BUILDING QUEENSLAND

GOLD COAST LIGHT RAIL STAGE 3A

BUSINESS CASE/COST BENEFIT ANALYSIS SUMMARY

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PURPOSE OF THIS DOCUMENT	This document provides an overview of the Gold Coast Light Rail Stage 3A Detailed Business Case. The primary objective of this document is to outline the economic analysis undertaken and the key outcomes.
STATUS	This summary was prepared based on the contents of the detailed business case presented to the Building Queensland Board in Q4 2018. The information presented may be subject to change as the proposal progresses through future stages of development, delivery and operations.

CONTENTS

1 SUMMARY INFORMATION

PROJECT NAME	Gold Coast Light Rail Stage 3A	
LOCATION	South East Queensland	
PROPOSAL OWNER	Department of Transport and Main Roads	
PROPOSED DELIVERY AGENCY	Department of Transport and Main Roads	
P90 COST ESTIMATES	NOMINAL	PRESENT VALUE [1]
CAPITAL COST	$709 million	$536.2 million
INCREMENTAL ONGOING COST		$ 131.8 million
TOTAL COST		$668 million
BENEFIT COST RATIO		1.1

2 PROPOSAL OVERVIEW

Light rail on the Gold Coast has a long history extending back to the mid-1990s when the Queensland Government and City of Gold Coast (CoGC) were considering options to address population growth projections for the Gold Coast and the impacts of increasing congestion on the city's transport system.

In 2009, the Queensland Government and CoGC identified the need for a light rail system to be delivered in stages across a 42-kilometre corridor from Helensvale in the north to Coolangatta in the south via the Gold Coast Airport.

Gold Coast Light Rail Stage 1 connects Gold Coast University Hospital with Southport, Surfers Paradise and Broadbeach. It extends 13 kilometres, stopping at 16 stations and using 14 light rail vehicles, connecting major destinations such as Griffith University, Broadwater Parklands, Gold Coast Aquatic Centre, Gold Coast Convention and Exhibition Centre, and Pacific Fair Shopping Centre.

Stage 2 commenced operations in December 2017, four months ahead of the Gold Coast Commonwealth Games held in April 2018. It extends 7.3 kilometres and links Parkwood and Helensvale to the Gold Coast Health and Knowledge Precinct, with three extra stations (Parkwood East, Parkwood and Helensvale), two park 'n' ride facilities and four new light rail vehicles. Connecting to the Gold Coast rail line at the Helensvale station, light rail provides a one-transfer journey between the Gold Coast and Brisbane.

Stage 3A is the proposed next stage of the system, extending 6.7 kilometres along the Gold Coast Highway from the existing Broadbeach South station to Burleigh Heads, with planning for eight new stations, five new light rail vehicles and an extension to the existing depot facility.

The route for Stage 3A connects to the existing Stage 1 alignment in the north and supports an increase in efficiency of use of the surrounding infrastructure and supportive bus network.

The light rail extension will deliver significant transport, economic and urban renewal opportunities. It will be critical to accommodate forecast growth in Gold Coast southern corridor and address increasing congestion along the city's three main north-south roads (i.e. the Gold Coast Highway, Southport-Burleigh Road and the M1).

[1] Discounted at 7 per cent.

The project will also contribute to mitigating the impacts of congestion on nationally significant transport corridors like the M1 from Southport to Burleigh Heads and Helensvale to Southport, which are both projected to be in the top 10 congested transport corridors within South East Queensland by 2031.

The light rail system on the Gold Coast has a proven record over four years of increasing public transport patronage, alleviating congestion and transforming the way the city develops through consolidated land use.

3 SERVICE NEED

The *Gold Coast City Transport Strategy 2031* identified that approximately 88 per cent of all trips made on the Gold Coast are by private vehicle, with less than five per cent by public transport. Poor public transport connectivity in the Gold Coast southern corridor between Broadbeach and Burleigh Heads is resulting in significant road congestion and poor journey reliability.

Car dependency in the corridor is placing pressure on the existing road network and there are practical constraints on the ability to significantly expand road network capacity. Private vehicle trips in the corridor are expected to increase by 20 per cent between 2016 and 2041.

The Gold Coast has a population of 576,000, which is expected to increase by 61 per cent to 928,000 by 2041.

The South East Queensland Regional Plan 2017 (*ShapingSEQ*) estimates the Gold Coast will require 158,600 new dwellings by 2041 to cater for forecast population growth. Current trend growth in the southern corridor, if unchanged, will fail to realise urban consolidation potential, increasing pressure to accommodate growth through less sustainable urban expansion.

The Gold Coast cannot accommodate the expected growth through urban expansion without encroachment on the region's natural resources and without significant investment in the provision of infrastructure and services over a large geographic area.

Despite the existence of employment areas, employment opportunities in the southern corridor are limited, or dispersed with poor connectivity, constraining the attractiveness of the corridor for urban consolidation.

To support the expected population growth in the Gold Coast region through to 2041, *ShapingSEQ* estimated an additional 180,000 jobs would need to be created. CoGC has identified the southern corridor presents a significant opportunity to accommodate future job growth in existing industrial and commercial employment locations and, in particular, in the vicinity of the Gold Coast Airport. *ShapingSEQ* identifies the Gold Coast Airport, Coolangatta and Tweed Heads as a Regional Economic Cluster.

Access to these regional employment opportunities will support market demand for dwellings in the southern corridor.

As growth continues, there will be greater demand on transport infrastructure where there is limited urban space to increase the road network. Without investment in more sustainable transport options, congestion will cost the Gold Coast in lost productivity. Error! Reference source not found. outlines the problems to be addressed in the business case.

Table 1 Problems to be addressed

IDENTIFIED PROBLEMS	PROBLEM STATEMENT
URBAN GROWTH/LAND USE	
Inadequate urban growth in the southern corridor	Current trend growth in the southern corridor, if unchanged, will fail to realise urban consolidation potential, increasing pressure to accommodate growth through less sustainable urban expansion.
ECONOMIC DEVELOPMENT	
Limited or poorly connected employment and economic activity	Employment opportunities in the southern corridor are limited, or are dispersed with poor connectivity, constraining the attractiveness of the southern corridor for urban consolidation.
TRANSPORT NETWORK	
Car dependency trend	The car dependency of current transport mode share trends in the southern corridor places high pressure on the existing road network and will not support the liveability and economic attractiveness of the southern corridor necessary to deliver urban consolidation and renewal objectives.
Limited ability to expand road network	The southern corridor has a limited number of major road transport corridors, each with a limited transport or expansion capacity.
Current public transport cannot facilitate urban renewal	Existing bus services in the southern corridor do not have the level of transport accessibility, reliability or appeal necessary to drive a significant change in mode shift or enable a major shift in market behaviour to urban consolidation and renewal.

4 OPTIONS ASSESSMENT

A comprehensive options assessment was undertaken for the detailed business case including qualitative and quantitative multi-criteria assessment analysis, transport modelling and economic assessment.

The qualitative assessment considered a broad range of potential infrastructure and non-infrastructure solutions to address the service need in the Gold Coast southern corridor. The two project options progressed through to detailed business case were:

- light rail from Broadbeach to Burleigh Heads (the Stage 3A corridor)
- bus network upgrades in the Stage 3A corridor.

The options assessment confirmed that light rail from Broadbeach to Burleigh Heads was the best performing option across the qualitative, quantitative and economic assessments criteria and would promote the public transport uplift, urban renewal and land use change required to support a growing population.

5 BASE CASE

The base case represented a business-as-usual approach to planning and transport infrastructure provision in the Stage 3A corridor. It reflected the current view of the population, employment and dwellings growth in the corridor in the absence of the project.

The population and employment numbers were based on the Queensland Government Statistician's Office 2015 population projections, rebased to the 2016 Australian Census data and reflecting the expected growth

rate from *ShapingSEQ*. The market-based assessment was completed to identify the likely property market take-up of development entitlements under the CoGC existing planning controls in the Stage 3A corridor.

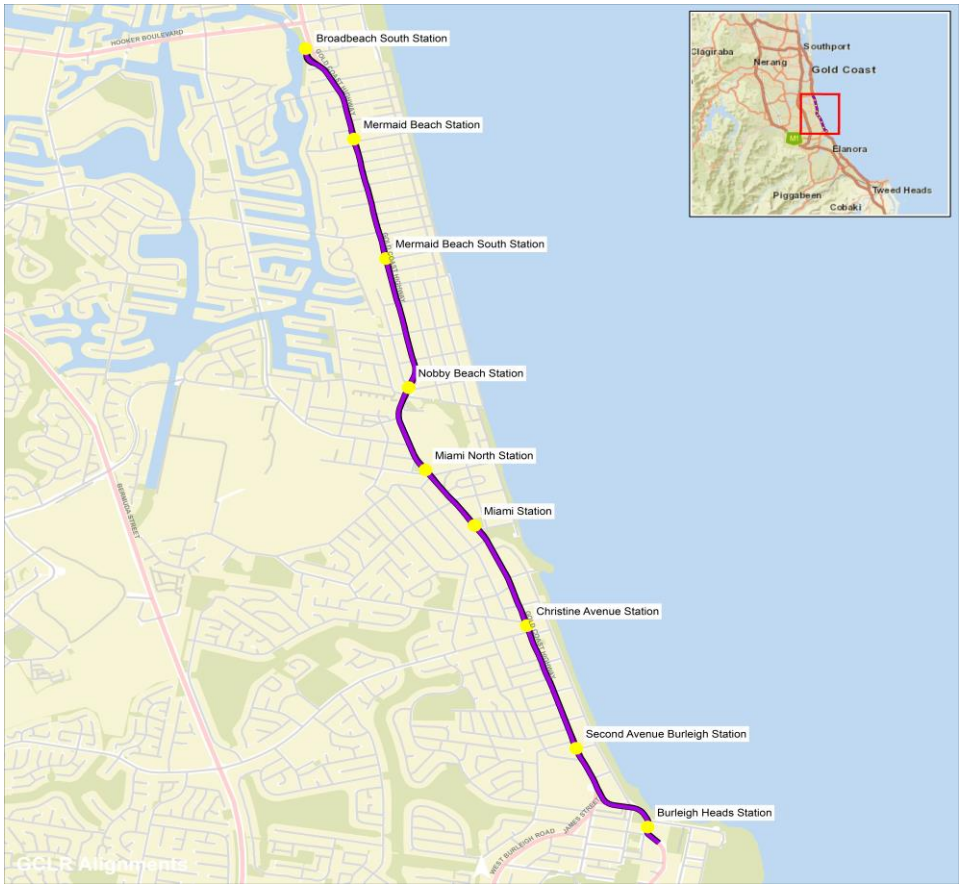
6 REFERENCE PROJECT

The key design features of the reference project included:

- a 6.7-kilometre alignment from Broadbeach South station to Burleigh Heads via the Gold Coast Highway
- northern interface with Stage 1 at the Broadbeach South station
- southern termination south of the intersection of the Gold Coast Highway and Goodwin Terrace, Burleigh Heads
- dual track in the centre of the Gold Coast Highway
- eight light rail stations
- five additional light rail vehicles
- provision for stabling of two light rail vehicles at Broadbeach South station
- an approximate journey time of 16-17 minutes.

Figure 1 illustrates the alignment of the reference project.

Figure 1: Reference project alignment



7 METHODOLOGY

An economic analysis was undertaken using a cost benefit analysis framework that applied discounted cash flow techniques in accordance with the Department of Transport and Main Roads, Building Queensland and Queensland Treasury guidelines. The approach was developed with reference to relevant state, national and international guidelines as outlined in Table 2.

Table 2 Summary of guidelines by benefits category

CATEGORY	QUEENSLAND/STATE GOVERNMENT	COMMONWEALTH/INFRASTRUCTURE AUSTRALIA	INTERNATIONAL GUIDELINES
Overall appraisal framework	Department of Transport and Main Roads (2011) – Cost Benefit Analysis Manual Building Queensland (2016) – Cost Benefit Analysis Guide	ATAP (2016) T2 Infrastructure Australia (2018) – Assessment Framework	
Transport benefits	Department of Transport and Main Roads (2011) – Cost Benefit Analysis Guide Building Queensland (2016) – Cost Benefit Analysis Guide Transport for NSW (2018) Economic Guidelines	ATAP (2016) PV2 ATAP (2018) M1 Austroads (2012) Austroads (2010) Infrastructure Australia (2018) – Assessment Framework	
Wider economic benefits	Building Queensland (2016) – Cost Benefit Analysis Guide	ATAP Guidelines, Measuring WEBs in Australian Cities Discussion Paper (June 2017)	UK Department for Transport (DfT) (2018), Transport Analysis Guidance – WebTAG
Land use benefits		Infrastructure Australia (2018) – Assessment Framework	UK DfT (2018), Transport Analysis Guidance – WebTAG

The cost benefit analysis assessed the benefits and costs of the reference project to evaluate whether incremental benefits exceeded the incremental costs of achieving them. The key measures of economic performance presented in the economic appraisal were the net present value (NPV) of cost and benefits, and benefit cost ratio (BCR).

8 DEMAND FORECASTS

The Gold Coast Light Rail Stage 3A project is presented as an integrated transport and land use project and is expected to drive a significant change in the land use surrounding the Gold Coast Southern Urban Corridor. The Gold Coast City Council have a stated intent to prevent the spread of urban sprawl and create the right conditions to promote urban densification around key amenity nodes.

This includes increasing the population across the Gold Coast Southern Urban Corridor. To achieve these aims, it is necessary to have a public transit system which is able to cope with higher usage and which is seen as a catalyst for growth in the region. Light rail systems have been shown to be this catalyst, with examples including Sydney Light Rail Inner West Stages 2 and 3, and Gold Coast Light Rail Stage 1.

9 COST BENEFIT ANALYSIS RESULTS

By addressing congestion and urban growth issues in the Gold Coast southern corridor, the Gold Coast Light Rail Stage 3A project will deliver considerable benefits and social value including:

- improved connectivity to employment opportunities, commercial and retail outlets and social services
- improved access to businesses for customers
- improved pedestrian and cyclist safety
- enhanced mode sharing and encouragement of active travel options
- enhanced convenience and transport experience for visitors and residents
- potential increase in property values
- protection of regional greenspace by concentrating development in the serviced area.

Table 3 Cost benefit analysis

COST BENEFIT ANALYSIS RESULTS	PRESENT VALUE ($MILLION, ROUNDED)	
	First round	Second round
List of monetised benefits		
(a) Transport benefits	724	1,353
(b) Urban renewal benefits	-	599
(c) Wider economic benefits (WEBs)	241	539
TOTAL monetised benefits	965	2,490
Capital costs P90	536	536
Operating and maintenance costs	132	132
TOTAL costs	668	668
NPV (without WEBs and urban renewal benefits)	56	685
BCR (without WEBs and urban renewal benefits)	1.1	2.0

Table 4 Evaluation parameter for economic appraisal

ASSUMPTION	PARAMETER	SOURCE AND COMMENT
Real discount rate	7% (real), with 4% and 10% sensitivity tests	Infrastructure Australia Guidelines (2018) and Building Queensland (2016)
Base price year	FY2018/19	Parameters designated in prices prior to the base price year are inflated to FY2018/19 dollars
Construction period	Jul-2019 to Oct-2023 including: ▪ Client incurred works: Jul-2019 to Oct-2023 ▪ Contractor Works: Feb-2020 to Apr-2023 ▪ Practical Completion: Apr-2023	Fission (2018)
Asset life	▪ Earthworks – 125 years ▪ Drainage – 120 years ▪ Light rail vehicles – 35 years ▪ Rail systems – 20 years ▪ Transport stations and interchanges – 50 years ▪ Track work – 100 years ▪ Buses – 20 years ▪ Land around stations – infinite	ATAP M1 (2018) and ATC (2006)
Ramp-up of benefits	Three years, based on historical take-up for Gold Coast Light Rail Stage 1	Based on data provided by TransLink (2017) which examined the ramp up from Gold Coast Light Rail Stage 1
Appraisal period	30 years from the commencement of operations on the Stage 3A system, beginning 1/05/2023 and ending 30/04/2053, for a total appraisal period of 35 years	Department of Transport and Main Roads (2011) and Infrastructure Australia (2018)
Annualisation factor	The Gold Coast Light Rail model provides outputs for an average weekday over a 24-hour period. These were scaled to annual values using an average annualisation factor of 324 across the network.	Based on existing annualisation of current bus routes and an assessment of the induced trips and their purpose as a result of Gold Coast Light Rail Stage 3A
Interpolation and extrapolation	Compound annual growth rates applied for interpolation between modelled years. Extrapolation of demand beyond 2041 based on CAGR of previous modelled period and capped at 1.9% based on population growth in the Gold Coast local government area from *ShapingSEQ*.	ATAP T2 (2016) and UK DfT (2018)
Residual value	A straight line depreciation methodology is used to determine the residual value of capital assets at the end of the appraisal period.	Department of Transport and Main Roads (2011)

10 SENSITIVITY ANALYSIS

Sensitivity analysis identifies key economic risks within the conducted analysis. It examines how much the results deviate consequently from changes in proposal driver/s, or combinations of drivers.

The sensitivity analysis for the project is summarised below.

Table 5 Sensitivity analysis

Sensitivity	First round transport		Second round transport		Total (with WEBs and UR)	
	NPV	BCR	NPV	BCR	NPV	BCR
Core	**56**	**1.1**	**685**	**2**	**1,822**	**3.7**
Discount Rate						
1. 4% Discount Rate	424	1.5	1,657	3.1	3,376	5.3
2. 10% Discount Rate	-123	0.8	218	1.4	1,035	2.8
Costs and benefits						
3. P50 Costs	83	1.1	712	2.1	1,850	3.9
4. Costs +20%	-78	0.9	551	1.7	1,688	3.1
5. Costs -20%	190	1.4	818	2.5	1,956	4.7
6. Benefits +20%	201	1.3	955	2.4	2,320	4.5
7. Benefits -20%	-89	0.9	414	1.6	1,324	3.0
Economic benefits and parameters						
8. No ramp up	72	1.1	703	2.1	1,849	3.8
9. Slower ramp up	46	1.1	673	2.0	1,807	3.7
10. Annualisation factor	42	1.1	677	2.0	1,814	3.7
11. Value of time	34	1.1	650	2.0	1,786	3.7
12. Vehicle occupancy rate	93	1.1	761	2.1	1,902	3.8
13. Extrapolation (benefit growth capped in 2041)	42	1.1	626	1.9	1,744	3.6
14. Extrapolation (no cap on benefit growth)	84	1.1	942	2.4	2,250	4.4
15. Approach to public transport user benefits	50	1.1	644	2.0	1,781	3.7

11 WIDER ECONOMIC IMPACTS

The wider economic impacts achieved from reducing transport costs and travel times include:

- agglomeration benefits from improved accessibility
- output change in imperfectly competitive markets increasing competition between businesses
- increased labour supply

The wider economic impacts achieved from land use intervention include:

- improved land value
- avoidable costs
- environmental and sustainability benefits.

12 SOCIAL IMPACTS

By addressing congestion and urban growth issues in the Gold Coast southern corridor, this project will deliver considerable social value including:

- improved connectivity to employment opportunities, commercial and retail outlets and social services
- improved access to businesses for customers
- improved pedestrian and cyclist safety
- enhanced mode sharing and encouragement of active travel options
- enhanced convenience and transport experience for visitors and residents
- potential increase in property values
- protection of regional greenspace by concentrating development in the serviced area.

13 PROJECT IMPLEMENTATION

The preferred delivery model was determined following an assessment process. Selection of the preferred delivery option preceded an assessment of possible packaging opportunities for the works and contracting options.