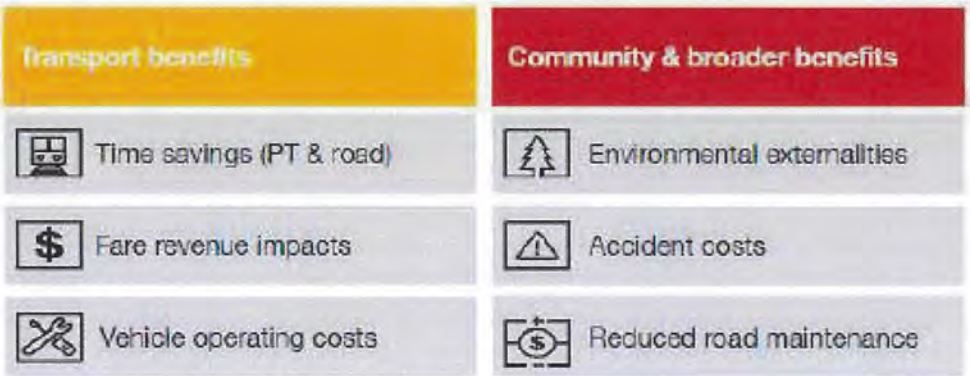
Table 45 Economic analysis assumptions

Item	Assumption(s)	Source(s) and comments
Real discount rate	7.0% (real)	Consistent with IA CBA (2021) guidelines and Business Case Development Framework (BCDF) (2021) advice
Appraisal start date	1 July 2022 (2022/23)	Reflects the current financial year at time of analysis
Base price year	1 June 2022 (2021/22)	Base price year selected to align with cost advisor inputs. Parameters designated in prices prior to the base price year are inflated to 2021/22 dollars using appropriate indices
Annualisation	285.6	Sourced from ATAP (Australian Transport Assessment and Planning) - M1 Public Transport (2022)
Opening year	2030/31 opening year	As per cost estimates for the project
Appraisal period	Starting in 2022/23, concluding 30 years from first year of operations (2022/23 to 2052/53)	As options considered in this rapid CBA consist of both road, bus and LRT solutions, a conservative 30 year appraisal period has been assumed
Transport model years	2031 and 2041	Two future transport model years have been adopted in the transport modelling framework for the rapid CBA

Item	Assumption(s)	Source(s) and comments
Transport modelling Base Case	2018 QGSO (medium series) demographic projections and committed and funded transport projects only	Consistent with IAAF (2021) guidelines
Interpolation, extrapolation of transport modelling results	Compound annual growth rates have been applied to outputs of the demand modelling for interpolation between modelled years. Extrapolation of demand beyond the last modelled year is based on the forecast population growth rate for the Gold Coast LGA between 2031 and 2041 of 1.8%.	ATAP - T2 (2018) supports interpolation and extrapolation based on historic trends, or related factors that may affect the growth in benefits

4.6.3.2. Economic benefits

Each of the project options will generate a number of benefits for public transport users, road users, the community, and the broader economy. Figure 44 identifies the benefits quantified in the economic appraisal. Given the nature of a rapid CBA framework, this is not an exhaustive list but reflects the major economic benefit drivers of the options. Importantly, given the information available at this stage of the assessment, benefits related to potential land use change and Wider Economic Benefits (WEBs) are not captured.



(1)

Figure 44 Monetised economic benefits

The methodology applied to monetise these benefit streams is summarised in Table 46.

Table 46 Economic benefit methodology summary

Benefit	Methodology
Public transport travel time savings	Travel time savings for public transport users were calculated based on travel time savings (in minutes) for the complete door-to-door journey of continuing and new users from the demand model. These travel time savings were monetised by applying the Value of Time as outlined in ATAP – PV2 (2016) and travel time multipliers for different components of a trip from ATAP – M1 (2018). The Value of Time was escalated to a FY22 base price year. Daily benefits were annualised using the annualisation factor and the "rule of half" was applied to new users.

Benefit	Methodology
Road user travel time savings	Travel time savings for road users were calculated based on travel time savings (in minutes) for the journey of continuing and new users from the demand model. These travel time savings were monetised by applying the Value of Time as outlined in ATAP – PV2 (2016) and vehicle occupancy rates from TfNSW (2020). The Value of Time was escalated to a FY22 base price year. Daily benefits were annualised using the annualisation factor and the "rule of half" was applied to new users.
Fare revenue benefits	Additional fare revenue for the rapid CBA was calculated in the GCSTM, using the GCSTM modelled fare, based on increased PT patronage between the Base Case and project options. The GCSTM modelled fare was escalated to a FY22 base price year. Daily benefits were annualised using the annualisation factor.
Vehicle operating cost savings	Vehicle operating costs are based on change in car, LCV and HCV vehicle kilometres travelled, transformed into vehicle operating costs through use of Austroads (2012) urban journey speed model. Vehicle operating costs were escalated to a FY22 base price year and daily benefits were annualised using the annualisation factor.
Environmental externalities	Environmental impacts are derived from changes in vehicle kilometres travelled and monetised through use externality unit rates from ATAP – PV5 (2021). Externality unit rates were escalated to a FY22 base price year and daily benefits were annualised using the annualisation factor.
Accident costs	Safety impacts are derived from changes in vehicle kilometres travelled, monetised with crash rates from Austroads (2010) and crash costs from ATAP – PV2 (2016). Crash costs were escalated to a FY22 base price year and daily benefits were annualised using the annualisation factor.
Reduced road maintenance	Avoided routine maintenance costs are derived from changes in vehicle kilometres travelled, monetised through use of TfNSW Economic Parameter Values (2020). Avoided routine maintenance costs were escalated to a FY22 base price year and daily benefits were annualised using the annualisation factor.

4.6.3.3. Economic costs

The primary costs relevant for rapid CBA are the design, construction and operation of project options. P50 risk-adjusted cost estimates, developed via a probabilistic Monte-Carlo simulation, were used as the central case for this economic appraisal. Capital costs for each of the shortlisted options are provided in Appendix D: Options assessment report and summarised in Table 47.

Table 47 Capital costs ($ millions, real, P50 risk contingency)

Option	Undiscounted capital cost	Capital cost discounted at 7%
Option 1	n/a	n/a
Option 2	54	35
Option 3a	1,359	1,002
Option 3b	1,165	865
Option 4	1,215	893

Option	Undiscounted capital cost	Capital cost discounted at 7%
Option 5	2,194	1,706
Option 6	2,772	2,227

Ongoing operating and maintenance costs during operation have been included from the first year of operations for each option to the end of the appraisal period. The following unit rate operating costs were applied to additional in-service public transport kilometres for each of the options.

- Bus $6 per in-service kilometre ($FY18)
- BRT $16 per in-service kilometre ($FY18)
- LRT $16 per in-service kilometre ($FY18)[120] .

The unit operating cost parameters were escalated to a FY22 base price year.

4.6.3.4. Outcomes of the rapid CBA

Each of the project options will deliver a number of benefits to transport users as well as the community. The outcomes of the rapid CBA for each of the project options under a 7 per cent discount rate are shown in Table 48.

Table 48 Economic outcomes ($ millions, discounted at 7% real)

	Bus service enhancements	Bus service enhancements with opportunistic infrastructure	Bus lanes on Gold Coast Highway (with bridge widening)	Bus lanes on Gold Coast Highway (without bridge widening)	Road upgrades on Gold Coast Highway	Bus Rapid Transit	Light Rail Transit
	1	2	3a	3b	4	5	6
Economic costs							
Capital costs	0	35	1,002	865	893	1,706	2,227
Operating costs	7	7	53	53	7	183	183
Total costs	7	43	1,055	919	900	1,889	2,410
Economic benefits							
Public transport travel time savings	0	2	39	39	1	15	73
Public transport fare revenue benefits	2	3	29	29	3	168	185

[120] Unit rates benchmarked against Gold Coast Light Rail, Brisbane Metro, Canberra Light Rail Stage 1 and Sunshine Coast Mass Transit projects.

	Bus service enhancements	Bus service enhancements with opportunistic infrastructure	Bus lanes on Gold Coast Highway (with bridge widening)	Bus lanes on Gold Coast Highway (without bridge widening)	Road upgrades on Gold Coast Highway	Bus Rapid Transit	Light Rail Transit
	1	2	3a	3b	4	5	6
Road user travel time savings	1	1	18	15	36	108	103
Road user vehicle operating cost savings	4	2	53	53	-21	288	308
Avoided road user accident costs	0	0	4	5	-1	30	34
Avoided road user environmental impacts	-1	-1	-2	-2	-2	23	28
Avoided road user road maintenance costs	0	1	7	7	-2	48	54
Total benefits	6	8	148	146	13	680	786
Rapid CBA results							
Net present value (NPV)	**0**	**-35**	**-907**	**-773**	**-886**	**-1,209**	**-1,624**
Benefit Cost Ratio (BCR)	**1.0**	**0.2**	**0.1**	**0.2**	**0.0**	**0.4**	**0.3**

The following is observed:

- Option 1 and 2 represent relatively low-cost interventions, with a net present cost of $7 million and $43 million respectively. Accordingly, the benefits of these two options are also relatively marginal, with a net present value (NPV) of $6 million and $8 million.
- Option 3a and 3b achieve very similar economic benefits, with bridge widening provided under Option 3a resulting in an additional $2 million in economic benefits. However, these additional economic benefits come at an additional economic cost of $136 million, resulting in a lower NPV and benefit cost ratio (BCR).
- Option 4 comes at a present economic cost of $900 million, while only achieving $13 million in economic benefits, resulting in a NPV of -$886 million and a BCR of 0.0.
- Option 5 and 6, consisting of a BRT and LRT system from Burleigh Heads to Coolangatta via the Gold Coast Airport, come at relatively significant economic costs of $1.8 and $2.4 billion respectively. These two options also deliver substantial economic benefits, monetised at $680 million and $786 million respectively, resulting in BCRs of 0.4 and 0.3 respectively.

The qualitative benefits which have not been monetised for the rapid CBA are likely to be positive for Options 1, 2, 3, 5 and 6. Based on the analysis undertaken for the MCA, Option 6 would have the largest benefit across both amenity impacts as well land use related benefits and would therefore have the largest increase in benefits if these were to be monetised.

4.7 Conclusions

The outcomes of the options evaluation are summarised below.

4.7.1 Option 1 and Option 2

Option 1 and 2, bus service enhancements without/with opportunistic infrastructure, represented relatively low-cost interventions, with a net present cost of $7 million and $43 million respectively. The benefits of these two options are also relatively marginal, with a NPV of $6 million and $8 million. Based on the Rapid CBA, these options represent low-cost alternatives to a mass transit solution, noting that they do not fully address the problems and opportunities identified in the ILM. Option 2 scored slightly higher than Option 1 in the quantitative MCA. Option 1 and Option 2 both have the same levels of bus network improvements, with Option 2 exploring opportunities for low-cost infrastructure improvements to better prioritise PT and improve its reliability. Option 2, bus service enhancements with opportunistic infrastructure, is recommended to be progressed to the PE stage.

4.7.2 Option 3a/b

Options 3a and 3b, bus lanes on Gold Coast Highway (with/without bridge widening), ranked second behind Option 6, LRT BH2C, in the quantitative MCA. Option 3a and 3b achieved very similar economic benefits, with bridge widening provided under Option 3a resulting in an additional $2 million in economic benefits. However, these additional economic benefits come at an additional economic cost of $136 million, resulting in a lower NPV and BCR. Based on these outcomes, it is recommended that Option 3b (without bridge widening) be progressed to the PE stage as a more value for money solution.

4.7.3 Option 4

Option 4, road upgrades on the Gold Coast Highway, scored the lowest except for the "do-minimum" option in the quantitative MCA. Option 4 had a present economic cost of $900 million, while only achieving $13 million in economic benefits, resulting in a NPV of -$886 million and a BCR of 0.0. Based on the outcomes of the qualitative and quantitative MCA and rapid CBA, Option 4 is recommended to not be progressed.

4.7.4 Option 5 and Option 6

Option 5, Bus Rapid Transit, and Option 6, Light Rail Transit, come at relatively significant economic costs of $1.8 and $2.4 billion, respectively. These two options also deliver substantial economic benefits, monetised at $680 million and $786 million respectively, resulting in BCRs of 0.4 and 0.3 respectively. Option 6 scored the highest on the quantitative MCA across all sensitivities. Option 5, however, scored poorly on the quantitative MCA, particularly against the public amenity and acceptance and operational integrations criteria, and was not preferred to the LRT option across any criterion or sensitivity test.

In addition to the quantitative outcomes for Options 5 and 6, there are a number of other factors that should be considered in the comparison between LRT and BRT:

- By 2026 there will already be three stages of LRT operating along the coastal urban corridor. A BRT option in the BH2C corridor would introduce a new public transport technology with separate contracting, operating and maintenance requirements, including:
  - associated development costs to establish a standalone BRT depot, stabling and operating system for Stage 4
  - additional land acquisition to provide a wider cross-section to accommodate BRT

- potential issues with cross-border integration with any TfNSW mass transit option
- additional forced interchanges at Burleigh Heads and increased complexity of incorporating three modes of PT (LRT, BRT and buses) which includes a 200m long walk between LRT and BRT and crossing of a signalised intersection, which creates a significant disincentive
- training costs for BRT drivers and operators additional to those already incurred for the LRT and buses.

- Even with the 25-metre higher passenger capacity buses operating on a 7.5 minute headway, BRT is forecast to be nearing capacity in the BH2C corridor by 2041
- Additionally, while also operating near its capacity constraints during normal operations, as an event city, there is a requirement for the PT network to regularly deal with surge demand which the BRT is not able to accommodate
- A turnaround facility at the Burleigh Heads terminus is required, which requires extensive infrastructure and the potential for significant additional property impacts or road user impacts to accommodate this facility
- The SEQ Regional Plan (2017) and the SEQ Regional Transport Plan (2021) both specify LRT in the corridor from Burleigh to Coolangatta by 2041 and the City of Gold Coast City Transport Strategy (2013) specifies LRT from Broadbeach to Gold Coast Airport by 2031
- The GCLR Stage 1 Business Case included a detailed assessment of LRT and BRT modes including transport modelling, whole of life cost and financial assessment, risk assessment, and economic assessment. LRT was demonstrated to be a superior solution, especially from a customer experience perspective, and was ultimately chosen as the preferred mode in 2009. BRT was also re-considered in the Stage 3 DBC, with LRT again being confirmed as the preferred mode.

Given these considerations, BRT does not present a practicable alternative to the LRT within the context of the BH2C corridor and does not warrant further consideration in the PE. LRT is the preferred high-capacity, high-amenity mass transit solution for this corridor with proven success on the Gold Coast to realise the desired transport and land use outcomes with strong patronage and mode share outcomes. It therefore recommended that LRT be progressed for assessment against lower cost alternative transport options that would be delivered in the absence of an investment in LRT. Accordingly, a BRT option in the BH2C corridor was not carried forward to the detailed evaluation stage of the PE. Further detail on the suitability and evidence around LRT and BRT within the context of this corridor and Project is included in Appendix D: Options assessment report.

4.7.5 Shortlist of PE options

Based on the outcomes of the quantitative MCA and rapid CBA, the shortlisted PE options presented for detailed analysis in the PE stage are:

- Light Rail Transit referred to as Option 1 Dedicated Light Rail (LRT)
- Bus lanes on the Gold Coast Highway (without bridge widening) referred to as Option 2 Dedicated Bus Lanes (DBL)
- Bus service enhancements with opportunistic infrastructure referred to as Option 3 Enhanced Bus Provisions (EBP).

5. Project options

The chapter outlines the process adopted to assess, define and develop the three shortlisted PE options including technical designs and operational elements. The overarching approach is detailed in the following sections:

- Approach to define and develop project options
- Option 1 Dedicated Light Rail
- Option 2 Dedicated Bus Lanes
- Option 3 Enhanced Bus Provisions
- PE options project delivery environmental assessment.

5.1 Approach to define and develop project options

5.1.1 Review of the previous base case

A review of the base case assumptions was conducted prior to commencement of the assessment process for the three preferred options. This included an update of road use management policies on posted speeds and the extent of paid car parking. For bus services, TMR's TransLink Division supplied Remix data (bus route and scheduling information) which detail the proposed bus network for the central Gold Coast area when GCLR Stage 3 is in operation, including changes to existing services and proposed new routes. The existing bus route information and GCLR Stage 3 Remix data were reviewed to identify the future base case (i.e. proposed bus network following completion of GCLR Stage 3).

5.1.2 Project constraints and requirements

Key project requirements and constraints are summarised in Table 49.

Table 49 Key project requirements and constraints

Element	Project constraints / requirements
General requirements	
Project alignment	The public transport alignment (for each option) must be contained within the defined project corridor – which was identified in the Gold Coast Highway Multi Modal Corridor Study (GCH MMCS) – and tie into (or interface with) the Stage 3 Burleigh Heads Light Rail Station
General traffic lanes	Four general traffic lanes (i.e. two traffic lanes in each direction) must be maintained on the Gold Coast Highway. The GCH MMCS previously considered reducing the Gold Coast Highway to two-lanes at constrained locations. However, TMR has committed to retaining four traffic lanes on the highway (based on a ministerial commitment in response to community feedback).
Active transport	The entire BH2C corridor is defined as a Principal Cycle Route and must provide facilities for people riding bikes and include provision for Principal Cycle Routes that traverse the project corridor and align with the requirements of TMR's Cycling Infrastructure Policy. Existing width constraints within the corridor (particularly through Palm Beach) will require high quality cycling facilities to be provided on adjacent corridors (to be informed by an Active Transport Strategy in Appendix E: Design Development Report). The project must include provision for tie-ins to existing and planned sections of the Gold Coast Oceanway south of Tallebudgera Creek and at the Currumbin Creek approaches.

Element	Project constraints / requirements
Community consultation feedback	Consideration of the detailed feedback received during the community consultation activities on the GCH MMCS completed by TMR in 2021.
Category C boundary	Minimise property impacts and avoid encroaching over the 'Category C' boundary (where possible). Category C Protected Planning refers to planning that is approved and protected, but not included in current funding and delivery programs, as outlined in TMR's Approved Planning Policy (October 2017). The Category C boundary was recently refined for the future light rail extension based on the GCH MMCS route strategy and concept design.
Burleigh Head National Park	The project should minimise impacts to Burleigh Head National Park Project Options 1 and 2 (LRT and DBL Options) must include provision of a new fauna crossing (with active transport facilities) over the Gold Coast Highway to connect the eastern and western sides of the national park
Gold Coast Airport	Minimise property impacts to Gold Coast Airport (Commonwealth) land and include a public transport station at (or in close proximity) to the airport
Pedestrian access to public transport stops/stations	The project should provide safe pedestrian crossings on the Gold Coast Highway for access to public transport stations/stops. For the LRT Option, signalised pedestrian crossings are required on both sides of LRT stations to improve pedestrian safety and accessibility. The Oceanway between Tallebudgera Creek and Currumbin Creek is included for all options.
Public transport services	All project options result in changes to the existing public transport (bus) services. A Public Transport Operational Assessment (refer to Appendix E: Design Development Report) was undertaken as part of the PE to conduct a preliminary assessment of the proposed bus network services (including route and timetable changes) for each project option, based on initial planning undertaken by TransLink and others. The concept designs for all project options are required to include provision of public transport stations/stops and associated facilities (turnaround areas, interchanges and driver facilities, where required) to support the proposed bus network defined in the Public Transport Operational Assessment.
Parking	Parking is impacted for all options with higher impacts for the LRT and DBL options. The Project should consider offsetting loss of parking along the project corridor and provision of new carparks where possible. Provisions for parking to be assessed separately in the Business Case stage on the preferred option(s).
Project option specific requirements	
Option 1 – LRT Option	
LRT configuration and alignment	The GCH MMCS confirmed the LRT configuration shall be at-grade, dual light rail track which provides a level of priority and is consistent with the look, feel and functionality of previous (and planned) GCLR phases. The LRT alignment is required to follow the project corridor between Burleigh Heads and Coolangatta and include a connection to the Airport. It should generally follow the preferred alignment identified in the GCH MMCS, subject to a more rigorous sub-options analysis during the PE phase to refine the LRT alignment.

Element	Project constraints / requirements
LRT stations	14 new light rail stations proposed along the BH2C corridor (southwards of Burleigh Heads Station which will be delivered as part of GCLR Stage 3). The proposed station locations were determined in the GCH MMCS based on serving key destinations and are generally fixed. The stations are generally proposed at 800m spacings through developed areas along the route.
Future rail spur	The LRT Option will need to ensure that a rail spur at Thrower Drive, Palm Beach for a potential western extension to Elanora (as indicated in the City's 2031 Transport Strategy).
Light rail satellite depot	The LRT Option requires a new light rail satellite depot and stabling yard in Bilinga, located adjacent to the Gold Coast Highway within TMR road reserve (north of the Southern Cross University).
Creek crossings	New bridge structures are required at Tallebudgera Creek and Currumbin Creek for light rail vehicles (LRV) as the existing bridges are unsuitable for LRV loading and will need to be constructed off-line adjacent to these existing road structures. The new Tallebudgera Creek light rail bridge must include provision for active transport facilities. The new Currumbin Creek bridge is for LRVs only and should be situated west of the existing structures (due to lower property and environmental impacts). TMR is currently undertaking planning for a new active transport bridge at this location (with connections to the Oceanway) which will be situated to the east of the existing structures.
Option 2 – DBL Option	
Bus stop locations	This option assumes all existing bus stops are retained on the Gold Coast Highway north of Tugun (with optimisation of bus stop locations to be investigated in subsequent phases if this option is progressed further). New bus stops are proposed along the highway through Tugun/Bilinga, generally at the same locations as the proposed LRT stations (in Option 1).
Creek crossings	Buses are required to merge into the general traffic lanes at the Tallebudgera Creek and Currumbin Creek crossings (i.e. no dedicated bus lanes at these locations). This is based on the outcomes of the PE options shortlisting exercise where a DBL Option with new bridges at these two crossings was considered, however, was excluded from further consideration. This project option must include provision for tie-ins to the proposed new active transport bridge at Currumbin Creek east of the existing bridge structures (described in Option 1 above).
Option 3 – EBP Option	
Bus stop locations	This option assumes all existing bus stops are retained in their existing location on the Gold Coast Highway north of Tugun (with optimisation of bus stop locations to be investigated in subsequent phases if this option is progressed further).
Creek crossings	This option assumes no new bridges at the Tallebudgera Creek and Currumbin Creek crossings (consistent with Option 2).
Property impacts	The EBP Option is intended to provide a low-cost solution for improving public transport patronage and efficiency on the project corridor. As such, property impacts for the PT infrastructure works have been avoided for this option.

5.1.3 Design requirements and components

The design development was guided by the corridor vision. The Basis of Design is underpinned by three strategies – the Access Strategy, Active Transport Strategy, and People and Place Strategy – which combined provide a strategic appreciation of the corridor in terms of its current and future multi-modal transport function and integration with land use.

The relationship between these three strategies and the Basis of Design report is illustrated in Figure 45 and a summary of the scope for each strategy is provided below:

(1) **Access Strategy** – Identified key vehicle access requirements along the corridor based on the current and future transport network requirements. It also outlined how vehicular access will need to be integrated with active transport movements and facilitate connectivity to key places/land uses and proposed public transport stations along the corridor (to be informed by the below strategies).

(2) **Active Transport Strategy** – Defined the active transport strategy along the project corridor, integration between the Principal Cycle Network, existing and planned/proposed active transport facilities (including the Oceanway network) some of which are outside of the BH2C project scope and key land uses/precincts. This strategy also outlined the active transport facilities to be incorporated in the BH2C concept design including consideration of key east-west active transport links that traverse the project corridor.

(3) **People and Place Strategy** – Provides an appreciation of the amenity-based context of the corridor and defines a holistic people and place-based design approach that recognises local character and amenity, and integration of key places and land use with the transport network. This strategy also includes a high-level assessment of Movement and Place attributes along the corridor to inform the Access Strategy and define existing and emerging precincts along the corridor.

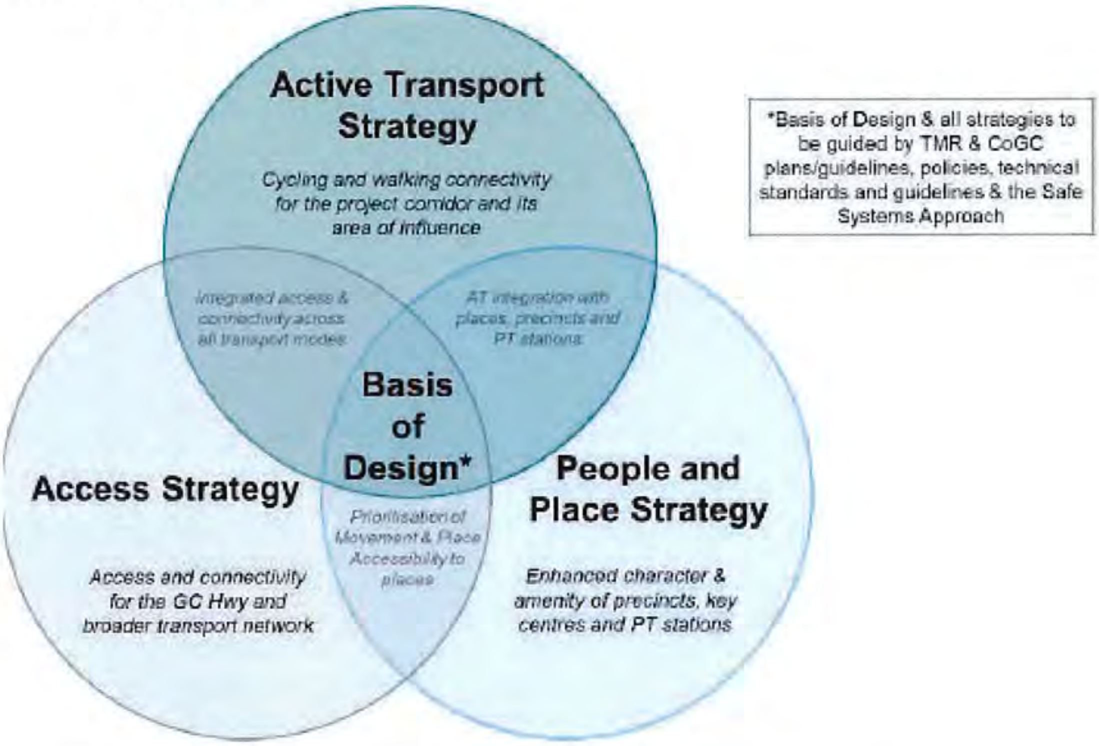


Figure 45 Relationship between the Basis of Design and supporting strategies

A summary of the key findings and outcomes from each of the strategies is provided below:

- Access Strategy:
  - Identified the importance of maintaining vehicle connectivity to key east-west links traversing the corridor (where possible) including George Street East, Ikkina Road, Tallebudgera Recreation Centre and Tallebudgera Tourist Park, Tallebudgera Drive, Nineteenth Avenue, Palm Beach Avenue, Thrower Drive, Duringan Street, Tomewin

Street, Millers Drive, Tugun Currumbin Road, Toolona Street, Boyd Street (future intersection), Kirribin Street, Terminal Drive, Musgrave Street (Coolangatta Road), Ocean Street and Miles Street.

  - Included recommendations to consolidate (or close) access to lower order roads, where possible (subject to further investigation and traffic modelling/analysis) such as Twenty Fifth Avenue, Seventeenth Avenue, Eighth Avenue, Third Avenue, Toolona Street East, Kitchener Street, Desalination Plant Road, Loongana Avenue and all unsignalised mid-block U-turn facilities.
  - Maintain local access movements in and around Coolangatta Central Business Area between Lanham Park and Warner Street
- Active Transport Strategy:
  - Confirmed the project requirement, consistent with TMR's Cycling Infrastructure Policy, to explicitly provide facilities on the entire BH2C corridor for people walking. Strategic direction to provide for walking as part of major projects is provided in the Queensland Walking Strategy.
  - The active transport strategy was not completed in the PE stage of the project and will continue to be developed in the next stage. Key points that require improvement includes:
    - trunk north-south corridor is along the Oceanway as separated pedestrian and bikeway due to spatial constraints
    - bicycle and pedestrian east-west facilities along each key local road with facilities to cross the Gold Coast Highway and connect to the Oceanway and key local destinations
    - pedestrian crossings to connect key public transport stations
    - east-west cycle facilities to connect and terminate close to key public transport stations
    - supporting directional signage to guide pedestrians and bicycle riders to the Oceanway, public transport facilities and key local destinations.
  - Due to corridor constraints including limited road corridor width and the need to resume private property, out of corridor provision has been included in some sections, namely Palm Beach.
  - The Active Transport Strategy, in the Business Case, will improve the accessibility provisions generally in accordance with TMR's Accessibility and Inclusion Strategy.
- Street inPeople and Place Strategy:
  - Identified the current and future road function adopting 'Movement and Place' principles to help inform potential changes to speed limits along the project corridor.
  - Identified key 'Place' locations, station precincts and opportunities for land use integration.
  - Developed high level concept options for key precinct locations for consideration by TMR/the City in future project phases.

5.1.4 Key design parameters for all options

The project team has developed key design parameters to transform the form and function of the Gold Coast Highway to align with the corridor vision statement and project objectives. Table 50 details the fundamental design parameters adopted for all three project options and Table 51 lists the assumed design speeds adopted for each option.

Table 50 Key design parameters for the project corridor

Design Parameter	Segment 1 – Burleigh Headland	Segment 2 – Palm Beach	Segment 3 – Currumbin Headland	Segment 4 – Tugun to Bilinga	Segment 5 – Kirra to Coolangatta
Road Name(s)	Tweed Street Gold Coast Highway	Gold Coast Highway	Gold Coast Highway	Gold Coast Highway (26.0m B-Double Route)	Coolangatta Road Lanham Street McLean Street Griffith Street Chalk Street
Number of Traffic Lanes	4 through lanes (two lanes in each direction)				2 through lanes (one lane in each direction)
Road Design Vehicle	19.0m Single Articulated 12.5m Single Unit Truck/Bus			26.0m B-Double	19.0m Single Articulated 12.5m Single Unit Truck/ Bus
Road Design Check Vehicle	19.0m Single Articulated	19.0m Single Articulated	19.0m Single Articulated	26.0m B-Double	19.0m Single Articulated
Pedestrian	Off-road shared paths	Off-road shared paths	Off-road shared paths	Off-road shared paths	Off-road shared paths
Bike Riders	Separated cycle track	Separated cycle track (Oceanway)	In Corridor Off-road shared paths (Gold Coast Highway) Out of corridor Off-road shared paths (Oceanway)	Out of corridor Off-road shared paths (Oceanway) On-road cycle lane (Golden Four Drive) Separated cycle track (Coolangatta Road)	Separated cycle track (Coolangatta Road)

TMR undertook a speed limit planning assessment for the purpose of informing future posted speed limits along the project corridor (in response to the introduction of additional signalised intersections/ accesses and increased land use intensity from residential and urban development). Table 51 lists the assumed design speeds adopted for each option.

Table 51 Speed parameters

Chainages (m)	Zone / Segment description	Chainages (m)	Posted speed (km/h)	Design speed (km/h)	
				LRT & DBL Options	EBP Option
1100	Segment 1: Burleigh Headlands	Ch. 40052 – Ch. 41732 (Brake St – Tallebudgera Dr Rd)	60	60	70
1200	Segment 2: Palm Beach	Ch. 41732 – Ch. 45100 (Tallebudgera Dr - Thrower Dr)	60	60	70
		Ch. 45100 – Ch. 45660 (Thrower Dr - Currumbin Creek)	70	70	
1300	Segment 3: Currumbin	Ch. 45660 – Ch. 46400 (Currumbin Creek - Tomewin St)	70	70	70
		Ch. 46400 – Ch. 47300 (Tomewin St - Tugun Currumbin Rd)	60	60	70
		Ch. 47300 – Ch. 47700 (Tugun Currumbin Rd - south of Toolona St)	70	80	80
1400	Segment 4: Tugun to Bilinga	Ch. 47700 – Ch. 50700 (South of Toolona St - Terminal Dr)	70	80	80
		Ch. 50700 – Ch. 50900 (Terminal Dr - Coolangatta Rd)	50	50	60
1500	Segment 5: Coolangatta	Ch. 50900 – Ch. 53295 (Gold Coast Highway - Warner St)	50	50	60

5.1.5 Concept phase design of the three shortlisted PE options

The three shortlisted options were further refined and designed in 12D software to a concept level using limited survey at key sections and supplemented with lidar for the remaining sections. Option 1 LRT is described in detail as it is the most complex option technically, while Option 2 and Option 3 are described in less detail to highlight differences from Option 1. This level of development is suitable to inform engineering scope, risks and the project costs needed to compare each option in a competitive MCA.

5.2 Option 1 Dedicated Light Rail

The Dedicated Light Rail (LRT) Option proposes an extension of GCLR from Burleigh Heads to the Gold Coast Airport and Coolangatta (i.e. GCLR Stage 4). The LRT alignment generally follows the Gold Coast Highway and Coolangatta

Road and includes bus network changes to improve connectivity and accessibility to the light rail. This option involves a combination of side and centre running dedicated right-of-way that passes through intersections at-grade (i.e. it is not vertically separated. There are new separate LRT bridges at Tallebudgera and Currumbin Creeks and a new stabling facility near the Airport. The system is assumed to be powered by traction power delivered by overhead line equipment. On advice from technical advisers and discussion with GCLR Stage 3 project team, it was decided to defer consideration of possible on-board power or 'wireless light rail' to future stages of the project. Key components of Option 1 are summarised in Table 52.

Table 52 Key LRT components

Component	Description
System	Expansion of existing GCLR LRT system, including dual standard gauge track and overhead wire traction power. Extension connects near Burleigh Heads station and continues south through Tallebudgera, Palm Beach, Currumbin, Tugun, Gold Coast Airport and will have a terminus at Coolangatta.
Route length	13.4km
Stations	14 LRT stations as follows: • 6 side platform stations • 7 island platform stations • 1 island terminus station (Warner Street, Coolangatta).
Cross section	Two-way dedicated LRT corridor separated from general traffic, combination of centre running and side (verge) running Width varies from 8m to 9m, with approximately 11.6 m required at island platform stations and approximately 13.5 m required at side platform stations.
LRV details	Eight new Bombardier Flexity 2 Tram, as per existing GCLR system 43.45m long, bi-directional vehicle with 7 modules Static width – 2.65m Max. operating speed – 70km/h (not to exceed road posted speed limit) Max. design speed - 80km/h (dependent on the adjacent road speed and position in the transport corridor).
Depot location	Main existing LRT depot located in Southport with all existing LRVs to be maintained at this depot. New satellite depot proposed at Bilinga (adjacent to the Gold Coast Airport) with a stabling yard for 8 LRVs to reduce out of service running times and driver facilities.
Key traffic interactions	72 at-grade intersections, including major intersections on the Gold Coast Highway at Tallebudgera Drive, Nineteenth Avenue, Palm Beach Avenue, Thrower Drive, Tomewin Street, Tugun Currumbin Road, Toolona Street, Kitchener Street, Boyd Street, Terminal Drive and Coolangatta Road; and at the Coolangatta Road/Musgrave Street intersection.
Indicative Property impacts	78 full property lot impacts, 226 partial property lot impacts.

Component	Description
Bridges and structures	Two new light rail bridge structures, one fauna overpass and two active transport/pedestrian bridge structures.
Active transport	Active transport provisions for the length of the corridor including a new 6m wide segregated active transport pathway shared with the LRT and a new Tallebudgera Creek bridge. A new active transport bridge at Currumbin Creek is being investigated by TMR in a separate process, and is out-of-scope for the BH2C project.
Power System	750V DC Traction Power supply and Overhead Line system.
Bus network	Bus interchanges at Thrower Drive (Palm Beach), Toolona Street (Tugun), Boyd Street (Tugun), Gold Coast Airport and Warner Street (Coolangatta).
Running time	2041 forecast light rail journey time of just over 30 minutes from Burleigh Heads to Coolangatta (based on the 2041 Gold Coast Aimsun Model Southern Extension (GCAMSE) microsimulation model).
Service hours	Weekday services: • 10 minute headways during early morning (5am-7am) • 7.5 minute headway during peaks (7am-7pm) • 15 minutes during evenings (7pm-12am) • No operations from 12am-5am (service replaced by 700 night bus). Weekend services: • 10 minute headway during early mornings and peaks (5am-7pm) • 15 minute headway during evenings (7pm-12am) • 30 minute headways during early mornings (12am-5am).

5.2.1 Scope

5.2.1.1. Route selection process in the Multi-modal Corridor Study

The preferred LRT alignment from the Gold Coast Highway (Burleigh Heads to Coolangatta Multi-modal Corridor Study (MMCS) was taken forward into the PE phase for further assessment including options analysis and design development/refinement.

The MMCS was undertaken by TMR in two stages between 2020 and 2022. Its primary purpose was to identify the land requirements to enable implementation of a preferred range of transport infrastructure solutions including for light rail, buses, pedestrians, bike riders, private transport (including freight) and manage encroachment by development.

The study concluded that the Gold Coast Highway is the preferred route for a future southern extension of the light rail from Burleigh Heads to Coolangatta. It also concluded that an at-grade, segregated dual track is the most appropriate light rail configuration, consistent with previous (and proposed) Gold Coast light rail stages.

As part of the MMCS, a preliminary options analysis was undertaken to identify the preferred track alignment and station locations for the light rail, which is summarised below:

- LRT alignment is generally central-running along the Gold Coast Highway and Coolangatta Road (due to the high density of intersections and residential driveways) with the exception of the following locations:

- Side running (east of the Gold Coast Highway) across Tallebudgera Creek for a new light rail bridge with active transport provisions
- Side running (west of the Gold Coast Highway) across Currumbin Creek (for a new light rail bridge) and Currumbin Hill
- Side running (east of the Gold Coast Highway) through Tugun and Bilinga from Tugun Currumbin Road to Terminal Drive
- LRT then traverses the Gold Coast Highway at Terminal Drive with a connection to the Gold Coast Airport and new light rail satellite depot (adjacent to airport land), then crosses the Gold Coast Highway near the SCU Gold Coast Campus to Coolangatta Road at the Musgrave Street intersection
- Side running (east of Coolangatta Road) between Lord Street and Miles Street, then becomes fully segregated passing through Lanham Street Park then on-road following Chalk Street to the Warner Street intersection, Coolangatta (proposed terminus).

- 14 LRT stations located near key trip attractors, generators, and east-west connections. The stations are generally located at 800m spacings through developed areas to provide an effective balance between PT efficiency and accessibility at the following locations:
  - Burleigh Head National Park (north of Tallebudgera Creek), Burleigh Heads
  - Five stations in Palm Beach located at Twenty Fifth Avenue, Nineteenth Avenue, Twelfth Avenue, Palm Beach Avenue and Thrower Drive
  - Tomewin Street, Currumbin
  - Two stations in Tugun located at Toolona Street and Boyd Street
  - George Street, Bilinga
  - Gold Coast Airport
  - Three Coolangatta stations located at Musgrave Street, Miles Street and Warner Street (terminus).

The proposed spacing between LRT stations adopted in the MMCS was consistent with GCLR Stages 1 to 3 (for urban segments) and is consistent with typical international practice. It is noted that the station names attributed to each station are based on the nearest crossroads (or major attraction) and are intended to be working titles only, subject to confirmation in subsequent phases.

Figure 46 provides a schematic of the preferred LRT alignment and station locations from the GCH MMCS. The GCH MMCS route strategies were used to support the designation of land requirements associated with future transport upgrades of the corridor as 'Category C Protected Planning', in accordance with the TMR's Approved Planning Policy (October 2017). This category refers to planning that is approved and protected but not included in current funding and delivery programs. The Category C designation ensures that the project corridor is protected from developments that could otherwise hinder the feasibility of the project and provides TMR with the opportunity to work collaboratively with developers to achieve mutually beneficial outcomes for the transport corridor.

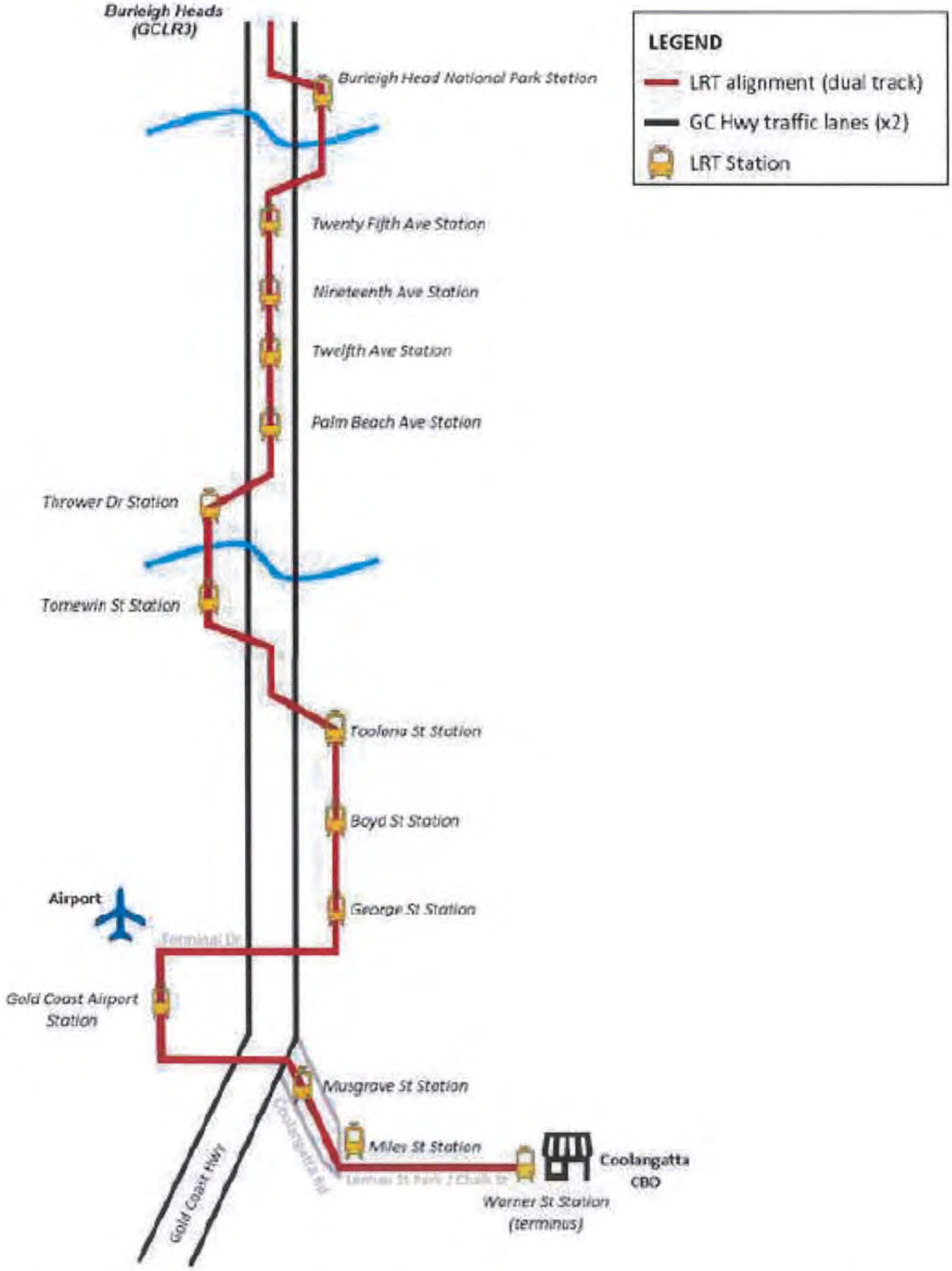


Figure 46 Schematic of the preferred GCH MMCS LRT alignment and station locations

5.3 Option 1 Dedicated Light Rail – PE design development process

The initial concept design from the MMCS was further refined during the PE design stage. This took on board the results of community and stakeholder consultation and project objectives for the BH2C project. A new preliminary design was developed and tested, and this updated design was used to underpin the financial and economic analysis for this PE.

Figure 47 shows a flowchart of the design development process undertaken during the PE phase to refine the LRT Option since the MMCS.

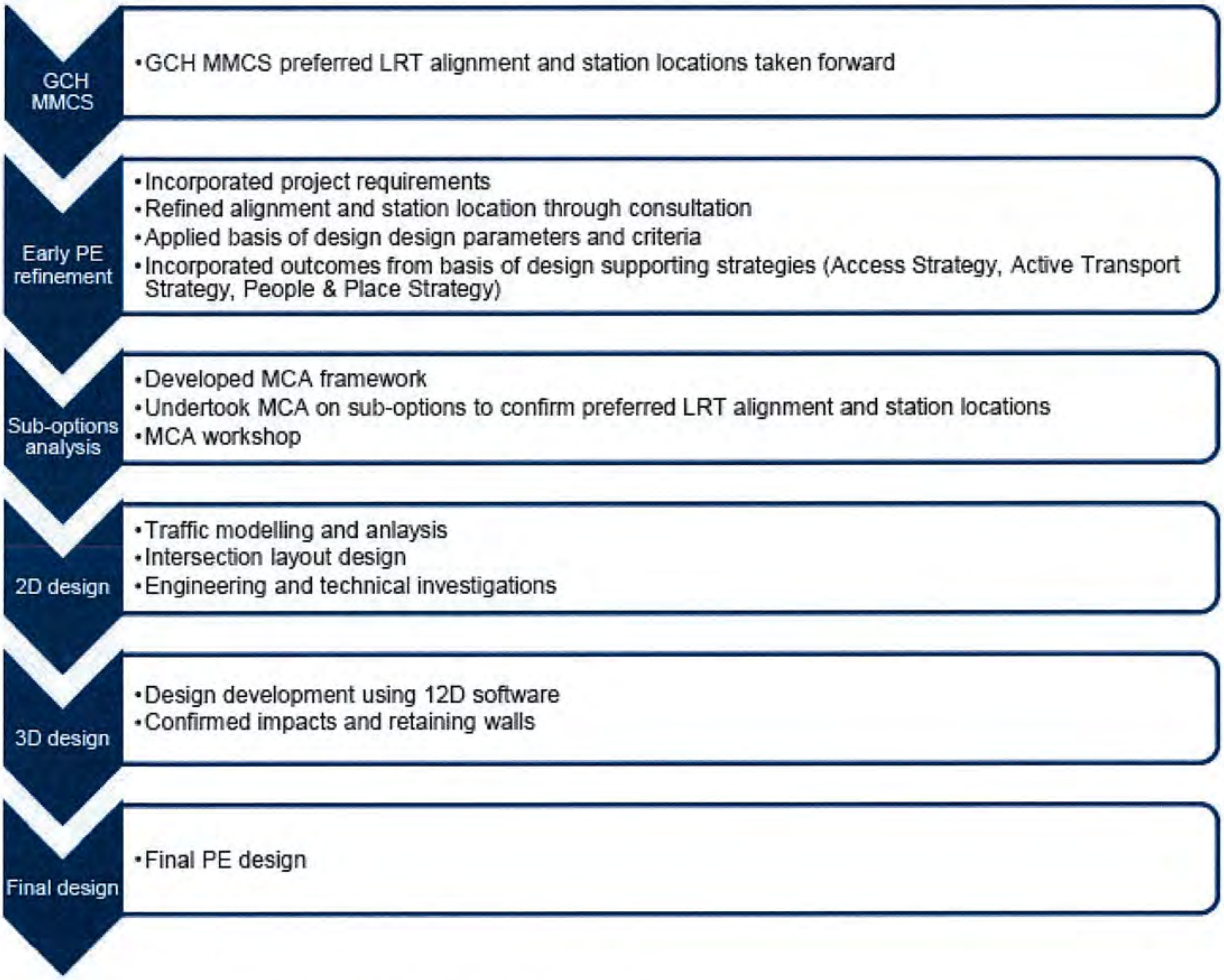


Figure 47 LRT Option – PE design development process

A summary of the key design refinements undertaken based on the strategy outcomes and community consultation feedback is provided below:

- Gold Coast Highway retained as four traffic lanes along the entire project corridor based on community consultation feedback and a ministerial commitment. This resulted in removal of parking, reduced lane widths and footpath verges through Palm Beach to minimise property impacts.
- Provision of the following parking facilities at the Jellurgal Aboriginal Cultural Centre – parking for up to 2 coaches near centre, retention of two People with Disability (PWD) parking bays and a loading zone for deliveries.

- Reinstatement of right/U-turn access on the Gold Coast Highway at Palm Beach at the following intersections: Northbound right/U-turn bays included at Twenty-Third Avenue, Eleventh Avenue and Fourth Avenue; and a southbound right/U-turn bay at Palm Beach Avenue.
- The Palm Beach Avenue LRT Station was relocated south of Palm Beach Avenue to provide a southbound right turn bay on the Gold Coast Highway, given this road provides an important connection to the M1 Motorway (based on the Access Strategy outcomes, as noted above). The revised station location also provides an opportunity to enhance the "place" function of the Palm Beach precinct by making Fifth Avenue a pedestrian friendly street.
- The existing mid-block signalised pedestrian crossing near Hawaii Avenue was reinstated and the signalised intersection at First Avenue was removed. First Avenue was not identified as a critical location for vehicle access in the Access Strategy and it was considered more critical to retain right turn access at Palm Beach Avenue and Thrower Drive (which are both higher order roads of important significance to the road network). However, the Active Transport Strategy noted retention of the pedestrian crossing is desirable to retain pedestrian accessibility and connectivity across the highway, particularly given the adjacent pedestrian crossings (at Fourth Avenue and Thrower Drive) are approximately 650m apart, which is beyond the desirable 400m walking distance.
- Providing a longer dedicated left turn access lane from the Gold Coast Highway northbound into Thrower Drive, Currumbin.
- Toolona Street LRT Station relocated approximately 100m north to improve pedestrian connectivity and accessibility to the Tugun CBD and bus stops on Golden Four Drive.
- Tugun Currumbin Road / Durran Street intersection removed based on the consultation feedback and the Access Strategy (which did not identify this intersection as essential for vehicle accessibility).
- Retaining vehicle access at the Gold Coast Highway / Kitchener Street intersection based on concerns raised during the Burleigh Heads to Tugun community consultation and feedback from the City. Initially, options were explored to convert the Gold Coast Highway / Kitchener Street intersection to a left-in/left-out (LILO) arrangement with a signalised pedestrian crossing on the highway (as Kitchener Street is a principal cycle route and to replace the existing mid-block pedestrian crossing located 160m to the south near Sand Street). However, this intersection arrangement was later refined to allow the right turn into Kitchener Street which alleviates the heavy right turn reliance at Toolona Street intersection.

5.3.1.1. Preferred alignment adopted for the PE concept phase design

Figure 48 presents the preferred alignment for LRT based on the updates undertaken through the PE stage.

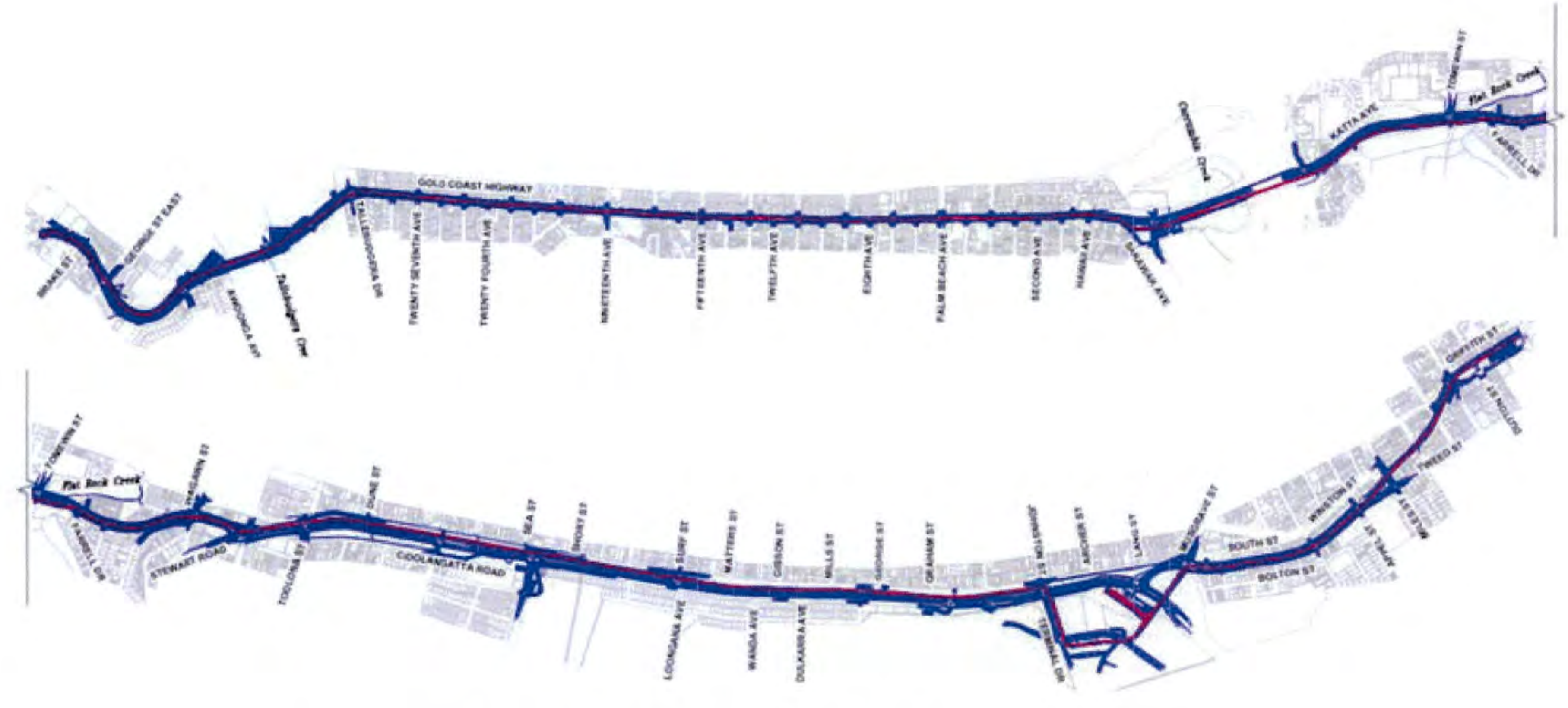


Figure 48 LRT Option alignment (Updated PE alignment for Option 1 Dedicated LRT (shown in red))

5.3.1.2. Track configuration

The LRT track configuration is an at-grade, segregated dual track. The LRT alignment is generally centre running along most of the project corridor, with the exception of the selected locations such as

- the Tallebudgera and Currumbin Creek crossings (where side running is required to retain the existing road bridges),
- through Tugun and Bilinga, between Tugun Currumbin Road and Gold Coast Airport,
- the Gold Coast Airport (where the alignment veers off the highway into Airport land), and
- through the Lanham Park and alongside Chalk Street in Coolangatta.

Figure 49 and Figure 50 show typical cross-sections of the LRT and road corridor based on a central running alignment. The rail cross-sections are:

- 8.0m (minimum) light rail corridor
- 4.0m (typical) rail track centres.

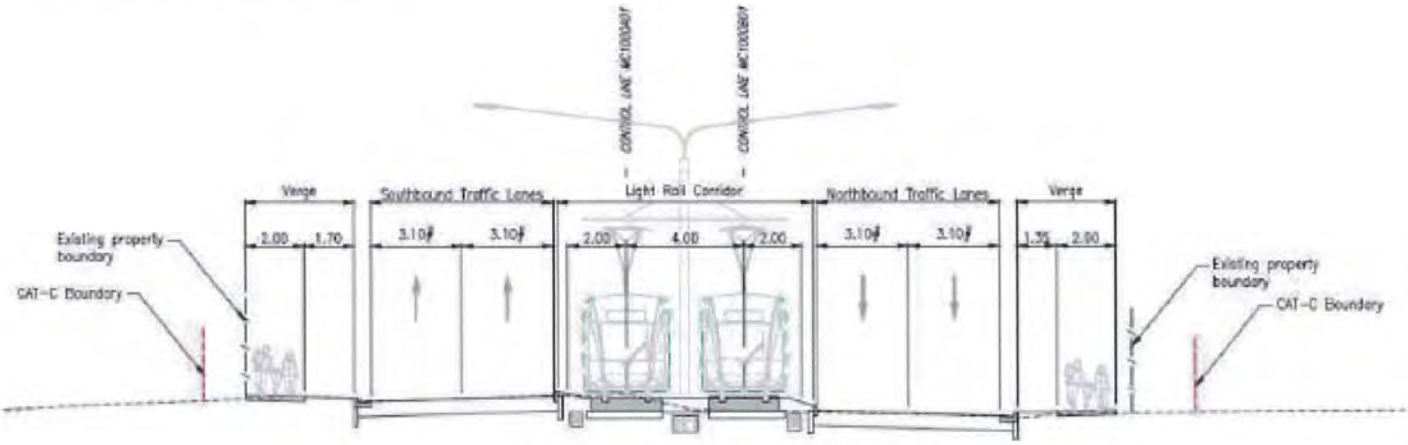


Figure 49 Typical LRT cross-section with centre running

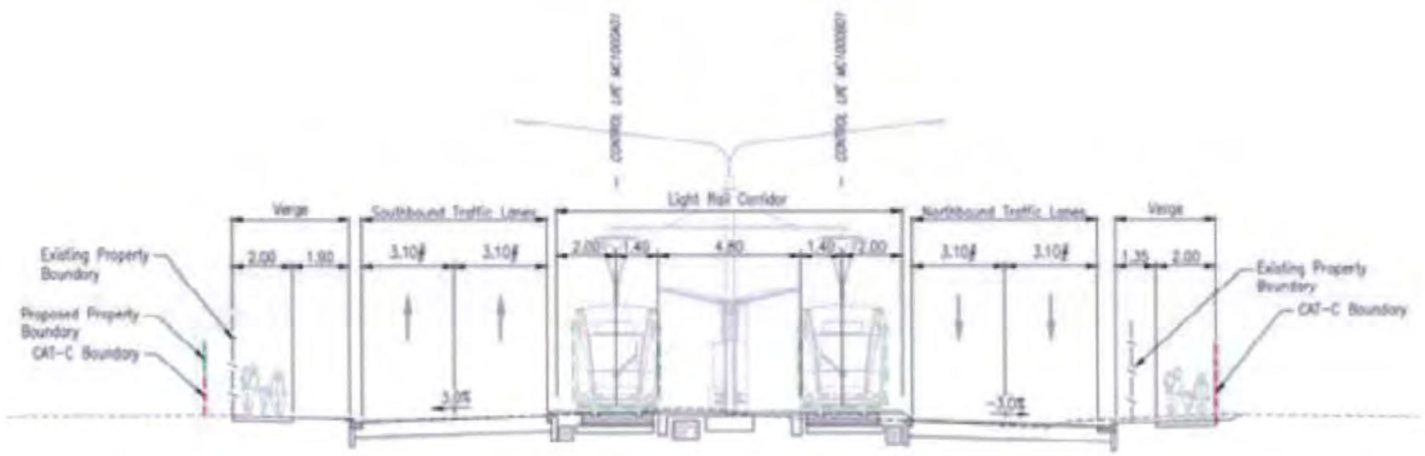


Figure 50 Typical LRT cross-section at stations

5.3.1.3. Road corridor configuration

The Gold Coast Highway and Coolangatta Road are a four-lane road (i.e. two traffic lanes in each direction) for the entire length of the project corridor. On-street parking is currently permitted on sections of the project corridor.

The typical road cross-section is summarised below:

- Median Lane – 3.3m
- Kerbside Lane – 3.3m
- No on-street parking allowance
- No cycle lane allowance
- Verge width – 4.3m typical.

Table 53 details the key road design parameters adopted for the project.

Table 53 Key Road Design Parameters

	Applicable Design Standard	Comments
General Traffic Lanes	3.5m	Reduced to 3.3m for constrained areas and 3.1m (Extended Design Domain (EDD)) through Palm Beach
Footpath	2.0m nominal	High pedestrian volumes 2.5m preferred width
Shared Path	3.0m	2.5m min
Active Transport Path	3.0m	2.0m where one-way
On-Road Cycle Lane	1.5m	Through vehicle traffic speed = 60km/h

5.3.1.4. Property requirements

An assessment of property requirements was undertaken based on a combination of "full" and "partial" resumptions. A "full" property resumption occurs where a building or structure (such as a carport/pool) is impacted by the design, whereas a "partial" resumption occurs where no building or structure is proposed to be impacted. Additional land requirements for drainage and relocation of PUP (Public Utility Plants) were also considered as a part of the assessment.

Table 54 highlights the number of properties identified for a full or partial property acquisition for the LRT Option. TMR will be required to undertake consultation with these property owners in subsequent stages.

Table 54 Option 1 LRT – Property Impacts

Segment	Full	Partial	Total
1 - Burleigh Heads	6	6	12
2 - Palm Beach	42	138	170
3 - Currumbin	21	11	32
4 - Tugun / Bilinga	3	1	4
5 - Coolangatta	6	1	7
Total	**78**	**157**	**235**

5.3.1.5. Car parking

A summary of the number of parking impacts is provided in Table 55.

Table 55 Option 1 LRT - Parking Impacts (excluding Oceanway)

Segment	Existing	Residential	PWD	Commercial	Commercial loading zones	Recreational	Remaining
1 – Burleigh Heads	353	-107	3	0	-2	-46	201
2 – Palm Beach	641	-385	0	-63	-6	14	201
3 – Currumbin	122	-64	0	-54	0	0	4
4 – Tugun/Bilinga	250	-77	0	-12	-1	0	160
5 – Coolangatta	708	-79	-4	-159	0	0	466
Total	**2,074**	**-712**	**-1**	**-288**	**-9**	**-32**	**1,032**

The LRT Option results in removal of on-street parking along the project corridor. TMR advice regarding parking aspirations informed the design approach, which included:

- No net loss of commercial parking (including loading zones), tourism and recreational parking spaces
- Retention of existing residential parking only where it is compatible with the project design
- No acquisition of freehold land to accommodate residential parking.

The design intent has been to aim for a zero net-loss in parking to minimise disruptions for local businesses, residents and the community that rely on parking. However, there may also be opportunities to better utilise remaining parking supply. A parking study will be required in the business case stage to address:

- Demand management opportunities including paid parking in centres, consistent with the City's overarching policy, and parking regulations to better utilise parking in surrounding precincts
- Opportunities for providing new car parking supply to offset parking spaces removed in commercial areas.

The following approach has been adopted to minimise parking impacts, based on TMR advice:

- No net-loss of parking at Tallebudgera Creek via the upgraded carparks adjacent to the Jellurgal Aboriginal Cultural Centre and the Tallebudgera Recreation Camp
- Palm Beach and Currumbin – the majority of on-street parking is removed for the LRT Option, with the focus on achieving the critical project requirements (i.e. LRT, four general traffic lanes and active transport facilities, where feasible), with a lesser priority given to on-street parking. Throughout the PE, opportunities have been investigated to retain on-street parking (where possible), however, parking offsets (at off-site carparks) would be required to achieve a zero net-loss outcome. Carpark locations will require further investigation during the Business Case development phase utilising properties identified for full resumption property or by investigating the feasibility of converting some existing at-grade carparks into multi-storey carparks
- Zero net-loss of parking at the Palm Beach Parklands located to the north of Currumbin Creek

- Zero net-loss of parking along Golden Four Drive at Tugun
- Minimise parking loss along Golden Four Drive through Bilinga. There may be opportunity to offset parking loss at locations along the road where there is currently no parking is provided
- Minimise parking loss along Coolangatta Road through Bilinga. There are opportunities to offset parking, subject to the City's cycle track planning
- Minimise parking loss along Coolangatta Road through Kirra.
- Minimise parking loss in Coolangatta CBD. The design as aimed to retain as much parking as possible, however, there will be parking impacts to the Chalk Street carpark to accommodate the Warner Street Station, which could potentially be offset with a multi-storey carpark if feasible.

5.3.1.6. Park'n'Ride opportunities

Opportunities for potential park 'n' ride sites have been investigated during the PE phase to offset the loss of parking as described above. Three potential park 'n' ride sites are currently under investigation at the following locations:

- Near Thrower Drive Station: 100 spaces using informal on and off-street parking and the Palm Beach Parklands car park
- Near Boyd Street Station: 300 spaces using a formal park 'n' ride facility
- Near Musgrave Street Station: 200 spaces using a formal park 'n' ride facility.

Further investigation on these potential park 'n' ride sites will need to be undertaken during the Business Case phase, in consultation with the City.

5.3.1.7. Track form

A track form design has been adopted from previous GCLR stages and includes the following different pavement types:

- Embedded track design for single track and dual tracks
- Embedded track with urban design at pedestrian crossings
- Embedded track with urban design at stations, and
- Embedded track with Turf finish
- Plinth track across bridges.

The track form design parameters are listed in Table 56.

Table 56 Track Form Design Parameters

Design Element	Parameter
Track Form	Embedded track with encased rail consisting of either concrete, asphalt, blocks, pavers or grassed finishes.
Track Form (bridges)	Plinth track with exposed rail
Rail Type	Embedded track – 51R1 Grooved rail Exposed Track – 49E1 Vignole rail
Rail Gauge	1435mm (standard gauge) – measured between the running edge on the inside of the rails

Design Element	Parameter
Track Design Loading	LRV track system in areas of road intersections or where maintenance vehicles are permitted to access the slab, it must be designed as a minimum in accordance with the highest standard of either Austroads, AS 5100 or TMR's design requirements for pavement design and be structurally reinforced.
Mainline Turnouts	1 in 6, R50m min
Depot Turnouts	1 in 4, R25m min

For all embedded track locations grooved rail is proposed. Grooved rail has both a running head and a keep creating a protected area for the flange of the wheel to run. This enables the rail to be embedded without installing a guard rail or similar protection to provide the space for the flange of the wheel to safely pass. The bridge lengths in the corridor are sufficiently long enough to change to Vignole rail (rail profile normally used for heavy rail) using a transition rail.

The rail is to be embedded in the track slab surrounded by a material that provides support for the rail vertically and horizontally, electrical insulation (as the first defence in management of stray current), resilience for mitigation of noise and vibration, surface friction (for road vehicles at intersections).

There are a number of options to be considered for the finished surface of the track slab including:

- Concrete slab: The slab has a finished level at the same height as the adjacent rail. A brushed finish is normally provided to have a suitable slip resistance. The concrete can have alternative colours or surface treatments to better match with the surrounding urban treatments in areas of high amenity if needed.
- Paved finish: Provides a more aesthetically pleasant finish to the track slab to integrate with the surrounding urban treatments. The concrete track slab has a finished level below the top of rail to allow a mortar bed and topping paver to be installed level with the top of rail.
- Asphalted finish: The concrete slab is similar to the paved treatment but with an asphalt topping. The interface between the concrete slab at the rail and the asphalt and drainage of the asphalt need to be carefully designed and constructed to ensure the durability of the asphalt.
- Grassed or planted track: Natural vegetation reduces the scale of hard finishes providing the benefits of increasing permeability, noise mitigation, and mitigation of urban heat. Grassed track could be used in light rail only sections of the corridor. Each of the rails are embedded in a concrete beam. The concrete beams are either connected by a concrete slab or horizontal supports to maintain the gauge of the track. Soil and the selected plants or grasses can be placed between each of the rail beams.

Consideration of maintenance and durability is important in selecting the appropriate grass or plants to be used within the light rail corridor. The edge of the swept path will need to be marked through a change in height of planting (such as shrubs), a strip of different material, or a change of material at the interface. Alternative stray current treatments would need to be part of the design treatments for this type of light rail corridor.

5.3.1.8. Station design elements

Two station platform types are proposed for the LRT corridor:

- Island platforms – single platform with faces to tracks on each side
- Side platforms – two platforms at each stop either adjacent to each other or staggered.

General requirements for both island and side platforms are provided in Table 57.

Table 57 **Station Design Platform Criteria**

Design Parameter	Value	Comment
Stop platform length (nominal LRV length)	45.0 m	Plus DDA compliant access at one end
Island Platform width	4.8m	To be assessed with passenger demand
Terminating Island Platform width	5.8m – 8.0m	To be assessed with passenger demand
Side Platform width	3.6m	To be assessed with passenger demand
Platform height	285mm	Nil
Coping to track centreline	1.375m nominal	Will be LRV specific to manage step gap
Horizontal Alignment through Platform	Straight through platform and for 12m either side	Nil
Platform Crossfall	1.0% desirable	Sloping away from the track
Platform Access	DDA Compliant	Nil

It is assumed that the station design will take a similar form to the existing GCLR system stations. The following general requirements are to be provided at each station:

- Station lighting
- CCTV cameras with full coverage for stations and approaches
- Add Value Vending Machine (AVVM) ticketing machines
- Passenger information displays
- Station cabinets
- Way finding signage
- Off-platform bicycle storage racks as per landscape design.

On platform public toilet facilities are typically not considered in the design of light rail infrastructure due to the nature of the urban environment which it services. Such facilities are mostly available in the surrounding public domain.

Detailed architectural and urban design will be developed for each station in the next stage of the design process to achieve an outcome based on Crime Prevention Through Environmental Design (CPTED). The typical side and island platform cross sections are shown in Figure 51 and Figure 52 respectively.

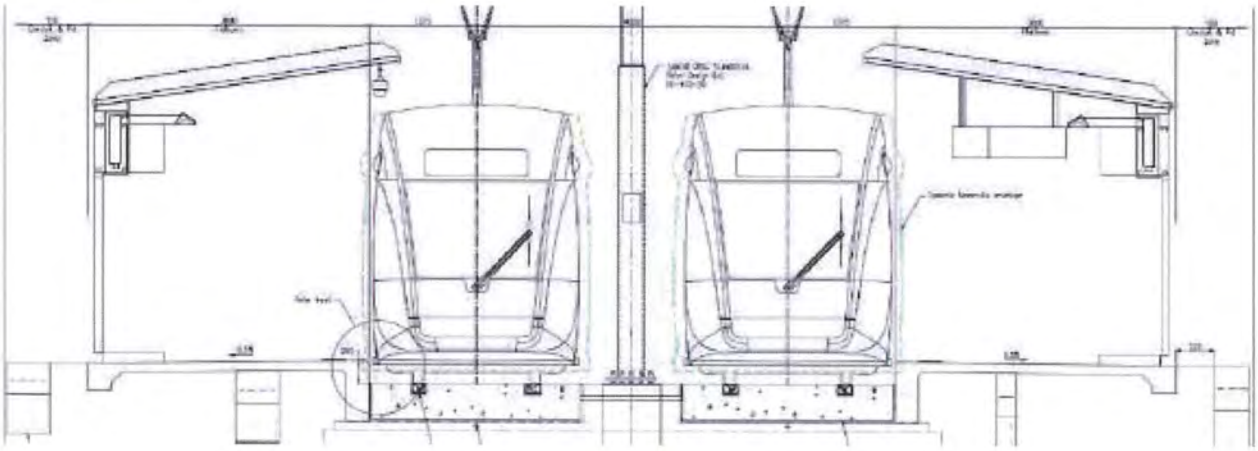


Figure 51 Typical side platform cross section

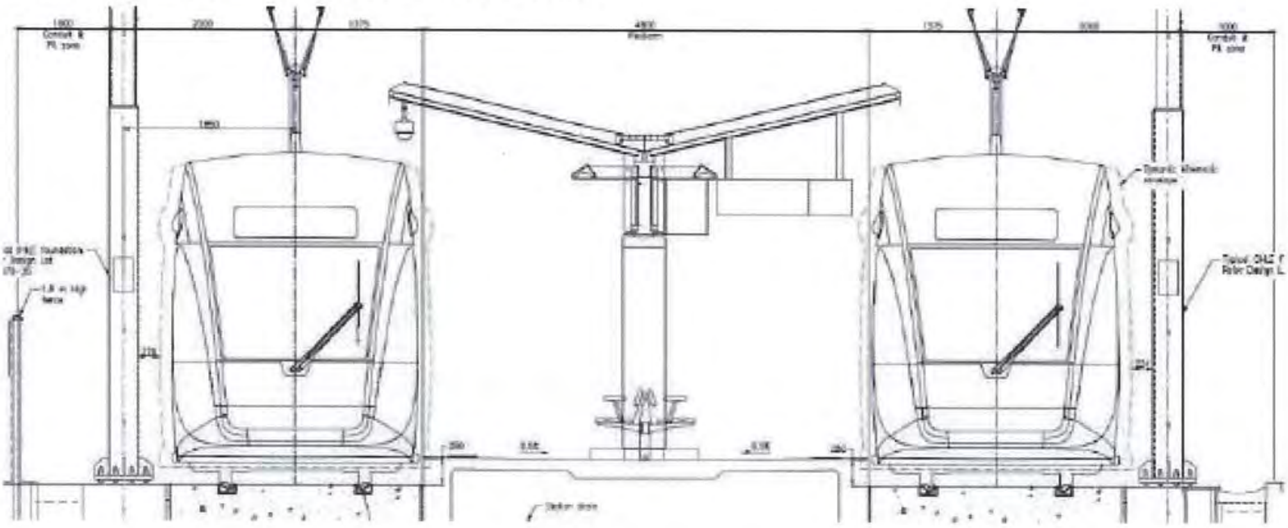


Figure 52 Typical island platform cross section

5.3.1.9. Station locations

The concept design includes 14 LRT stations along the project corridor, as detailed in Table 58. The station locations were identified during the GCH MMCS based on an 800m desirable spacing near key trip attractors, generators and east-west connections.

Table 58 LRT station locations

Ch.	Station Name	Station Platform Type	Location
40985	Burleigh Head National Park	3.6m side platforms	Adjacent to the Jellurgal Aboriginal Cultural Centre and Burleigh Head National Park
42106	Twenty-Fifth Avenue	4.8m island platform	North of Twenty-Fifth Avenue (relocated from initial location at Twenty-Eighth Avenue due to geometric constraints)
42860	Nineteenth Avenue	4.8m island platform	South of Nineteenth Avenue
43493	Twelfth Avenue	4.8m island platform	Adjacent to Twelfth Avenue

Ch.	Station Name	Station Platform Type	Location
44255	Palm Beach Avenue	4.8m island platform	South of Palm Beach Avenue
45047	Thrower Drive	3.6m side platforms	North-west of the Gold Coast Highway / Thrower Drive intersection (opposite Palm Beach Parklands and Palm Beach Currumbin High School). The LRT station includes a bus interchange
46492	Tomewin Street	3.6m side platforms	South of Tomewin Street and opposite the Currumbin Wildlife Sanctuary entrance
47552	Toolona Street	4.8m island platform	North of Toolona Street and adjacent t Golden Four Drive
48667	Boyd Street	3.6m side platforms	South-east of Gold Coast Highway / Boyd Street intersection (adjacent to Golden Four Drive)
50042	George Street	4.8m island platform	Adjacent to Golden Four Drive / George Street intersection (east of Gold Coast Highway)
51107	Gold Coast Airport	3.6m side platforms	West of Tom Norris Road (within Airport precinct). LRT station includes a proposed bus interchange and future provision for heavy rail transfer
51757	Musgrave Street	4.8m island platform	South of Coolangatta Road / Musgrave Street intersection
52588	Miles Street	3.6m side platforms	North-east of Coolangatta Road / Miles Street intersection
53437	Warner Street	8.0m island platform	South-west of Chalk Street / Warner Street intersection. Connecting bus stops proposed on Warner Street (south of Chalk Street)

Key interchange locations between bus and light rail are proposed at the Thrower Drive, Toolona Street, Boyd Street and Warner Street LRT stations (refer to Section 5.3.3.3 for further information).

5.3.1.10. Traction power

The LRT vehicles are powered through an overhead line (OHL) catenary powered by a series of Traction Power substations, which are supplied by the Energex network. The concept OHL design was developed utilising the proposed street lighting pole locations in the median with a maximum spacing of 40m. The following aspects of the alignment design will also influence the OHL pole location design:

- Station platform location
- Sharp horizontal rail geometry
- Intersection layouts and traffic turning movement
- Overhead Energex power lines along Gold Coast Highway verge (for OHL stay pole locations)
- Rail crossovers
- Spur line locations.

The space proofing of the Traction Power Substations (TPS) along the length of the LRT corridor are influenced by a number of factors detailed in Table 59.

Table 59 **TPS design inputs**

Design Parameter	Value	Comment
Traction Power	750V DC	
Traction Power system supply spacing	1.5 to 2.0km	Additional consideration required for steep grades and regenerative braking power collection
Traction Power Substation	10.4 x 4.5m	
Harmonic Filter	5 x 5m	
Energex Supply (Ring Main Unit)	4.2 x 4m	
TPIS Switchgear	5 x 5m	
Overall Site size	40 x 15m	Based on typical equipment requirements from Stage 3

5.3.1.11. Rail Systems (Communications and ITS)

The rail system and communication network design has not been undertaken for this concept design stage. Some space proofing to allow for conduit requirement for TMR Communications, Traction Power, Stray Current and Rail Systems has been considered in the LRT Corridor typical cross-section.

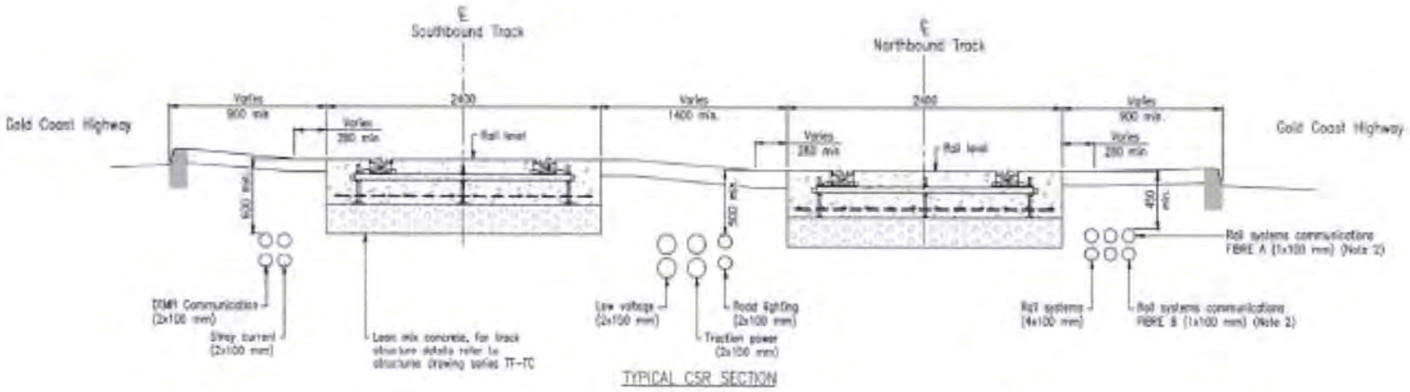


Figure 53 Typical Combined Services Route Conduit requirements

Details relating to the rail systems and communications requirements and design will be determined and confirmed during the next phase of the design in the Business Case stage.

5.3.1.12. Satellite Depot and Stabling

The GCH MMCS identified a requirement for a new LRT satellite and stabling yard to support GCLR Stage 4 operations. Currently, all operations for GCLR (including the future Stage 3 extension) are managed from the Southport depot which includes a stabling yard for 18 LRVs. The GCLR Stage 3 works include upgrade of the Southport stabling yard for an additional six LRVs, increasing the total capacity of the stabling yard to 24 LRVs.

A high-level assessment of the location, function, requirements and layout of the proposed Coolangatta light rail satellite depot was undertaken as part of the GCH MMCS, in consultation with TransLink and Keolis Downer—the current GCLR O&M operator. The preferred site is located on vacant TMR road reserve located west of the Gold Coast Highway and adjacent to the Airport, as shown in Figure 54. This site was identified as the preferred location to avoid impacts to the Gold Coast Airport land and operations.

Figure 54 Location of proposed light rail satellite depot and stabling facility

5.3.2 Construction activities

5.3.2.1. Constructability

A high-level construction methodology has been prepared based on the concept design. The approach typically involves five phases:

(1) Investigation and design

(2) Utilities

(3) Civil works (road)

(4) Civil works (rail)

(5) Testing and commissioning.

After further site investigation utilities are constructed first, predominantly at night under single lane closure. This will minimise disruption to the travelling public and adjoining residents.

Road and rail civil works will occur concurrently to reduce the duration of the overall construction period. Significant temporary pavement works will be required across the alignment to manage traffic whilst civil and rail works is under construction. A significant portion of the civil works will be constructed in day hours behind barriers, whilst construction through intersections will be at night.

Tallebudgera Creek and Currumbin Creek bridge construction has been proposed as working from a barge as the negative environmental impact from a pushed rock working platform will be significant.

Testing and commissioning will be approached in stages, starting from the north at Burleigh and working towards Coolangatta.

A construction program for the LRT Option has been prepared and can be viewed in the Cost Estimate Report at Appendix E: Design Development Report. Table 60 highlights the key durations from the construction program.

Table 60 LRT Option – Construction Program

Construction Phase	Duration
Mobilisation	2 weeks
Design	31 weeks
Construction (including inclement weather allowance)	200 weeks
Total inclement weather allowance in the construction duration	32 weeks
Total	**233 weeks**

5.3.2.2. Early works

With the significant PUP impacts, it would be recommended that the PUP relocations be undertaken as early works to the extent possible. As the design is developed, there may be the opportunity to construct offline infrastructure as early works, however, this will need to be investigated during the Business Case phase.

5.3.2.3. Preliminary project timeframes

To determine escalation allowance, it is necessary to develop a project delivery program. The project timeline used in preparing this estimate is presented in Table 61.

Table 61 LRT Option – Preliminary Project Timeframes

Stage	Start	Finish
Scoping	Ongoing	Q4 2022
Development	Q1 2023	Q2 2026
Delivery	Q3 2026	Q4 2030
Finalisation	Q1 2031	Q2 2031

5.3.3 Operations

5.3.3.1. Service frequency

The estimated light rail travel time in 2041 for the BH2C corridor is 30.2 minutes, based on the GCAMSE microsimulation model. Once complete, the total travel time for the entire GCLR system between Helensvale and Coolangatta will be approximately 92 minutes.

The LRT is proposed to operate as summarised below, consistent with the service frequency proposed for GCLR Stage 3.

- Weekday services:
  - 10 minute headways during early morning (5am-7am)
  - 7.5 minute headway during peaks (7am-7pm)
  - 15 minutes during evenings (7pm-12am)
  - No operations from 12am-5am (service replaced by 700 night bus).

- Weekend services:
  - 10 minute headway during early mornings and peaks (5am-7pm)
  - 15 minute headway during evenings (7pm-12am)
  - 30 minute headways during early mornings (12am-5am).

5.3.3.2. Provision for future extensions

A possible connection of the LRT to Elanora is indicated in the Gold Coast City Transport Strategy (2013). A dual track spur line connection from Thrower Drive Station to Elanora is likely to be feasible, and this option has been protected in the PE design. An assessment of the need for an Elanora spur line and the availability of a corridor was not undertaken as part of the PE design process. This may be undertaken at some future time and would include the possible need to interface with a proposed regional passenger rail station adjacent to the M1 at Guineas Creek Road, Elanora.

The concept design can also accommodate a future southern extension of the light rail at the Warner Street terminus in Coolangatta across the New South Wales border into Tweed Heads. The North Coast Regional Plan 2041 (New South Wales Department of Planning and Environment, 2022) states "In the future, the Gold Coast Light Rail could extend from the Gold Coast Airport into Tweed Heads and Tweed Heads South, changing the way people access jobs, education and services."

TfNSW has conducted planning studies for the future light rail extension (including the Tugun to Tweed Heads MMCS currently), however, there are currently no funding commitments for this project.

5.3.3.3. Public bus operations

A preliminary assessment of the proposed bus network services (including route and timetable changes) was undertaken for each project option to inform the concept designs (including provision for bus stops, interchanges, turnaround areas and driver facilities). The base case bus network for 2031 and 2041 assumes opening of the new infill regional passenger rail stations at Pimpama, Hope Island and Merrimac, and the opening of GCLR Stage 3 to Burleigh Head. Additional changes were then developed for all options, as described below, including improvements to both Queensland and New South Wales bus services.

The operational changes associated with each project option include:

- All project options:
  - Changes to the supporting bus networks (in terms of route and scheduling changes and total service kilometres) to inform the operational cost estimate
  - High-level assessment of the light rail/bus interchange facilities (including interchange locations and functional requirements terms of number of bus stops, layover facilities etc.) and bus turnaround areas to inform the concept design and cost estimate
  - Operational cost estimate to inform the economic appraisal.
- LRT Option only:
  - Functional requirements of the Coolangatta satellite depot and stabling yard including number of additional LRVs required for GCLR Stage 4.

The key changes proposed to the public transport network for the LRT Option (compared to the Base Case network i.e. post-GCLR Stage 3) include:

- GCLR network extended 13.4 kilometres from Burleigh Heads to Coolangatta with 14 new LRT stations including an Airport connection
- The 700 (day service) and 777 (which are the primary trunk routes servicing the project corridor) will be removed given the functions of these routes will be replaced by GCLR Stage 4. The 700 night bus will continue to operate in place of the LRT from 12am-5am
- The following east-west bus feeder services are proposed to be truncated at the Gold Coast Highway to remove duplication with GCLR Stage 4:

- Route 701 truncated at the Burleigh Heads LRT station
- Route 760, 771 and 773 truncated at the Thrower Drive LRT station (note 760 route is subject to further investigation in the Business Case stage including consideration options to retain the Airport connection)
- Route 768 and 774 truncated at Boyd Street LRT station (note 774 route is subject to further investigation in the BC phase including consideration options to retain the Coolangatta connection)
- Route 600 extended to the Warner Street LRT station, Coolangatta from the current Tweed Heads start/terminus.

The 600, 760 and the majority of feeder services are proposed to operate as high-frequency services (with a 15 minute or less headway) during peak periods.

Key light/rail bus interchanges are proposed at the following locations:

- Thrower Drive, Palm Beach – interchange with a bus turnaround area for east-west services and bus stop capacity for three buses (operating in a nose-to-tail arrangement). The bus station is proposed on Sarawak Avenue to consolidate interchanging services to a single location which improves legibility and amenity for the customers. Further consideration of layover areas and driver facilities will need to be undertaken during the Business Case Development stage, in consultation with TransLink.
- Toolona Street / Golden Four Drive, Tugun – interchange with bus stops on Golden Four Drive and bus stop capacity for 1-2 buses (to be confirmed).
- Boyd Street, Tugun - interchange with bus stops on Boyd Street and bus stop capacity for 1-2 buses (to be confirmed). A potential park 'n' ride site is also under consideration at this location, for further assessment during the Business Case Development stage. Further consideration of layover areas, driver facilities and alternative locations for bus turnaround will need to be undertaken during the Business Case Development stage, in consultation with TransLink.
- Gold Coast Airport – interchange with bus stops on a new access road (south of Terminal Drive / Tom Norris Road). The PE design includes two 90m long indented bus stops (provides capacity for 4-8 buses, depending on the proposed type of operation i.e. nose-to-tail or independent). However, further review/refinement of this interchange is required in subsequent phases based on outcomes from the Airport masterplan revision and confirmation of the preferred 760 route option, and potential consideration of layover and driver facilities.
- Warner Street, Coolangatta - interchange with the Warner Street (south of Chalk Street) bus stops with capacity for one bus. The Griffith Street bus stops are also located 130m walking distance to the Warner Street LRT Station for connections to the Route 601.

These interchanges will require further investigation during the Business Case stage pending the outcomes of other TMR planning studies (currently underway) and refinement of bus network changes for the LRT Option (including confirmation of the preferred routes for the 760 and 774). Further consultation with TransLink and the City is required to confirm the interchange facilities and functional requirements.

Burleigh Heads Station (south of Goodwin Terrace) is also a key LRT/bus interchange. However, this interchange is included in the GCLR Stage 3 scope and includes a bus turnaround area on the Gold Coast Highway (southbound) at the Brake Street intersection which is retained in all project options.

5.3.3.4. Traffic signal priority

LRVs are given priority at all traffic signals to prioritise public transport and minimise delays for passengers. This is typically provided through pre-emptive signal priority where LRVs are detected approaching the traffic signals (through detectors) and 'calls' the LRV priority phase at the downstream traffic signals to terminate the active (general traffic) signal phase and activate the light rail movement signal phase through the intersection to avoid (or minimise) delays for LRVs.

The traffic signal phasing to returns to normal operation once LRVs have safely cleared the intersection before the next signal phase commences (as per typical operational requirements). LRV drivers also have the ability to call the LRV priority phase (at downstream traffic signals) when departing the station. These arrangements have been optimised for operation of GCLR stages 1 and 2, and are shown to cause minimal disruption to traffic flows where a 7.5 minute headway is maintained for LRT operations.

5.4 Option 2 Dedicated Bus Lanes

Option 2: Dedicated bus lanes (DBL) aims to make better use of existing road infrastructure by providing priority lanes for buses. It includes:

- New dedicated 24-hour kerbside bus lanes on the Gold Coast Highway and Coolangatta Road (from Burleigh Heads to Miles Street Coolangatta)
- Two new separated 24-hour bus lanes through Lanham Park and Chalk Street Coolangatta
- Four general traffic lanes maintained on the Gold Coast Highway to Musgrave Street
- Two general traffic lanes along Coolangatta road to Miles Street
- No widening of Tallebudgera and Currumbin Creek bridges, with buses required to merge into general traffic at these locations
- Bus pre-emption to advance the green phase at traffic signals where feasible.

The key components of the Option 2: Dedicated Bus Lanes are shown in Table 62.

Table 62 DBL Components

Component	Description
System	New 24-hour bus lanes, mostly kerbside for the full length of the BH2C corridor utilised by standard route buses
Route length	13.4km
Stops	New bus stops, including premium bus stop infrastructure, to generally match the existing bus stop locations. 29 indented bus stops provided at key locations. 21 in line bus stops in corridor constrained locations.
Cross section	Two x 4 m wide kerbside 24 hour bus lanes and four general traffic lanes from Burleigh Heads to Musgrave Street, with bus lanes and two general traffic lanes from Musgrave Street to Miles Street Coolangatta. Two x 5 m wide new separated 24 hour bus lanes through the Lanham Park cutting and Chalk Street Coolangatta
Vehicles	No specific changes to the bus fleet are proposed as part of this option.
Vehicle size/length	12.5m standard bus vehicles
Depot location	No new depot infrastructure is required for this option
Key traffic interactions	29 signalised at grade intersections, including major intersections at Tallebudgera Avenue, Toolona Street, Thrower Drive, Boyd Street, and Musgrave Street
Indicative Property impacts	78 full property (lot) impacts, 237 partial property (lot) impacts
Bridges and structures	A new active transport bridge across Currumbin Creek is being investigated by TMR in a separate process, and is out-of-scope for the BH2C project

Component	Description
Active transport	Improved active transport provisions for the length of the corridor as recommended by the Active Transport Strategy
Power System	No specific changes to the bus fleet are proposed as part of this option.
Running time	An expected journey time of 30 minutes
Service hours	24/7

5.4.1 Design requirements and components

5.4.1.1. Project scope exclusions

The following exclusions are specific to DBL Option:

- Upgrades to the bus fleet (including electrification)
- New bridge crossings at Tallebudgera and Currumbin Creeks
- Consolidation or rationalisation of bus stops
- Full integration of the DBL design with the Option 1 LRT design as a potential 'interim' project.

5.4.1.2. Review and refinement of Project Option 2

The overall design approach of the DBL Option was developed using a similar methodology to the LRT Option. Figure 55 shows a flowchart of the design development process undertaken during the PE stage to develop the DBL Option including overarching activities.

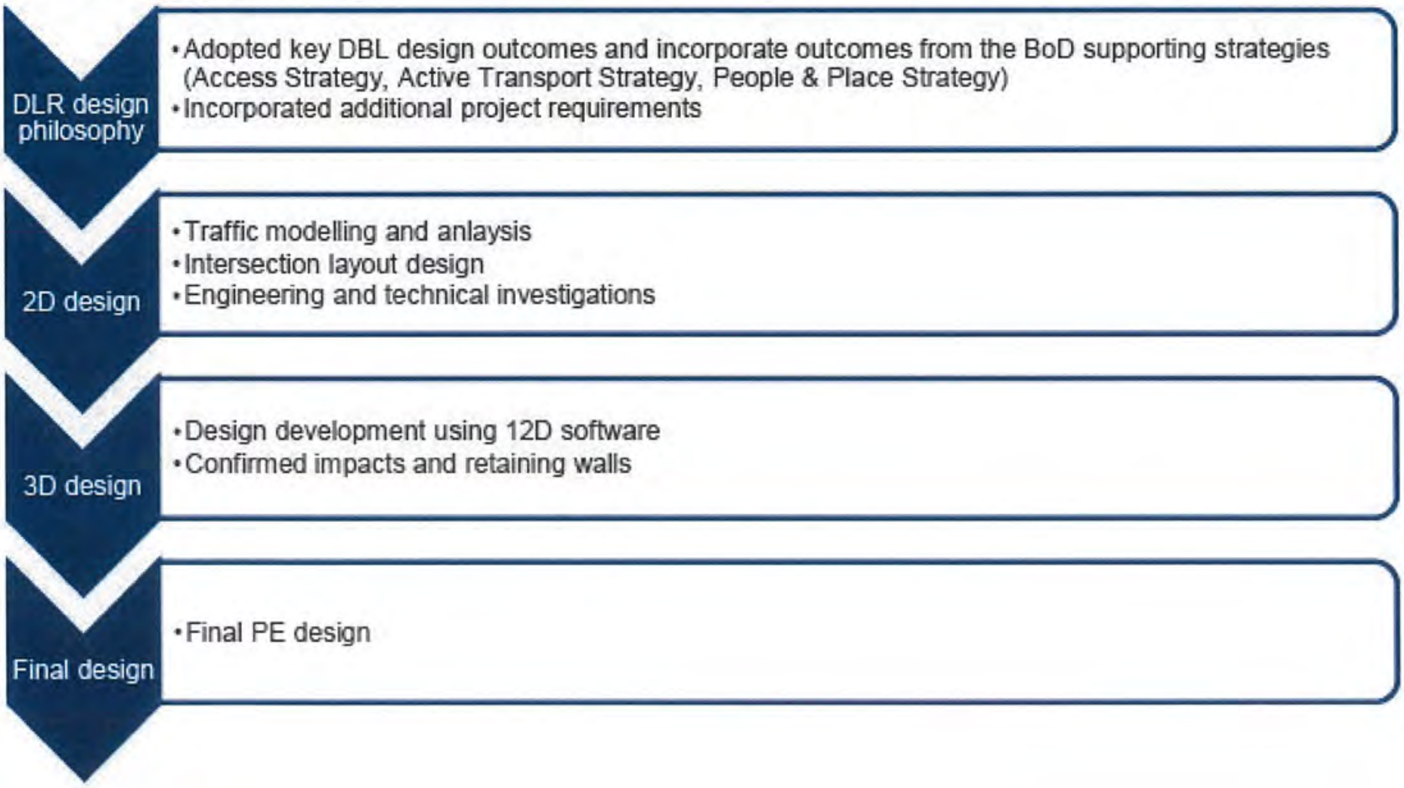


Figure 55 DBL Option – Design Development Methodology

5.4.2 Scope

5.4.2.1. Road Corridor Configuration

For the DBL Option, the following key design parameters shown in Table 63 were adopted for the general road corridor configuration.

Table 63 Key Road Design Parameters

	Applicable Design Standard	Comments
General Traffic Lanes	3.5m	Reduced to 3.3m for constrained areas and 3.1m EDD through Palm Beach
Footpath	2.0m nom	High pedestrian volumes 2.5m preferred width
Shared Path	3.0m	2.5m min
Active transport Path	3.0m	2.0m where one-way
On-Road Cycle Lane	1.5m	Through vehicle traffic speed = 60km/h

5.4.2.2. Design Elements Based on the LRT Design

The following design elements were incorporated into the DBL Option concept design based on the LRT Option concept design:

- Where road widening is required due to technical requirements of the DBL design, the design should widen to the side of the road in line with LRT Option, to support a future possible conversion to LRT
- The fauna bridge is to be included in the design due to similar impacts to Burleigh Hill
- Active Transport facilities will be similar to the LRT Option (i.e. off road cycleways and shared paths at Burleigh and Currumbin Hills) and will be included in the DBL design
- Similar provision for the Coolangatta Cycleway are to be included in the design
- Adopt a similar approach to the LRT design through the existing Lanham Park cutting by providing a separate section of two-way bus lanes.

The following items – which formed part of the LRT Option – are not required as part of the concept design for the DBL Option:

- Bus interchange at the Gold Coast Highway / Thrower Drive intersection as passengers on east-west bus routes are not required to interchange with a different transport mode to travel north-south along the Gold Coast Highway
- Reprioritisation the Gold Coast Highway at the Gold Coast Highway/Tugun Currumbin Road intersection
- Relocation of the Gold Coast Highway from Tugun to the Airport as the dedicated bus lanes can be accommodated on the highway by shoulder widening
- Additional interchange/ turn around areas within the Gold Coast Airport as there are already suitable bus facilities at this location.

5.4.2.3. Property requirements

Introduction of the DBL Option impacts some of the existing properties along the project corridor. Table 64 below highlights the number of full and partial property impacts.

Table 64 DBL Option – Property Impacts (excluding oceanway)

Segment	Full	Partial	Total
1 – Burleigh Heads	13	6	19
2 – Palm Beach	39	144	183
3 – Currumbin	19	15	34
4 – Tugun/Bilinga	2	1	3
5 – Coolangatta	5	2	7
Total	**78**	**168**	**246**

5.4.2.4. Car parking

Introduction of the DBL Option into the existing road corridor requires changes to the road configuration, resulting in impacts to on-street parking along the project corridor. A summary of the number of the existing parking bays impacted and required offsets is provided in Table 65. The responses to removal of car parking for Option 2 will be similar to that described above for Option 1.

Table 65 DBL Option – Car Parking Impacts

Segment	Existing	Residential	PWD	Commercial	Commercial loading zones	Recreational	Remaining
1 – Burleigh Heads	353	-107	-1	0	-2	-35	208
2 – Palm Beach	641	-354	0	-63	-6	-18	200
3 – Currumbin	122	-56	0	-54	0	0	12
4 – Tugun/Bilinga	250	-55	0	0	-1	0	194
5 – Coolangatta	708	-116	-8	-241	0	0	343
Total	**2,074**	**-688**	**-9**	**-358**	**-9**	**-53**	**957**

5.4.2.5. Stations / stops

Existing bus stop locations have generally been retained in their current location along the corridor, with some minor relocations closer to intersections or places of interest to increase patronage and reduce walking distances which generally have been accommodated in the design.

New bus stop facilities with a mix of indented bus bays at higher order stops (i.e. CBD areas or near key destinations such as schools) and in-line bus stops in other areas.

5.4.3 Construction activities

5.4.3.1. Constructability

A high-level construction methodology has been prepared based on the concept design. The approach typically involves the following four phases:

(1) Investigation and Design

(2) Utilities

(3) Civil works (road)

(4) Testing and commissioning.

After further site investigation utilities is constructed first, predominantly at night under single lane closure. This will minimise disruption to the travelling public and adjoining residents.

Significant temporary pavement works will be required across the alignment to manage traffic whilst civil works is under construction. A significant portion of the civil works will be constructed in day hours behind barriers, whilst construction through an intersection will be at night.

Construction of the Tallebudgera Creek Bridge has been priced working from a barge as negative environmental impact from a pushed rock working platform will be significant.

A construction program for the DBL Option has been prepared and can be viewed in the cost estimate report at Appendix E: Design Development Report. Table 66 highlights the key durations from the construction program.

Table 66 DBL Option – Construction Program

Construction Phase	Duration
Mobilisation	2 weeks
Design	52 weeks
Construction (including inclement weather allowance)	172 weeks
Total inclement weather allowance in the construction duration	28 weeks
Total	**205 weeks**

5.4.3.2. Early works

With the significant PUP impacts, it would be recommended that as much of the PUP relocations be undertaken as early works as possible. As the design is developed, there may be the opportunity to construct offline infrastructure as early works, however, this will need to be investigated during the Business Case Development stage.

5.4.3.3. Preliminary project timeframes

To determine escalation allowance, it is necessary to develop a project delivery program. The project timeline used in preparing this estimate is presented in Table 67 below.

Table 67 DBL Option – Preliminary Project Timeframes

Stage	Start	Finish
Scoping	Ongoing	Q4 2022

Stage	Start	Finish
Development	Q1 2023	Q2 2026
Delivery	Q3 2026	Q2 2030
Finalisation	Q3 2030	Q3 2030

5.4.4 Operations

5.4.4.1. Public Bus Operations

The Routes 700, 777 and 760 will continue to service the Gold Coast Highway as the primary high frequency trunk routes in the DBL Option, supported by a number of east-west local feeder routes. Route 700 operates between West Burleigh – Tweed Heads, while the 777 will continue to operate as an express service between West Burleigh – Airport. The 760 is the primary trunk route between Robina – Tweed Heads via the Airport. The routes 700, 765, 777 and 774 all provide a transfer opportunity to/from the existing GCLR at Burleigh Heads station.

A summary of the key changes proposed to the public transport network for the DBL Option (compared to the Base Case network) is provided below.

- Routes 700 and 760 realigned to remain on the Gold Coast Highway (using the dedicated bus lanes) between Tomewin Street, Currumbin and Coolangatta Road, Coolangatta. Currently, these services divert off the Gold Coast Highway to Golden Four Drive south of Tomewin Street
- Route 771 and 773 truncated at the Thrower Drive Bus Station (instead of First Avenue, Palm Beach)
- Route 768 truncated at the John Flynn Private Hospital, Tugun
- Route 600 extended from current Tweed Heads start/terminus to Griffith Street, Coolangatta (east of the Warner Street Bus Station) with higher frequency operations at a 7.5 minute headway
- All other routes are assumed to utilise the same alignment as the Base Case (with post GCLR Stage 3 changes – refer to the *Public Transport Assessment Report* at Appendix E: Design Development Report for further information).

The key trunk routes (600, 700, 777, 760) and east-west feeder services are proposed to operate as high-frequency services (with a 15 minute or less headway) during peak periods.

Key bus transfer opportunities occur at:

- Thrower Drive, Palm Beach
- Gold Coast Airport
- Warner Street, Coolangatta.

5.4.4.2. Traffic Signal Priority

It is assumed that all traffic signals on the project corridor will include traffic signal pre-emption for buses travelling in the dedicated bus lanes. This provides priority for buses at signalised intersections through provision of detectors (on the bus lane approaches) which are activated by the approaching bus and 'call' the bus priority signal phase (which is typically combined with the Gold Coast Highway through movement phase) to terminate the active signal phase. This process is subject to the minimum green times green and inter-green phase which are applied to maintain safe operations and are mainly defined by pedestrian protection crossing requirements.

It is noted that left-turning vehicles are legally permitted to enter bus lanes for up to 100 m when entering/exiting the road, under the Road Rules. At most intersections, dedicated left turn lanes have not been provided (due to the constrained road corridor), therefore, even with traffic signal pre-emption, buses are likely to experience delays from left turning traffic, particularly at intersections with high pedestrian activity.

The proposed bus queue jump on the Thrower Drive (west) approach to the Gold Coast Highway intersection will require a dedicated advanced green signal ("B-light") to ensure buses can safely turn left or right onto the Gold Coast Highway without conflicts with general traffic turning onto the highway from this approach.

5.4.4.3. Vehicles

It is intended that TransLink's standard 12.5m single axle buses are used. No specific upgrades to the current bus fleet are proposed as part of this option, however the design is compatible with potential fleet upgrades such as articulated buses, double decker buses and electrification of the bus fleet commencing in 2025.

5.5 Option 3 Enhanced Bus Provisions

Option 3: Enhanced bus provision is a low infrastructure option that focusses on improving the existing bus system. It takes the opportunity, where feasible and effective, to provide bus priority measures within the existing roadways. It includes:

- Bus service upgrades to improve the frequency and service span of the bus network that will exist following the opening of GCLR Stage 3
- Short sections of bus lane at key locations on the Gold Coast Highway (both directions) to improve bus efficiency and reliability including:
  - Tallebudgera Drive, Palm Beach
  - Nineteenth Avenue, Palm Beach
  - Palm Beach Avenue, Palm Beach
  - Thrower Drive, Palm Beach – plus a bus queue jump on the Thrower Drive (west) approach for buses turning left and right onto the Gold Coast Highway.

Additionally, some minor improvements to the existing bus stops and pedestrian access are included in the option. The EBP components are outlined in Table 68.

Table 68 EBP components

Component	Description
System	An upgrade of bus services supported by localised bus priority measures where effective and feasible
Route length	13.4 km
Stops	37 existing bus stops to remain 9 bus stops upgraded to premium stops and/or relocated to improve access.
Cross section	Two kerbside dedicated bus lanes (queue bypass lanes) with four lanes of general traffic at the approaches to selected intersections. All other areas are to match the existing road formation.
Vehicles	No specific changes to the bus fleet are proposed as part of this option.
Vehicle size/length	12.5m standard bus vehicles
Depot location	Nil

Component	Description
Key traffic interactions	4 bus queue bypass lanes at key intersections. Upgrade of 8 unsignalised intersections to signalised intersections to improve safety and pedestrian crossing opportunities. 1 signalised mid-block pedestrian crossing.
Indicative Property impacts	Nil
Bridges and structures	Nil
Active transport	Shared path upgrades near bus stops to improve connectivity and access. Improved cross-corridor connectivity with additional traffic signals provided at key intersections.
Power System	No specific changes to the bus fleet are proposed as part of this option.
Bus network	No change to the existing bus network
Running time	An expected journey time of 30 minutes
Service hours	No change to existing service hours

5.5.1 Design requirements and components

5.5.1.1. Project scope exclusions

The following exclusions are specific to the EBP Option.

- Upgrades to the bus fleet (including electrification)
- New bridge crossings
- Consolidation or rationalisation of bus stops.

5.5.1.2. Review and refinement of Project Option 3

The overall design approach of the EBP Option was developed using the methodology shown in Figure 56.

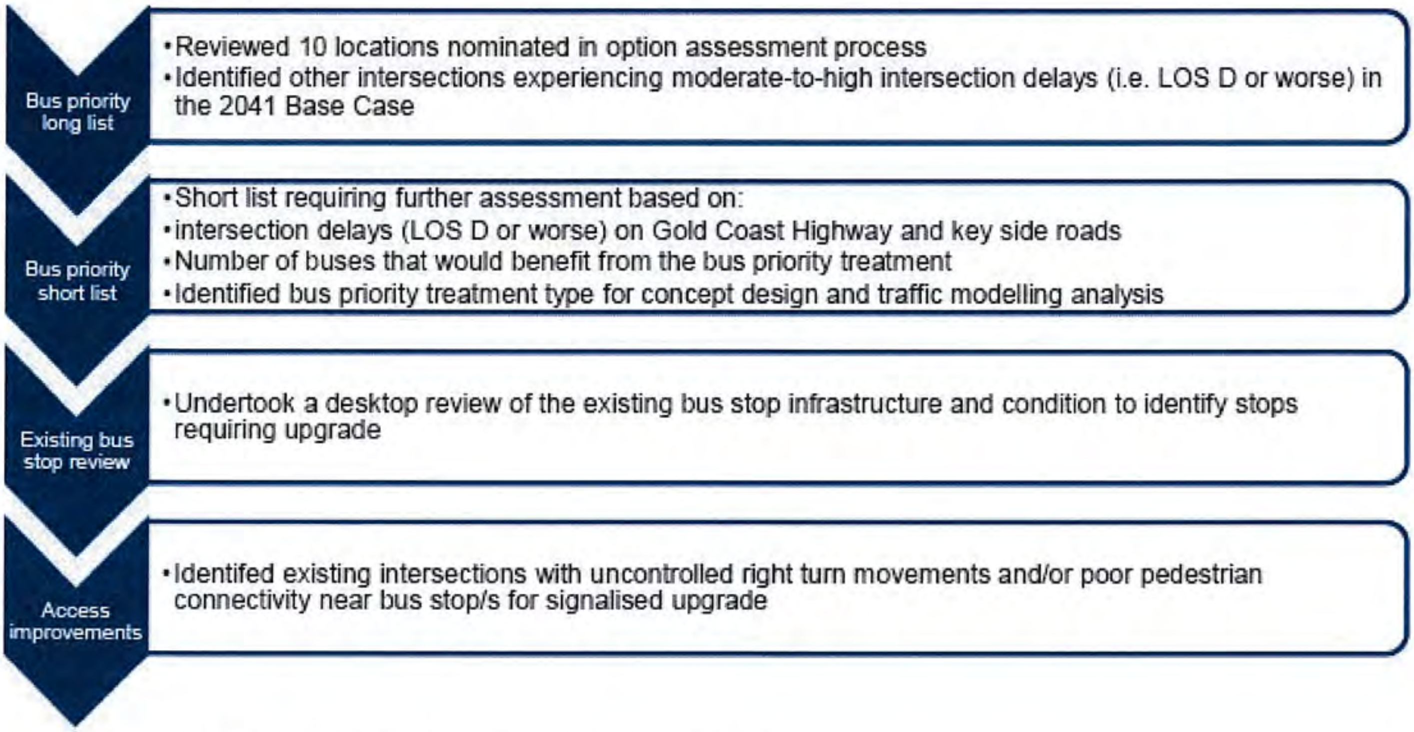


Figure 56 EBP Option – Design Development Methodology

The analysis recommended that bus priority treatments be investigated on the Gold Coast Highway at four Palm Beach intersections (Tallebudgera Drive, Nineteenth Avenue, Palm Beach Avenue and Thrower Drive), in addition to bus priority on the Thrower Drive (west) approach to the Gold Coast Highway intersection. These locations were progressed for design development including more detailed traffic modelling and technical investigations to refine the concept design.

5.5.2 Scope

5.5.2.1. Property requirements

The EBP Option does not impact any existing properties within the study area as all works are generally within the existing road carriageway.

5.5.2.2. Car parking

Introduction of Option 3 into the existing road corridors requires changes to the existing on street parking to provide space for the bus priority lanes. This has resulted in removal of a small number of the on-street parking provided. A summary of the number of the car park offset is provided in Table 69.

Table 69 EBP Option – EBP Car Parking Impacts

Segment	Existing	Residential	PWD	Commercial	Commercial loading zones	Recreational	Remaining
1 – Burleigh Heads	353	-15	0	0	0	-2	336
2 – Palm Beach	641	-63	0	-24	-3	-18	533
3 – Currumbin	122	0	0	-7	0	0	115
4 – Tugun/Bilinga	250	-2	0	-2	0	0	246

Segment	Existing	Residential	PWD	Commercial	Commercial loading zones	Recreational	Remaining
5 – Coolangatta	708	0	0	0	0	0	708
Total	**2,074**	**-80**	**0**	**-33**	**-3**	**-20**	**1,938**

5.5.2.3. Station / Stops

In the EBP Option, the existing bus stops are generally retained in their current locations with some minor upgrades to improve pedestrian accessibility in some locations.

5.5.3 Construction activities

5.5.3.1. Constructability

A high-level construction methodology has been prepared based on the concept design. Given the relative simplicity of the EBP option the general approach is to construct each individual site (intersection) sequentially.

A construction program for the EBP Option has been prepared and can be viewed at Appendix F: Cost estimate reports. Table 70 highlights the key durations from the construction program.

Table 70 EBP Option – Construction Program

Construction Phase	Duration
Mobilisation	2 weeks
Design	28 weeks
Construction (including inclement weather allowance)	82 weeks
Total inclement weather allowance in the construction duration	13 weeks
Total	**112 weeks**

5.5.3.2. Early works

Given the relative simplicity of the works associated with the EBP Option, early works are not required.

5.5.3.3. Preliminary project timeframes

To determine escalation allowance, it is necessary to develop a project delivery program. The project timeline used in preparing this estimate is presented in Table 71.

Table 71 EBP Option – Preliminary Project Timeframes

Stage	Start	Finish
Scoping	Ongoing	Q4 2022
Development	Q1 2023	Q2 2026
Delivery	Q3 2026	Q3 2028

Stage	Start	Finish
Finalisation	Q3 2028	Q3 2028

5.5.4 Operations

5.5.4.1. Public Bus Operations

A review of bus services in the base case was undertaken to improve service frequency, coverage and span where appropriate.

The Routes 700, 777 and 760 will continue to service the Gold Coast Highway as the primary high frequency trunk routes in the EBP Option, supported by a number of east-west local feeder routes. The Route 700 operates between West Burleigh – Tweed Heads, while the 777 will continue to operate as an express service between West Burleigh – Airport. The 760 is the primary trunk route between Robina – Tweed Heads via the Airport.

A summary of the key changes proposed to the public transport network for the EBP Option (compared to the Base Case network) is provided below. These changes mainly relate to minor adjustments to the scheduling (such as reduced headways and service window changes).

- Route 771 and 773 truncated at the Thrower Drive Bus Station (instead of First Avenue, Palm Beach, consistent with the DBL Option)
- Route 768 truncated at the John Flynn Private Hospital, Tugun (consistent with the DBL Option)
- Increased service windows proposed for the routes above
- All other routes are assumed to utilise the same alignment as the Base Case (with post GCLR Stage 3 changes – refer to the *Public Transport Assessment Report* for further information).

The key trunk routes (700, 777, 760, 600) are proposed to operate as high-frequency services in 2041 (with a 15 minute or less headway) during peak periods. While most of the east-west feeder routes (such as the Routes 768, 771, 772, 773 and 774) are proposed to operate on a 30-minute headway during the 2031 and 2041 peak periods.

Key bus interchanges may be justified at the following locations, however these were not designed and included in scope, as there are TMR planning studies in progress to develop these opportunities:

- Thrower Drive, Palm Beach – existing bus stops on Thrower Drive (south of Luzon Parade) with capacity for two buses, and on the Gold Coast Highway (south of Thrower Drive) with capacity for two buses. Opportunities could be explored in the Business Case stage to optimise interchanges between these stops including consideration of layover areas, bus turnaround provisions (on Thrower Drive) and driver facilities, in consultation with TransLink.
- Gold Coast Airport – interchange with bus stops on the Gold Coast Highway with capacity for two buses.

These interchanges will require further investigation during the Business Case stage pending the outcomes of other TMR planning studies (currently underway) and refinement of bus network changes for the LRT Option (including confirmation of the preferred routes for the 760 and 774). Further consultation with TransLink and the City is required in the BC phase to confirm the interchange facilities and functional requirements.

5.5.4.2. Traffic Signal Priority

It is assumed that all traffic signals on the project corridor will include traffic signal pre-emption for buses travelling in the bus lanes (similar to the DBL Option). This provides priority for buses at signalised intersections through provision of detectors (on the bus lane approaches) which are activated by the approaching bus and 'call' the bus priority signal phase (which is typically combined with the Gold Coast Highway through movement phase) to terminate the active signal phase. This process is subject to the minimum green times green and inter-green phase which are applied to maintain safe operations and are mainly defined by pedestrian protection crossing requirements. Refer to Section 5.4.4.2 for further information on the bus priority signal phasing at signalised intersections.

5.5.4.3. Vehicles

It is intended that TransLink's standard 12.5m and/or 14.5m single axle buses are used. No specific upgrades to the current bus fleet are proposed as part of this option. However, the design is compatible with potential fleet upgrades such as articulated buses, double decker buses and electrification of the bus fleet.

5.6 PE options project delivery environmental assessment

This section summarises the environmental assessment that was undertaken to make an early assessment of potential environmental risks and opportunities associated with the delivery phase of the project options. The purpose of the environmental assessment was to determine an overall environmental risk rating for each project option from a delivery stage perspective to identify and inform whether further environmental assessments are warranted as part of the pre-construction process.

5.6.1 Methodology

To determine levels of risk for each of the options being investigated through the PE, the risk levels as determined by TMR's Environmental Processes Manual, have been adapted to ensure they are consistent with the Department's descriptors for environmental risk. Table 72 provides a summary of what project characteristics are attributed to various risk levels. Table 73 outlines the key features of each option that may introduce an environmental impact, Table 74 identifies the risk per environmental factor based on these project option features with Table 75 discussing the potential impacts for each factor in the study area and the potential mitigations and approvals required based on this. An outline of environmental constraints along the study area (which assessed a corridor large enough to contain all options) is provided in this Environmental Scoping Report (ESR) at Appendix E: Design Development Report.

Table 72 Environmental risk rating descriptions

Environmental risk rating	Description
Negligible	Negligible environment risk is attributed to elements that do not require any assessment. The environment management requirements of MRTS51 and MRTS52 are not required as part of the Contract requirements.
Low	Low risk environmental elements do not need further environmental assessment as identified in the ESR. Site specific issues or legislative requirements needed to be managed are very few and minor in consequence. TMR's due diligence can be sufficiently addressed by incorporation of MRTS51 and MRTS52 and completed annexure within contract documentation.
Medium	Medium risk environmental elements require further environmental assessment as identified in the ESR. Medium Risk elements will generally have at least one site specific impact or legislative approval that needs to be managed through design or contract.
High	High risk environmental elements typically require further detailed environmental assessment as identified in the ESR and have many site-specific impacts, complex legislative approvals and have numerous design and contract considerations.

5.6.2 Identification of environmental impacts

A summary of the main features of each option which contribute to environmental risk is provided in Table 73.

Table 73 Identification of potential environmental impacts

Option	Potential environmental impacts
Option 1 LRT	• Construction of a new combined bridge over Tallebudgera Creek to accommodate proposed light rail and active transport which has the potential to impact habitat and water quality values in the creek and surrounding areas. • Residential property resumptions to accommodate new light rail stations along the Gold Coast Highway corridor which has the potential to increase noise impacts for some sensitive receivers. • Provision for fauna land bridge between Burleigh Head National Park and Burleigh Ridge Park, which is likely to require additional land to accommodate associated fauna infrastructure. • Vegetation impacts in environmentally sensitive areas (e.g. Burleigh Head National Park, areas of marine plants, Currumbin Hill Conservation Park and Flat Rock Creek). Partial (minor) resumption of Burleigh Head National Park which is likely to require a revocation of the national park, involving a lengthy approvals process and may require the provision of environmental offsets. • Construction of a new combined bridge over Tallebudgera Creek to accommodate proposed light rail and active transport which has the potential to impact habitat and water quality values in the creek and surrounding areas. • Separated light rail and active transport bridge over Currumbin Creek which has the potential to impact on habitat values within the creek and surrounding land. • Partial resumption of Golden Four Park to accommodate active transport, which reduces the area of the park available for community use and has the potential to impact on local amenity. • Impacts to Gold Coast Airport land to accommodate proposed light rail alignment and associated stations, which is located on Commonwealth land and is likely to trigger approval under Commonwealth legislation. • Impacts to local road networks south of Gold Coast Airport and greenspace adjacent to Gordon Road, which has the potential to increase amenity impacts to sensitive receivers and reduce recreational areas for the local community.
Option 2 DBL	• Partial (minor) resumption of Burleigh Head National Park which is likely to require a revocation of the national park, involving a lengthy approvals process and may require the provision of environmental offsets. • Provision for fauna land bridge between Burleigh Head National Park and Burleigh Ridge Park, which is likely to require additional land to accommodate associated fauna infrastructure. • Minor vegetation impacts in environmentally sensitive areas (Burleigh Head, areas of marine plants, Currumbin Hill Conservation Park and Flat Rock Creek) • Active transport bridge over Currumbin Creek which has the potential to impact on habitat values within the creek and surrounding land. • Partial resumption of Golden Four Park to accommodate minor widening for bus lanes, which reduces the area of the park available for community use and has the potential to impact on local amenity. • Impacts to local road networks south of Coolangatta Airport and greenspace adjacent to Gordon Road, which has the potential to increase amenity impacts to sensitive receivers and reduce recreational areas for the local community.
Option 3 EBP	• Provision of bus priority measures at key intersections, which has the potential to impact on noise, vibration and public amenity for sensitive receivers.

Option	Potential environmental impacts
	• Upgrade of existing bus stops to intermediate/premium bus stops within the existing road corridor, which has the potential to impact on noise, vibration and public amenity for sensitive receivers.

5.6.3 Environmental risk assessment

Based on the expected scope of each option, risk ratings have been assigned to each environmental element outlined in Table 74. Options 1 and 2 involve significant infrastructure works, and therefore have high potential environmental impacts and risks. They may also require revocation of minor areas of Burleigh Heads National Park. The potential project impacts for each factor are further described in Table 75, with the risk ratings based on the likely level of impact of each option on these identified potential issues or considerations.

Table 74 Environmental risk assessment ratings

Environmental factor	Potential environmental impacts		
	Option 1 LRT	Option 2 DLR	Option 3 EBP
Water quality	High	High	Low
Soil and land	High	High	Low
Biodiversity/Flora	High	High	Low
Biodiversity/Fauna	High	High	Low
Cultural heritage	High	Medium	Low
Noise, vibration, air quality and public amenity (construction)	High	High	Medium
Noise, vibration, air quality and public amenity (operation)	High	Medium	Medium
Development Approvals	High	High	Low
Offsets	High	High	Low

5.6.4 Potential environmental issues and recommendations

Table 75 outlines the potential environmental impacts and issues across the options by each of the categories, the potential mitigations and further assessment required in the Business Case stage and the likely approvals required.

Table 75 Potential environmental issues and recommendations

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
Water quality – Erosion and sedimentation			
The study area traverses a number of watercourses (both marine and freshwater). All options have potential to impact water quality during construction and operation.	A concept Erosion and Sediment Control Plan (ESCP) should be developed during planning and design as well as a detailed hydraulic assessment (MUSIC modelling) of expected impacts from new infrastructure to manage operational water quality impacts. Principle's detailed in the TMR Road Drainage Design manual should also be incorporated where possible into the preferred option design.	**Unlikely** Environmentally relevant activity 16 (Extractive and screening activities) is not expected to be triggered as culvert extensions, in-stream works and extraction via borrow pits are not anticipated for the current scope of works. Further, ERA16 does not apply to the construction of road infrastructure under the Environmental Protection Regulation 2019, Schedule 2, Part 4, Section 16 2(c). Compliance with the water quality objectives within the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP Water and Wetland Biodiversity) for Tallebudgera and Currumbin Creek is required. Review of contractor ESCP will be required as part of suitability assessment of the Construction Environmental Management Plan.	Statutory timeframe of 55 business days associated with a project-specific EA application. Further time required (up to 6 months is permitted) in the instance that additional information is requested, plus permit preparation time of approximately one month. ***Lead time – 10 to 12 months***
The study area includes a number of Matters of State Environmental Significance (MSES) wetlands and groundwater dependent	Hydrological modelling is required to model the impacts to wetlands and associated GDEs.	**Potential** MSES wetlands within the study area may trigger offsets under the *Environmental Offsets Act 2014* if the outcome of the SRI	Code Assessable - Development Assessment timeframes apply Three to four months excluding any information requests, plus pre- lodgement meetings with the

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
ecosystems (GDE) that either intersect or are proximate to the expected alignment.	A significant residual impact assessment (SRI) will be required to assess whether offsets are triggered by impacts to listed wetland areas by the preferred option.	assessment deems there to be a residual impact caused by the preferred option.	regulator and the preparation and supporting information. ***Lead time – 12 months however if land based offsets are required, this time may be extended***
Parts of the study area fall within mapped Coastal Management Districts (CMD)	The preferred option will need to be assessed against mapped tidal limits and CMDs within the study area to determine appropriate mitigation measures and development approvals (DA)	**Yes** Works within tidal areas and CMDs will trigger the following DAs for: • Operational Work (Prescribed Tidal Works) • Interfering with quarry material within a CMD	Code Assessable (development approval) Three to four months excluding any information requests, plus pre- lodgement meetings with the regulator and the preparation and supporting information. ***Lead time – 12 months***
Acid Sulfate Soils (ASS)			
The study area contains sections which are likely to contain ASS, including: • Tallebudgera Creek • Currumbin Creek • Flat Rock Creek • Coolangatta Creek drainage outlet (near Winston Street).	Site Investigations are recommended to confirm the presence and extent of ASS in high-risk locations	**No** No formal approval is required; however, an ASS management plan is required for areas where site investigation has confirmed ASS and potential ASS. The ASS sampling and subsequent management plan (if required) is to be developed in accordance with Queensland Acid Sulfate Soil Technical Manual (QASSIT)	***Lead time – 2 to 3 months***

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
Contaminated land			
The study area contains numerous contaminated lots listed on the Environmental Management Register (EMR). The study area contains sites which are deemed high risk for Per- and Poly-fluoroalkyl Substances (PFAS), including: • Bilinga Fire and Rescue Station • Tweed Heads Fire Station • Eloy Water Australia, sewage treatment plant • Gold Coast Airport	A preliminary site investigation is required to determine if contaminated soil/PFAS is present and requires management and/or removal from registered EMR lots/high risk PFAS sources. Given the potentially significant implications of PFAS or other contaminants on project delivery timeframes and cost, it is recommended that further investigations be carried out within the Business Case phase of the Project	**To be determined** If contaminated soil/material is removed from a lot registered on the EMR it must be moved to a registered facility under a soil disposal permit	10 – 15 business days Four weeks plus permit preparation (approximately 1 month). ***Lead time – 2 to 3 months***
Flora			
The study area is likely to contain threatened flora species protected under State and Commonwealth law.	Ecological investigations (including formal protected plant flora surveys within 12 months of works commencing) are required under the *Nature Conservation Act 1992* to confirm the presence of	**To be determined** Depending on threatened species identified within the project footprint (upon selection of a preferred option) various permits may be required. Potential permits required include:	**Protected Plants Permit** 40 business days Two months plus permit preparation, approximately one month. Lead time – 3 to 4 months

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
High risk areas expected to contain threatened species are: • Tallebudgera Creek (Burleigh Ridge Park, Burleigh Head National Park) • Currumbin Creek (Tarrabora Reserve, Kandra Reserve, Currumbin Hill Conservation Park) • Flat Rock Creek (Alex Griffiths Park).	threatened flora species once a preferred option is selected and impact areas are confirmed. If required, assessment under *the Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).	• EPBC Act referral / approval • Protected plants clearing permit.	**EPBC referral** Following receipt of a valid referral, the Minister will make a decision on whether the proposal triggers matters protected under the EPBC Act within 20 business days. Lead time – 3 to 6 months **EPBC approval** If the Project receives a 'controlled action' decision from Department of Climate Change, Energy, the Environment and Water (DCCEEW), the approval may take 12 to 18 months depending on the type of additional surveys required to be undertaken, to carry out assessment, prepare reports and submit for approval. ***Lead time – Up to two years from submission.*** Additional time required to prepare the application and carry out any pre-application environmental surveys (seasonal investigations, etc). (approximate four months).
State and local biodiversity corridors intersect the study area at the following locations: • Tallebudgera Creek • Currumbin Creek.	Project planning and design phases should consider these corridors and ensure connectivity is maintained or improved (where possible).	**No** No formal approval is attached to development around these environmental constraints however, maintenance and/or improvement to fauna connectivity is likely to be a consideration for any subsequent EPBC Act referral process.	***Lead time - as per input into EPBC referral and approval.***

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
Fauna			
The study area is likely to contain threatened fauna species protected under State and Commonwealth law. High risk areas expected to contain threatened species are: • Tallebudgera Creek (Burleigh Ridge Park, Burleigh Head National Park) • Currumbin Creek (Tarrabora Reserve, Kandra Reserve, Currumbin Hill Conservation Park) • Flat Rock Creek (Alex Griffiths Park).	Ecological investigations (including formal significant impact assessment) under the *Nature Conservation Act 1992* and EPBC Act are required to confirm the presence and likely impacts to threatened fauna species once a preferred option is selected and impact areas are confirmed. If required, assessment under the EPBC Act.	**To be determined** Depending on threatened species identified within the project footprint of the preferred option and outcomes of a significant impact assessment (upon selection of a preferred option) referral and assessment under the EPBC Act may be required.	**EPBC referral** Following receipt of a valid referral, the Minister will make a decision on whether the proposal triggers matters protected under the EPBC Act within 20 business days. Lead time – 3 to 6 months **EPBC approval** If the Project receives a 'controlled action' decision from DCCEEW, the approval may take 12 to 18 months depending on the type of additional surveys required to be undertaken, to carry out assessment, prepare reports and submit for approval. ***Lead time – Up to two years from submission.*** Additional time required to prepare the application (approximate four months)
The study area impacts mapped koala habitat under both current and repealed State legislation attached to TMR's Memorandum of Agreement (MOA).	Impacts to koala habitat will need to be quantified under both current and MOA-related legislation to understand TMR's offset liabilities and likelihood for triggering a referral and assessment under the EPBC Act.	**To be determined** Impacts to koala habitat will need to be quantified to understand TMR's likelihood for triggering a referral under the EPBC Act.	**EPBC self- assessment** Undertake self-assessment of impacts to MNES to determine if the Project is likely to have a significant impact and will need to refer the Project. Lead time – 1 to 2 months **EPBC referral** Following receipt of a valid referral, the Minister will make a decision on whether the proposal triggers

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
			matters protected under the EPBC Act within 20 business days. Lead time – 3 to 4 months **EPBC approval** If the Project receives a 'controlled action' decision from DCCEEW, the approval may take 12 to 18 months depending on the type of additional surveys required to be undertaken, to carry out assessment, prepare reports and submit for approval. ***Lead time – Up to two years from submission.*** Additional time required to prepare the application (approximate four months)
There are two Fish Habitat Areas (FHAs) proximate to the study area. Of greatest concern is one in Currumbin Creek immediately adjacent to the Gold Coast Highway.	Ensure planning and design phases aim to avoid the mapped FHAs. Fish passage must be provided for all mapped Fisheries waterways and must comply with the Accepted Development Requirements for Waterway barrier works.	**Possible** If FHAs cannot be avoided a development approval for Operational work completely or partly in a declared FHA will be required unless the work is accepted development.	Code Assessable - Development Assessment timeframes apply Three to four months excluding any information requests, plus pre- lodgement meetings with the regulator and the preparation and supporting information. ***Lead time – 12 months however if land-based offsets are required, this time may be extended***
Cultural Heritage			
Desktop assessments undertaken by Jabree Limited and TMR identified a number of Indigenous	An updated Cultural Heritage Risk Assessment (CHRA) for the study area has been undertaken (see Appendix E: Design Development Report). It	**Likely** The presence of Indigenous and historic heritage values along the corridor suggests that consultation with Traditional Owner	Negotiation with the Jabree People and development of a Cultural Heritage Management Agreement (CHMA). A Cultural Heritage Management Plan may

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
and historic heritage values along the study area.	is recommended that further survey and consultation with the following parties regarding the Project be undertaken: • Jabree / Danggan Balun People • City of the Gold Coast Council • Queensland Parks and Wildlife Service (QPWS).	groups (Jabree / Danggan Balun People) will be required once impacts associated with the preferred alignment are confirmed. A Cultural Heritage Management Plan may be required depending on impact areas and powers contained in existing MOU with Jabree Limited	be required depending on impact areas and powers contained in existing MOU with Jabree Limited Lead time (if required) - up to six months A range of consultation is required with the City of Gold Coast and QPWS regarding historical heritage places of significance prior to any works being conducted. ***Lead time up to six months***
Noise and vibration			
There are numerous sensitive receptors located within the study area. These include both anthropogenic and natural receivers including: • Residential areas • Recreational areas • Educational facilities • Health care facilities • Marine fauna.	Upon selection of a preferred option and alignment, a preconstruction road traffic noise assessment (RTNA) in accordance with the TMR Noise Code of Practice Vol 1 and screening assessment in accordance with the TMR Noise Code of Practice Vol 2 is recommended to be undertaken. Additional screening and assessment of impacts to marine fauna is also recommended as part of the above assessments.	**No** Outcomes of the RTNA and screening assessment will be utilised to inform design of barriers and their locations while the screening assessment will inform the requirement or a noise and vibration management plan during construction phases of the project. Similarly, additional marine fauna noise investigations will be utilised to inform monitoring and management requirements in the construction phase.	***Lead time – 3 to 4 months***

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
Air quality			
Numerous sensitive receptors located within the study area. These include both anthropogenic and natural receivers including: • Residential areas • Recreational areas • Educational facilities • Health care facilities • Terrestrial fauna and habitats	Upon selection of a preferred option and alignment, a quantitative assessment of likely air quality impacts against the TMR Road Traffic Air Quality Management Manual 2014 is recommended.	**No** Outcomes of the assessment will identify appropriate mitigation measures and/or treatments to be considered to manage expected construction and operational air quality impacts from the project.	***Lead time 3- 4 months***
Native title and land tenure			
There are locations within the study area which have land tenure that may require Native Title to be extinguished	Ensure TMR's Native Title Unit (NTU) is engaged to assess the preferred option and expected land requirements. Native Title is to be extinguished where required.	**Possible** TMR NTU to undertake 24KA application to extinguish Native Title under the *Native Title Act 1993* (Cth) for the project where required.	Standard notification period is 30 business days, plus assessment and submission preparation (approximately four weeks) ***Lead time – Two and a half months***
Offsets			
The project is likely to impact Commonwealth and State threatened species through clearing of mapped habitat. This has the	Undertake a significant impact assessment (SIA) for expected impacts to Matters of National	**Likely** Offsets may be required (pending the outcomes of SIA and SRI assessments).	***Lead time – 12 months however if land-based offsets are required, this time may be extended***

Potential impact/opportunity	Recommended mitigation/further assessment	Potential approvals	Timeframes
potential to trigger offsets under both Commonwealth and State legislation.	Environmental Significance (MNES) under the EPBC Act. Undertake a significant residual impact (SRI) assessment for expected impacts to Matters of State Environmental Significance (MSES).		

5.6.5 Recommended further studies

The outcome of the environmental assessment is that the study area is considered high risk for impacts to identified environmental constraints. Regardless of the preferred option, there are enough high-risk constraints within the area assessed to suggest any works within the alignment will require further detailed site investigations. The number of investigations and likely approvals will however be dependent on the option selected.

The recommended further investigations detailed are based on a worst-case scenario associated with the largest scope of works identified in the LRT option concept design.

Table 76 Recommended further studies

Factor	Recommended further studies
Water	• A concept ESCP should be developed during Business Case phase once a preferred option has been selected • Detailed hydraulic assessment (MUSIC modelling) of expected impacts from new infrastructure to manage operational water quality impacts. Principals detailed in the TMR Road Drainage Design manual should also be incorporated where possible into the preferred option design • Hydrological modelling is required to model the impacts to wetlands and associated GDEs • The preferred option will need to be assessed against mapped tidal limits and CMDs within the study area to determine appropriate mitigation measures and development approvals (DA)
Soil	• Site investigations in accordance with QASSIT guidelines are recommended to confirm the presence of ASS in high-risk locations • A preliminary site investigation is required to determine if contaminated soil/PFAS is present and requires removal from registered EMR lots/high risk PFAS sources
Flora	• Ecological investigations (including formal protected plant flora surveys) are required to confirm the presence of threatened flora species once a preferred option is selected and impact areas are confirmed • Project planning and design phases should consider mapped biodiversity corridors and ensure connectivity is maintained or improved (where possible)
Fauna	• Ecological investigations (including formal protected plant flora surveys) are required to confirm eh presence of threatened flora species once a preferred option is selected and impact areas are confirmed • Project planning and design phases should consider mapped biodiversity corridors and ensure connectivity is maintained or improved (where possible)
Cultural Heritage	• TMR to consult with the Aboriginal Parties to survey and develop mitigation measures prior to any construction activities • Consult with QPWS regarding impacts to the Burleigh Head National Park • Consult with DES regarding impact to state listed infrastructure and obtain an Exemption Certificate where required • Consult with Gold Coast City Council regarding impact to local heritage places • Consult with Gold Coast City Council and family members regarding relocation of TMR listed site Betty Derrick Memorial

Factor	Recommended further studies
Noise and vibration	• Upon selection of a preferred option and alignment, a pre-construction road traffic noise assessment (RTNA) in accordance with the TMR Noise Code of Practice Vol 1 and screening assessment in accordance with the TMR Noise Code of Practice (Vol 2) is recommended to be undertaken • Additional screening and modelling of impacts to marine fauna is also recommended as part of the above assessments
Air quality	• Further qualitative assessment of construction phase air emissions for the preferred option is required in order to recommend mitigation measures and identify requirements for air quality monitoring during the construction phase • Undertake further quantitative detailed assessment of road traffic on the Gold Coast Highway for Segment 4 and Segment 5 if the light rail option is progressed • Undertake detailed quantitative air quality assessment for the dedicated bus lane option if the peak hourly bus volume is expected to exceed 80 buses per hour, or if daily volumes are expected to exceed 400 buses per day. Confirm the scope of assessment if low emission buses are likely to be used • Confirm the requirement for further assessment for the enhancement to bus provisions
Native Title	• Ensure TMR's Native Title Unit (NTU) is engaged to assess the preferred option and expected land requirements • Native Title is to be extinguished where required
Offsets	• Undertake a significant impact assessment (SIA) for expected impacts to Matters of National Environmental Significance (MNES) • Undertake a significant residual impact (SRI) assessment for expected impacts to Matters of State Environmental Significance (MSES)

5.6.6 Conclusion

Overall, the Project has been assessed as having an environment and cultural heritage risk of HIGH. Given the significant infrastructure works required under Options 1 and 2 they have the greatest potential environmental impact, and therefore associated risk, with Option 1 having the highest risk. Option 3 has only moderate levels of infrastructure being built and therefore overall presents a relatively low level of risk from an environmental perspective.

Field assessments and/or survey of specific environment or heritage issue/s will be required during the Business Case stage to further understand the risk of the preferred option/s and enable a more detailed consideration of impacts, risks and potential approval pathways. Appendix E: Design Development Report details the further assessments and studies recommended as part of the Project's environmental assessment and management to be undertaken in the Business Case, or subsequent stages, as appropriate. As outlined in Table 75, these investigations and approvals have extensive lead times. If LRT is the preferred option, an EPBC Referral will require 2-3 years potentially from submission. This approval would need to be secured before construction could commence and depending on the contract type before procurement. This has potential implications for the Project delivery timeframe that should be confirmed in the Business Case stage, with potential environmental approvals and key studies needing to be submitted by 2024-25 to enable delivery timeframes to be met.

6. Risk analysis and cost estimate

This chapter reports on the outcomes of the preliminary cost estimate and risk analysis and quantification impacting on each of the project options under consideration. This chapter is supported by the Risk Assessment Report at Appendix E: Design Development Report and the Cost Estimate Report at Appendix F: Cost estimate reports. This chapter details the estimating process, key assumptions, inputs, and findings, including:

- Risk analysis
- Capital cost estimate
- Operating cost estimate
- Conclusions.

6.1 Risk analysis

6.1.1 Methodology and approach

A risk analysis process was undertaken to establish, identify, assess, treat, monitor and review risks associated with the project options. TMR defines program and project risk as 'the effect of uncertainty on the program or project objectives'. AS/NZS 31000 2018 defines risk management as 'the architecture (principles, framework and processes) for managing risk efficiently'.

The risk analysis for the project options was undertaken following the processes and requirements set out in TMR's Project Cost Estimating Manual (PCEM) and AS/NZS 31000 2018 Risk Management. TMR's Risk Management Practice Guides address the specific risk requirements at a project level. The TMR risk management process provides the minimum requirement for risk management and a common language for use across TMR.

The risk management process is divided into five key steps as shown in Figure 57:

(1) Communication and Consultation

(2) Planning for Risk Management / Establish the Context

(3) Risk Assessment:

(4) Risk identification

(5) Risk analysis

(6) Risk evaluation

(7) Risk Treatment.

(8) Monitoring and Review.

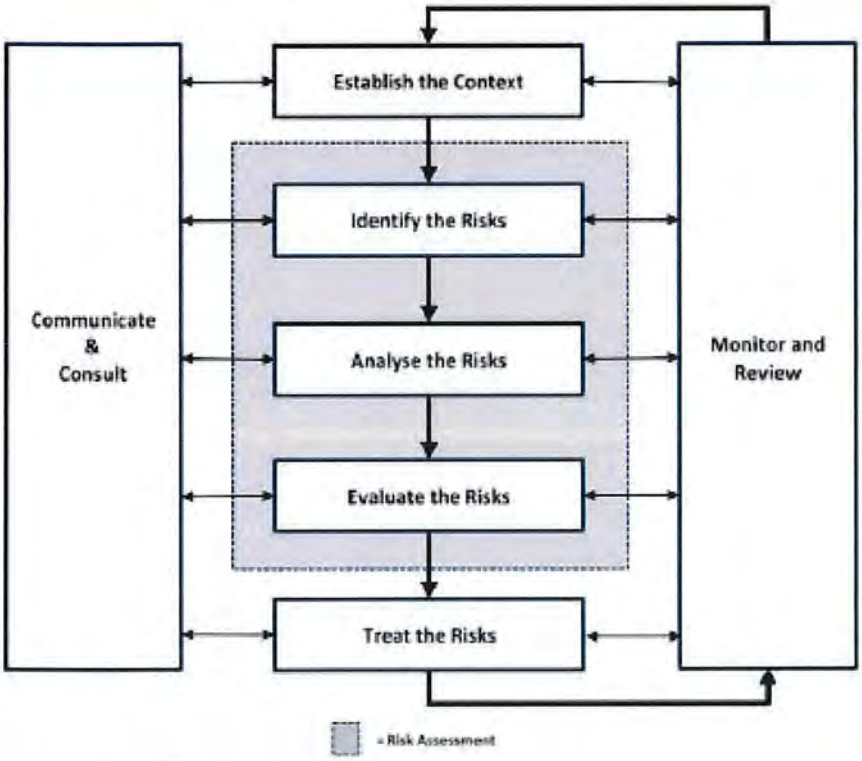


Figure 57 TMR Risk Management Process

6.1.2 Risk identification

The risk identification process involved determining which risks might affect the project options, documenting their characteristics and preparing for their successful management.

TMR's Risk Context Profiling (RCP) tool was used, following the TMR Engineering Policy 153 Risk Context Profiles, to identify the main areas of high risk for the project that require further investigations in the PE. Initially, RCPs were completed for Option 1 to attain a better understanding of the risk context as the highest risk project option. The TMR RCP tool consists of 10 project risk categories, including:

(1) Geotechnical

(2) Environmental, Cultural heritage etc.

(3) Vulnerable Road Users

(4) Stakeholders

(5) Procurement

(6) Project management

(7) Safety and Wellbeing

(8) Contract Administration

(9) Construction

(10)Finalisation.

The risk rating for each of the RCP categories is based on a percentage of the scores given to each item within the category. The level of risk ('low', 'medium', 'high') is divided into the following bands:

(1) Low Risk: 0% to ≤45%

(2) Moderate Risk: >45% to ≤60%

(3) High Risk: >60% to 100%.

The aggregate RCP scores for the preferred alignment for Option 1, resulting from the RCP review and risk workshops are presented in Table 77 and Figure 58.

Table 77 Ranked Risk Context Profile (RCP) Score

Rank		Key Risk Category		RCP Rating		Number of Risk Areas	
				Extreme	High	Moderate	Low
1	Environmental, Cultural heritage	81%	High	3	7	1	0
3	Stakeholders	81%	High	2	6	1	0
6	Project Management	78%	Moderate	0	5	0	0
2	Geotechnical	73%	Moderate	2	2	3	0
4	Construction	73%	Moderate	0	7	2	0
10	Vulnerable Road Users	70%	Moderate	1	3	4	0
9	Safety and Wellbeing	67%	Moderate	0	3	6	0
8	Procurement	64%	Moderate	0	2	3	0
7	Contract Administration	62%	Moderate	0	1	8	0
5	Finalisation	60%	Low	0	1	4	0
		Total		**8**	**37**	**32**	**0**

Figure 58 Risk Context Profile Summary

The RCP for Option 1, including the detailed scoring for each risk area, is provided in Appendix E: Design Development Report. The RCP informed the development of the project Risk Register which included a range of risk items.

6.1.3 Risk rating

The identified risk items were assessed based on the TMR Risk Assessment and Ratings Matrix (RARM). The risk items were considered against the following risk dimensions:

- Workplace Health and Safety
- Time or schedule delay
- Legal and Compliance
- Assets Operations and Services
- Performance and Capability
- Historical and Indigenous Heritage
- Environmental
- Media and Reputation
- Financial.

Each identified risk was revised to assess its significance to the project options. The approach was to determine the likelihood of the risk occurring, and the consequence if it does, and then to use those scores to determine an overall rating for the risk. The likelihood and consequence ratings were based on the criteria outlined in Table 78 and Table 79, respectively, to ensure a consistent and effective assessment.

Table 78 **Likelihood criteria**

Likelihood	Qualitative statement	The probability that an event will occur
Rare	This event may have happened previously in TMR/the City or "like" organisations. Not expected to occur in TMR/the City in the foreseeable future.	<5%
Unlikely	This event has occurred previously in TMR/the City or "like" organisations. Occurrence in TMR/the City would be considered highly unusual.	6%-30%
Possible	This event may have occurred previously in TMR/the City or "like" organisations. The distinct possibility of occurrence.	31%-60%
Likely	This event may have occurred in TMR/the City or "like" organisations regularly. Occurrence within the financial year.	61%-90%
Almost certain	This event occurs frequently within TMR/the City.	>91%

Table 79 **Consequence criteria**

Consequence Levels	Severe	Major	Moderate	Minor
Description	A risk event that, if it occurs, will have a severe impact, on achieving desired results, to the extent that one or more of its critical outcomes objectives will not be achieved.	A risk event that, if it occurs, will have a major impact, on achieving desired results, to the extent that one or more stated outcome objectives will fall below acceptable levels.	A risk event that, if it occurs, will have a moderate impact, on achieving desired results, to the extent that one or more stated outcome objectives will fall well below goals but above minimum acceptable levels.	A risk event that, if it occurs, will have a minor impact, on achieving desired results, to the extent that one or more stated outcome objectives will fall below or well below goals but above minimum acceptable levels.

Risks were then rated using the matrix proposed by TMR's Guidelines (as seen in Figure 59), noting that the Workplace Health and Safety Rare/Severe is rated High.

	Rare	Unlikely	Possible	Likely	Almost Certain
Severe	Medium	High	High	Extreme	Extreme
Major	Medium	Medium	High	High	Extreme
Moderate	Low	Medium	Medium	High	High
Minor	Low	Low	Medium	Medium	Medium
Insignificant	Low	Low	Low	Medium	Medium

Figure 59 **Risk Rating Matrix**

The risk rating process was confirmed in two risk workshops on 16 June 2022 and 14 December 2022 with the project team. The purpose of the workshops was to review and agree on the risk rating for each category in the RCP, and to discuss the 'high' rated risks for each of the disciplines. New risks were raised, while other risks were reviewed, and updated.

Following the risk workshops, and RCP completion, the project risk register was updated. The scope of each risk was expanded to include the cause of the risk, the impact of the risk on the project, the controls applied to the risk and the proposed treatment options to reduce the risk rating. The Project risk register was reviewed and updated on an ongoing basis.

Based on the high-risk RCP areas, 36 project-specific risks were identified during the PE phase through workshops and discussions with key stakeholders. Table 80 summarises the project risk ratings across the 36 active risks, before, and post, mitigation. The extreme risks identified relate to geotechnical, contaminated land and stakeholder issues. The current risk register is provided in Appendix E: Design Development Report.

Table 80 Project risk summary

Initial Risk		Residual Risk	
Rating	Number of Risks	Rating	Number of Risks
Extreme	7	Extreme	0
High	23	High	8
Moderate	6	Moderate	21
Low	0	Low	5

6.1.4 Discussion of specific risks

The key risks identified as part of the overall project risks are summarised in Table 81 and recommended for active management in the next phase.

Table 81 Key project-specific risks

Risk #	Risk Description	Risk Commentary
1	Adverse geotechnical conditions including excavations / embankments, foundation conditions for reinforced soil structures (RSS) walls, major culverts and structures resulting in consolidation and stability issues requiring additional treatments or protection	This risk focuses on the impact of geotechnical assumptions not being realised given the limited geotechnical information available at this stage.
3	Adverse off-site flood impacts	This risk focuses on the existing drainage network being suboptimal, along with the project being in a low-lying area, with possible sea level rise resulting in drainage design challenges.
9	Discovery of contaminated land (e.g. landfill, per- and polyfluoroalkyl substances (PFAS)) on-site and contaminated groundwater	Potential contamination from known sources includes firefighting foam (fire stations, airport) and Tallebudgera (from sewage treatment plant). PFAS has been detected in the surface soils and surface water present within the Project, causing potential program delays and increased costs.

Risk #	Risk Description	Risk Commentary
10	Inadequate provision for vulnerable road users during and post construction resulting in injuries	The project is located in a highly populated urbanised area, with schools also present so increased risk of people not doing the correct thing. Strategic interface points between trams, buses, park 'n' ride, and pedestrians are issues which will require careful management pre, during and post construction.
11	Project outcomes do not meet community expectations	This risk identifies the lack of consultation with impacted community members and businesses to date. Community concern of a net loss of parking (i.e. on-road parking along Gold Coast Highway to be off-set on side roads or potentially with a new multi-storey carpark in Palm Beach), not meeting the communities' expectations of provision of service, i.e. bike lanes, insufficient lanes, changes in access and local road network impact on existing or future DAs.
17	The existing public utility plant (PUP) may be damaged or need to be removed and reinstalled to facilitate the work	This risk identifies problems with the accuracy of 'as built' plans along Gold Coast Highway and the City roads, asbestos pits located on-site, PUP conflicts not identified during preconstruction, also noting that the City services are not on Before You Dig Australia (BYDA) Queensland Transport Minister's commitment to retaining four traffic lanes on the Gold Coast Highway (increases the likelihood of PUP impacts).
12	Lack of support from Gold Coast Airport	This risk documents potential resistance to the proposed intersection and/or access configurations, due to land requirements, or potential impacts on internal structures and service roads. In addition, electromagnetic radiation from the LRT could potentially affect sensitive airport equipment and may require special investigation and treatments.

6.1.5 Risk quantification

Contingency is an allowance included in a project to offset uncertainty. It may be a time allowance in the program of works for delay or a cost allowance in the project cost estimate to account for the residual risk after other mitigation measures have been implemented. The amount of the contingency is reassessed at key milestones to represent the knowledge and level of uncertainty at that time. Cost estimate risks may be broken down into two major classifications based on the distinctly different nature of the risk, namely planned and unplanned risks:

- Planned risks consider the potential for variances in quantifying the scope of the work (quantity variance) and the estimated productivity and rates associated with the estimate itself (price variance). Planned risks have been considered for each item in the construction estimate with a risk range on the unit rate and quantity for each scheduled work item included in the risk model.
- Unplanned risks relate to the potential changes in circumstances that may occur and impact the works to be undertaken, and hence the cost to deliver the project.

The quantification of each risk item was confirmed in a risk workshop on 27 October 2022. To quantify the unplanned risk, the risks identified in the project risk register were aggregated into the nine specific cost risk categories following the PCEM. Each cost risk category was then valued using a 'best-case', 'most likely' and 'worst-case' scenario, and likelihood. A Monte Carlo simulation was then run using @Risk and the outputs represent the statistical analysis of the unplanned risks associated with the construction and Principal's costs at the PE stage.

The categories of cost risk and opportunities impacting the project and need to be managed are:

- Client Managed Cost Increases
- Standards and Policy Changes
- Design Development Changes
- Project Delay
- Revised Functionality
- Changes during Construction
- Contractor Retained
- Risk Transfer (Insurance)
- Third-Party Influences
- Potential Scope Changes.

The risk profile for each project option was developed following the general principles and guidelines ISO31000:2018. Table 82 shows the risk adjustment as a percentage of the base estimate. The P90 risk allowance for each option was within the typical contingency range for this stage of project development and was consistent with the PCEM contingency guidance value.

Table 82 Project options risk adjustment ($ million, Real)

Risk level	Option 1	Option 2	Option 3
P50 risk adjustment	1,026	721	89
Proportion of base estimate	39.2%	36.1%	28.2%
P90 risk adjustment	1,299	954	132
Proportion of base estimate	49.6%	47.9%	41.9%

6.1.6 Summary of the risk analysis

The key risk items identified which may have the potential to impact the project options moving forward were:

- Adverse geotechnical conditions, including the discovery of contaminated material
- Stakeholder interface, including meeting stakeholder expectations, maintaining access during construction, and the impact of vulnerable road users, associated with works in a heavily congested urban environment.

The Risk Register in Appendix E: Design Development Report considers the risks identified at the end of the PE, for the project life (from design to construction). As such, several steps can be taken in the subsequent phases to further refine and mitigate the project risks. These actions are captured as mitigation measures.

The identified Risk Register items and risk ratings were used to determine the unplanned risk contingency in the project's P50 and P90 cost estimate.

6.2 Capital cost estimate

6.2.1 Methodology and approach

The methodology used to develop the cost estimate complies with the requirements of the PCEM 8th Edition, Dec 2021. Key basis of estimates relied upon in the development of this estimate for Option 1, Option 2, and Option 3 are detailed below in Table 83.

Table 83 Basis of estimate

	Option 1 – Preliminary Evaluation	Option 2 – Preliminary Evaluation	Option 3 – Preliminary Evaluation
Cost estimate performance standard	-30% to +100% variance of completed project cost	-30% to +100% variance of completed project cost	-30% to +100% variance of completed project cost
Confidence category	Category 2	Category 2	Category 2
Project type	Type 1: Complex / high or extreme risk transport infrastructure projects, requiring higher levels of investigation, rigor and control.	Type 1: Complex / high or extreme risk transport infrastructure projects, requiring higher levels of investigation, rigor and control.	Type 1: Complex / high or extreme risk transport infrastructure projects, requiring higher levels of investigation, rigor and control.
Delivery method	Design and Construct	Design and Construct	Design and Construct
Contract administration	TMR contract administrator	TMR contract administrator	TMR contract administrator
Construction period	July 2026 to December 2030	July 2026 to June 2030	July 2026 to September 2028
Estimate base date	November 2022	November 2022	November 2022
Estimate methodology	First principles using Expert Estimation	First principles using Expert Estimation	First principles using Expert Estimation
Estimate basis	All information provided up to 20 January 2023	All information provided up to 20 January 2023	All information provided up to 20 January 2023
Best Practice Industry Conditions for Transport Civil Constructions Projects (BPIC)	Yes, +$300M conditions applied	Yes, +$300M conditions applied	Yes, +$300M conditions applied
Risk methodology	Probabilistic modelling using @Risk software	Probabilistic modelling using @Risk software	Probabilistic modelling using @Risk software
Escalation methodology	In accordance with QTRIP Escalation Report September 2022 – Commonwealth Escalation Rates Rail	In accordance with QTRIP Escalation Report September 2022 – Commonwealth Escalation Rates Road	In accordance with QTRIP Escalation Report September 2022 – Commonwealth Escalation Rates Road

	Option 1 – Preliminary Evaluation	Option 2 – Preliminary Evaluation	Option 3 – Preliminary Evaluation
Bill of quantities	Prepared by AECOM, reviewed and expanded by Fission	Prepared by AECOM, reviewed and expanded by Fission	Prepared by AECOM, reviewed and expanded by Fission

6.2.1.1. Exclusions

The following are specifically excluded from the scope of this estimate:

- Goods and Services Tax (GST)
- Operational costs
- Consideration of alternative delivery method (e.g. PPP).

6.2.2 Scope and assumptions

The cost estimator maintains a database of costs for labour, materials, plant, and subcontract resources which is updated regularly by seeking the latest industry prices. These cost rates are adjusted where appropriate for the specific project to take cognisance of locality and scale. For those items that have a significant cost impact, every effort is made to obtain up to date, specific project pricing.

Labour rates allowed in the cost estimate are sourced from a publicly available enterprise agreement for a typical Tier 1 contractor. Rates for the key labour resources in the estimate are detailed in Table 84.

Table 84 Labour rates

Classification	Effective Hourly Rate
BPIC – Construction Worker 1 (e.g. New Entrant)	$97.13
BPIC – Construction Worker 2 (e.g. Skilled General Labourer)	$101.88
BPIC – Construction Worker 3 (e.g. Form Worker)	$104.18
BPIC – Construction Worker 4 (e.g. Concrete Finisher)	$110.89
BPIC – Construction Worker 5 (e.g. Trade Qualified Tradesperson)	$116.78
BPIC – Construction Worker 6 (e.g. Heavy Mobile Plant Operator)	$117.40

6.2.3 Cost breakdown

A summary of the risk-adjusted capital cost estimates for each option is presented in Table 85. This represents an estimate of the total cost to deliver the Project options, including risk and uncertainty.

Table 85 **Project Cost Summary ($ millions, Real)**

Element	Option 1	Option 2	Option 3
Client			
Scoping			
Sunk Cost	6	6	6
Development			
Project Management	11	11	5
Design and Investigation	16	11	1
Delivery			
Project Management	133	97	7
Contract Administration	122	96	12
Client supplied insurance, fees, levies	44	31	3
Finalisation			
Project Management	2	1	0
Contract Administration	1	1	1
Property			
Purchase price	628	628	151
Construction			
Contractor			
Environmental works	83	74	
Traffic management and temporary works	292	255	8
Public Utilities Adjustments	127	125	25
Bulk earthworks	66	63	4
Retaining walls	50	112	6
Drainage	73	51	-
Bridges	71	35	10
Rail Systems - Overhead wiring	23	-	-
Rail Systems - Signalling	46	-	-

Element	Option 1	Option 2	Option 3
Rail Systems – Rail Communications	134	-	-
Rail Systems – Combined Services Route	53	-	-
Roadworks, Landscaping, Fencing	341	367	63
Transport Stations, Interchanges, Buildings, Stations, Stabling and Maintenance Buildings	33	8	2
Trackwork	179	-	-
Client			
Public Utility Plant	17	17	10
Other Materials and Construction Services	64	-	-
Totals			
Total real costs	**2,618**	**1,991**	**314**
P50 risk adjustment	1,522	987	119
Total P50 Project Capital Cost	**4,140**	**2,978**	**434**
P90 risk adjustment	1,849	1,260	167
Total P90 Project Capital Cost	**4,467**	**3,252**	**482**

6.2.4 Construction schedule and escalation

Table 86 below highlights the key durations from the construction program.

Table 86 Duration on key construction phase

Construction phase	Option 1 – Duration	Option 2 – Duration	Option 3 – Duration
Mobilisation	2 weeks	2 weeks	2 weeks
Design	31 weeks	52 weeks	28 weeks
Construction (including inclement weather allowance)	200 weeks	172 weeks	82 weeks
Total inclement weather allowance in the construction duration	32 weeks	28 weeks	13 weeks
Total	**233 weeks**	**205 weeks**	**112 weeks**

The Project may apply for Commonwealth funding and as such the allowance for escalation of costs has been determined by applying the escalation indices (shown in Table 87) in accordance with the latest Queensland Project Cost

Breakdown (PCB) form issued by TMR in February 2022 (Queensland PCB Template 2021-22) across the various years of project expenditure.

Table 87 Cost escalation rates

Financial Year	2022/2023	2023/2024	2024/2025	2025/2026	2026/2027	2027/2028	2028/2029	2029/2030
Escalation rate – Option 1	2.30%	2.60%	2.20%	1.60%	1.80%	2.20%	2.20%	2.20%
Escalation rate – Option 2	2.27%	2.01%	1.40%	0.82%	1.27%	2.00%	2.56%*	
Escalation rate – Option 3	2.27%	2.01%	1.40%	0.82%	1.27%	2.00%	2.56%*	

* 2028/2029 and onwards

6.2.5 Risk-adjusted Project Costs

The risk adjusted cost estimates are outlined in Table 88.

Table 88 Risk adjusted cost estimate summary ($ millions, Real)

Cost estimate summary	Option 1	Option 2	Option 3
Sunk costs	6	6	6
Principal's costs	1,045	900	196
Construction contractor's costs	1,573	1,091	118
Base estimate (Principal's costs + construction costs)	2,617	1,991	314
Risk and Contingency Total (P50)	1,027	721	89
Risk and Contingency Total (P90)	1,299	954	132
Total Project Cost (Base estimate + Risk and Contingency)			
Total P50 Real Capital Cost	3,644	2,712	403
Total P90 Real Capital Cost	3,917	2,945	446

6.3 Operating and maintenance cost estimate

The ongoing operating and maintenance costs have been included from the first year of operations for each option to the end of the appraisal period. These costs represent operating costs that are incremental to the Base Case operating costs and capture only the costs associated with increased service frequency and / or maintenance of additional infrastructure. Specifically, operating costs include:

- On-vehicle crew
- Direct vehicle operating costs
- Infrastructure operations and maintenance
- Overhead costs.

The unit cost estimates were sourced from ATAP – M1 (2021) which provides an operating cost summary for bus, tram and train (mid-2014 prices, excluding GST). Of note, ATAP – M1 (2021). The unit prices have been escalated to $2023 dollars using CPI.

A deterministic risk contingency of 40 per cent for P50 is used as the central case for this economic appraisal. A 55 per cent deterministic risk contingency for P90 has been included as a sensitivity test. Operating costs incremental to Base Case operating costs are outlined in Table 89 for each option.

Table 89 Nominal operating cost estimates over 30 years ($ millions, nominal)

	Nominal		
	Option 1	Option 2	Option 3
Operational Expenditure	1,913	461	342
Operational Expenditure - P50	2,678	646	479
Operational Expenditure - P90	2,965	715	530

6.4 Conclusions

This chapter presents the findings from the detailed cost and risk assessment for the PE. Throughout the PE stage, risk management has been undertaken in accordance with relevant TMR frameworks and guidelines, and has included development of a comprehensive risk model, detailed analysis of planned and unplanned risks, indicative allocation of these risks, and quantification of project risk to inform the risk-adjusted cost estimates. From this analysis, the project team has developed risk treatment and mitigation strategies, which will be further enhanced in subsequent stages of the Project.

The risk adjusted (P50) capital costs shown in Table 90 show that the new infrastructure options Option 1 and Option 2 have the highest capital costs, while Option 3 has a relatively lower capital costs as the option has minimal infrastructure.

Table 90 Summary risk adjusted (P50) capital and operating costs ($ millions)

Cost estimate summary	Option 1	Option 2	Option 3
Total P50 Real Capital Cost – P50	3,644	2,712	403
Outturn Operational Expenditure - P50	2,678	646	479

7. Financial analysis

The purpose of this chapter is to outline the results of the financial analysis undertaken during the PE stage. The financial analysis was used to determine the financial implications and impact on government of each project option.

The chapter includes:

- Introduction
- Project costs
- Project revenues
- Summary of net present cost/value
- Implications of staging
- Potential funding sources
- Conclusions.

The Financial Analysis Report in Appendix G: Financial analysis report provides further details on the financial analysis.

7.1 Introduction

The financial analysis captures capital and operating costs of the project options over the period of analysis. The analysis has utilised the cost estimates developed by the project cost estimators including base costs and risk adjustments at the P50 and P90 confidence levels.

To ensure a reasonable level of confidence in the robustness of the analysis, the financial analysis presents the P50 and P90 confidence levels. The P50 and P90 confidence levels represent the cost at which there is a 50 percent and 90 percent probability that the final cost of the project will be less than that amount. The P50 and P90 costs have been developed using detailed risk quantification techniques including monte-carlo analysis.

The financial impact of each of the project options is shown in outturn costs and Net Present Cost terms. The outturn cost represents the sum of future year budget expenditure and represents the budget impact of the project. The Net Present Cost is an accepted method for comparing different project options as it considers the time value of money and discounts future cashflows to present values. This allows comparison with other projects where delivery timeframes may differ from this project.

7.1.1 Assumptions

The key general financial assumptions used for the financial model and their sources are summarised in Table 91.

Table 91 Key financial analysis assumptions

Description	Assumption	Source
Base date for Present Value (PV) analysis	All options: 30 June 2022 (FY22)	Modelling assumption as agreed with TMR and the City

Description	Assumption	Source
Period of analysis	30 years following first year of operations	
Pre-construction		
Option 1 LRT	1 July 2022 to 30 June 2026	fission cost report/PwC
Option 2 DBL	1 July 2022 to 30 June 2026	fission cost report/PwC
Option 3 EBP	1 July 2028 to 30 June 2028	fission cost report/PwC
Construction		
Option 1 LRT	1 July 2026 to 31 December 2030	fission cost report/PwC
Option 2 DBL	1 July 2026 to 31 December 2030	fission cost report/PwC
Option 3 EBP	1 July 2028 to 31 December 2030	fission cost report/PwC
Operation	30 years following construction completion	ATAP Guidelines
Capital costs	Probabilistic P50 and P90 level of confidence cost estimates	fission cost report (based on reference design prepared by AECOM)
Operational costs	Project specific risk adjusted cost estimates for operations and lifecycle maintenance	AECOM and fission
Construction escalation rate		fission in accordance with Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) 2021/22 Project Cost Breakdown (PCB) issued to TMR in February 2022. Option 1: PCB template for Rail Option 2 and Option 3: PCB template for Road.
Option 1 LRT	FY23: 2.30% FY24: 2.60% FY25: 2.20% FY26: 1.60% FY27: 1.80% FY28: 2.20% FY29: 2.20% FY30: 2.20%	
Option 2 DBL and Option 3 EBP	FY23: 2.27% FY24: 2.01% FY25: 1.40% FY26: 0.82% FY27: 1.27% FY28: 2.00% FY29+: 2.56%	

Description	Assumption	Source
Inflation rate	June 2023: 6.7% p.a. June 2024: 3.6% p.a. June 2025: 3.0% p.a. June 2026 and future: 2.5% p.a.	Reserve Bank of Australia (RBA) Australian Consumer Price Index (CPI) forecasts to Jun 2025, then 2.5% per annum in accordance with the midpoint of the RBA's CPI target.121
Uplift factor / part year escalation Option 1 LRT Option 2 DBL Option 3 EBP	 1.01341666666667 1.01324166666667 1.01311010087306	 fission cost report fission cost report fission cost report
Discount rate	4.422%	Average daily 10-year bond rate for the last 20 days of trading, provided by QTC as at 28/02/2023.
Periodicity	Preliminaries period: annually Construction period: annually Operations period: annually	PwC
Basis of cashflows	Nominal	PwC
Rounding	The sum figures presented in each table may not total due to differences in rounding. Rounding has not been applied in the financial model.	PwC
Taxation	Tax and GST exclusive	Agreed with TMR and the City.

7.2 Project costs

7.2.1 Capital costs

The project capital cost estimates for each project option are presented in detail in Chapter 7 – Risk analysis and cost estimate. Figure 60 presents the nominal annual construction costs for each project option over the construction period at the P50 level.

[121] RBA (2023). *Forecast Table – February 2023.* Accessed at https://www.rba.gov.au/publications/smp/2023/feb/forecasts.html.

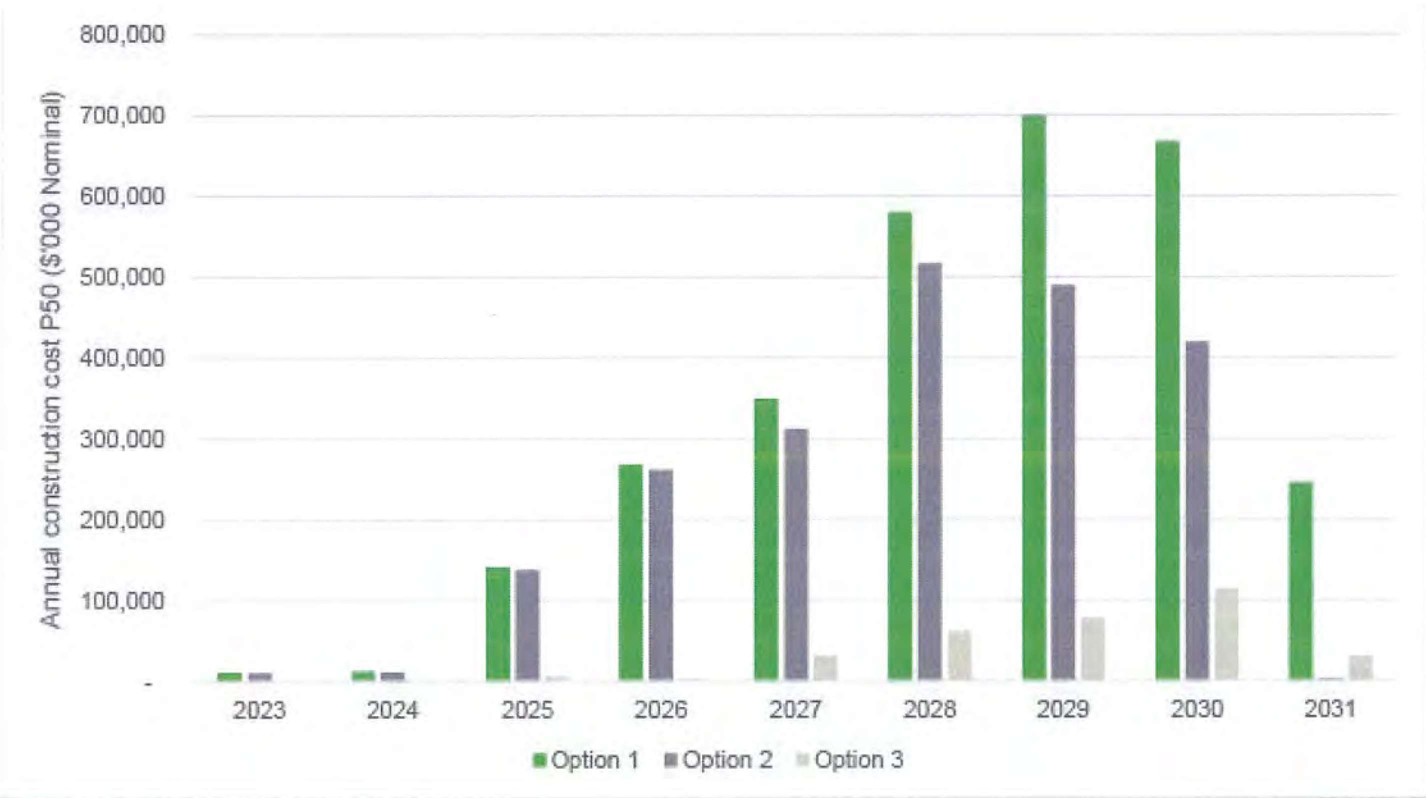


Figure 60 Construction costs

The delivery phase costs for the project options are shown in Table 92. The delivery costs are outlined at P50 and P90 levels in nominal and PV terms.

Table 92 Incremental capital phase costs ($'000)

	Nominal			PV		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Client costs	1,151,492	964,728	215,950	929,034	788,074	165,131
Contractor costs	1,811,643	1,213,007	135,275	1,329,926	908,191	96,102
Risk adjustment—P50	1,177,267	800,631	101,365	872,791	601,831	72,262
Construction costs—P50	**4,140,401**	**2,978,366**	**452,590**	**3,131,751**	**2,298,096**	**333,496**
Risk adjustment—P90	1,503,613	1,074,683	152,233	1,093,871	787,485	106,722
Construction costs—P90	**4,466,747**	**3,252,418**	**503,457**	**3,352,831**	**2,483,750**	**367,955**

7.2.2 Ongoing operational costs

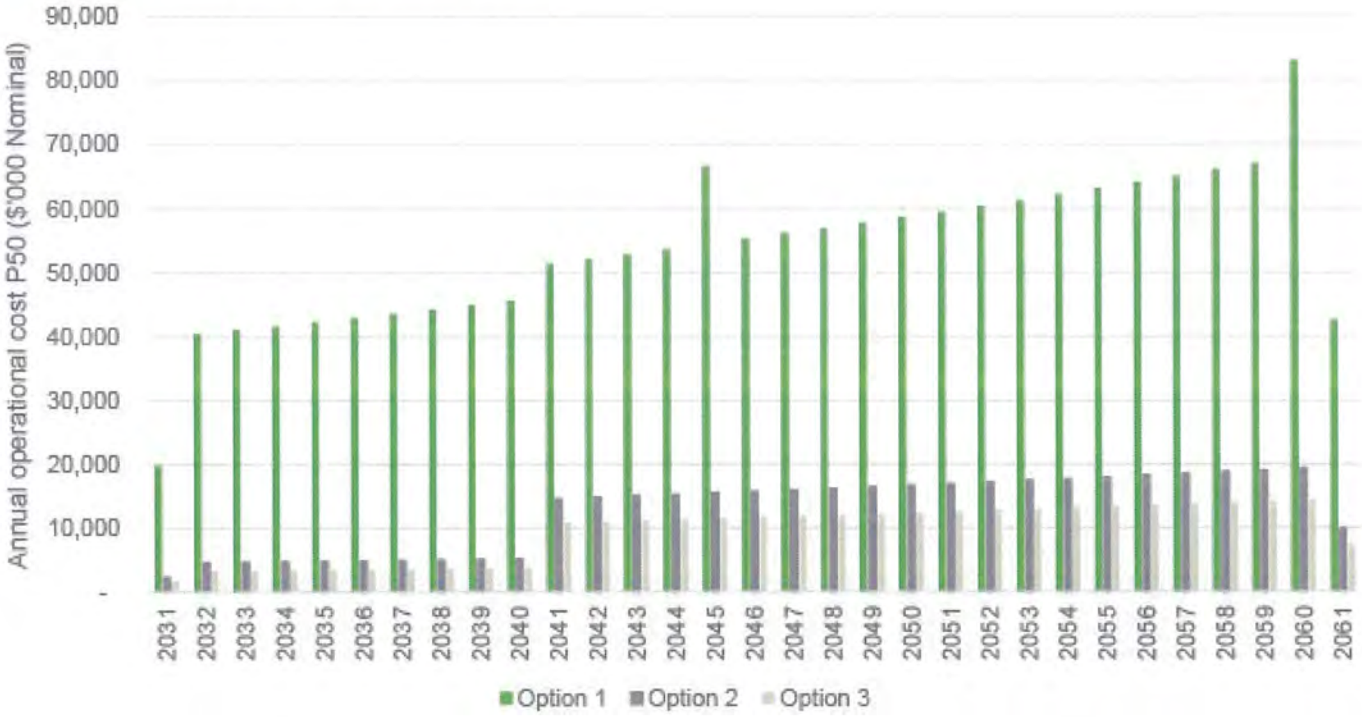


Figure 61 Incremental operational costs

The incremental operating costs are shown in Table 93. The incremental operating costs are presented in nominal and present value (PV) terms for the project options over the 30-year operating analysis period.

Table 93 Incremental operating phase costs ($'000)

	Nominal			PV		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Operational Expenditure	1,913,037	461,436	342,253	656,702	144,882	107,237
Operational Expenditure - P50	2,678,252	646,010	479,154	919,383	202,835	150,132
Operational Expenditure - P90	2,965,208	715,226	530,492	1,017,888	224,567	166,218

7.3 Project revenues

Farebox revenue is the incremental revenue generated by the project options as a result of increased PT passenger trips across all modes. The estimated revenue relies on the transport and demand modelling forecasts which estimated annual base incremental farebox revenue for years 2031 and 2041. The annual fare revenue was interpolated using the compound annual growth rate (CAGR) between modelled years, 2031 and 2041. A 1.8% extrapolation growth rate was applied to post-2041 revenues. This is based on the projected CAGR for the Gold Coast local government area (LGA) between 2036 and 2041. Figure 62 presents the annual estimated incremental farebox revenue for the project options in nominal terms over the 30-year operating analysis period.

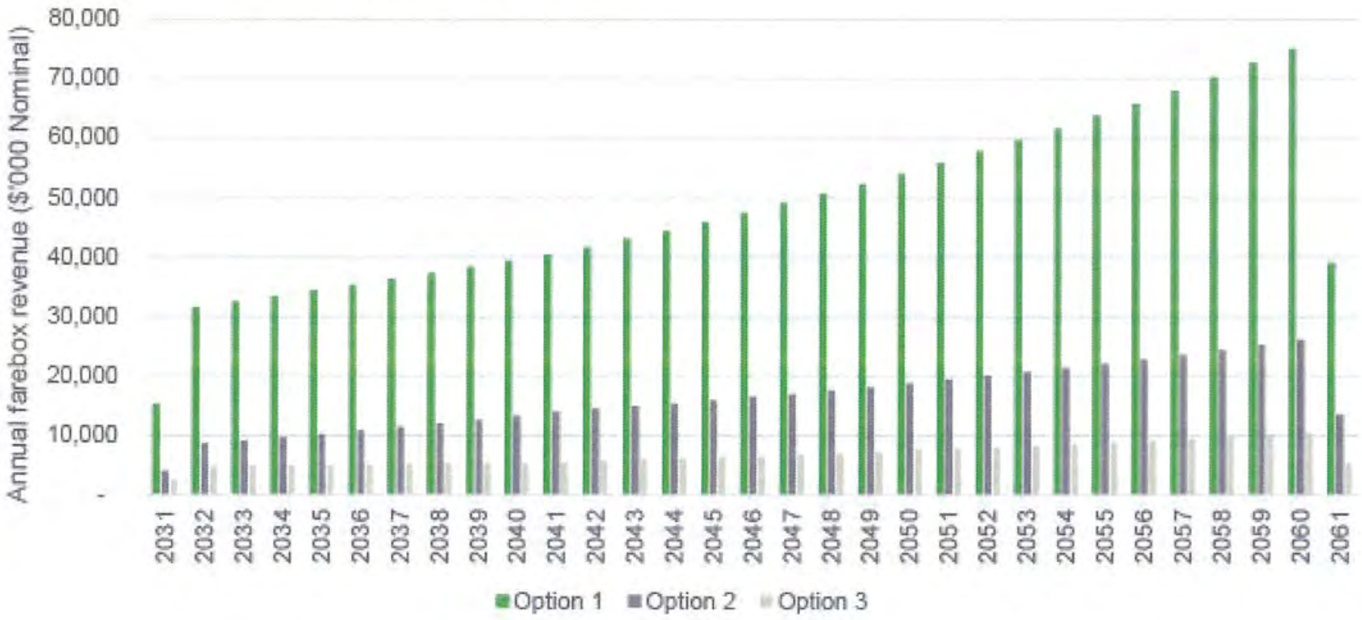


Figure 62 Incremental farebox revenue

The farebox revenue is outlined in Table 94. The incremental farebox revenue is presented in nominal and PV terms for the project options over the 30-year operating analysis period.

Table 94 Incremental farebox revenue ($'000)

	Nominal			PV		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Farebox revenue	1,615,207	547,738	227,160	536,908	178,822	76,167

7.4 Summary of net present cost / value

Table 95 to Table 97 outline the overall net project cost over the entire assessment period (i.e. delivery phase and operating phase) for the project options. The whole-of-life summary for all options is shown in Figure 63.

Table 95 Summary of whole-of-life project cash flows for Option 1 ($'000)

	Nominal		PV	
	P50	P90	P50	P90
Construction costs	(4,140,401)	(4,466,747)	(3,131,751)	(3,352,831)
Operating costs	(2,678,252)	(2,965,208)	(919,383)	(1,017,888)
Farebox revenue	1,615,207	1,615,207	536,908	536,908

	Nominal		PV	
	P50	P90	P50	P90
Net project value	(5,203,446)	(5,816,747)	(3,514,226)	(3,833,811)

Table 96 Summary of whole-of-life project cash flows for Option 2 ($'000)

	Nominal		PV	
	P50	P90	P50	P90
Construction costs	(2,978,366)	(3,252,418)	(2,298,096)	(2,483,750)
Operating costs	(646,010)	(715,226)	(202,835)	(224,567)
Farebox revenue	547,738	547,738	178,822	178,822
Net project value	(3,076,639)	(3,419,906)	(2,322,109)	(2,529,495)

Table 97 Summary of whole-of-life project cash flows for Option 3 ($'000)

	Nominal		PV	
	P50	P90	P50	P90
Construction costs	(452,590)	(503,457)	(333,496)	(367,955)
Operating costs	(479,154)	(530,492)	(150,132)	(166,218)
Farebox revenue	227,160	227,160	76,167	76,167
Net project value	(704,584)	(806,789)	(407,461)	(458,006)

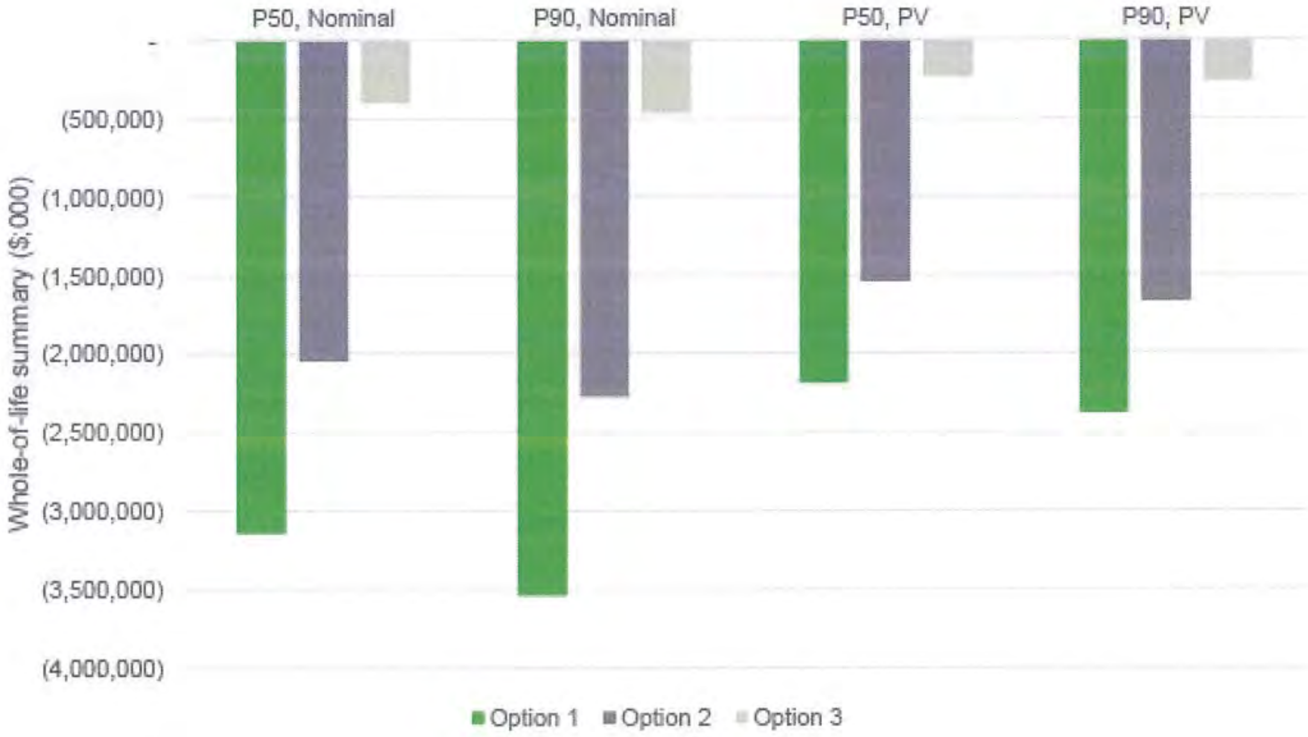


Figure 63 Whole-of-life summary

7.4.1 Sensitivity analysis

Sensitivity tests were conducted on the project options to consider various incremental increases and decreases to cost, revenue, and discount rates as well as impacts of construction delays. The sensitivity analyses are presented in Table 98 and illustrated in Figure 64.

Table 98 Sensitivity analysis (PV $'000)

ID	Sensitivity test	NPV Option 1		NPV Option 2		NPV Option 3	
		P50	P90	P50	P90	P50	P90
0	Core results	(3,514,226)	(3,833,811)	(2,322,109)	(2,529,495)	(407,461)	(458,006)
1	Increased discount rate: +1%	(3,257,885)	(3,540,096)	(2,189,083)	(2,376,568)	(368,909)	(413,180)
2	Decreased discount rate: -1%	(3,805,423)	(4,169,955)	(2,466,768)	(2,697,069)	(453,414)	(511,617)
3	Increased capital cost: +20%	(4,140,576)	(4,504,377)	(2,781,728)	(3,026,246)	(474,160)	(531,597)
4	Decreased capital cost: -20%	(2,887,875)	(3,163,245)	(1,862,490)	(2,032,745)	(340,762)	(384,415)
5	Increased operations costs: +20%	(3,698,102)	(4,037,389)	(2,362,676)	(2,574,409)	(437,488)	(491,250)

ID	Sensitivity test	NPV Option 1		NPV Option 2		NPV Option 3	
		P50	P90	P50	P90	P50	P90
6	Decreased operations costs: -20%	(3,330,349)	(3,630,234)	(2,281,542)	(2,484,582)	(377,435)	(424,763)
7	Increased revenue: +20%	(3,406,844)	(3,726,430)	(2,286,345)	(2,493,731)	(392,228)	(442,773)
8	Decreased revenue: -20%	(3,621,607)	(3,941,193)	(2,357,874)	(2,565,260)	(422,694)	(473,240)
9	Increased escalation: +1%	(3,954,410)	(4,336,301)	(2,564,860)	(2,809,664)	(471,916)	(532,846)
10	Decreased escalation: -1%	(3,125,459)	(3,393,006)	(2,101,214)	(2,276,619)	(352,556)	(394,521)
11	Worst case	(5,500,387)	(6,025,579)	(3,389,256)	(3,716,239)	(682,755)	(767,421)
12	Best case	(2,186,184)	(2,375,866)	(1,540,808)	(1,667,875)	(236,946)	(266,479)

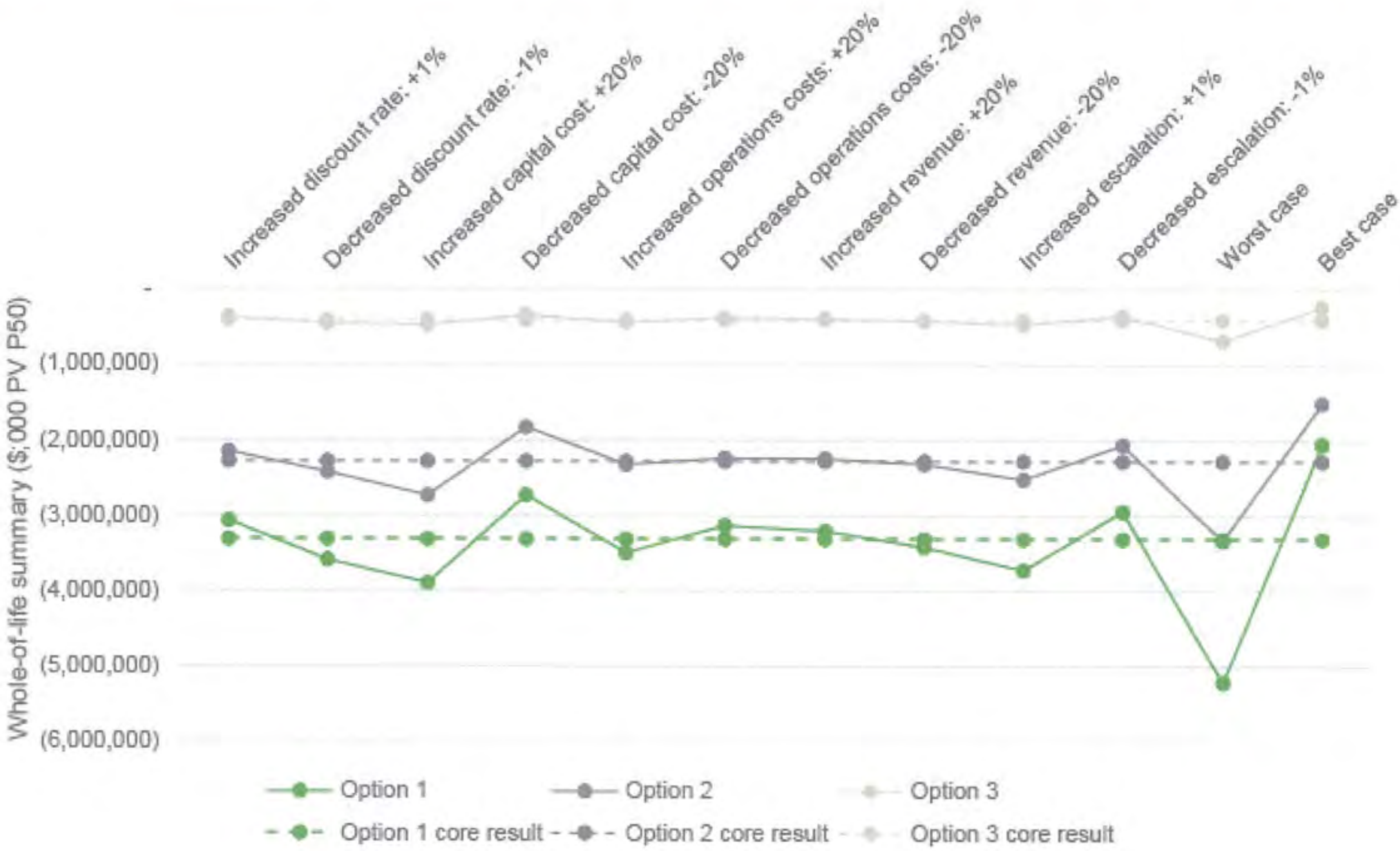


Figure 64 Sensitivity analysis

7.5 Implications of staging

All project options provide the opportunity for staging as they are linear infrastructure with a number of potential interim destinations. Options 1 and 2 could be staged logically to either Currumbin Creek or the Airport. A stage of Option 1 to Currumbin Creek may require construction of a temporary stabling facility. Given the overarching strategic need and intent of the Project, reaching the Airport is likely critical component of both options. For Option 1, this would allow for use of the planned stabling facility at Bilinga as a part of that stage. Option 3, by virtue of its low capital costs and requirement for progressive service upgrades, would also lend itself to staging.

Staging of Options 1 and 2 could decrease the upfront capital costs required. However, truncating the routes may limit the potential increase in patronage or land use impact each option could have and any impact on cost would need to be considered against the benefits that could be realised. The impact of escalation and inflation, however, may make the future nominal cost of extensions more expensive. Further, a stage from the Airport to Coolangatta is only about 3 km in length, and yet would entail significant transaction costs which could result in an inefficient allocation of resources. Staging options should be further considered in the Business Case stage, including consideration of how any staging impacts on benefits that could be realised.

7.6 Potential funding sources

The financial assessment considered the affordability for the project options. Critical to the assessment of affordability was the comparison of each project's estimated capital and operating costs relative to the available funding/revenue. For all three project options, the incremental farebox revenue was found to be insufficient to recover the capital and operating costs. At the P50 level, there is a funding shortfall of $3.5bn PV for Option 1, $2.3bn PV for Option 2 or $0.4bn PV for Option 3. At the business case stage, the project team will further explore the commerciality of the project and the option to be funded by the private sector and proceed on a profit-earning basis. This analysis is critical to the project's delivery and will mitigate the potential need for re-scope if the design is unaffordable.

At the P50 level, the capital costs for the project options were significant with $3.1bn PV construction costs and $0.9bn PV operating costs for Option 1, $2.3bn PV construction costs and $0.2bn PV operating costs for Option 2 and $0.3bn PV construction cost and $0.2bn PV operating cost for Option 3.

The Queensland and/or Australian Governments may be able to partially, or wholly, finance the delivery and operations of the project. The extent of government financing, however, is largely contingent on the level of capital outlay required and further analysis in the PE and the Business Case. The significant levels of short-term economic stimulus provided by the Queensland and Australian Governments to address the economic downturn borne by the COVID-19 pandemic may also limit the level of financing available for this project. This may, in turn, necessitate additional funding and financing support from other sources. For projects of this size, scale and complexity, the Australian Government will require a comprehensive assessment process prior to justifying the requisite financing and funding support. The development of the business case will play an integral role in independently assessing and, if appropriate, justifying the delivery of the project options.

Value capture is the practice of harnessing the increased value provided infrastructure investments to create an additional, or increased, revenue stream to offset the delivery costs. A commonly investigated approach is a tax on increased land values that have arisen due to a new or upgraded piece of infrastructure that increases an area's accessibility and thus commercial attractiveness. Precedent projects have offset financial impacts of public transport infrastructure through increases in land tax, stamp duty and capital gains tax, on the current land and development land within the project corridor. However, there are very limited examples of successful implementation of value capture mechanisms in Australia and it has not emerged as a common practice for major transport projects.

The City implemented a Transport Improvement Charge which is levied on general rates on rateable land within the LGA, and is used to fund the City Transport Program, some of which has historically been applied to support the City's contribution to GCLR. In 2021-22 the Charge realised $41 million for the City. While a substantial value, this is a city-wide charge, and this revenue is used to fund a variety of transport infrastructure improvements and therefore is not available solely to fund this project. Additionally, it is significantly less than the required funding commitment over the 30-year appraisal period.

There is the opportunity and a number of approaches which could be explored in the business case to determine whether value capture should be further developed. The Queensland Government is currently trialling a new value creation framework which may be relevant for the business case stage.

7.7 Conclusions

The financial analysis has assessed the financial impact of the project options to the Queensland Government and its potential funding partners in other levels of government. The key outcomes of the financial analysis over the construction program and estimated over the 30-year operating period are as follows:

- The upfront funding requirements to construct and deliver the project options range from $0.5 billion for Option 3 to $4.1 billion for Option 1 in nominal terms at the P50 confidence level
- Option 1 would require the greater funding commitment to deliver the project, with a net whole of life cost of $5.2 billion and $5.8 billion in nominal terms at P50 and P90 confidence levels respectively
- In nominal terms, Option 1 is projected to generate approximately $1.6 billion in incremental farebox revenue across the 30-year analysis period, which is $1.1 billion more than Option 2 or $1.4 billion more than Option 3 in nominal terms.

Capital contributions from the Australian, Queensland and/or the City, and the private sector, may be required to fund the delivery of the project, which would be subject to the development of a detailed funding strategy and construction program as the project becomes more defined at the business case stage.

8. Transport demand modelling and analysis

8.1 Purpose and overview

The purpose of this chapter is to document the transport outcomes based on the demand modelling of the options considered and assessed as part of the Preliminary Evaluation. As identified within Chapter 3, the southern Gold Coast exhibits high car dependency, a lack of competitive and attractive PT options and abundant availability of low-cost car parking options. These problems are expected to grow into the future as population and employment numbers grow by around 40 per cent and more than 50 per cent between 2019 and 2041 respectively in the BH2C study area, and there are significant opportunities to improve cross-border public transport connectivity through this project (refer Chapter 3).

8.2 Methodology and approach

8.2.1 Strategic Modelling

Strategic transport modelling to support the Preliminary Evaluation was undertaken in two primary phases to identify the benefits and wider network effects of the project options and to inform economic analysis. These two phases included:

(1) To evaluate the Long List Options using the most recently available Gold Coast Strategic Transport Model: Multi Modal (GCSTM-MM) at the time, Version 2.2Q.

(2) To evaluate the Short List Options using an updated Version 2.3 of GCSTM-MM which included revisions relating to network, mode choice and assignment parameter adjustments to improve the model's ability to match observed data and improve the model as a reliable forecasting tool.

Both phases of option modelling were completed for assessment years of 2031 as the nominal year of opening and 2041 as a 10-year planning horizon. The primary purpose of the modelling was to understand the impacts of no project (i.e. the Base Case) and the relative transport benefits of the project options.

This chapter is primarily focused on the reporting of the Short List option modelling:

(1) Short List Option 1: Dedicated Light Rail

(2) Short List Option 2: Dedicated Bus Lanes

(3) Short List Option 3: Enhanced Bus Provisions.

A separate detailed modelling report has been prepared and attached in Appendix H: Transport modelling report. This modelling report has been prepared in accordance with TMR's Transport Modelling Assessment Framework (TMAF) and includes a detailed summary of the model review and update process, the Long List and Short List options modelling outcomes and the outcomes of the land use option Modelling.

8.2.2 Operational Modelling

Operational modelling was undertaken as part of the overall PE and used to inform the light rail travel times for the strategic modelling. The operational modelling can be summarised as follows:

- The operational traffic modelling has provided a good basis to compare the project options, showing they all perform well with regard to traffic impacts on the local and State-controlled road networks
- The operational modelling has demonstrated that despite significant geometric changes required to accommodate Option 1: Dedicated Light Rail, adequate traffic flows and a good level of service on the Gold Coast (GC) Highway and the Pacific Motorway - M1 (M1) can be maintained
- The operational modelling demonstrated the major intersections with the GC Highway were assessed against a common criterion and deemed to perform within acceptable performance limits.

It is recommended that further detailed operational modelling is undertaken at the Business Case stage using an enhanced microsimulation model in order to optimise the design and to better understand the traffic impacts of the preferred options on the road network to develop adequate mitigation measures. Mesoscopic modelling to assess localised road impacts in the study area should also be undertaken.

8.3 The strategic transport model

The strategic model utilised for this Preliminary Evaluation (PE) was Version 2.3 of the Gold Coast Strategic Transport Model: Multi Modal (GCSTM-MM) which has been developed over time as a planning tool for the City of Gold Coast. Refer to the detailed modelling report attached in for further detail on the model selection.

8.3.1 Structure of the Gold Coast Strategic Transport Model: Multi Modal (GCSTM-MM)

The GCSTM-MM is a four-step strategic transport model that covers the entire Gold Coast Local Government Area (LGA) and northern portions of the Tweed Shire (Tweed) LGA. The model area includes 1,946 internal transport zones and 13 external cordon locations. In calculating trip generation from each of these zones, eight travel purposes (home based work – white collar, home-based work – blue collar, home-based education, home-based tertiary education, home-based shopping, home-based other, non-home-based other and work-based work) are considered (classified into home based and non-home-based trips).

These trips are allocated between seven transport modes (including car, public transport and active modes), with the model being calibrated based on observed mode choice in the Gold Coast and Northern Tweed region. Commercial vehicle demand matrices are calculated separately and not subject to mode choice. Thus, eight transport modes are modelled in total.

The model represents a full typical work day and is subdivided into four time periods, including a two-hour AM peak (7am to 9am), a two-hour PM peak (4pm to 6pm), a seven-hour daytime off peak period (9am to 4pm) and an 'evening' period capturing the rest of the day (6pm to 7am).

Key inputs to the GCSTM-MM include demographic and land use data for each zone, a representation of the road and public transport networks for each time period, cost information (such as parking charges, fares, vehicle operating costs and value of time) and external demands. The external demands for the GCSTM-MM are drawn from the South East Queensland Strategic Transport Model: Multi Modal (SEQSTM-MM) including traffic volumes and heavy rail passenger volumes (including Park and Ride and Kiss and Ride at train stations).

Figure 65 shows the GCSTM-MM extents with a breakdown of LGAs and the project study area. The data presented within this chapter is reported in terms of the following:

- Gold Coast LGA
- Northern Tweed comprising of SA2s: Tweed Heads, Tweed Heads South and Banora Point
- BH2C Study Area which comprises the area between Burleigh Heads and Coolangatta and just east of the Pacific Motorway (M1). The study area is fully contained within the Gold Coast LGA.

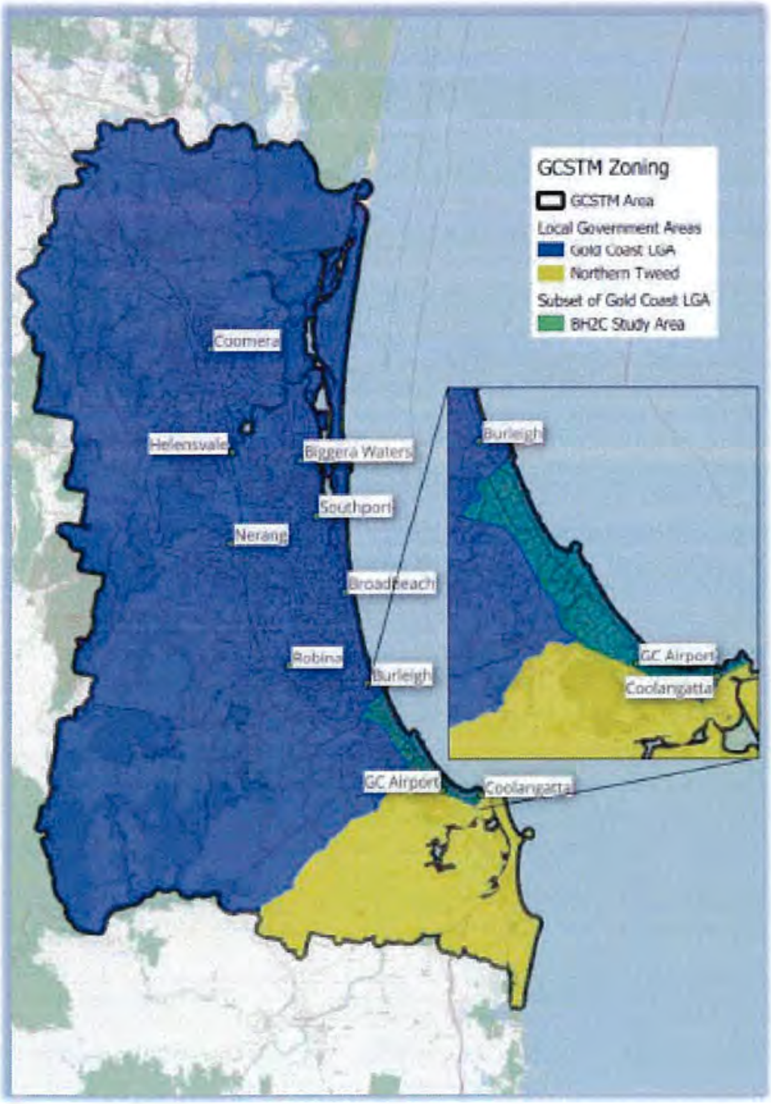


Figure 65 Geographical Areas Relevant to the BH2C Project

8.3.2 Demographic assumptions

The demographic and land use inputs to Version 2.3 of GCSTM-MM are based on a refined set of the Queensland Governments Statistician's Office (QGSO) 2018 medium series projections by TMR's Transport Analysis Unit (TAU). TAU in 2021 included Transport for New South Wales (TfNSW) Travel Planning Zone projections for the Tweed area to reflect updated assumptions for the Cobaki Lakes area based on more detailed information and reflect refinements to the Gold Coast Airport. Table 99 shows the population, household, employment and enrolments for the base case and forecast years.

Table 99 Base and forecast population, household, employment and enrolments

Year	Region	Population	Households	Employment	Enrolments
2019	Gold Coast LGA	614,993	246,169	299,067	150,803
	Northern Tweed Area	62,182	30,854	24,182	10,607
	BH2C Study Area	34,220	15,959	13,479	8,673
2031	Gold Coast LGA	789,264	317,693	384,432	194,978
	Northern Tweed Area	73,210	35,917	28,363	12,080

Year	Region	Population	Households	Employment	Enrolments
	BH2C Study Area	41,078	19,276	17,448	10,388
2041	Gold Coast LGA	933,963	379,511	453,952	227,991
	Northern Tweed Area	78,700	38,411	31,330	12,711
	BH2C Study Area	47,503	22,167	25,794	10,631

Note: The study area is entirely within the Gold Coast LGA

8.3.3 Base case network assumptions

Future year base case GCSTM-MM models have been developed for 2031 and 2041 assessment years based on the updated Version 2.3 model in consultation with TMR South Coast Region, TMR's TAU and the City to provide a sound basis for analysing the impact of the Project. The general approach to future year modelling has been to adopt a 'do minimum' base scenario, including only committed works, consistent with the requirements of the IAAF.

8.3.3.1. Road Network

A detailed review of the project inclusions was carried out for the modelled network, in consultation with TMR and the City, as the existing scheme list was out of date. The scheme list was updated to reflect the latest QTRIP planning, remove non-committed projects in Queensland and New South Wales sections of the model and to incorporate all of the relevant (link-based) upgrade projects contained in the City's Local Government Infrastructure Plan 2 (LGIP2) have been included in the 2031 and 2041 models.

Table 100 identifies the major base case road network upgrades assumed in each forecast year.

Table 100 Road upgrades

Project Description	2031	2041
Bermuda Street Extension: New road link from Bermuda Street to Tallebudgera Creek Road as four lanes including connections to Old Coach Road and Oyster Creek Drive (from 2026)	✓	✓
Christine Avenue Upgrade: Capacity upgrade eastbound from Bermuda Street to Whistler Drive (from 2026)	✓	✓
Gold Coast Airport Second Access: Additional airport access intersection south of the Musgrave Street overbridge (from 2026)	✓	✓
M1 Varsity Lakes to Tugun: Six-lane upgrade of the M1 between Reedy Creek Road and Stewart Road, including service roads as per the approved plans (from 2026)	✓	✓
Old Coach Road: Four lane upgrade from Bridgeman Drive to Kingsmore Boulevard (from 2031)	✓	✓
Palm Beach Avenue: Four-lane upgrade from the M1 to Philippine Parade (from 2036).		✓

8.3.3.2. Public Transport Network

The public transport network in the 2019 base case comprises GCLR Stages 1 and 2, the Queensland Rail (heavy rail) network, and TransLink's bus network operating on the Gold Coast in 2019. For future year modelling, the key public transport network changes include the introduction of GCLR Stage 3 (Broadbeach to Burleigh Heads) in 2026 and modifications to the bus routes that start or finish south of Burleigh Heads. Future base cases for bus operations were developed for 2031 and 2041 based on Remix data (bus route and scheduling information) supplied by TMR's TransLink Division, which detailed the proposed bus network for the central Gold Coast area when GCLR Stage 3 is in operation (including changes to existing services and proposed new routes).

Table 101 and Figure 66 show the major public transport infrastructure assumptions for 2031 and 2041.

Table 101 Public Transport Upgrades

Project Description	2031	2041
Rail Station Upgrades (Pimpama, Hope Island, Merrimac)	✓	✓
GCLR3 – Broadbeach to Burleigh Heads	✓	✓
Bus timetable update for GCLR3	✓	✓

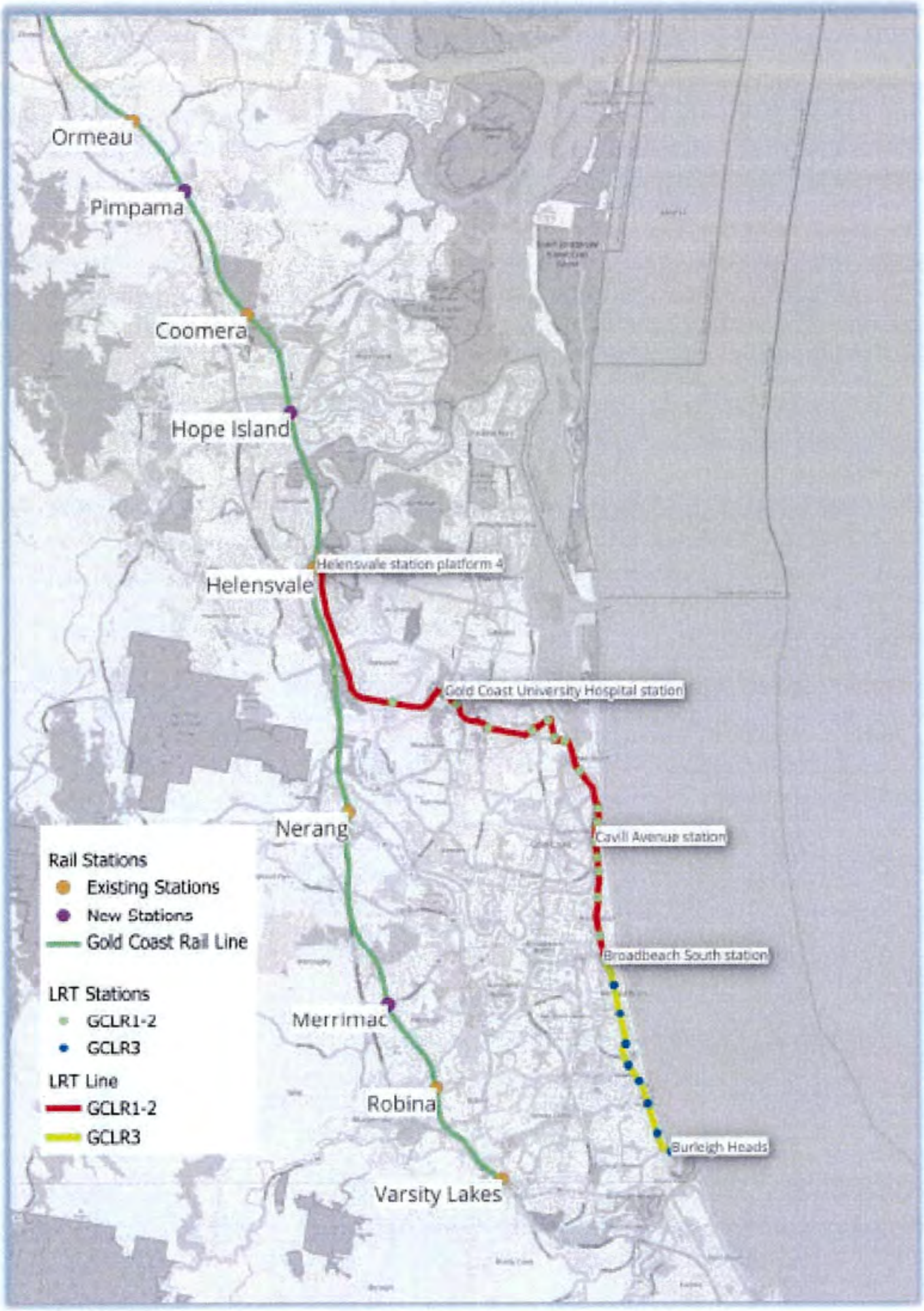


Figure 66 Future Year Public Transport Upgrades

Table 102 2031 and 2041 Base Case bus service assumptions

Route	Route Description	Route Location	Peak Frequency (minutes)
600	Tweed Mall to Banora Point, via The Tweed Hospital and Tweed City (New South Wales service)	No change to the 2022 service	30
601	Tweed Heads West to Kingscliff via Coolangatta, The Tweed Hospital and Tweed City (New South Wales service)	Extended from Kennedy Drive to Cobaki Lakes (via Piggabeen Rd)	30
700	Tweed Heads – Broadbeach via Burleigh Heads	Tweed Heads – Burleigh Heads (section from Broadbeach to Burleigh Heads truncated at Stockland, Burleigh Heads)	7.5
701	The Pines to Robina (new service)	New high frequency service from The Pines to Robina via Gold Coast Highway, Reedy Creek Road, Varsity Lakes Station, and Robina Station.	15
750	Robina – Broadbeach via Bond University	Timetable changes only – 15min service frequency reduced to 6:30am-7:15pm (previously 6:30am-7:30pm). No route changes.	15
760	Tweed Heads – Robina via Airport, Varsity Lakes	No change to the 2022 service	30
~~763~~ /771	Lakewoods – The Pines via Elanora	763 replaced with new 771 service with extended schedule window. Route extended from The Pines to Gold Coast Highway, Palm Beach	30
~~764~~ / 772	Burleigh Heads – Currumbin Park via The Pines	764 renamed as 772 with extended schedule window. No route or frequency changes.	60
765	Robina – North Burleigh via Christine Ave	Southern section from North Burleigh to The Pines truncated at Christine Ave LRT Station. Removed routing via Scottsdale Dr/Varsity Lakes Station.	15
~~766~~ / 773	Currumbin Waters – The Pines	766 replaced with new 773 with extended schedule window and 30 min headway. Route extended from The Pines to Gold Coast Highway, Palm Beach	30
~~767~~ / 774	Tweed Heads – The Pines via Currumbin & Tugun	767 replaced with new 774 with extended schedule window (no frequency changes). Route extended from Tugun West to Coolangatta and Tweed Heads via John Flynn Hospital & Golden Four Drive.	60
768	Tweed Heads – The Pines via John Flynn Hospital	Boyd St, Tugun extension to Cobaki Lakes assumed.	60
777	Airport – Broadbeach South Station	Airport – Burleigh Heads (section from Burleigh Heads to Broadbeach truncated at Stockland, Burleigh Heads)	15

8.4 Future modelling scenarios

A summary of the modelling cases utilised for the Preliminary Evaluation and the network and land use scenarios applicable to each, is provided within Table 103.

Table 103 Modelling cases

Year	Case	Network scenario	Land use scenario
2019	2019 Base case	Light rail from Helensvale to Broadbeach	Refined QGSO 2018 by TMR's TAU to incorporate New South Wales projections, updated Cobaki Lakes assumptions and refinements to Gold Coast Airport.
2031	Base case	Light rail from Helensvale to Burleigh	
2041	Base case	Light rail from Helensvale to Burleigh	
2031 & 2041	Option 1: Dedicated Light Rail	Light rail from Helensvale to Coolangatta Bus network modified for Option 1	
2031 & 2041	Option 2: Dedicated Bus Lanes	Light rail: Helensvale to Burleigh Bus network modified for Option 2	
2031 & 2041	Option 3: Enhanced Bus Provisions	Light rail: Helensvale to Burleigh Bus network modified for Option 3	

8.4.1 Option 1 – Dedicated Light Rail

8.4.1.1. Changes from base case

Key changes from the base case for this option are:

- The introduction of dual-track light rail with its own Right of Way (RoW) between the GCLR3 terminus in Burleigh Heads and the intersection of Chalk Street / Warner Street in Coolangatta (refer to Table 104).
- Several new signalised intersections and reduction to the number of right-turns to and from the Gold Coast Highway.
- Narrow traffic lanes (3.1m wide) with no parking through Palm Beach.
- Road speed reduction and impedance (i.e. side friction) increase on Gold Coast Highway and Coolangatta Road to reflect new signalised intersections.
- Public Transport bus route timetable adjustments (refer Table 104 for route modifications supporting Option 1) to remove or truncate services where they compete with the Project Option as well as increased frequencies for services which act as feeders for the Light Rail.

Table 104 Changes to 2031 & 2041 Bus Services for Option 1 -v- Base Case

Route	Route Description	Changes Compared to the Base Case	Peak Frequency (headway)		
			Base	2031	2041
600	Tweed Mall to Banora Point, via The Tweed Hospital and Tweed City (New South Wales service)	Route extended from its start/terminus at Wharf Street, Tweed Heads to the Coolangatta LRT Station (via Griffith Street and Warner Street)	30	7.5	7.5
700	Removed				

Route	Route Description	Changes Compared to the Base Case	Peak Frequency (headway)		
			Base	2031	2041
701	The Pines to Robina – now Burleigh Heads to Robina	Truncated at Burleigh Heads Light Rail station (so Robina to Burleigh Heads only)	15	15	7.5
750	Robina – Broadbeach via Bond University	No Change	15	15	7.5
760	Thrower Drive Station – Robina via Varsity Lakes	Removed between Thrower Drive Station to Tweed Heads	30	15	7.5
768	Tweed Heads – The Pines via John Flynn Hospital	Northern section between The Pines and Boyd Street is removed; southern section from Boyd Street LRT Station to Tweed Heads is removed.	60	30	7.5
771	Lakewoods – The Pines via Elanora	Truncated at Thrower Drive LRT Station	30	15	7.5
772	Burleigh Heads – Currumbin Park via The Pines	No change	60	30	7.5
773	Currumbin Waters – The Pines	Truncated at Thrower Drive LRT station	30	15	7.5
774	Tweed Heads – The Pines via Currumbin & Tugun	Truncated at Boyd Street / Gold Coast Highway	60	30	7.5
777	Removed				

Figure 67 **Dedicated Light Rail Corridor and Stations**

8.4.2 Option 2 – Dedicated Bus Lanes

8.4.2.1. Changes from base case

Key changes from the base case for this option are:

- Bus lanes as added outer lanes to the Gold Coast Highway (essentially replacing parking/auxiliary lanes) between Burleigh Heads and Musgrave Street. Along Coolangatta Road between Musgrave Street and Miles Street bus lanes replace one of the two existing traffic lanes in each direction. Bus lanes are located on the short section of Miles Street between Coolangatta Road and the historic rail corridor and buses use this corridor as a RoW from Miles Street to the Chalk Street / Warner Street roundabout
- Generally, left turn movements from the Gold Coast Highway share the bus lane
- The bus lanes 'drop out' across Tallebudgera Creek and across Currumbin Creek
- Between Tallebudgera Creek Tourist Park and Thrower Drive all bus stops are 'in-lane'. On the Gold Coast Highway near Thrower Drive and to the south of Tomewin Street bus stops are 'indented' clear of the bus lane in each direction
- Several new signalised intersections have been introduced and a few turn movement bans implemented at other intersections via partial or full median closures across the Gold Coast Highway

- Road speed reduction and impedance (i.e. side friction) increase on Gold Coast Highway and Coolangatta Road.
- Public Transport Bus route timetable adjustments (refer Table 105 for route modifications supporting Option 2).

Table 105 Changes to 2031 & 2041 Bus Services for Option 2 -v- Base Case

Route	Route Description	Changes Compared to the Base Case	Peak Frequency (headway)		
			Base	2031	2041
600	Tweed Mall to Banora Point, via The Tweed Hospital and Tweed City (New South Wales service)	Extended from current start/terminus to Griffith St, Tweed Heads bus stop (within 130m walking distance of new Chalk St Bus Station in Coolangatta)	30	7.5	7.5
700	Tweed Heads - Broadbeach via Burleigh Heads	Buses re-routed to use dedicated bus lanes on Gold Coast Highway (from Currumbin to Tweed Heads), and starts/terminates at Chalk St Bus Station in Coolangatta (instead of Wharf St, Tweed Heads)	7.5	7.5	7.5
760	Tweed Heads - Robina via Airport, Varsity Lakes	Buses re-routed to use dedicated bus lanes on Gold Coast Highway (from Currumbin to Tweed Heads) and starts/terminates at Chalk St Bus Station in Coolangatta (instead of Wharf St, Tweed Heads).	30	15	7.5
768	Tweed Heads - The Pines via John Flynn Hospital	Section from Boyd St to The Pines removed.	60	30	30
771	Lakewoods - The Pines via Elanora	Truncated at Thrower Drive Bus Stop	30	15	7.5
772	Burleigh Heads - Currumbin Park via The Pines	No change	60	15	7.5
773	Currumbin Waters - The Pines	Truncated at Thrower Drive Bus Stop	30	15	7.5
774	Tweed Heads - The Pines via Currumbin & Tugun	No change	60	15	7.5

8.4.3 Option 3 – Enhanced Bus Provision

8.4.3.1. Changes from base case

This option includes bus jumps which are short sections of bus lanes on approach to intersections, shared with left turning traffic, at the following locations:

- Gold Coast Highway / Tallebudgera Drive: both highway approaches
- Gold Coast Highway / Nineteenth Avenue: both highway approaches
- Gold Coast Highway / Palm Beach Avenue: both highway approaches
- Gold Coast Highway / Thrower Drive: both highway approaches and on the Throwers Drive (west) approach to facilitate buses turning left and right out of Throwers Drive.

Public Transport Bus route timetable adjustments (refer Figure 138 for route modifications supporting Option 3).

Table 106 Changes to 2031 & 2041 Bus Services for Option 3 -v- Base Case (AECOM, 10/10/2022)

Route	Route Description	Changes Compared to the Base Case	Peak Frequency (headway)		
			Base	2031	2041
600	Tweed Mall to Banora Point, via The Tweed Hospital and Tweed City (New South Wales service)	No change	30	7.5	7.5
760	Tweed Heads - Robina via Airport, Varsity Lakes	No change	30	15	15
768	Tweed Heads - The Pines via John Flynn Hospital	Removed between Boyd St to The Pines.	60	30	30
771	Lakewoods - The Pines via Elanora	No change	60	30	30
772	Burleigh Heads - Currumbin Park via The Pines	No change	60	30	30
773	Currumbin Waters - The Pines	No change	30	30	30
774	Tweed Heads - The Pines via Currumbin & Tugun	No change	60	30	30

8.5 Modelling outcomes

The following subsections provide a summary of the key transport outcomes of each option against the base case including a summary of the key network statistics and private and public transport user benefits.

8.5.1 Summary of key network statistics

Table 107 presents the network statistics for the following geographical areas:

- The whole GCSTM-MM model area
- The 'BH2C Study Area' which comprises the area between Burleigh Heads and Coolangatta and just east of the M1.

Table 107 Summary of Key Network Statistics

Metric		Base		Option 1		Option 2		Option 3	
		Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area
2019	Private vehicle person-trips	1,682,545	150,718	-	-	-	-	-	-
	Public transport person-trips	71,637	8,820	-	-	-	-	-	-

Metric		Base		Option 1		Option 2		Option 3	
		Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area
	Active transport person-trips	201,685	19,075	-	-	-	-	-	-
	Total person-trips[1]	1,955,866	178,613	-	-	-	-	-	-
	Public transport modal split (%)	3.7%	4.9%	-	-	-	-	-	-
	Active transport modal split (%)	10.3%	10.7%						
	Private vehicle average speed (km/h)	42.4	42.0	-	-	-	-	-	-
2031	Private vehicle person-trips	2,132,608	184,866	2,117,103	173,569	2,128,842	182,768	2,130,466	184,188
2031	Public transport person-trips	121,612	12,167	138,137	23,836	125,932	14,302	124,006	12,944
2031	Active transport person-trips	264,680	23,191	264,253	22,954	264,907	23,360	264,568	23,167
2031	**Total person-trips[1]**	2,518,900	220,225	2,519,492	220,359	2,519,681	220,429	2,519,040	220,300
2031	Public transport modal split (%)	4.8%	5.5%	5.48%	10.82%	5.00%	6.49%	4.92%	5.88%
2031	Active transport modal split (%)	10.5%	10.5%	10.5%	10.4%	10.5%	10.6%	10.5%	10.5%
2031	Private vehicle average speed (km/h)	41.2	42.8	41.3	43.0	41.2	42.7	41.2	42.8
2041	Private vehicle person-trips	2,457,190	208,766	2,438,507	195,988	2,451,943	205,518	2,455,221	208,055
2041	Public transport person-trips	155,586	14,550	176,649	29,060	162,033	18,536	157,915	15,476
2041	Active transport person-trips	328,343	27,974	327,390	27,288	328,475	28,031	328,211	27,918

Metric		Base		Option 1		Option 2		Option 3	
		Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area
	Total person-trips[1]	2,941,119	251,289	2,942,547	252,336	2,942,451	252,085	2,941,347	251,449
	Public transport modal split (%)	5.3%	5.8%	6.0%	11.5%	5.5%	7.4%	5.4%	6.2%
	Active transport modal split (%)	11.2%	11.1%	11.1%	10.8%	11.2%	11.1%	11.2%	11.1%
	Private vehicle average speed (km/h)	38.7	41.4	38.7	42.0	38.6	41.5	38.6	41.5

[1] *Total person-trips vary between options because 'drive to public transport' trips are included as both private vehicle trips and public transport trips. These volumes are insignificant in the context of total person-trip volumes when comparing options.*

A summary of the key results for the base case include:

- Along with the significant development and economic growth expected on the Gold Coast, total person trips will increase within the model area by 28 per cent between 2019 and 2031, 50 per cent between 2019 and 2041 and 17 per cent between 2031 and 2041, with a similar trend occurring for the study area with 23 per cent between 2019 and 2031, 41 per cent between 2019 and 2041 and 14 per cent between 2031 and 2041.
- When considering the breakdown of trip types between 2019 and 2041, private vehicle trips are expected to increase by 46 per cent and public transport trips to increase by 117 per cent across the whole model area, while a similar trend is observed within the study area, with private vehicle trips increasing by 38.5 per cent and public transport trips increasing by 65 per cent.
- The public transport mode share is expected to increase from 3.7 per cent in 2019 to 4.8 per cent in 2031 and 5.3 per cent in 2041. This is attributed partly to increasing traffic congestion which results in a reduction in average traffic speeds across the network from 42.4 km/h in 2019 to 38.7 km/h in 2041.
- Conversely, within the BH2C cordon area public transport modal share increases from 5.5 per cent in 2031 to 5.8 per cent in 2041.

The results highlight that the increase in public transport usage between 2031 and 2041 in the BH2C cordon area is well below the increase across the Gold Coast - highlighting a potential opportunity for improved public transport to capture a greater share of trips in the project study area.

8.5.1.1. Forecast mode share changes - project options vs base case

The strategic modelling outcomes shows the aggregate impact to public transport utilisation for each project option compared to the base case to be:

- Option 1: +18,500 passengers in 2031 and +22,900 passengers in 2041
  - 2031: LRT +25,250, Bus -6,700, Rail -80
  - 2041: LRT +27,200, Bus -4,300, Rail +50.
- Option 2: +4,900 passengers in 2031 and +7,200 passengers in 2041
  - 2031: LRT +240, Bus +4,500, Rail +80
  - 2041: LRT -40, Bus +6,950 Rail +260.
- Option 3: +2,900 passengers in 2031 and +2,900 passengers in 2041

- 2031: LRT +40, Bus +2,800, Rail +30
- 2041: LRT -250, Bus +3,000, Rail +90.

Figure 68 and Figure 69 show that for the Gold Coast LGA public transport mode share increases by 0.7 per cent for Option 1, 0.2 per cent for Option 2 and 0.1 per cent for Option 3. In terms of the BH2C study area, there is a much more significant increase in mode share percentage in 2041 of 5.7 per cent for Option 1, 1.2 per cent for Option 2 and 0.3 per cent for Option 3.

Overall, the public transport configuration in Option 1 leads to the greatest increase in public transport mode share.

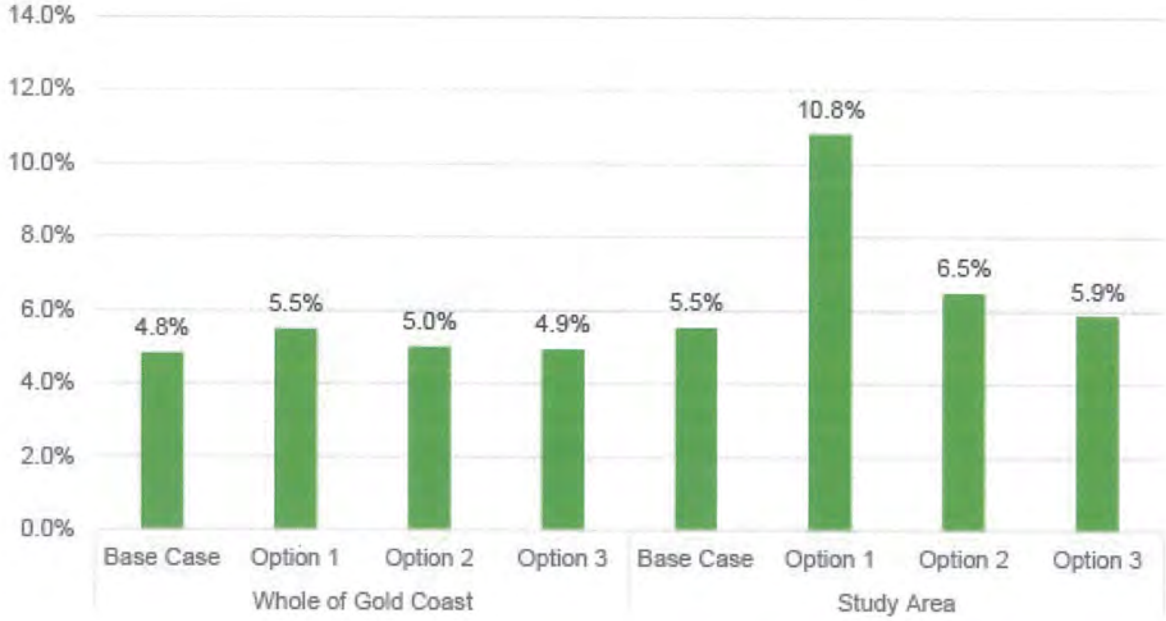


Figure 68 **Forecast 2031 PT Mode Share**

Figure 69 **Forecast 2041 PT Mode Share**

8.5.1.2. Forecast mode share – commuter trips (project options vs base case)

Public transport utilisation for commuter trips (within the study area and globally) is observed to have changes that are generally in line with the overall mode share trend. Figure 70 and Figure 71 show that commuter public transport mode share is only modestly impacted across the whole model area, while there are more substantial impacts within the study area.

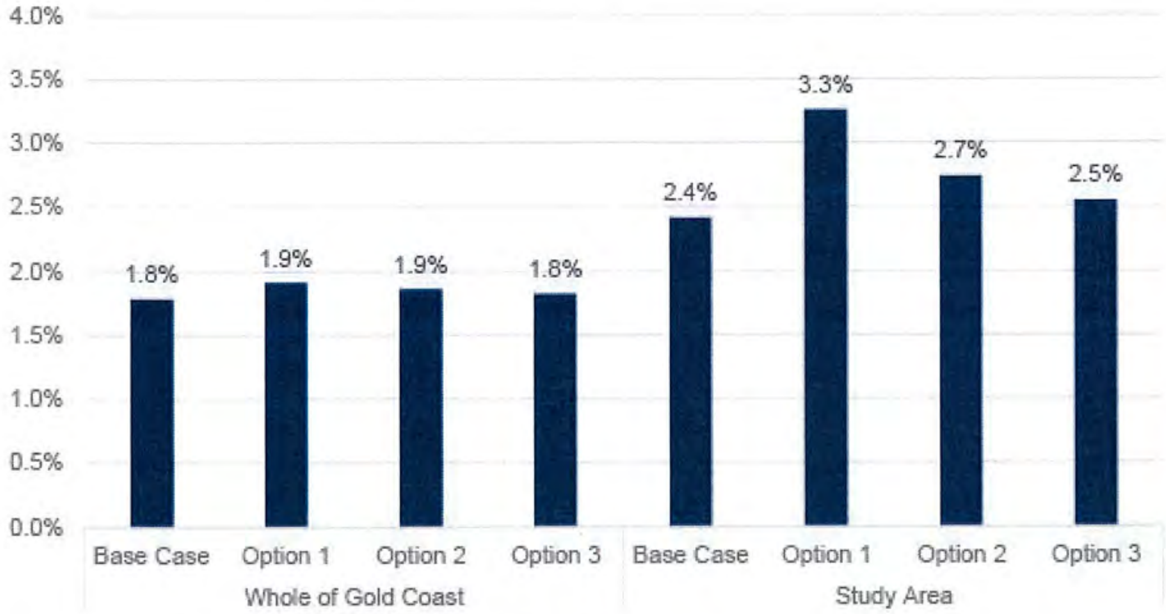


Figure 70 **Forecast 2031 Commuter PT Mode Share**

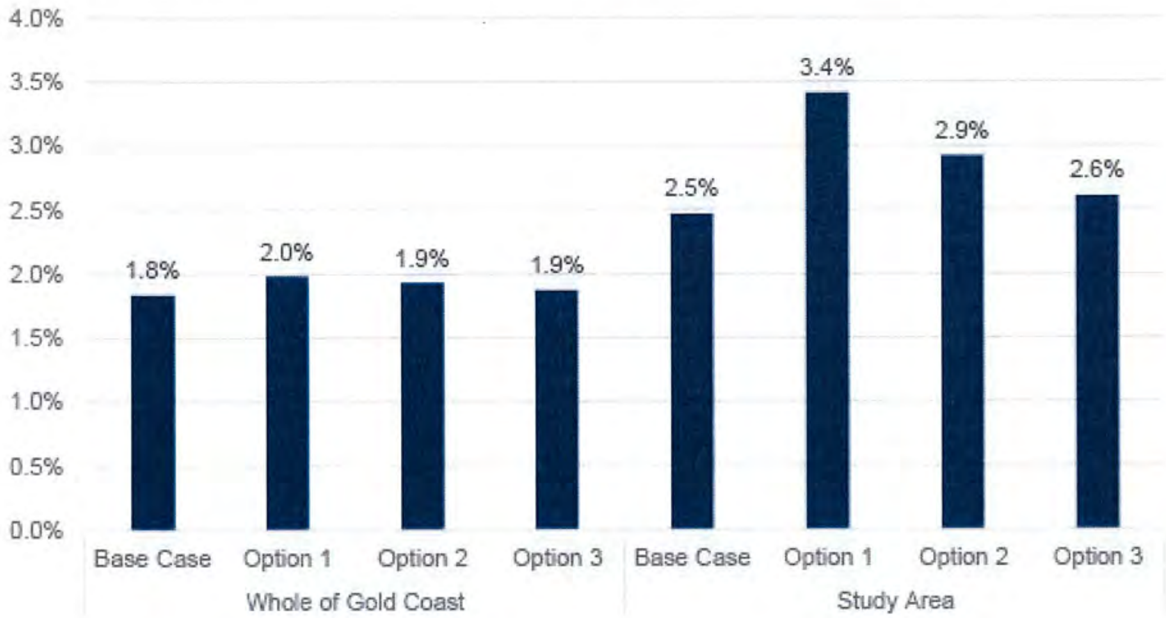


Figure 71 **Forecast 2041 Commuter Mode Share**

8.5.2 Road user benefits

8.5.2.1. Forecast traffic volumes

8.5.2.1.1. Base Case

Figure 72 describes the growth in road volumes between 2031 and 2041 base cases and shows that road volume growth around the study area is split between the M1 and GC Highway. Growth along the GC Highway through Palm Beach to Burleigh Heads shows minimal negative growth. Figure 73 and Figure 74 illustrate the expected volume/capacity ratios on the network in the 2041 AM and PM peak periods respectively. These plots highlight a number of corridors with volumes expected to be approaching or exceeding capacity including the M1 and GC Highway throughout the study area.

Red = less traffic; Green = more traffic; line thickness = relative difference in volume

Figure 72 Base Case - Road Volume Changes (2031 vs 2041, 24hr)

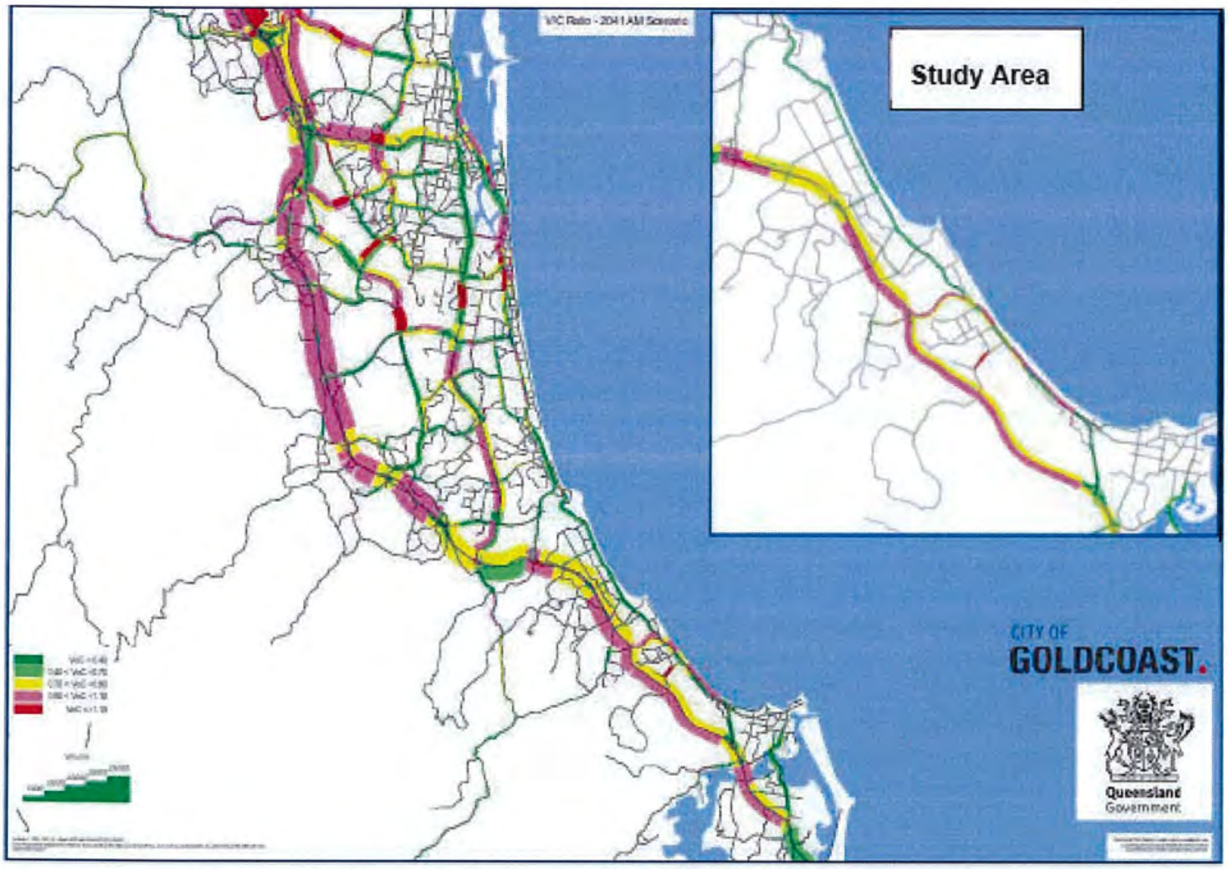


Figure 73 Base Case – Volume / Capacity Ratios (2041, AM peak)

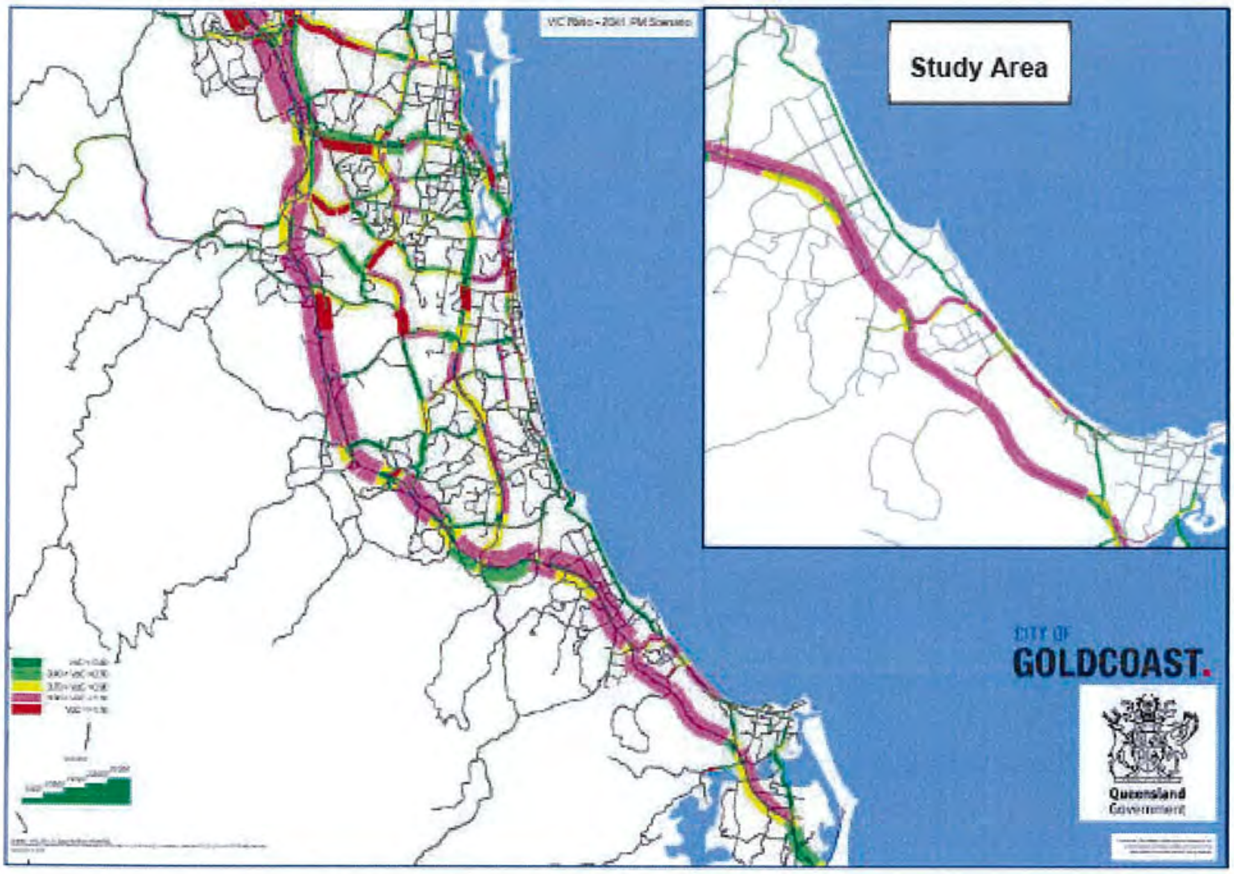
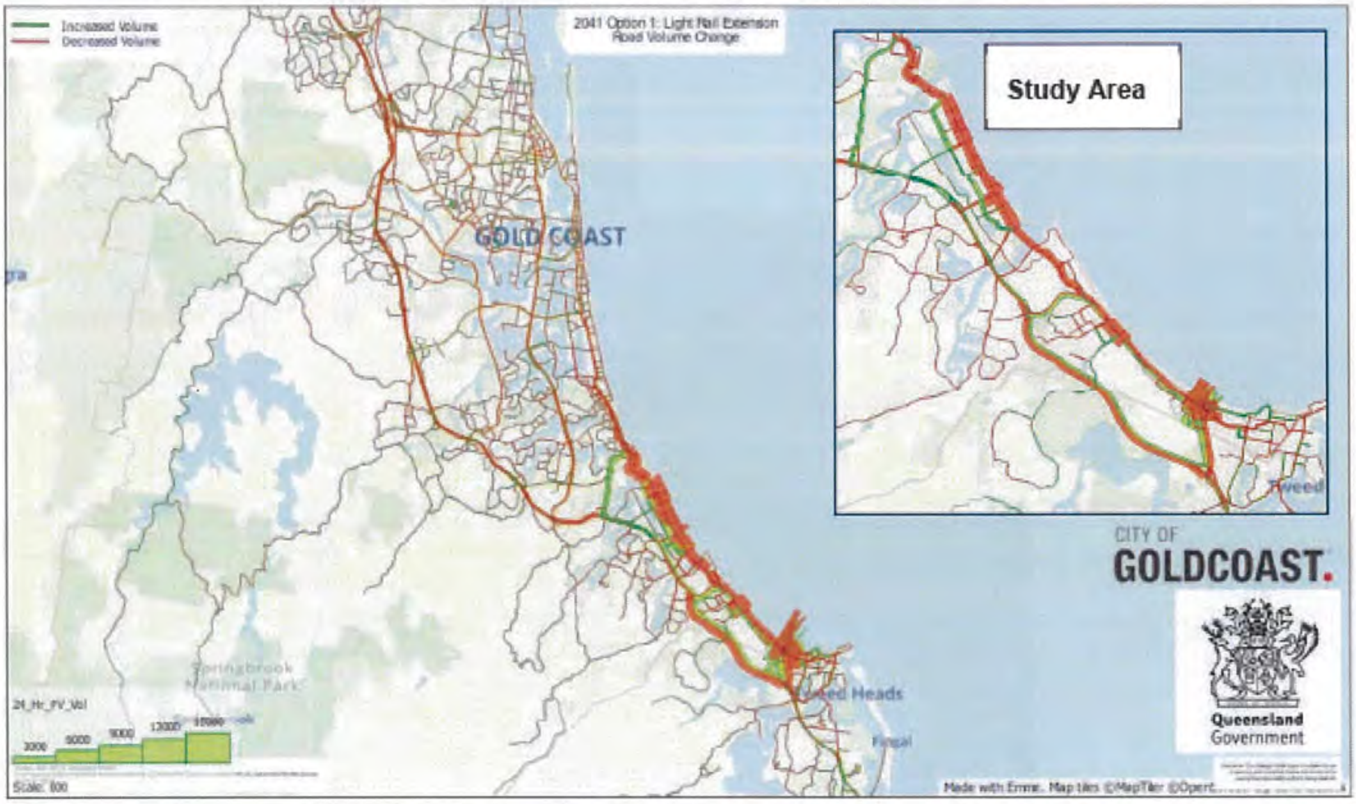


Figure 74 Base Case Volume / Capacity Ratios (2041, PM Peak)

8.5.2.1.2. Option 1

For Option 1 with the light rail extension along the GC Highway corridor, the road network is adjusted to match the new configuration. As a consequence of the increased public transport ridership and increased road impedance (effectively decreasing capacity) there is a notable decrease in road traffic along the GC Highway. With increased public transport ridership, there is also a decrease in northbound traffic along the M1. There is an increase in traffic volumes southbound deviating from the GC Highway along West Burleigh Road to the M1 due to minor capacity reductions along the GC Highway. Figure 75, Figure 76 and Figure 77 illustrate the road volume change for Option 1 compared to the Base Case in 2041, the AM volume on capacity ratio and PM volume on capacity ratio, respectively.



Red = less traffic; Green = more traffic; line thickness = relative difference in volume

Figure 75 Option 1 – Road Volume Change vs. Base Case, 2041

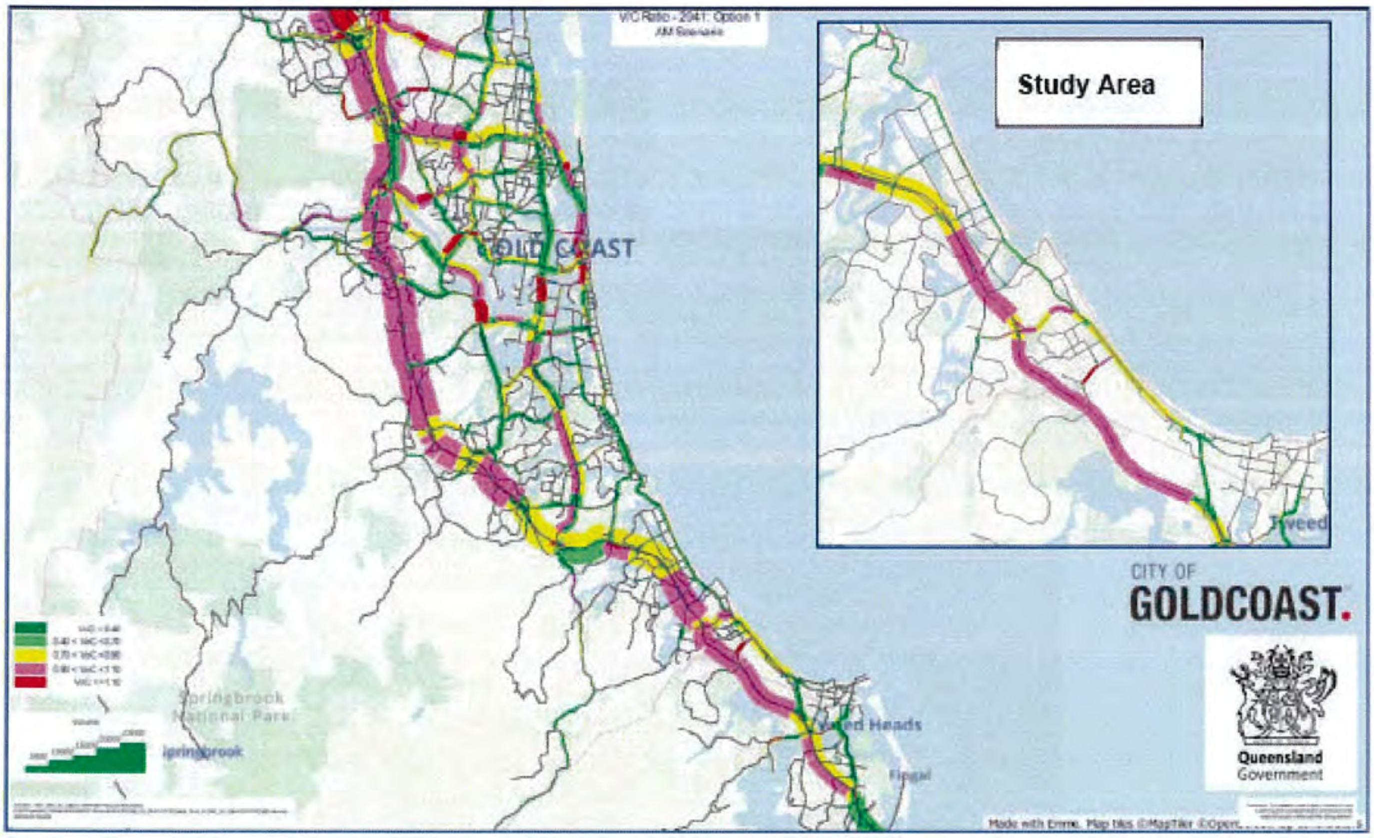


Figure 76 Option 1 – AM Volume on Capacity Ratio, 2041

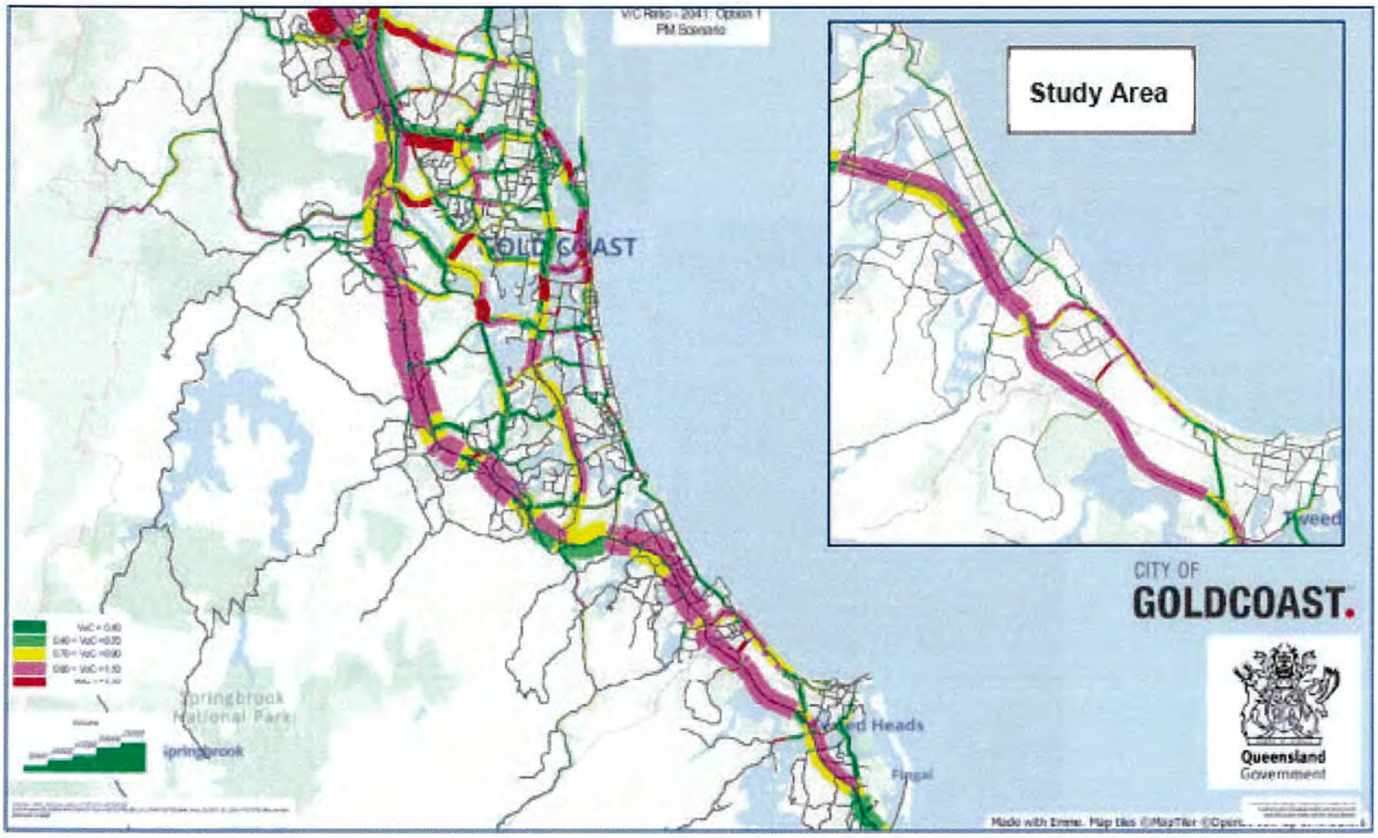


Figure 77 Option 1 – PM Volume on Capacity Ratio, 2041

8.5.2.1.3. Option 2

For Option 2, the Gold Coast Highway between Coolangatta and Burleigh Heads has been reconfigured with two additional dedicated bus lanes (one northbound, one southbound), an increased road impedance and speed limit reductions (which effectively decreases the through capacity). For north-south movements from the Burleigh Heads area, traffic deviates along West Burleigh Road to the M1, as well as a minor increase in traffic between Mermaid Waters and Burleigh Heads along Southport Burleigh Road. Figure 78, Figure 79 and Figure 80 illustrate the road volume change for Option 2 compared to the Base Case in 2041, the AM volume on capacity ratio and PM volume on capacity ratio, respectively.

Red = less traffic; Green = more traffic; line thickness = relative difference in volume

Figure 78 Option 2 – Road Volume Change vs. Base Case (2041, 24hr)

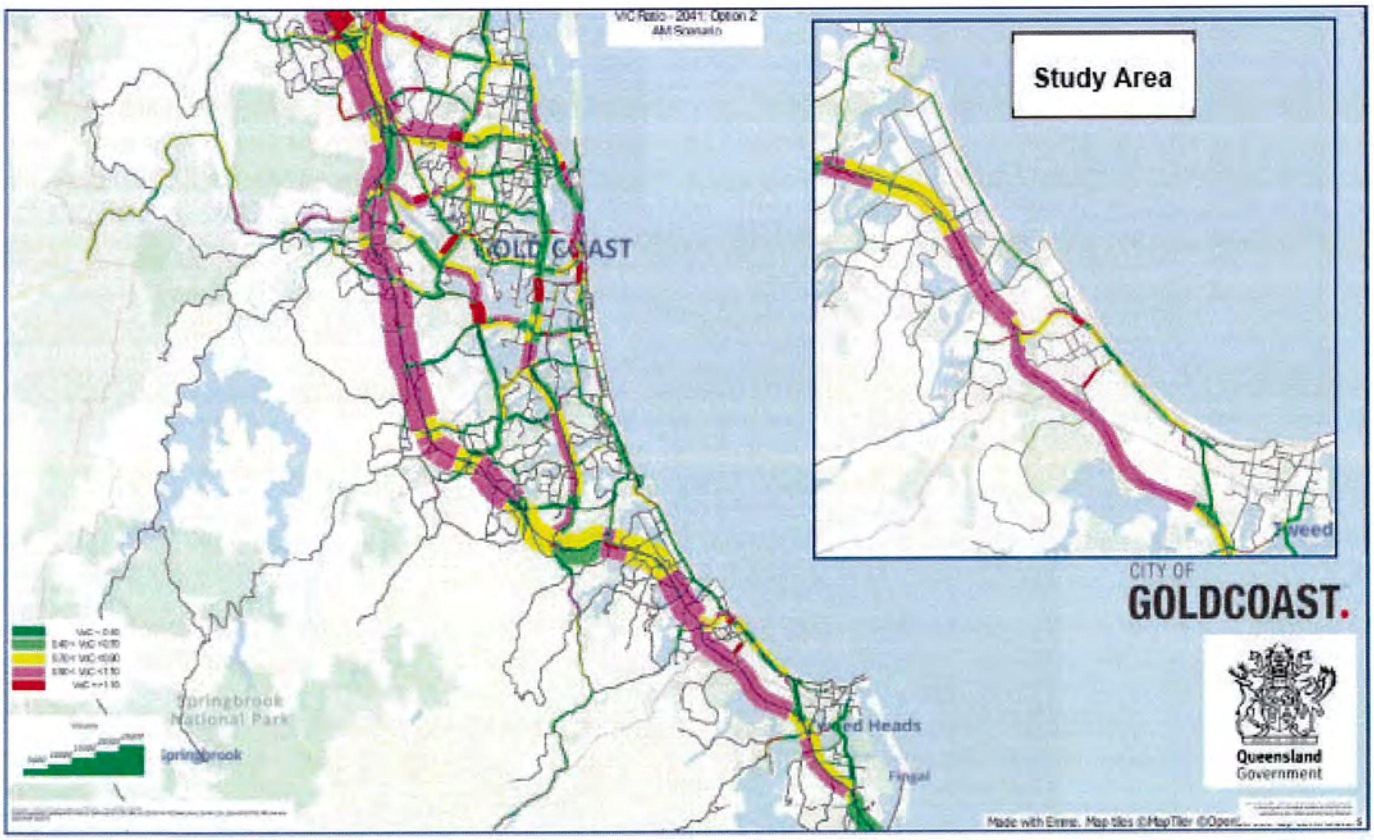


Figure 79 Option 2 – AM Volume on Capacity Ratio, 2041

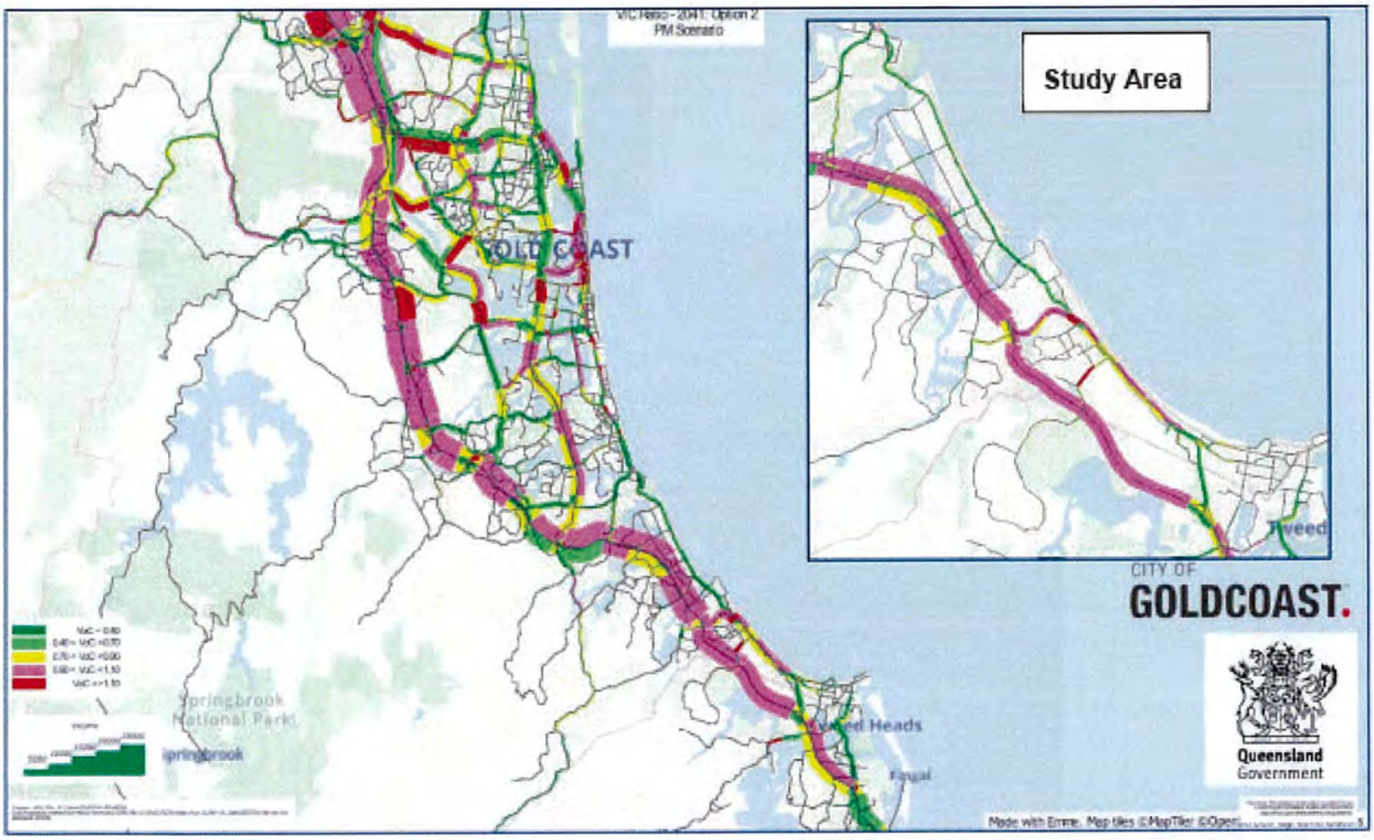


Figure 80 Option 2 – PM Volume on Capacity Ratio, 2041

8.5.2.1.4. Option 3

With the increased bus route timetabling of Option 3, there is very minimal impact to the road network. Small mode share shifts to public transport show minor decreases in road traffic across the network, particularly along the M1 and GC Highway within the study area. Figure 81, Figure 82 and Figure 83 illustrate the road volume change for Option 2 compared to the Base Case in 2041, the AM volume on capacity ratio and PM volume on capacity ratio, respectively.

Red = less traffic; Green = more traffic; line thickness = relative difference in volume

Figure 81 Option 3 – Road Volume Change vs. Base Case (2041, 24hr)

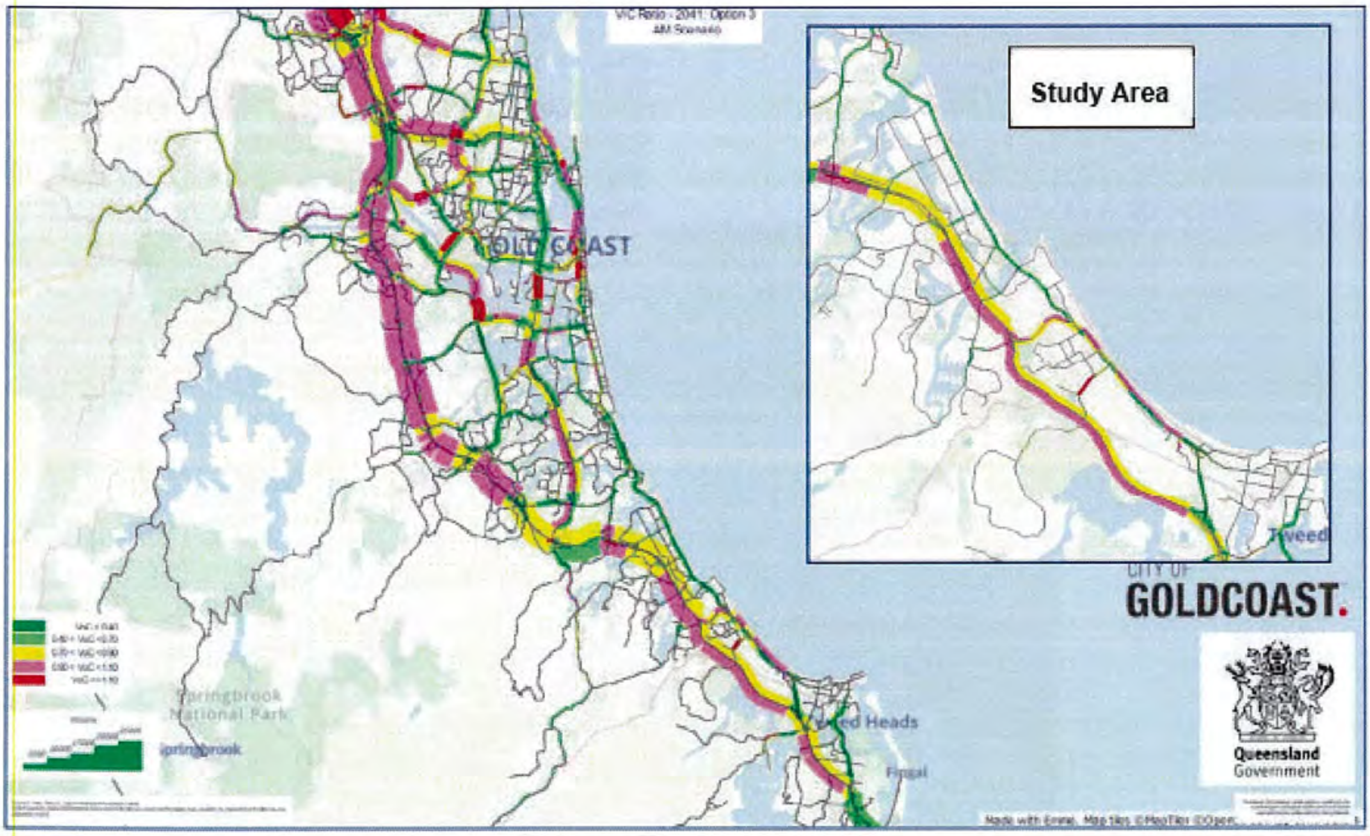


Figure 82 Option 3 – AM Volume on Capacity ratio, 2041

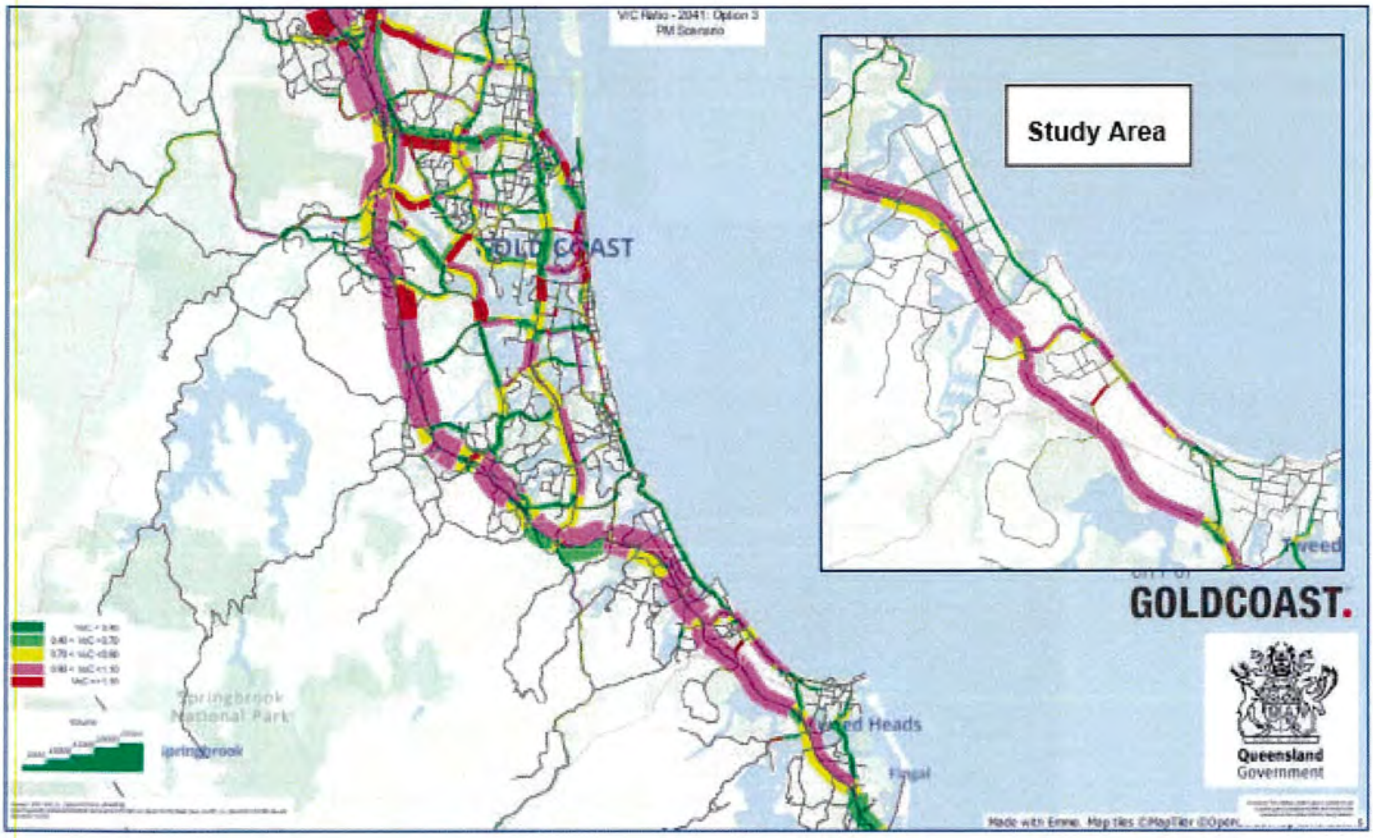


Figure 83 Option 3 – PM Volume on Capacity ratio, 2041

8.5.2.2. Vehicle kilometres travelled (VKT) and Vehicle hours travelled (VHT)

The daily private vehicle kilometres travelled (VKT) and vehicle hours travelled (VHT) results are presented in Table 108 and Table 109, and show that there are decreases in all options compared to the Base Case. The data shows that there are reductions in VKT and VHT for Option 1 and Option 2, but minimal to no change for Option 3. The change in private vehicle travel is significantly greater in Option 1.

Table 108 Total daily private vehicle-kilometres travelled (VKT) ('000)

Year	Base		Option 1		Option 2		Option 3	
	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area
2019	21,773	2,001	-					
2031	27,740	2,732	27,605	2,641	27,715	2,718	27,728	2,728
			(-0.5%)	(-3.3%)	(-0.1%)	(-0.5%)	(0.0%)	(-0.1%)
2041	32,404	3,397	32,244	3,309	32,372	3,386	32,394	3,392
			(-0.5%)	(-2.6%)	(-0.1%)	(-0.3%)	(0.0%)	(-0.1%)

Table 109 Total daily private vehicle-hours travelled (VHT) ('000)

Year	Base		Option 1		Option 2		Option 3	
	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area
2019	514	47.7	-					
2031	673	63.9	669	61.4	673	63.6	673	63.7
			(-0.7%)	(-3.9%)	(-0.1%)	-0.5%	(-0.1%)	(-0.3%)
2041	840	81.9	834	78.8	839	81.5	840	81.8
			(-0.8%)	(-3.8%)	(-0.1%)	(-0.5%)	(-0.0%)	(-0.1%)

8.5.2.3. Private vehicle travel times between key destinations

The average demand weighted private vehicle travel times between a number of key destinations along the Gold Coast Highway are presented in Table 110. The modelling results show that road travel times increase slightly (less than five per cent on average) in Options 1 and 2.

With less than five per cent change compared to the base case this is not considered outside the realm of normal day to day variations in travel time, and therefore the project options in general have reasonably minimal impact to private vehicle travel times.

Table 110 Average travel time between key destinations (minutes)

Journey	2031				2041			
	Base	Option 1	Option 2	Option 3	Base	Option 1	Option 2	Option 3
	Southbound							
Burleigh Heads to Airport	24.7	25.8	26.0	24.7	26.5	26.8	27.1	26.5
Burleigh Heads to Tweed Mall	29.4	29.9	29.2	29.4	29.5	29.6	29.8	29.5
Burleigh Heads to Coolangatta	26.9	28.0	28.1	26.9	28.7	27.9	28.1	28.7
Broadbeach to Coolangatta	38.4	38.8	37.6	38.4	40.1	38.1	38.7	40.0
	Northbound							
Airport to Burleigh Heads	24.6	25.8	26.0	24.6	26.4	27.5	28.1	26.4
Tweed Mall to Burleigh Heads	29.7	30.5	30.7	29.7	31.2	31.9	32.5	31.2
Coolangatta to Burleigh Heads	27.1	28.0	28.2	27.2	28.9	29.7	30.2	28.9
Coolangatta to Broadbeach	37.5	38.2	38.5	37.6	36.7	37.0	37.3	36.7

8.5.3 Public transport user benefits

8.5.3.1. Passenger kilometres travelled and Passenger hours travelled

The daily passenger kilometres travelled (PKT) and passenger hours travelled (PHT) results are presented in Table 111 and Table 112. All options show an increase in PKT (due to more PT travel), with Option 1 showing significantly greater increases than Option 2 and 3. PHT also increases across all options highlighting the increased PT patronage particularly in Option 1 but also in Options 2 and 3.

Table 111 Passenger-kilometres travelled (PKT) ('000)

Year	Base		Option 1		Option 2		Option 3	
	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area
2019	752	64.0						
2031	1,576	109.5	1,739	183	1,621	126.9	1,599	115
			+10.4%	+67.1%	+2.9%	+15.9%	+1.5%	+5.0%
2041	2,023	151.7	2,229	251.9	2,095	186.1	2,047	159.6
			+10.2%	+66.1%	+3.6%	+22.7%	+1.2%	+5.2%

Note: PKT based on in-vehicle travel distance

Table 112 Passenger-hours travelled (PHT) ('000)

Year	Base		Option 1		Option 2		Option 3	
	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area	Whole Model	BH2C Study Area
2019	18.1	1.9						
2031	34.0	3.4	41.0	7	34.5	3.5	34.6	3.5
			+20.8%	+105.9%	+1.7%	+2.9%	+1.9%	+2.9%
2041	43.4	4.8	51.7	9.3	44.5	5.2	44.1	5.0
			+19.0%	+93.8%	+2.4%	+8.3%	+1.4%	+4.2%

Note: PHT based on in-vehicle travel time

8.5.3.2. Public transport travel between key destinations

Table 113 and Table 114 show the AM and PM public transport travel times using a combination of the Route 700 and the LRT between key destinations along the Gold Coast Highway which use the Route 700 and LRT. For both 2031 and 2041, Options 2 and 3 show generally improved travel time between locations due to increased public transport availability by bus and network improvements to facilitate faster running bus services. Option 1 generally shows increased travel times for trips south of Burleigh which is related to the LRT services being scheduled to stop at each stop along the alignment, compared with the bus modes which do not always stop at each location.

The difference in travel times between LRT and bus options (with bus appearing to be significantly faster) is also likely linked to the fact that the model systemically underrepresents bus travel times, along with the stopping patterns discussed above. For public transport trips that travel through Burleigh Heads (i.e., between Broadbeach and Coolangatta) Option 1 still shows significantly slower travel times compared to Option 2 and 3, even with the removal of the transfer between LRT and bus. Overall, it is recommended that public transport travel times are investigated further as part of the next phase of the project.

Table 113 Public Transport travel time between key destinations (minutes) – PM Peak

Journey	2031				2041			
	Base	Option 1	Option 2	Option 3	Base	Option 1	Option 2	Option 3
Southbound								
Broadbeach to Coolangatta	45.32	44.89	39.42	45.01	41.07	46.77	47.12	44.89
Burleigh Heads to Airport	20.15	24.41	13.32	19.92	21.23	24.41	14.68	20.98
Burleigh Heads to Coolangatta	27.43	30.16	21.53	27.12	29.23	30.16	23.18	28.88
Northbound								
Airport to Burleigh Heads	20.00	24.41	15.74	19.71	21.71	24.41	17.43	21.36
Coolangatta to Burleigh Heads	27.09	30.49	19.25	25.62	27.66	30.49	20.95	27.42
Coolangatta to Broadbeach	44.98	44.89	37.14	43.51	45.01	30.49	38.84	44.77

Note: Travel times based on Route 700 and LRT journey (includes wait and walk time of 3.5 minutes)

Table 114 Public Transport travel time between key destinations (minutes) – PM Peak

Journey	2031 Base	Option 1	Option 2	Option 3	2041 Base	Option 1	Option 2	Option 3
	Southbound							
Burleigh Heads to Airport	20.06	24.41	15.14	19.61	21.76	24.41	16.78	21.23
Burleigh Heads to Coolangatta	25.26	30.16	18.54	24.82	27.08	30.16	20.17	25.97
Broadbeach to Coolangatta	43.15	44.89	36.43	42.71	44.97	44.89	38.06	43.86
	Northbound							
Airport to Burleigh Heads	19.92	24.41	15.74	19.71	21.60	24.41	17.43	21.26
Coolangatta to Burleigh Heads	25.42	30.49	19.25	25.09	27.36	30.49	20.95	27.02
Coolangatta to Broadbeach	43.31	44.89	37.14	42.98	45.25	30.49	38.84	44.91

Note: Travel times based on Route 700 and LRT journey (includes wait and walk time of 3.5 minutes)

8.5.3.3. Impact on Gold Coast Light Rail Stages 1 – 3

Figure 84 to Figure 87 show the passenger volumes on the light rail between stations for 2031 and 2041 as well as north and southbound line loadings. All figures show that Options 2 and 3 do not significantly impact light rail ridership compared to the base case, and there is negligible change in passenger volumes at the primary interchange point at Burleigh Heads.

Option 1 shows that a continuous light rail transit line increases overall patronage within existing segments of the line (i.e., Stages 1-3 sections of Gold Coast Light Rail). At Burleigh Heads, there is an increase of approximately 8,500 and approximately 9,500 trips for 2031 and 2041 respectively per day. This increase in patronage diminishes along the transit line, however Broadbeach South sees approximately 4,100 and approximately 4,200 more trips in 2031 and 2041 while Gold Coast University Hospital Station sees approximately 1,100 more trips daily for 2031 and 2041. Delivery of Option 1 generates higher patronage on the existing GCLR network, providing further utilisation and maximisation of the benefits of the existing investment and demonstrating the benefits of a single mode, high quality mass transit network along the Coast.

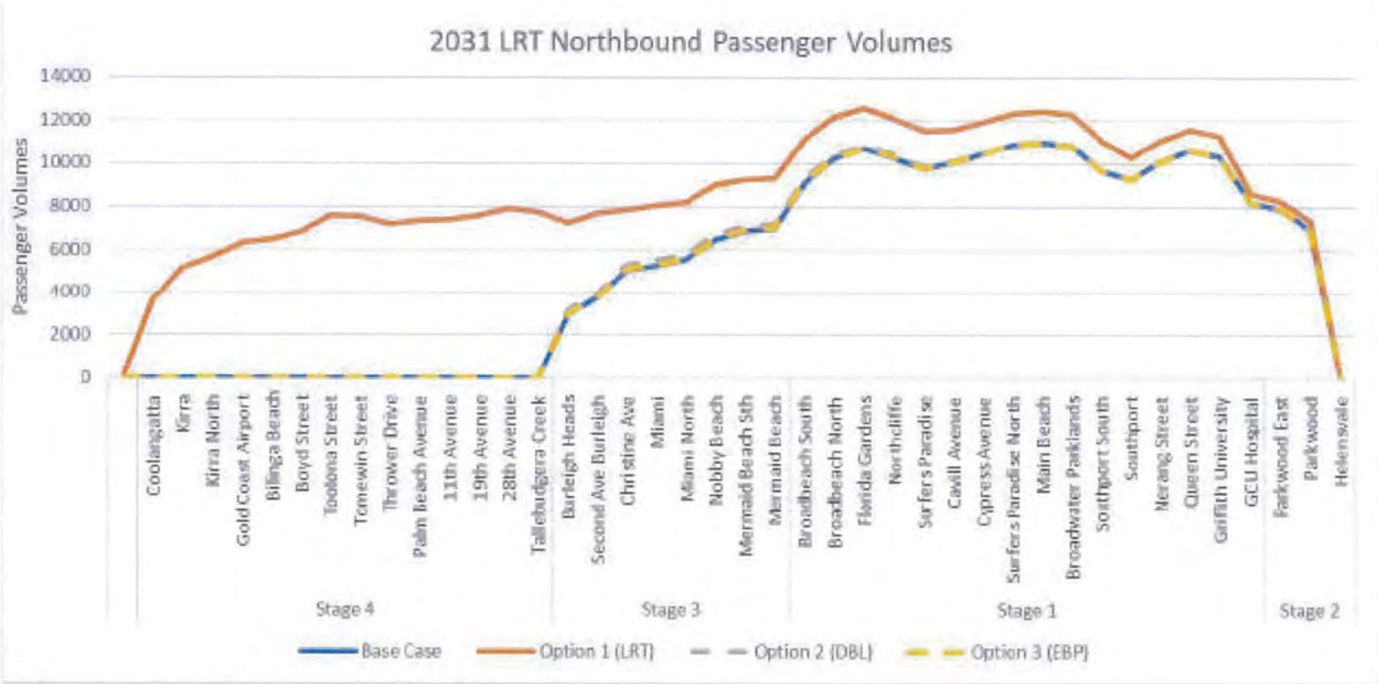


Figure 84 LRT Northbound Volumes (2031, 24hr)

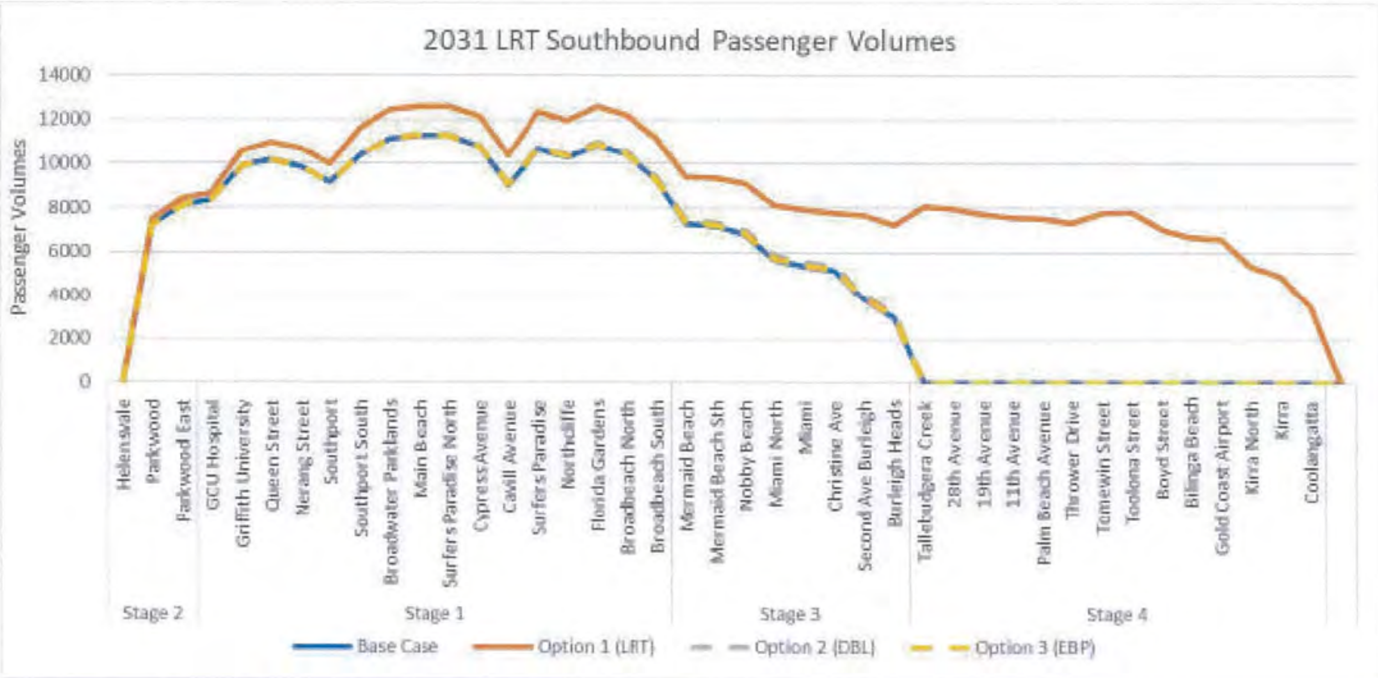


Figure 85 LRT Southbound Volumes (2031, 24hr)

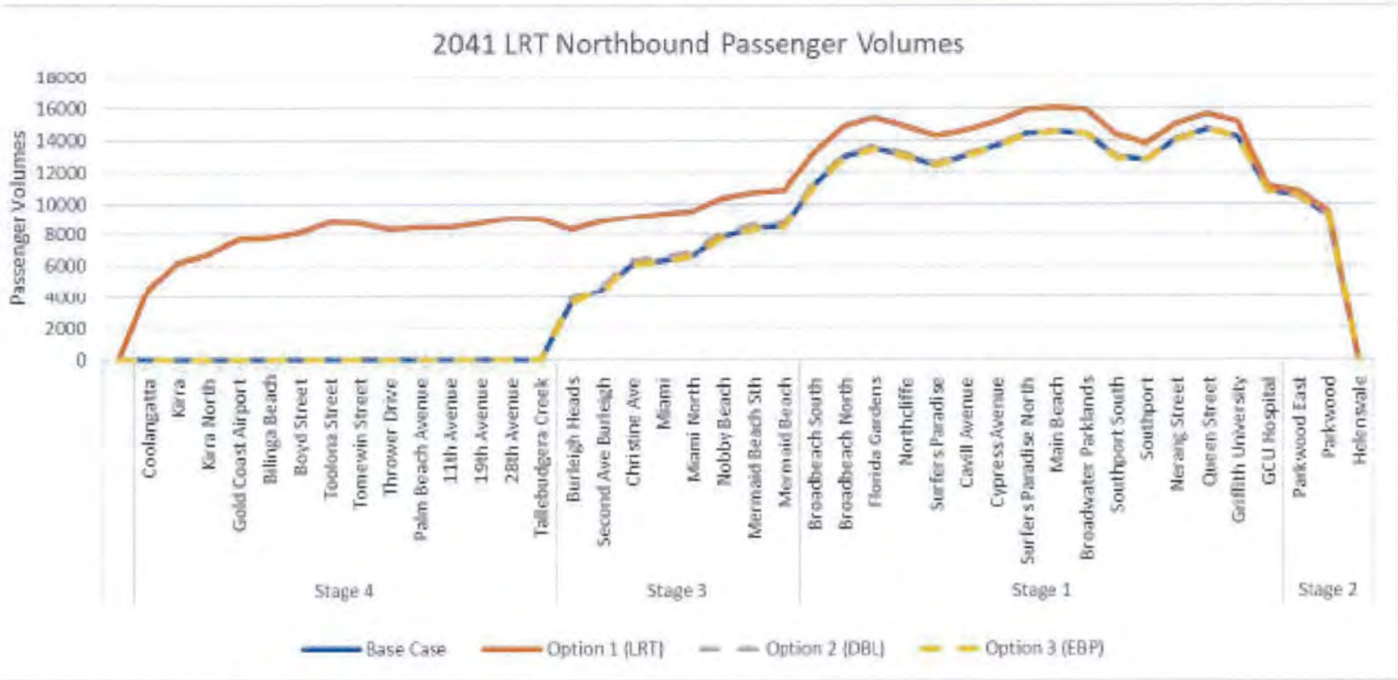


Figure 86 LRT Northbound Volumes (2041, 24hr)

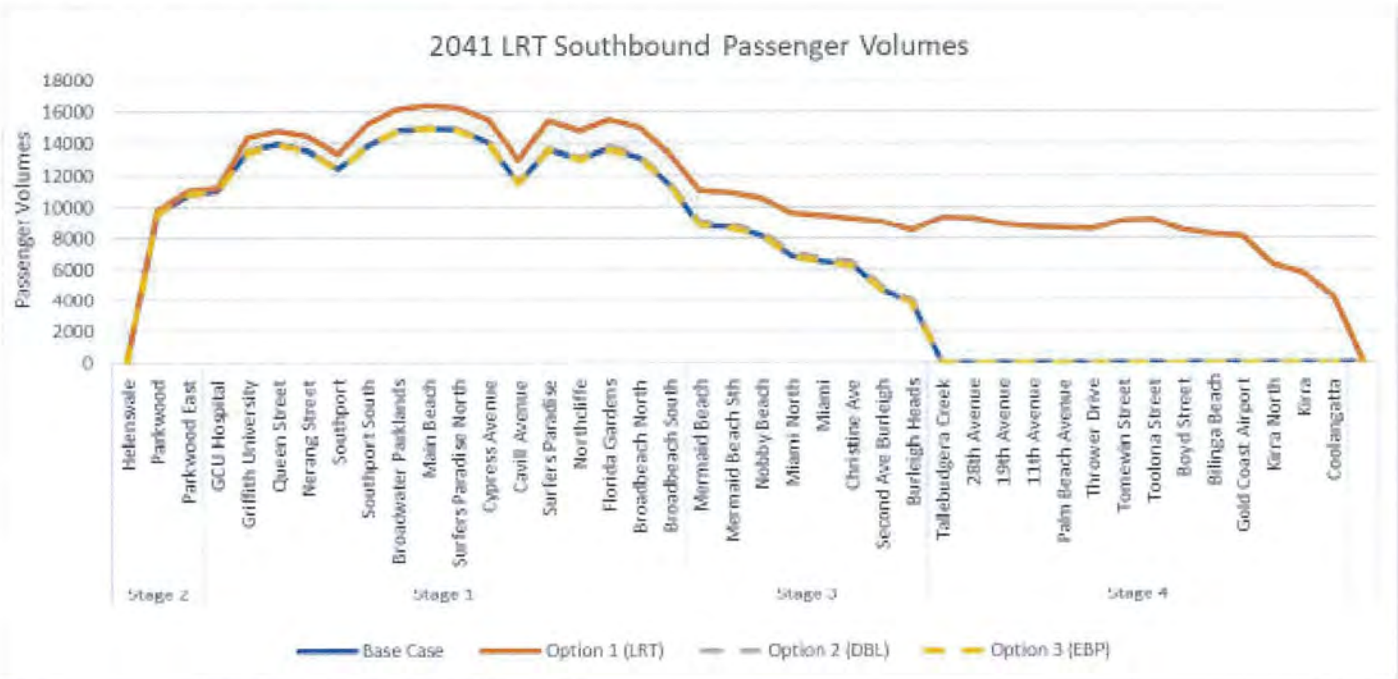


Figure 87 2041 LRT Southbound Volumes (2041, 24hr)

8.5.3.4. Forecast passenger volumes

8.5.3.4.1. Base Case

Figure 88 illustrates the growth in public transport patronage between 2031 and 2041. There is minimal patronage growth south of Burleigh Heads with growth split between bus routes along the Gold Coast Highway and along the Pacific Motorway. From the Burleigh interchange, there is significant growth along the light rail corridor (GCLR1-3) to the heavy rail link at Helensvale. This indicates the attractiveness of a dedicated light rail (and heavy rail) mass transit service over standard bus corridors.

8.5.3.4.2. Option 1

Figure 89 shows a significant rise in daily patronage along the LRT from Burleigh Heads northwards to Helensvale. Along the new LRT corridor, the strategic modelling shows a significant drop in Bus patronage (red) where the 700/777 bus services have been removed and a larger rise in LRT daily patronage indicating a general mode shift towards PT and in particular the LRT at Tallebudgera Creek, Bus volumes decrease by 9617 passengers, while LRT volumes are 18,416, representing a net increase in PT volumes of 8,799. At Burleigh Heads interchange, LRT volumes increase by 9,460 passengers, from 7,473 to 16,932 passengers. Increases in LRT patronage are provided in additional detail in Section 8.5.3.3.

8.5.3.4.3. Option 2

Figure 90 shows a mix in public transport daily patronage along the GC Highway (Currumbin to Coolangatta). There is an adjustment to public transport trips with a reduction in patronage along Reedy Creek Road and an increase in trips moving along Thrower Drive and the M1 towards Robina as a consequence of bus service changes. Across Tallebudgera Creek, PT volumes decrease by 691 on the GC Highway and increase by 2,780 trips on the M1. This is likely due to the assumption in Option 2 of a higher frequency 760 service that attracts patronage from GC Highway – Reedy Creek Road despite the presence of bus lanes on the GC Highway. It suggests that similar patronage benefits to bus lanes could be achieved with improved bus services because congestion-related influences are not significant in the future between Currumbin Creek and Burleigh Heads. There is also an increase in patronage across the border from Tweed Heads. The magnitude of the increases in PT patronage are much lower compared to Option 1.

8.5.3.4.4. Option 3

Figure 91 shows an increase in public transport daily patronage between Tweed Heads South and Coolangatta. Minor changes in other segments of the network are due to bus timetabling changes. Across the Tweed River, PT patronage increases by 1,949, however these trips mostly terminate at Tweed Mall. Along the GC Highway, PT patronage increases by 657 trips.

Overall, Option 1 shows the highest patronage of all options, more than doubling GC Highway daily patronage of the Base Case between Gold Coast Airport and Palm Beach Avenue, and significant increases north of Palm Beach Avenue. Option 2 and Option 3 patronage levels on the GC Highway are influenced by the bus service strategies associated with these options and a small shift in demand towards more western-orientated services is reflected in slightly lower GC Highway patronage than the Base Case, although total public transport usage increases under these options.

Red = less patronage; Green = more patronage; line thickness = relative difference in volume

Figure 88 Base Case Public Transport Patronage Change (2031 vs 2041, 24hr)

Red = less patronage; Green = more patronage; line thickness = relative difference in volume

Figure 89 2041 Public Transport Patronage Change (Option 1 vs Base, 24hr)

Red = less patronage; Green = more patronage; line thickness = relative difference in volume

Figure 90 2041 Public Transport Patronage Change (Option 2 vs Base, 24hr)

Red = less patronage; Green = more patronage; line thickness = relative difference in volume

Figure 91 2041 Public Transport Patronage Change (Option 3 vs Base, 24hr)

8.5.3.5. Forecast transfers

The strategic modelling shows that the majority of passenger transfers in 2031 for the Base Case, Option 2 and Option 3 (the bus-based options) occur at Burleigh Heads Interchange for transfers to/from light rail. Option 2 also shows a high demand (1,383 trips daily) for Queensland and New South Wales bus-to-bus transfers at Griffith Street with bus lanes from there to the north. Figure 92 and Figure 93 illustrate the major PT transfers for the project options in 2031 and 2041, respectively.

Option 1, with light rail continuing south of Burleigh Heads shows its highest bus-to-light rail transfers occurring at Thrower Drive (with a number of east-west bus services terminating there) and at Coolangatta Station as the light rail terminus.

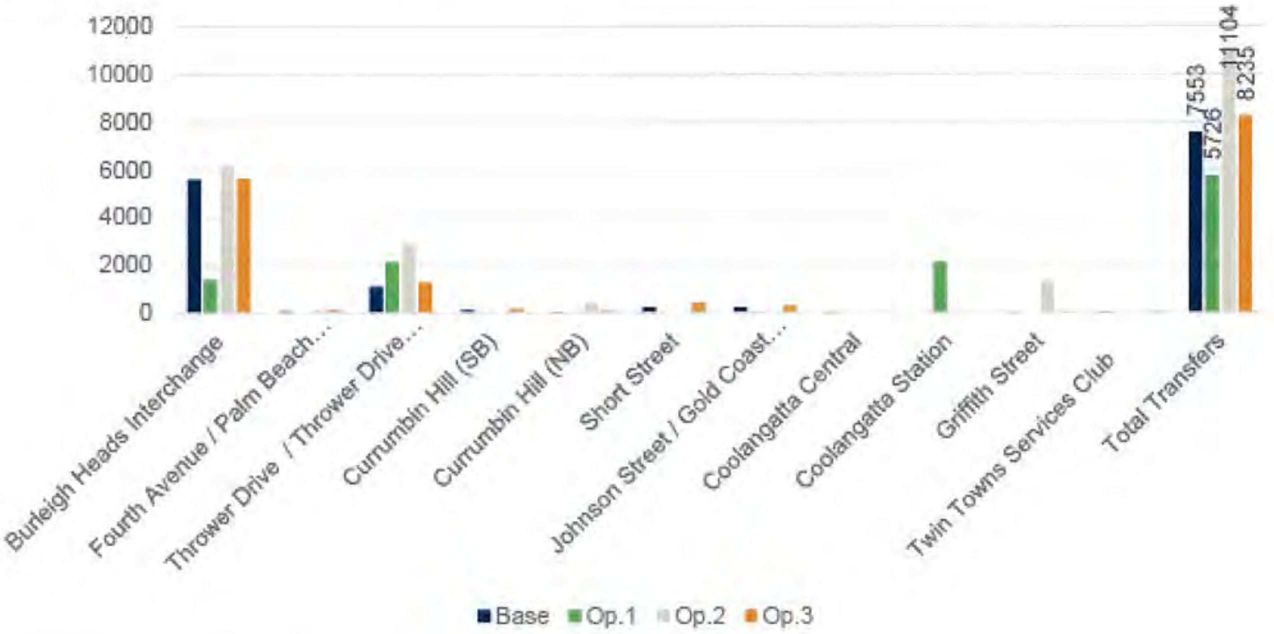


Figure 92 Major PT Transfers - 2031, 24hr

Note: Transfer movements are the sum of the alighting movements and the boarding movements

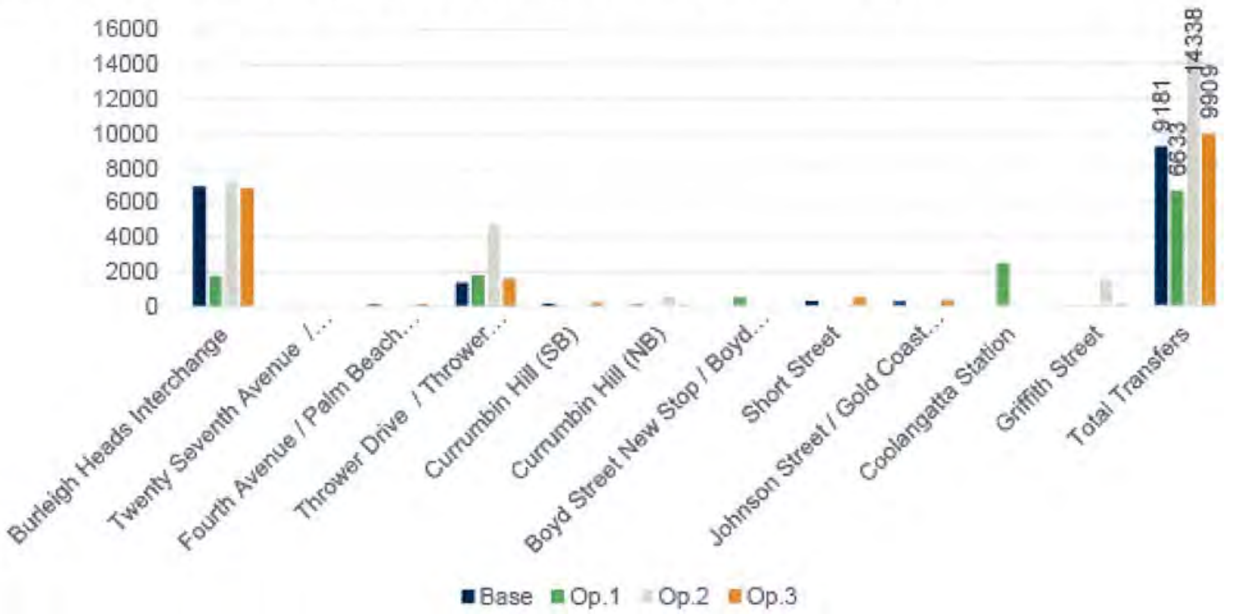


Figure 93 Major PT Transfers - 2041, 24hr

Note: Transfer movements are the sum of the alighting movements and the boarding movements

8.5.4 Cross-Border Trips

As all options increase the public transport availability around the border, the modelling results show an increase in PT mode share for cross-border trips.

Table 115 shows the daily volume of cross-border trips by mode, by option. Total trips increase by 25 per cent and 35 per cent from 2019 for 2031 and 2041 respectively. For both 2031 and 2041, all options result in an increase in cross-border PT trips, however Option 1 attracts the greatest increase, more than doubling the PT mode share (3,616 trips in the Base Case and 7,506 trips in Option 1). Option 1 results in an increase in 3.8 per cent in cross-border PT mode share, Option 2, a 1.4 per cent increase and Option 3, a 0.7 per cent increase demonstrating the significantly greater impact that Option 1 has on transport outcomes and PT mode share.

Table 115 Daily cross-border trips by mode

Metric		Base Case	Option 1	Option 2	Option 3
2019	**Total person-trips**	**87,118**	-	-	-
	Private vehicle trips	80,580	-	-	-
	Public transport trips	2,936	-	-	-
	PT Mode Share (%)	3.4%	-	-	-
2031	**Total person-trips**	**108,862**	**109,903**	**109,295**	**109,024**
	Private vehicle trips	100,792	97,980	99,873	100,234
	Public transport trips	3,616	7,506	4,976	4,346
	PT Mode Share (%)	3.3%	6.8%	4.6%	4.0%
2041	**Total Trips**	**117,828**	**118,862**	**117,699**	**118,064**
	Private vehicle trips	108,290	104,866	106,536	107,728
	Public transport trips	4,093	8,676	5,757	4,906
	PT Mode Share (%)	3.5%	7.3%	4.9%	4.2%

Note: These trips are those from New South Wales to Queensland or Queensland to New South Wales. Each leg of a return trip is counted individually.

8.5.5 Airport Trips

As a major destination within the study area, the Gold Coast Airport is a major attractor of trips and is expected to grow in demand over time. As Option 1 provides a station directly within the airport, this results in a significant increase (+1,027 trips per day) in the attractiveness of public transport for airport related trips and drives the significant improvement in public transport mode share from 5.8 per cent in the base case to 8.7 per cent and 9.1 per cent in 2031 and 2041, respectively, as shown in Table 116.

Table 116 Daily airport trips by mode

Metric		Base Case	Option 1	Option 2	Option 3
2019	**Total person-trips**	**20,014**	-	-	-
	Private vehicle trips	18,876	-	-	-
	Public transport trips	1,138	-	-	-
	PT Mode Share (%)	5.7%	-	-	-

Metric		Base Case	Option 1	Option 2	Option 3
2031	**Total Trips**	**34,186**	**34,493**	**34,311**	**34,201**
	Private vehicle trips	32,210	31,490	31,948	32,156
	Public transport trips	1,976	3,003	2,364	2,045
	PT Mode Share (%)	5.8%	8.7%	6.9%	6.0%
2041	**Total Trips**	**54,228**	**54,845**	**54,494**	**54,271**
	Private vehicle trips	51,083	49,836	50,564	50,975
	Public transport trips	3,145	5,009	3,930	3,296
	PT Mode Share (%)	5.8%	9.1%	7.2%	6.1%

8.6 Scenario and sensitivity analysis

A range of sensitivity tests were also defined for modelling and evaluation purposes.

The sensitivity tests were based on including:

- Land use modelling sensitivity tests based around the 'probable base case' (i.e., without project in place) and 'project case (i.e., land use uplift case with light rail)
- Park and Ride provision at three locations in Option 1 including:
  - Near Thrower Drive Station: 100 spaces using informal on and off-street parking and the Palm Beach Parklands car park
  - Near Boyd Street Station: 300 spaces using a formal PnR
  - Near Musgrave Street Station: 200 spaces using a formal PnR.

8.6.1 Land Use Modelling Sensitivity (Probable Case)

The modelling results reported in previous sections are based upon the demographics provided from the QGSO 2018 medium forecast. As discussed in Chapter 8, it is reasonable to expect that there would be a land use response within the BH2C Study Area as a result of the broader demographic growth expected on the Gold Coast and therefore a scenario analysis has been undertaken on the 'probable' demand scenarios.

The following subsections compare the 'probable base case' against the QGSO base case to identify any changes to transport outcomes, and also compares the 'project case (i.e., land use uplift case with light rail) against the 'probable base case'.

At a high level, the 'probable base case' (i.e., without a project in place) results in a redistribution of population compared to the QGSO forecast from Palm Beach, Currumbin, and Tugun to other areas of the Gold Coast, like Southport and Coolangatta, whilst the 'project case' (i.e., land use uplift case with light rail) results in noticeable population increases immediately adjacent to the light rail corridor within the BH2C Study Area. For all forecasts total population over the Gold Coast LGA has been held constant, however total households vary minimally due to the different assumptions adopted.

It is noted that the study area reported on for the transport modelling outcomes differs slightly from the study area used in Chapter 8, which included an additional section of Burleigh Heads.

8.6.1.1. Modelling outcomes of Probable Base Case vs QGSO Base Case

Table 117 provides a detailed breakdown of model wide statistics comparing models run using QGSO and probable base case demographics. Based on the modelling, the following observations can be made:

- There are minor differences in total trips generated with percentages between 0.00 per cent and 0.01 per cent in 2031 and -0.05 per cent in 2041.
- There is an insignificant difference between overall public transport mode share in Option 1, Option 2 and Option 3. The public transport patronage increases between 0.04 per cent and 0.12 per cent in 2031 and decreases between -0.31 per cent and 0.07 per cent in 2041 resulting in no discernible difference in public transport mode share.
- Active transport sees the most significant change with an increase in trips of approximately 0.11 per cent in 2031 and 0.27 per cent in 2041.

In summary, when comparing between the probable base case and QGSO there was no notable impact to public transport mode share or patronage between any of the project options tested, which suggests that the differences between QGSO and the 'probable base case' are largely insignificant in terms of impact on the project options highlights that the project options are not highly sensitive to demographic changes.

Table 117 Difference table – Daily Model Statistics using QGSO vs Probable Base Case

QGSO vs Probable		Base			Option 1			Option 2			Option 3		
		QGSO	Diff %	Probable	QGSO	Diff %	Probable	QGSO	Diff %	Probable	QGSO	Diff %	Probable
2031	Total person-trips	2,518,900	0.00%	2,519,015	2,519,492	0.00%	2,519,608	2,519,681	0.01%	2,519,890	2,519,040	0.01%	2,519,166
	Private vehicle person-trips	2,132,608	-0.01%	2,132,414	2,117,103	-0.01%	2,116,823	2,128,842	-0.01%	2,128,624	2,130,466	-0.01%	2,130,230
	Public transport person-trips	121,612	0.01%	121,626	138,137	0.08%	138,250	125,932	0.12%	126,079	124,006	0.04%	124,051
	Active transport person-trips	264,680	0.11%	264,975	264,253	0.11%	264,534	264,907	0.11%	265,187	264,568	0.12%	264,885
	Public transport modal split (%)	4.8%	0.00%	4.8%	5.5%	0.00%	5.5%	5.0%	0.01%	5.0%	4.9%	0.00%	4.9%
	Active transport modal split (%)	10.5%	0.01%	10.5%	10.5%	0.01%	10.5%	10.5%	0.01%	10.5%	10.5%	0.01%	10.5%
	VHT	673,009	-0.02%	672,841	668,515	-0.03%	668,288	672,482	-0.03%	672,287	672,582	-0.03%	672,394

QGSO vs Probable		Base			Option 1			Option 2			Option 3		
		QGSO	Diff %	Probable	QGSO	Diff %	Probable	QGSO	Diff %	Probable	QGSO	Diff %	Probable
2041	VKT	27,740,028	-0.01%	27,738,220	27,605,004	-0.01%	27,601,888	27,714,660	-0.01%	27,712,272	27,727,902	-0.01%	27,724,796
	PHT	33,971	-0.04%	33,958	41,050	-0.01%	41,044	34,542	-0.07%	34,517	34,613	-0.04%	34,600
	PKT	1,575,861	0.01%	1,575,996	1,738,968	0.02%	1,739,324	1,621,474	0.13%	1,623,603	1,599,393	0.04%	1,599,958
	Total person-trips	2,941,119	-0.05%	2,939,551	2,942,547	-0.05%	2,940,989	2,942,451	-0.05%	2,941,004	2,941,347	-0.05%	2,939,796
	Private vehicle person-trips	2,457,190	-0.09%	2,454,954	2,438,507	-0.08%	2,436,629	2,451,943	-0.09%	2,449,796	2,455,221	-0.09%	2,453,023
	Public transport person-trips	155,586	-0.11%	155,415	176,649	-0.31%	176,096	162,033	-0.07%	161,924	157,915	-0.11%	157,747
	Active transport person-trips	328,343	0.26%	329,183	327,390	0.27%	328,264	328,475	0.25%	329,284	328,211	0.25%	329,026
	Public transport modal split (%)	5.29%	0.00%	5.29%	6.00%	-0.02%	5.99%	5.51%	0.00%	5.51%	5.37%	0.00%	5.37%
	Active transport modal split (%)	11.16%	0.03%	11.20%	11.13%	0.04%	11.16%	11.16%	0.03%	11.20%	11.16%	0.03%	11.19%

QGSO vs Probable	Base			Option 1			Option 2			Option 3		
	QGSO	Diff %	Probable	QGSO	Diff %	Probable	QGSO	Diff %	Probable	QGSO	Diff %	Probable
VHT	840,373	-0.09%	839,651	833,603	-0.08%	832,959	839,506	-0.10%	838,686	839,985	-0.09%	839,268
VKT	32,404,044	-0.07%	32,380,870	32,243,504	-0.07%	32,221,020	32,371,798	-0.08%	32,345,304	32,394,432	-0.08%	32,369,820
PHT	43,443	-0.26%	43,329	51,698	-0.43%	51,476	44,504	-0.28%	44,379	44,062	-0.27%	43,942
PKT	2,022,877	-0.13%	2,020,205	2,228,718	-0.25%	2,223,142	2,095,037	-0.02%	2,094,577	2,047,445	-0.12%	2,044,949

Note: Option 1 results are using the Probable base case demographics, not the Probable Option 1 land use demographic forecast

8.6.1.2. Modelling outcomes of Project Case (Land use uplift case with Option 1 light rail) vs. Probable Base Case

Strategic transport infrastructure like light rail can have city shaping effects which result in land use changes. Based on the probable demographic forecast, a revised demographic set referred to as the 'project case' has been developed based around the implementation of Option 1.

The 'project case' had a large redistribution of population and employment:

- From: Coomera, Pimpama and the western halves of Palm Beach and Currumbin
- To: Coolangatta and the eastern parts of Palm Beach, Currumbin and Tugun when compared to the QGSO demographics.

Table 118 (illustrated in Figure 94 and Figure 95) provides a comparison of the network statistics for the 'probable base case' and 'project case'. Based on the modelling, the following observations can be made:

- With the increased population directly along the new light rail corridor, there is an increase of ~19,000 and ~25,000 PT trips for 2031 and 2041 respectively. Public transport mode share increases from 4.8 per cent to 5.6 per cent (5.5 per cent without land use) in 2031 and 5.3 per cent to 6.1 per cent (6.0 per cent without land use) in 2041. This is primarily driven due to increased proximity to PT services along the LRT corridor.
- Along with the increased public transport patronage, Walk-to-PT trips increase by 25.2 per cent and 26.45 per cent for 2031 and 2041 respectively while resident Drive-to-PT trips decrease by 0.64 per cent and increase by 0.95 per cent in 2031 and 2041. This reflects the improved PT accessibility of the LRT.

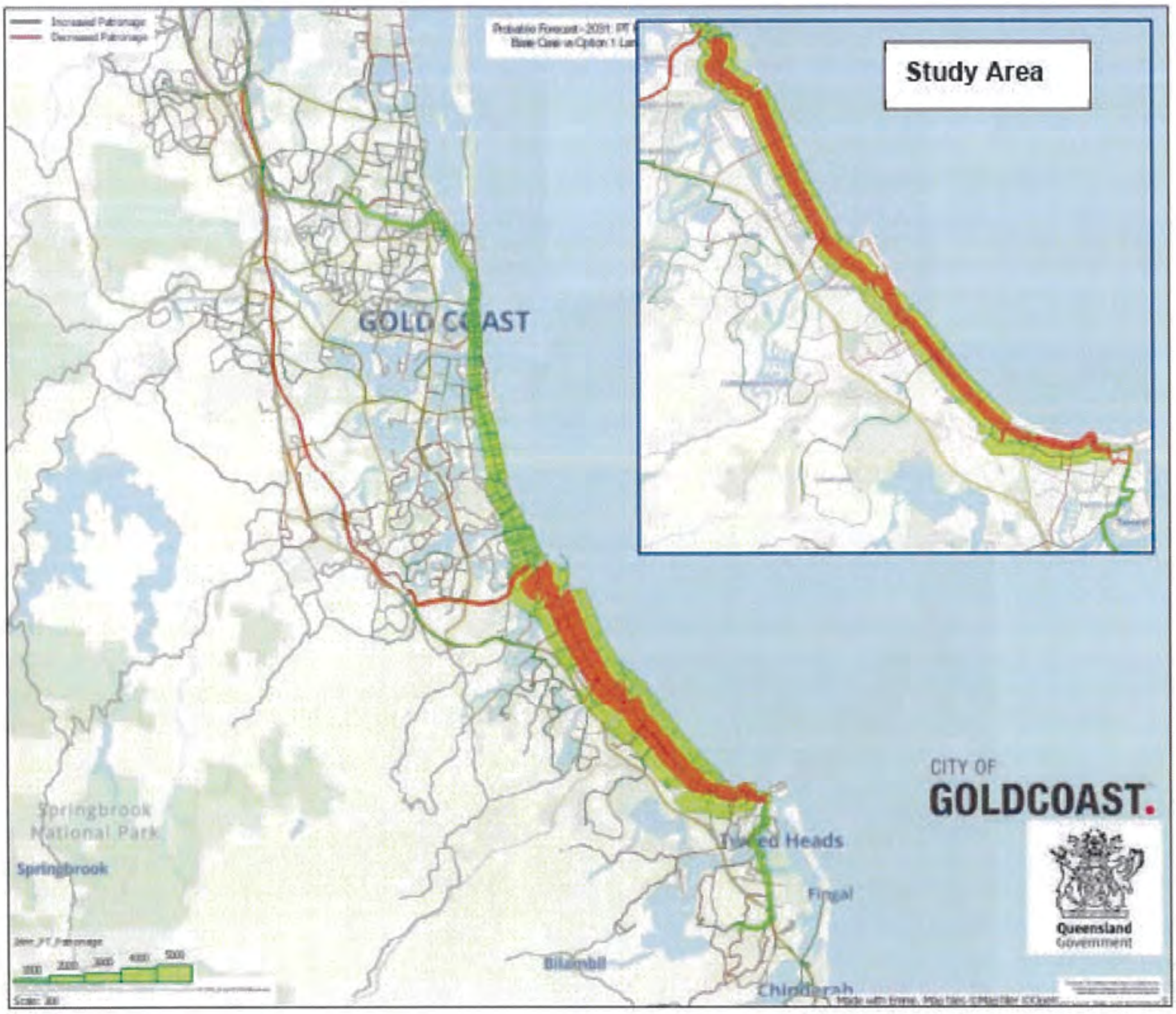
In summary, the land use modelling outcomes for the 'project case' demonstrated that:

- The introduction of a light rail service drives a significant increase in public transport trips while decreasing car usage. This is driven by the increase in population and employment directly adjacent to the light rail corridor because of the land use impacts associated with light rail.
- Improved accessibility of public transport drives significant growth in resident Walk-to-PT trips without major increases in Drive-to-PT trips.

Table 118 Difference table – Probable Base Case vs Project Case (i.e. land use uplift case with light rail)

GCSTM-MMv2.3 Network Statistic (24hr)		Base Case	Change	Diff %	Project Case
2031	Total person-trips	2,519,015	1,202	0.05%	2,520,216
	Private vehicle person-trips	2,132,414	-17,583	-0.82%	2,114,831
	Public transport person-trips	121,626	19,082	15.69%	140,708
	Active transport person-trips	264,975	-297	-0.11%	264,677
	Public transport modal split (%)	4.83%	0.75%	0.75%	5.58%
	Active transport modal split (%)	10.52%	-0.02%	-0.02%	10.50%
	VHT	672,841	-4,006	-0.60%	668,834
	VKT	27,738,220	-116,628	-0.42%	27,621,592
	PHT	33,958	8,126	23.93%	42,084
	PKT	1,575,996	191,495	12.15%	1,767,490
	Walk to PT Trips (resident only)	71,021	17,888	25.19%	88,909
	Drive to PT Trips (resident only)	3,955	-25	-0.64%	3,929

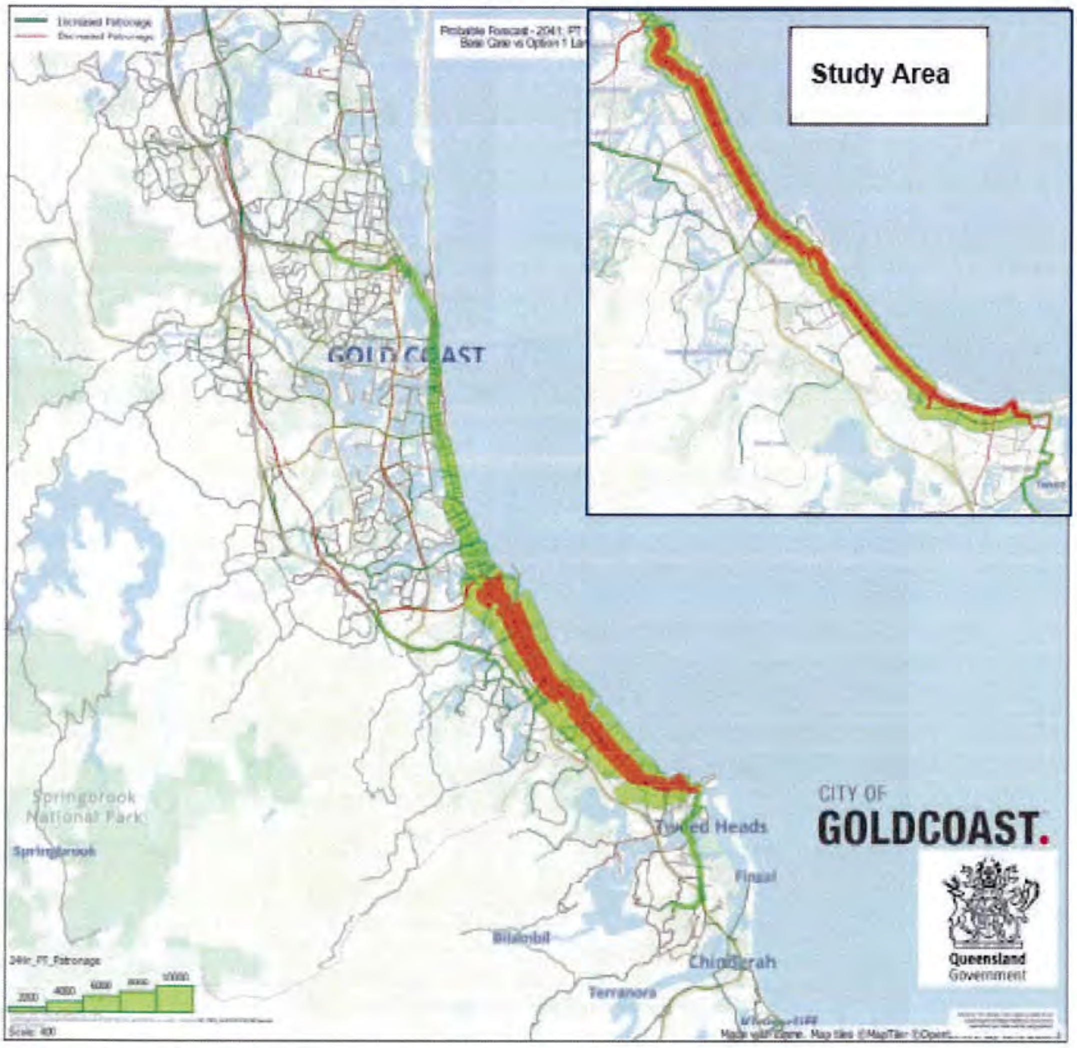
	GCSTM-MMv2.3 Network Statistic (24hr)	Base Case	Change	Diff %	Project Case
2041	Total person-trips	2,939,551	4,316	0.15%	2,943,867
	Private vehicle person-trips	2,454,954	-19,716	-0.80%	2,435,238
	Public transport person-trips	155,415	25,284	16.27%	180,699
	Active transport person-trips	329,183	-1,253	-0.38%	327,929
	Public transport modal split (%)	5.29%	0.85%	0.85%	6.14%
	Active transport modal split (%)	11.20%	-0.06%	-0.06%	11.14%
	VHT	839,651	-5,172	-0.62%	834,480
	VKT	32,380,870	-94,850	-0.29%	32,286,020
	PHT	43,329	10,100	23.31%	53,429
	PKT	2,020,205	256,203	12.68%	2,276,407
	Walk to PT Trips (resident only)	87,117	23,038	26.45%	110,155
	Drive to PT Trips (resident only)	4,847	45	0.92%	4,892



Red = less patronage; Green = more patronage; line thickness = relative difference in volume

Figure 94 2031 Forecast PT Patronage – Probable Base Case vs Project Case[122]

[122] Note: The reduction in trips shown between Tweed Heads and Burleigh Heads is related to the removal of existing bus trips on Route 700 and 777. The green where there is no red is additional PT patronage



Red = less patronage; Green = more patronage; line thickness = relative difference in volume

Figure 95 2041 Forecast PT Patronage – Probable Base Case vs Project Case[123]

8.6.2 Park and Ride Provision Sensitivities

The GCSTM includes provision for a number of formal Park and Ride facilities throughout the Gold Coast (i.e. at heavy rail stations), however the model does not cater for informal Park and Ride. As new Park and Ride facilities are often associated with mass transit improvement projects a sensitivity test was undertaken for Option 1 to determine the impact of three potential sites for 'formal' PnR provision:

- Thrower Drive Station: 100 spaces
- Boyd Street Station: 300 spaces
- Musgrave Street Station: 200 spaces.

The provision of a total of 600 Park and Ride spaces for light rail increased public transport person trips by 459 trips. The 24hr private vehicle access (IN) demands to the Park and Ride sites in 2041 are:

- Thrower Drive: 199 vehicles IN
- Boyd Street: 279 vehicles IN

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[123] Note: The reduction in trips shown between Tweed Heads and Burleigh Heads is related to the removal of existing bus trips on Route 700 and 777. The green where there is no red is additional PT patronage

- Musgrave Avenue: 250 vehicles IN
- Total: 728 vehicles IN.

The results suggest that if Park and Ride is provided in the locations and at the levels proposed, about half of the Park and Ride demand generated on light rail switches entirely from another mode and about half would have accessed light rail anyway, using another method.

It is noted that these tests do not rule out the need for Park and Ride facilities to be eventually included in scope of future public improvements in the study area, and these can be further investigated in future stages of the project.

8.7 Conclusion of the strategic transport assessment

Between 2031 and 2041, public transport modal share across the Gold Coast is forecast to increase from 4.8 per cent to 5.3 per cent. Within the BH2C study area (south of Burleigh Heads, west to the M1 and north of the Tweed River) total trips increase by 14% and public transport modal share increases from 5.5 per cent to 5.8 per cent. This suggests that there is opportunity for growth in public transport in the southern corridor, if better public transport options are provided for network users.

Of the project options tested, daily public transport modal share across Gold Coast model area (incl. Northern Tweed) increases from 5.3 per cent in the Base Case to 6.0 per cent with Option 1 (a 13 per cent improvement), to 5.5 per cent with Option 2 (a 3.7 per cent improvement) and to 5.4 per cent with Option 3 (a 1.8 per cent improvement). When considering the project study area only, the base case shows a public transport modal share of 3.4 per cent which increases significantly to 9.1 per cent with Option 1 (a 167 per cent improvement), moderately to 4.6 per cent with Option 2 (a 35 per cent improvement) and remains at 3.7 per cent with Option 3.

Road traffic congestion is reduced in Option 1 with a reduction of 6,000 VHT in 2041. Option 2 and 3 show negligible differences to the base case in 2041. There is also a significantly greater saving of VKT in Option 1 of 161,000 kilometres in 2041, compared with 35,000 kilometres and 10,000 kilometres saved in Options 2 and 3 respectively.

Table 119 presents some key network metrics for each option when compared with the relevant base case. This further demonstrates that Option 1 results in the most significant reduction of car trips, the highest increase in public transport trips and the best improvement in use of GCLR stages 1-3, within both the model area and study area when compared to Option 2 and Option 3. The 'project case' with urban uplift from inclusion of Option 1 results in similar trends to Option 1 and demonstrates that improved land use within the study area results in an overall improvement to the public transport patronage and usage of the GCLR stages 1-3. It is noted that within the study area, car trips increase under this project case, however this is a natural result of more people residing within the study area and increasing the total number of person trips.

Overall, from a modelling perspective Option 1 can be determined to perform the best based on the metrics assessed (mode share, VKT, transfers, largest change in car trips, improvement to GCLR stages 1-3 etc.), and significantly increases the public transport mode share in the study area by 2041.

On the advice of the project's land use adviser, a project case land use uplift scenario resulting from the introduction of light rail under Option 1 only was also undertaken and determined to result in higher public transport patronage for Option 1 and higher numbers of passengers using the existing Stages 1, 2 and 3 of Gold Coast Light Rail.

The land use uplift scenarios were shown to be important to improving the overall performance of public transport and reduced overall vehicle travel in the study area.

Table 119 Daily Summary of Options vs. Base – 2031 and 2041

Metric		Base Case (for reference)		Option 1[1]		Option 2[1]		Option 3[1]	
		Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area	Whole Model	Study Area
2031	Change in car trips	2,132,608	184,866	-15,505	-11,297	-3,766	-2,099	-2,142	-678
	Passengers using GCLR (Stages 1-3)	57,270	-	+10,807	-	+456	-	+85	-
	Change in public transport trips	121,612	12,167	+16,525	+11,668	+4,320	+2,134	+2,394	+777
2041	Change in car trips	2,457,190	208,766	-17,354	-11,660	+2,837	-2,131	+6,115	+407
	Passengers using GCLR (Stages 1-3)	75,289	-	+11,552	-	+466	-	-67	-
	Change in public transport trips	155,586	14,550	+19,446	+14,677	+18,705	4,153	+14,587	+1,093

[1] *Compared to QGSO Base Case*

9. Land use analysis

The purpose of this chapter is to present the population and employment projections for the project as an input to the transport demand modelling and economic appraisal. The chapter is focused on the outcomes of the land use analysis undertaken for the PE, with the detailed methodology and assumptions that underpin these outcomes documented in the Technical Report at Appendix I: Land use report, which should be read in conjunction with this chapter. This chapter includes an overview of the scenarios considered, an outline of the methodology applied and the analysed forecasts, including:

- Introduction
- Methodology
- Base Case land use forecasts
- Project Case land use forecasts
- Conclusions.

9.1 Introduction

This section provides an overview of the purpose of the Land Use Case Analysis (LUCA) project, defines the scenarios being considered in the analysis and presents the Study Area for the assessment.

9.1.1 Purpose

The purpose of the LUCA project was to forecast the additional population and employment attributable to investment in public transport in the BH2C corridor over the period 2026 to 2041, as an input to transport demand modelling and economic appraisal.

Figure 96 presents a stylised representation of the conceptual framework used to inform this analysis. Mass transit provides a substantial improvement in public transport customer amenity, which also increases market take-up within current planning controls. This is due to increased demand to live and work near light rail facilities and is typically reflected through higher property values around light rail stations. The additional public transport capacity provided by mass transit may also enable changes to planning controls which increase the upper limit for growth.

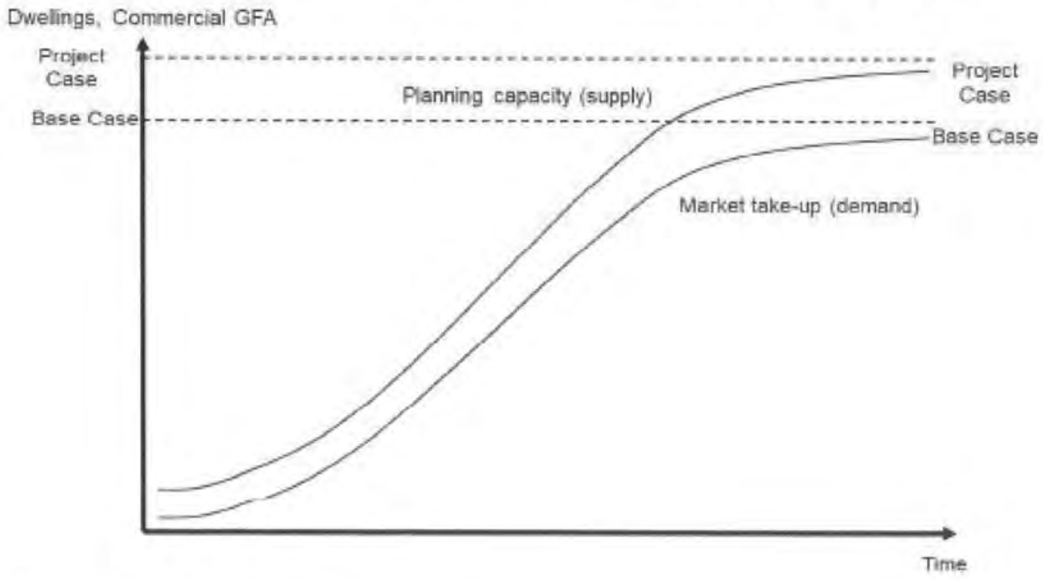

Figure 96 Stylised framework for land use change

9.1.2 Scope and Study Area

The scope of this analysis is limited to headline indicators within the Study Area defined for the LUCA project (Figure 97 below) which includes dwellings, commercial floorspace, employment, and population projections (although, there is also redistribution of Local Government Infrastructure Plan version 2 (LGIP2) forecasts outside the Study Area to maintain control totals for the City of Gold Coast). The analysis is undertaken at the lot level and then aggregated to the Statistical Area 2 (SA2) level for the Study Area and corresponding travel zones for input to transport demand modelling.

In relation to the application of the Study Area defined for the LUCA it is noted that:

- The northern part of the Study Area overlaps with the catchment for GCLR Stage 3, therefore the LUCA project forecasts have been manually adjusted to exclude potential double counting
- The Gold Coast Airport extends beyond the Study Area; however, the full extent of the Gold Coast Airport Masterplan area has been considered.
- The LUCA project aligns with the PE study area which does not extend into Tweed Heads. As the northern Tweed Heads is within a walking catchment of the southernmost stations in the Coolangatta precinct there is an opportunity to consider land use outcomes generated by the improved public transport services.

Figure 97 BH2C LUCA project Study Area

9.1.3 Land use guidelines

The LUCA project methodology has been developed to meet the requirements of the ATAP Guidelines for Land Use Benefits (Module 08) and the IAAF and IA Guide to Economic Appraisal (Appendix C Land Use Impacts).

9.2 Methodology

Figure 98 presents an overview of the land use methodology which is undertaken at the lot level and then aggregated to SA2s for the LUCA project Study Area and travel zones for transport demand modelling. Extensive detail on each step of the methodology, and how it aligns and responds to the requirements of the relevant guidelines, is included in Appendix I: Land use report.

This figure has been removed as it contains commercially sensitive information.

Figure 98 Land use methodology overview

The methodology applied has been designed specifically to ensure that there is a clear ability to attribute any changes to light rail. The land value uplift that isolates the impact of proximity to light rail while controlling for other impacts such as zoning, proximity to the coast, proximity to waterways and proximity to main roads (that is, the factors that the Valuer-General uses to estimate unimproved land values) and changing no other assumptions in the project case development feasibility modelling except land values ensures that any uplift claimed is directly attributable to light rail.

The land use analysis has undergone an assurance process led by the City with appropriate SME review and endorsement.

9.2.1 Modal assessment

The LUCA project focuses on LRT based on an assessment of transport-related drivers of land use. This land use modal assessment was prepared to be consistent with the ATAP guidelines and the IAAF. It concluded that bus options may support or accelerate planned growth but are unlikely to unlock additional growth in the same way as by increasing market take-up of existing planning capacity.

Further, bus lanes cannot provide the step change in transport amenity or capacity required to catalyse land use change. Although there is some evidence of land value uplift from proximity to busways and similar infrastructure[124], there is also evidence from Sydney that uplift from this is attributable to potential changes to planning controls rather than improved accessibility or amenity[125] and evidence from Brisbane of significant variability in land value impacts across the city including large areas with negative impacts[126]. Bus lanes would improve reliability by separating buses from general traffic but would not provide a sufficient step-change in amenity or capacity to have any impact on land use change. Bus lanes

[124] See, for example, Smith et al, 2015; cited in Infrastructure and Transport Ministers (2021), "Australian Transport and Assessment and Planning Guidelines, Module 08: Land-use benefits of transport initiatives", p41.
[125] LUTI Consulting and Mecone (2016) 'Transit and Urban Renewal Value Creation: Hedonic Price Modelling Assessment of Sydney's Key Transit and Transit-Oriented Urban Renewal Investments (2000-2014), Table 26, p101.
[126] Yen (2016), "Residential Property Value Impacts of Proximity to Transport Infrastructure: An Investigation of Bus Rapid Transit and Heavy Rail Networks in Brisbane"

are not considered to provide a "bus rapid transit solution" and lack the priority and permanence necessary to engender additional land use uplift by virtue of their delivery. As noted by ATAP: "While bus lanes provide some priority to buses, these do not function as a dedicated running way due to many legitimate and de facto uses of the bus lane by other modes."[127].

As such, the Base Case and Project Case land use forecasts for bus options are not expected to be materially different and only LRT is included in forecasts of alternative land use outcomes in the Project Case.

9.2.2 Cases and scenarios

The purpose of the analysis is to isolate the additional land use uplift attributable to LRT and considers two cases:

- **Base Case** – Land use forecasts excluding light rail and constrained by current, committed and funded transport infrastructure which impacts both demand (that is, market take-up of available planning capacity as reflected in property values) and supply (that is, the ability to change planning controls such as height limits, density or zoning to increase the potential for further growth).
- **Project Case** – Land use forecasts including light rail, which re-estimate development feasibility including increased land values as a result of proximity to light rail stations.

The analysis undertaken is for the PE stage with a number of scenarios considered and will be subject to more detailed assessment in the Business Case Development stage to fully realise identified opportunities from land amalgamation, developer incentives, consistent height limits or rezoning. The following scenarios are considered most likely to be realised in practice and so are the focus of this chapter:

- **Conservative Scenario** – Property values and construction costs are assumed to be reflective of historic trends, with correction for significant short-term escalation from COVID-19 which is not expected to persist throughout the 20-year horizon for these forecasts.
- **Probable Scenario** – Growth in property values (+8 per cent[128]) is assumed to exceed growth in construction costs (-8 per cent) over the longer-term improving estimated development feasibility.

The analysis also presents a **Demand Constrained Scenario** as a downside sensitivity test, assuming higher construction costs (+8 per cent) and lower property values (-8 per cent) over the longer-term[129], lower land value uplift form light rail (-25 per cent) and no complementary changes to planning controls (0 per cent reinvestment).

The probable scenario reflects the most likely outcome based on current known constraints and opportunities and is used as the core input into the economic analysis.

9.2.3 Key assumptions

Table 120 presents key parameter assumptions applied in development feasibility modelling which are based on construction costs from the Rawlinsons Australian Construction Cost Handbook (2022), an allowance for additional development 'soft costs' (e.g. architecture, engineering, project management, accounting, legal and financing), property sales data (Valuer-General, RP Data, realestate.com.au and Colliers Research) and a minimum risk-adjusted rate of return for a developer to undertake a project.

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[127] Australian Transport Assessment and Planning Guidelines. O9 BRT and LRT options assessment and cost-benefit analysis. 2021.p 11.
[128] Base Case end sale revenue and construction costs have been adjusted to reflect the mid-point estimate of the residential property price index and the producer price index (output to construction) between a period of 2019 and 2022. For the producer price index, output to construction is used rather than construction inputs as this is more reflective of what would be passed onto the consumer in the property market. Variances of around 8% in the scenarios reflect approximations of the upper bound of this growth and a downside sensitivity test of the impact of these trends reversing.
[129] Lower forecast supply of dwellings and gross floor area in this scenario is not expected to significantly drive up prices as there is no evidence of supply side constraints in the PUG Model version 1.0 (based on the difference between the ultimate capacity and LGIP2 scenario) and this scenario assumes lower demand for market take-up of available capacity.

Table 120 Development cost parameter assumptions

Parameter	Value
Producer Price Index, Construction All Groups	Pre-COVID 2019 – 120.6; Post-COVID 2019 rate – 150.6
Attached Dwellings Price Index, Brisbane	Pre-COVID 2019 – 106.8; Post-COVID 2019 rate – 122.8
Hurdle margin[130]	20%
Construction cost, house/semi-detached (GFA)	$2,800/sqm
Construction cost, unit (GFA)	$4,900/sqm
Construction cost, commercial/retail (GFA)	$3,200/sqm
Soft costs (included in above rates)	30% unit and commercial / 15% house/townhouse
Assumed weighted average house/semi-detached size (GFA)	150sqm[131]
3 bdrm / 4 bdrm / 5bdrm / Other (<=2 or >= 5 bdrm)	60% / 30% / 5%/ 5%
Assumed weighted average unit size (GFA)	105sqm
1 bdrm /2 bdrm / 3 bdrm	15% / 50% / 35%
Quality splits	60% medium finish / 40% high finish
Residential land values[132] (house/unit)	
Burleigh Heads	$1,204,000 / $787,000
Palm Beach	$1,433,000 / $778,000
Currumbin-Tugun	$1,123,000 / $709,000
Bilinga	$1,389,000 / $880,000
Coolangatta	$1,435,000 / $777,000
$/GFA by commercial grade (base / prime / secondary)	$4,900 / $5,700 / $4,250
Yield (real) by commercial grade (base / prime / secondary)	6.5% / $6.0% / 7.0%

Source: Rawlinsons Australian Construction Handbook (2022), ABS Producer and Property Price Indices, Valuer General Unimproved Land Values, Market Research (RP Data, JLL, Colliers) and ABS Census Dwellings and Population (2016 and 2021).

[130] Risk profit margin required to undertake the project.
[131] The assumed size reflects the lower end of dwelling sizes outlined in Rawlinsons for a house or townhouse property. In practice, other than individual project homes, it is extremely difficult to replace 'like-for-like' on a profitable commercial basis. As such it is assumed this is not a typical market strategy for forecasting purposes.
[132] Currently market values have been adjusted to the mid-point between pre/post COVID levels. See Realestate.com.au suburb profiles.

9.3 Base Case land use scenarios

This section presents Base Case land use forecasts, which excludes light rail, and compares these to the LGIP2 forecasts from the City's PUG Model Version 1.0.

9.3.1 Scenario results

9.3.1.1. Employment projections

Base Case employment (full time equivalent) without light rail is forecast to grow from the current 16,679 (2021) to between 20,671 jobs (Conservative) to 21,084 jobs (Probable) in 2041. This is equivalent to growth of 1.1 per cent and 1.2 per cent per annum respectively over this period and includes:

- LUCA Study Area excluding Gold Coast Airport (refer to Figure 99)
- Gold Coast Airport (refer to Figure 100).

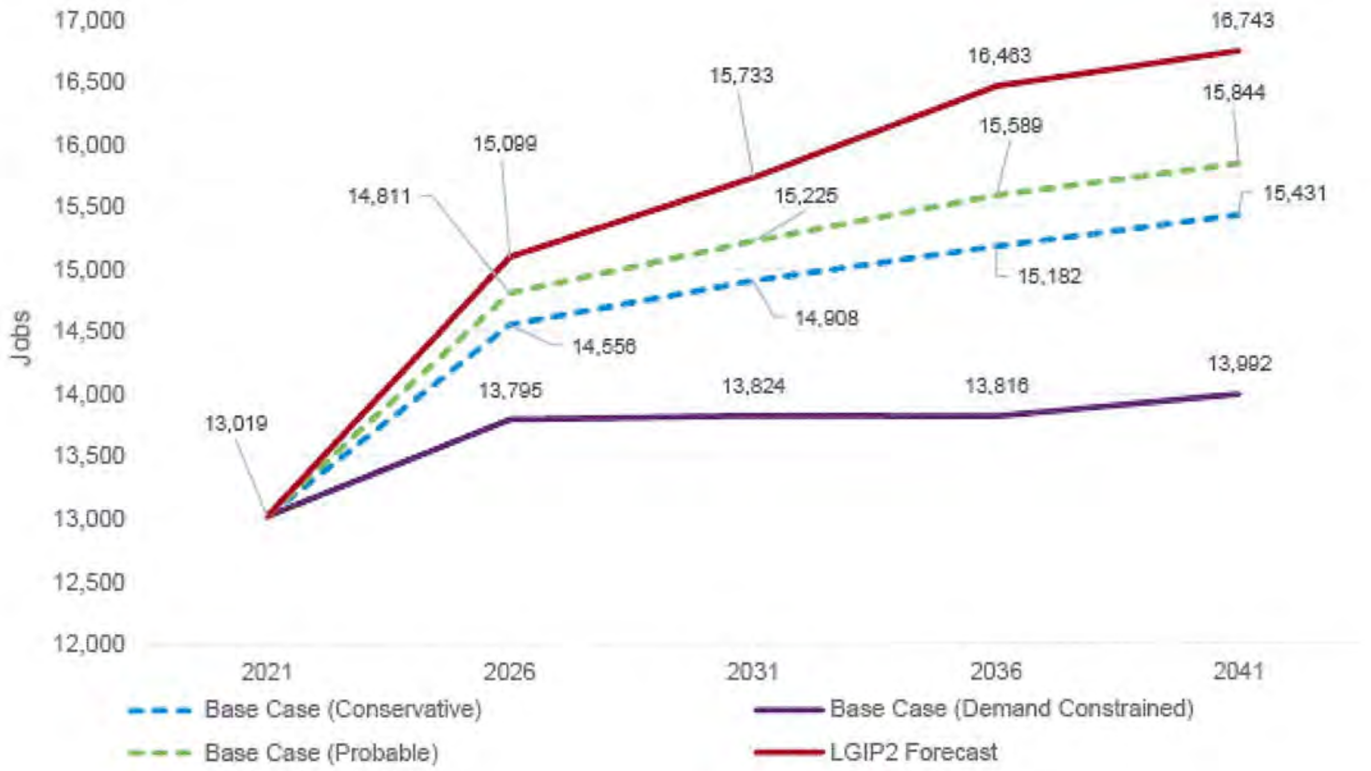

Figure 99 Base Case Employment Forecasts by Scenario (LUCA Study Area excluding Gold Coast Airport)

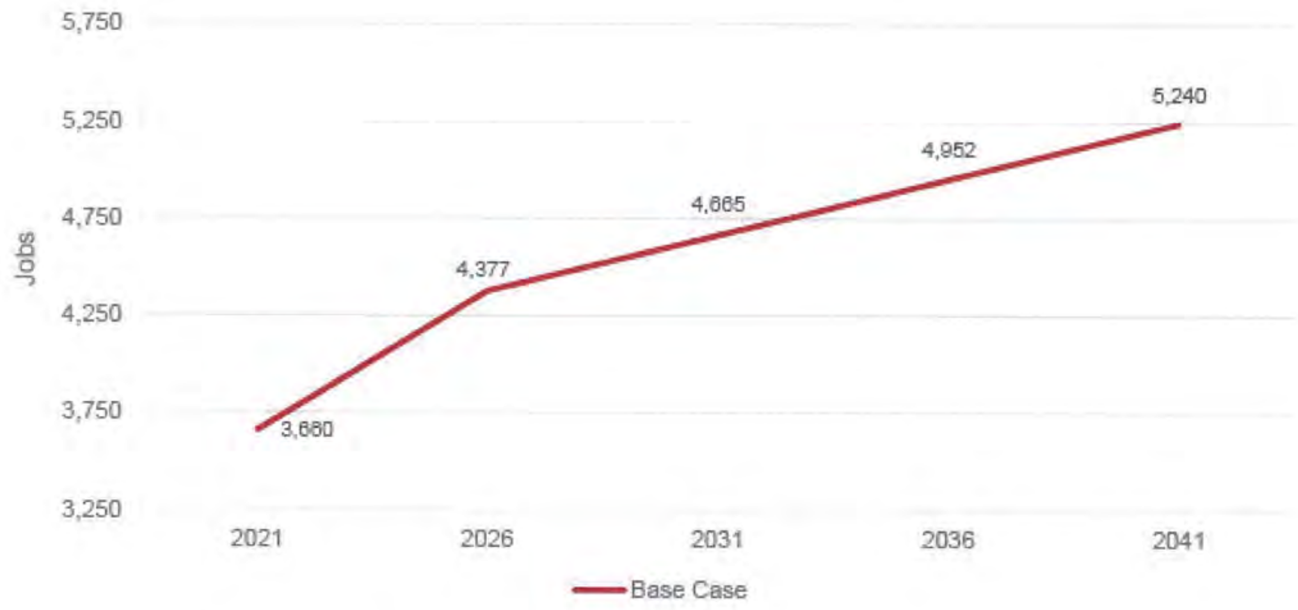

Figure 100 Gold Coast Airport Base Case Employment Forecasts (all Scenarios)

Note: Gold Coast Airport employment forecasts are estimated separately to the rest of the LUCA Study Area and are based on the Airport Master Plan 2017 rather than development feasibility modelling of sites in the LGIP2 development scenario. The same forecasts for Gold Coast Airport are applied to all scenarios presented for the LUCA Study Area forecasts excluding Gold Coast Airport.

9.3.1.2. Population projections

Base Case resident population without LRT is forecast to grow from the current 43,070 people (2021) to between 53,570 (Conservative) to 55,352 (Probable) people in 2041 (Figure 101). This is equivalent to growth of 1.1 per cent and 1.3 per cent per year respectively over this period. These forecasts are below LGIP2 by around 7 per cent and 4 per cent respectively in 2041. Advice from QAL is that no long-term residential development is permitted at Gold Coast Airport.

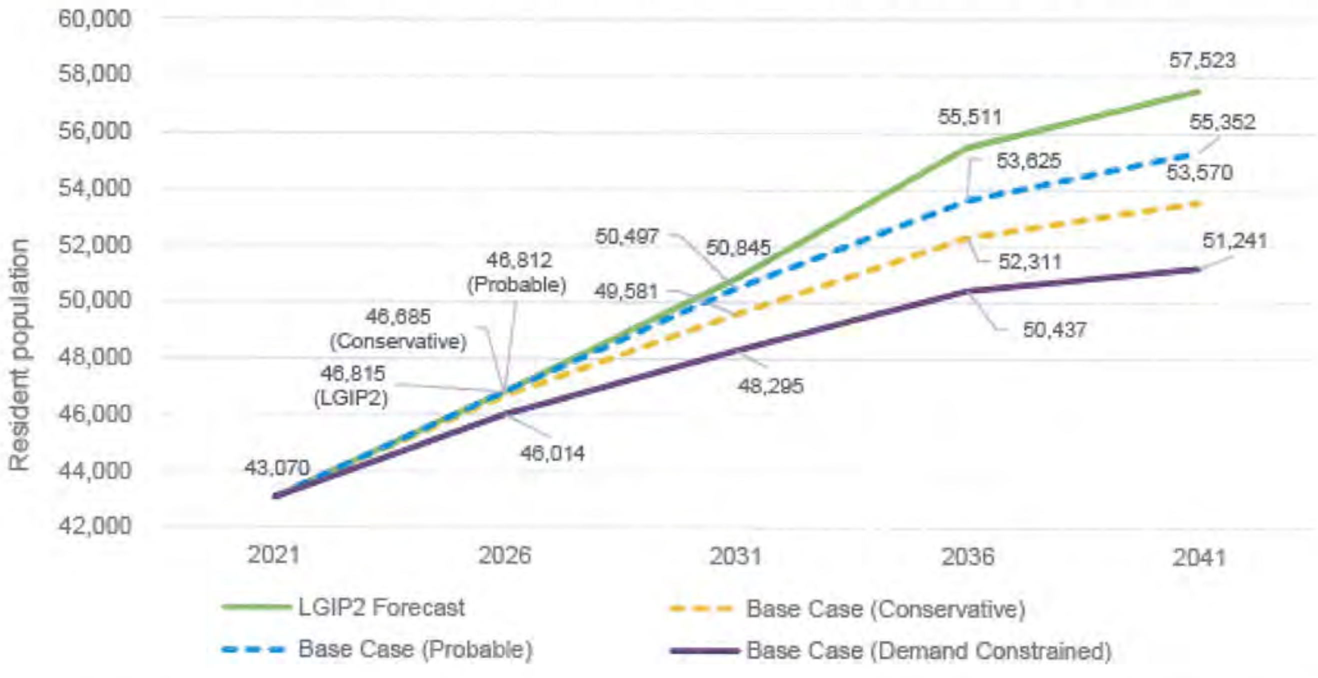

Figure 101 Base Case Resident Population Forecasts by Scenario (LUCA Study Area excluding Gold Coast Airport)

9.3.2 Comparison results (LGIP2)

This section compares Base Case (Probable scenario) projections by precinct in the LUCA Study Area to LGIP2 forecasts for the same area to demonstrate the extent and location of land use constraint by scenario.

9.3.2.1. Employment comparison to LGIP2

Table 121 shows the comparison of Base Case employment forecasts by precinct to the LGIP2 forecast for the Probable scenario. These are forecast to achieve 900 fewer (-5 per cent) jobs than LGIP2 in 2041. The greatest reductions are estimated in the Coolangatta, Currumbin-Tugun and Burleigh Heads precincts.

Note: Negative values impact that forecasts are lower than the LGIP2 development scenario in the PUG Model version 1.0

Table 121 Difference between Base Case (Probable) and LGIP2 job forecasts by precinct (LUCA Study Area excluding Gold Coast Airport)

Jobs - # Chg.	2021	2026	2031	2036	2041
Bilinga – Airport	0	-15	-15	-15	-15
Burleigh Heads	0	0	-4	-212	-212
Coolangatta	0	-145	-330	-463	-464
Currumbin – Tugun	0	-128	-153	-178	-203
Palm Beach North	0	0	0	0	0
Palm Beach South	0	0	-6	-6	-6
Total	**0**	**-288**	**-508**	**-874**	**-900**
Jobs - % Chg.	**2021**	**2026**	**2031**	**2036**	**2041**
Bilinga – Airport	0%	-6%	-7%	-7%	-7%
Burleigh Heads	0%	0%	0%	-12%	-11%
Coolangatta	0%	-3%	-7%	-10%	-10%
Currumbin – Tugun	0%	-3%	-3%	-3%	-4%
Palm Beach North	0%	0%	0%	0%	0%
Palm Beach South	0%	0%	0%	0%	0%
Total	**0%**	**-2%**	**-3%**	**-5%**	**-5%**

Note: Negative values impact that forecasts are lower than the LGIP2 development scenario in the PUG Model version 1.0.

Table 122 shows the comparison of Base Case resident population forecasts by precinct to the LGIP2 forecast for the Probable scenario. These are forecast to achieve 2,171 fewer (-4 per cent) residents than LGIP2 in 2041. The greatest reductions are in the Bilinga-Airport, Currumbin-Tugun and Coolangatta precincts.

Table 122 Base Case (Probable) resident population comparison to LGIP2, by precinct

Population - # Chg.	2021	2026	2031	2036	2041
Bilinga – Airport	0	0	-19	-723	-723
Burleigh Heads	0	0	-5	-5	-5
Coolangatta	0	4	-61	-181	-466
Currumbin – Tugun	0	-6	-229	-943	-943
Palm Beach North	0	0	0	0	0
Palm Beach South	0	0	-34	-34	-34
Total	**0**	**-2**	**-348**	**-1,886**	**-2,171**
Population - % Chg.	**2021**	**2026**	**2031**	**2036**	**2041**
Bilinga – Airport	0%	0%	0%	-15%	-15%
Burleigh Heads	0%	0%	0%	0%	0%
Coolangatta	0%	0%	-1%	-2%	-4%
Currumbin – Tugun	0%	0%	-2%	-7%	-7%
Palm Beach North	0%	0%	0%	0%	0%
Palm Beach South	0%	0%	-1%	-1%	-1%
Total	**0%**	**0%**	**-1%**	**-3%**	**-4%**

Note: Negative values impact that forecasts are lower than the LGIP2 development scenario in the PUG Model version 1.0

9.4 Project Case land use scenarios

This section presents Project Case land use forecasts, which include light rail, and compares these to the LGIP2 forecasts from the City of Gold Coast's PUG Model Version 1.0. It is noted that land value uplift from light rail has been assumed from 2026 in the Project Case to enable the extrapolation of results between 2026 and 2031 in the economic appraisal and this timing would normally be linked to the timing of an announcement or commitment to the project that is viewed as credible by the market rather than the opening of the light rail service itself. For example, there is evidence from GCLR Stage 1 that significant land value uplift occurred from the time the feasibility study was announced in 1996 and continued into operations in 2016.

9.4.1 Scenario results

This section presents Project Case forecasts for the Conservative, Probable and Demand Constrained scenarios developed for the LUCA project.

9.4.1.1. Employment projections

As shown in Figure 102 and Figure 103, Project Case employment (full time equivalent) with light rail is forecast to grow from the current 16,679 jobs (2021) to between 23,585 (Conservative) and 24,982 (Probable) jobs in 2041. This is equivalent to growth of 1.7 per cent and 2.0 per cent per annum respectively over this period and includes:

- LUCA Study Area excluding Gold Coast Airport (refer to Figure 102)
- Gold Coast Airport (refer to Figure 103).

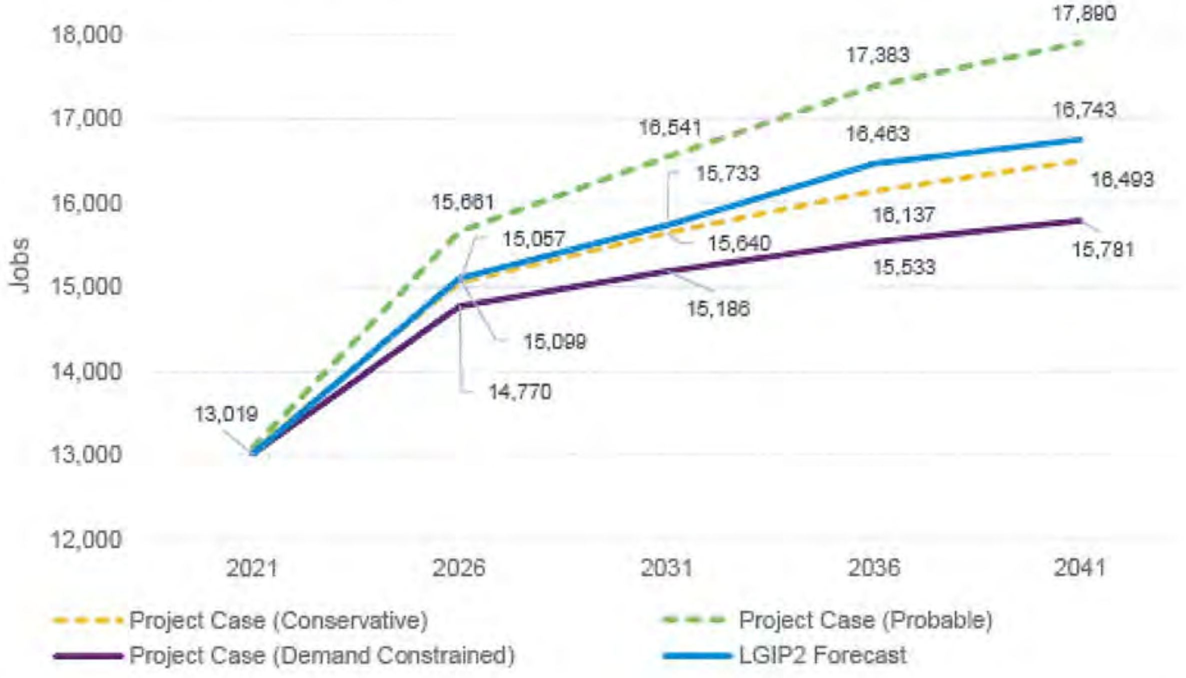

Figure 102 Project Case Employment Forecasts by Scenario (LUCA Study Area excluding Gold Coast Airport)

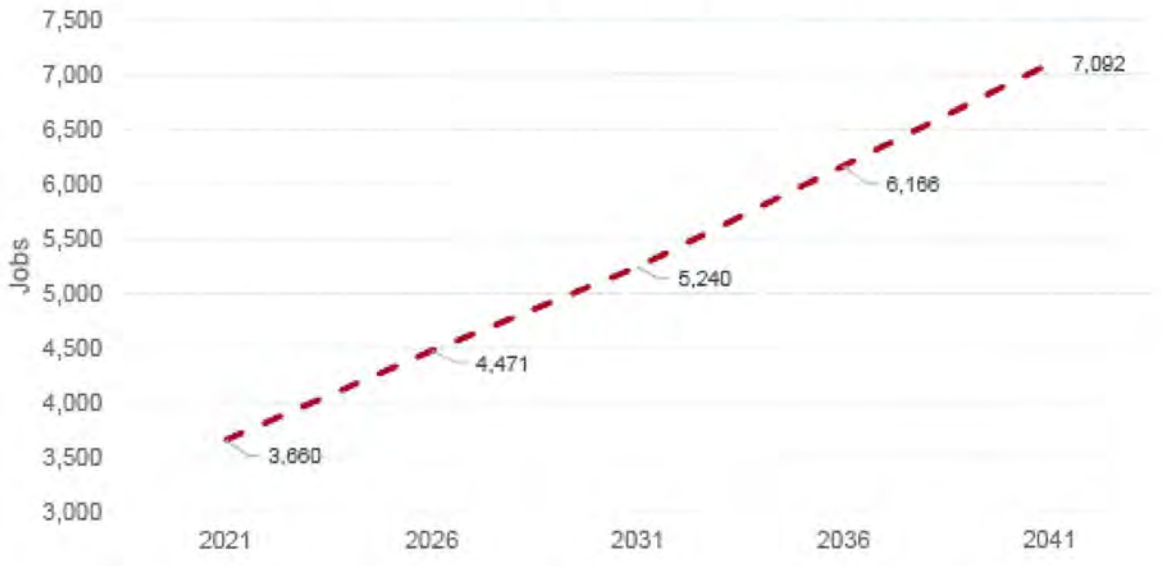

Figure 103 Gold Coast Airport Project Case Employment Forecasts (all Scenarios)

Note: Gold Coast Airport employment forecasts are estimated separately to the rest of the LUCA Study Area and are based on the Airport Master Plan 2017 rather than development feasibility modelling of sites in the LGIP2 development scenario. The same forecasts for Gold Coast Airport are applied to all scenarios presented for the LUCA Study Area forecasts excluding Gold Coast Airport.

9.4.1.2. Population projections

Project Case resident population with light rail is forecast to grow from the current 43,471 people (2021) to between 60,222 (Conservative) and 65,479 (Probable) people in 2041 (refer to Figure 104 below). This is equivalent to growth of 1.7 per cent and 2.1 per cent per annum respectively over this period. Advice from QAL is that no long-term residential development is permitted at Gold Coast Airport.

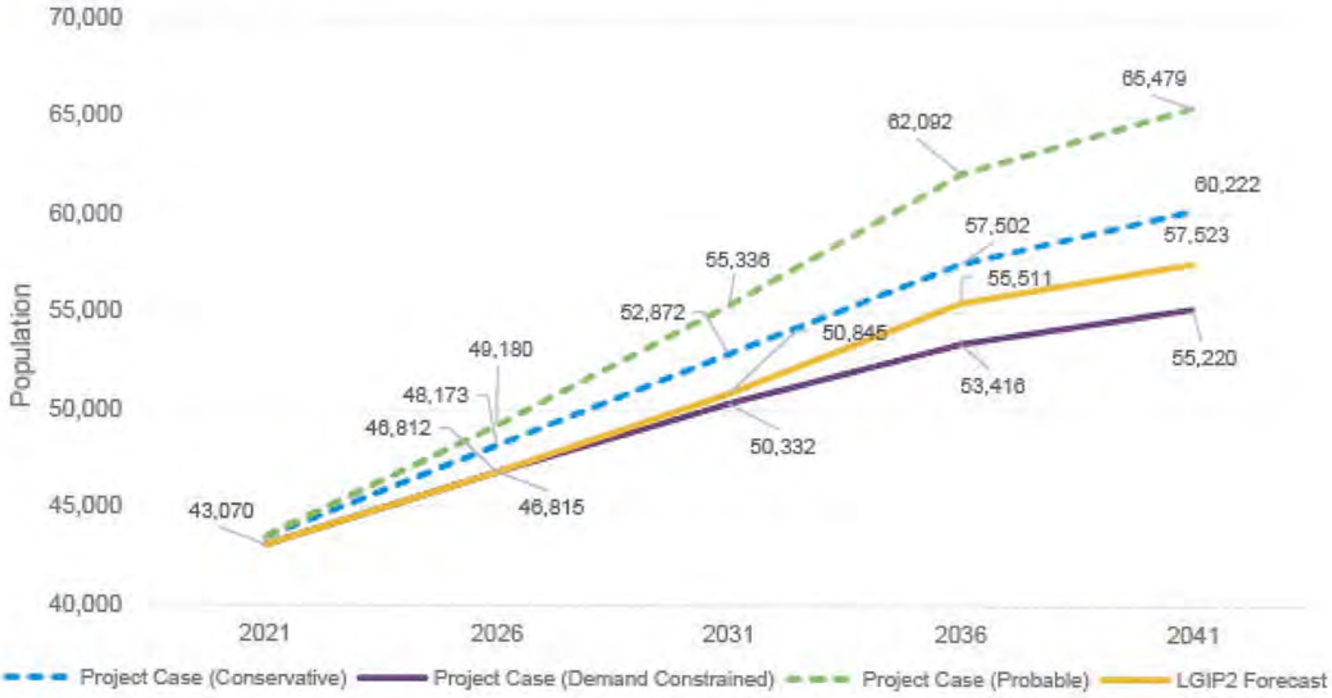

Figure 104 Project Case Resident Population Forecasts by Scenario (LUCA Study Area excluding Gold Coast Airport)

9.4.2 Comparison results (Base Case)

This section shows how Project Case forecasts compare to the Base Case for the Conservative and Probable scenarios developed for the LUCA project.

9.4.2.1. Employment comparison to Base Case

Figure 105 and Figure 106 show that light rail is forecast to unlock an additional 2,914 jobs (Conservative) to 3,898 jobs (Probable) in 2041 compared to the Base Case that excludes LRT. This is equivalent to a 14 per cent and 18 per cent increase respectively in 2041 and includes:

- LUCA Study Area excluding Gold Coast Airport (refer to Figure 105)
- Gold Coast Airport (refer to Figure 106).

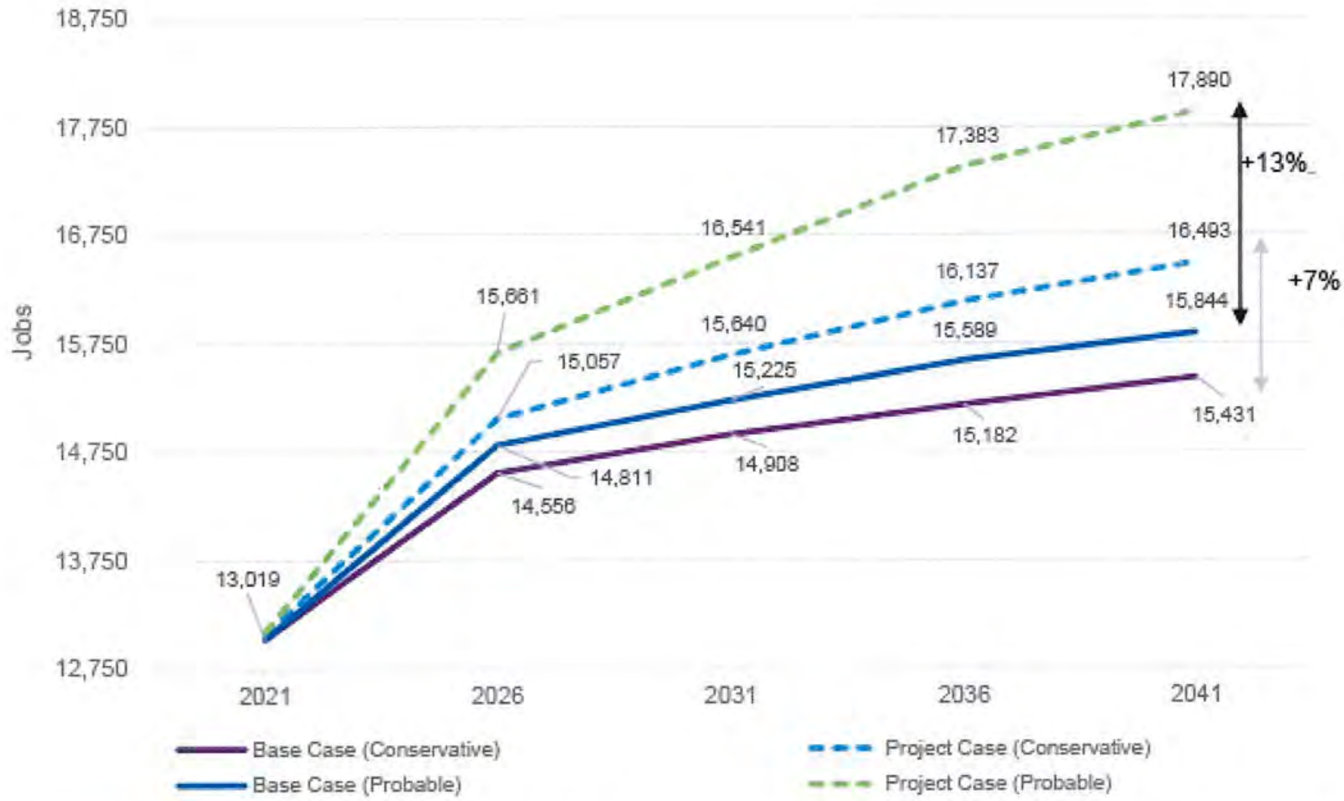

Figure 105 Comparison of Project Case and Base Case Employment Projections (LUCA Study Area excluding Gold Coast Airport)

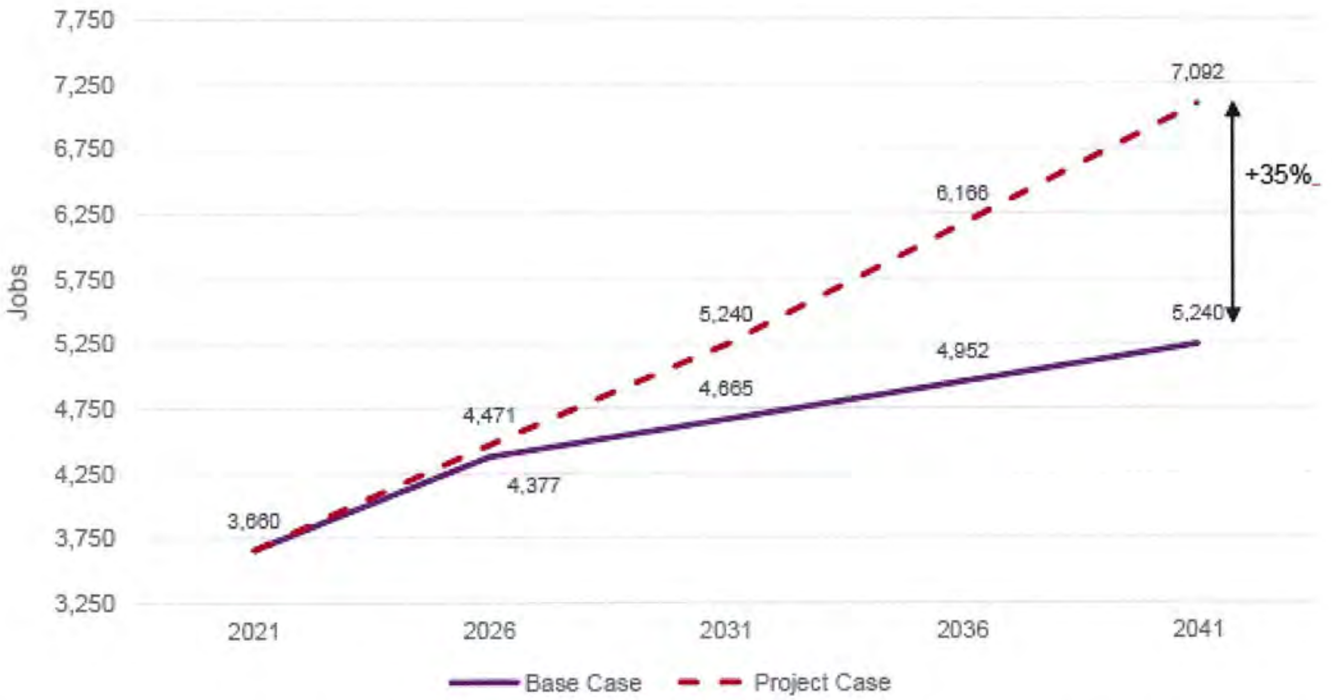

Figure 106 Comparison of Project Case and Base Case Employment Projections (LUCA Study Area excluding Gold Coast Airport)

Note: Gold Coast Airport employment forecasts are estimated separately to the rest of the LUCA Study Area and are based on the Airport Master Plan 2017 rather than development feasibility modelling of sites in the LGIP2 development scenario. The same forecasts for Gold Coast Airport are applied to all scenarios presented for the LUCA Study Area forecasts excluding Gold Coast Airport.

Table 123 shows the incremental increase in jobs between the Base Case and Project Case by precinct for the Probable scenario, respectively. The greatest uplift in jobs in 2041 is forecast in the Bilinga-Airport, Coolangatta and Palm Beach North precincts.

Table 123 Incremental employment by precinct (2041, Probable Scenario, Project Case less Base Case)

Incremental Employment (Probable Scenario)	2021	2026	2031	2036	2041
Bilinga – Airport	0	125	616	1,256	1,895
Burleigh Heads	0	22	25	69	111
Coolangatta	0	251	409	660	755
Currumbin – Tugun	0	309	325	334	341
Palm Beach North	0	214	448	555	601
Palm Beach South	0	23	69	134	195
Total	**0**	**944**	**1,891**	**3,008**	**3,898**

Note: Positive values indicate that forecasts are higher than the Base Case.

9.4.2.2. Population comparison to Base Case

Figure 107 below shows that light rail is forecast to unlock development to accommodate an additional 6,652 people (Conservative) to 10,127 people (Probable) in 2041 compared to the Base Case that excludes LRT. This is equivalent to a 12 per cent and 18 per cent increase, respectively.

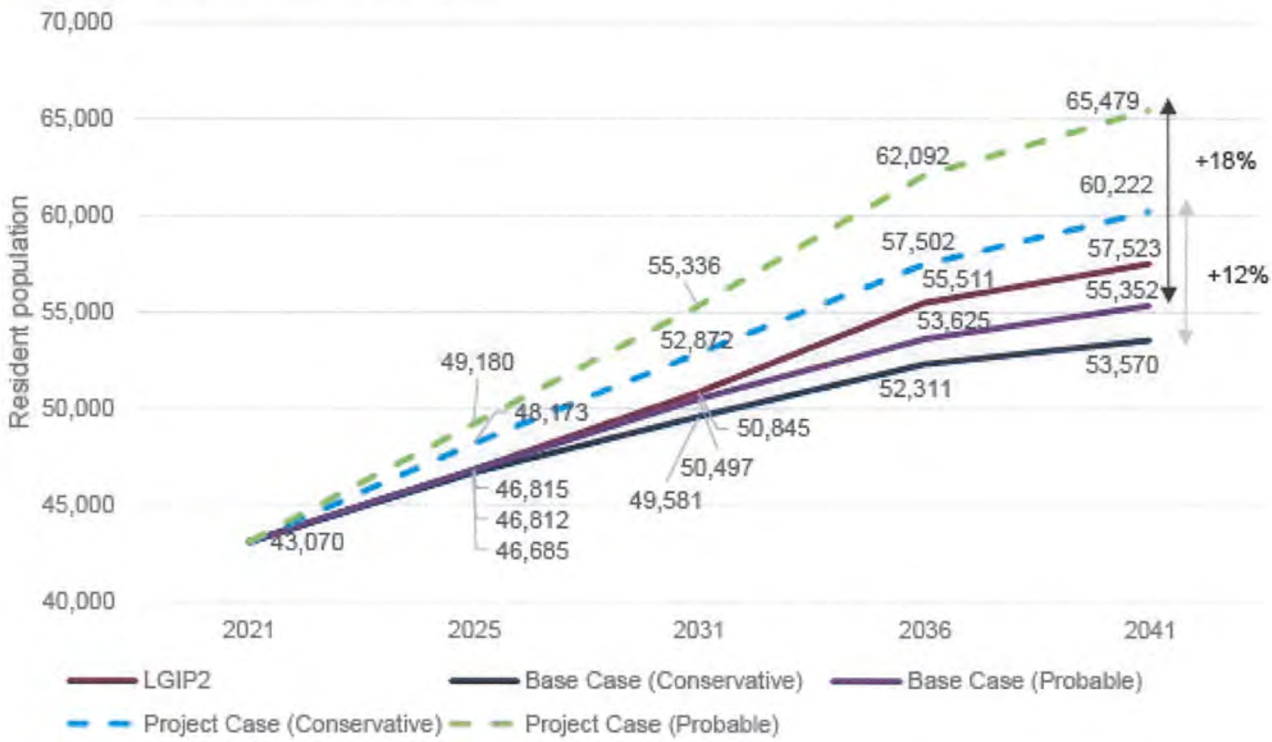

Figure 107 Comparison of Project Case and Base Case Population Projections (LUCA Study Area)

Table 124 shows the incremental increase in resident population between the Base Case and Project Case by precinct for the Probable Scenario. The greatest uplift in resident population in 2041 is forecast in the Palm Beach North, Currumbin-Tugun and Coolangatta precincts.

Table 124 Incremental population by precinct (Probable Scenario, Project Case less Base Case)

Incremental Employment (Probable Scenario)	2021	2026	2031	2036	2041
Bilinga – Airport	0	509	857	1,371	1,381
Burleigh Heads	0	80	140	211	307
Coolangatta	0	311	651	1,022	1,898
Currumbin – Tugun	0	440	1,251	2,521	2,581
Palm Beach North	0	804	1,472	2,604	3,089
Palm Beach South	0	223	468	740	872
Total	**0**	**2,367**	**4,839**	**8,468**	**10,128**

9.4.3 Sensitivity testing

Sensitivity tests for the core Conservative and Probable Scenarios have been prepared to demonstrate the impact of changing assumptions regarding land use uplift and re-investment (refer to Table 125) while holding all other assumptions constant including sales and construction cost rates.

Table 125 Sensitivity test assumptions

Scenario	Conservative	Probable
Land value low	25% reduction	25% reduction
Land value "worst case"	50% reduction	50% reduction
Reinvestment low	0%	12.5%
Reinvestment high	25%	50%

Figure 108 and Figure 109 show that the land use forecasts are relatively insensitive to changes in the land use uplift (2 per cent to 7 per cent reduction in Project Case) but there could be significant uplift from realising additional opportunities identified by stakeholders, which have been proxied by the re-investment mechanism for the purposes of the PE (8 per cent to 16 per cent increase in Project Case). This demonstrates the importance of more detailed analysis in the Business Case stage to maximise the opportunities from specific opportunity sites, land amalgamation, developer incentives and changes to planning controls including height limit increases or changes to zoning (and based on more recently published population and employment demographics which are currently being developed but are not yet complete at the time of completing the LUCA project).

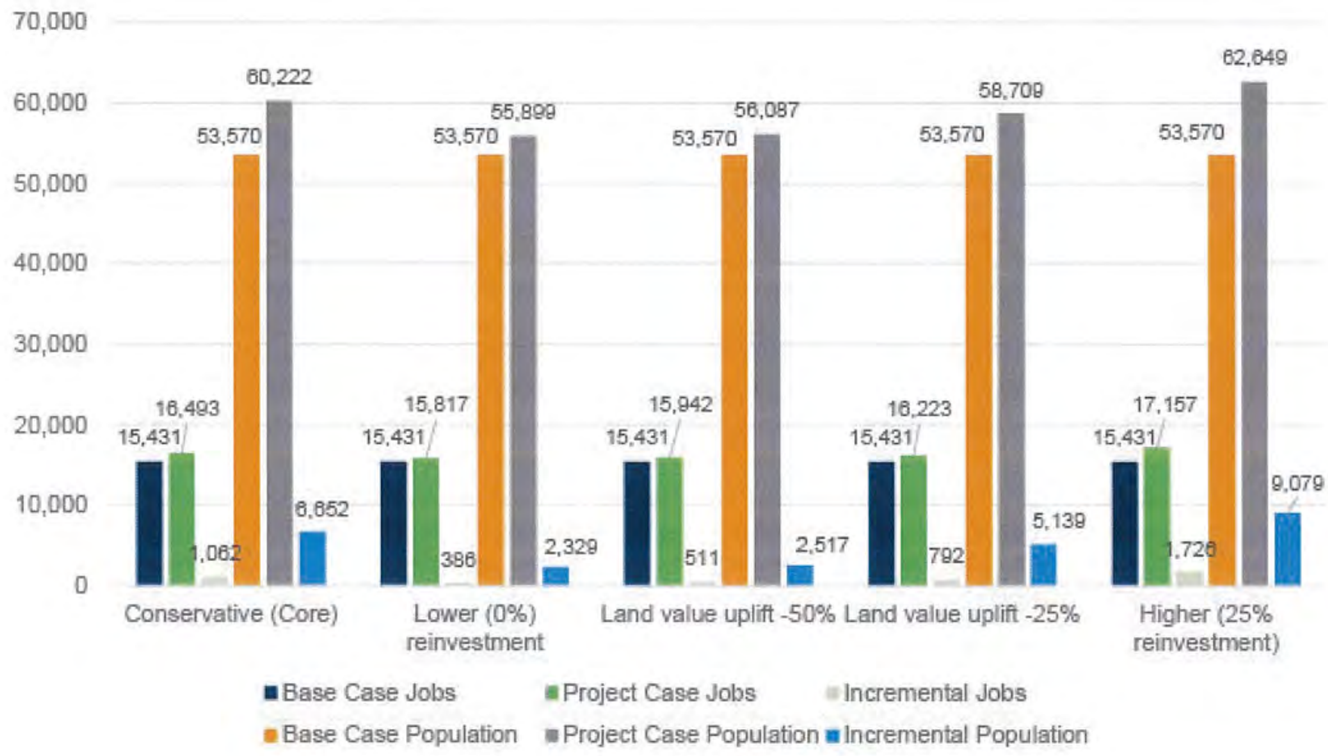

Figure 108 Land use uplift and re-investment sensitivity tests (2041, Conservative Scenario, LUCA Study Area excl. Gold Coast Airport)

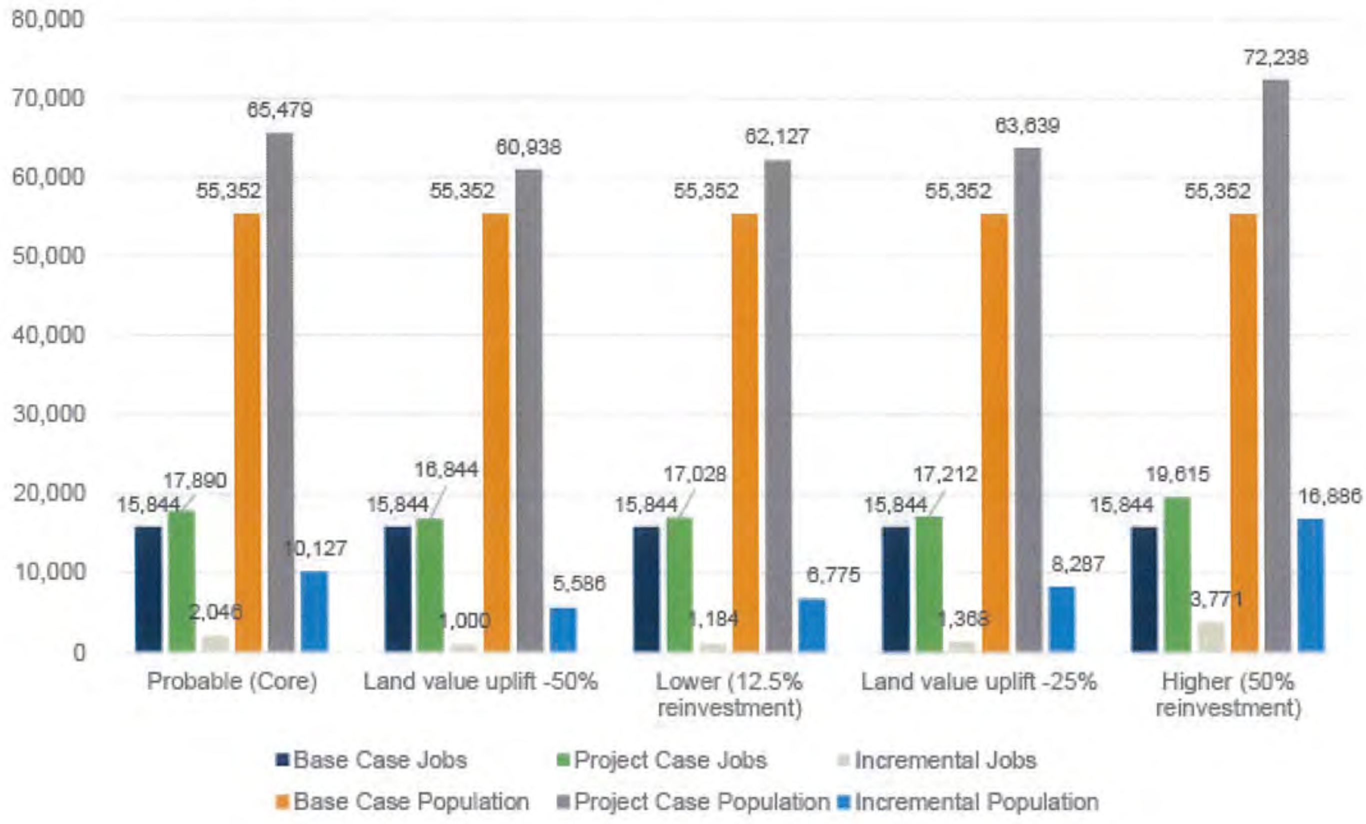

Figure 109 Land use uplift and re-investment sensitivity tests (2041, Probable Scenario, LUCA Study Area excl. Gold Coast Airport)

9.5 Conclusions

The LUCA demonstrates there is significant land use opportunity associated with the potential extension of LRT which should be maximised through more detailed analysis as part of the Business Case stage. Bus lane options are not expected to unlock additional land use change in the same way as LRT due to lower vehicle capacity, reliability, ride smoothness and permanency level.

There are a number of elements of the current land use analysis for LRT that are conservative and potentially constrained by the LGIP2 development locations, current planning controls and City Plan assumptions e.g. excluding land amalgamation. A reinvestment assumption adds a temporal element to the development feasibility modelling and partially reflects some of the significant additional opportunities identified by stakeholders. However, it is not currently applied to the Base Case (where a temporal element may be justified by planning control changes and other opportunities related to light rail are not relevant) and benchmarks from publicly available light rail studies show how substantial the opportunity from complementary changes to planning controls could be (that is, increasing land values by as much as 63 per cent uplift from complementary rezoning or 79 per cent from increased floor space ratios in addition to uplift of up to 30 per cent from light rail accessibility alone). But there are also a number of downside risks related to growth in land values, construction costs and reinvestment assumptions that would need to be investigated in more detail in the Business Case alongside the identified opportunities.

Even under these conservative assumptions, LRT in the BH2C corridor is forecast to unlock between 2,914 jobs (Conservative) to 3,898 jobs (Probable) in 2041 and 6,652 people (Conservative) to 10,127 people (Probable) in 2041 compared to the Base Case that excludes light rail, which is equivalent to a 13 per cent and 18 per cent increase, respectively. Figure 110 illustrates the forecast incremental uplift from light rail (2041).

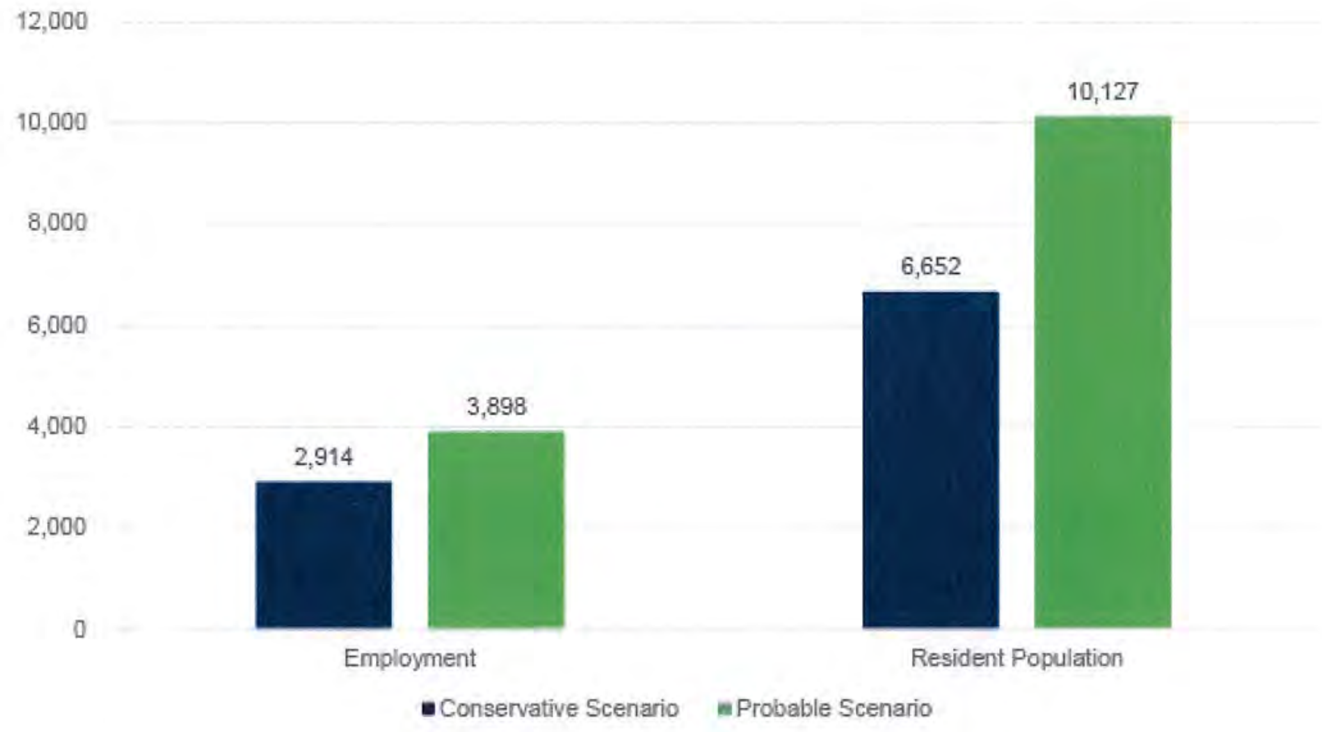

Figure 110 Forecast incremental uplift from light rail (2041, Project Case less Base Case)

Although not included in the land use forecasts for the LUCA project, the potential integration of light rail with northern Tweed also represents a significant opportunity to further enhance land use outcomes. In addition to the land use opportunities identified in northern Tweed, this area is also part of the Southern Gateway REC that includes Gold Coast Airport and Coolangatta. A single seat light rail journey across the border would both increase foot traffic for businesses and provide a larger pool of workers to realise the significant commercial opportunities identified.

The land use analysis has undergone an assurance process led by the City with appropriate SME review and endorsement.

10. Economic analysis

The project will generate significant benefits for public transport users, road users, the community and the broader economy. This chapter details the methodology, assumptions, inputs and outcomes of the economic appraisal on the merits of the shortlisted project options. The chapter includes:

- Assumptions
- Methodology and approach
- Transport demand modelling outputs
- Project costs
- Project benefits
- Summary results
- Qualitative economic benefits
- Conclusions.

Further details on the economic appraisal methodology, assumptions, inputs and outcomes are provided in the accompanying CBA report in Appendix J: CBA report.

10.1 Assumptions

The general assumptions and parameters applied across the economic appraisal are outlined in Table 126. All costs and benefits quantified through the CBA are modelled and discounted in real terms (i.e. exclusive of inflation) using a 7 per cent discount rate.

Table 126 Economic analysis assumptions

Item	Assumptions
Real discount rate	7% (central case), with sensitivity tests at 4% and 10%
Appraisal start date	1 July 2022 (2022/23)
Base price year	1 September 2022 (2022/23)
Annualisation	Demand annualisation factor: 295.4
Opening year	1 January 2031 for all options
Appraisal period	Starting in 2022/23 concluding 30 years from first year of operations (2030/31 to 2060/61).
Economic appraisal inputs	Demand modelling inputs to benefit estimation are drawn from GCSTM modelling on the three shortlisted infrastructure options. Inputs into the cost estimate for the economic appraisal were obtained from the cost estimator.
Transport modelled years	2031 and 2041.

Item	Assumptions
Interpolation, extrapolation of transport modelling results	Compound annual growth rates are applied for interpolation between modelled years. Extrapolation of demand beyond the last modelled year was based on forecast compound annual growth rate between 2036 and 2041 for the Gold Coast LGA population (1.8%). As demand is not forecast to exceed capacity within the appraisal period no capping of benefits growth has been applied. Sensitivity testing has been carried out on alternative extrapolation assumptions.
Demographic assumptions	RPS' probable land use forecast demographic scenario is used as the core scenario for the economic appraisal, with sensitivity testing completed with RPS' conservative and QGSO forecast demographic scenario. Further detail on the demographic scenarios is provided in Chapter 8.
Consideration of land use change	Land use change reflects change in settlement behaviour in response to the accessibility improvements delivered by the project as assessed by RPS. Within the economic appraisal for Option 1, second round transport and wider economic benefits associated with land use change have been captured. Further detail on the land use change with Option 1 is provided in Chapter 1.

Key guidelines referred to in this economic appraisal include:

- Transport and Main Roads – Cost-Benefit Analysis Manual (TMR, 2011)
- Transport and Main Roads (2021) – C7526 Economic Analysis (Deliverables and Reporting) (TMR, 2021)
- Infrastructure Australia - Assessment Framework (IAAF, 2021)
- Infrastructure Australia – Guide to economic appraisal (IA CBA, 2021)
- Infrastructure Australia – Guide to assessing greenhouse gas emissions (interim) (IA, 2023)
- State Development, Infrastructure, Local Government and Planning – Business Case Development Framework Release 3 (BCDF, 2021)
- State Development, Infrastructure, Local Government and Planning – Cost-benefit Analysis Guide Release 3 (BCDF CBA, 2021)
- Transport and Infrastructure Council – The Australian Transport Assessment and Planning Guidelines
- Austroads – Guide to Project Evaluation Part 4: Project Evaluation Data (Austroads, 2012)
- TfNSW – Transport for NSW Cost-Benefit Analysis Guide (TfNSW, 2019)
- TfNSW – Transport for NSW Economic Parameter Values (TfNSW, 2022)
- TfNSW – Technical Note on Calculating Road Vehicle Operating Costs (TfNSW - VOC, 2022).

10.2 Methodology and approach

The purpose of the economic appraisal is to assess the potential costs against benefits associated with investment by applying discounted cashflow techniques, consistent with Queensland and national guidance. The costs and benefits in the CBA are calculated for the increment between the Base Case and each of the options assessed. Figure 111 provides an overview of the approach and methodology applied for the economic appraisal for this project.

This figure has been removed as it contains commercially sensitive information.

Figure 111 Approach to economic assessment

10.3 Transport demand modelling outputs

Transport demand modelling and analysis was completed using GCSTM v2.3. GCSTM was specifically updated for the purposes of this project to improve the capability of the model in respect of trip generation, trip distribution, mode choice and time period splits.

The GCSTM allows behavioural responses to project options including:

- Route switching where some people respond to the project by choosing an alternative route for their trip
- Mode shift where some people respond to the project by shifting to an alternative mode for their trip
- Changes in destination where some people respond to the project by travelling to an alternative destination.
- Further detail on the transport demand modelling completed for this project is provided in Chapter 8.

This section discusses the key transport demand modelling outputs that are key inputs to the economic analysis. All outputs graphed represent a 24-hour period and are for the RPS Probable demographics set (i.e. the core demographic scenario for the economic appraisal).

10.3.1 Transport demand

Transport demand outputs (Figure 112) demonstrate how the project options influence demand for alternate transport modes.

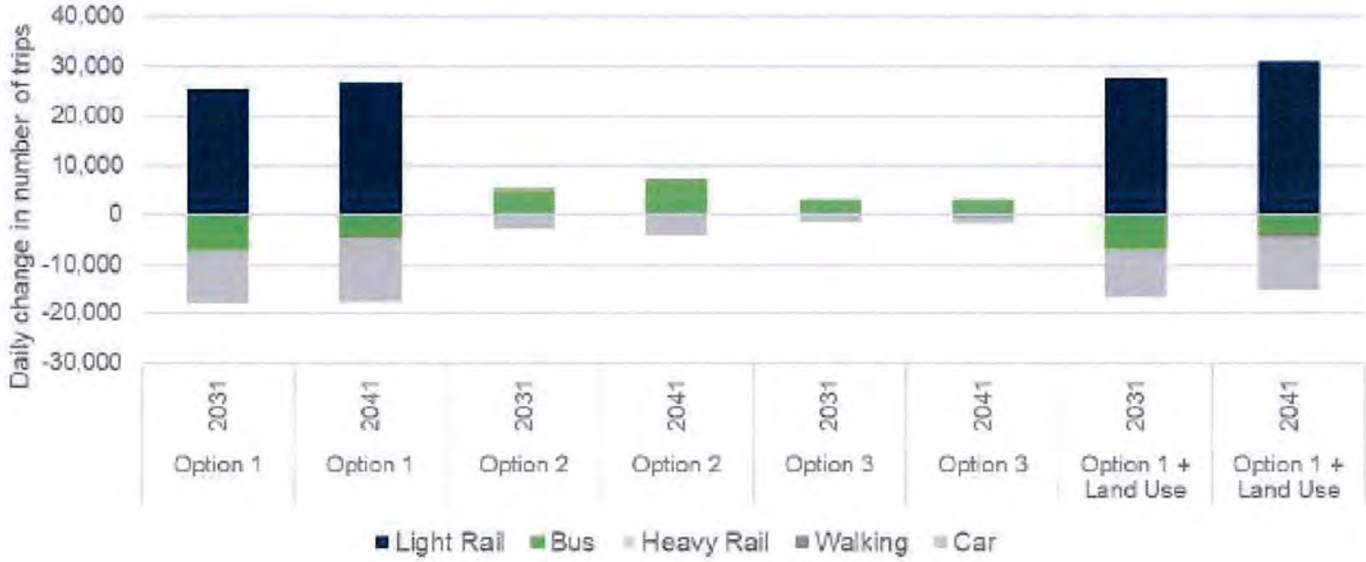

Figure 112 Total transport demand outputs, trips over a 24-hour period, for each option

Key observations from transport demand outputs include:

- A mode shift away from car towards public transport is observed under each option. A decrease in demand for bus transport is observed for Option 1, likely due to patrons switching from bus transport to light rail transport. Overall Option 1 results in the greatest increase in public transport demand, with an additional 18,573 journeys in 2031 and 22,521 journeys in 2041.
- An increase in bus transport patronage is observed for Options 2 and 3 due to the improvement in bus network performance and bus service frequency under these options.

10.3.2 Public transport travel time savings

Public transport travel time savings reflect the perceived benefits to public transport users over their complete door-to-door public transport journey. Public transport travel time savings for each option is outlined in Figure 113.

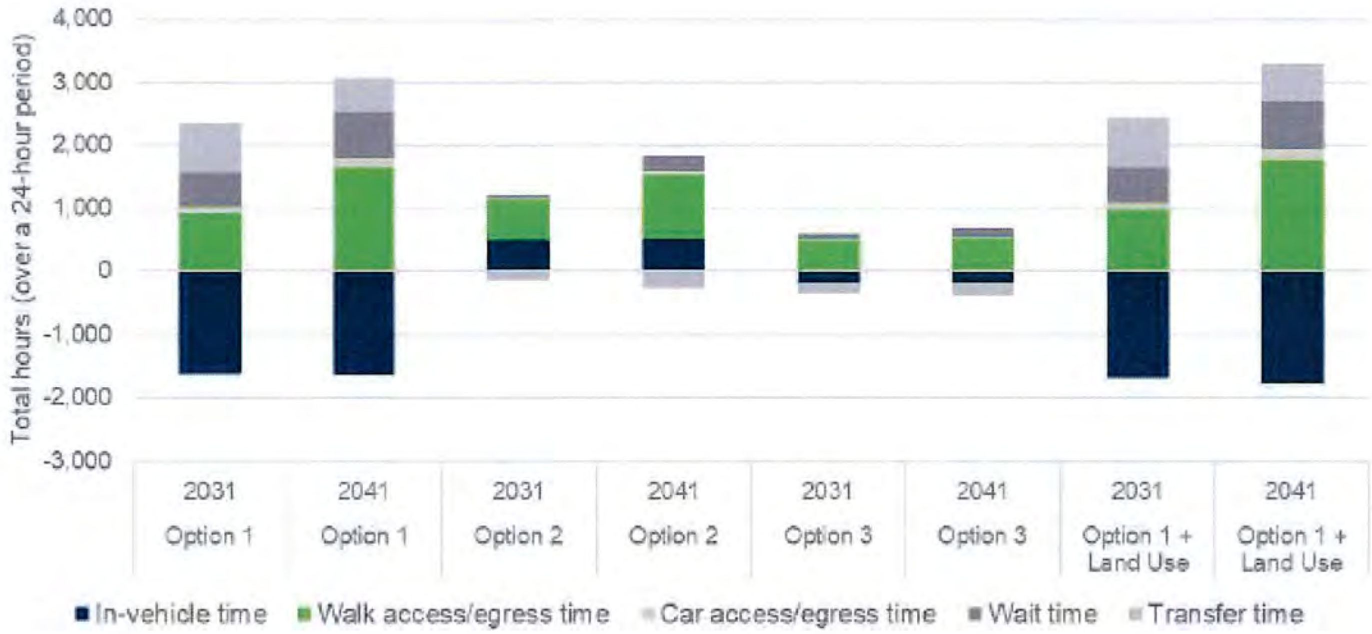

Figure 113 Total public transport travel time savings, hours over a 24-hour period, for each option

Key observations from public transport travel time saving outputs include:

- Walk access / egress and wait time savings are observed under each option. This is likely due to the improved accessibility to bus / light rail and the increased service frequency achieved under each option.
- Option 1 results in an increase in in-vehicle time compared to the Base Case. This is likely due to the stopping pattern of light rail, which stops at all stations, compared to bus services which also run express services. However, the increase in IVT is compensated by improved walk / access egress time, wait time and transfer time.
- Option 2 results in the greatest improvement in in-vehicle travel time. This is likely due to the dedicated bus lanes provided under this option which allow buses to bypass traffic on the road, and greater flow frequencies.

10.3.3 Road user travel time savings

Road user travel time reflects the total travel time for road users to complete their door-to-door journey. Road user travel time for each option is outlined in Figure 114.

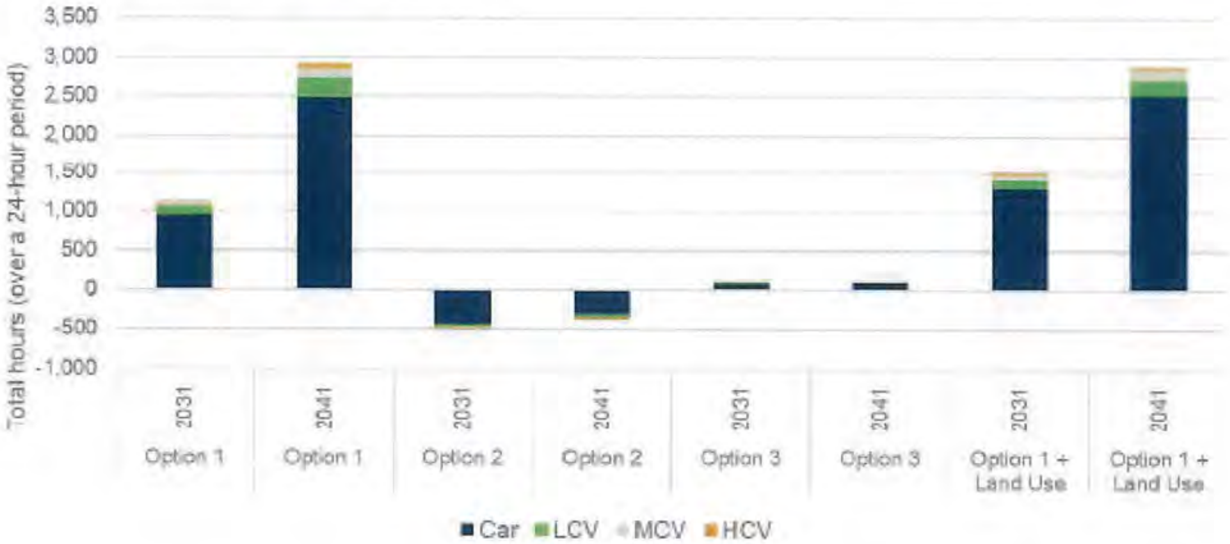

Figure 114 Total road user travel time savings, hours over a 24-hour period, for each option

Key observations for road user travel time saving outputs include:

- Option 1 results in the greatest increase in road user travel time savings. This is likely due to the large mode shift away from road vehicle transport towards public transport that is observed for this option, resulting in reduced congestion for continuing road users and associated travel time improvements.
- Option 2 results in an increase road user travel time (i.e. reduction in road user travel time savings). This is likely due to the dedicated bus lane causing traffic flow disruptions for road transport users, which results in an increase in road user travel time for road users despite the mode shift towards public transport observed for this option.
- Minor road user travel time savings are observed for Option 3, in line with the magnitude of public transport mode shift observed for this Option.

10.3.4 Vehicle kilometres travelled

Vehicle kilometres travelled are a key performance indicator for transport demand modelling and underpin a number of benefit streams in the economic appraisal, including safety benefits, externality benefits and road maintenance benefits. Change in vehicle kilometres travelled for each option is provided in Figure 115.

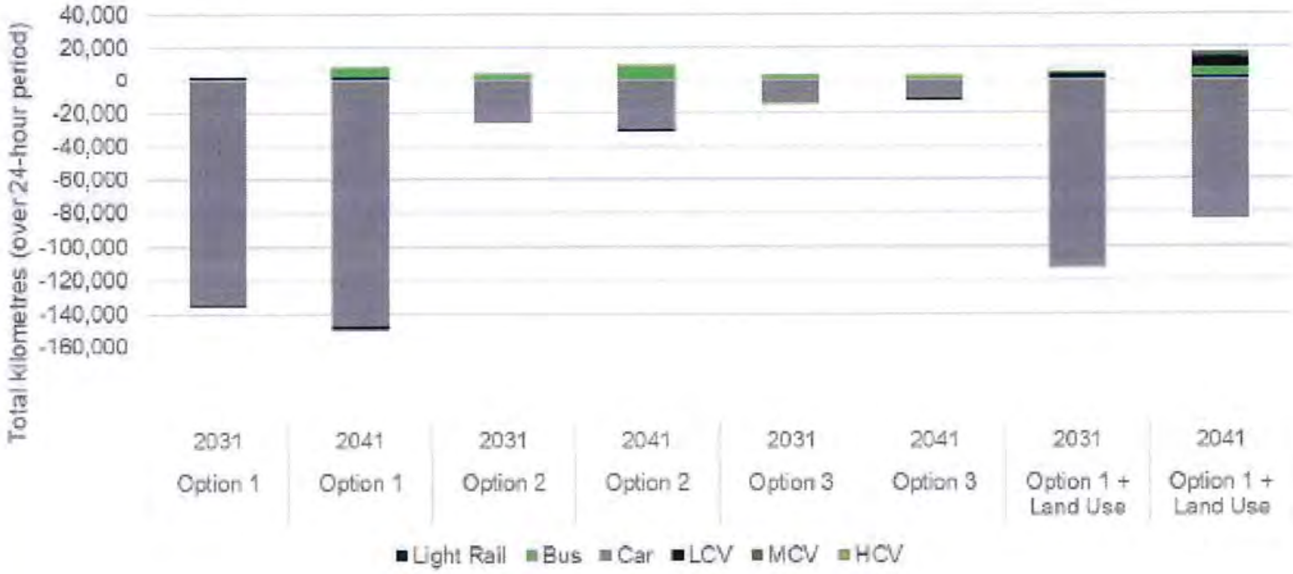

Figure 115 Total vehicle kilometres travelled over a 24-hour period for each option

Key observations from vehicle kilometres travelled include:

- A decrease in car vehicle kilometres travelled is observed under each Option. Option 1 results in the greatest decrease in vehicle kilometres travelled. This is likely because the light rail option provides greater transport network coverage compared to the bus transit options, and therefore results in the greatest mode shift toward public transport.
- For the 2031 modelled year, Option 1 results in a 616 per cent decrease in VKT compared to Option 2 and 1,133 per cent decrease in VKT compared to Option 3.

10.3.5 Vehicle operating costs

Vehicle operating costs reflect the costs to vehicle owners of operating a vehicle. Changes in vehicle operating costs for each option is provided in Figure 116.

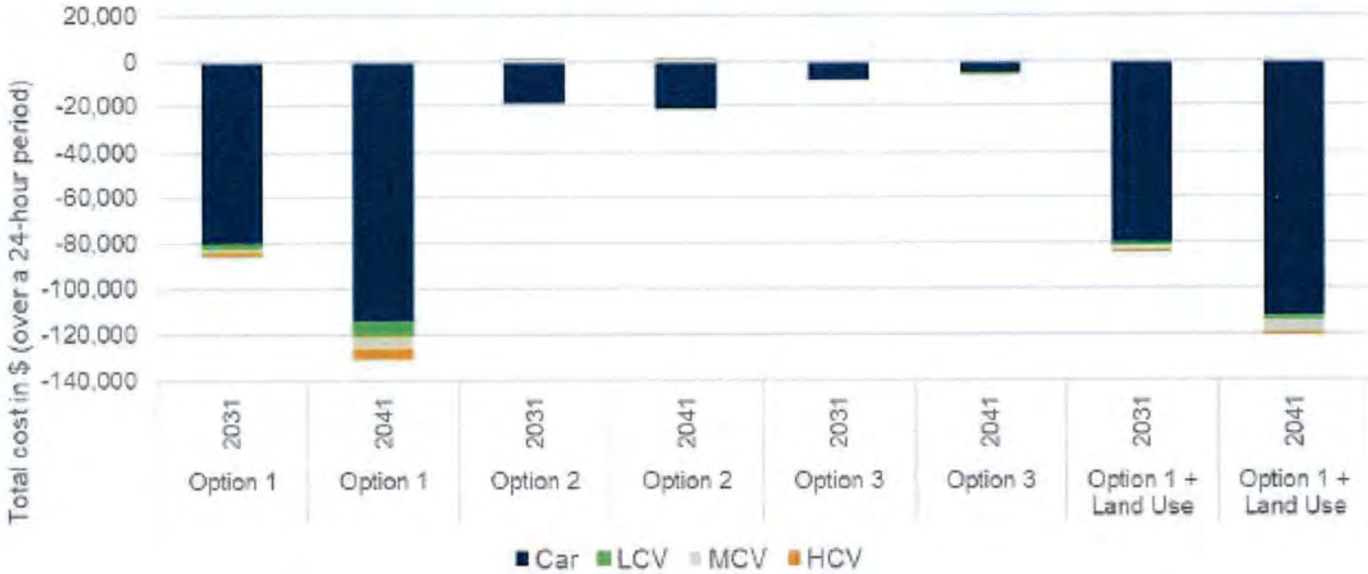

Figure 116 Total Vehicle Operating Costs (Resource), dollars over 24-hour period, for each option

Key observations from vehicle operating costs include:

- Resource vehicle operating costs decrease under each option, indicating a decrease in cost between the Base Case and Project Case. This is likely due to the mode shift away from road user transport towards public transport that is observed for these Options, with fewer vehicles on the road resulting in improved free-flow traffic speeds and therefore a decrease in vehicle operating costs.
- The magnitude of change in vehicle operating costs observed is broadly consistent with the other road network and public transport impacts observed, with Option 1 having the greatest impact due to having both the largest decrease in VKT as well as congestion reduction.

10.4 Project costs

The primary costs relevant for this project's economic appraisal are the design, construction and operation of the project options.

10.4.1 Capital costs

Capital costs included in this economic appraisal consist of construction costs and client costs for the delivery of the project. The construction period for Option 3 has been adjusted for the purposes of the economic and financial appraisal, from 1 July 2026 to 30 September 2028 to align with the construction period for Options 1 and 2 which end in 30 June 2030.

P50 risk-adjusted cost estimates, developed using a probabilistic method of Monte Carlo simulation using @Risk software, are used as the central case for the economic appraisal. P90 risk-adjusted costs have been included as sensitivity tests. Nominal escalation is excluded from the capital cost estimates included within the economic appraisal. Capital costs for each infrastructure option are outlined in Table 127. Real undiscounted capital costs are displayed graphically for each Option in Table 127.

Table 127 Capital cost inputs (FY$23 millions, real, present value discounted at 7%)

Costs	P50 risk contingency	P90 risk contingency
Option 1 – LRT		
Total capital costs (real, undiscounted)	$3,644	$3,917
Total capital costs (real, present value, discounted at 7%)	$2,536	$2,694
Option 2 – DBL		
Total capital costs (real, undiscounted)	$2,712	$2,945
Total capital costs (real, present value, discounted at 7%)	$1,945	$2,080
Option 3 – EBP		
Total capital costs (real, undiscounted)	$403	$446
Total capital costs (real, present value, discounted at 7%)	$269	$293

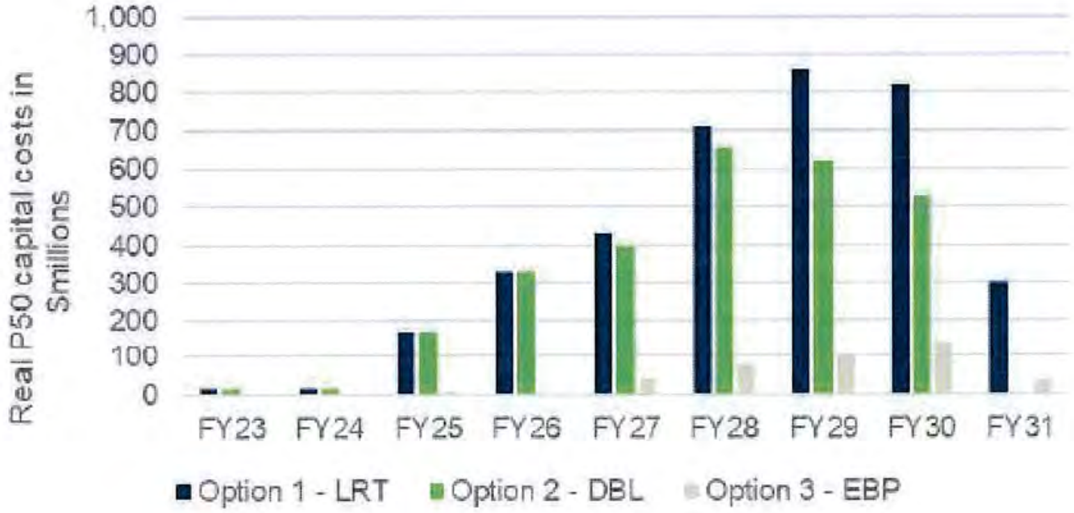

Figure 117 Time profile of real, undiscounted P50 capital costs ($ millions) for each option

10.4.2 Ongoing operational costs

The ongoing project operating and maintenance costs during operations have been included from the first year of operations for each Option to the end of the appraisal period. These costs represent project operating costs that are incremental to the Base Case operating costs and capture only the costs associated with increased service frequency and / or maintenance of additional infrastructure. Specifically, operating costs include:

- On-vehicle crew
- Direct vehicle operating costs
- Infrastructure operations and maintenance
- Overhead costs.

Unit cost estimates were sourced from ATAP – M1 (2021) which provides an operating cost estimate for bus, tram and train (mid-2014 prices, excluding GST). Of note, ATAP – M1 (2021) also includes a profit margin percentage on operating costs. However, this was excluded from the economic appraisal as this cost is an internal transfer within society. The unit prices have been escalated to $2023 dollars using CPI.

Operating costs incremental to Base Case operating costs are outlined in Table 128 for each option.

Table 128 Operating cost inputs (FY$23 millions, real, present value discounted at 7%)

Costs	P50 risk contingency	P90 risk contingency
Option 1 – LRT	$345	$382
Option 2 - DBL	$67	$74
Option 3 - EBP	$49	$55

10.5 Project benefits

Each of the project Options will generate benefits for public transport users, road network users, the community and the broader economy. Figure 118 identifies the benefits to be quantified in the economic appraisal, noting that second round benefits have been assessed for Option 1 only.

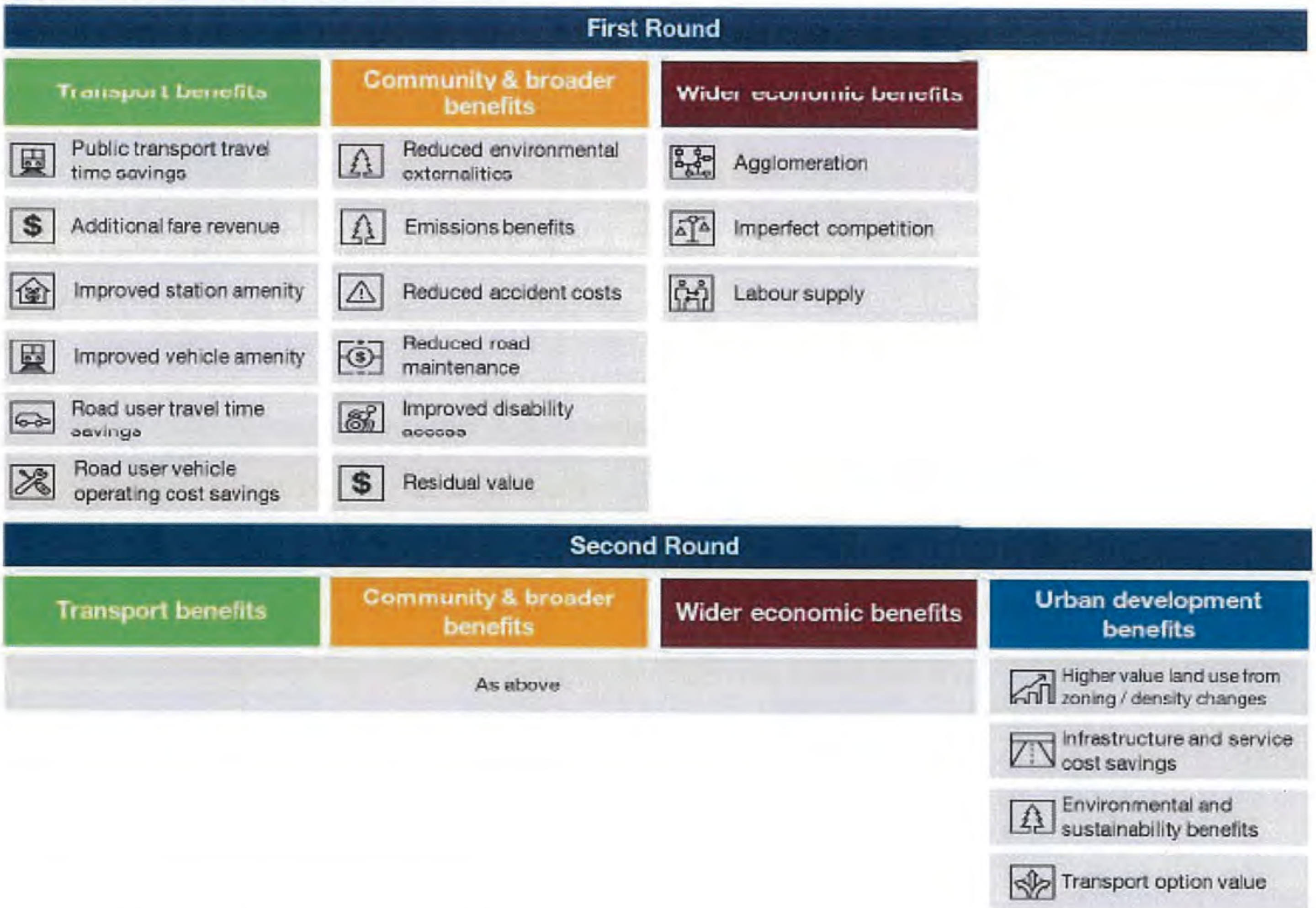

Figure 118 Monetised economic benefits

The methodology applied to monetise these benefit streams is summarised in Table 129.

Table 129 Economic benefits methodology summary

Benefit	Methodology
Public transport travel time savings	Travel time savings for public transport users are based on consumers surplus approach, applying a rule of half to new users, and are monetised using parameters sourced from ATAP – PV2 (2016), TfNSW (2022) and ATAP – M1 (2021).
Fare revenue benefits	Fare revenue benefits are derived based on GCSTM modelled fare revenues for the Base and Project Options.
Improved stop / station amenity	Improved stop / station amenity benefits are derived based on the perceived higher quality of light rail transport compared to bus transport. Monetisation parameters are based on TfNSW (2022).

Benefit	Methodology
Improved vehicle amenity	Improved vehicle amenity benefits are derived based on the perceived higher quality of light rail transport compared to bus transport. Monetisation parameters are based on TfNSW (2022).
Road user travel time savings	Travel time savings for road users are based on consumers surplus approach, applying a rule of half to new users, and are monetised using parameters sourced from ATAP – PV2 (2016) and TfNSW (2022).
Vehicle operating cost savings	Vehicle operating cost savings are based on change in car, LCV and HCV vehicle kilometres travelled, transformed into vehicle operating costs through use of Austroads (2012) urban journey speed model.
Reduced environmental externalities	Environmental impacts are derived from changes in vehicle kilometres travelled and fuel consumed, monetised through use of TfNSW (2022) externality unit values.
Reduced emissions	Reduced emissions benefits for bus and light rail have been derived from TfNSW (2022) on a per kilometre travelled basis. This guidance applies a $85 / tonne CO_2 emission cost. Reduced emissions benefits for cars, LCV, MCV and HCV are based on fuel consumption and have been monetised using ATAP – PV2 (2016) fuel consumption to emissions conversion parameters and an $85 / tonne CO_2 emission cost as per TfNSW (2022) for consistency between modes.
Reduced accident costs	Safety impacts are derived from changes in vehicle kilometres travelled, monetised with crash rates from Austroads (2010) and crash costs from ATAP – PV2 (2016).
Improved accessibility	Improved accessibility benefits for light rail are monetised through Steer Davies Gleave (2015) demand uplift percentages and John Stanley et al (2010) value per trip for reduced social exclusion.
Reduced road maintenance	Avoided routine maintenance costs are derived from changes in vehicle kilometres travelled, monetised through use of TfNSW (2022).
Residual value	Residual value at the end of the appraisal period is calculated using a straight-line depreciation method using asset lives derived from ATAP – M1 (2021)
Wider economic benefits – agglomeration benefits	Agglomeration benefits were calculated in accordance with UK WebTAG and ATAP based on the change in effective job density.
Wider economic benefits – imperfect competition benefits	Imperfect competition benefits were calculated in accordance with ATAP – T3 (2022) based on changes in perceived business and freight benefits.
Wider economic benefits – labour supply benefits	Labour supply benefits were calculated using parameters derived from UK WebTAG guidance based on changes in commuter travel time.
Higher value land use	Higher value land use benefits were assessed through use of LUTI Consulting's (LUTI) hedonic land price model (HPM) of the Gold Coast, based on changes in population and employment under the land use scenario.

Benefit	Methodology
Infrastructure cost savings	Infrastructure cost savings were developed from cost estimates from Trubka et al (2010) and City of Gold Coast developer charges.
Environment and sustainability benefits	Environment and sustainability benefits associated with land use changes in response to the project are based on LUTI's method for calculating embodied and operating CO_2 emissions by housing typology form.
Option value	Transport option value benefits were assessed through LUTI's HPM of the Gold Coast and 2021 land valuations data.

10.6 Summary results

10.6.1 Core results

The delivery of the project will produce a number of benefits for public transport users, road users, the community and the broader economy. Economic outcomes for the project under a 7 per cent discount rate are shown in Table 130.

Table 130 Economic results ($ millions, present value, discounted at 7% real)

	Option 1 – LRT	Option 2 – DBL	Option 3 – EBP
Economic costs			
Capital costs (Real, P50 risk contingencies)	2,536	1,945	269
Operating costs (P50 risk contingencies)	345	67	49
Total costs	**2,880**	**2,012**	**318**
First round benefits			
Transport benefits			
Public transport travel time savings	110	69	17
Transfers[133]	*1*	*(10)*	*(4)*
Continuing users	*81*	*70*	*21*
New/lost users	*28*	*9*	*(0)*
Road user travel time savings	118	(18)	5
Continuing users	*118*	*(17)*	*5*
New/lost users	*0*	*(0)*	*-*

[133] Insufficient data to disaggregate transfers by continuing and new/lost users, so are reported separately

	Option 1 – LRT	Option 2 – DBL	Option 3 – EBP
Public transport fare revenue benefits	213	65	29
Vehicle operating costs	362	61	21
Vehicle amenity benefits	2	-	-
Station amenity benefits	14	-	-
Total transport benefits	**829**	**177**	**71**
Community and broader benefits			
Externalities	28	(7)	(1)
Emissions[134]	7	(7)	(2)
	3 – 10	*(3 – 10)*	*(1 – 3)*
Safety	39	8	4
Residual value	67	52	4
Total community and broader benefits	**140**	**46**	**4**
Total economic benefits	**969**	**223**	**75**
	966 – 973	*227 – 220*	*76 – 74*
First round results			
NPV	**(1,911)**	**(1,789)**	**(243)**
	(1,914 – 1,908)	*(1,785 – 1,792)*	*(241 – 244)*
BCR	**0.34**	**0.11**	**0.24**
	0.34 – 0.34	*0.11 – 0.11*	*0.24 – 0.23*
First round wider economic benefits			
Agglomeration benefits	74	6	5
Labour supply benefits	1	0	0
Output change in imperfectly competitive markets	4	(0)	0
Transport benefits			

[134] Median unit cost of emissions assumes a carbon price of $65 / tonne (in $ December 2021). The range presented here represents +/-50% climate change unit cost of emissions in accordance with IA's interim Guide to Assessing Greenhouse Gas Emissions (February 2023)

	Option 1 – LRT	Option 2 – DBL	Option 3 – EBP
Road maintenance	15	1	1
Disability access benefit	32	-	-
Total economic benefits	**1,095**	**230**	**81**
	1,092 – 1,099	*234 – 227*	*82 – 80*
First round results including wider economic benefits, road maintenance and disability access benefits			
NPV	**(1,785)**	**(1,782)**	**(237)**
	(1,788 – 1,782)	***(1,778 – 1,785)***	***(236 – 238)***
BCR	**0.38**	**0.11**	**0.26**
	0.38 – 0.38	***(0.12 – 0.11)***	***(0.26 – 0.25)***
Second round benefits			
Second round transport user benefits from land use change (incl. road maintenance benefits)	(19)	-	-
Second round wider economic benefits	56	-	-
Urban development benefits			
Higher value land use benefits	887	-	-
Option value benefits	457	-	-
Infrastructure and cost saving benefits	80	-	-
Environment and sustainability benefits	9	-	-
Total urban development benefits	1,434	-	-
Total economic benefits	**2,566**	**230**	**81**
Total benefits including second round benefits and urban development benefits			
NPV	**(314)**	**(1,782)**	**(237)**
BCR	**0.89**	**0.11**	**0.26**

Key findings of the economic appraisal results include:

- Total first round economic benefits of the project are estimated to be between $75 million and $969 million (real, discounted at 7 per cent). Option 1 delivers the highest economic benefits of $969 million, followed by Option 2 and lastly Option 3. The project comes at an economic cost of $2,880 million for Option 1, followed by $2,012 million for Option 2 and $318 million for Option 3.

- Vehicle operating cost savings represent one of the largest benefit categories across the three options, driven by a mode shift away from private vehicle road travel. In addition, public transport fare revenue is a significant benefit stream across the three options, driven by the increase in patronage (in particular for Option 1).
- Option 3 delivers the highest NPV (-$243 million), followed by Option 2 (-$1,789 million) then Option 3 (-$1,911million). The BCR was calculated to facilitate the ranking of options. Option 1 has the highest first-round BCR (0.34), followed by Option 3 (0.24) and then Option 2 (0.11).

10.6.2 Scenario and sensitivity analysis

Sensitivity analysis was also undertaken to test the robustness of the economic analysis to changes in inputs and assumptions. This analysis includes both sensitivity tests recommended by relevant guidelines, as well as other key sensitivity tests to reflect project-specific uncertainties. Results of this sensitivity analysis are shown in Table 131 and Table 132. Figure 119 compares the NPV results for each option under a range of sensitivity tests.

Table 131 Economic outcomes for sensitivity tests excluding wider economic benefits, road maintenance and disability access benefits, second round benefits from land use change and urban development benefits (FY23 millions, real, present value, discounted at 7%)

Sensitivity test		Option 1		Option 2		Option 3	
		NPV	BCR	NPV	BCR	NPV	BCR
Core		**(1,911)**	**0.34**	**(1,789)**	**0.11**	**(243)**	**0.24**
Discount rate	4%	(1,726)	0.51	(1,897)	0.20	(275)	0.33
	10%	(1,846)	0.23	1,622)	0.07	(211)	0.18
Economic costs	+20%	(2,487)	0.28	(2,191)	0.09	(306)	0.20
	-20%	(1,335)	0.42	1,386)	0.14	(179)	0.30
	P90	(2,101)	0.32	(1,927)	0.11	(273)	0.22
Benefits	+20%	(1,730)	0.40	(1,754)	0.13	(228)	0.28
	-20%	(2,091)	0.27	(1,823)	0.09	(257)	0.19
	Best Case (4% discount rate, +20% benefits, -20% costs)	(691)	0.76	(1,363)	0.28	(168)	0.49
	Worst Case (10% discount rate, -20% benefits, +20% costs)	(2,434)	0.16	(1,990)	0.05	(271)	0.12
Demographic scenarios	RPS conservative demographic scenario	(1,920)	0.33	(1,684)	0.16	(137)	0.57
	QGSO demographic scenario	(1,924)	0.33	(1,799)	0.11	(243)	0.24
CBA methodology	Extrapolation rate (Average CAGR)	(1,784)	0.38	(1,746)	0.13	(253)	0.20

Sensitivity test		Option 1		Option 2		Option 3	
		NPV	BCR	NPV	BCR	NPV	BCR
and parameters	Extrapolation rate (0% post last modelled year)	(1,975)	0.31	(1,803)	0.10	(247)	0.22
	Extrapolation rate (3.6% post last modelled year)	(1,838)	0.36	(1,772)	0.12	(237)	0.25
	ATAP Occupancy rates	(1,910)	0.34	(1,789)	0.11	(242)	0.24
	50-year appraisal period	**(1,798)**	**0.38**	**(1,797)**	**0.11**	**(234)**	**0.27**

Table 132 Economic outcomes for sensitivity tests including wider economic benefits, road maintenance and disability access benefits, second round benefits from land use changes and urban development benefits (FY23 million, real, present value, discounted at 7%)

Sensitivity test		Option 1		Option 2		Option 3	
		NPV	BCR	NPV	BCR	NPV	BCR
Core		(314)	0.89	(1,782)	0.11	(237)	0.26
Discount rate	4%	531	1.15	(1,884)	0.20	(265)	0.36
	10%	(654)	0.73	(1,618)	0.07	(207)	0.19
Economic costs	+20%	(890)	0.74	(2,184)	0.10	(300)	0.21
	-20%	262	1.11	(1,379)	0.14	(173)	0.32
	P90	(504)	0.84	(1,920)	0.11	(267)	0.23
Benefits	+20%	186	1.06	(1,746)	0.13	(221)	0.30
	-20%	(814)	0.72	(1,817)	0.10	(252)	0.21
	Optimistic Case (4% discount rate, +20% benefits, -20% costs)	2,018	1.71	(1,348)	0.29	(155)	0.53
	Pessimistic Case (10% discount rate, -20% benefits, +20% costs)	(1,481)	0.49	(1,987)	0.05	(268)	0.13
CBA methodology	Methodology to calculate agglomeration benefits	(346)	0.88	(1,783)	0.11	(238)	0.25

Sensitivity test		Option 1		Option 2		Option 3	
		NPV	BCR	NPV	BCR	NPV	BCR
and parameters	Extrapolation rate (Average CAGR)	(256)	0.91	(1,731)	0.14	(247)	0.22
	Extrapolation rate (0% post last modelled year)	(389)	0.86	(1,797)	0.11	(242)	0.24
	Extrapolation rate (3.6% post last modelled year)	(31)	0.99	(1,764)	0.12	(231)	0.27
	ATAP Occupancy rates	(312)	0.89	(1,782)	0.11	(237)	0.26
	50-year appraisal period	(152)	0.95	(1,789)	0.11	(227)	0.29

Figure 119 NPV results (including all benefits) for each option under sensitivity tests

Sensitivity testing shows that the NPV for Option 1 is sensitive to changes in inputs and assumptions. Specifically, the NPV for Option 1 is positive under a range of upside scenarios (4 per cent discount rate, decrease in costs and increase in benefits). The sensitivity testing results demonstrate merit in further investigating Option 1.

10.7 Qualitative economic benefits

In addition to economic costs and benefits monetised as part of the core CBA, there are also a range of benefits that have been assessed qualitatively for their expected impact on economic outcomes. The expected impact on BCR is reported separately for Option 1 compared to Options 2 and 3.

This is because Option 1 has a significantly larger impact on transport demand compared to Options 2 and 3. These are discussed in Table 133.

Table 133 Qualitative costs and benefits

Cost/Benefit	Expected impact on BCR		Discussion
	Option 1 LRT	Option 2 – DBL Option 3 – EBP	
Amenity impacts of construction and operations	−	−	The construction of the project would result in increased noise and vibration at various in locations in the project study area. However, given that the bus options involve minor upgrades to the road network and the light rail option is an extension of the existing corridor, the incremental noise and vibration externalities caused by the project itself are not expected to be material. Additionally, these impacts will be minimised through the environmental approvals process.
Second round transport benefits and urban development benefits	N/A – monetised in economic appraisal	+	The delivery of a dedicated bus lane under Option 2 may result in a marginal shift in population and employment distribution, while noting that there is insufficient evidence to quantify these potential changes at this stage of the Project. These changes in population and employment would be expected to result in second round transport benefits and urban development benefits.
Urban renewal benefits due to reduced vehicle traffic	++	+	The implementation of the project will shorten car vehicle trips within SEQ. This benefit is significant for Option 1 which results in a significant proportion of car trips switching to light rail. Beyond noise, emissions and safety benefits (monetised in this economic appraisal), this reduction in car vehicle traffic will deliver improved amenity outcomes for local communities.
Active transport benefits	++	+	The Gold Coast is a popular tourist destination as well as an area with strong local population growth. Through the project, it is expected that more people will switch part of their journey to forms of active travel, where the most popular forms of active transport include walking or cycling. Additional active travel is expected to produce positive financial, environmental and social benefits, marginally increasing economic outcomes.
Benefits to tourists	++	+	Enhanced public transport network connectivity, particularly to the Airport, is likely to deliver additional benefits to tourists beyond those reflected in demand modelling and captured within this economic appraisal.

Cost/Benefit	Expected impact on BCR		Discussion
	Option 1 LRT	Option 2 – DBL Option 3 – EBP	
Reduced future investment in the road network	++	+	Additional transport capacity provided by the project, especially with the expansion of the light rail network under Option 1, will reduce the number of private vehicles in the Gold Coast region and SEQ broadly thereby reducing the level of investment required in the road network in the future.
Road user reliability benefits	++	+	Travellers take into consideration travel time reliability in their travel decision-making. As each option results in a mode-shift towards public transport, the project is expected to reduce the level of congestion on road network thereby increasing reliability and travel time benefits for road users.
Public transport travel time reliability benefits	+	+	Public transport users take travel time reliability into consideration in their travel decision-making. Each option results in an improvement to the public transport service offered, thereby resulting in increased reliability benefits for public transport users.
Olympic and Paralympic Games	++	+	The Gold Coast will host Olympic Games events at four existing venues and two temporary venues. The additional transport capacity provided by the project will help facilitate movement between venues and reduce congestion in the Gold Coast during the event.
Reduced bus environmental externalities	N/A	+	Under Option 2 and 3, new bus vehicles are assumed to be electric, which will gradually provide externality benefits into the future as the bus fleet composition changes.

10.7.1 Areas for improvement

The economic analysis completed for the PE phase of the project has identified areas for further improvement and refinement in the Business Case phase, including:

- **Improved alignment between transport modelling outcomes and inputs into the economic appraisal.** Transport demand modelling outputs show similar travel time savings for Option 1 and 2. However, Option 1 achieves significantly more patronage, driven by an evidence-based user preference for light rail in the mode choice module of the demand model. This should be investigated for integration into the economic appraisal to allow the additional modelled perceived benefits of light rail (beyond travel time savings) to be monetised, as the current results appear to understate the benefits on light rail.
- **Inclusion of an additional modelled year post 2041.** Congestion relief impacts of each of the Options are significantly more pronounced in 2041 relative to 2031, leading to a step change in road user benefits. Inclusion of an

additional modelled year post 2041 would improve interpolation and extrapolation assumptions, allowing these road user benefits to be better reflected.

- **Improved base case numbers for visitor travel**, which will form a major component of the public transport user base
- **Updated Gold Coast Airport trip generation base**, taking into account the latest passenger forecasting data available from the Airport
- **Quantification of currently unquantified economic benefits** including road user, public transport travel time reliability and Scope 1, 2 and 3 emissions, as well as refinement to the PE stage benefit methodology for disability access benefits.

10.8 Conclusions

Delivering the Project will result in substantial benefits for public transport users, road users, the community and the broader economy. Project benefits have been monetised with a present value of $969 million for Option 1, $223 million for Option 2 and $75 million for Option 3. When economic costs are considered, Option 1 delivers a net present of -$1,911 million, Option 2 of -$1,789 million and Option 3 of -$243 million, resulting in a BCR of 0.34 for Option 1, 0.11 for Option 2 and 0.24 for Option 3. Option 1 is the preferred option from a BCR perspective, while Option 3 is the preferred option on a NPV basis.

When WEBs, road maintenance and disability access benefits, second round benefits from land use change and urban development benefits are included, economic benefits for Option 1 substantially improve to $2,566 million, driven primarily by the unlocking of urban development benefits with land use change. This results in a significant improvement in BCR, from 0.34 to 0.89 and NPV, from -$1,911 million to -$314 million. However, from a NPV perspective Option 3 still remains the preferred option.

Sensitivity testing demonstrates that Option 1 becomes the preferred option on both an NPV and BCR basis under upside sensitivity tests (i.e. +20% increase in economic benefits). There are a substantial number of qualitative benefits that would be expected to be higher under Option 1 relative to Option 2 and 3, as well as areas for improvement to the existing economic appraisal methodology that would be expected to result in higher benefits for Option 1 relative to Option 2 and 3.

Inclusion of these qualitative benefits or improvements to the economic appraisal methodology would be expected to result in Option 1 as the preferred option on both an NPV and BCR basis. On this basis, it is recommended that Option 1 is progressed for further analysis in the Business Case stage.

11. Legislative and regulatory review

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12. Whole of Government policy issues

This chapter identifies, evaluates, and reports on the specific issues arising from a policy perspective which may prevent, impede, or have significant implications for the project options. This chapter should be read in conjunction with Chapter 3 – Project justification, which considers broader strategic policy and alignment between Commonwealth, State, and Local Government objectives, Chapter 12 – Legislative and regulatory review, and Chapter 14 – Public interest assessment. The policy issues considered in this chapter relate to:

- Procurement
- Employment
- Tolling
- Pricing of fares
- Climate change and sustainability.

The whole of government policy analysis has determined that there are no policy issues that would prohibit the Project proceeding.

12.1 Procurement

The Queensland Government is committed to supporting competitive local industries and providing full, fair, and reasonable opportunities to tender for work on infrastructure, resource-based projects, and major procurements. If the Project proceeds beyond the Business Case, it will be procured in accordance with Australian and Queensland Government policies, including the Commonwealth Procurement Rules (CPRs) (2022)[135] and Queensland Procurement Policy (QPP) 2021[136].

TMR has well-documented and practised procurement processes in place to guide activities and to support the principles of the QPP. These processes are consistent with government frameworks and allow TMR's procurement to align with the responsible Department's needs. In accordance with the requirements of Project Assessment Framework (PAF), a more detailed investigation of the procurement methodology will be undertaken during the Business Case development and procurement phases. However, irrespective of which agency may be responsible for procurement and project delivery, all agencies (including TMR) will conduct the procurement process in alignment with relevant Australian and Queensland Government policies. The procurement policies summarised below are deemed to be relevant to the Project and will be followed in future stages of project delivery.

12.1.1 Queensland Government procurement policies

12.1.1.1. Queensland Procurement Policy (2021)

The Queensland Government's overarching policy for the procurement of goods and services aims to:

- **Focus on the economic benefit to Queensland:** Applying a local benefits test for all significant procurement, and supporting secure and fair employment outcomes, and showcasing Queensland's food and beverage industry
- **Maximise Queensland suppliers' opportunity to participate:** Ensuring that for each procurement opportunity, at least one regional and one Queensland supplier, where possible, is invited to submit a quote or tender
- **Support regional and remote economies:** Allowing agencies to procure outside of whole-of-government supply arrangements for regional and remote locations

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[135] Australian Government, Department of Finance. (2022). *Commonwealth Procurement Rules*. https://www.finance.gov.au/sites/default/files/2022-06/CPRs%20-%201%20July%202022.pdf
[136] Queensland Government, Department of Energy and Public Works. (2021). *Queensland Procurement Policy*. https://www.forgov.qld.gov.au/__data/assets/pdf_file/0034/187297/qldprocurementpolicy2021.pdf

- **Support disadvantaged Queenslanders:** Increasing procurement with genuine, quality social enterprises
- Stimulate the Information and Communications Technology (ICT) sector and drive innovation: Doubling the ICT pre-qualification exemption to $1 million.

The QPP requires agencies to apply a local benefits test for the procurement of a project and the measurement of local benefits over time. As the project progresses, opportunities for local contractors will be identified. Opportunities are dependent upon the skills and offerings demonstrated by local companies and contractors against the project's specific needs. Appropriate criteria weighting will be given in future Request for Tender documents to encourage local participation and maximise opportunities for local suppliers and contractors.

The Policy's principles (displayed in Figure 120) focus on:

- Putting Queenslanders first when securing value for money: Recognising that value for money is more than price paid
- Working together to achieve outcomes: Providing a flexible procurement framework based on an agency-led procurement model
- Governance and planning: Focusing on a category management approach with a strong governance framework and integrated planning
- Leaders in procurement practice: Professionalising the procurement discipline and building procurement capability
- Integrity, probity, and accountability: Ensuring procurement is undertaken with integrity, that probity is appropriately managed, and that accountability for outcomes is maintained
- Advancement of government objectives: Providing the procurement framework to advance economic, environmental, and social objectives.

Figure 120 Queensland Government procurement policy principles

Based on these principles, QPP requires that agencies determine how to and who will measure and review the local benefits, and any processes, standards or methodologies to be adopted. As the project progresses, TMR will ensure this procedure is upheld as part of its established procurement process.

Three Best Practice Principles (BPPs) are included in QPP to ensure quality and safe workplaces that support the delivery of projects on time and on budget. The BPPs are:

- Best practice Workplace Health and Safety (WHS) systems and standards
- Best practice commitment to apprentices and trainees
- Best practice industrial relations.

Agencies will apply the BPPs for construction projects valued over $100 million when engaging principal/major contractors, who will then use their best endeavours to apply the equivalent policy requirements when procuring subcontractors and suppliers performing work under the contract.

TMR has developed a guidance document, the Best Practice Industry Conditions for Transport Civil Construction Projects dated December 2020 (Transport BPIC). The Transport BPIC is an expression of government policy as it relates to best practice industrial relations. The Transport BPIC sets standards and expectations to ensure that a workforce with optimal skills and experience is attracted and retained for the life of a project's delivery, and that relevant stakeholders can interact in a positive, collaborative, and productive way through to successful project completion. As construction of this project will cost more than $100 million, the costs associated with implementing the Transport BPIC have been included in the project cost estimates included in Chapter 14 – Risk analysis and cost estimate.

QPP provides a schedule of procurement-related policies and instruments which are outlined in Table 135. Policies and instruments related to Indigenous procurement, local content, project assessment, and transport infrastructure are relevant to this project and are further detailed in this chapter.

Table 135 Queensland procurement related policies and instruments

Category	Policy or instrument	Responsible departments
All	Queensland Indigenous (Aboriginal and Torres Strait Islander) Procurement Policy[137]	Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships
	Queensland Charter for Local Content[138]	State Development, Infrastructure, Local Government and Planning
	Project Assessment Framework[139]	Queensland Treasury
	Queensland Leasing Approval Policy for Public Sector Entities[140]	Queensland Treasury
	Quality Assurance	Energy and Public Works
	Queensland Small Business Procurement Commitment – Action Statement	Employment, Small Business and Training
Building Construction and Maintenance	Capital Works Management Framework	Energy and Public Works
	Maintenance Management Framework	Energy and Public Works

[137] Queensland Government, Department of State Development Accessed at https://www.dsdsatsip.qld.gov.au/resources/dsdsatsip/work/atsip/business-economic-development/qlpp/queensland-indigenous-procurement-policy.pdf
[138] Queensland Government, Department of State Development, Infrastructure, Local Government and Planning (2021). Accessed at https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0014/33260/queensland-charter-for-local-content.pdf
[139] Queensland Government, Queensland Treasury, Project Assessment Framework (PAF). Accessed at https://www.treasury.qld.gov.au/programs-and-policies/project-assessment-framework/
[140] Queensland Government, Queensland Treasury, Queensland Leasing Approval Policy for Public Sector Entities (2019). Accessed at https://s3.treasury.qld.gov.au/files/Queensland-Leasing-Approval-Policy-for-Public-Sector-Entities-10.06.2020.pdf

Category	Policy or instrument	Responsible departments
	Queensland Government Building and Construction Training Policy	Employment, Small Business and Training
Information and Communication Technology	Information and Communication Technology Small and Medium Enterprise Participation Scheme	Communities, Housing and Digital Economy
	Relevant information standards, including IS13 for the procurement and disposal of ICT products and services	Communities, Housing and Digital Economy
Transport Infrastructure and Services	Transport Infrastructure Project Delivery System	Transport and Main Roads

12.1.1.2. Queensland Indigenous Procurement Policy (2017)

The *Queensland Indigenous Procurement Policy* (QIPP) aims to increase the value of Queensland contracts awarded to Indigenous businesses. The QIPP will:

- Increase the capacity and capability of Indigenous businesses to successfully tender for Queensland Government contracts
- Grow and develop a diverse and sustainable Indigenous business sector in Queensland by increasing the capacity and capability of Indigenous businesses to supply to the Queensland Government, but also to supply to the private sector through supply chains and increased private sector demand
- Improve employment outcomes and opportunities for Aboriginal Peoples and Torres Strait Islander Peoples to participate in the Queensland economy.

TMR will implement these policies in any procurement process. This may involve alignment with the QIPP's three key objectives, including setting:

- A target for purchasing from indigenous enterprises
- Assigning Commonwealth contracts to Indigenous enterprises
- Minimum Indigenous participation requirements.

The QIPP will be considered further when investigating procurement methodology in the Business Case.

12.1.1.3. Queensland Charter for Local Content

The *Queensland Charter for Local Content* aims to provide all businesses with full, fair, and reasonable opportunities to tender for Queensland Government procurements. More specifically, the objectives of the policy include:

- Encouraging more effective and adaptive approaches to maximising local content
- Applying greater transparency in the expenditure of government funds
- Providing greater certainty in the engagement of local content
- Adopting an efficient and effective tracking and review process for local content outcomes.

The charter is used to support Government agencies to incorporate the principles into procurement processes and procedures. If the project progresses beyond the Business Case, this policy will be applied by TMR to the procurement process for the preferred Option. This involves ongoing communication and transparency between TMR and regional businesses, economic development bodies, media, and subcontractors.

12.1.1.4. Project Assessment Framework

TMR implements the PAF to assess projects at all stages of their lifecycle, from the initial assessment of the service required, through to delivery. This project is currently in the PE stage of the PAF, and its purpose and methodology are detailed in Chapter 1. As with all major infrastructure projects in Queensland, the project will be required to follow the PAF guidance for the post Business Case stages, including Supply Strategy Development (procurement planning), Source Supplier (release of procurement documents, market responses and contract award), establish service capability, deliver service and (post completion) benefits realisation.

12.1.1.5. Transport Infrastructure Project Delivery System

The *Transport Infrastructure Project Delivery System* (TIPDS) provides guidance for the procurement of works specifically relating to gaining value for money in the delivery phase of a transport project. The TIPDS involves three volumes:

Selection of delivery options

This volume focuses on developing appropriate delivery strategies and choosing the right contact type for the implementation of transport infrastructure projects. The guidance describes various types of delivery and outlines strategies to narrow the range of options, including for implementing partnerships. Delivery options for the project are explored in Chapter 20 and will be further assessed in the Business Case.

Tendering for Infrastructure Works

This volume addresses the question of how tenders can be developed, invited, processed, assessed, and evaluated for different delivery options. Tendering options will be foreshadowed in the Business Case and TMR will consider this volume's strategies in procurement methodology.

Prequalification System

Volume three is based on the National Prequalification System for Civil (road and bridge) and Construction works and sets out details for contractors. It specifically deals with bidders eligible for departmental tenders. The prequalification system will be exercised prior to procurement of the project.

12.1.1.6. Building Information Modelling Implementation Strategy

Queensland is leading the way with a coordinated whole-of-government approach following the Digital Enablement for Queensland Infrastructure - Principles for Building Information Modelling (BIM) Implementation. This will transition infrastructure projects from paper-based plans to digital plans, which will deliver significant benefits during the design, construction, and operational phase of the project's life. Key project objectives of the BIM include:

- more efficient and on-time project delivery
- reduced project risk
- improved safety
- improved built outcomes
- improved asset management
- better whole-of-life management of born digital information assets/public records
- reduced costs.

From 1 July 2019, all Queensland Government construction projects with a value of $50 million or more were required to use BIM from the early planning phase. All major government infrastructure projects will transition to implement BIM by 2023.

The State Infrastructure Strategy (2022) outlined a priority action to review and update the Digital Enablement for Queensland Infrastructure - Principles for Building Information Modelling (BIM) Implementation to further advocate for a "digital by default" approach to government infrastructure. As per Queensland Government construction requirements for projects with a value of $50 million or more, the size of the Project will require BIM to be considered during the Detailed Design stage.

12.1.2 Australian Government procurement policies

12.1.2.1. Commonwealth Procurement Rules (2022)

The *Commonwealth Procurement Rules* (CPRs) are the keystone of the Australian Government's procurement policy framework. They are supported by a range of tools to ensure accountability and transparency and reduce the costs and complexity of conducting business with the Australian Government. Officials must comply with the CPRs when they procure goods and services. The CPRs indicate good practice and have been designed to provide officials with flexibility in developing and implementing procurement processes that reflect their relevant entity's needs. Officials are guided through a series of different rules and requirements under six headings including:

- Value for money
- Encouraging competition
- Efficient, effective, economical, and ethical procurement
- Accountability and transparency
- Procurement risk
- Procurement method.

The CPRs will be enforced during all procurement activities through the project's delivery.

12.1.2.2. Australian Industry Participation National Framework (2000)

The *Australian Industry Participation* (AIP) *National Framework* requires Commonwealth, state and territory governments to ensure fair and reasonable opportunity for industry to compete for work.

To meet these requirements, proponents of major projects with capital expenditure of $500 million or more must complete the following:

- Notify the AIP Authority of the major project
- Complete and submit a draft AIP plan for approval
- Manage and implement the AIP plan, by:
- Reporting compliance against the AIP plan to the AIP Authority every six months
- Notifying the AIP Authority of any changes in your project
- Keeping detailed records.

For successful tenderers of projects receiving $20 million or more in funding from the Australian Government, an AIP plan may be required to be developed and implemented. An AIP plan outlines how the successful tenderer will provide industry with opportunities to participate in the project. A decision on the requirement for an AIP will be made at the outset of the procurement phase in consultation with the Australian Government. If required, the project will meet all relevant requirements of the AIP to ensure fair, full, and reasonable opportunity for industry participation and competition.

12.1.2.3. Black Economy Procurement Connected Policy Guidelines (2019)

This policy provides guidance for Australian Government procurement processes in response to the Black Economy Taskforce's Final Report. The purpose is to ensure that the Australian Government is leading by example in procurement processes to reduce black economy activity in the supply chain. This includes provision of satisfactory tax statements by businesses wishing to tender for contracts over $4 million. As per the guidelines, this policy will be applied during the project's procurement process to enhance supply chain integrity.

12.1.2.4. Code for the Tendering and Performance of Building Work (2016)

The policy sets out the Australian Government's Code of Practice for all building industry participants that seek to be, or are, involved in Australian funded building work. The code will be applied during the procurement process.

12.1.2.5. National Guide to Alliance Contracting (2015)

If applicable to the project, the *National Guide to Alliance Contracting* provides consistent and leading practice guidance to public sector agencies that develop and own infrastructure projects. This policy will be considered once the contracting options are established.

12.1.2.6. National Framework for Traditional Contracting of Infrastructure (2015)

The *National Framework for Traditional Contracting of Infrastructure* assists clients using traditional contracting delivery models to procure infrastructure, meet the Australian Government's expectations, and to engage the market in the most effective and efficient way. The framework helps practitioners to understand and apply good practice to managing contracts, however the framework is not mandatory. The framework states that each practitioner is expected to apply their own judgment within the requirements of their jurisdiction when tailoring the practices to each specific project.

The framework outlines a primary objective to establish consistently good practices across jurisdictions which can only be achieved through a common understanding of foundation concepts (and terminology). There are five topics to consider when applying the frameworks:

(1) Good practice and commercial principles for traditional contracting

(2) project definition and tendering

(3) Development of project budgets in business cases

(4) Governance and contract management

(5) Performance and continuous improvement.

If applicable, the framework may be used to guide the application of contracting models and procurement of the project.

12.1.2.7. National PPP Policy and Guidelines (2015)

The *National PPP Policy and Guidelines* provide a consistent framework to enable the public and private sectors to work together in the provision of public infrastructure and related assets. The documents that make up the Policy and Guidelines provide an endorsed framework for the delivery of PPP projects and are applied by all Australian, state and territory government's public private partnership projects released to the market. If the project is to be delivered as a PPP, it will need to consider and apply the PPP policy and guidelines unless there is a valid reason to depart from the processes set out to enable more efficient procurement for all parties and must first be approved by the relevant authority.

12.2 Employment and training

The Queensland Government is committed to providing strong and sustainable economic, environmental, and social benefits to the community. The project will offer significant direct and indirect employment opportunities.

12.2.1 Employment opportunities and potential benefits

Through upholding existing standards and conditions, the project is not anticipated to have negative impacts on employment terms and conditions, or on the local economy. Detailed consideration of employment generation, training opportunities and business engagement policies will occur in the Business Case. Based on the capital cost of the most cost intensive option, the project has the potential to support 512 onsite, and 1,924 total direct and indirect FTE jobs during the construction phase based on estimates provided by the TMR PIP Portfolio Reporting and Analysis team.

12.2.2 Construction. Relevant employment policy

This section outlines the relevant employment policies applicable to the future phases of project development and delivery.

12.2.2.1. Unite and Recover – Queensland's Economic Recovery Plan

The *Unite and Recover – Queensland's Economic Recovery Plan* was updated for the 2021-22 State Budget to reflect the significant effort made in response to the COVID-19 pandemic and to establish a foundation for longer-term prosperity. The three-pillared Plan aims to:

- Protect Queensland's health
- Create jobs
- Work together.

A number of initiatives have been proposed to support or align with the plan to boost employment participation and improve economic outcomes. Policies relevant to this project include the Queensland Government's statement of objectives for the community, the Queensland Government Building and Construction Training Policy, Queensland Jobs Fund, and Skilling Queenslanders for Work program. Should the project be approved at the Business Case stage, it would help meet several of the objectives of the Unite and Recover Plan.

12.2.2.2. Queensland Government's Objectives for the Community

The *Financial Accountability Act 2009* (Qld) requires that the Queensland Government prepare a statement of long-term objectives for the community, to be tabled and agreed to by the Legislative Assembly. In 2021, the Queensland Government aligned priorities with the *Unite and Recover – Queensland's Economic Recovery Plan*.

The long-term objectives are:

- **Safeguarding our health**: safeguard people's health and jobs by keeping Queensland pandemic ready
- **Supporting jobs**: Support increased jobs in more industries to diversify the Queensland economy and build on existing strengths in agriculture, resources and tourism
- **Backing small business**: Help small business, the backbone of the state's economy, thrive in a changing environment
- **Making it for Queensland**: Grow manufacturing across traditional and new industries, making new products in new ways and creating new jobs
- **Building Queensland**: Drive investment in the infrastructure that supports our recovery, resilience and future prosperity
- **Growing our regions**: Help Queensland's regions grow by attracting people, talent and investment, and driving sustainable economic prosperity
- **Investing in skills**: Ensure Queenslanders have the skills they need to find meaningful jobs and set up pathways for the future
- **Backing our frontline services**: Deliver world-class frontline services in key areas such as health, education, and community safety
- **Protecting the environment**: Protect and enhance our natural environment and heritage for future generations and achieve a 50 per cent renewable energy target by 2030.

Should the project progress beyond the Business Case, it will directly support increased employment during construction and operation, with local workforce to be prioritised.

12.2.2.3. Queensland Government Building and Construction Training Policy

The *Queensland Government Building and Construction Training Policy* requires that for major Queensland Government and government owned corporation building and/or civil construction projects, with a contract sum of $100 million or greater (including GST), a minimum of 15 per cent of the total labour hours be undertaken by apprentices and/or trainees, or through other workforce training. Significant opportunities for local apprentices and trainees will be available on this project through:

- TMR graduate programs

- Apprenticeship schemes
- Training and employment schemes.

In addition, supply contract opportunities are to be made available through the procurement process to locally based Aboriginal and Torres Strait Islander businesses, as required by the employment policies of the Australian and Queensland Governments.

12.2.2.4. Skilling Queenslanders for Work

Skilling Queenslanders for Work is a Queensland Government initiative that supports skill development and uptake of qualifications to boost workforce participation levels. The program offers eight streams that deliver training opportunities for young people, Aboriginal and Torres Strait Islander peoples, people with a disability, mature age job seekers, women re-entering the workforce, veterans and ex-service personnel, and people from culturally and linguistically diverse backgrounds. TMR's procurement practices and commitment to the Queensland Government Building and Construction Training Policy closely align with this initiative. The policy also has potential to support the delivery of the project and will be further considered in future planning.

12.2.2.5. Queensland Jobs Fund

As part of the 2021-22 State Budget, the Queensland Government established a $3.34 billion Queensland Jobs Fund to drive industry development and employment opportunities across Queensland. The fund supports projects that have the potential to deliver ongoing economic benefits, improve productivity, and prioritise investment across a range of existing and new industries, including advanced manufacturing. This policy will be carefully considered during the Business Case stage if barriers or opportunities are identified and require Government support to be overcome or realised.

12.3 Tolling / user charges

This PE is investigating PT options which are not expected to influence or impact any tolling conditions or policy in Queensland.

12.4 Pricing of fares and public transport policy

The pricing of travel fares is set by TransLink, a division of TMR with state-wide responsibility for public transport. Fare pricing seeks to support the TransLink vision and purpose of creating a single integrated transport network accessible to everyone.

In late 2017, TMR implemented the *Fairer Fares* initiative across the SEQ transport network. Changes included:

- reducing zones from 23 smaller zones to eight wider zones, making local travel more affordable
- reducing fares for all zones
- extending the weekday morning off-peak period to 6am
- introducing free weekend travel for children aged five to 14 years travelling on a child go card
- replacing the '9 and free' incentive with '8 paid journeys and 50 per cent off subsequent journeys per week'.

50 per cent concession fares were also introduced for Job Seekers and Asylum Seekers, with Veterans concessions extended to include both gold and white Veteran Card holders. Fares across all project Options will be introduced in line with *Fairer Fares*.

TransLink adopted a number of technology solutions to plan and operate public transport services. In 2006, TransLink launched a smartcard ticketing system which provides a cashless means to fare collection. In 2022, TransLink has been supporting G:link to conduct the first trial of new Smart Ticketing payment methods in Queensland on GCLR. Passengers can now tap on and off using a Visa, Mastercard or American Express contactless debit or credit card, smartphone or smart watch to pay for adult fares across the entire G:link network as part of the trial.

While public transport fares will apply to this project, they are not proposed to increase as a direct consequence of the project. Figure 121 shows the fare zones on the Gold Coast as at May 2023 and Table 136 provides the relevant fares.

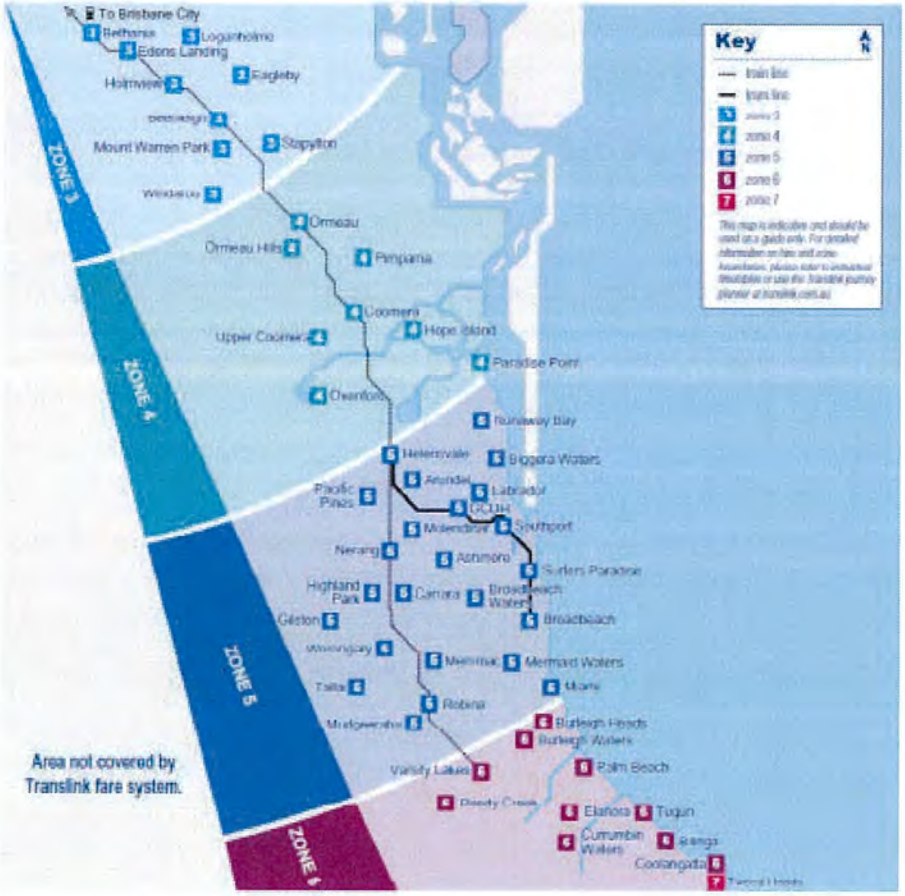

Figure 121 Fare zones (as at May 2023)

Table 136 TransLink fares (as at May 2023)

Zones travelled	*go* card	*go* card off-peak	Single paper ticket
1	$3.55	$2.84	$5.10
2	$4.34	$3.47	$6.30
3	$6.63	$5.30	$9.60
4	$8.72	$6.98	$12.60
5	$11.46	$9.17	$16.60
6	$14.55	$11.64	$21.10
7	$18.10	$14.48	$26.20
8	$21.48	$17.18	$31.10

12.5 Climate change and infrastructure sustainability

12.5.1 Infrastructure sustainability

12.5.1.1. Infrastructure Sustainability Council Infrastructure Sustainability Rating

TMR applies the Infrastructure Sustainability Council (ISC) Infrastructure Sustainability Rating Scheme to projects valued greater than $100 million. At the PE stage, this includes a preliminary materiality assessment of the project options using the ISC Infrastructure Sustainability Scorecard.

A Preliminary Infrastructure Sustainability Management Plan (PISMP) has been developed for the three shortlisted options for the project (refer to Appendix L: PISMP). The purpose of an ISMP is to inform and assist project coordinators on high priority project areas to increase the overall efficiency and reduce the overall impact of projects. The primary tool used to achieve this is the Infrastructure Sustainability (IS) Planning Tool v2.0, which assesses project options against the quadruple bottom line. This approach analyses:

- Governance: Addresses context, procurement strategy, resilience and leadership approach
- Environmental: Addresses GHG emissions, offsetting and energy efficiency
- Economic: Informs options assessment, assesses valuing and considering externalities, equity distributional impacts and economic and financial sustainability
- Social and cultural: Addresses stakeholder engagement looking at credibility, inclusivity, scope and authenticity.

The IS Planning Tool v2.1 is a non-statutory document created by the Infrastructure Sustainability Council (ISC), that has been adopted by the TMR in line with the Queensland SIS requirement to be incorporated in all projects with a budget in excess of $50 million. The project's ISMP includes consideration of:

- Track infrastructure
- Rollingstock facilities
- Roads and interchanges
- Civil, geotechnical and flooding works.

The following table includes the proposed sustainability objectives to be considered and embedded in the BH2C Public Transport project. The objectives considered during option selection will ensure alignment with TMR sustainability principles and create an environmentally, economically and socially sustainable transport system that supports liveable and prosperous communities.

The sustainability objectives have been proposed in stages, the initial PE stage will inform option selection and include minimising carbon footprint, reduction of negative local impacts during both operations and construction, such as level crossings, access to businesses, noise and visual amenity. The objectives progressed to the Business Case stage will require a comprehensive assessment.

Table 137 represents the TMR sustainability objectives as well as the sustainability objectives derived from the BH2C Public Transport sustainability workshop held in February 2023.

Table 137 **Sustainability objectives**

Themes	TMR sustainability objectives	BH2C sustainability objectives PE stage	BH2C sustainability objectives Business Case stage
Governance	Embed sustainability in the planning, design, construction and operation of the project	Develop a PISMP to guide option selection, mapping out key project processes	• Develop sustainability metrics that translate into procurement and into delivery • Include sustainability criteria at stage gate reviews • Maximise the learnings and knowledge from TMR
Environmental	Minimise the greenhouse gas footprint of materials and whole-of-life emissions from the asset	• Minimise construction and operational footprint • Set a carbon footprint baseline • Prioritise resource efficiency, durability and low maintenance	• Consider the opportunity to deliver a carbon neutral construction project • Preference provided to alternative materials • Set reduction targets for energy in the design and construction to filter through to the procurement documentation
	Protect and enhance natural environment values	• Minimisation of biodiversity offset obligation • Maximise ecological connectivity opportunities	• Embed ecological connectivity and enhancement opportunities into design
	As part of the circular economy maximise reuse and recycling of waste	• Minimise cut and fill balance • Maximise reuse of existing materials, operating equipment and other existing assets	• Initiatives to drive zero earthworks to landfill are included
Economic	Maximise asset whole-of-life value of the infrastructure and minimise whole-of-life costs	• Include in the financial assessment a cost of carbon	• Include in the financial assessment a cost of carbon
	Minimise water use and consider non-potable water sources.	• Design for a drought tolerant landscape	• Initiatives to drive zero potable water during construction • Ensure a resilient landscape surrounding the selected transport option • The collection and usage of rainfall and improved water quality (Water Sensitive Urban Design (WSUD)

Themes	TMR sustainability objectives	BH2C sustainability objectives PE stage	BH2C sustainability objectives Business Case stage
Social and Cultural	Develop active transport and accessibility improvements for the community	• Maintain liveability and connectivity of communities (consideration of constructability to minimise community disruption) • Accessibility overarching experience	• Increase access to and use of active transportation options (e.g., walking, biking, public transit) in the community. • Identify and address barriers to active transportation and accessibility • Promote and encourage active transportation
	Support local industry participation and incorporate workforce development opportunities	• Maximise opportunity to hire local and indigenous workforce and engage with local supply chain	• Engage with locals and indigenous groups early to allow for capacity building to respond to construction opportunities • Maximise the opportunity to support local industry to expand
	Promote workforce health and safety	• Crime Prevention Through Environmental Design (CPTED) across project development	• Design options to maximise natural surveillance, access control, lighting for safety and security, and maintain a well-kept and aesthetically pleasing environment • Design options to establish clear territorial boundaries • Engage local community and stakeholders in the process
Additional	Building in resilience and adaptation to potential climate change	• Maintain or improve current flood immunity – consider the wider community and ensure resilience and maintenance of operations • Maximise design adaptations prior to mitigation actions to reduce climate change risk to both local communities and future operations	• Design options to drive the reduction of the heat island effect that will be driven by the hardstand

12.5.1.1.1. Materiality Assessment

To aid with the options analysis and understand the sustainability risks associated with each option, a separate materiality assessment was performed using the IS Planning tool V2.0. The materiality assessment provided an analysis of what areas of sustainability are most relevant, or material, to each option. It considered the size, location, scope, value and the type of development as well as the operating conditions. This helped to direct the IS Rating to areas of greatest benefit from a sustainability perspective.

Option 3 differed significantly from Option 1 and Option 2 which was appropriate given the similar nature of Option 1 and Option 2. The primary difference between Option 1 and Option 2 was the permanency and new construction of the LRT under Option 1. The permanency of the asset means the operation of the asset has less flexibility during climate events, hence the importance of resilience, but because the design and construction is new, there are more opportunities for green infrastructure and energy efficiency initiatives.

Figure 122 highlights the areas of sustainability priority for this project. All three proposed options are compared to a default rating of 2 points, which shows the category's 'possible score' within the Infrastructure Sustainability Council (ISC) scorecard. A score received above the default rating of 2 points indicates a focus point for prioritisation, whereas a score received below the default rating indicates that the area is less important for the option.

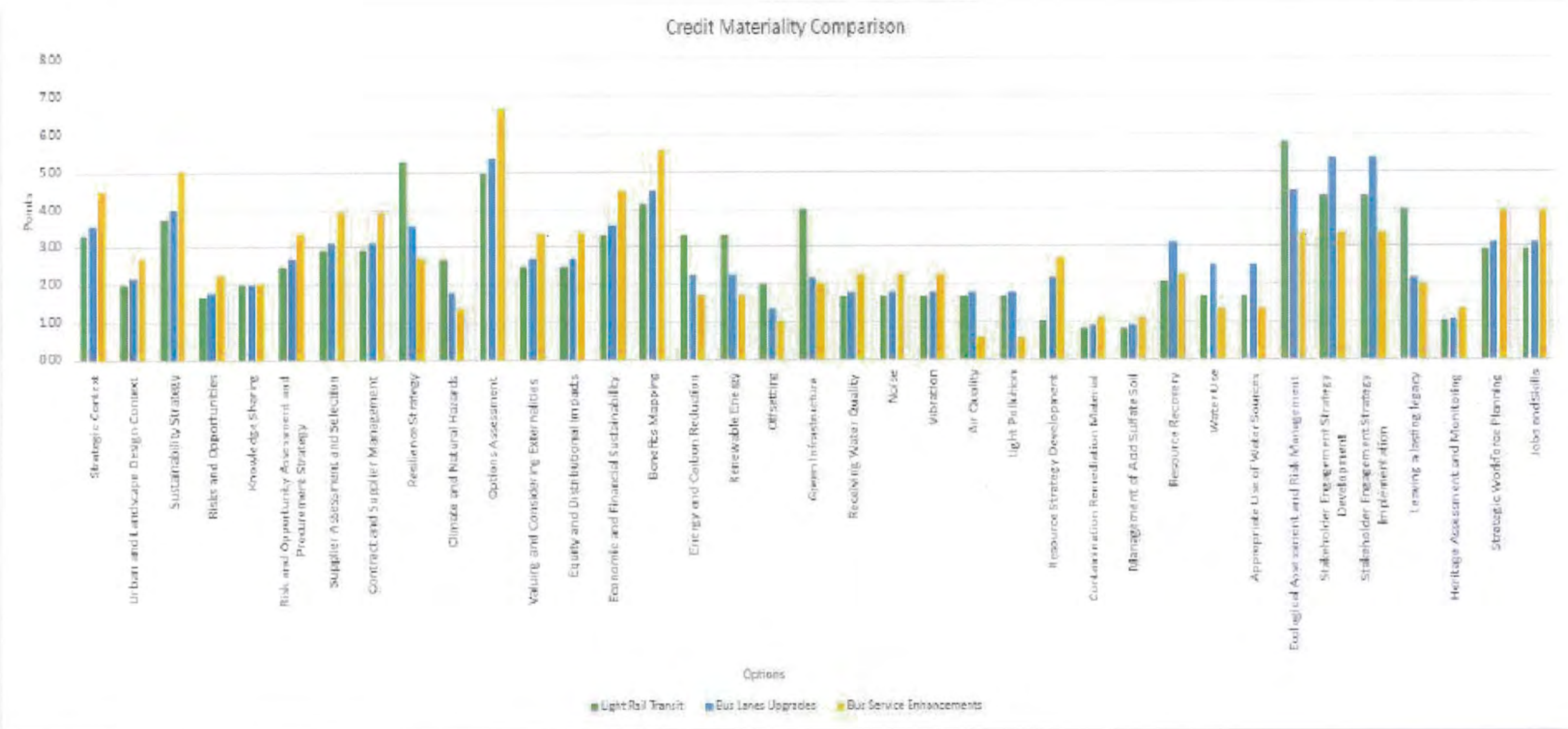

Figure 122 Credit materiality comparison

This report identifies the five most important (material) sustainability issues for this project are placed upon:

- Ecological assessment and risk management
- Stakeholder Engagement Strategy Development and Implementation
- Resilience Strategy
- Economic and Financial Sustainability
- Strategic Workforce Planning.

12.5.1.1.2. Outcomes

Out of the three options, Option 3 EBP ranked lowest as it does not provide a long-term sustainable solution. Option 3 was found not to address the Gold Coast growth projections, user experience nor the desire to encourage and increase usage of public transport.

When considering Option 1 LRT and Option 2 DLR, there were both construction and operational trade-offs. Option 2 has less construction impacts due to less materials and during operations has more flexibility during flooding events as their route is not fixed. However, Option 2 was found not to have the ability to cope with the long-term capacity required or create a positive user experience. For Option 1 LRT, there are greater construction impacts for both materials and community disruption, predominantly because of the new bridges required. Operationally, Option 1 LRT provides greater capacity and a better user experience as it connects to the existing LRT infrastructure on the Gold Coast. However, there is the potential for the LRT operations to be more impacted by climate change events, in particular flooding, due to the static nature of the asset. Finally, it is important to note that the LRT is aligned with community expectations and the Gold Coast City vision, in particular the themes of liveable places and connected communities.

It is recognised that while there are higher construction impacts from the LRT option and costly disruptions in the event of a flood, the long-term advantages of higher patronage use, seamless journey experience and alignment with the Gold Coast City's vision are greater.

12.5.1.1.3. Areas of focus

The key areas of focus to achieve the sustainability objectives for each option are summarised in Table 138.

Table 138 Key areas of focus

Option	Key areas of focus to achieve sustainability objectives
Option 1 LRT	• Employ a rigorous ecological assessment and risk management plan • Employ a strong resilience plan • Complete a thorough options assessment and benefit mapping • Establish stakeholder engagement strategies and an implementation plan • Leave behind a positive legacy.
Option 2 DLR	• Employ a rigorous ecological assessment and risk management plan • Employ a thorough options assessment and benefit mapping • Establish stakeholder engagement strategies and an implementation plan • Develop a holistic approach Integrating Sustainability.

Option	Key areas of focus to achieve sustainability objectives
Option 3 EBP	• Ensure a robust strategic context plan to boost the return on investment • Integrating sustainability to achieve set sustainability targets whilst enhancing bus services • Conduct a logical options assessment plan to mitigate any negative externalities • Integrate an economic and financial sustainability to recognise the risks and resources required • Conduct benefits mapping.

12.5.2 Sustainability outcomes and policy alignment

Public transport has a critical role to play in the transition a zero emissions economy, with transport emissions accounting for over 13 per cent of Queensland's emissions and is the third largest emitter category. Even with the transition to zero emissions vehicles, having a diverse and multi-modal transport network will still play a critical role in the sustainable and efficient delivery of infrastructure and movement of people.

The Queensland Government has a commitment to reaching achieving net zero emissions by 2050, with an interim target to reduce emissions by 30% below 2005 levels by 2030. Investment in PT, and moving people out of vehicles, as well as greater urban consolidation, will play an important role in achieving this target. Option 1 provides not only the greatest capacity improvement for PT, but also realises the greatest realised mode shift to PT from private vehicles. Light Rail results in over 18,000 trips per day being removed from the road network by 2041. From fuel emissions alone, Option 1 will realise a reduction in carbon emissions of over 18,000 tonnes per day, compared to only 2,900 for Option 2 and 1,500 for Option 1, a 500 per cent and 1,100 per cent reduction respectively. Option 1 will also support a greater degree of urban consolidation than either Option 2 or Option 3 with greater density requiring less provision of infrastructure and more efficient use of resources, and aligning to the requirements of *ShapingSEQ* and the outcomes set by the Queensland government.

12.5.3 Climate Change Adaptation Plan

A Climate Change Adaptation Plan (CCAP) (refer to Appendix M: CCAP) has been developed to supplement and support the PISMP in coverage of important climate considerations and potential for mitigative and adaptive strategies to anthropogenic induced climate issues. The purpose of the CCAP is to identify the potential climate risk drivers that could impact the project options and assess the initial site-specific climate risks for each option. The analysis of the site-specific climate risks will then be used to inform TMR's decision making on the preferred option for the Project and certain design adaptation or operational mitigation strategies that will be used. The Australian Standards AS5334:2013 Climate Change Adaptation for Settlements and Infrastructure and AS ISO 31000:2018 Risk Management – Guidelines, along with the TMR EP170 Climate Change Risk Assessment Methodology, were the key reference documents used to inform the process of this assessment. These references complement each other by providing a comprehensive framework for addressing climate change risks and implementing effective risk management strategies.

Risks to the sites have been identified through the use of data from a number of sources, including the Australian Bureau of Meteorology (BoM), the CSIRO Climate Change in Australia Future Climate Tool, and the Queensland Future Climate Dashboard (Long Paddock). Climate change projections for the region were assessed extending out to 2090 using Representative Concentration Pathways (RCPs) and various climate data models sourced from Long Paddock.

The key risks that have been identified in relation to the BH2C project include:

(1) Extreme heatwaves. It is expected there will be higher extreme temperatures, more frequent hot days (max temp >35°C), and more frequent and extreme heatwaves, potentially causing accelerated deterioration of transport infrastructure and difficult operating conditions.

(2) Bushfires. Intensity and frequency of bushfires are expected to increase, potentially causing severe damage to transport infrastructure (structural collapse), health and safety concerns from smoke, and fire causing closures to transport routes.

(3) Flooding. The intensity and frequency of extreme rainfall events is expected to increase. Mean sea level is expected to rise, and the height of extreme sea-level events is also expected to increase. Flooding could potentially submerge transport infrastructure underwater and disrupt the transport network.

The outcome of the study is a risk assessment tool that evaluates climate risks for each option within two parameters: likelihood and consequence. Based on both parameters, risks have been classified with a grade from low to extreme.

Table 139 below shows a summary of the relative climate risks of each alignment option from the preliminary risk assessment completed. Relatively, the light rail transit is the riskiest option, followed by the Dedicated Bus Lanes and then the Enhanced Bus Provisions.

Table 139 Project option relative risk rating

Key climate risk driver	Option 1 LRT	Option 2 DBL	Option 2 EBP
Extreme heatwaves	High	Low	Low
Bushfires	High	Medium	Low
Flooding	High	Medium	Low

Importantly, this report is only a preliminary study to determine initial climate risks. A more in-depth analysis of the identified risks should be conducted prior to final design decisions on a specific alignment. These include but are not limited to:

- Extensive flood modelling along the exact BH2C project alignment to determine exact coverage, depth and damage associated with mass flooding to determine the impact on BH2C transport infrastructure.
- Extensive fire risk mapping to determine projected frequency and severity of the identified bushfire hotspots along the exact BH2C project alignment and the potential impact on BH2C transport infrastructure.
- Extensive coastal inundation modelling to determine the exact level of potential coastal inundation along the exact BH2C project alignment and its impact on the BH2C transport infrastructure.

12.6 Conclusions

Relevant state and Commonwealth whole-of-government policy issues that may prevent, impede, or have significant implications for the Project Options have been carefully considered in this chapter. The specific policy areas considered relate to procurement, employment, tolling, pricing of fares, climate change and sustainability.

It has been determined that there are no policy issues that would prohibit the project from proceeding to the Business Case stage. Conversely, a number of identified policies have the potential to support the delivery of the project and will be considered in future planning. All short-listed options investigated as part of the PE stage align with whole-of government policies outlined above. There is no substantive point of difference between the options on the basis of their compliance to the relevant policies. There are some differences in the level of employment impacts between the options due to the relative differences in capital expenditure, and some differences in mode shift achieved and network performance which may impact on a more detailed climate change assessment in the Business Case stage.

It is recommended that policy issues are discussed with stakeholders during development of the Business Case to ensure appropriate consideration is given to any policy related outcomes that may arise from the project's adoption.

13. Social impact evaluation

13.1 Purpose and overview

The purpose of this chapter is to evaluate the social benefits and/or impacts that the construction and operation of the project options may trigger. The purpose of the social impact evaluation (SIE) is to capture the positive contribution the project options could generate to society, identify opportunities to create additional social value (enhancements) and to enable any negative impacts to be identified and appropriately mitigated (mitigations). This chapter discusses:

- Approach
- Identify impacts
- Evaluate impacts
- Integrate outcomes.

Additional detail on the social impacts of each option is located in Appendix N: Social Impact Evaluation register.

13.2 Approach

The approach to the SIE was based on the best practice framework BCDF *Social Impact Evaluation guide* (2021). The SIE uses the three-step process presented in the SIE guide as illustrated in Figure 123.

Figure 123 SIE three-step process

The SIE was designed to capture the positive contribution the project options make to society. It also enables any negative impacts to be identified and appropriately mitigated. In undertaking the SIE, regard has been given to the existing social environment and the likely degree of change (positive or negative impact) in the study area during the construction and operation phases of the project. The SIE considered all three shortlisted options and enables consideration of the relative position and negative impacts each option could have to identify which option has the greatest potential to realise significant positive social benefits. Key elements of the SIE include:

- the social and other benefits of the proposed project
- negative social impacts to be mitigated
- opportunities to create additional social value for the proposed project.

13.2.1 Step 1: Identify social impacts

Step 1 aimed to identify who will be affected by the project and describe how they may be impacted. Step 1 included:

- identifying stakeholders
- identifying and describe impacts
- documenting the social impact baseline.

13.2.2 Step 2: Evaluate social impacts

Step 2 aimed to identify the change experienced by stakeholders between the baseline and project/option. Step 2 included:

- assessing the likelihood and consequence of impacts occurring without the project (baseline)

- assessing the likelihood and consequence of the impacts occurring with the project
- assessing the likelihood and consequence of the impacts after mitigations/enhancements to minimise negative impacts and enhance positive impacts.

13.2.3 Step 3: Integrate outcomes

Step 3 aimed to identify how the outcomes of the evaluation connect to other aspects of the PE. Step 3 included:

- identifying impacts to be included in the economic analysis
- including relevant elements in the project options and other analyses.

13.2.4 Engagement activities

A range of communication and engagement activities were undertaken in 2022 to support development of the PE. The outcomes of this engagement informed the development of the SIE. Refer to Chapter 15 – Public interest assessment for details of the engagement program activities that provided input to the SIE.

13.2.5 Data sources

Scoping of the social baseline and social impact was informed by:

- demographic data outlined in Chapter 3 – Project justification
- publicly available information (such as aerial mapping) to establish an understanding of the existing social environment
- social impact assessments undertaken for GCLR Stage 1, 2 and 3
- community and stakeholder engagement undertaken for the project, which includes identification of community values.

13.3 Step 1 – Identify impacts

13.3.1 Stakeholders affected by project options

The first step of the SIE was to identify who will be affected by the project options and how. The stakeholders are summarised in Table 140.

Table 140 Stakeholder identification

Stakeholder	Option 1	Option 2	Option 3
Motorists	✓	✓	✓
Active transport users	✓	✓	✓
Residents	✓	✓	✓
Landowners/developers	✓	✓	Minimal impact
Businesses	✓	✓	Minimal impact
PT users	✓	✓	✓
Service/utility authorities	✓	✓	✓

Stakeholder	Option 1	Option 2	Option 3
Schools	✓	✓	✓
Visitors (tourists)	✓	✓	✓
Community groups and clubs	✓	✓	✓
Cultural heritage groups	✓	✓	Minimal impact
Environmental groups	✓	✓	Minimal impact

13.3.2 Identify and describe impacts

The anticipated impacts for each stakeholder group during operations across the project options are detailed in Table 141.

Table 141 Identified impacts for each stakeholder group during operations

Stakeholder	Option 1	Option 2	Option 3
Motorists	Decreased network congestion	Decreased network congestion	Decreased network congestion
	Improved travel time	Improved travel time	Improved travel time
	Changes to local traffic conditions and access on Gold Coast Hospital (GCH) and some adjacent streets	Changes to local traffic conditions and access on GCH and some adjacent streets	Changes to local traffic conditions and access on GCH and some adjacent streets
	Reduced local parking on GCH and some adjacent streets	Reduced local parking on GCH and some adjacent streets	N/A
Active transport users	Decreased network congestion	Decreased network congestion	Decreased network congestion
	Improved travel time	N/A	N/A
	Improved cyclist safety	Improved cyclist safety	Improved cyclist safety
	Improved PT and active transport mode share, safety and security at PT stations and through dedicated pedestrian and cycle routes off-corridor	N/A	N/A
Residents	Decreased network congestion	Decreased network congestion	Decreased network congestion

Stakeholder	Option 1	Option 2	Option 3
	Changes to local traffic conditions and access on GCH and some adjacent streets	Changes to local traffic conditions and access on GCH and some adjacent streets	Changes to local traffic conditions and access on GCH and some adjacent streets
	Reduced local parking on Gold Coast Highway and some adjacent streets	Reduced local parking on Gold Coast Highway and some adjacent streets	N/A
	Job creation	Job creation	N/A
	Increased tax revenue through economic activity and development along the corridor	Increased tax revenue through economic activity and development along the corridor	N/A
	Improved pedestrian safety	Improved pedestrian safety	Improved pedestrian safety
	Enhanced travel options improving connectivity and mobility for the public	N/A	N/A
	Providing a reliable and efficient mode of transport to residents and visitors	N/A	N/A
	Impact to visual amenity	Impact to visual amenity	Impact to visual amenity
	Noise generated by passenger activity at stations adjacent to residential properties may result in noise impacts	Noise generated by passenger activity at stations adjacent to residential properties may result in noise impacts	Noise generated by passenger activity at stations adjacent to residential properties may result in noise impacts
	Potential conflict with residents owing to displaced business parking in residential streets	Potential conflict with residents owing to displaced business parking in residential streets	Potential conflict with residents owing to displaced business parking in residential streets
	Increased risk to health and amenity from emissions, noise, dust and vibration during construction	Increased risk to health and amenity from emissions, noise, dust and vibration during construction	Increased risk to health and amenity from emissions, noise, dust and vibration during construction
Landowners/developers	Changes to local traffic conditions and access on Gold Coast Highway and some adjacent streets	Changes to local traffic conditions and access on Gold Coast Highway and some adjacent streets	Changes to local traffic conditions and access on Gold Coast Highway and some adjacent streets
	Supports more effective urban development	N/A	N/A

Stakeholder	Option 1	Option 2	Option 3
	Increased property values	Impact to visual amenity	Impact to visual amenity
	Compulsory land acquisition	Compulsory land acquisition	Compulsory land acquisition
	Impact to visual amenity	N/A	N/A
Businesses	Easier access for customers arriving by PT within the walk-up catchment to light rail stations	N/A	N/A
	Reduced local parking on Gold Coast Highway and some adjacent streets	Reduced local parking on Gold Coast Highway and some adjacent streets	N/A
	Future commercial and retail development growth	N/A	N/A
	Construction disruptions negatively impact existing businesses in the short-term	N/A	N/A
PT users	Decreased network congestion	Decreased network congestion	Decreased network congestion
	Increased PT options	N/A	N/A
	Improved travel time	Improved travel time	Improved travel time
	Providing a reliable and efficient mode of transport to residents and visitors	N/A	N/A
	Changes to bus services and bus stops on the local public transport network	Changes to bus services and bus stops on the local public transport network	Changes to bus services and bus stops on the local public transport network
Service/utility authorities	Implications for existing and future service locations	Implications for existing and future service locations	N/A
Schools	Easier access to PT and shopping, work, education and entertainment	Easier access to PT and shopping, work, education and entertainment	Easier access to PT and shopping, work, education and entertainment
	Improved access and safety for students	Improved access and safety for students	Improved access and safety for students

Stakeholder	Option 1	Option 2	Option 3
Visitors (tourists)	Easier access to PT and shopping, work, education and entertainment	Easier access to PT and shopping, work, education and entertainment	Easier access to PT and shopping, work, education and entertainment
	Easier for tourists to access popular destinations on the Gold Coast, boosting tourism and economic activity in the area	Easier for tourists to access popular destinations on the Gold Coast, boosting tourism and economic activity in the area	Easier for tourists to access popular destinations on the Gold Coast, boosting tourism and economic activity in the area
	Providing a reliable and efficient mode of transport to residents and visitors	N/A	N/A
Community groups and clubs	Impact to visual amenity	Impact to visual amenity	Impact to visual amenity
Cultural heritage groups	Improved awareness of cultural heritage	N/A	N/A
	Ground disturbance to significant cultural sites within the construction site	Ground disturbance to significant cultural sites within the construction site	Ground disturbance to significant cultural sites within the construction site
Environmental groups	Impact on environment and heritage value through design	Impact on environment and heritage value through design	Impact on environment and heritage value through design
	Loss of existing green space	Loss of existing green space	Loss of existing green space
	Enhanced green space	Enhanced green space	Enhanced green space

13.3.3 Social impact baseline

13.3.3.1. Identification of social impacts

The next step in the SIE was to detail the social impacts that may occur as a result of the project being implemented during construction and upon commencement of services. The positive and negative impacts have been allocated into the following categories:

- Community impacts (C): impacts on infrastructure, services, voluntary organisations, activity networks and cohesion.
- Health impacts (H): impacts on mental, physical and social wellbeing.
- Intergenerational impacts (I): where people have perceptions about their safety, fears about the future of their community, and their aspirations for their future and the future of their children.
- Personal and property rights (P): The effects of land acquisitions and personal impacts caused by the project – particularly where people are economically affected, or experience personal disadvantage. This could also be perceived as positive impacts in the advantages gained from increased property values.
- Quality of life and cultural impacts (Q): impacts on sense of place, aesthetics and heritage, perception of belonging, security and liveability, aspirations for the future, social networks and impacts on shared customs, obligations, values, language, religious belief and other elements which make a social or ethnic group distinct.

- Economic (E): includes employment, efficiency, productivity, property values, reliability, other wider economic impacts, income (labour market), burden of national debt, standard of living, economic dependency, and affordable housing.
- Lifestyle impacts (L): impacts on the way people behave and relate to family, friends and cohorts on a day-to-day basis.

13.3.3.2. Setting the social impact baseline

The description of the existing social environment provides a baseline of the key social characteristics and conditions of the study area. The social impact baseline is the social environment in the absence of the project. The project social baseline was informed by:

- analysis of key population and demographic indicators as outlined in Chapter 3
- analysis of the local and regional economy indicators, including employment and income, and dwelling characteristics as outlined in Chapter 3
- review of existing social infrastructure in the study area, including services and facilities that support quality of life and well-being and the community's means of access to these
- identification of tourist and recreational uses in the study area
- analysis of existing transport and access.

The social context was presented in Chapter 3 which included an outline of the problem and opportunities to be addressed within the scope of the PE, including population growth, housing demand, employment opportunities and connection to economic activity. The social impact baseline for each impact identified in Section 13.3.2 is shown in Table 142.

Table 142 Social impact baseline

No.		Impact category	Impact	Description (baseline)
C01		Community	Decreased network congestion	Community is accustomed to current levels of network congestion
C02		Community	Easier access to PT and shopping, work, education and entertainment	Restricted access to PT impedes economic activity, urban renewal and increases car dependency and congestion
C03		Community	Easier access for customers arriving by PT within the walk-up catchment to light rail stations. Improved walkability between PT and local destinations which increases visibility of businesses to potential customers	Community is accustomed to current levels of PT mobility
C04		Community	Increased PT options	Public has few travel options, low connectivity and mobility
C05		Community	Improved travel time	Public travel time, with no improvements and likely reductions due to increased congestion

No.		Impact category	Impact	Description (baseline)
C06		Community	Improved access and safety for students	Access and safety to PT network remains at current levels
C07		Community	Changes to local traffic conditions and access on Gold Coast Highway and some adjacent streets	Motorists are able to access local streets with few restrictions
C08		Community	Reduced local parking on Gold Coast Highway and some adjacent streets	There are 2074 existing car parks (AECOM, 2023). On-street parking is available in front of many shops and businesses
C09		Community	Impact to visual amenity	Community is accustomed to current visual amenity
C10		Community	Noise generated by passenger activity at stations adjacent to residential properties may result in noise impacts	Community is accustomed to current levels of noise
C11		Community	Potential conflict with residents owing to displaced business parking in residential streets	No conflict
C12		Community	Changes to bus services and bus stops on the local public transport network	No conflict
C13		Community	Implications for existing and future service locations	No conflict
E01		Economic	Increased economic activity along the BH2C corridor	Economic activity continues at current projected growth
E02		Economic	Job creation	Job creation continues on current projected level of growth
E03		Economic	Increased tax revenue through economic activity and development along the corridor	Economic activity and development continues on current projected level of growth
E04		Economic	Support more effective urban development	Gold Coast residents currently enjoy a high quality of life with access to recreational options, green space and quality housing
E05		Economic	Easier for tourists to access popular destinations on the Gold Coast, boosting tourism and economic activity in the area	Current PT network mobility offers limited high capacity, high amenity mass transit connectivity to the corridor and Gold Coast Airport

No.		Impact category	Impact	Description (baseline)
E06		Economic	Construction disruptions negatively impact existing businesses in the short-term	Businesses are currently not subject to major construction
H01		Health	Improved pedestrian safety	Pedestrian safety is improved over time with additional signalised crossings, widened footpaths and dedicated pedestrian routes
H02		Health	Improved cyclist safety	Cyclist safety is improved over time with additional signalised crossings and dedicated cycle routes
H03		Health	Improved PT and active transport mode share, safety and security at PT stations and through dedicated pedestrian and cycle routes off-corridor	Mode share, safety and security at existing PT stations remains as is No change to pedestrian and cycle routes along corridor
I01		Intergenerational	Enhanced travel options improving connectivity and mobility for the public	Connectivity and mobility for the public are improved as required
L01		Lifestyle	Providing a reliable and efficient mode of transport to residents and visitors	The current network is constrained and it is unlikely that a reliable and efficient mode of transport can be provided without the project
L02		Lifestyle	Increased risk to health and amenity from emissions, noise, dust and vibration during construction	Community is accustomed to maintenance work only within the corridor
PPR01		Personal Property Rights	Future commercial and retail development growth	Commercial and retail development continues at current expected growth projections
PPR02		Personal Property Rights	Increased property values	Property value increases continues on current growth projections
PPR03		Personal Property Rights	Compulsory land acquisition	No conflict
Q01		Quality of Life	Enhanced green space	Community is accustomed to and values green space

No.		Impact category	Impact	Description (baseline)
Q02		Quality of Life	Improved awareness of cultural heritage	Community awareness of cultural heritage remains at the same level
Q03		Quality of Life	Ground disturbance to significant cultural sites within the construction site	No conflict
Q04		Quality of Life	Impact on environment and heritage value through design	Sites with environment and heritage values exist within the corridor
Q05		Quality of Life	Loss of existing green space	Community is accustomed to and values green space

13.4 Step 2 – Impact evaluation

The second step of the SIE was to evaluate the change experienced by the stakeholders between the baseline and the project options and with enhancements/mitigation. The likelihood and consequence for each impact was assessed for the baseline, with the project and with mitigations/enhancements across the project options. The likelihood and consequence ratings were based on the criteria outlined in Table 143 and Table 144, respectively, to ensure a consistent and effective assessment.

Table 143 Likelihood criteria

Likelihood criteria	Description
Rare	• <5% probability • The impact may occur only in exceptional circumstances
Unlikely	• 5% to 35% probability • The event could occur at some time but is improbable
Possible	• 35% to 65% probability • The event might occur at some time
Likely	• 65% to 95% probability • The event is likely to occur
Almost certain	• 95% to 100% probability • The event is expected to occur

Table 144 Consequence criteria

Consequence criteria	Description
Insignificant	• Small-scale impacts. These impacts provide limited value or cost to society. These impacts may require future consideration if there is change to the project options.
Minor	• Short-term and mostly local impacts • Positive impacts provide some value to society • Negative impacts can be easily adapted to by society
Moderate	• Medium-term impacts • Positive impacts can be enhanced to provide substantial value to society • Society has the capacity to adapt and cope with the negative impacts
Major	• Long-term and potentially far-reaching impacts • Positive impacts will provide substantial value to society • Society has limited capacity to adapt and cope with the negative impacts
Significant	• Long-term, high-magnitude and far-reaching impacts • Positive impacts will provide significant value both locally and regionally • Society has no capacity to cope with significant negative impacts

The SIE matrix in Table 145 was used to provide a rating of low, medium or high based on the likelihood and consequence ratings. This matrix is based on the matrix from the BCDF SIE guide.

Table 145 Impact Risk Assessment matrix

		CONSEQUENCE				
		INSIGNIFICANT 1	MINOR 2	MODERATE 3	MAJOR 4	SIGNIFICANT 5
LIKELIHOOD	ALMOST CERTAIN 5	LOW	MEDIUM	HIGH	HIGH	HIGH
	LIKELY 4	LOW	MEDIUM	HIGH	HIGH	HIGH
	POSSIBLE 3	LOW	MEDIUM	MEDIUM	HIGH	HIGH
	UNLIKELY 2	LOW	LOW	MEDIUM	MEDIUM	MEDIUM
	RARE 1	LOW	LOW	LOW	MEDIUM	MEDIUM

13.4.1 Evaluation outcomes

The detailed evaluation outcomes are shown in Appendix N: Social Impact Evaluation register. The impact evaluation and residual ratings have been summarised for each option, as demonstrated in Figure 124 and Figure 125 for Option 1, Figure 126 and Figure 127 for Option 2 and Figure 128 and Figure 129 for Option 3.

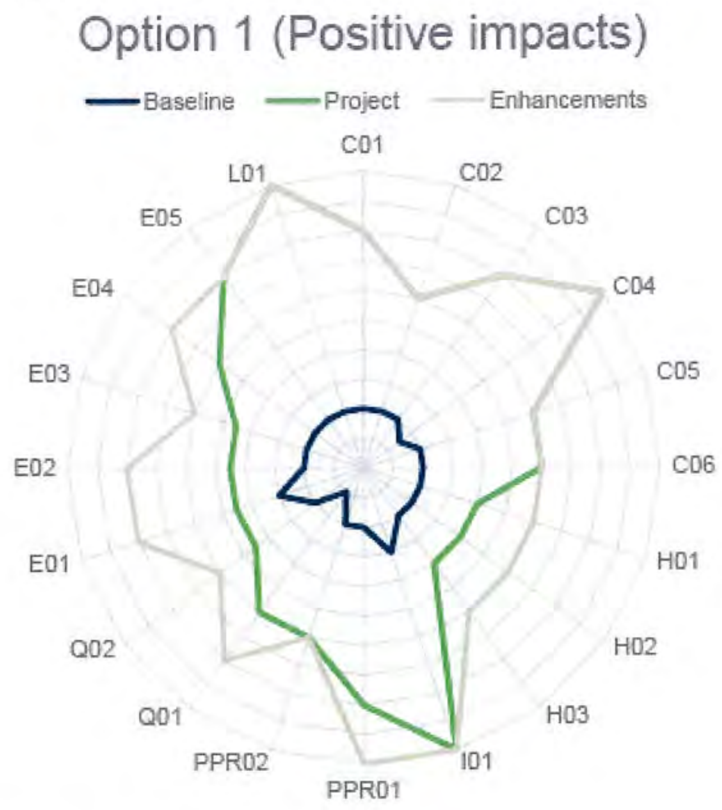

Figure 124 Option 1 positive impacts ratings summary

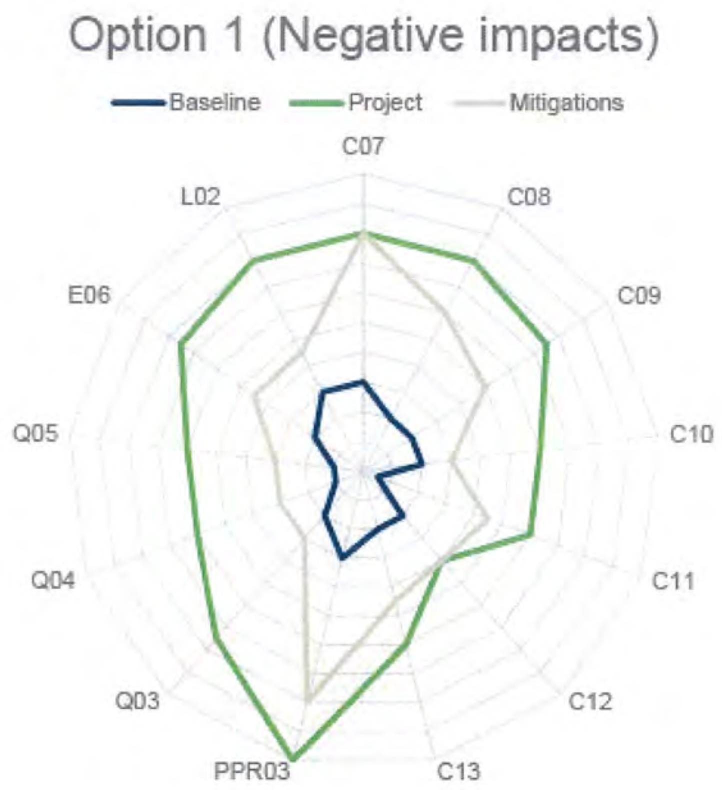

Figure 125 Option 1 negative impacts ratings summary

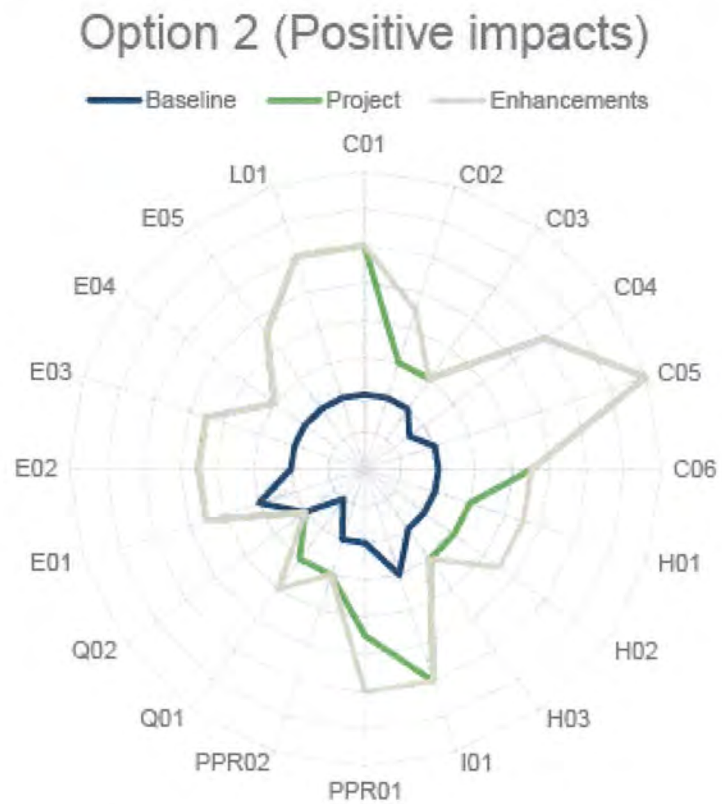

Figure 126 Option 2 positive impacts ratings summary

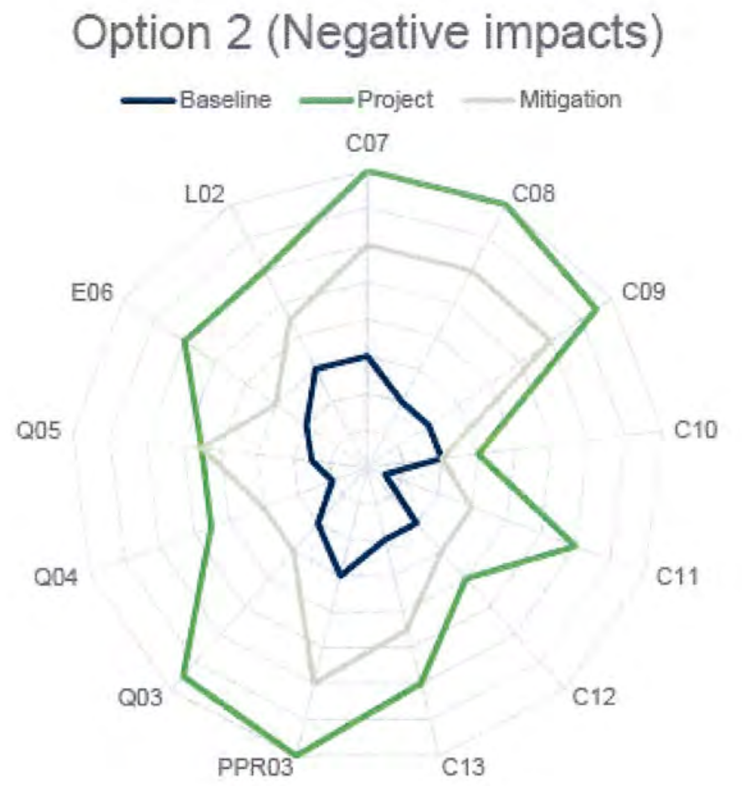

Figure 127 Option 2 negative impacts ratings summary

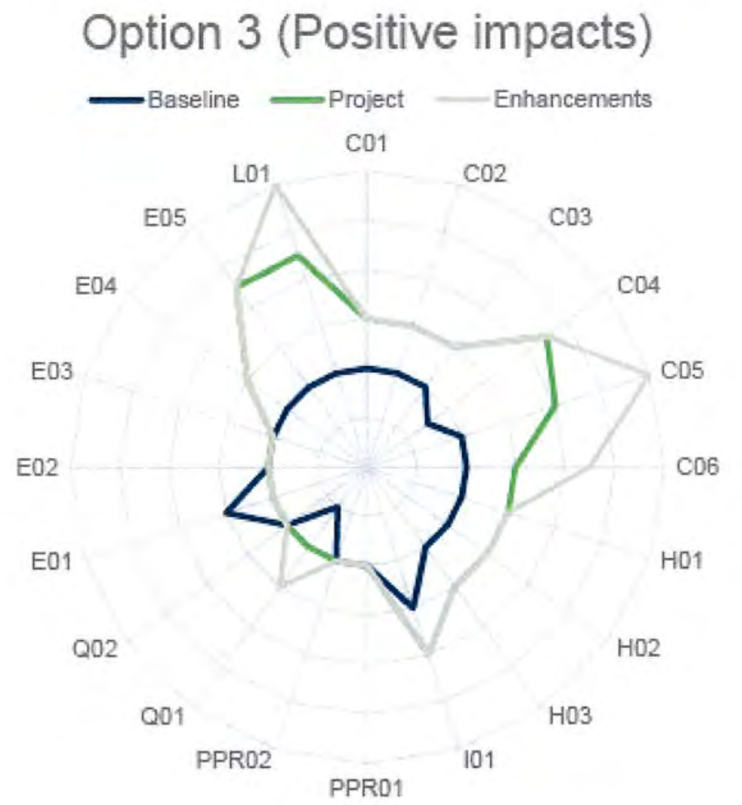

Figure 128 Option 3 positive impacts ratings summary

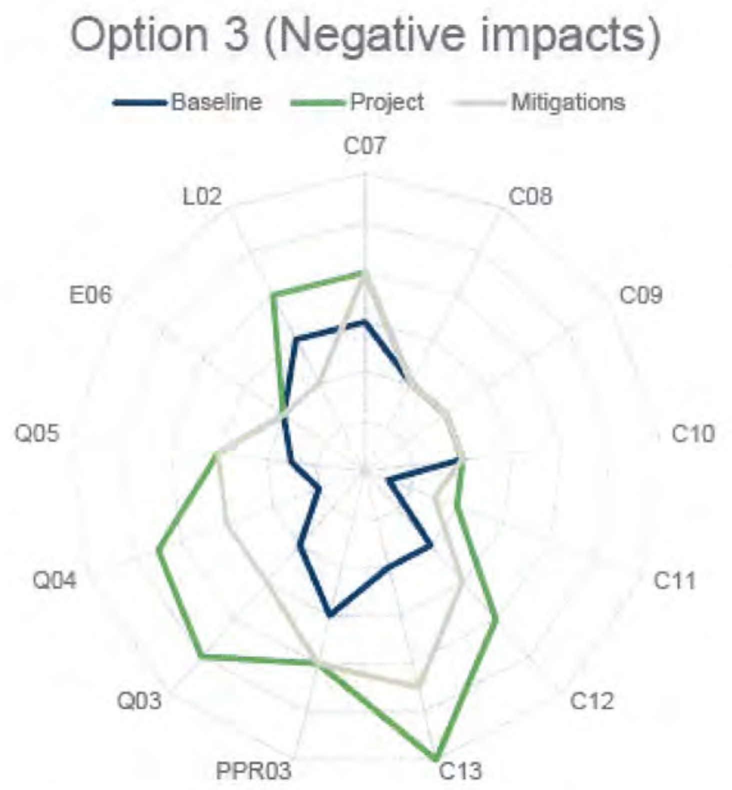

Figure 129 Option 3 negative impacts ratings summary

The evaluation considered the experience by the stakeholders between the baseline and the project options and with enhancements/mitigation. The enhancement/mitigation strategies for the social impacts rated "High" are summarised in Table 146.

Table 146 Summary of enhancement/mitigation strategies for social impacts rating "High"

Impact number	Impact	Option 1 Mitigation / enhancement	Option 2 Mitigation / enhancement	Option 3 Mitigation / enhancement
Positive impacts – opportunities to enhance benefits				
C03	Easier access for customers arriving by PT within the walk-up catchment to light rail stations. Improved walkability between PT and local destinations which increases visibility of businesses to potential customers	Perform stakeholder engagement with local businesses and educational facilities to maximise benefits to businesses and wider community		
C05	Improved travel time	Enhanced access to the PT network through increased frequencies and service locations		Enhanced access to the PT network through increased frequencies

Impact number	Impact	Option 1 Mitigation / enhancement	Option 2 Mitigation / enhancement	Option 3 Mitigation / enhancement
C06	Improved access and safety for students	Increased awareness of pedestrians Enhanced safety through additional signalised crossings and widened footpaths in school catchment areas		Nil
E04	Support more effective urban development	Effective management of urban development consequential to project Economic development strategy and associated City planning to manage and enable growth	Nil	Nil
E05	Easier for tourists to access popular destinations on the Gold Coast, boosting tourism and economic activity in the area	Work with airport to maximise connectivity and design outcomes at the Airport station	Work with airport to maximise connectivity to Airport	Nil
L01	Providing a reliable and efficient mode of transport to residents and visitors	Design project for positive user experience		
PPR01	Future commercial and retail development growth	Provide a sufficient number of stations and connections to other transport modes to maximise benefits to users		Nil
Q01	Enhanced green space	Investigate key areas of opportunity for the development of green spaces along the corridor		
Negative social impacts – mitigation strategies				
C07	Changes to local traffic conditions and access on Gold Coast Highway and some adjacent streets	Investigate opportunities to counterbalance network congestion through improvement of alternative route capacity		
C08	Reduced local parking on Gold Coast Highway and some adjacent streets	Investigate opportunities to offset parking off-corridor where possible		Nil
PPR03	Compulsory land acquisition	Undertake a focused stakeholder engagement with landholders		
C09	Impact to visual amenity	Integration of new infrastructure will have least possible visual impact New stations will incorporate urban design to integrate them positively into public realm		Nil

Impact number	Impact	Option 1 Mitigation / enhancement	Option 2 Mitigation / enhancement	Option 3 Mitigation / enhancement
C10	Noise generated by passenger activity at stations adjacent to residential properties may result in noise impacts	Minimisation of noise at stations by: - Noise monitoring - Operational management - Station design to consider noise reduction methods such as positioning of shelters and speakers - Lighting levels		Nil
C11	Potential conflict with residents owing to displaced business parking in residential streets	Undertake stakeholder engagement to reduce conflicts with residents		
C13	Implications for existing and future service locations	Provide continued access to existing locations and services through a suitable alternative with low impacts on PT users		
E06	Construction disruptions negatively impact existing businesses in the short-term	Reduce construction impacts by: - Use construction interventions to minimise amenity impacts - Early engagement of businesses to collaboratively devise means to promote that businesses are still open and to ensure safe access of customers to businesses - Robust compliance framework in relation to minimisation of community impacts embedded into construction contract		Nil
L02	Increased risk to health and amenity from emissions, noise, dust and vibration during construction	Reduce construction risks through the following: - Contractor to suppress dust throughout construction such as site screening, use of a water truck, covering stockpiles etc. - Contractor to conduct vibration, noise and air quality monitoring		
Q03	Ground disturbance to significant cultural sites within the construction site	Ensure planned works are maintained within the current kerb to kerb alignment		
Q04	Impact on environment and heritage value through design	Investigate opportunities for the design and location to be largely underpinned by its minimal impact on trees and heritage locations of significance, including flora and fauna in State and council owned local parks		
Q05	Loss of existing green space	Investigate the opportunity to incorporate green space into the corridor design		Nil

13.5 Step 3 – Integrate outcomes

This final step of the SIE was to identify how the outcomes of the evaluation connect to other aspects of the PE.

13.6 Summary of outcomes

13.6.1 Detailed summary

In order to compare the project options, a summary of the final impact ratings are shown in Figure 130 and Table 147 for positive impacts and Figure 131 and Table 148 for negative impacts.

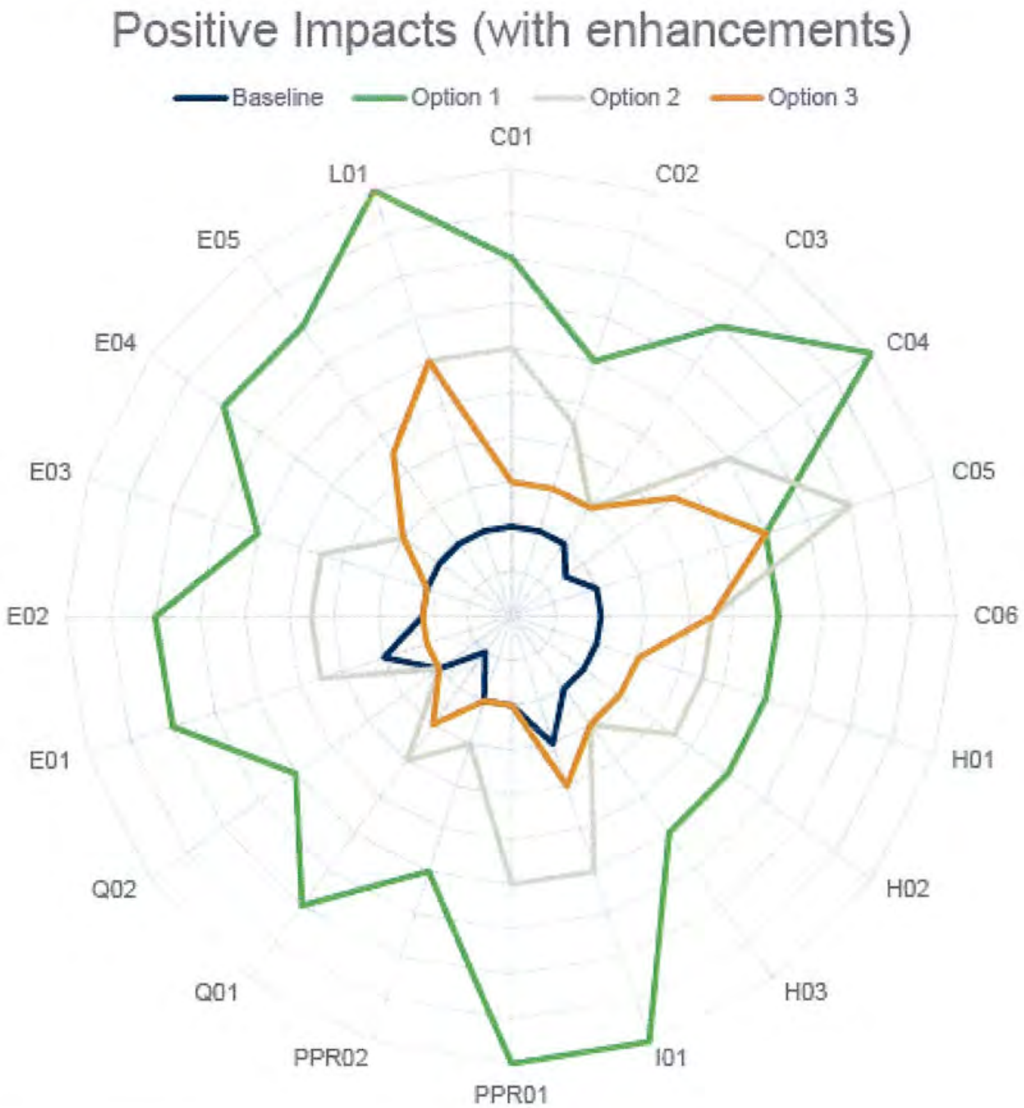

Figure 130 Positive impacts ratings across project options and baseline

Table 147 Positive impacts ratings across options and baseline

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
C01	Decreased network congestion	Community is accustomed to current levels of network congestion	LOW	Project will provide improved mobility, making the PT network more attractive to commuters as an alternative to cars	HIGH	Project will provide improve mobility, making the PT network more attractive to commuters as an alternative to cars	MEDIUM	Project option is not expected decrease network congestion significantly	LOW
C02	Easier access to PT and shopping, work, education and entertainment	Restricted access to PT impedes economic activity, urban renewal and increases car dependency and congestion	LOW	Easier access to PT network, increasing residents mobility and ability to access jobs and educational opportunities	HIGH	Easier access to PT network, increasing residents' mobility and ability to access jobs and educational opportunities	MEDIUM	Easier access to PT network, increasing residents' mobility and ability to access jobs and educational opportunities	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
C03	Easier access for customers arriving by PT within the walk-up catchment to light rail stations. Improved walkability between PT and local destinations which increases visibility of businesses to potential customers	Community is accustomed to current levels of PT mobility	LOW	Increased radius of PT catchment area and enhanced access and mobility of PT network, providing users easier access to businesses, education facilities and infrastructure throughout the connected PT network	HIGH	Increased radius of PT catchment area and mobility of PT network	MEDIUM	Increased radius of PT catchment area and mobility of PT network	MEDIUM
C04	Increased PT options	Public has few travel options, low connectivity and mobility	LOW	Project will enhance PT network connectivity and mobility for users due to a larger 'walk-up' catchment area	HIGH	Project will enhance PT network connectivity and mobility for users	HIGH	Project will enhance PT network connectivity and mobility for users	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
C05	Improved travel time	Public travel time, with no improvements and likely reductions due to increased congestion	LOW	Project will increase the PT network's ability to deliver improved travel time	HIGH	Project will increase the PT network's ability to deliver improved travel time	HIGH	Project will increase the PT network's ability to deliver improved travel time	HIGH
C06	Improved access and safety for students	Access and safety to PT network remains at current levels	LOW	Project will increase access and safety through improving existing pedestrian infrastructure along the corridor	HIGH	Project will increase access and safety through improving existing pedestrian infrastructure along the corridor	MEDIUM	Project will enhance access to bus stations and safety of stations for students	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
E01	Increased economic activity along the BH2C corridor	Economic activity continues at current projected growth	MEDIUM	Increased access to businesses and enhanced exposure throughout the corridor Improved connectivity and mobility and greater access to services Creation of jobs and business opportunities along the corridor Increased investment in infrastructure and development opportunities along the corrido	HIGH	Increased access to businesses and enhanced exposure throughout the corridor	MEDIUM	Increased access to businesses and enhanced exposure throughout the corridor	LOW

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
E02	Job creation	Job creation continues on current projected level of growth	LOW	Project will support increased economic activity through easier access to business centres, creating attractive development opportunities along the corridor, increased opportunities for employment Increased mobility of PT network and access to education and business centres will increase employment opportunities along the corridor	HIGH	Project will support increased economic activity through easier access to business centres and creating attractive development opportunities along the corridor	MEDIUM	Project will support increased economic activity through easier access to business centres and creating attractive development opportunities along the corridor	LOW

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
E03	Increased tax revenue through economic activity and development along the corridor	Economic activity and development continues on current projected level of growth	LOW	Project will support increased economic activity and development along the corridor Creation of jobs and business opportunities along the corridor Increased tax revenue through new developments, businesses and job opportunities	HIGH	Project will support increased economic activity	MEDIUM	Project will support increased economic activity	LOW
E04	Support more effective urban development	Gold Coast residents currently enjoy a high quality of life with access to recreational options, green space and quality housing	LOW	Project will support more effective urban development minimising negative impacts of urban sprawl	HIGH	Project option unlikely to manage urban sprawl	MEDIUM	Project option is unlikely to manage urban sprawl	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
E05	Easier for tourists to access popular destinations on the Gold Coast, boosting tourism and economic activity in the area	Current PT network mobility offers limited high capacity, high amenity mass transit connectivity to the corridor and Gold Coast Airport	LOW	Project will encourage tourist use of extended PT network by providing connection to Gold Coast Airport and increasing network mobility between the northern and southern Gold Coast	HIGH	Project may encourage tourist use of extended PT network by providing connection to Gold Coast Airport and increasing network mobility between the northern and southern Gold Coast	MEDIUM	Project may encourage tourist use of extended PT network	MEDIUM
H01	Improved pedestrian safety	Pedestrian safety improves over time with additional signalised crossings, widened footpaths and dedicated pedestrian routes	LOW	Project will increase access and safety through improving existing pedestrian infrastructure along the BH2C corridor	HIGH	Project will increase access and safety through improving existing pedestrian infrastructure along the BH2C corridor	MEDIUM	Improved pedestrian safety with enhancements made to existing signalised crossings and footpaths	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
H02	Improved cyclist safety	Cyclist safety improves over time with additional signalised crossings and dedicated cycle routes	LOW	Project will increase access and safety through improving existing infrastructure for cyclists along the corridor	HIGH	Project will increase access and safety through improving existing infrastructure for cyclists along the corridor	MEDIUM	Improved cyclist safety with enhancements made to existing signalised crossings and bike lanes/paths	MEDIUM
H03	Improved PT and active transport mode share, safety and security at PT stations and through dedicated pedestrian and cycle routes off-corridor	Mode share, safety and security at existing PT stations remains as is No change to pedestrian and cycle routes along corridor	LOW	Project will increase PT and active transport mode share access through dedicated pedestrian and cycle routes off-corridor	HIGH	Project will increase mode sharing access through dedicated pedestrian and cycle routes off-corridor	MEDIUM	Project may increase mode sharing access through dedicated pedestrian and cycle routes off-corridor	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
I01	Enhanced travel options improving connectivity and mobility for the public	Connectivity and mobility for the public are improved as required	MEDIUM	New infrastructure will provide significant mobility benefits for all people including locals and tourists	HIGH	New infrastructure will provide significant mobility benefits for all people including locals and tourists	HIGH	Project option may provide increased mobility benefits for all people including locals and tourists	MEDIUM
L01	Providing a reliable and efficient mode of transport to residents and visitors	The current network is constrained, and it is unlikely that a reliable and efficient mode of transport can be provided without the project	LOW	Improved PT options will enhance visitor and residents' experiences due to a reduction in congestion and improved reliability of public transport	HIGH	Improved PT options will enhance visitor and residents' experiences due to a reduction in congestion and improved reliability of public transport	HIGH	Improved PT options may enhance visitor and residents' experiences due to a reduction in congestion and improved reliability of public transport	HIGH

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
PPR01	Future commercial and retail development growth	Commercial and retail development continues at current expected growth projections	LOW	Improved access to key facilities within the corridor through the project and its connection to local bus routes and other modes of transport	HIGH	Improved access to key facilities within the corridor through the project and its connection existing local bus routes	HIGH	Improved access to key facilities within the corridor through the project and its connection to existing local bus routes	LOW
PPR02	Increased property values	Property value increases continue on current growth projections	LOW	Property values within the walk-up catchment areas are likely to increase in the long term due to improved connectivity and access to modern public transport	HIGH	Project option unlikely to result in land use changes	MEDIUM	Project option unlikely to result in land use changes	LOW

Impact number	Impact	Baseline	Impact rating	Option 1	Impact rating (with enhance-ments)	Option 2	Impact rating (With enhance-ments)	Option 3	Impact rating (With enhance-ments)
Q01	Enhanced green space	Community is accustomed to and values green space	LOW	The project seeks to improve greening of the corridor by planting appropriate species for the light rail, road and pathway infrastructure Promotes sustainable transport	HIGH	The project seeks to improve greening of the corridor by planting appropriate species for bus stations and road and pathway infrastructure	MEDIUM	The project seeks to improve greening of the corridor by planting appropriate species for bus stops and road and pathway infrastructure.	MEDIUM
Q02	Improved awareness of cultural heritage	Community awareness of cultural heritage remains at the same level	LOW	Improving access, general community knowledge of cultural heritage sites along the corridor Potential benefit of drawing attention to sites of cultural heritage significance through incorporation into station designs, improving access to cultural heritage site	HIGH	Project option unlikely to enable significant increase in cultural heritage awareness	LOW	Project option unlikely to enable significant increase in cultural heritage awareness	LOW

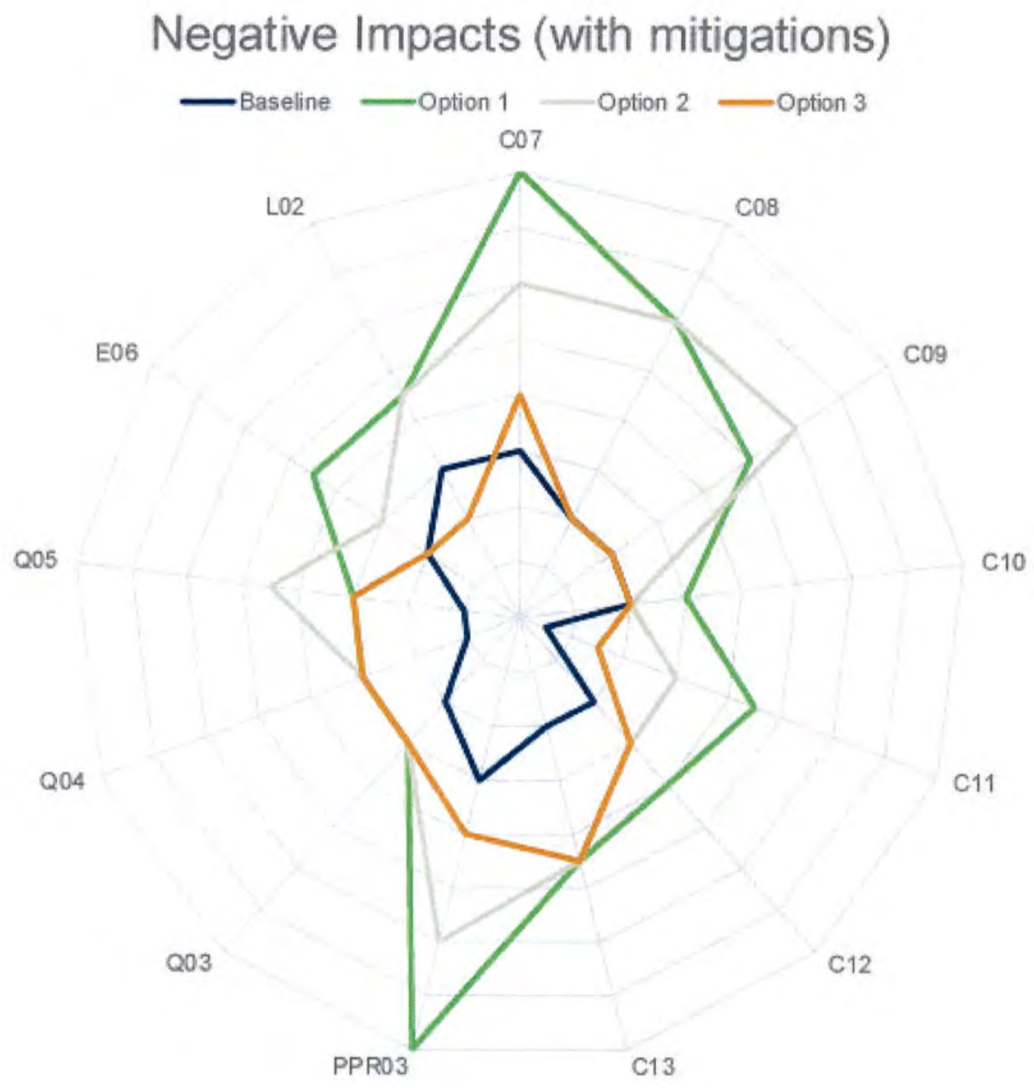

Figure 131 Negative Impacts Ratings Across Project Options and Baseline

Table 148 Negative impacts ratings across options and baseline

Impact number	Impact	Baseline	Impact rating	Option1	Impact rating (with mitigations)	Option 2	Impact rating (with mitigations)	Option 3	Impact rating (with mitigations)
C07	Changes to local traffic conditions and access on Gold Coast Highway and some adjacent streets	Motorists can access local streets with few restrictions	LOW	Conditions will change and access will be restricted, property owners and drivers in general will know what to expect and how to manage it. Increased network congestion owing to less lanes during construction periods. Local streets to be used as alternative routes likely are to experience long periods of congestion and increased traffic thoroughfare	HIGH	Conditions will change and access will be restricted in areas where new bus stations are constructed, property owners and drivers in general will know what to expect and how to manage it	MEDIUM	Local traffic conditions changed at discrete locations	LOW
C08	Reduced local parking on Gold Coast Highway and some adjacent streets	There are 2,074 existing car parks (AECOM, 2023). On-street parking is available in	LOW	Parking spaces will be removed reducing motorist access to businesses and residences. PE design estimates a loss of 1,042 car parks (AECOM, 2023)	HIGH	Parking spaces will be removed reducing motorist access to businesses and residential facilities. PE design estimates a loss of	HIGH	Project option will have minimal impact on parking PE design estimates a loss of 136 car parks (AECOM, 2023)	LOW

Impact number	Impact	Baseline	Impact rating	Option1	Impact rating (with mitigations)	Option 2	Impact rating (with mitigations)	Option 3	Impact rating (with mitigations)
		front of many shops and businesses				1,117 car parks (AECOM, 2023)			
C09	Impact to visual amenity	Community is accustomed to current visual amenity	LOW	Project will impact visual amenity through large TPS' new stations poles and wires	MEDIUM	Project will impact visual amenity through new stops, removal of parking	HIGH	Project option will have minimal impact on visual amenity	LOW
C10	Noise generated by passenger activity at stations adjacent to residential properties may result in noise impacts	Community is accustomed to current levels of noise	LOW	Noise generated by passenger activity at stations adjacent to residential property may result in noise impacts	MEDIUM	Noise generated by passenger activity at stations adjacent to residential property may result in noise impacts	LOW	Project option will have minimal impact on noise at existing bus stops	LOW
C11	Potential conflict with residents owing to displaced business parking in	No conflict	LOW	Blocked access to resident parking at business centres and in surrounding residential streets	MEDIUM	Blocked access to resident parking at business centres and in surrounding residential streets	MEDIUM	Localised parking issues during construction	LOW

Impact number	Impact	Baseline	Impact rating	Option1	Impact rating (with mitigations)	Option 2	Impact rating (with mitigations)	Option 3	Impact rating (with mitigations)
	residential streets								
C12	Changes to bus services and bus stops on the local public transport network	No conflict	LOW	Project will impact current bus services and users during construction	MEDIUM	Project will impact current bus services and users	MEDIUM	Project will impact current bus services and users	MEDIUM
C13	Implications for existing and future service locations	No conflict	LOW	Project will make changes to the existing locations of services	MEDIUM	Project will make changes to the existing locations of services	MEDIUM	Project will make changes to the existing locations of services	MEDIUM
E06	Construction disruptions negatively impact existing businesses in the short-term	Businesses are currently not subject to major construction	LOW	Business failure due to loss of trade caused by: restricted access removal of customer car parking including potential conflict with residents over displaced business parking business frontage compromised changes to amenity including visual impacts of	MEDIUM	Business failure due to loss of trade caused by: restricted access removal of customer car parking including potential conflict with residents over displaced business parking business frontage compromised changes to amenity including visual	MEDIUM	Businesses unlikely to be disrupted during construction	LOW

Impact number	Impact	Baseline	Impact rating	Option1	Impact rating (with mitigations)	Option 2	Impact rating (with mitigations)	Option 3	Impact rating (with mitigations)
				construction site, noise, vibration and dust impacts		impacts of construction site, noise, vibration and dust impacts			
L02	Increased risk to health and amenity from emissions, noise, dust and vibration during construction	Community is accustomed to maintenance work only for most of the corridor	MEDIUM	Construction of project option may cause: Dust Noise Vibration during use of heavy machinery Emissions from use of generators and heavy machinery	MEDIUM	Construction of project option may cause: Dust Noise Vibration during use of heavy machinery Emissions from use of generators and heavy machinery	MEDIUM	Construction of project option may cause: Dust Noise Vibration during use of heavy machinery Emissions from use of generators and heavy machinery	LOW
PPR03	Compulsory land acquisition	No conflict	MEDIUM	Compulsory land acquisition may be required	HIGH	Some land acquisition may be required	HIGH	Minimal land acquisition may be required	MEDIUM
Q03	Ground disturbance to significant cultural sites within the construction site	No conflict	MEDIUM	Construction activities may cause ground disturbance to significant cultural sites	MEDIUM	Construction activities may cause ground disturbance to significant cultural sites	MEDIUM	Construction activities may cause ground disturbance to significant cultural sites	MEDIUM
Q04	Impact on environment	Sites with environment	LOW	Siting of main stations could have	MEDIUM	Siting of new bus stations could have	MEDIUM	Siting of new bus stops could have	MEDIUM

Impact number	Impact	Baseline	Impact rating	Option1	Impact rating (with mitigations)	Option 2	Impact rating (with mitigations)	Option 3	Impact rating (with mitigations)
	and heritage value through design	and heritage values exist within the corridor		impact on significant vegetation and heritage locations		impact on significant vegetation and heritage locations		impact on significant vegetation and heritage locations	
Q05	Loss of existing green space	Community is accustomed to and values green space	LOW	To enable the construction the light rail, some loss of green space may be necessary	MEDIUM	To enable the construction the dedicated bus lanes, some loss of green space may be necessary	MEDIUM	Project option is not expected to reduce green space	MEDIUM

13.6.2 Conclusions

Overall, this SIE has identified 20 positive and 13 negative social impacts. The majority of the positive impacts are expected to occur during operations of the project options while many of the negative impacts are expected to be temporary during construction.

In order to compare the project options, a social impact rating score was calculated based on the impact ratings. The outcomes, summarised in Table 149, show that Option 1 has the highest net social impact rating followed with a significant margin by Option 2 and Option 3.

Table 149 Summary of social impact rating scores

Project option	Positive social impact rating score (with enhancements)*	Negative social impact rating score (with mitigations)**	Net social impact rating score***	Ranking
Baseline	81	52	29	N/A
Option 1 LRT	300	122	178	1
Option 2 DBL	184	109	75	2
Option 3 EBP	131	72	59	3

* Calculated as the sum of the product of likelihood and consequence for each positive social impact

** Calculated as the sum of the product of likelihood and consequence for each negative social impact

*** Calculated as the difference of positive social impact rating score and negative social impact rating score where positive values represents a positive social impact

While Option 1 had the most potential major negative impacts such as changes to local traffic conditions and parking, land acquisition and temporary construction impacts, it also showed the most potential to deliver major positive social impacts to the broadest section of society. Option 1, with enhancements in place to maximise positive social impact, had the greatest positive social impact of the project options across the impact categories. The positive social impact rating score for Option 1 is significantly higher than Option 2 and Option 3, at 60 per cent and 129 per cent respectively. The negative social impact rating for Option 1 is larger than Options 2 and 3 but only by 12 per cent and 60 per cent respectively, indicating the significant potential upside that Light Rail provides that the other options do not.

At this stage of assessment, the balance of impacts does not indicate a net social outcome that would prevent the project from progressing. Option 1 presents a significant positive increase from the baseline indicating its significant potential to realise positive social impacts and outcomes.

The SIE should be reviewed in the business case and updated following any additional community consultation. The Business Case Stage should also include further consideration of mitigation and enhancement strategies for potential impacts.

14. Public interest assessment

This chapter evaluates the social benefits achieved through delivery of the project options, including its contributions to community well-being. The public interest assessment tests the project options to determine if, on balance, they deliver equitable outcomes for all stakeholders and that it proceeds with a high-level of transparency in its processes.

The Office of the Information Commissioner Queensland describes the term 'public interest' as:

"...considerations affecting the good order and functioning of the community and government affairs for the well-being of citizens. Public interest considerations are generally common to all members of, or a substantial segment of, the community, as distinct from matters that concern private or personal interests. However, some public interest considerations can apply for the benefit of an individual."[141]

This chapter provides an overview of stakeholder and public interest matters relating to this project. There is a primary focus on key public interest assessment topics identified in the PAF Guidance, namely the:

- Effectiveness of the project in meeting the service requirements
- Community consultation
- Accessibility compliance
- Public access and equity
- Accountability and transparency provisions
- Consumer rights
- Security
- Privacy
- Conclusions.

14.1 Effectiveness in meeting requirements

This section provides an assessment of how effectively the project options meet the service requirements. The service requirements are described in Chapter 3 – Project justification. Refer to Chapter 20 – Project Benefits for more detailed reference to service requirements and benefits. A brief rationale about how each project option is effective in meeting each of the service requirements is summarised as follows:

- **SR1 Efficient, reliable, connected, accessible and safe integrated transport network**: All project options support an integrated transport network. Option 1 is most effective at meeting SR1 as it would provide an efficient transport network that meets the needs of various users, supports urban consolidation and the economic potential of the study area and aligns with the long-term planning and existing transport network in the region. Option 2 and Option 3 would also support the integrated transport network; however, both options are less effective in accessibility and connectivity, given the interface with the existing GCLR system.
- **SR2 Enhanced PT connectivity to essential services and key destinations (including across the border)**: All options provide improved PT which is important for managing forecast travel-demand within and beyond the study area, reducing traffic congestion and associated environmental impacts. The transport demand modelling indicates that Option 1 will have the most significant uptake in PT services as it provides the greatest improvements in connectivity and PT attractiveness.

[141] How to Balance Public Interest, Office of the Information Commissioner Queensland (2015): https://www.oic.qld.gov.au/annotated-legislation/rti/9.9.-3/part-5/47-grounds-on-which-access-may-be-refused/section-473b/application-of-section-473b-rti-act#1

- **SR3 Support the delivery of reliable and efficient transport between key locations (the airport, venues, key event locations and accommodation) during major events on the Gold Coast including 2032 Olympic Games:** All project options include improved PT to key locations including the Gold Coast Airport. Option 1 provides the greatest increase in PT capacity and the greatest connectivity into the existing network and would therefore support the demand to the best extent.
- **SR4 Maximised regional economic growth**: Option 1 is the most effective in maximising regional economic growth. Option 1 will increase employment and economic activity within the study area and would improve employment self-containment. Option 2 and Option 3 are less effective in maximise reginal economic growth.
- **SR5: Preserved and enhanced liveability**: Option 1 is the most effective in preserving and enhancing liveability as it improves transport accessibility which would reduce car-dependency and congestion impacts, enhance community amenity and liveability. Option 2 and Option 3 seek to improve the current PT mode in the study area but is less effectively in supporting greater demand to live and work in the study area.
- **SR6 Sustainable and attractive urban development**: All project options provide a transport solution to population growth. However, only Option 1 provides a strategic, city-changing transport response that would accelerate dwelling and employment growth and enable the study area to realise the opportunity for long-term sustainable urban consolidation. It is unlikely that Option 2 and Option 3 would meet SR6. For further information, refer to Chapter 5.

14.2 Community consultation

14.2.1 Purpose

The purpose of community engagement which informed this PE:

(1) To **inform the broader community** about progress of the project

(2) To **consult with residents who live close to the Gold Coast Light Rail Stage 4 corridor** and other key stakeholders to enable community input to influence the outcomes of decision making about project negotiables.

14.2.2 Community engagement approach

The approach to community engagement was detailed in TMR's Communication and Engagement Plan. Direct community engagement on the PE was undertaken by TMR to coincide with the completion of the corridor studies:

- Burleigh Heads to Tugun completed in 2020
- Burleigh Heads to Tugun completed from July to September 2021
- Tugun to Coolangatta in November 2022.

14.2.3 Community engagement outcomes

14.2.3.1. Burleigh Heads to Tugun community engagement

The community consultation outcomes from the Gold Coast Highway (Burleigh Heads to Tugun) Multi-modal corridor study showed overall support for the recommendations of the study as a potential solution to help improve the liveability and connectivity in and around the local communities. The following provides a summary of the results of the consultation program undertaken between 7 March and 30 April 2020.

Community consultation included:

- Release of a media statement and media briefing with the Honourable Annastacia Palaszczuk MP, Premier and Minister for Trade and the Honourable Mark Bailey MP, Minister for Transport and Main Roads on Saturday 7 March 2020
- Key stakeholder briefings
- Release of Executive Summary of the study findings encouraging email and telephone feedback

- A flyer letterbox dropped to 38,000 residents and businesses in the suburbs of Burleigh, Elanora, Palm Beach, Currumbin and Tugun
- Independent community and social media sentiment market research.

A series of community information sessions at local shopping centres and markets were planned for late March 2020. However, due to the implementation of COVID-19 social distancing measures these sessions were cancelled.

The results of the independent community market research where 500 residents and business decision makers were interviewed showed overall support for the Gold Coast Highway Multi-modal Corridor Study as a potential solution to help improve the liveability and connectivity in and around the local communities between Burleigh Heads and Tugun is strong, with 68 per cent of residents and business operators indicating a level of positive support.

Other results included:

(1) The light rail extension along the Gold Coast Highway between Burleigh Heads and Tugun is a clear preference (58 per cent) over bus lanes (25 per cent), while a heavy rail extension to the airport from Varsity Lakes is highly regarded (87 per cent)

(2) Wildlife protection between Burleigh Head National Park and Burleigh Ridge Park was rated as of key importance (84 per cent of the community), while M1 connectivity was noted as important by 82 per cent of the community and is the biggest overall concern for business respondents (78 per cent)

(3) Development of an Oceanway path is considered important by 81 per cent of the community

(4) The primary benefits of the multi-modal corridor noted by residents include improved walking and cycling paths, reduced traffic congestion and a faster and easier journey for commuters.

14.2.3.2. Tugun to Coolangatta

The community consultation outcomes for Gold Coast Highway (Tugun to Coolangatta) Multi-modal corridor study showed that 63 per cent of residents support the project. Respondents reported LRT as the most popular public transport mode used. The outcomes showed that 1 in 3 residents believe GCLR Stage 4 will improve access and connectivity. In GCLR Stage 4 corridor suburbs, 47 per cent of residents support the project while 37 per cent do not support the project.

14.2.4 Impacts on stakeholders

The research process included telephone interviews, community feedback and analysis of community sentiment of posted content. The community feedback is summarised in Table 150.

Table 150 Impact on project stakeholders

Stakeholder	Number of responses	Interests/Concerns
Telephone enquiries	9 in total received with 5 positive/neutral and 4 negative	General concerns were property and environmental impacts. Positive/ neutral comments included the benefit of more transport options.
Posted content	1,718 mentions 1,342 posts 20,842,791 potential impressions	The sentiment analysis of all sourced digital media posts on the topic of the multi-modal corridor study for the period February to April 2020 was +33%, which is a weak positive result. Facebook is the primary channel for messaging related to light rail, also having the highest engagement of any channel. While detractors are vocal, they have a comparatively low engagement rate and have very few highly active members. News channels provided the highest sentiment for the study, both in their reporting and by user comments (+47%).

Stakeholder	Number of responses	Interests/Concerns
Written communication	52 in total with 28 positive/neutral and 24 negative	General concerns were: • Reduction of lanes (2-lane traffic boulevard) • Increased traffic along the Gold Coast Highway due to development • Preference for buses/current bus service sufficient • Impacts on the local community (aligned with high-rise development).

14.3 Accessibility compliance

The provision of accessible transport infrastructure to all potential users is based on the *Disability Discrimination Act 1992* (Cth), which seeks to eliminate discrimination against people with disability as far as possible.

TMR's Disability Action Plan 2018 – 2022 (the Action Plan) requires understanding of disability legislation and consultation with the disability sector to inform the development of the transport system. The Action Plan asks that projects consider the development of:

- A plan for Compliance at the start of project planning
- An accessibility Compliance Report prior to finalisation of design process
- A Stakeholder Consultation Plan with the disability sector at the start of the project planning and/or prior to finalisation of the design process.

To meet TMR's requirements, a Compliance Plan must be delivered to support the project. This Plan should be referred to in development of the Reference Design as part of the Business Case stage and comply with all relevant accessibility standards. An Accessibility Compliance Report will also be developed prior to finalisation of the Detailed Design process.

TMR disability SMEs will be consulted at the Business Case stage, while engagement with the disability sector will be conducted through the following channels:

- Community/stakeholder consultation
- TMR internal input via the TMR Accessibility Reference Group and Accessible Transport Network.

If there are accessibility issues that have not been identified in this PE, the Business Case stage will conduct a further review of project compliance with accessibility standards and seek additional engagement with stakeholders to resolve any outstanding issues.

14.4 Accountability and transparency provisions

There are legislative requirements and numerous government policies at Commonwealth, state and local levels that provide principles of accountability and transparency and guide the development of input for the PE. The project will be delivered in accordance with the principles of accountability and transparency as contained in various government documents including the:

- PAF and National PPP Guidelines
- *Right to Information Act 2009* (RTI Act) and the *Information Privacy Act 2009* (IP Act)
- TMR Right to Information procedures and executive consultation policy
- Queensland Government's Response to Accountability and Integrity in Queensland (2009)
- *Public Sector Ethics Act 1994*
- *Public Service Act 2008*

- Queensland Government's Public Service Code of Conduct
- State Procurement Policy (2008)
- National Competition Policy: Australian Government Publishing Service (1993) (AGPS)
- Queensland Treasury – Public Benefit Test Guidelines
- all other relevant Commonwealth, state and local government laws.

A probity adviser will be engaged to provide probity oversight if approval is given for the project to proceed to the Business Case stage. A probity advisor will be required if targeted market sounding activities are undertaken, particularly if potential private sector finance parties are to be engaged.

As a local government, the City is subject to the requirements under the *Information Privacy Act 2009* (IP Act). The IP Act regulates the way personal information is collected and handled in the public sector environment, as described through the Information Privacy Principles. The IP Act also has a process for providing individuals with access to personal information in government's possession.

Given the nature and scope of the project, it is unlikely that issues associated with personal information would impact in any significant way on the implementation of the system. To protect personal information the City, State and any commercial businesses using the patronage information would need to implement their own privacy of information protocols when handling and collecting personal information of passengers and customers. Any information supplied by the community (such as for the Community Engagement and Consultation Report) would be used solely for the purposes of the Business Case in accordance with the Queensland Government's privacy guidelines under the *Right to Information Act 2009*. As such, information would not be disclosed to any third parties without the consent of the individual unless required by law.

14.5 Public access and equity

Equitable access to transport infrastructure is part of the development of this project guided by TMR's Strategic Plan 2019-2023 and Disability Action Plan 2018-2022 to ensure TMR meets its vision and purpose of 'creating a single integrated transport network accessible to everyone'.

Option 1 is an ultra-low floor light rail system that is fully accessible to people in wheelchairs or with mobility difficulties. This will improve accessibility for all, meaning that more attractions such as jobs, schools, beaches or shops will be within a reasonable travelling distance from people's houses. The preferred option aligns with the Disability Standards for Accessible Public Transport 2002 (DSAPT) and provides an accessible means to public transportation for people with a disability, thereby removing discrimination from public transport services. The technical design of the project will have regard to standards such as (but not limited to):

- locating stations on a flat gradient and avoiding hilltop locations where passengers have to climb non-compliant footpath grades
- providing adequate and unhindered access paths and passing areas, including doorways
- providing adequate space for manoeuvring at stations and whilst embarking and disembarking
- providing sufficient resting points
- providing adequate ramps for access to platforms at an acceptable slope (if any)
- providing adequate dedicated spaces and areas for waiting passengers
- ensuring all boarding devices are compatible with the infrastructure.

More sustainable transport options, including the project, will also benefit the Gold Coast by reducing traffic congestion and travel times, to contribute to retaining the amenity and lifestyle of the region.

During planning and construction, impacts may include noise, vibration and road/pathway access. These impacts will be mitigated as much as possible through management of construction processes. Once complete, impacts may include loss of amenity from related infrastructure such as noise barriers and noise impacts.

For the project to be in the public interest, there should be equity between the recipients of the benefits and bearers of associated costs. As a major infrastructure project, it will benefit existing and new residents, workers and business owners. The project is expected to provide health, economic, and environmental benefits for the community, contributing to the liveability of the Gold Coast. The project will provide travel choices for the community to improve their connectivity to local centres, community services, health, education, employment and recreation opportunities. Over the long term, the project will provide a net benefit to the community through positive outcomes for lifestyle, improved access and environmental benefits. Details on any changes to the road network, driveways and parking can be seen in the design plans in Appendix E: Design Development Report, with a summary of the parking changes discussed in Chapter 5.

14.6 Consumer rights

TMR's community engagement policy, standards, guidelines and principles provide direction and a framework for how to work with communities. They incorporate appropriate documentation and access to information as part of project management to ensure openness and transparency in community engagement and departmental compliance with relevant legislation. Access to records allows communities to see how their inputs were used in the department's decisions. These policies, standards, guidelines and principles have been incorporated in this PE.

Consumer rights are the legal and moral duties of protection owed by a supplier to a purchaser or user of goods or services. The fundamentals of consumer rights include:

- right to safety
- right to be informed
- right to choose
- right to be heard.

It is anticipated that the project will beneficially impact socially disadvantaged people who are more dependent on public transport, with safe, frequent and reliable services. Other public transport patrons in the broader community will also enjoy these benefits.

Beyond public transport dependencies, the public community as a whole is intended to be the main user of the project. Other ancillary consumers are most likely to be those secondary impacted stakeholders such as local residents and business owners. Given the project's history and various previous government consultations and negotiations with the community, any risks associated with consumer rights for the development of the preferred option have the potential to be relatively low. To ensure that the risk, and with it the complexities, of consumer rights are minimised, it is essential to develop and implement policies which protect the existing rights of the public and ensure that these protections are communicated clearly with the public.

It is noted that there may be safety concerns, particularly at night. This project aims to address that by considering Crime Prevention Through Environmental Design (CPTED) principles in the design of the preferred option. For example, some safety aspects to consider could be the passive security of the area around each station, posing questions such as:

- Does the area have natural surveillance, and will surveillance infrastructure be installed at each station?
- Can nearby residents, business or road users see the area clearly?
- Are there people in the area that could stop or witness potential crimes?
- Is the space open or are there places for "strangers" to hide?
- Is there adequate natural and installed lighting?

These safety aspects represent only a sample of the safety considerations relevant to this project and indeed there are other safety aspects to consider, especially those that directly relate to during travel time within a passenger transport vehicle (such as surveillance infrastructure, emergency call buttons or exits). Given that the area is intended to integrate with other aspects of residential and commercial land use planning, there is an inherent level of passive security provided to the area. It is recommended that the principles of CPTED are considered in the design process, including adequate lighting and signage to ensure the safety of the area.

An LRT project option would seek to apply the public safety approach of GCLR Stages 1, 2 and 3 during design, construction, and operations.

14.7 Security

The TMR design standards have been taken into consideration in addressing the potential for accident and injury, anti-social behaviours, and crime when developing concept phase designs for the three PE options. CPTED principles have been used in the planning to ensure that public spaces are safe and the opportunity for crime is minimised by incorporating devices such as adequate lighting, CCTV cameras, and fencing, along with encouraging passive surveillance by allowing for clear sight lines. The project will also consider the needs of emergency services in their ability to gain access to all facilities in an appropriate and efficient way.

14.8 Privacy

The project must comply with the legislation and information privacy principles outlined in the:

- *Privacy Act 1988* (Cth)
- The IP Act and the RTI Act - provide safeguards for the handling of personal information in the public sector environment
- Queensland Government's Information Standard 18: Information Security Policy (2019) (IS18:2018) - sets out the principles for addressing information security risks, including classification and control of material, personal security, and physical and environmental security.

Any information supplied by the community as part of the project will be used solely for the purposes of the PE in accordance with the Queensland Government's privacy guidelines under the RTI Act and IP Act. This information will not be disclosed to any third parties without the consent of the individual unless otherwise required by law.

14.9 Conclusions

This public interest assessment has considered the social benefits and the potential impacts that may result from the delivery of the Project Options. This chapter considered the project's ability to meet the service requirements, public access and equity, accountability and transparency, consumer rights, security, and privacy. At this stage of the PAF process, there are no public interest issues that would prohibit the project options progressing to the Business Case stage. All project options also provide more travel choices for the community, improving connectivity to local centres, community services, health, education, employment and recreational opportunities.

15. Summary evaluation and ranking of project options

This chapter provides a consolidated summary of the assessment of the Project options completed in this PE, to determine which option/s should be progressed to the Business Case for further analysis if this Project passes through Gate 2 of the PAF. The summary evaluation and ranking of project options will be discussed in the following sections:

- Summary evaluation
- Ranking
- Conclusions.

15.1 Summary evaluation

A robust, transparent and well documented preliminary assessment has been completed in Chapters 6 to 15 of this PE to compare and determine the performance of the project options against the following key areas:

- Environmental risk assessment
- Risk and cost
- Financial
- Transport demand
- Land use
- Economic
- Legislative and regulatory
- Whole of Government policy
- Social impact
- Public interest.

A summary evaluation of how each project option performs against the preliminary assessment areas is provided in this section, with ranking applied in Section 16.2. Rationale for the performance of each option against these areas is included in the following tables:

- Option 1 LRT is described in Table 151
- Option 2 DBL is described in Table 152
- Option 3 EBP is described in Table 153.

Table 151 Summary evaluation rationale – Option 1 LRT

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
Environmental	Option 1 requires significant infrastructure works so has a high potential environmental impact risk.	Environmental risk assessment ratings were: (1) Water quality HIGH (2) Soil and land HIGH (3) Biodiversity/Flora HIGH (4) Biodiversity/Fauna HIGH (5) Cultural heritage HIGH (6) Noise, vibration, air quality and public amenity (construction) HIGH (7) Noise, vibration, air quality and public amenity (operation) HIGH (8) Development approvals HIGH (9) Offsets HIGH.	Option 1 was rated HIGH for environmental and cultural heritage risk.
Risk and cost	The categories of cost risk and opportunities impacting the project which need to be managed are: • Client Managed Cost Increases • Standards and Policy Changes • Design Development Changes • Project Delay • Revised Functionality	P50 real risk adjustment: $1.026 billion. Base estimate (Principal's cost + construction costs): $2.617 billion. P50 nominal operational expenditure (risk contingency of 40%): $2.678 billion.	Total P50 risk adjusted real whole-of-life cashflows: • Outturn Capital costs: $3.644 billion • Outturn Operating and maintenance costs: $2.678 billion.

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
	• Changes during Construction • Contractor Retained • Risk Transfer (Insurance) • Third-Party Influences • Potential Scope Changes.		
Financial	LRT projects are capital intensive infrastructure. The key capital cost impacts for Option 1 are project management, contract administration, property purchase, traffic management and temporary works, public utilities adjustments, rail systems, roadworks, landscaping, fencing, trackwork.	P50 PV construction costs: $3.131 billion. P50 PV operating costs: $0.919 billion. P50 PV farebox revenue: $0.536 billion.	The farebox revenue generated under Option 1 is insufficient to offset the significant upfront construction costs and ongoing operating costs. The Option 1 P50 NPV is estimated to be -$3.514 billion.
Transport demand	Option 1 results in the most significant reduction in car trips, the highest increase in public transport trips and the best improvement in use of GCLR stages 1-3, within both the model area and study area when compared to Option 2 and Option 3. The 'project case' with urban uplift from inclusion of Option 1 results in similar trends to Option 1 and demonstrates that improved land use within the study area results in an overall improvement to the public transport patronage and usage of the GCLR stages 1-3.	Change in VKT in the study area: -3.3 per cent (2031), -2.6 per cent (2041) Change in car trips in the study area: -11,297 (2031), -11,660 (2041). Additional passengers using GCLR Stage 1-3: 10,807 (2031), 11,552 (2041). Additional public transport trips in the study area: 11,668 (2031), 14,677 (2041).	Under Option 1, the public transport modal share within the study area was 9.1 per cent compared to 3.4 per cent in the base case (a 167 per cent improvement).
Land use	The LUCA demonstrates there is significant land use opportunity associated with the potential extension of LRT.	LRT in the BH2C corridor is forecast to support an additional 3,898 jobs and 10,127 people in 2041 within the study area compared to the Base Case that excludes light rail, which is equivalent	Option 1 is associated with significant land use opportunities.

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
		to a 13% and 18% increase respectively.	
Economic	Option 1 is forecast to deliver considerable economic benefits associated with transport benefits, community and broader benefits and wider economic benefits.	Option 1 delivers $969 million in benefits when WEBs, other benefits and the impacts of land use change are excluded (real, discounted at 7%). When all benefit streams are considered, including the impacts of land use change, Option 1 delivers $2,566 million in economic benefits.	Option 1 deliver significant benefits at a high construction and operating cost, resulting in: • NPV of -$1,911 million • BCR 0.34. When WEBs and second round benefit are included, the results increase to: • NPV of -$314 million • BCR 0.89. Option 1 is the preferred option from a BCR perspective both with and without land use change.
Legislative and regulatory	The legal and regulatory issues will be most significant for Options 1 and 2 which both involve substantial new infrastructure (including multiple water way crossings) and modifications to the existing road network. Additional considerations arise for Option 1 given it involves works on Commonwealth land at the Gold Coast Airport which will require careful planning and coordination and engagement with DITRDCA and the airport operator and lessee.	Nil	It has been determined that all identified issues can be managed through appropriate planning, coordination and mitigation strategies.
Whole of Government policy	Within the infrastructure sustainability assessment Option 1 ranked first.	FTE estimates: • On-site 512 per year	It has been determined that there are no policy issues that would prohibit

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
	LRT has greater construction impacts for both materials and community disruption as it is a significant infrastructure investment with the greatest level of change. Operationally, it provides greater capacity and a better user experience. However, there is the potential for the LRT operations to be more impacted by climate change events, in particular flooding, due to the static nature of the asset. Finally, it is important to note that the LRT is aligned with community expectations and the Gold Coast City vision, in particular the themes of liveable places and connected communities. LRT also supports the greatest mode shift away from private vehicles towards more sustainable public and active transport modes and therefore strongly aligns with government objectives regarding climate change actions and net zero.	• Total (including direct and indirect) 1,924 per year. Climate change risk ratings: • Extreme heatwaves HIGH • Bushfires HIGH • Floodings HIGH.	Option 1 proceeding to the Business Case stage.
Social impact	While Option 1 had the most potential major negative impacts such as changes to local traffic conditions and parking, land acquisition and temporary construction impacts, it also showed the most potential to deliver major positive social impacts to the broadest section of society. Option 1 had the greatest positive social impact of the project options across the impact categories.	Positive social impact rating score (with enhancements): 300 (baseline 81). Negative social impact rating score (with mitigations): 122 (baseline 52). Net social impact rating score: 178 (baseline 29).	The balance of impacts for Option 1 does not indicate a net social outcome that would prevent the project from progressing.
Public interest	Option 1 was the most effective in meeting the service requirements. Option 1 was the preferred option and had significant support in the community consultation. Option 1 also performed best for accessibility.	The community consultation outcomes from the Gold Coast Highway Multi-modal Corridor Study found that a light rail extension along the Gold Coast Highway between Burleigh Heads and	At this stage, there are no public interest issues that would prohibit the Option 3 from progressing.

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
		Tugun is a clear preference (58%) over bus lanes (25%).	

Table 152 Summary evaluation rationale – Option 2 DBL

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
Environmental	Option 2 requires significant infrastructure works so has a high potential environmental impact.	Environmental risk assessment ratings: • Water quality HIGH • Soil and land HIGH • Biodiversity/Flora HIGH • Biodiversity/Fauna HIGH • Cultural heritage MEDIUM • Noise, vibration, air quality and public amenity (construction) HIGH • Noise, vibration, air quality and public amenity (operation) MEDIUM • Development Approvals HIGH • Offsets HIGH	Option 2 was rated HIGH for environmental and cultural heritage risk.
Risk and cost	The categories of cost risk and opportunities impacting the project which need to be managed are: • Client Managed Cost Increases • Standards and Policy Changes • Design Development Changes • Project Delay	P50 real risk adjustment: $721 million. Base estimate (Principal's cost + construction costs): $1.991 billion. P50 nominal operational expenditure (risk contingency of 40%): $646 million.	Total P50 risk adjusted real whole-of-life cashflows: (11) Outturn Capital costs: $2.712 billion • Outturn Operating and maintenance

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
	• Revised Functionality • Changes during Construction • Contractor Retained • Risk Transfer (Insurance) • Third-Party Influences • Potential Scope Changes.		costs: $0.646 billion.
Financial	Roadworks projects are capital intensive infrastructure. The key capital cost impacts for Option 2 are project management, contract administration, property purchase, traffic management and temporary works, public utilities adjustments, roadworks, landscaping, fencing.	P50 PV construction costs: $2.298 billion. P50 PV operating costs: $0.203 billion. P50 PV farebox revenue: $0.179 billion.	The farebox revenue generated under Option 2 is insufficient to offset the significant upfront construction costs and ongoing operating costs. The Option 2 P50 NPV is estimated to be -$2.322 billion.
Transport demand	From a modelling perspective, Option 2 performed moderately on the metrics assessed (mode share, VKT, transfers, largest change in car trips, improvement to GCLR stages 1-3 etc.)	Change in VKT in the study area: -0.5 per cent (2031), -0.3 per cent (2041) Change in car trips in the study area: -2,099 (2031), -2,131 (2041). Incremental passengers using GCLR Stage 1-3: 456 (2031), 466 (2041). Additional public transport trips in the study area: 2,134 (2031), 4,153 (2041).	Under Option 2, the public transport modal share was 4.6 per cent compared to 3.4 per cent in the base case (a 35 per cent improvement).
Land use	The land use modal assessment concluded that bus options may support or accelerate planned growth, but are unlikely to unlock significant additional growth.	N/A	Land use benefits for Option 2 are not expected to be

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
			materially different to the base case.
Economic	Option 2 is forecast to deliver some economic benefits associated with transport benefits, community and broader benefits and wider economic benefits.	Option 2 Project benefits PV: $223 million (real, discounted at 7%). This option was not forecast to result in additional benefits from land use change.	Option 2 delivers moderate benefits at a high construction and operating cost, resulting in an: • NPV of -$1,782 million BCR 0.11.
Legislative and regulatory	The legal and regulatory issues will be most significant for Options 1 and 2 which both involve substantial new infrastructure (including multiple water way crossings) and modifications to the existing road network.	Nil	It has been determined that all identified issues can be managed through appropriate planning, coordination and mitigation strategies.
Whole of Government policy	The infrastructure sustainability assessment Option 2 ranked second. When compared to Option 1, Option 2 had less construction impacts due to less materials and lower community impact, and during operations has more flexibility during flooding events as their route is not fixed. However, Option 2 was found not to have the ability to cope with the long-term capacity required or create a positive user experience. Option 2 also does not result in the same levels of mode shift away from private vehicles or support the achievement of the governments sustainability targets or objectives to the same extent as Option 1.	Climate change risk ratings: • Extreme heatwaves LOW • Bushfires MEDIUM • Floodings MEDIUM	It has been determined that there are no policy issues that would prohibit Option 2 proceeding to the Business Case stage.

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
Social impact	Option 2 had similar negative social impacts to Option 1 but significantly lower positive social impacts.	Positive social impact rating score (with enhancements) 184 (baseline 81). Negative social impact rating score (with mitigations) 109 (baseline 52). Net social impact rating score 75 (baseline 29).	The balance of impacts for Option 2 does not indicate a net social outcome that would prevent the project from progressing.
Public interest	Option 2 was the second most effective in meeting the service requirements. The option does not align with community expectations of prior planning for the corridor.	The community consultation outcomes from the Gold Coast Highway Multi-modal Corridor Study found that there was some support for bus lanes (25%).	At this stage, there are no public interest issues that would prohibit the Option 2 from progressing.

Table 153 Summary evaluation rationale – Option 3 EBP

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
Environmental	Option 3 requires moderate levels of infrastructure works so has a low potential environmental impact.	Environmental risk assessment ratings: • Water quality LOW • Soil and land LOW • Biodiversity/Flora LOW • Biodiversity/Fauna HIGH • Cultural heritage LOW • Noise, vibration, air quality and public amenity (construction) MEDIUM • Noise, vibration, air quality and public amenity (operation) MEDIUM • Development Approvals LOW	Option 3 was rated MEDIUM for environmental and cultural heritage risk.

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
		• Offsets LOW	
Risk and cost	The categories of cost risk and opportunities impacting the project which need to be managed are: • Client Managed Cost Increases • Standards and Policy Changes • Design Development Changes • Project Delay • Revised Functionality • Changes during Construction • Contractor Retained • Risk Transfer (Insurance) • Third-Party Influences • Potential Scope Changes.	P50 real risk adjustment: $89 million. Base estimate (Principal's cost + construction costs): $314 million. P50 nominal operational expenditure (risk contingency of 40%): $479 million.	Total P50 risk adjusted real whole-of-life cashflows: • Outturn Capital costs: $0.403 billion • Outturn Operating and maintenance costs: $0.479 billion.
Financial	Key capital cost impacts for Option 3 are project management, contract administration, property purchase, traffic management and temporary works, public utilities adjustments, roadworks, landscaping, fencing. Option 3 has minimal capital-intensive infrastructure.	P50 PV construction costs: $0.333 billion. P50 PV operating costs: $0.150 billion. P50 PV farebox revenue: $0.076 billion.	The farebox revenue generated under Option 3 is insufficient to offset the significant upfront construction costs and ongoing operating costs. The Option 3 P50 NPV is estimated to be -$0.407 billion.
Transport demand	From a modelling perspective, Option 3 performed worst on the metrics assessed (mode share, VKT, transfers,	Change in VKT in the study area: -0.1 per cent (2031), -0.1 per cent (2041)	Under Option 3, the public transport modal share remained similar

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
	largest change in car trips, improvement to GCLR stages 1-3 etc.)	Change in car trips in the study area: -678 (2031), 407 (2041). Additional passengers using GCLR Stage 1-3: 85 (2031), -67 (2041). Incremental public transport trips in the study area: 777 (2031), 1,093 (2041).	to the base case at 3.7 per cent.
Land use	The land use modal assessment concluded that bus options may support or accelerate planned growth, but are unlikely to unlock significant additional growth.	N/A	Land use benefits for Option 3 are not expected to be materially different to the base case.
Economic	Option 3 is forecast to deliver some economic benefits associated with transport benefits, community and broader benefits and wider economic benefits.	Option 3 Project benefits PV: $81 million (real, discounted at 7%).	Option 3 deliver minimal benefits but at a low incremental construction and operating cost, resulting in an: • NPV of -$237 million • BCR 0.26. Option 3 is the preferred option on a NPV basis.
Legislative and regulatory	The legal and regulatory issues for Option 3 that may arise are more localised than Options 1 and 2. For example, tenure freehold – negotiations with body corporates for the acquisition of impacted common property; and, land acquisition and access, compulsory acquisition – potential delays.	Nil	It has been determined that all identified issues can be managed through appropriate planning, coordination

Assessment area	Qualitative impacts	Quantitative impacts	Risk/value
			and mitigation strategies.
Whole of Government policy	The infrastructure sustainability assessment Option 3 EBP ranked lowest as it does not provide a long-term sustainable solution. Option 3 was found not to address the Gold Coast growth projections, user experience nor the desire to encourage and increase usage of public transport.	Climate change risk ratings: • Extreme heatwaves LOW • Bushfires LOW • Floodings LOW	It has been determined that there are no policy issues that would prohibit Option 3 proceeding to the Business Case stage.
Social impact	Option 3 had similar negative social impacts to Option 1 but significantly lower positive social impacts.	Positive social impact rating score (with enhancements): 131 (baseline 81). Negative social impact rating score (with mitigations): 72 (baseline 52). Net social impact rating score: 59 (baseline 29).	The balance of impacts for Option 3 does not indicate a net social outcome that would prevent the project from progressing.
Public interest	The public interest assessment found that Option 3 was unlikely to meet the service requirements.	The community consultation showed limited support for a bus enhancement solution.	At this stage, there are no public interest issues that would prohibit the Option 3 from progressing.

15.2 Ranking

Based on the summary evaluation, the project options have been ranked according to technical merits and assessment outcomes, as per the ranking scale in Figure 132. This is a comparative assessment therefore a ranking of third does not mean the option delivers a negative outcome, rather that it does not perform as strongly as the other options against the assessment areas. The ranking of project options and the rationale behind each determination is included in Table 154.

1st
2nd
3rd

Figure 132 Ranking scale

Table 154 Rationale for project option outcomes

Assessment area		Option 1 LRT	Option 2 DBL	Option 3 EBP
Project delivery environmental assessment	Rank			
	Rationale	Given the significant infrastructure works required under Options 1 and 2 they have the greatest potential environmental impact, and therefore associated risk, with Option 1 having the highest risk. Option 3 only includes moderate levels of infrastructure being delivered and overall presents a relatively low level of risk from an environmental perspective.		
Risk analysis and cost estimate	Rank			
	Rationale	The new infrastructure options Option 1 and Option 2 have the highest capital costs, while Option 3 has a relatively lower capital costs as the option delivers minimal infrastructure improvements. The capital costs in real terms for Option 1 are 800 per cent greater than the capital costs for Option 3 but only 35 per cent more than Option 2. Therefore, from a cost perspective, Option 1 and Option 2 are similar but Option 3 is the lowest cost.		
Financial analysis	Rank			
	Rationale	Option 3 was ranked first on a financial basis as it has the smallest whole-of-life net present cost. Options 1 and 2 have a similar performance on the financial assessment given the significant capital costs associated with each option. Staging of Options 1 and 2 could decrease the upfront capital costs required. However, truncating the routes may limit the potential increase in patronage or land use impact each option could have and any impact on cost would need to be considered against the benefits that could be realised. Option 3, by virtue of its low capital costs and requirement for progressive service upgrades, would lend itself to staging.		
Transport demand and modelling analysis	Rank			
	Rationale	Option 1 performed the best based on the transport modelling metrics assessed (mode share, VKT, transfers, largest change in car trips, improvement to GCLR stages 1-3 etc.), and significantly increases the public transport mode share in the study area by		

Assessment area		Option 1 LRT	Option 2 DBL	Option 3 EBP
		2041 (PT mode share of 5.7 per cent for Option 1, 1.2 per cent for Option 2 and 0.3 per cent for Option 3) and reduces private vehicle usage and VKT.		
Land use analysis	Rank			
	Rationale	The LUCA demonstrates there is significant land use opportunity associated with the potential extension of LRT which should be maximised through more detailed analysis as part of the Business Case stage. Option 2 and Option 3 are not expected to unlock additional land use change in the same way as LRT due to lower vehicle capacity, reliability, ride smoothness and permanency level.		
Economic analysis	Rank			
	Rationale	Project benefits have been monetised with a present value of $969 million for Option 1, $223 million for Option 2 and $81 million for Option 3. When economic costs are considered, Option 1 delivers a NPV of -$1,911 million, Option 2 of -$1,782 million and Option 3 of -$237 million, resulting in a BCR of 0.32 for Option 1, 0.10 for Option 2 and 0.24 for Option 3. When the benefits from WEBs, other benefits and land use change are included, economic benefits for Option 1 substantially improve resulting in a of 0.89 and NPV of -$314 million. Overall, Option 1 is the preferred option from a BCR perspective both including and excluding land use change, while Option 3 is the preferred option on a NPV basis.		
Legislative and regulatory	Rank			
	Rationale	The legal and regulatory issues will be most significant for Options 1 and 2 which both involve substantial new infrastructure (including multiple water way crossings) and modifications to the existing road network. All of these issues can be managed through appropriate planning, coordination and mitigation strategies.		
Whole of Government	Rank			
	Rationale	The infrastructure sustainability assessment ranked Option 3 lowest as it does not provide a long-term sustainable solution and was found not to address the Gold Coast growth projections, user experience nor the desire to encourage and increase usage of public transport and reduce GHG and achieve net zero targets. Option 2 had less construction impacts owing to less materials and lower community impact, and during operations has more flexibility during flooding events as their route is not fixed. However, Option 2 was found not to have the ability to cope with the long-term capacity required, create a positive user experience aligned to expectations or facilitate long term shift away from private vehicle dependence. Therefore, Option 1 was ranked highest, and Option 2 was ranked second. The climate risk assessment determined that Option 1 had the most risks, followed by Option 2 and Option 3. The policy review determined that there are no policy issues that would prohibit the project options from proceeding to a business case.		
Social impact evaluation	Rank			
	Rationale	The positive social impact rating score for Option 1 is significantly higher than Option 2 and Option 3, at 60% and 129% respectively. The negative social impact rating for Option 1 is larger than Options 2 and 3 but only by 12% and 60% respectively,		

Assessment area		Option 1 LRT	Option 2 DBL	Option 3 EBP
		indicating the significant potential upside that Light Rail provides that the other options do not. At this stage of assessment, the balance of impacts does not indicate a net social outcome that would prevent the project from progressing. Option 1 presents a significant positive increase from the baseline indicating its significant potential to realise positive social impacts and outcomes. The majority of negative impacts are also temporal, isolated to the construction phase, whereas benefits are realised primarily during operations and will have long term positive outcomes.		
Public interest assessment	Rank			
	Rationale	Option 1 was the most effective in meeting the service requirements followed by Option 2. Option 3 is unlikely to meet the service requirements. Based on extensive stakeholder engagement, Option 1 is clearly preferred over Option 2. Option 1 performed best for achieving accessibility outcomes followed by Option 2 and Option 3. At this stage of the PAF process, there are no public interest issues that would prohibit the project options progressing to the Business Case stage. All project options also provide more travel choices for the community, improving connectivity to local centres, community services, health, education, employment and recreational opportunities.		

15.3 Conclusions

This summary evaluation summarised the ten assessments completed as part of the PE. The overall sum of assessment scores and rankings are shown in Table 155.

Table 155 Sum of assessment scores

Project option	Sum of assessment scores*	Ranking
Option 1 LRT	21	1
Option 2 DBL	14	3
Option 3 EBP	16	2

* *Calculated as the sum of ranks for each assessment where rank of 1st = 3, 2nd = 2 and* 3rd = 1 *(higher value represents better ranking across assessments)*

Based on the outcomes of the summary evaluation, Option 1 has emerged as the overall highest performing option across the detailed quantitative and qualitative assessments in the PE, with the highest scores across the land use, economic, social impact, Whole of Government and transport modelling assessments. Option 3 was the highest performing option for cost and risk and financial analysis. IA recommends that at least two options in addition to a "do-minimum" base case be investigated in the business case. Given this recommendation, Option 3 has emerged as a low-cost alternative that may be considered as a staging option in the Business Case phase.

Option 2 did not perform the strongest in any assessment and there was no significant cost saving for Option 2 compared to Option 1. For this reason, it is recommended that Option 2 does not progress for further assessment in this PE. Therefore, the remaining chapters will assess project benefits, market sounding, value for money, and delivery model approach for Option 1 and Option 3.

16. Market sounding

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17. Value for Money assessment

All PAF projects (estimated capital cost > $100m) must be considered as potential Public Private Partnership (PPP) candidates in the PE stage. The purpose of this chapter is to consider the extent to which there is potential to deliver the project as a PPP arrangement to provide the state greater value for money than a traditional delivery model. This assessment is a qualitative assessment of the potential for greater value for money to be achieved under a PPP delivery option when assessed against the value for money drivers, compared to the preferred 'traditional delivery model' identified in Chapter 18.

The purpose of this chapter is to identify if there is potential for a PPP to deliver improved value for money in the design, construction, operations and maintenance of the project and to confirm if the PPP options should be considered in detail in the Business Case phase. The chapter includes:

- Background
- Assessment methodology
- PPP delivery models
- Outcomes for the VfM analysis
- Project finance
- Conclusions.

17.1 Background

The project options will connect public transport users to Stage 3 of the GCLR network, which is currently under construction, and which will end at Burleigh Heads. Relevant considerations for each project option are as follows:

- Option 1 LRT would constitute an extension of the existing light rail network from Burleigh Heads to Coolangatta. The light rail network currently operates as a PPP, with GoldlinQ having the contract with the Queensland government for the design, construction, operations and maintenance of the first three stages of the GCLR system. GCLR Stage 1 was commenced on its own PPP, with Stage 2 and 3 being added consecutively, as operator franchise modifications, to the scope of the GoldLinQ PPP Contract. The end date for the original franchise agreement has not been extended through the Stage 2 and Stage 3 processes. Funding and financing arrangements for the PPPs for Stages 1, 2 and 3 of the GCLR network include:
  - A combination of Australian Government, Queensland Government and Gold Coast Regional Council and private sector funding for CAPEX. Significant use of government funding allowed the project to benefit from the lower interest rates that are available to governments.
  - An availability payment to GoldlinQ for the operation of trams and light rail system. For the availability payment GoldLinQ is obliged to maintain and operate the system, with availability payments being at risk if agreed service levels are not met.
  - TransLink collection of fares and assumption of revenue risk.
  - The City charges a transport infrastructure charge on all Gold Coast ratepayers, which is used to pay for a component of its funding commitment to the Project. This constitutes a form of value capture.
- Option 3 EBP would require passengers to get off the GCLR network at Burleigh Heads where Stage 3 will end when it is completed, in the same manner as they would do for base-case bus services. Gold Coast busses are currently provided by private operators operating under contract with TransLink, with TransLink collecting fares and assuming the revenue risk, and there is no reason to expect this arrangement to change. The opportunistic infrastructure enhancements proposed include bus queue jumps and parking spaces.

As described in the delivery options chapter, and above, there is an existing operator franchise PPP that encompasses all three stages of GCLR. While the existing franchise agreement is due to expire in June 2029, it is assumed that the light rail service will continue to operate beyond 2029, and that TransLink will contract with a private sector entity to deliver the light rail services, including operations and maintenance of the light rail vehicles, systems and physical infrastructure that comprises the light rail system. The Delivery Options Chapter also identifies that there will be a single light rail operator on the system and therefore the future operator (post 2029) will also operate Stage 4 including the additional vehicles, once it is operational. The scale of the operational contract for the light rail system post 2029 is significant and the agreement at that point would be considered a form of PPP contract due to the size of the operating company, the number of employees, and the scope of work being undertaken.

Additionally, as the existing GoldLinQ franchise agreement is due to expire in 2029, the State Government will need to appoint a future operator of GCLR beyond 2029. The State Government may elect to extend the existing operator franchise beyond 2029, or to appoint a new private sector party to take the place of GoldLinQ. Under both options, the process of appointing the future operator will be overlap with the procurement and construction of Stage 4.

It is recommended that the Business Case for Stage 4 includes detailed consideration the re-franchising process to appoint the future operator, and of the role of the future operator in the delivery of Stage 4. If the re-franchising process is planned separately to the Business Case, the Business Case should include a summary of the process and timing of appointing the future operator.

17.2 Assessment methodology

The purpose of this section is to consider the extent to which there is potential to deliver the project as a PPP arrangement to provide the state greater value for money than a traditional delivery. To achieve this at Preliminary Evaluation phase the PAF requires that the potential value generation of each project option delivered as a PPP has been qualitatively assessed against VfM criteria. The VfM criteria together with explanations are detailed in the following sections.

17.2.1 Output based service requirement encouraging innovation

Output based service requirements tend to create an environment that encourages innovation from the private sector. This is achieved by allowing the performance of the project to be measured quantitatively and qualitatively by its outputs. To determine the potential for value for money to be derived from an output-based service requirement, key questions are as follows:

- Is the project suited to an output-based specification?

  The service requirements for this project are as follows:

  - SR 1: Efficient, reliable, connected, accessible and safe integrated transport network
  - SR 2: Enhanced PT connectivity to essential services and key destinations (including across the border)
  - SR 3: Supporting the delivery of reliable and efficient transport between key locations (the Gold Coast Airport, venues and accommodation) during the Brisbane 2032 Olympic and Paralympic Games
  - SR 4: Maximised regional economic growth
  - SR 5: Sustainable and attractive urban development
  - SR 6: Preserved and enhanced liveability.

  These service requirements apply to all three options and are all output based. Option 3 fulfills these criteria to the least extent with Option 1 being by far the best. It would be expected that the better the project fulfills the criteria, the greater scope and potential benefit there would be from innovation.

- Are the output requirements easily defined and able to be measured in terms of performance?
- Service Requirement 1 is the primary service requirement which will be measured by metrics in the benefits realisation plan and chapter (see Chapter 20 – Project Benefits). The remaining service requirements are all able to be defined and measured, though doing so would be more complex than for Service Requirement 1, but qualitative approaches may be enough to describe different approaches to innovation.
- Is there potential for the private sector to provide innovative solutions to the State's requirements?

TMR has a strong record and program on innovation that relates to the project options, including construction techniques, network operation and technological solutions such as vehicle automation and electrification. This points to strong potential for innovation on all project options. TMR has also been able to get innovative outcomes from the private sector on comparable projects, including GCLR stages 1-3.

17.2.2 Risk Allocation

Value for money is maximised by optimal risk allocation. Risk should be allocated to the party best able to manage it. Such optimal allocation reduces individual risk premiums and the overall cost of the project, because the party in the best position to manage a particular risk should be able to do so at the lowest price. Therefore, in determining the potential for value for money to be derived in this area, key questions include:

- are the risks well understood and able to be articulated?
- are there risks that are able to be better managed by the private sector under a PPP solution?
- is it possible to achieve optimal risk transfer (e.g. price certainty) under a PPP delivery option or are there likely to be subsequent significant variations or scope changes?
- will the private sector be able to price the risks efficiently or is it likely that there will be a significant risk premium included in the private sector's pricing under a PPP solution?

It is expected for Options 2 and 3 that risk allocation would continue to be the same as for existing privately run bus services on the Gold Coast. For Option 1, is expected to be similar in risk allocation to GCLR Stages 1 to 3. The primary risk borne by private sector operators in all three cases is the cost of operating, delivery and maintaining a service that meets agreed service levels, or the cost of penalties for not meeting these levels.

17.2.3 Whole-of-life costing

Integration between design, construction, operations and maintenance under PPP delivery can provide the incentive to achieve lower whole-of-life costs. The basic principle is that, under traditional delivery, if the design and construction roles are separated from the operations and maintenance roles, there is no incentive for one to minimise the costs of the other. Under a PPP arrangement, the central contractor has an incentive to ensure an optimal mix of construction and operating costs. In determining the potential value for money to be derived in this area, key questions include:

- will a PPP solution offer the opportunity for a more efficient capital versus operating expenditure mix due to the PPP solution being viewed as a package, rather than as separate projects (e.g. design and construction; operation and maintenance and so on)?
- does the project include a significant operating expenditure component? Projects with a significant operating expenditure component offer the most opportunity to achieve greater value for money through PPP delivery?

As road-based services, Options 2 and 3 are likely to have relatively low operating expenditures, limited to the operations of the vehicles and road maintenance. Option 1 is likely to have higher operating expenditure due to being rail based and therefore may better fulfill this criterion.

A similar large contribution to the project by all levels of government and consequently less exposure to capital costs by private partners, may limit any incentive to reduce lower whole of life costs through innovative capital expenditure.

TMR currently has a policy focus on automated vehicles which may be relevant to this project, as these vehicles trade off labour with capital investment in vehicle automation, though the extent to which this is advanced enough to be relevant to this project should be explored at business case stage.

17.2.4 Asset Utilisation

An assessment of the potential and scale of the private sector to achieve additional revenue should be undertaken (e.g. selling access to space that would otherwise be underutilised by the public sector). All three options would include space, for example for advertising at stations, though the value of this space may differ depending on the level of demand each option is expected to induce via land use impacts. Based on the PE traffic analysis, Option 3 is likely to induce the lowest amount of demand while Option 1 is likely to generate the highest.

17.2.5 Competitive Market

A key mechanism for achieving value for money is a competitive bidding process. In determining the potential for value for money to be derived in this area, key questions include:

- are there a number of private sector bidders for this type of project?
- is there a strong market appetite to participate in the project?

As outlined in Chapter 17 – Market Sounding, PPP has clearly been a favoured financing and delivery solution for major rail and road projects in Australia in recent times. However, there has been a greater reluctance by the private sector more recently to take on major project risks that are outside of their control (e.g. environment, ground conditions, demand etc.). This has resulted in a decrease in PPP projects and an increase in more collaborative and flexible contracting models such as Alliances, CPA or D&C contracts with Alliance based shared risk principles.

Therefore, until formal market sounding with industry is conducted, it is difficult to determine whether there will be enough competition to generate a good value for money outcome for the Queensland Government. Until that time, it should be assumed that the market will remain tight, as described in Chapter 17 – Market Sounding.

17.3 PPP delivery models

There are many different PPP delivery models and combinations of models available but given the established nature of the previous stages of GCLR and of bus services on the Gold Coast, it will be assumed for the purposes of this analysis that a PPP model be similar to the existing arrangements described in the background section.

17.4 Outcomes of the VfM analysis

The VfM of the project options was assessed using the scoring scale outlined in Table 157. The assessment compares the most likely PPP model, being an Availability PPP, against the preferred traditional model identified from the delivery options assessment in Chapter 18.

Table 157 VfM Assessment Scoring Scale

Score	Scope for value generation
×	represents no scope for value generation
✓	represents some scope for value generation
✓✓	represents reasonable scope for value generation
✓✓✓	represents excellent scope for value generation

The outcomes of the VfM are summarised in the following tables:

- Option 1 LRT is described in Table 158
- Option 3 EBP is described in Table 159.

Table 158 Option 1 LRT - Value for Money Assessment summary

PAF VfM driver	Traditional delivery model ECI-CPA – TransLink to Own and Operate Light Rail system	PPP delivery model Private sector to design, build, finance and operate the light rail system (arrangement from previous phases)	Analysis of value for money
Output based service requirement encouraging innovation	✓	✓✓✓	TransLink ownership of vehicles and infrastructure would remove any private sector innovation opportunity and be likely to dramatically reduce innovation. As the option would constitute a light rail line, there may be opportunities for innovation in construction for both traditional and PPP delivery. Opportunities for private proponents to incorporate vehicle automation in the project, should be considered at business case stage
Appropriate risk allocation	✓	✓✓	Ownership and operation of a light rail fleet by a private operator with revenue at risk for meeting service requirements, may create a greater incentive to manage risks of service delivery failures. As the option constitutes a separate rail line, there may be scope for the private sector to better manage risk.
Minimising whole of life costing	✓	✓✓✓	High CAPEX to OPEX ratio gives some scope to minimise whole of life costs through capital investment. Opportunities for private proponents to incorporate vehicle automation in the project, should be considered at business case stage.
Improving asset utilisation	✓	✓✓	Under current arrangements TransLink assumes revenue risk, so there is no opportunity to give the PPP proponent the incentive to improve patronage. Good opportunities are likely to exist for separate bus lanes to generate extra revenue from commercial leasing of space at stations and advertising space.
Competitive market	✓	✓	The works required for this project option are very significant, which may reduce the number of contractors who can compete for them in the expected tight construction market. This is likely to impact both PPP and traditional delivery models

PAF VfM driver	Traditional delivery model ECI-CPA – TransLink to Own and Operate Light Rail system	PPP delivery model Private sector to design, build, finance and operate the light rail system (arrangement from previous phases)	Analysis of value for money
Overall score	5	11	This project option favours continuation of the existing PPP arrangement, where services are contracted to private bus services. The significant scale of the project may generate value from including capital works in a PPP contract for this option. There may be scope for further innovation such as through automation, which could be considered at business case stage.

Table 159 Option 3 EBP - Value for Money Assessment summary

PAF VfM driver	Traditional delivery model TIC CO – TransLink to Own and Operate Buses	PPP delivery model Contract to private operator (Current arrangement)	Analysis of value for money
Output based service requirement encouraging innovation	x	✓	TransLink ownership of buses would remove any private sector innovation opportunity. However, as the option has minimal capital works, is the least costly option and would be undertaken on a state-controlled road, innovation opportunities by the private sector in construction would be limited. Opportunities for private proponents to incorporate vehicle automation in the project, should be considered at business case stage.
Appropriate risk allocation	✓	✓	Ownership and operation of a bus fleet by a private operator with revenue at risk for meeting service requirements, may create a greater incentive to manage risks of service delivery failures. However, due to this option being undertaken on a state-controlled road, construction risks may best be managed by TMR.
Minimising whole of life costing	✓	x	Relatively low CAPEX to OPEX ratio gives less scope to minimise whole of life costs through capital investment.

PAF VfM driver	Traditional delivery model TIC CO – TransLink to Own and Operate Buses	PPP delivery model Contract to private operator (Current arrangement)	Analysis of value for money
Improving asset utilisation	x	✓	Under current arrangements TransLink assumes revenue risk from ticketing and on-board advertising for buses, so there is limited opportunity to give the PPP proponent the incentive to improve patronage. Some opportunities may exist to generate extra revenue from advertising space.
Competitive market	✓✓✓	x	The works required for this project option are likely to be small enough that plenty of contractors would be available to construct them. Competition for providing private bus services may be constrained by cost advantages for existing private operators, which already operate on Gold Coast networks.
Overall score	5	3	This project option favours the continuation of the existing service agreement, where services are contracted to private bus services. Due to the smaller scale of the project and minimal capital works, it is unlikely however that there would be any value from a PPP arrangement.

17.5 Project finance

It is expected that the PPP contracting arrangements will continue to evolve as new projects come to market and as the risk appetite of the construction market changes. In addition to innovations in the PPP contracting arrangements, there are also opportunities for potential innovations in the PPP financing arrangements including:

- Equity finance – Equity finance is direct investment by shareholding individuals or institutions. This approach has been used in combination with debt finance in previous stages of GCLR. The benefit of equity finance is in managing risk to the Project and to government in the event of any potential downturn in economic activity, as equity is a lower priority for reimbursement than debt in the instance of financial difficulty. The increased risk to shareholders is compensated with a rate of return on the investment of equity.
- Value capture financing – Value capture financing better targets those who most benefit from value uplift. The current Gold Coast Regional Council Transport Infrastructure Levy is charged to all Gold Coast ratepayers but data in the land use modelling and benefit/cost analysis for the project has identified areas which will benefit more from increased densification. A value capture arrangement that targets landowners that benefit the most from the Project. For example, developers of new higher density residential and commercial developments may raise funds for the Project while better addressing the principle of vertical equity, a significant public interest consideration.
- Availability payments – The revenue takes the form of an availability (or service) payment from government once the asset is built and available for use. This model is typically used for social infrastructure PPPs such as schools,

hospitals, prisons but it has also been used for a range of other infrastructure types such as roads and public transport projects where:

- There is no ability, or desire, to charge users of the infrastructure the full cost required to offset the costs of the project or there is an ability to charge users of the infrastructure, but the PPP market will not accept exposure to patronage risk, and it is therefore better VfM for the State to retain this risk
- Payments are attached to the performance of the asset (generally based on availability and proper functioning of the asset to provide the requisite services to the public)
- Service payments may be abated for failure to meet required service standards or performance indicators, with abatements sized by reference to time of day, and the extent and severity of impacts
- TMR has used this type of contract on the previous stages of GCLR.

Financial scenario testing at the business case stage, would be able to demonstrate the potential impacts of each of these potential PPP innovations on the project.

17.6 Conclusions

The conclusions of the Value for Money assessment are as follows:

- The previous stages of GCLR were delivered using a PPP Contract, and this has been successful
- The current PPP Contract is due to end in 2029 and the end of term arrangements (re-franchising) need to be considered in detail in the Business Case
- There is potential for PPP delivery for the LRT option for Stage 4
- There is limited potential to deliver the bus lanes option as a PPP, for the capital works
- The existing bus service contracts to operate bus services in SEQ, including the Gold Coast are essentially PPPs (availability style contract) and the additional bus services to be delivered in Options 2 and 3 would be contracted using the current form of bus service contract
- The Business Case should be a VfM Business Case and include detailed analysis of the PPP options that could be used to deliver Stage 4.

18. Delivery options assessment

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19. Project benefits

19.1 Approach

Benefits management aims to ensure that transport system improvements from projects are clearly defined, measurable, provide a compelling case for investment and are ultimately achieved.

TMR's project frameworks (the department's OnQ Project Management Framework and the whole-of-government Project Assessment Framework) have integrated benefits management practices.

TMR's Benefits Management Framework is shown in Figure 142. It provides a clear line-of-sight from the department's strategies through to delivering project outcomes. It enables the department to critically compare the benefits from its selected initiatives, make informed decisions about its investment choices and assess the performance of the Transport Infrastructure Portfolio.

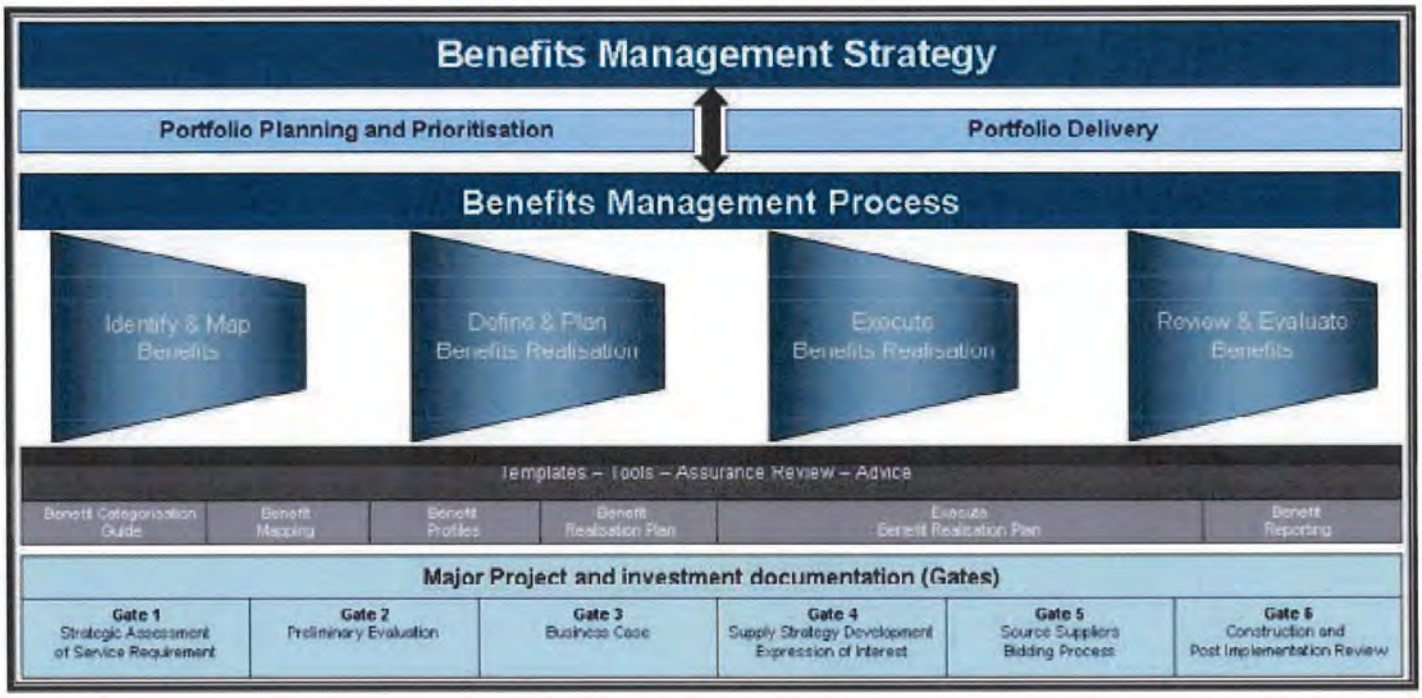


Figure 142 TMR Benefits Management Strategy

A benefits management approach at the project level is mandated to be applied to major projects. TMR defines a major project as a project with an estimated capital expenditure equal to or greater than $100 million, or a project of significant risk and/or complexity below this financial threshold.

Major projects are required to develop a Benefits Realisation Plan, outlining how and when benefits will be delivered and how benefits will be measured and reported at the closure of the project.

19.2 Identify and map project benefits

The purpose of this section is to identify each of the project benefits that may exist for the project options.

An Investment Logic Map (ILM) has been provided in Chapter 3 to illustrate how the project aligns with TMR strategic objectives, whilst drawing a clear line of sight between the problems/opportunities, priority needs, and service requirements.

Table 177 provides further defines the primary transport benefits expected from the project options and associated metrics for measuring the project option's outcome performance.

Table 177 BH2C Benefits

Benefits	Owner	Measurement	Metric
B1: Increased PT travel efficiency and reliability within the study area	TMR	Average PT travel time (bus vs tram)	Average travel time (bus and tram)
		Customer satisfaction	Customer survey (bus and tram) - Overall perception of travel time reliability
B2: Increased PT accessibility and integration within the study area	TMR	Land-use Urban Planning and Transport Accessibility Indicators (LUPTAI)	Proportion of population with accessibility to a range of services using PT Proportion of population with accessibility to a range of services by walking or cycling
		PT patronage	Patronage (bus and tram)
		Customer satisfaction	Customer survey (bus and tram) - Overall perception of accessibility and amenity - Personal safety at stops and stations
B3: Reduced traffic congestion, externalities	TMR	Travel times	Travel times between key locations on Gold Coast Highway in the Study Area
B4: Increased community liveability within the study area	The City	People visit, shop, dine and play within the study area	Pedestrian activity within the study area Building edges survey
		City is connected to its waterways	Kilometres of good public access to waterfront
		Wide range of choice for access and mobility	Journey to work mode share
		Dwelling uptake	Demographics profile
B5: Increased economic prosperity within the study area	The City	Major events participation	Public attendance in major events and festivals
		Local employment	Business types and GFA
		Development applications (DA)	DA approvals

19.3 Benefits Realisation Plan

A Benefits Realisation Plan (BRP) has been developed for the Project (see Appendix P: Benefits Realisation Plan). This BRP captures the project's intended contribution towards achieving the outcomes and benefits of the PTIIP. It also includes the approach to be used for coordinating the management and reporting of project benefits during the project's lifecycle.

All information relating to the structure, cost for measuring and reporting, management and realisation of the project benefits are captured in the BRP. The BRP outlines the detailed approach and governance for monitoring, evaluating and reporting the progress of achieving planned benefits after project completion. It also includes a schedule of key dates for conducting reviews and evaluations of the progress in embedding new capabilities and the achievement of project benefits.

It is noted that the PTIIP excludes light rail which is one of the preferred options. If light rail were chosen as the preferred option it would contribute towards the Rail Infrastructure Improvements Investment Program (RIIIP), which will be updated in the business case BRP.

19.3.1 Governance

The governance roles and responsibilities are summarised in Table 178.

Table 178 Governance roles and responsibilities

Role	Responsibilities
Project level	
For transport benefits delivered on the state-controlled PT corridor: Regional Director, South Coast Region **For local council benefits:** The City	As the **Project Benefit Owner**: • Responsible for specific benefits being realised by the project • Responsible for delivering the project's outcomes and agreed benefits • Ensure appropriate project resources are provided to deliver project benefits • Approves the identification and release of project benefits.
Project Owner	
Principle Engineer **Project Manager**	As the **Project Benefit Manager** for transport benefits delivered on the state-controlled PT corridor: • Responsible for coordinating with the PTIIP Investment Program Manager (Strategy), the Project Owners and their stakeholders the identification, planning and reporting of project benefits during the project's lifecycle • Validate the program benefits by developing and delivering required project output solutions • Develop and implement the Project BRP for each project within the NLTNUIP that has a project value greater than $50m • Quantify realised benefits against the baseline data and capture this assessment as part of the project's Post-Implementation Review • Responsible for actively managing project benefits during the project lifecycle, including ensuring that project scope variations are aligned with the planned programmed benefits • During project finalisation, responsible for the handover of the ongoing management of project benefits to the following business areas: – District, Regional and/or Departmental business operations – Investment Program Manager (Strategy), PTIIP • Manager (Benefits), Portfolio Management Office.

Role	Responsibilities
Steering Committee	• Consulted and informed on the progress of the project benefits being realised

19.3.2 Baseline and performance measurement

19.3.2.1. Criteria

The criteria used in identifying the benefit measures are:

- The application of the TMR Benefits Management Strategy and Framework (methodology, mapping techniques, tools and templates) to ensure appropriate benefits management approach is used by the project.
- The application of TMR's Benefits Categorisation Guide and PTIIP BRP to apply standard measures, baseline criteria, and benefits evaluation approach to ensure identification, alignment, and reporting and contribution of project benefit performance to PTIIP outcomes and objectives.
- Selected data and metrics that will be used to measure the expected benefits are confirmed by TMR.

19.3.2.2. Validation

The processes used to validate the project's baseline measures are:

- A strategic evaluation of project outcomes was conducted to confirm priority needs and service requirements to be addressed by the project.
- Project Owner consultation, review and endorsement of project benefits to ensure the project outcomes are measurable and resources are available to assess benefit performance beyond project closure.
- Consultation with Manager (Benefits) within the Portfolio Management Office to confirm and verify the application of benefits management practice during Business Case development.
- Consultation with TransLink to confirm and verify business-as-usual data and metrics for the evaluation of project benefit (transport outcome) performance.

19.3.3 Benefits review, evaluation and reporting

The BH2C project's benefit performance will be evaluated as part of the project's health check, gate check and post-implementation review activities. Any new requirement to review the project's benefits outside this scope will need to be discussed with and approved by the Project Owner, as additional costs and effort are generated to address ad hoc project benefit reporting request.

As a minimum, project benefits will be measured and reported as a point in time, within 6-12 months of project completion, to address Federal and State Government requirements. Benefits from the project and their contribution to the PTIIP benefits will be reviewed, evaluated and reported as part of a Post-Implementation Review. For Major Projects (over $100m), the outcome of the Review is presented to the IIC as part of a Gate 6 – Project Closure submission (as detailed in Appendix 2 of this Plan).

The project's benefit evaluation activities will leverage on existing TMR capability and capacity to collect, analyse and report on Queensland's transport network performance. Therefore, the BH2C project team will coordinate with TMR Metric Owners to identify and apply the appropriate benefit metrics to evaluate the project's benefit performance. It is anticipated that the cost relating to data collection, analysis and reporting of the project's benefits should be minimal and is included in the cost of the project and/or the PTIIP.

Once the project is finalised and a post-implementation review completed, the ongoing management of accrued PTIIP related project benefits will be managed by the PTIIP Manager (Strategy). When required, the Project Owner, through the support of Regional/District staff will report on non-PTIIP related project specific benefits.

19.3.4 Benefits realisation handover approach

As part of the completion activities for the project, the Project Director will hand over the benefits management to the:

- Rail Infrastructure Improvements, Investment Program Manager
- Passenger Transport Infrastructure Improvement Program.

The purpose of the handover being the responsibility to report on the Project's program level benefits. Portfolio Management Office, Manager (Benefits) – to manage portfolio benefits and for coordination of departmental resources to support and provide assurance to the Investment Program in addressing any additional project/program level benefit reporting requirement after project closure.

19.4 Benefits realisation – success of previous stages

This section will describe the success of previous stages of Gold Coast Light Rail including:

- Light rail patronage
- Public transport patronage on the Gold Coast
- Transport network benefits and reporting
- Land Use and Urban form benefits.

19.4.1 Overview

Since the commencement of Stage 1, GCLR has demonstrated significant benefits across the transport network and in the development of the Gold Coast as Australia's largest non-capital city. Key transport, land use, economic and social benefits are highlighted in Figure 3.6 and outlined in the following sections.

TMR regularly monitors and reports on system performance. The City also monitors the light rail corridor land use benefits every two years through the Building our city – Light Rail Corridor Status Report. The 2019 report was published in early 2021.

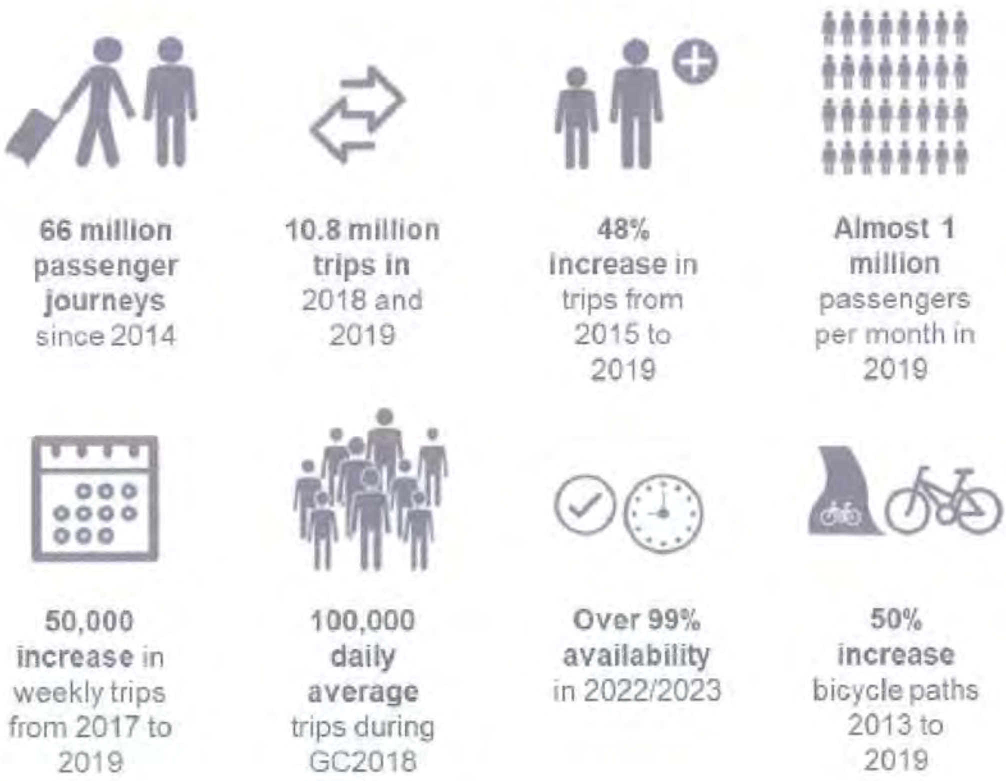


Figure 143 Key outcomes of GCLR Stages 1 and 2

19.4.2 Light rail patronage

19.4.2.1. Annual patronage

The delivery of light rail on the Gold Coast in 2014 (GCLR Stage 1) provided a step change in the public transport network and a corresponding change in public transport usage and mode share. The largest annual patronage increase occurred in 2018 in response to the opening of Stage 2, with its connection to the heavy rail network at Helensvale. The total annual trips increased by 3.51 million trips per year (approximately 48%) between 2015 2019 and exceeded 10 million trips per year in 2018 and 2019. In September 2022, the light rail passed 65 million total passenger journeys (since opening in 2014)

Table 179 Annual patronage - Gold Coast Light Rail[148]

Year	2015	2016	2017	2018	2019	2020	2021	2022
Total annual trips on light rail	7,298,320	8,001,069	8,163,411	10,757,104	10,804,942	5,756,809	5,678,630	6,910,514
Increase on previous year		702,749	162,342	2,593,693	47,838	-5,048,133	-78,179	1,231,884
Annual Increase %		9.6%	2.0%	31.8%	0.4%	-46.7%	-1.4%	21.7%

The impact of the Covid-19 pandemic and the associated domestic and international travel restrictions is evident in the 2020, 2021 patronage forecasts, however in October 2022 weekly patronage returned to 100% of pre-Covid levels for the first time. The light rail was the first public transport mode to achieve this in south east Queensland.

19.4.2.2. Daily patronage growth

Over the same time period, average daily trips have increased from 17,589 in 2014 to 29,603 in 2019 as shown in Table 180. In 2018, the GCLR system (Stages 1 and 2 provided a public transport spine to support the Gold Coast Commonwealth Games with the system carrying more than 100,000 passengers per day during the games.

As with the annual patronage, the impact of the Covid-19 pandemic and the associated domestic and international travel restrictions is evident in the 2020, 2021 patronage data.

Table 180 GCLR Average Daily Patronage[149]

Year	Average Daily Trips	Increase over previous year	% Increase
2014	17,589		
2015	19,995	2,407	13.7%
2016	21,921	1,925	9.6%
2017	22,366	445	2.0%
2018	29,472	7,106	31.8%
2019	29,603	131	0.4%
2020	15,772	-13,831	-46.7%
2021	15,558	-214	-1.4%

[148] Source: TransLink ticketing data

[149] Source: TransLink ticketing data.

Year	Average Daily Trips	Increase over previous year	% Increase
2022	18,933	3,375	21.7%

19.4.2.3. Daily boardings on light rail

The number of passengers choosing to use light rail continues to grow across the length of the system as shown by the average daily boardings at selected stops in Table 191. The introduction of Stage 2 saw an increase in passenger boardings across the entire system (including Stage 1) as there were more destinations throughout the Gold Coast.

Table 181 Average daily boardings – light rail stations

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Helensvale light rail station							
Gold Coast University Hospital Station	1,636	1,828	1,908	2,240	2,556	1,957	1,459
Southport Station	2,248	2,538	2,554	2,858	3,070	2,389	1,800
Cavill Avenue Station	3,424	3,950	3,969	4,368	4,578	3,522	2,442
Broadbeach Station	2,835	3,390	3,715	3,975	4,088	3,148	2,216

19.4.3 Light Rail performance

19.4.3.1. Punctuality and Reliability

TransLink measures the ongoing performance of GCLR through the primary metrics of punctuality and reliability. A summary of the annual performance of GCLR for the 12 months from March 2022 to April 2023 is provided in Table 192.

Table 182 Performance of Gold Coast Light Rail

Month	Punctuality %	Reliability %
April 2023	96.30	99.96
March 2023	95.54	99.82
February 2023	94.43	99.93
January 2023	95.87	99.88
December 2022	95.36	99.78

Month	Punctuality %	Reliability %
November 2022	95.11	99.94
October 2022	97.44	99.85
September 2022	95.67	99.94
August 2022	96.43	99.96
July 2022	95.46	99.96
June 2022	96.03	99.86
May 2022	95.23	99.93
April 2022	95.18	99.95
March 2022	95.46	99.74

Punctuality is used to measure the number of trams that arrive at stations at the advertised times and reliability measures the number of trams that stop at all stations for all scheduled trips. The performance of light rail is significantly better than bus on-time running in south east Queensland. as shown in Figure 151 and Figure 152.

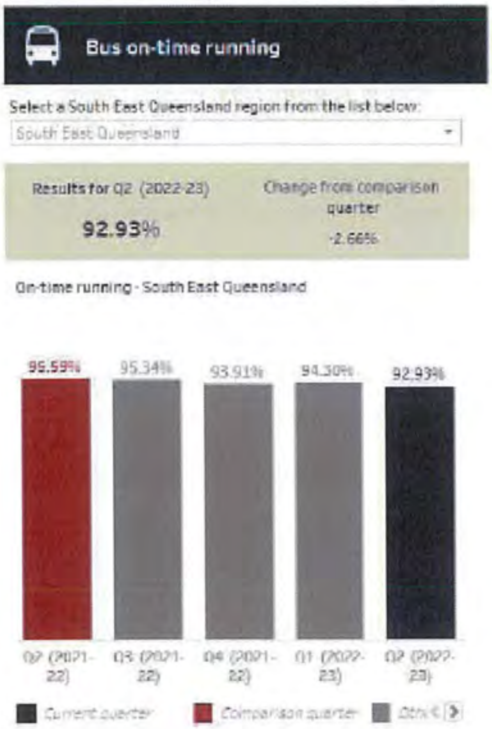


Figure 144 SEQ Bus on time running[150]

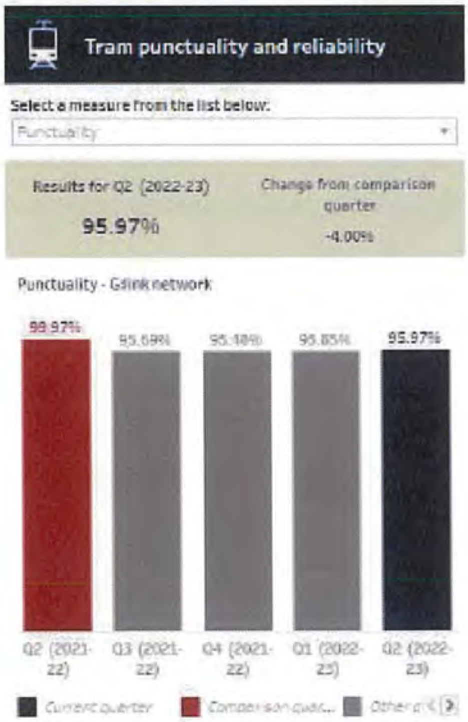


Figure 145 GCLR Tram on time running[151]

[150] Source: https://translink.com.au/about-translink/reports-and-publications/performance

[151] Source: https://translink.com.au/about-translink/reports-and-publications/performance

19.4.3.2. Customer Satisfaction

The light rail operator GoldLinQ completes passenger satisfaction surveys each year across the five key measures of satisfaction. The results (out of ten) for July 2019 (pre-Covid) are shown in Table 183.

Table 183 GoldLinQ GCLR Customer Satisfaction

Customer Satisfaction Measure	July 2019 Score (out of 10)
Reliability	9.36
Customer Service	8.57
Feel Safe and Secure	8.90
Clean and Presentable	8.77
Ease of Use	8.95

Of the 2,422 survey respondents in June 2019, around half of passengers were frequent users of light rail with 52% using the network more than 20 times in the last month. A fifth (22%) of passengers were new or low users of light rail (up to five trips in a month).

19.4.4 Comparison against Stage 2 Detailed Business Case

19.4.4.1. Light rail Stage 2 performance

GCLR Stage 2 commenced operations in December 2017, and TMR completed a Post Implementation Review of the Stage 2 project in 2019 to assess the first year of operations. The review highlighted the success of Stage 2 in achieving or exceeding the level of performance that was forecast in the Business Case including:

- The GCLR Stage 2 Business Case estimated a 10% increase in annual patronage on light rail (total network) in 2018, the actual result was a 32.4% increase.
- The GCLR Stage 2 Business Case estimated a 20% increase in annual patronage on light rail (total network) by 2028, this was exceeded in the first year.
- The GCLR Stage 2 Business Case estimated an increase in the daily light rail patronage of 7,206 trips by 2023, as a result of Stage 2. The light rail has achieved and increase of 7,202 daily trips in the first year after Stage 2 opened.
- The GCLR Stage 2 Business Case estimated a total of 978 boardings per day at the Helensvale light rail station. In the first year of operations (2018) it has averaged 2,818 boardings per day.
- Passenger trips at Helensvale heavy rail station have increased by 55% since the inception of Stage 2, which has improved intermodal connectivity for inter-regional public transport trips.
- The GCLR Stage 2 Business Case estimated a total of 636 boardings per day at the Parkwood light rail station. In the first year of operations (2018) it has averaged 624 boardings per day.
- The GCLR Stage 2 Business Case estimated a total of 86 boardings per day at the Parkwood East light rail station. In the first year of operations (2018) it has averaged 224 boardings per day.
- The GCLR Stage 2 Business Case estimated a light rail journey time of 11 minutes for the length of Stage 2 (between Helensvale and the Gold Coast University Hospital). This journey time was achieved and confirmed in the future timetables and provides a significant time saving compared to the previous bus journey time of 21 minutes for the same journey.

Overall, the first year of operations of Stage 2 exceeded the forecast performance in the Stage 2 Business Case for light rail patronage, light rail journey time, and transfers between the light rail and heavy rail at Helensvale.

19.4.4.2. Park and ride facilities on GCLR Stage 2

GCLR Stage 2 included Park and Ride sites at Helensvale and Parkwood that have significantly increased access to public transport at these locations, thereby increasing the use of light rail and reducing trips on the alternate road network. TransLink conducted a study in February and March 2018, to monitor the use of these car parks and this highlighted the significant take up of these facilities.

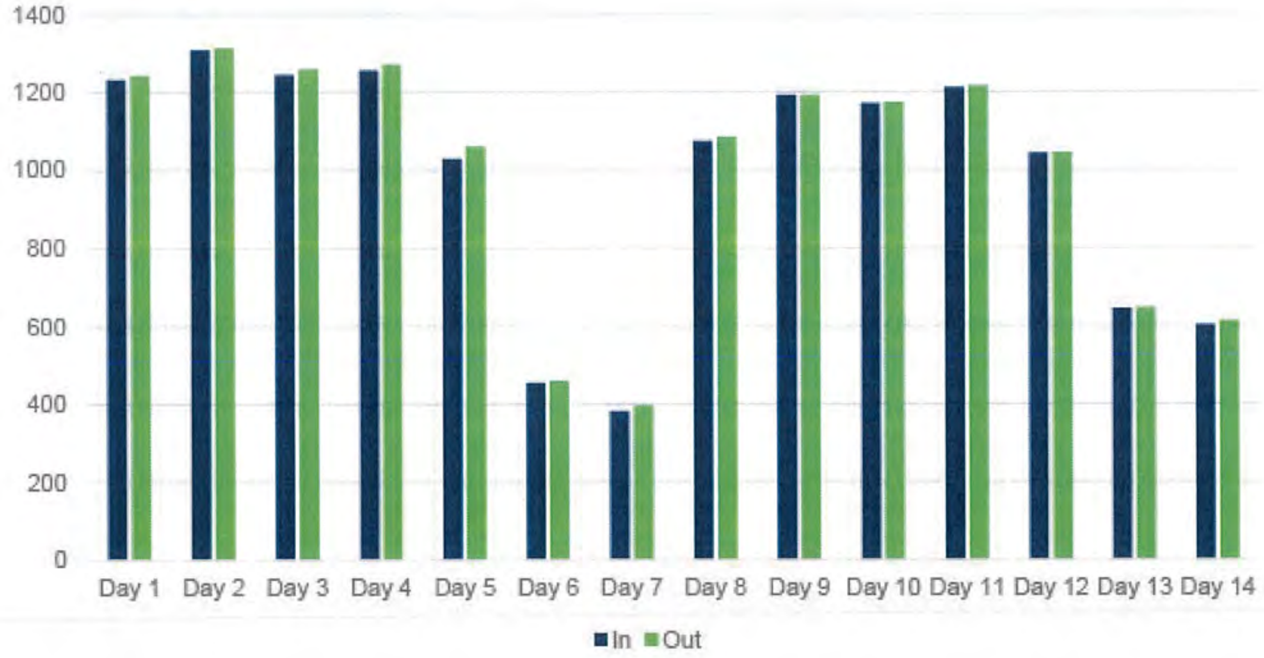


Figure 146 Helensvale Park and Ride demand (Feb/March 2018) (capacity 500 spaces)

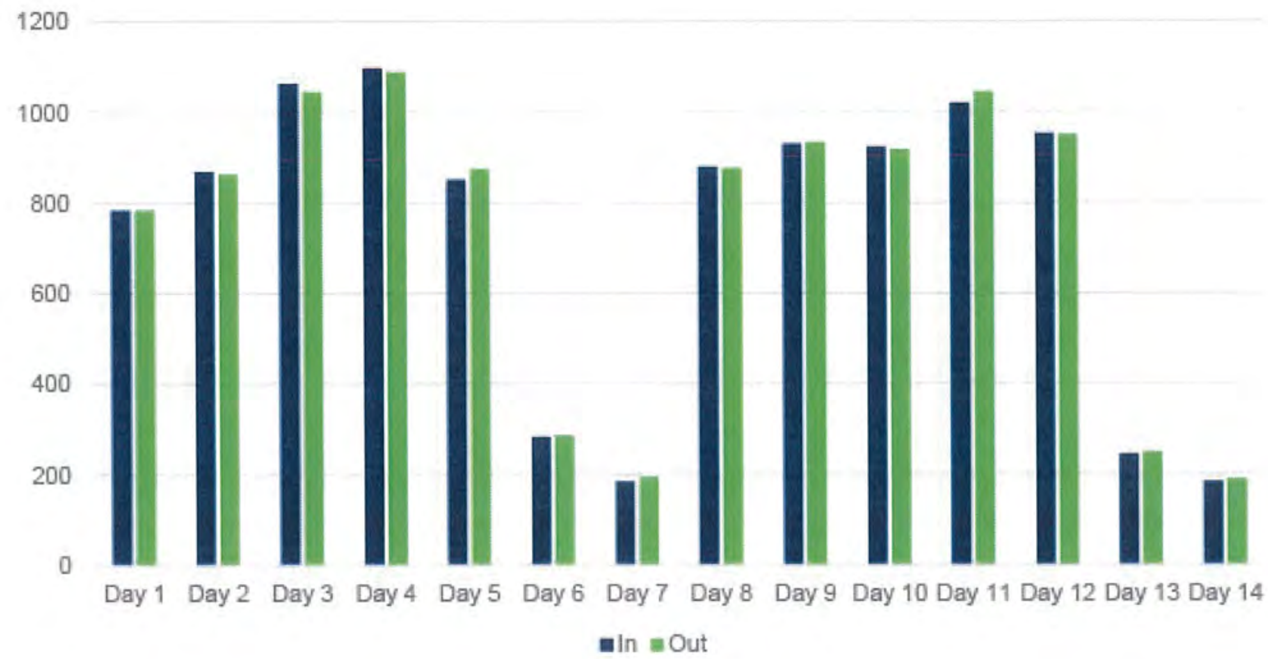


Figure 147 Parkwood Park and Ride Demand (Feb/March 2018) (capacity 1,000 spaces)

The delivery of Stage 2 had a positive impact on traffic volumes on Smith Street within the project corridor at Parkwood and Southport as shown in Table 184.

Table 184 Smith Street daily traffic volumes

	Daily Traffic Volumes (AADT) [152]			
Location	2015	2016	2017	2018
Smith Street, Parkwood	60,437	67,307 +11%	68,933 +2%	68,254 -1%
Smith Street, Southport	20,522	22,141	19,873 -10%	18,753 -6%

19.4.5 Public Transport Patronage on the Gold Coast

When GCLR Stage 1 opened in 2014, it provided a step change in the level of Public Transport service provided on the Gold Coast. Since the commencement of Stage 1 in July 2014, there have been more than 65 million passenger journeys on the light rail system and approximately 198 million passenger journeys on the combined Gold Coast public transport network including heavy rail, buses, light rail, and on-demand transport.

Table 185 shows the overall public transport network patronage, including the impact of the Covid-19 pandemic in 2020-2022. In the period from 2015 to 2019, annual patronage on the Gold Coast network increased by 4.9 million or (20%).

Table 185 Annual patronage – All Gold Coast Public Transport Services[153]

Year	2015	2016	2017	2018	2019	2020	2021	2022
Total annual trips on Gold Coast PT (millions)	24.57	25.36	25.22	28.88	29.47	17.49	18.21	17.12
Increase on previous year (millions)		0.79	-0.14	3.66	0.59	-11.98	0.72	-1.09
Annual Increase %		3.2%	-0.6%	14.5%	2.0%	-40.7%	4.1%	-6.0%

Patronage on the Gold Coast area bus networks has also grown since the introduction of light rail in 2014. Table 186 shows the bus network patronage from 2015 to 2022 and demonstrates the impact of the Covid-19 pandemic on public transport usage from 2020 to 2022. In the period from 2015 to 2019, annual patronage on the Gold Coast network increased more modestly than the rail networks and grew by 533,000 passenger journeys, an increase of 4%. The modest level of growth is a function of the relocation of bus services out of the light rail corridor (the most popular services) and into other parts of the network.

[152] Source: TMR Traffic monitoring, Sites 11545 and 11548

[153] Source: TransLink ticketing data

Table 186 Annual patronage – Gold Coast area bus networks [154]

Year	2015	2016	2017	2018	2019	2020	2021	2022
Total annual trips on Gold Coast bus network (millions)	13.81	13.83	13.5	13.93	14.35	9.39	9.97	11.43
Increase on previous year (millions)		0.02	-0.33	0.43	0.42	-4.96	0.58	1.46
Annual Increase %		0.1%	-2.4%	3.2%	3.0%	-34.6%	6.2%	14.6%

19.4.6 Transport network performance

The purpose of this section is to demonstrate how the light rail has improved the performance of the transport network for other modes including private vehicles (cars), public transport, and active transport.

19.4.7 Traffic volumes at locations within light rail corridor

The City of Gold Coast undertakes regular traffic counts at locations throughout the city. The number of vehicles at the measured sites continues to decrease with the most notable drops at Scarborough Street in Southport and at the Gold Coast Highway in Broadbeach. While there has been an increase in the east-west connection into Surfers Paradise along Via Roma, there has also been a commensurate decrease along Thomas Drive. The results are shown in Table 187.

Table 187 Daily Traffic Volumes - Gold Coast Road Network

	Daily Traffic Volumes				Total Change between 2011 and 2018
Location	2011/2012	2015/2016	2016/2017	2018/2019	
Scarborough Street, Southport	10,801	5,489	5,987	5,675	47% decrease
Gold Coast Highway, Southport	57,627	54,356	45,776	48,637	16% decrease
Via Roma, Isle of Capri	15,911	16,863	16,662	17,249	8% increase

[154] Source: TransLink ticketing data

Location	Daily Traffic Volumes				Total Change between 2011 and 2018
	2011/2012	2015/2016	2016/2017	2018/2019	
Gold Coast Highway, Surfers Paradise	31,841	36,531	39,293	35,311	11% decrease
Gold Coast Highway, Broadbeach	40,845	32,344	30,115	33,992	17% decrease
Thomas Drive, Chevron Island	18,813	18,213	16,113	17,816	5% decrease

19.4.7.1. Active transport networks

Bicycle routes within the light rail corridor

The City of Gold Coast is committed to improving active transport facilities within the City, and also within the light rail corridor. The delivery of Stage 1 of light rail included a dedicated active transport bridge over the Nerang River between Southport and Main Beach to increase accessibility and provide a safer active transport experience for Gold Coast residents. In addition to the Nerang River crossing, the overall length of bicycle paths within the light rail corridor increased by 50 per cent from 83.3km in 2013 to 125.4km in 2019 as shown in Table 188.

Table 188 Bicycle Paths Within Light Rail Corridor

Year	Bicycle path length within the light rail corridor [155]
2013	83.3km
2015	112.6km
2017	125.1km
2019	125.4km

Pedestrians

The number of pedestrians moving through and using a space is a good indicator of the social and economic health of that place. The light rail system has contributed to increases in pedestrian movements throughout the light rail corridor as more people shift away from car based trips and use the light rail as the spine of their journey accompanied by active transport trips to and from the light rail. The most significant increase in pedestrian trips was measured at the Hooker Boulevard Bridge between the Broadbeach South Light Rail Station, and Pacific Fair. Pedestrian movements increased by 180 per cent between 2013 and 2019 at this location as shown in Table 189.

[155] Source: City of Gold Coast Light Rail Corridor Status Report 2019.

Table 189 Pedestrian counts within light rail corridor[156]

Year	Nerang Street, Southport	Scarborough Street, Southport	Nerang River Bridge	Via Roma Bridge, Isle of Capri	Monaco Street, Broadbeach	Hooker Boulevard
2013	3,978	22,020	1,074	1,050	990	5,796
2014	3,072	21,468	858	1,242	982	4,260
2015	3,462	23,938	978	1,188	1,128	6,066
2016	3,654	20,604	1,302	1,458	1,182	11,332
2017	4,190	22,086	1,068	1,704	1,518	11,826
2018	4,314	23,118	1,398	1,718	1,718	15,198
2019	4,068	22,990	1,446	1,622	1,622	16,200

Note: Pedestrian counts indicate the total number of pedestrians across a consecutive Friday and Saturday from 10am to 10pm.

19.4.8 Land use and urban form benefits

19.4.8.1. Land Use benefits

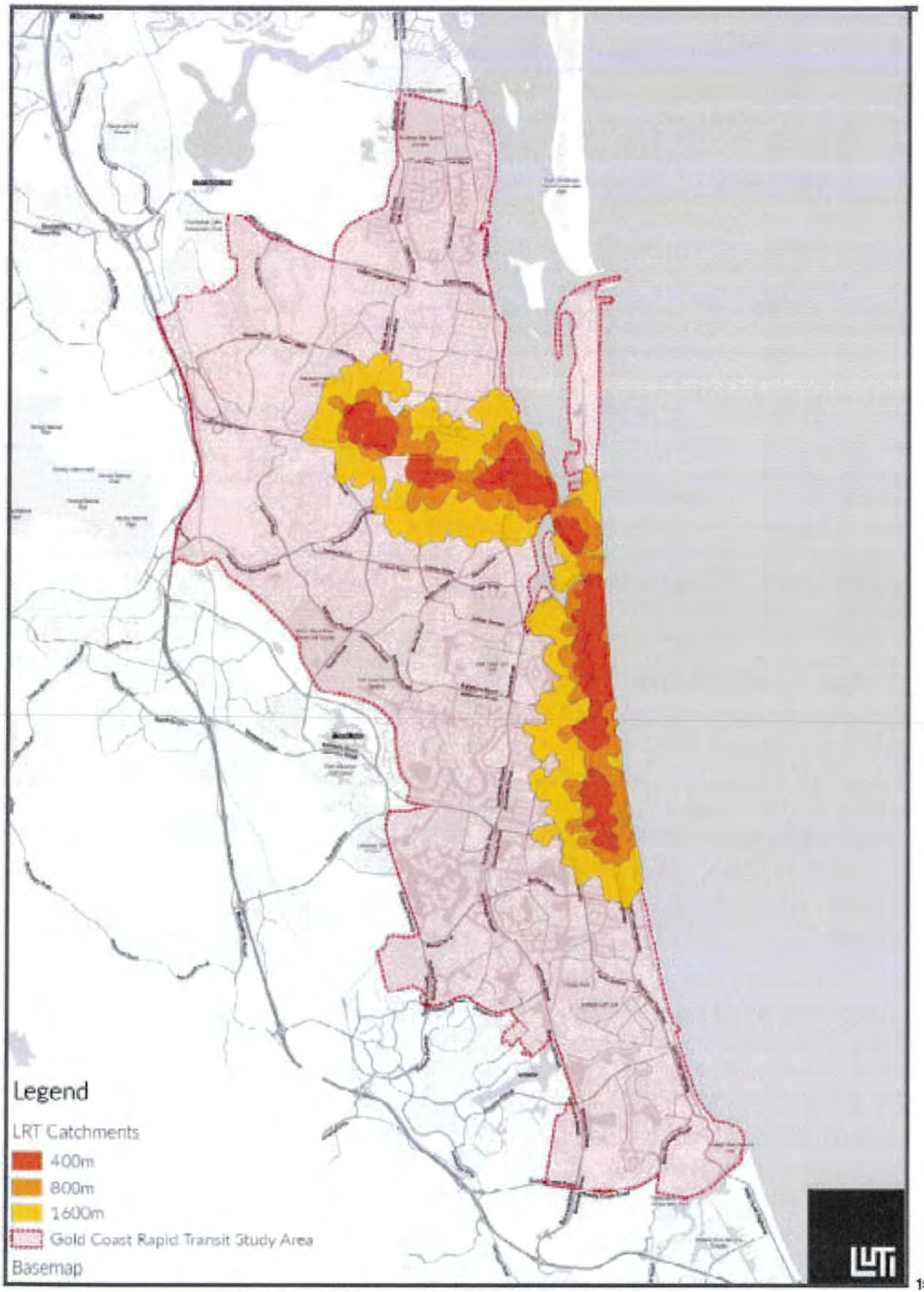
Modern light rail projects are primarily transport projects, however they have a significant secondary benefit of land value uplift, and urban regeneration as a result of the increased transport accessibility and amenity provided by the light rail system. The City and TMR have completed a number of previous studies into the land market response to GCLR Stage 1 which clearly demonstrate the successful land value response to Stage 1.

The Cities Research Institute at Griffith University conducted research and published findings in 2017 which indicated property values around light rail stations on the Gold Coast increased 30 per cent from 1996 to 2016, spiking during the early planning phases of Stage 1.[157]

LUTI Consulting were engaged by the Queensland Government in 2017 to undertake an analysis of land use response (willingness to pay study) to transport projects in south east Queensland which included a case study on Gold Coast Light Rail Stage 1. The study used Hedonic Price Modelling to compare the land values through time from 2000 to 2016 and with proximity to the light rail system. The study area and station catchments are shown in Figure 148.

[156] Source: City of Gold Coast Light Rail Corridor Status Report 2019.

[157] https://theconversation.com/why-gold-coast-light-rail-was-worth-it-its-about-more-than-patronage-78190



[158]

Figure 148 GCLR Stage 1 LUTI Consulting - Study Area and Station Catchments

The modelling was completed for all land types including residential and commercial land uses, and the results are shown in Figure 149 for all land uses and Figure 150 for multi-unit residential and commercial uses.

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[158] Source: LUTI Consulting, with permission of Queensland Government

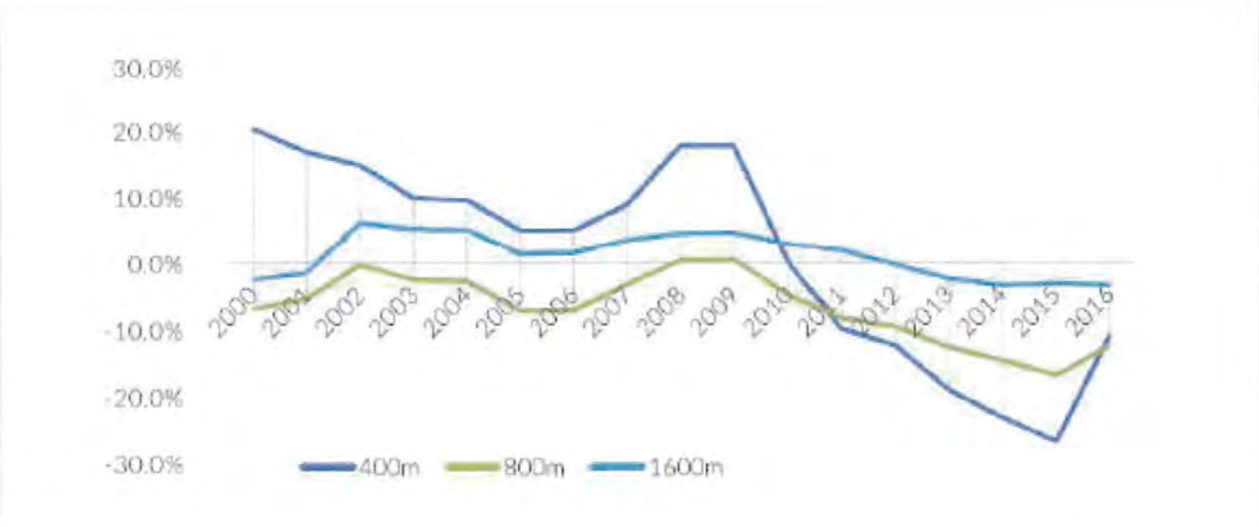

Figure 149[159] GCLR Stage 1 Land Value Change - All Land Uses

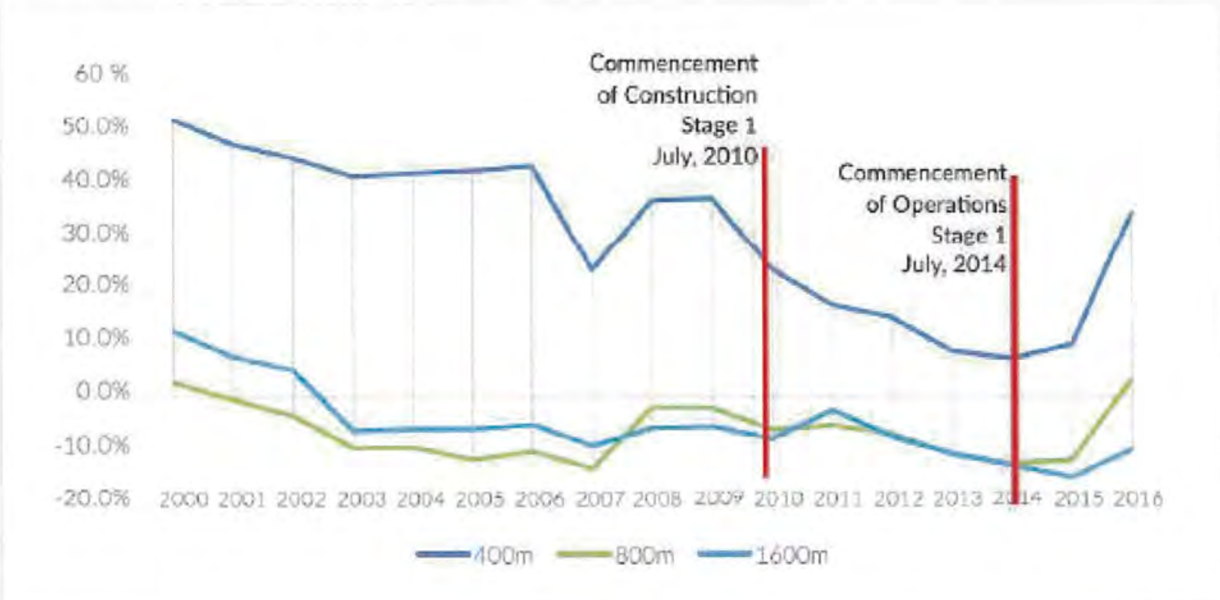

Figure 150[160] GCLR Stage 1 Land Value Change – Multi Unit Residential and Commercial Land Uses

Figure 149 and Figure 150 demonstrate that land values in the light rail corridor declined following the Global Financial Crisis, and during the construction of the light rail, with the 0 to 400 metre catchment being the most negatively impacted for all land uses. The research also demonstrates the positive impact that opening stage 1 had on land values with a 27 per cent uplift over 2 years in land values for multi-unit residential and commercial land use in the 0 to 400 metre catchment.

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[159] Source: LUTI Consulting, with permission of Queensland Government

[160] Source: LUTI Consulting, with permission of Queensland Government

19.4.8.2. Urban form benefits

The City measures a number of urban form metrics in the Building our City – Light Rail Corridor Status Report including the activation of building edges and the connectivity for non-vehicle transport within the corridor.

Building edges

The way that building edges interface with the street has a major impact on the safety and amenity of the that location. Blank walls, driveways, and pleasant but uninteresting landscaping often results in streets devoid of activity and surveillance. However, buildings with physical openings, retail and office uses, and that are built right up to the footpath add interest and vibrancy to the street.

The City regularly surveys the residential and commercial building edges close to the centres of activity. An active edge offers two-way visual and physical permeability at street level. The activities in these buildings add a sense of life and activity to the streetscape. A moderate edge provides some visual and/or physical access to the interior, but is partially obscured by distance, small fences and gates, signage, or the scale and type of glazing. An inactive edge provides no visual or physical interface due to solid walls, car parking, driveways or a lack of windows and doors.

Since 2013 almost 2 kilometres of additional active frontages have been created throughout the study area, predominantly through the construction of new buildings, and renovation of old buildings. Interestingly it has almost all come from inactive frontages as the total of moderate frontages has had relatively little change. The key centres of Southport, Surfers Paradise and Broadbeach have seen the biggest changes.

Connections

Increasing the ability for non-vehicle traffic to move through and around the corridor will increase the attractiveness of light rail as a transport option. It will also link together communities and encourage more non-vehicle trips to be taken. These links include bridges across waterways, laneways opening up large city blocks and locations for pedestrians to cross busy roads.

The City of Gold Coast regularly surveys the midblock links (arcades and laneways), bridges and pedestrian crossing points (pedestrian operated) within the corridor.

A new pedestrian and cycle bridge from Chevron Island to the Home of the Arts (HOTA) (along with upgraded footpaths to the Thomas Drive shops) has been completed. An increase in mid-block links is primarily due to a mix of new links at the former 2018 Gold Coast Commonwealth Games Village and at Griffith University. Note a change in previous years numbers due to a change in methodology.

Whilst pedestrian crossings along the eastern side of Australia Fair and along some major roads have been removed, there has been a net increase in crossings across the Corridor, with many added primarily along Old Burleigh Road in Surfers Paradise.

19.5 Conclusions

This chapter provides a summary of the projects that are expected to be realised if the project is delivered and describes the success of the previous stages of light rail against a wide range of criteria. The chapter documents the TMR approach for benefits management including:

- Identifying benefits as an extension of the investment logic mapping process
- Developing a benefits realisation plan that links the identified benefits to TMR corporate objectives, and the PTIIP objectives
- Identifying key performance metrics that will be used to monitor the performance of the project in the future
- Documenting the baseline performance of the transport network against the key performance metrics.

The chapter also identifies and documents the success of previous stages of light rail against a wide range of transport, land use, economic and social benefits.

20. Conclusions

The analysis undertaken in this PE has confirmed the priority need for the Project and determined its comparative affordability. This chapter summarises the outcomes of this analysis and the conclusions reached through the assessment of options. It includes the following sections:

- Priority
- Affordability.

20.1 Priority

The PE has confirmed the strategic need for intervention in the southern Gold Coast transport network to provide a major boost to PT connectivity as part of a multi-modal response to the identified problems and opportunities in this region. The PE has identified that a major investment in PT could substantially boost accessibility, change the way people travel, and result in a range of economic, social and environmental benefits for the southern Gold Coast, northern Tweed and the broader region.

20.1.1 Need for the project

The priority need for the project is demonstrated through its inclusion in several key Government policies and plans, demonstrating its strategic importance to the Gold Coast region. *ShapingSEQ* – the Queensland Government's framework for achieving SEQ's vision for growth – identifies catalytic infrastructure as a critical tool to manage population growth and achieve urban consolidation targets, of which is set at 80 per cent for the Gold Coast LGA.

The Gold Coast is Australia's sixth largest city with approximately 615,000 residents in the LGA in 2019[161]. The city has experienced strong population growth of 2.3 per cent per annum in recent years. Population in the study area is expected to increase by a further 47,500 people by 2041, a 39 per cent increase above current levels, presenting a complex and multi-faceted transport task for a region that is largely reliant on private transport. Employment within the study area is also forecast to increase by over 53 per cent, and overall employment in the Gold Coast by 155,000 jobs adding to the growing transport demand.

ShapingSEQ heralds the extension of the GCLR system to Coolangatta by 2041 as priority region-shaping infrastructure to support increased residential densities and employment growth, improve public transport accessibility and efficiency, and connect the Gold Coast Airport to major destinations for tourists.

The Project is also identified in the South Coast Regional Transport Plan as a key priority action to better manage the movement of people within and through the region. Currently, public transport is not an attractive mode choice in the study area, resulting in continued reliance on private vehicles. By 2041 it is forecast that only 5.8 per cent of trips in the study area will be made by PT. As the primary means of moving more people more efficiently, improving public transport in the southern Gold Coast is essential to managing forecast travel demand.

Without intervention, population and employment growth in the BH2C area will place increasing pressure on the road network and will compromise the liveability and lifestyle attraction of the Gold Coast, which is a key driver of this growth and resulting economic development. Reliance on private vehicles to the extent of the projected demand growth will have negative environmental, safety, and amenity outcomes associated with congestion, emissions, and increased accidents. In 2020, transport was Queensland's third largest contributor to total GHG emissions. Delivery of a high-quality mass transit system that supports a mode shift to PT, decreases dependence on private vehicles and delivers a multi-modal network will mitigate these negative externalities and support the Commonwealth and Queensland Government's net zero by 2050 emission targets.

[161] Queensland Governments Statisticians Office (QGSO) 2018 medium series projections, refined by TMR's TAU in 2021 to include Transport for New South Wales (TfNSW) Travel Planning Zone projections for the Tweed area, reflect updated assumptions for the Cobaki Lakes area based on more detailed information and reflect refinements to the Gold Coast airport

At the Local Government level, the Project is listed as a high priority within the City's Gold Coast Public Transport Plan 2018-2028, and the City's Transport Strategy articulates the criticality of delivering an integrated high frequency public transport network on the Gold Coast with future proofing for a mass transit corridor through to the Gold Coast Airport.

The southern Gold Coast is a major domestic and international entry point to Queensland. The Gold Coast Airport is part of the Southern Gateway REC and a major driver of the regional economy. In the year ending June 2019 it directly employed an estimated 2,200 FTE employees, in addition to supporting over 15,000 tourism-related jobs across the Gold Coast. By 2037, the Gold Coast Airport is forecast to host 16.6 million annual passenger movements and contribute $818 million per annum to the region, supporting an estimated 20,000 FTEs. In addition to the airport, the Southern Gateway REC encompasses the Coolangatta/ Tweed Heads major activity centre and the cross-border community in Tweed Heads and is identified in *ShapingSEQ* as critically important to the economic performance and growth of the region. To ensure continued opportunity for growth in tourism, aviation, and hospitality industries while supporting the economic performance of Coolangatta and the broader Southern Gateway REC, a vastly improved PT alternative is required. This would deliver significant economic benefits to the Gold Coast and Queensland economies and result in a more sustainable tourism and transport outcome as the region grows.

This will also support the Gold Coast's international reputation as an events city. Improved PT connectivity to the Gold Coast Airport will support the numerous major events that the Gold Coast hosts each year, including the Brisbane 2032 Olympic and Paralympic Games. In the absence of a mass transit solution with the ability to provide 'surge' capacity to support the growing number of events on the Gold Coast, these opportunities will either be missed or result in significant impact to the community.

20.1.2 Consequences of not acting

The Project seeks to respond to several existing and future network problems in the study area and realise opportunities for growth and development. Without intervention, the increasing demand on the transport network is forecast to result in road capacity constraints and congestion issues. The ability to expand the road network, given geographic constraints, beyond currently committed projects is limited and therefore continued growth in road transport demand in the absence of attractive, high capacity public transport will result in unsustainable congestion growth.

Given the area's economic importance, and the clear intentions of Government planning and policy, a well-considered strategic intervention is required to provide a major boost to public transport connectivity. This response should be based on a multi-modal approach that has high-quality public transport as the primary means of moving more people more efficiently.

The key issues that will arise without the Project include:

- The Gold Coast Airport will not perform an optimum role in supporting the region's economy and facilitating tourism which is a significant contributor to the regional and Queensland economy
- The Gold Coast Airport's environmental footprint will increase due to more private vehicle traffic
- A significant portion of the southern Gold Coast road network will be congested, and approaching or exceeding capacity by 2041
- Economic development, access to services and social amenity in the southern Gold Coast will be adversely and significantly impacted undermining local and state government and private sector intentions, including addressing the potential industry growth surrounding the Gold Coast Airport
- The ability to realise the required levels of urban consolidation as set out in *ShapingSEQ* to ensure and promote sustainable long term population growth will be compromised
- Gold Coast's reputation as an internationally leading event and tourism destination will be impacted, with the ability to effectively service major international events compromised including the Brisbane 2032 Olympic and Paralympic Games.

Analysis completed in this PE estimated that the nominal cost of the problem and value of the opportunity is $258 million in 2028 and $343 million in 2041, demonstrating that the Project meets IA's benchmark of national significance of $30 million per annum.

Through this Project, there is the opportunity to capitalise on existing proven investment in Light Rail on the Gold Coast to capitalise on the significant economic and lifestyle opportunity throughout the corridor including at the Gold Coast Airport, the Southern Gateway REC, and Coolangatta. If this opportunity is not taken, existing entrenched car based behaviour and undesired land use and urban form outcomes will become further entrenched resulting in unsustainable growth in congestion and population growth and reduced economic growth and productivity from the region.

20.1.3 Project benefits and outcomes

To address the problems and realise the opportunities, six potential options were identified and assessed based on their ability to meet the Project's service requirements via a quantitative MCA and Rapid CBA process. This assessment concluded that three shortlisted project options had the most potential to achieve the service requirements:

- Option 1 – Dedicated Light Rail (LRT)
- Option 2 – Dedicated Bus Lanes (DBL)
- Option 3 – Enhanced Bus Provisions (EBP).

These options underwent technical development and quantitative and qualitative assessment to determine their strategic fit, societal impact and deliverability and overall, the economic, land use, environmental and social benefits that could eventuate if the Project was delivered.

The analysis demonstrated that Option 1 is forecast to deliver significant patronage increases, with over 21,000 additional PT boardings a day in 2041, compared to 6,400 and 2,300 for Options 2 and 3 respectively. Option 1 results in a 5.7 per cent increase in PT mode share within the study area. This mode shift to PT, also results in a meaningful benefit to continuing road users as it reduces forecast congestion and supports a mature multi-modal transport network. Options 2 and 3 result in minimal congestion reduction and overall while having moderate impacts on PT patronage it is significantly lower than Option 1. The delivery of Option 1 will support 1,800 PT trips a day from the Gold Coast Airport by 2041, increasing PT mode share to the Airport by 3.3 per cent to 9.1 per cent, demonstrating the impact that delivery of a high amenity, attractive and dedicated mass transit solution has on mode share and its ability to support transport and economic outcomes.

Option 1 is forecast to accelerate population and jobs to 2041 by an additional 10,000 people and 3,500 jobs, supporting the achievement of the objectives and targets of *ShapingSEQ* and a more sustainable and high amenity-built form. This increased attractiveness of the corridor will also generate increased economic productivity, activity and growth of the Southern Gateway REC. Bus options are unable to provide the step change in transport amenity or capacity required to catalyse land use change. In the absence of a catalytic investment these significant economic, transport and sustainability outcomes will not be realised and the opportunity will be missed.

The economic outcomes of each option are shown in Table 190.

Table 190 Monetised economic, social and environmental impact ($ millions, PV, discounted at 7%)

Item	Option 1 – LRT	Option 2 – DBL	Option 3 – EBP
First round benefits (excluding land use change)			
Total transport benefits	827	177	71
Total community and broader benefits	140	46	4
Total other benefits	47	1	1
Total first round WEBs	79	6	5
Total first round economic benefits	1,095	230	81

Item	Option 1 – LRT	Option 2 – DBL	Option 3 – EBP
Second round benefits (including land use change)			
Second round transport user benefits from land use change (incl. road maintenance benefits)	(19)	n/a	n/a
Second round wider economic benefits	56	n/a	n/a
Urban development benefits			
Total urban development benefits	1,434	n/a	n/a
Total economic benefits	**2,566**	**230**	**81**

The economic outcomes demonstrate that both with and without benefits from land use change, based on monetisable benefits, Option 1 offers significantly greater economic benefits. This results in a stronger ability to support the achievement of policy objectives within the region. Option 2 and Option 3 have moderate to minimal economic benefits.

The SIE undertaken for the PE identified 20 positive and 13 negative potential social impacts. Option 1 had the greatest positive social impact of the project options across the impact categories. The positive social impact rating score for Option 1 is significantly higher than Option 2 and Option 3, at 60 per cent and 129 per cent respectively. The negative social impact rating for Option 1 is larger than Options 2 and 3 but only by 12 per cent and 60 per cent respectively and the majority of these are expected to be temporary during construction, indicating the significant potential upside that Light Rail provides that the other options do not.

20.1.4 Assessment outcomes and priority options

Overall, based on the qualitative and quantitative analysis undertaken, Option 1 was the strongest performing across the assessments in the PE with the highest benefits across the land use, economic, social impact, Whole of Government and transport modelling assessments. Option 3 was the top performer for cost and risk, and financial analysis.

Option 1 Dedicated Light Rail will support the realisation of a broad range of Commonwealth, state and local government policies and is identified in the *SEQ Regional Plan* and the *South Coast Regional Transport Plan* as well as the City's Transport Strategy and Public Transport Plan. Option 1 provides strong integration with the existing network connecting major employment, population and activity centres through a proven mass transit mode on the Gold Coast. There has been extensive options assessment across this PE and previous analysis with LRT being preferred across quantitative and qualitative evidence. LRT responds the greatest to the identified problems and opportunities and aligns strongly with the required outcome to deliver a multi-modal transport network to sustainably support growth. LRT delivers significant increase in PT patronage and was also the only option forecast to result in a meaningful land use response and urban renewal outcome. The option is forecast to realise the greatest economic benefits to society and has the highest BCR (rounded) of 0.4 without land use change, increasing to 0.9 when land use benefits are included.

Option 2 Dedicated Bus Lanes will broadly support government policies through increasing the attractiveness of PT in the study area, and encourage a mode shift towards PT. However, the option is not in line with previous planning or identified within any existing strategies by any level of government. Delivery of bus lanes on the Gold Coast Highway does not strongly align with the identified service requirements or problems and opportunities and for a significant capital cost, at only 23 per cent cheaper than Option 1, delivers minimal increases in PT patronage, and does not facilitate a land use response. The Project does not align strongly with the surrounding transport network, with minimal connectivity to other similar infrastructure. Option 2 delivers the lowest BCR of the assessed options, with a BCR of 0.1.

Option 3 Enhanced Bus Provisions, similar to Option 2, aligns with government policies through its focus on increasing the attractiveness of PT by improving its reliability and travel times. It also aligns with broader policy frameworks by representing a low cost, service-based initiative. The option largely reflects a moderate uplift in existing service provision and so represents a level of PT intervention that would occur in the absence of any step-change investment. This results in the option realising minimal increases in PT patronage, mode shift or travel time change, as well no assessed impact on land use in the corridor. The option does not respond to or achieve the identified service requirements. Given its low cost, and some moderate impacts, Option 3 has a BCR of 0.3.

Based on the analysis undertaken in the PE it was concluded that Option 2 was not preferred for continued assessment and only Options 1 and 2 proceeded for project benefits, market sounding, value for money, and delivery model considerations.

20.2 Affordability

Table 191 presents the overall net project cost over the assessment period (i.e. delivery phase and operating phase) for the options.

Table 191 Comparison of whole-of-life project cash flows for the shortlisted options ($ million P50 risk adjusted)

	Option 1		Option 2		Option 3	
	Nominal	PV	Nominal	PV	Nominal	PV
Construction costs	(4,140)	(3,132)	(2,978)	(2,298)	(453)	(333)
Operating costs	(2,678)	(919)	(646)	(203)	(479)	(150)
Farebox revenue	1,615	536	548	179	227	76
Net project value	(5,203)	(3,515)	(3,076)	(2,322)	(705)	(407)

The key outcomes of the financial analysis are:

- The upfront funding requirements to construct and deliver the project options range from $0.5 billion for Option 3 to $4.1 billion for Option 1 in nominal terms at the P50 confidence level
- Option 1 would require the greater funding commitment to deliver the project, with a net whole of life cost of $5.2 billion in nominal terms at P50 confidence levels respectively
- In nominal terms, Option 1 is projected to generate approximately $1.6 billion in incremental farebox revenue across the 30-year analysis period, which is $1.1 billion more than Option 2 or $1.4 billion more than Option 3 in nominal terms.

The capital costs of the options significantly outweigh the farebox revenue. During the operating phase the revenue covers approximately 60 per cent of the incremental operations and maintenance costs for Option 1, 84 per cent for Option 2 and 47 per cent for Option 3.

All project options provide the opportunity for staging as they are linear infrastructure with a number of potential interim destinations. Staging of Options 1 and 2 could decrease the upfront capital costs required. However, truncating the routes may limit the potential increase in patronage or land use impact each option could have and any impact on cost would need to be considered against the benefits that could be realised. Given the overarching strategic need and intent of the Project, reaching the Gold Coast Airport is a critical component of both options. The viability of delivery through a PPP if the Project is staged should also be considered as this may influence the attractiveness of the project to the private sector. However, even a staged version of the Project is still a substantial investment that may still be attractive for delivery through a PPP, as per previous stages of GCLR. Staging options should be further considered in the Business Case stage.

For all three project options, the incremental farebox revenue was found to be insufficient to recover the capital and operating costs. At the P50 level, there is a funding shortfall of $3.5bn PV for Option 1, $2.3bn PV for Option 2 or $0.4bn PV for Option 3.

Precedent projects have offset financial impacts of public transport infrastructure through increases in land tax, stamp duty and capital gains tax, on the current land and development land within the project corridor. The City implemented a Transport Improvement Charge which is levied on general rates on rateable land within the Gold Coast LGA. The revenue from the levy is used to fund the City Transport Program, some of which has historically been applied to support the City's contribution to GCLR. While a substantial value, this is a city-wide charge, and this revenue is used to fund a variety of transport infrastructure improvements and therefore is not available solely to fund this project. Additionally, it is significantly less than the required funding commitment over the 30-year appraisal period.

For Option 1, Stage 1-3 of GCLR was delivered through an availability PPP, which was transacted for Stage 1 and modified to deliver Stage 2 and subsequently currently Stage 3. The existing franchise agreement is due to expire in June 2029 and therefore has implications for this Project. At this stage of the assessment, while it was considered that there is potential for Stage 4 to be delivered via a PPP, it was determined that extension of the existing franchise to deliver a future stage of GCLR was not preferred and this would be transacted through a new open procurement process, however the Business Case should investigate this conclusion in more detail.

This section has been removed from this publicly released version as it contains commercially sensitive information, and release could impact future commercial negotiations.

21. Recommendations

The outcome of the technical, financial, and economic analysis completed in this PE has determined there is sufficient justification for Option 1 and Option 3 to progress to the Business Case stage.

Option 1 LRT realises significant PT mode share shift within the study area, additional PT boardings within the study area and GCLR stages 1-3 and an overall reduction in congestion, car usage and private vehicle VKT. It aligns strongly with the objectives of the *SEQ Regional Plan*, the *SEQ South Coast Regional Transport Plan* and the City's Transport and Public Transport plans. Two previous stages of Light Rail have been delivered on the Gold Coast, with Stage 3 currently under construction, and have demonstrated the step change in PT patronage that can occur through its delivery.

While Option 1 was the overall preferred option, it has a significant capital and operational costs. Therefore, it is recommended that Option 3 be considered as a comparator option as it was the second-best performing option through the PE. Option 3 has significantly lower impacts on mode shift and PT patronage and does not realise the majority of the service requirements. However, it represents the lower cost PT intervention that would occur if the step-change transformative investment in LRT was not warranted.

Therefore, based on the outcomes of this PE, the following recommendations should be considered:

- Option 1, LRT from Burleigh Heads to Coolangatta, is the preferred option and decision makers should approve the project passing through Gate Two and proceeding to the Business Case stage for further assessment.
- Option 3, Enhanced Bus Provisions, was the second highest performing option and should be progressed through Gate Two and proceeding to the Business Case stage as a comparator option to LRT.
- As the lowest performing option, Option 2, Quality Bus Corridor, should not be progressed through to the Business Case for further assessment.
- Further detailed technical and environmental assessments are required to better understand the impacts of LRT on the environment to inform the approvals pathway and timeframes.
- Further development of and update to the Active Strategy, including opportunity for further active transport improvements to be considered south of Currumbin.
- Engagement with DCCEEW to determine potential EPBC and EIS requirements and further consideration of approvals pathway and timeframes.
- Further community and stakeholder consultation, including working with members of the local indigenous community to identify and protect valued and unique cultural heritage sites along the route and development of a CHMP.
- Ongoing engagement with IA to ensure the requirements of the IA Assessment Framework are fully satisfied.
- Ongoing engagement with New South Wales authorities in respect of planning for cross-border transport improvements and economic development. This includes a possible extension of Option 1 into New South Wales, and for all options, major improvements to the coordination of bus networks.
- Further detailed analysis and monetisation of GHG emissions and ensuring the project makes a maximum contribution to achieving the national and state target of net zero emissions by 2050.
- On-ground investigations should be progressed to better inform key risk areas related to PUP, PFAS, Hydrology and other critical technical risk items to inform a more accurate cost estimate and risk profile.
- Further refinement of the transport modelling framework including:
  - Updates to ensure the model performance accurately reflects the benefits of LRT compared to the existing bus network and greater alignment between modelling results, economics and patronage outcomes.
  - Updates to take account of new population and employment forecasting to at least 2046.
  - Further investigation of the role and scale of bus interchange facilities including at Thrower Dr Currumbin and the Airport.
  - Refinement of bus network changes (including confirmation of the preferred routes for the 760 and 774).

- Improved base case numbers for visitor travel, which will form a major component of the public transport user base.
- Updated Gold Coast Airport trip generation base, taking into account the latest passenger forecasting data available from the Airport.
- Investigation of the viability of bus priority measures at traffic signals, including the feasibility and effectiveness of bus signal pre-emption.

- The methodology for economic assessment of land use uplift in the business case should follow a methodology that is agreed by Infrastructure Australia, TMR and City of Gold Coast prior to procurement of services to complete the work.
- Develop a methodology for economic assessment of tourism benefits, for agreement by Infrastructure Australia, TMR and City of Gold Coast, prior to procurement of services to complete the work.
- A comprehensive market sounding process with the contractor market, potential operations and maintenance providers, light rail vehicle providers, the private finance market and potential PPP partners is recommended to inform the constructability, packaging and delivery model assessment required in the Business Case stage.
- The existing concession with GoldLinQ for Stages 1-3 is due to expire in June 2029 which has implications for any future extension in terms of project delivery, operations as well as the ongoing operations of Stages 1-3. Any delivery model assessment as part of the Business Case needs to be considered alongside a detailed analysis of how TMR wishes to proceed with the operations of Stages 1-3 and any interfaces and synergies with a future extension to Coolangatta. Detailed commercial, legal and financial advice workstreams investigating these issues would be required to make an informed delivery model decision within the Business Case.
- Given the potential for Option 1 to be delivered as a PPP, the Business Case stage should progress as a PPP Business Case.
- Early engagement with Queensland Treasury is required to determine the requirements of the Business Case if a PPP is to be considered and the role of Queensland Treasury in the Business Case.

The estimated cost and resourcing required to undertake the Business Case, including planning for early works, is outlined in Chapter 23 – Readiness to Proceed and is up to $30 million, contingent on the required levels of on-ground technical and environmental investigations. The likely timeframe for completion of the Business Case and early works planning is April 2025.

22. Readiness to proceed to the next stage

Based on the outcomes of the PE, this chapter outlines a detailed resource and project plan to progress to the business case stage for further assessment, including:

- Business case development tasks
- Governance
- Program
- Resource requirements.

22.1 Business Case development tasks

The Business Case forms the final step in the evaluation stage of the PAF and is pivotal in providing a comprehensive evidence base for an investment decision. The purpose of the Business Case stage is to undertake a detailed comparative evaluation of options and delivery models, with a view of identifying and recommending the option and delivery model most likely to achieve the service requirements, while providing the best value for money outcome. The findings will be used for future monitoring of Project progression, and to determine if any key assumptions have changed.

The key activities which will be undertaken during the Business Case development stage will be:

- Review of the PE report to confirm the:
  - service requirements
  - project option/s and delivery models to be evaluated
  - project organisation and governance arrangements.
- Conduct a detailed comparative evaluation of the options and delivery models, in terms of undertaking a:
  - reference design for a preferred option resolving any outstanding issues from the preliminary design stage
  - detailed risk analysis of preferred option and of maintaining business as usual
  - updated transport model to take account of the latest population and employment projections and updated traffic and public transport forecasting
  - detailed financial and economic analyses (including sensitivity analysis)
  - market sounding
  - consideration of whole-of-government policy issues
  - consideration of legislative and regulatory issues, including the need for early engagement with the Australian Government regarding EPBC approval requirements
  - public interest assessment
  - consideration of procurement strategies
  - stakeholder and community consultation.

Successful completion of the Business Case development stage will provide a comprehensive report to inform investment decision makers regarding the priority and affordability of the preferred option and readiness to proceed to the next stage of the project, being Supply Strategy Development.

22.2 Governance

The importance of integrated transport, land use and economic development outcomes to justify investment in the preferred project option has been a central theme presented throughout this PE. The development of the Business Case must reflect an integrated approach to these key elements and ensure that urban renewal and economic development strategies are included along with the preferred transport solution as critical Business Case stage activities. This requirement is an important consideration for developing and implementing effective governance arrangements moving forward in the Business Case stage and beyond, ensuring that all key stakeholders are appropriately represented.

In addition, the previous three stages of the Gold Coast Light Rail project have all been developed through a partnership between all three spheres of government, and governance arrangements for a future stage must ensure an equitable approach to project design and key decision-making represents the needs and objectives of the three partners.

The BH2C project, if developed as a light rail option, would also have an extensive relationship with important travel demands across the Queensland and New South Wales border. Governance arrangements must also reflect the cross-border components of the project.

22.2.1 Governance framework

The proposed governance framework going forward to the Business Case is outlined in Figure 151.

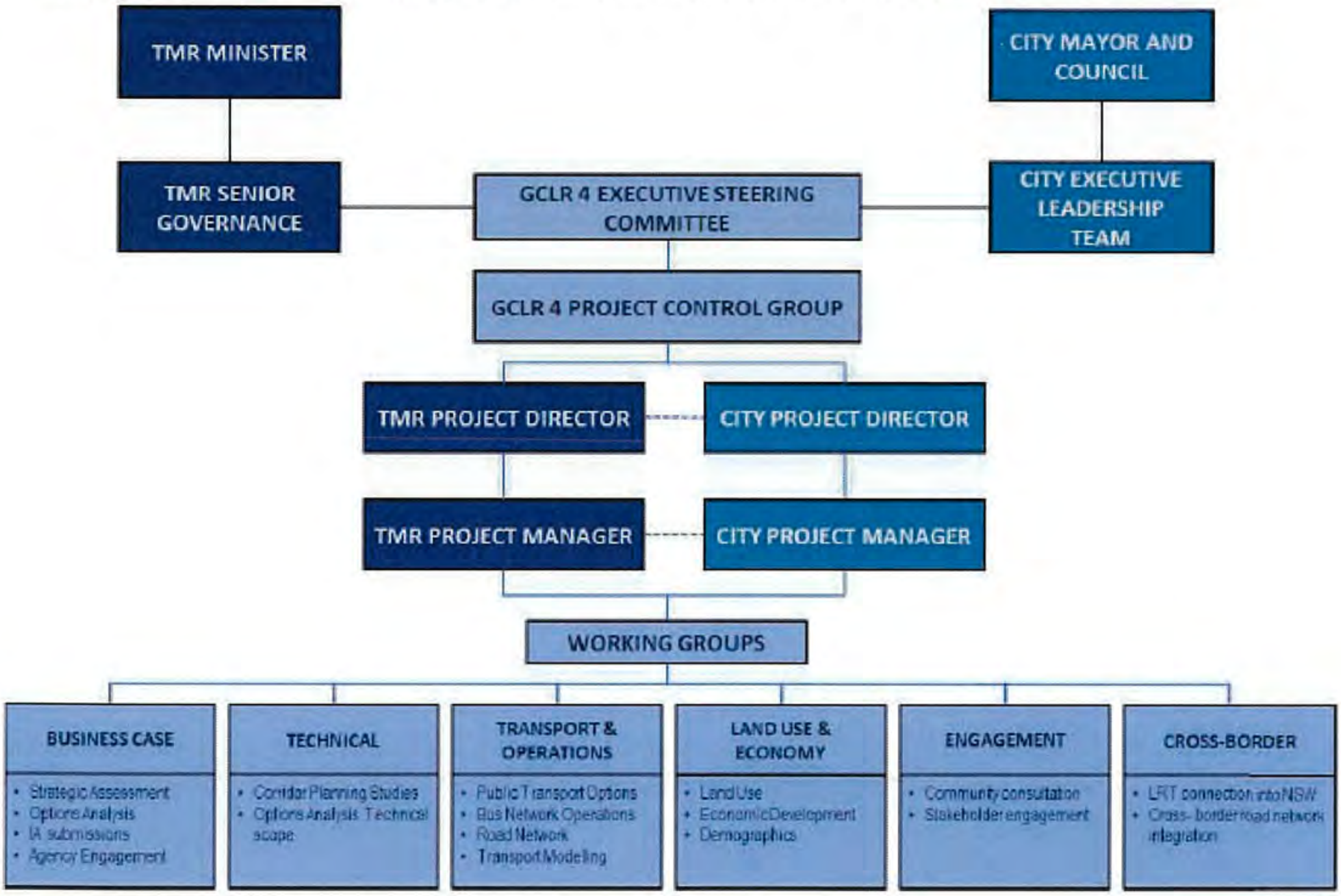

Figure 151 Proposed governance framework

22.2.1.1. Project Owner

As with previous stages of the Gold Coast Light Rail, and consistent with legislative and administrative arrangements applying to the delivery of major public transport projects in Australia, it is proposed that the Queensland Government (through TMR) is responsible for progressing the BH2C project through the Business Case stage.

The Project Owner is responsible for establishing the project direction, the project budget, achieving the stated project outcomes, and progressing through the Business Case stage of project development and the project control gates.

22.2.1.2. Executive Steering Committee

The Executive Steering Committee established to guide the previous stages of the PAF for the BH2C project will remain in place to guide the Business Case stage, with the following responsibilities:

- Work in partnership to ensure the expeditious delivery of a comprehensive Business Case for the project.
- Ensure coordination of activity and policy development with regards light rail and related transport, land use and economic planning.
- Ensure clarity and consistency in engagement with the Queensland and Australian governments regarding relevant activities.
- Provide a forum for cross government collaboration and high-level engagement with relevant stakeholders as required.
- Escalate and resolve issues within each member's area of responsibility to progress the objectives of the project.
- Ensure the distribution and sharing of information and documentation across all levels of government relevant to the project.
- Monitor the progress of relevant project activities and ensure the interests of the Gold Coast are served.
- Provide a forum for escalation and strategic decision-making, monitoring of risks, removal of obstacles and resolving key issues presented from the Project Control Group.
- Progress reporting to the various Council and State Government Committees and senior governance.
- Actively participate and take ownership of agreed actions.

The Executive Steering Committee will comprise representatives from the Queensland Government, City of Gold Coast, New South Wales and Australian governments.

22.2.2 Project team governance

The proposed project team governance structure is outlined in Figure 152. A collaborative project team will be established with the responsibility of coordinating Business Case activities to achieve high-quality decisions for a best-for-project outcome. Core expertise will be sourced from the City, TMR, and external secondments.

Strong working relationships will be required from all participants, necessitating co-location of the project team within a project office. Under the proposed arrangement, resources from the City and TMR will need to be seconded to key project positions as appropriate.

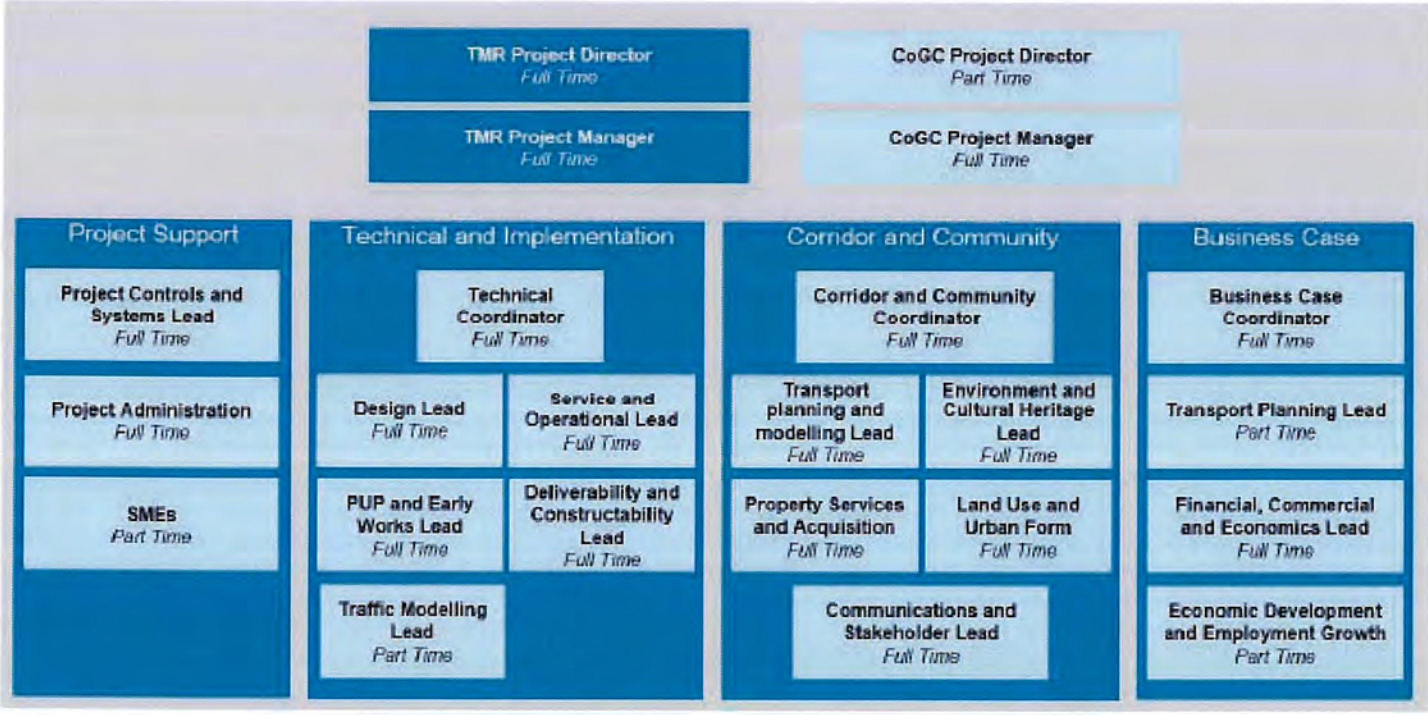

Figure 152 Project team governance structure

22.2.2.1. TMR Project Director

The Project Director will report to the Project Owner and be responsible for setting the direction and timeframes for the Project. The Project Director will chair the Project Control Group (PCG) and will be an attendee at the Steering Committee meetings as executive officer.

The Project Director is responsible for managing key stakeholder relationships to the project, including the Local, State and Commonwealth government stakeholders. The Project Director will also chair the Business Case Reference Group (BCRG).

22.2.2.2. TMR Project Manager

The Project Manager will report to the Project Director and be responsible for the day-to-day management of the project including the core Project Team members, the wider Project Team and the project advisors. The Project Manager will coordinate and manage the various project work streams to best meet project objectives during the Business Case stage. This will include monitoring and reporting on project progress against schedule, managing project risks and issues, coordinating the delivery of outputs and managing the project costs against budget.

22.3 Program

Table 192 outlines the activities and milestones to be completed as part of the Business Case.

Table 192 Program of Business Case activities/milestones

Activity/Milestone	Timing
Establish project team and governance arrangements	July 2023
Engage advisors (transport modelling, technical, cost, financial, economics)	September 2023
Confirmation of PE outcomes	October 2023

Activity/Milestone	Timing
Completion of reference designs and options impact analysis	November 2024
Completion of transport modelling	December 2024
Completion of risk assessment and cost estimates	December 2024
Completion of financial analysis	December 2024
Completion of economic appraisal	December 2024
Completion of legal assessment	February 2025
Completion of market sounding and value for money assessment	February 2025
Completion of Delivery Model Options Analysis	April 2025
Completion of Benefit Realisation Plan	March 2025
Completion of Plan and Budget for Supply Strategy stage	April 2025
Completion of Draft Business Case Report and Appendices	April 2025
Completion of PD&O Leadership Review and all Subject Matter Expert Reviews	May 2025
Completion of Project Steering Committee Endorsement	May 2025
Completion of Project Evaluation Unit Assurance	May 2025
Final (post-review) Business Case Report and Appendices	June 2025
Completion of TMR Gate 3 Submission	June 2025
TMR Gate 3 scheduled meeting	July 2025
Infrastructure Australia Gate 3 submission	July 2025

22.4 Resource requirements

22.4.1 Skills and capability requirements

Due to the nature of the Project, a broad mix of resources will be required to deliver the Business Case, including an appropriate mix of technical and financial / commercial experience sourced from both the public and private sectors. A summary of the workstreams and resources is provided in Table 193.

Table 193 Workstreams and resources

Workstream	Resource	Responsibility
Project manager	TMR	TMR
Stakeholder engagement	TMR/City	TMR/City
Legal advice	TMR-engaged-advisor	TMR
Market sounding	Advisory team	TMR
Business Case report development	Advisory team	TMR
Finance / commercial	Advisory team	TMR
Economics	Advisory team	TMR
Cost estimation	Advisory team	TMR
Engineering / environmental and traffic modelling	Advisory team	TMR
Landscaping and urban design	Advisory team	TMR/City
Strategic Transport Modelling	Advisory team	City
Operations modelling	Advisory team	TMR
Land Use and car parking	Advisory team	City

The proposed workstreams and key responsibilities are described in Table 194.

Table 194 Business Case work streams and responsibilities

Workstream	Description of Key Responsibilities
Project / Business Case Management	Overarching responsibility for day-to-day management and development of TMR's Business Case deliverables in conjunction with PAF guidelines. Consideration is given to the BCDF and IAAF. Establishment of reporting and risk management arrangements to monitor and control the performance of activities, including reporting as required by agency stakeholders and in relation to key performance indicators. Coordination of Business Case assurance activities in consultation with TMR assurance policies.
Stakeholder engagement	Implementing the Communications Action Plan and informing key stakeholders of the Reference Projects. Completion of a Public Interest Assessment that identifies the potential impacts and benefits to the public of proceeding with the Reference Projects.
Legal advice	Completion of regulatory and legislative review.

Workstream	Description of Key Responsibilities
Market sounding	This workstream involves market sounding of potential contractors and operators to obtain input on Project solution and inform / validate the preferred delivery model.
Business Case report development	Compiling all reporting, SME, and technical work into the final Business Case document, to be presented to the Australian and Queensland Governments.
Financial & Commercial	Development of a detailed financial model to assess the financial impact of the Project, including capital and operational cash flow implications, and funding / affordability considerations. Consideration of delivery options and recommended project delivery strategy.
Economics	Scoping of Base Case and Reference Projects. Comprehensive evaluation of all the relevant financial, environmental, and social costs and benefits, and calculation of the net present economic value for each relevant option. Developing a benefit estimation process / framework. Undertaking a concise value capture assessment to determine the viability of alternative funding sources available to the Project.
Engineering, Design, Constructability & Cost	This work stream undertakes the technical analysis of all infrastructure required for the Project covering investigations, calculations, modelling, analysis, design, drawing production and review. It will include engineering, 3D modelling, traffic impact modelling, constructability and cost estimating activities. All issues related to operation and maintenance of the project, including integration of the project into the wider transport network, and determining the most cost-effective engineering solutions to meet customer requirements.
Environment, Sustainability and Corridor Protection	Identification of approvals required for the project, associated regulatory requirements and program implications. Development and implementation of a recommended environmental approvals pathway.
Operations modelling	This work stream undertakes required traffic and public transport operational modelling for the Reference Projects.
Strategic transport modelling	This work stream undertakes the strategic transport modelling for the Reference Projects to support project design, impact assessment and economic assessments.
Land Use and car parking	Deliver a comprehensive land use analysis and assessment based on the response to the Reference Projects, determine car parking policy and provision consistent with best practice for public transport projects.

22.4.2 Funding requirements

The estimated funding required for the Business Case is up to $30 million, which includes allowance for contingency and planning for early works. More detailed estimates can be made once the review phase of the Preliminary Evaluation is completed. The maximum budget, based on the proposed resourcing arrangements and the program detailed in this chapter, is provided in Table 195. A memorandum of understanding is being negotiated between the State and the City to enable a sharing of the funding across the funding responsibilities shown in Table 195.

Table 195 Resource and funding requirements for Business Case stage

Business Case Cost Estimate	TMR ($'000)	COGC ($'000)	Total ($'000)
Internal	4,000	2,000	**6,000**
External (Managed by the Project Owner)			
Technical, Design & Planning	15,150		15,150
Environmental, Cultural Heritage and Native Title	1,250		1,250
Communications and community engagement	600		600
Cost estimator	200		200
Transport modelling		1,500	
Financial/Commercial	820		820
Legal	100		100
Economics	820		820
Land use and parking		500	500
Probity	10		10
Operational modelling (for PT projects)	350		350
Contingency	2,330	400	2,730
Totals	**25,630**	**4,400**	**30,030**

22.5 Conclusions

A governance structure for the Business Case stage of the project has been developed which leverages off existing arrangements and recognises the need for effective collaboration. The proposed Integrated Project Team will draw on expertise established during the PE stage, with specialist external advisors to be sourced for key Business Case deliverables. The estimated funding required for the Business Case is between $25 million and $30 million. Subject to approval to proceed, Option 1 and Option 3 have the necessary plans and processes in place to move forward to the Business Case stage.

Appendices

Appendix A: Public transport needs in the southern Gold Coast and northern Tweed region Strategic Assessment

Appendix B: Policy context and strategic alignment

Appendix C: COTP report

Appendix D: Options assessment report

Appendix E: Design Development Report

Appendix F: Cost estimate reports

Appendix G: Financial analysis report

Appendix H: Transport modelling report

Appendix I: Land use report

Appendix J: CBA report

Appendix K: Gold Coast Highway (Burleigh Heads to Coolangatta) Public Transport Project Preliminary Evaluation Legal Report

Appendix L: PISMP

Appendix M: CCAP

Appendix N: Social Impact Evaluation register

Appendix O: Delivery options

Appendix P: Benefits Realisation Plan

Appendices have not been included in this report.