

6. Longlist option development and shortlisting

This chapter documents the process of option generation and shortlisting is illustrated in Figure 6-1. Each step of the process is explained in detail within this chapter.



Figure 6-1: Option generation and shortlisting process

6.1 Corridor alignment options.

The first step in option generation involved identifying and assessing the most feasible and viable corridor alignment(s) within each corridor segment between Boyd Street in Tugun and the NSW/QLD border in Coolangatta. This involved identifying potential corridors and understanding the impacts and opportunities created by the Light Rail transport (LRT) within that corridor.

The LRT alignment north of Boyd Street, Tugun is based on the corridor planning from the earlier Gold Coast Highway (Burleigh Heads to Tugun) Multi Modal Corridor Study. The development and assessment of corridor options south of Boyd Street were undertaken on a section-by-section basis. The key requirement of this study (as identified in the corridor-wide vision) is that LRT must serve the airport precinct, therefore all options within the Airport section are aligned to travel to the airport. Refer to Figure 6-2 for an overview of all corridor options identified.

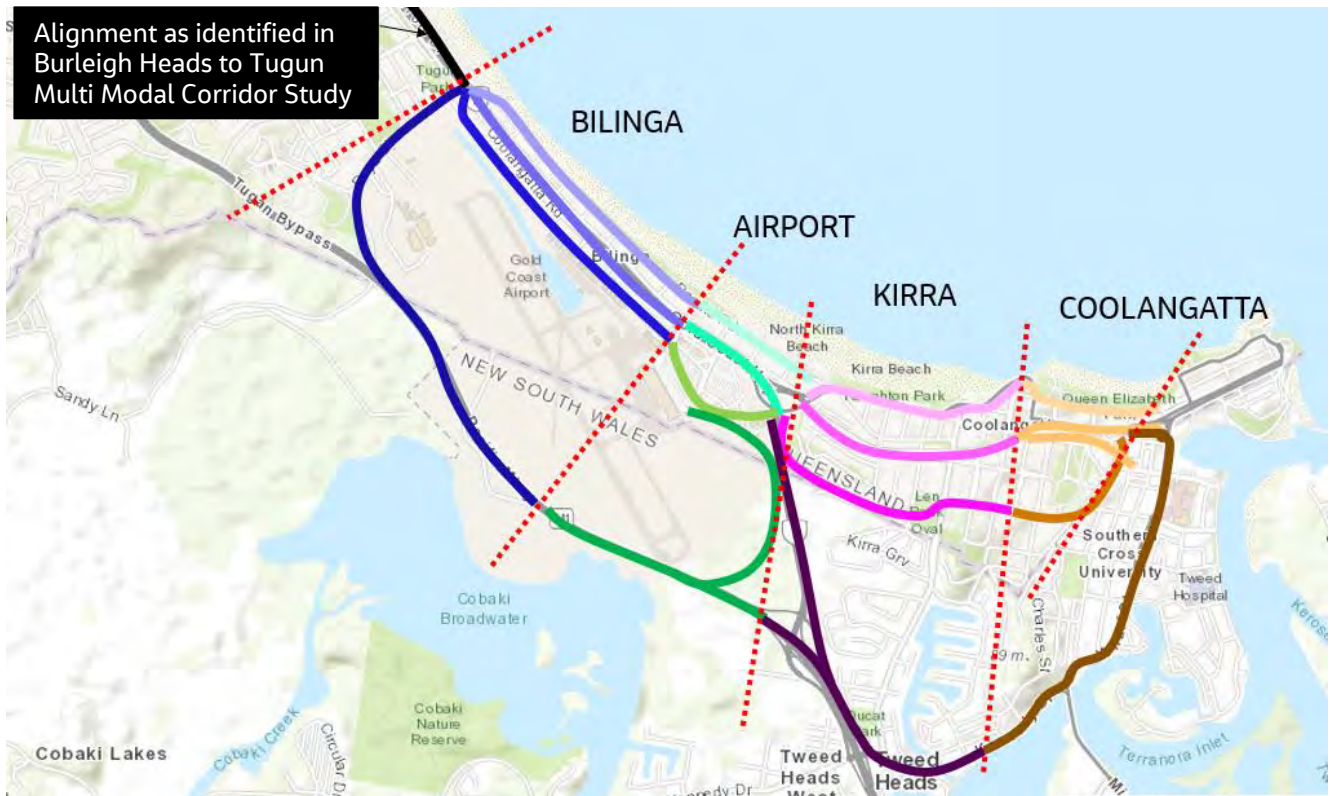


Figure 6-2: Corridor options identified and assessed (Tugun to Coolangatta)

6.1.1 Bilonga

The corridors analysed within Bilonga (between Boyd Street and Terminal Drive) include:

- East of Gold Coast Highway
- Gold Coast Highway (including Coolangatta Road / Golden Four Drive)
- West of Gold Coast Highway (Adina Avenue / Eastern Avenue)
- Pacific Motorway (M1)

The results of the high-level assessment are summarised in Table 6-1. Overall, the Gold Coast Highway corridor was selected as the only viable option to be taken forward.

Table 6-1: High level assessment of Bilonga corridor options

Options	Decision	High level assessment
East of Gold Coast Highway	DO NOT PROCEED	This corridor was not taken forward because the corridor has insufficient width (10 to 20m), is not a continuous road corridor, is exposed to extreme weather events and is not resilient.
Gold Coast Highway (including Coolangatta Road / Golden Four Drive)	PROCEED	This corridor was selected as it is very wide (up to 110m in some places), is the already established transport corridor in this location, including public transport and active transport links and can serve higher speeds that allows for better Light Rail rapid transit.
West of Gold Coast Highway (Adina Avenue / Eastern Avenue)	DO NOT PROCEED	This corridor was not taken forward as the corridor width is insufficient (10m) is lower speed which does not allow for a higher speed Light Rail rapid transport.

Options	Decision	High level assessment
Pacific Motorway (M1)	DO NOT PROCEED	The M1 corridor was not taken forward as it is located too far west (2km from land uses in Bilinga) and conflicts with the corridor already allocated for future heavy rail.

6.1.2 Airport

The corridors analysed within Airport (between Terminal Drive and Musgrave Street) include:

- East of Gold Coast Highway (Pacific Parade)
- Gold Coast Highway (including Coolangatta Road / Golden Four Drive)
- West of Gold Coast Highway (east of Airport terminal)
- Pacific Motorway (M1)

The results of the high-level assessment are summarised in Table 6-2. The Gold Coast Highway and west of Gold Coast Highway corridors were selected, as documented below.

Table 6-2: High level assessment of Airport corridor options

Options	Decision	High level assessment
East of Gold Coast Highway	DO NOT PROCEED	This corridor was not taken forward because the corridor has insufficient width (10 to 20m), is not continuous road corridor, is exposed to extreme weather events and is not resilient. Furthermore, this corridor means the LRT alignment would essentially bypass the airport, inconsistent with a key project requirement
Gold Coast Highway (including Coolangatta Road / Golden Four Drive)	PROCEED	This corridor was selected as it is very wide (up to 110m in some places), is the already established transport corridor including public transport and active transport links and can serve higher speeds that allows for better Light Rail rapid transit.
West of Gold Coast Highway (east of airport terminal)	PROCEED	This corridor was selected as it creates a direct connection to the airport terminal and surrounding land uses. It also takes advantage of the airport extension as identified in the Airport Master Plan and aligns with the proposed Light Rail alignment.
Pacific Motorway (M1)	DO NOT PROCEED	The M1 corridor was not taken forward as it is located at a significant distance west of the airport (1km from airport), creating a longer LRT distance to travel in/from airport. This corridor is also allocated for future heavy rail.

6.1.3 Kirra

The corridors analysed within Kirra (between Musgrave Street and Miles Street) include:

- Musgrave Street / Marine Parade
- Coolangatta Road
- Binya Avenue / Stapylton Street
- Pacific Motorway (M1)

The results of the high-level assessment are summarised in Table 6-3. The Musgrave Street/Marine Parade and Coolangatta Road Light Rail corridor options were chosen based on their proximity to major land uses.

Table 6-3: High level assessment of Kirra corridor options

Options	Decision	High level assessment
Musgrave Street / Marine Parade	PROCEED	This corridor was taken forward as it is in close proximity to the major land uses including retail facilities and the beach and although it has a carriageway width ranging from 10m to 18m, there is potential to increase available space utilising open space land along the foreshore.
Coolangatta Road	PROCEED	This corridor was taken forward as it is in close proximity to the land uses, is a key distributor road and is a continuous road corridor.
Binya Avenue / Stapylton Street	DO NOT PROCEED	This corridor was not taken forward because the corridor is not continuous, requires crossing of Miles Street and is located approximately 700m (significant walking distance) from the major land uses within Kirra.
Pacific Motorway (M1)	DO NOT PROCEED	The M1 corridor was not taken forward as it is located at a significant distance to the west (2km from the Kirra beach and the airport options). The M1 corridor is also already allocated for future heavy rail.

6.1.4 Coolangatta

The corridors analysed in Coolangatta (between Miles Street and the NSW/QLD border) includes:

- Marine Parade
- Griffith Street
- Chalk Street or Lanham Street / Gerrard Street
- Tweed Street / Jarvis Lane / Chalk Street
- Stapylton Street / Dixon Street
- Kennedy Drive / Wharf Street

The results of the high-level assessment are summarised in Table 6-4. The Marine Parade, Griffith Street and Chalk Street / Lanham Street / Gerrard Street Light Rail corridor options were chosen based on their proximity to major land uses.

Table 6-4: High level assessment of Coolangatta corridor options

Options	Decision	High level assessment
Marine Parade	PROCEED	This corridor was taken forward as it is in close proximity to the major land uses including retail facilities and the beach and also has a carriageway width of 20m.
Griffith Street	PROCEED	This corridor was taken forward as it is located in close proximity to the Griffith Street land uses and walking distance from the beach via a number of direct pedestrian corridors.
Chalk Street / Lanham Street / Gerrard Street	PROCEED	This corridor was taken forward as it is a direct LRT alignment in close proximity to the Griffith Street land uses and beach.
Tweed Street / Jarvis Lane / Chalk Street	DO NOT PROCEED	This corridor was not taken forward as it creates an indirect transport connection, requiring the LRT to take several turns through Coolangatta Road via narrow road corridors.
Stapylton Street / Dixon Street	DO NOT PROCEED	This corridor was not taken forward as it creates an indirect transport connection via local roads that serve a lower speed than

Options	Decision	High level assessment
		does not create a suitable environment for a high-speed Light Rail transport. In addition, it is located a significant distance from the major land uses approximately 700m from the beach.
Kennedy Drive / Wharf Street	DO NOT PROCEED	This corridor was not taken forward due to the significant distance between the alignment and the Coolangatta land uses (2km), catering for the Tweed Heads catchment.

6.1.5 Preferred corridor options

The corridor options for each section that were taken forward into the alignment long list process are illustrated in Figure 6-3.

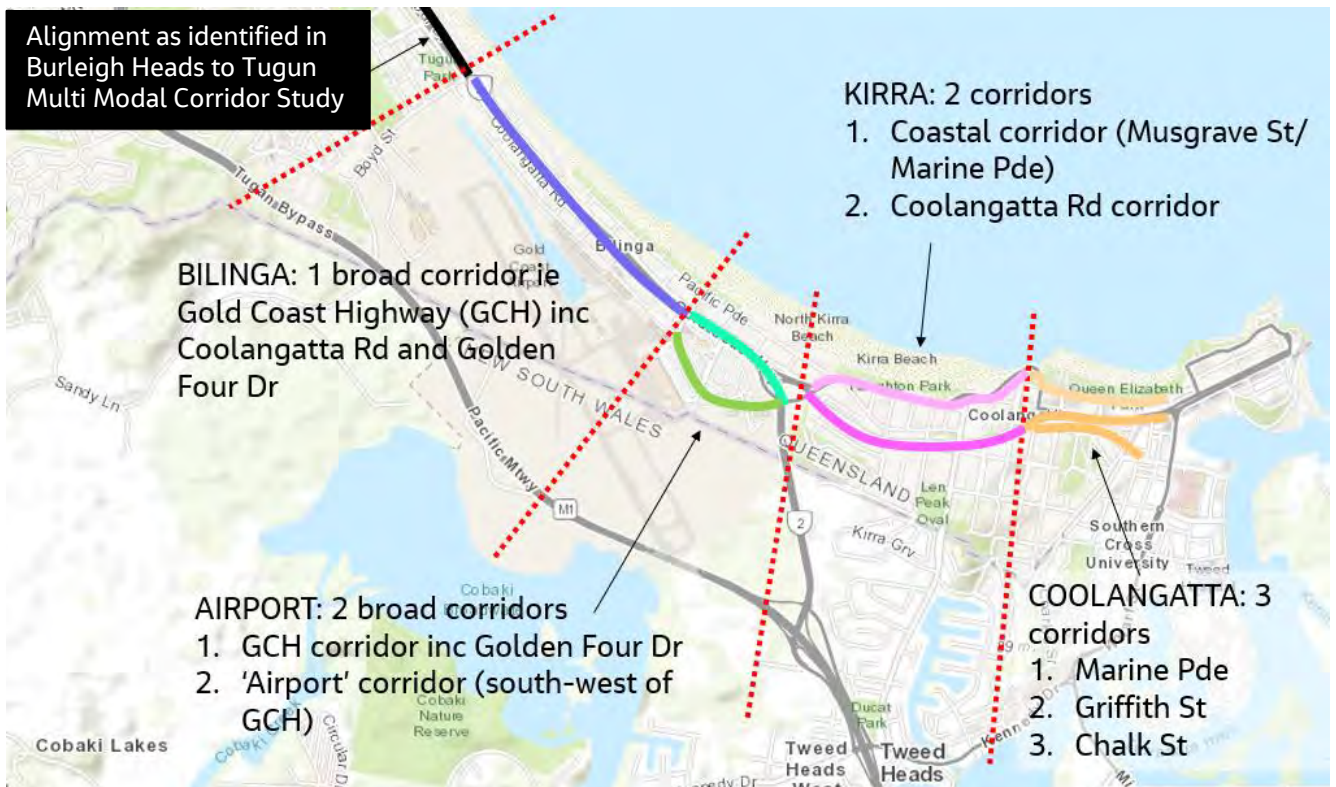


Figure 6-3: Preferred corridor alignment options

6.2 Station investigation areas

The process of developing the station location investigation areas included:

- Determination of the “key anchors” (non- negotiable station locations)
- Investigation and confirmation of benchmarked station spacing philosophy
- Identification of catchment areas and local area issues.

6.2.1 Key anchor stations

Refer to Figure 6-4 for an illustration of the key anchor stations identified for this study area. The key anchor stations include:

- Tugun station at Boyd Street – as confirmed through the previous Burleigh Heads to Tugun MMCS. This station is in proximity to a Knowledge and Technology precinct (John Flynn Hospital) as identified in the SEQ Regional Plan (ShapingSEQ).
- Airport – identified in the SEQ Regional Plan (ShapingSEQ) as another Knowledge and Technology precinct. It is also identified as a required stop in the corridor-wide vision “Light Rail stations served by frequent, reliable Glink services will knit together and form a focal point for key precincts, villages and centres (including the airport precinct)” and
- Coolangatta – identified as a “Major Regional Activity Centre” (Shaping SEQ, 2017)

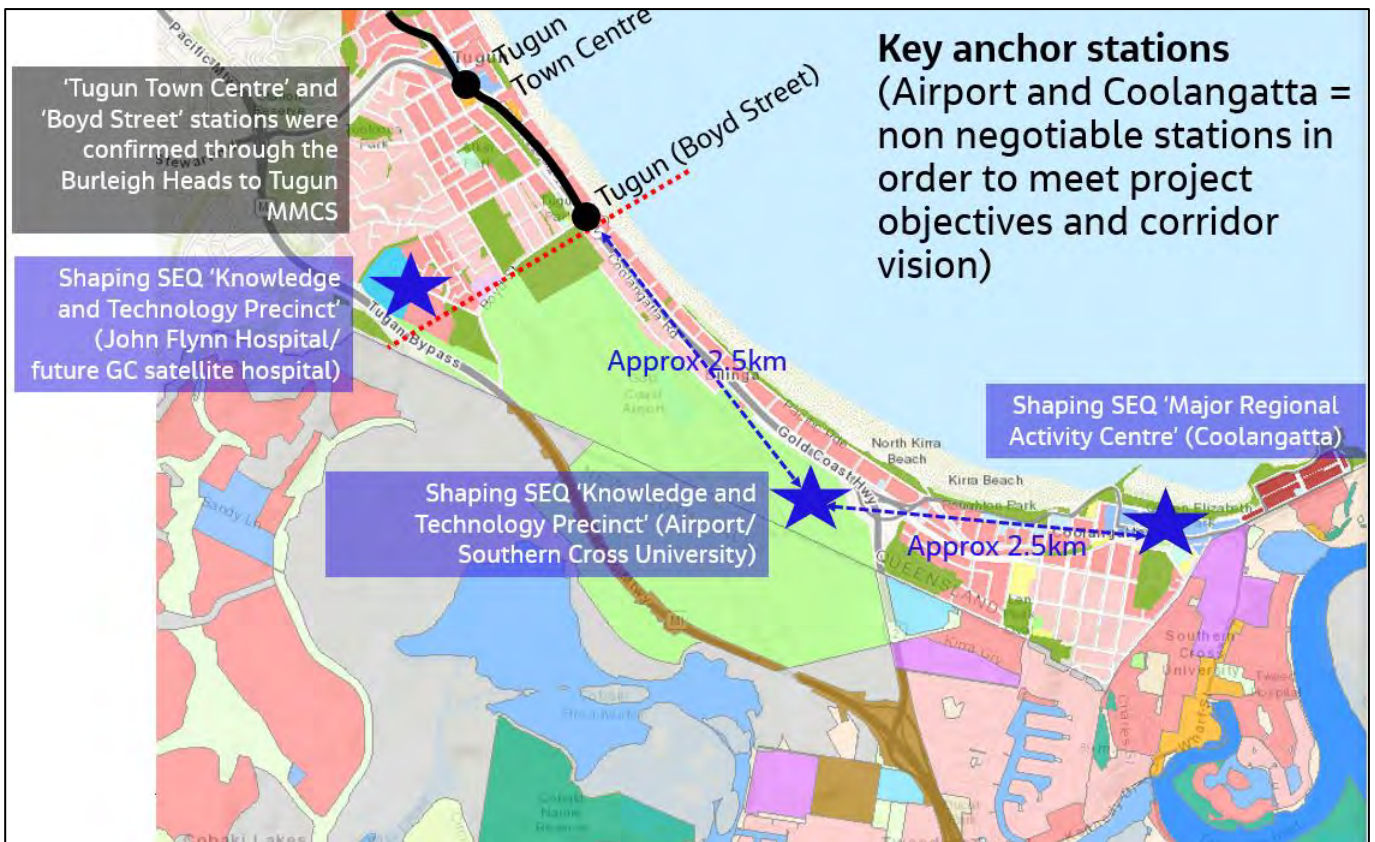


Figure 6-4: Key anchor stations

6.2.2 Station spacing philosophy

Station investigation zones were based on the key trip generators and attractors within each corridor segment and adopted the same methodology used for the Burleigh Heads to Tugun Multi-Modal Study (BH2T MMCS). That is, that Light Rail stations tend to best balance walk up access and rapid transit function where spacing, on average, is around every 800m. This 800m spacing appears to offer an effective balance between speed and accessibility, consistent with the constructed or planned urban segments of the overall GCLR and consistent with typical practice around the world. Table 6-7 documents this high-level assessment.

This spacing enables all currently well used bus stops and their catchments to be served by LRT either through direct replacement in a substantially similar location or through the amalgamation of 2-3 bus stop pairs into a single, centrally placed LRT station with a minor increase in walk distance.

It should be noted that the recommended 800m spacing is an average value and will need to vary along the corridor to enable each station to be in an optimum location. For example, stations may be located closer in key activity areas to cater for denser catchments and where trip ends (destination) are more tightly packed, while wider spacing may be more appropriate in lower density catchment areas.

Table 6-5: Assessment of station spacing options (process sourced from GCH MMCS)

Station spacing	Pros	Cons
Wide (approx. 2-3km+ capturing only the highest order "district centre" trip generators)	Typical of station spacing for heavy rail or express bus operations (as well as GCLR stage 2) it provides the fastest journey times	Does not meet the identified high priority functional requirement of maintaining good access for local catchments in this urbanised area. Not typical of stop spacing for urban LRT systems around the world and inconsistent with stages 1 and 3 (i.e., the urban coastal sections).
Close (approx. every 400m aligning largely with existing bus stop pairs)	Provides high level of accessibility especially for relatively consistent levels of density along a built-up arterial road corridor. Typical of frequent all stops urban bus services in Australasia	For long routes, journey times become uncompetitive with car and likely to be even longer than all stops bus route (700) it replaces as buses only stop on request, not at every stop. Generally, this stop spacing is less than most modern LRT systems (other than in CBD areas) and is lower than the GCLR stage 3 spacing.
Medium (approx. every 800m through built up parts of the corridors with stops more widely spaced elsewhere)	Meets the identified high and medium priority functional requirement identified above including good accessibility while maintaining reasonable journey times. Stop spacings in the order of 800m are common for modern LRT systems around the world	Will not provide as fast a journey time as the widely spaced option. Minor reduction in accessibility compared to the closely spaced option. Creates concerns for accessibility for people with mobility issues who would seek to rely on public transport - potential reduction in customer base results.

6.2.3 Catchment areas and local area trip attractors and generators

The wider network connections and other potential attractors along the corridor are detailed in Table 6-6. The table summarises the local trip attractors and generators within each section that were considered in choosing appropriate station investigation areas.

Table 6-6: Local trip generators and attractors

Section	Local trip generators and attractors
Bilinga	<ul style="list-style-type: none"> ▪ Prominent land uses within the vicinity of the Bilinga section include: ▪ Bilinga Beach ▪ the Bilinga Surf Lifesaving Club ▪ John Flynn Private Hospital.
Airport	<ul style="list-style-type: none"> ▪ The station at airport is to be developed as a regionally significant multi-modal passenger transport hub serving the airport/ university/ North Kirra precinct accommodating Light Rail transport, local public buses and future heavy rail. ▪ Other land uses located in the Airport section include Southern Cross University, tourist accommodation, retail (fronting the Gold Coast Highway) and aviation related businesses. ▪ Development of the airport land is subject to the Gold Coast Airport Master Plan and subsequent Major Development Plan process.
Kirra	<p>Prominent land uses within the vicinity of the Kirra section include:</p> <p>Kirra Beach</p> <ul style="list-style-type: none"> ▪ The Kirra Beach Surf Club ▪ The Kirra Beach Hotel (redevelopment) ▪ Coolangatta State School ▪ Kirra Beach Tourist Park ▪ Kirra Hill Lookout ▪ Aged care facilities – Kirrahaven Residential Care Centre, Blue Care Kirra Aged Care Facility, Kirra Beach Care Community and Kirra Haven Residential Care Centre.
Coolangatta	<p>Coolangatta is a major regional activity centre and the prominent attractors located in this section include:</p> <ul style="list-style-type: none"> ▪ Coolangatta Beach ▪ The Coolangatta Hotel ▪ Coolangatta Surf Club ▪ TAFE Queensland Coolangatta Campus ▪ Griffith Street – shop and retail properties ▪ The Strand ▪ Twin Towns Services Club (inc conference and event facility) ▪ Tweed Heads Public School

6.2.4 Recommended station investigation areas

Based on understanding of the key anchor stations, then reviewing the specific land uses located within each section, preferred station areas were taken forward as illustrated in Figure 6-5. In the section between Tugun and the Airport this analysis recommends wider station spacing than the 800m average discussed earlier (i.e., around 1,100m), due the narrow and limited catchment area being limited by the Ocean and the Airport and the LRT needing to provide a rapid transit connection. Between the Airport and Coolangatta, this analysis recommends a slightly closer station spacing than the 800m average discussed earlier (i.e., around 750m), due to a significantly greater extent of and potential density of catchment area. Overall, a five-station strategy as recommended here would result in an average station spacing of between 900-950m. The specific station locations within these general areas will be assessed at a finer level of detail on a section-by-section basis in the following sections.



Figure 6-5: Station investigation areas taken forward

6.3 Longlist options

Once a preferred corridor was determined for each section, and key station investigation areas were locked down, basic corridor option concepts (alignment and cross sections) were developed using CAD and Streetmix respectively. Key alignment features and cross section arrangement were identified, with consideration for the issues and opportunities for each option that require further investigation during the shortlisting if the option is preferred. A preliminary long list of options was developed for presentation at the TWG Workshop 2 held on 20 May 2021. Similar to Workshop 1, MURAL was used to record feedback on each option and to gain an understanding of how key stakeholders would assess each option. Feedback from that workshop was used to finalise the long list before evaluation.

6.3.1 Bilinga

Key inputs to the development of a longlist of options in Bilinga included:

- The transport requirements identified in Section 5.3
- LRT alignment options only within the preferred corridor of Gold Coast Highway (including Golden Four Drive and Coolangatta Rd) as discussed in Section 6.1
- A single station investigation area in the vicinity of George Street resulting in a 1.0 to 1.3km station spacing to the north and 1.0 to 1.2km to the south

Figure 6-6 and Table 6-7 summarises the long list of broad alignment options developed for Bilinga that sit within the preferred Gold Coast Highway corridor.



Figure 6-6: Bilinga long list of alignment options and station locations

Table 6-7: Bilinga long list of alignment options overview

Option	Key features (high level), issues and opportunities
B1 (east of Gold Coast Highway)	<ul style="list-style-type: none"> Sits in between Golden Four Drive (two lane distributor road, 50 km/h) and Gold Coast Highway (typically four lane arterial road, 80 km/h) <p>Issues and Opportunities:</p> <ul style="list-style-type: none"> May require localised 'shifting' of southbound Gold Coast Highway at LRT stops/ bus stops/ intersections Connections between Gold Coast Highway and Golden Four Drive to be controlled/ rationalised Form of cycle facility on Golden Four Drive to be determined (cycle lanes vs protected one-way vs off road two way) Extent of on road parking on western side of Golden Four Drive to be determined <p>Refer to Figure 6-7 for an indicative cross section.</p>
B2 (centre of Gold Coast Highway)	<ul style="list-style-type: none"> Within median of Gold Coast Highway (typically four lane arterial road, 80 km/h) Cycle facility relocated from Gold Coast Highway onto Golden Four Drive (in line with TMR cycle policy to avoid 80km/h road environment) Will require localised 'shifting' of carriageways at intersections and LRT <p>Issues and Opportunities:</p> <ul style="list-style-type: none"> All cross-corridor movements (including right turns) need to be signal controlled Additional pedestrian crossings will be required at stations <p>Refer to Figure 6-8 for an indicative cross section.</p>
B3 (west of Gold Coast Highway)	<ul style="list-style-type: none"> Sits in between Coolangatta Road (two lane distributor Road, 50 km/h) and Gold Coast Highway (typically four lane arterial road, 80 km/h) <p>Issues and Opportunities:</p> <ul style="list-style-type: none"> Connections between Gold Coast Highway and Coolangatta Road to be signal controlled and some movements may need to be rationalised/ relocated

Option	Key features (high level), issues and opportunities
	<ul style="list-style-type: none"> Form of cycle facility on Coolangatta Road to be determined (cycle lanes not currently continuous) Extent of on road parking on eastern side of Coolangatta Road to be determined. <p>Refer to Figure 6-9 for an indicative cross section.</p>

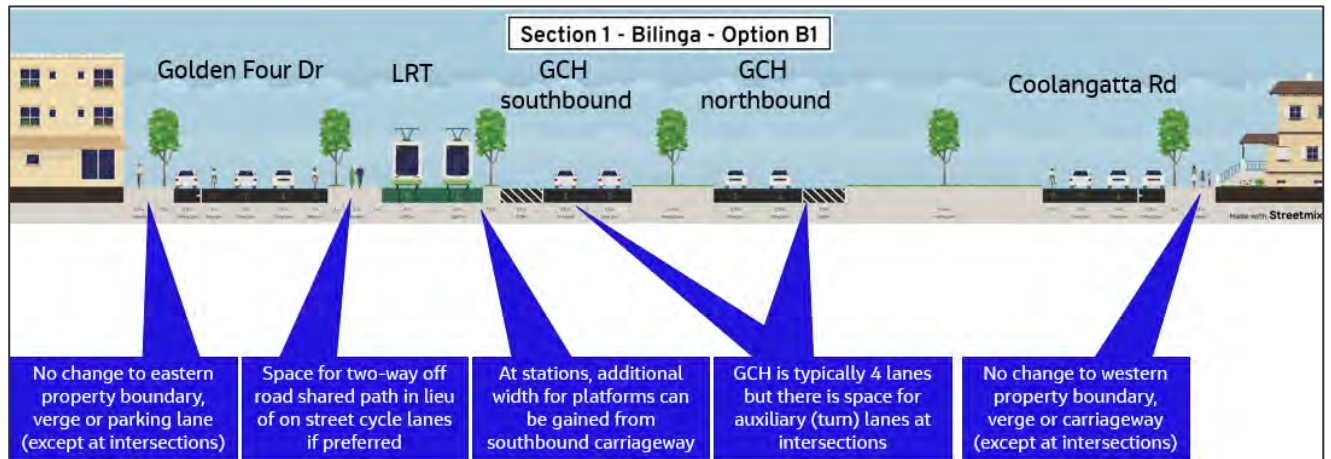


Figure 6-7: Alignment B1 proposed cross section (looking south)

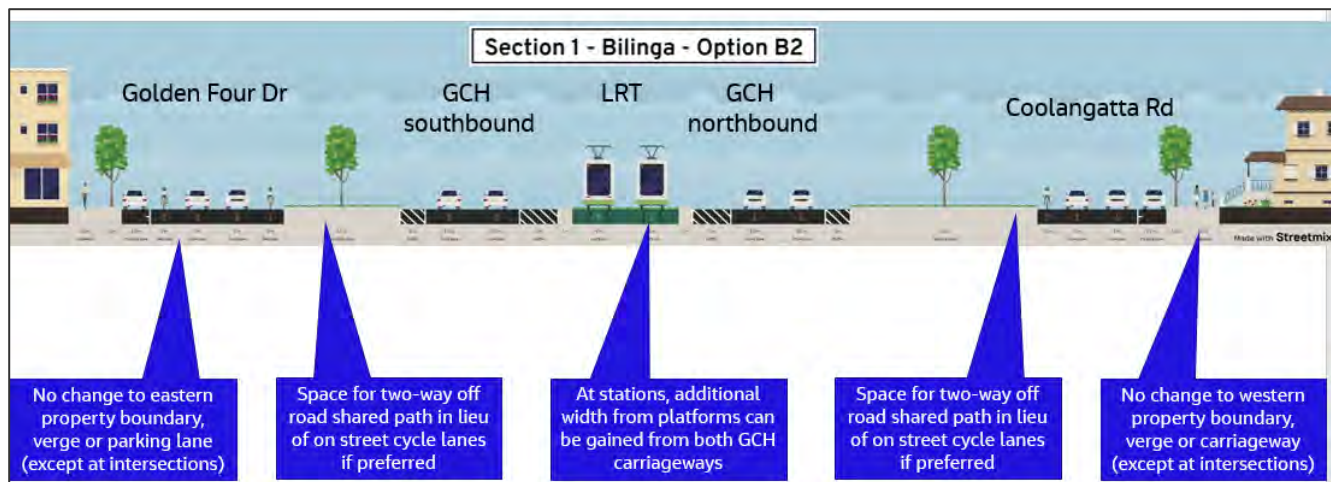


Figure 6-8: Alignment B2 proposed cross section (looking south)

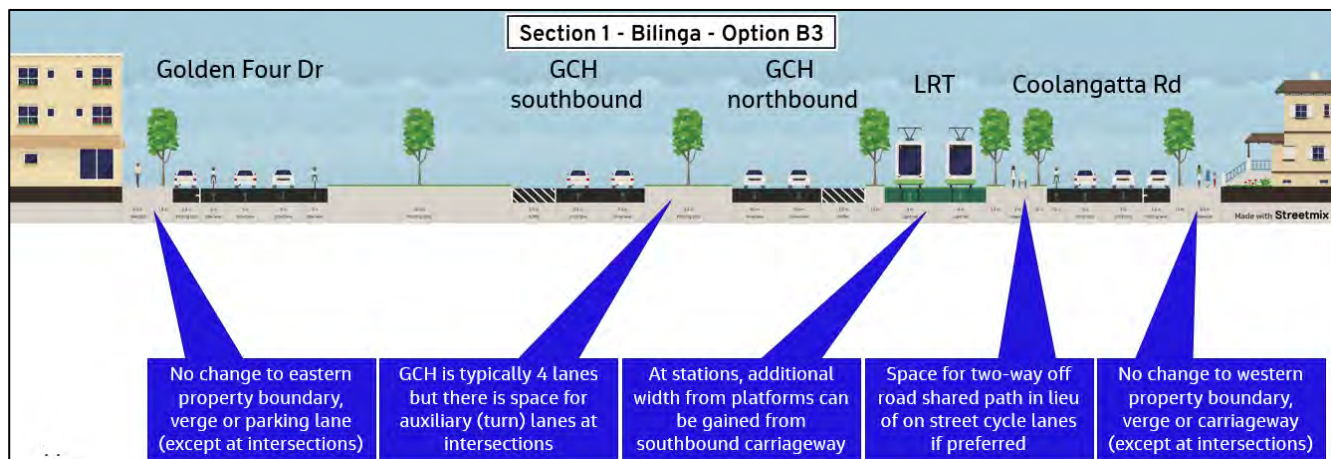


Figure 6-9:Alignment B3 proposed cross section (looking south)

6.3.2 Airport

Key inputs to the development of a longlist of options in the Airport included:

- The transport requirements identified in Section 5.3
- LRT alignment options only within the reduced airport zone notably south and west of the Gold Coast Highway
- A single station investigation area within the airport precinct to align with the emerging precinct planning by Queensland Airport Limited, to best serve the airport/ university/ future multi-modal interchange and other surrounding land uses.

The process of developing the long list of LRT alignment options, however, also involved the identification and combination of three different option components:

- Alignment options for Airport North (AN) - north of the terminal between Graham Street and Johnston Street)
- Alignment options for Airport South (AS) - south of the terminal between Johnston Street and Musgrave Street)
- Connection to a potential future heavy rail station (R). Two nominal rail station options were identified and agreed with TMR at the time as being indicative on ongoing planning work, namely a heavy rail station option 1 (R1) located closer to Gold Coast Highway; and a heavy rail station option 2 (R2) located closer to airport terminal

Figure 6-10 illustrates an overview of the airport options. A preliminary assessment of the most feasible combination of the option components (AN, AS and rail) was then undertaken to develop the long list of options (refer to Table 6-2). These options are summarised in Table 6-9 with nine options taken forward.

Route Strategy: Tugun to Coolangatta

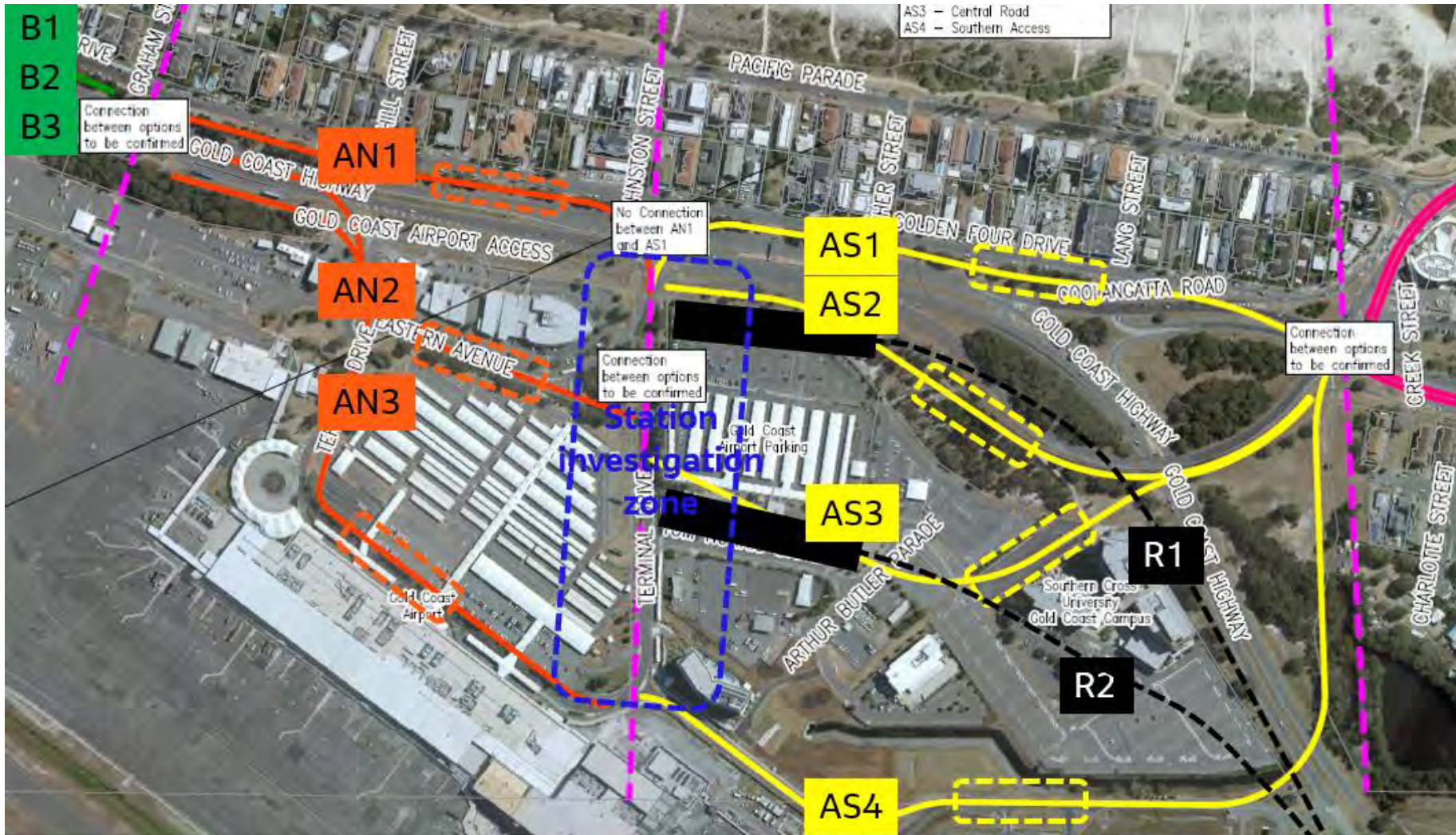


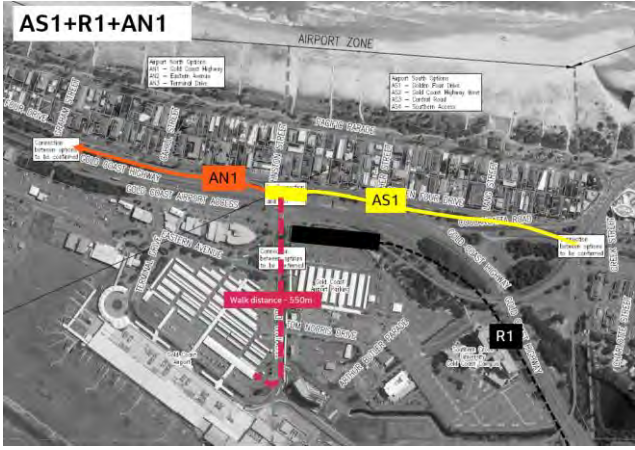
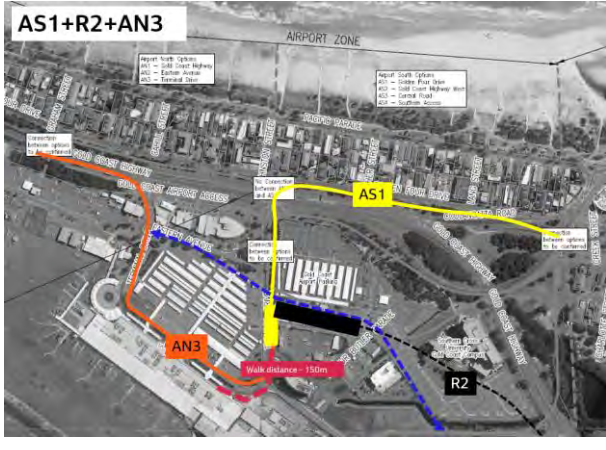
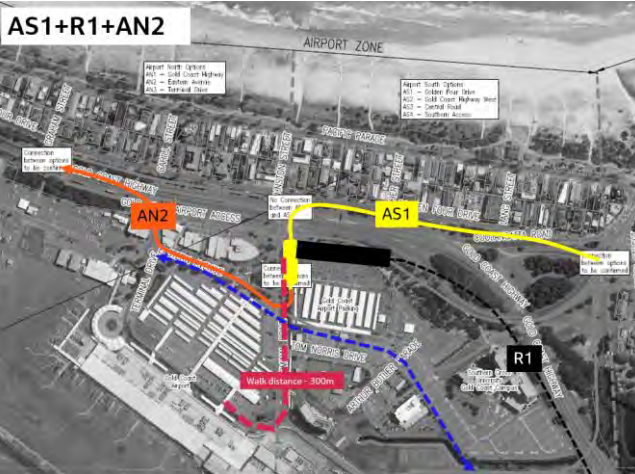
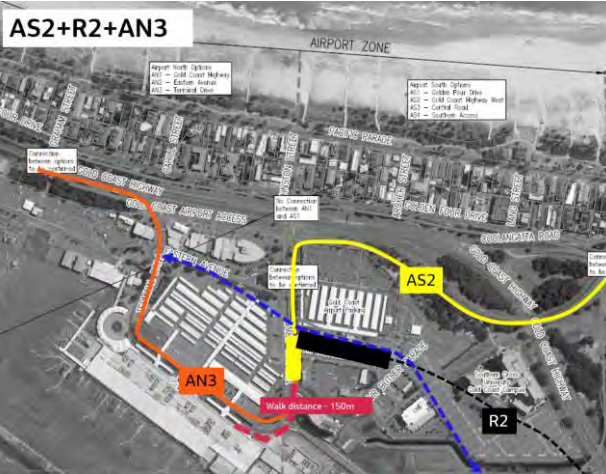
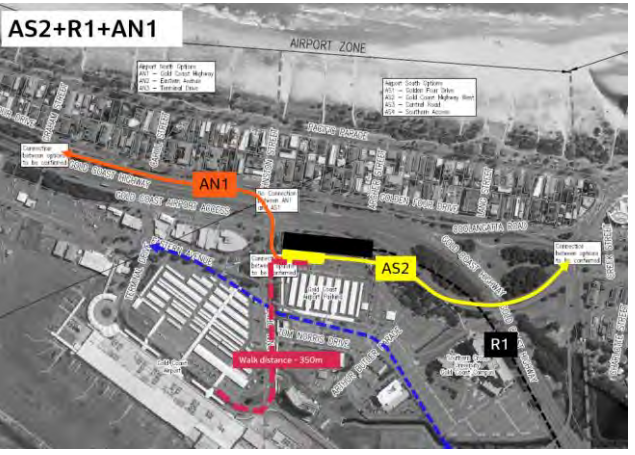
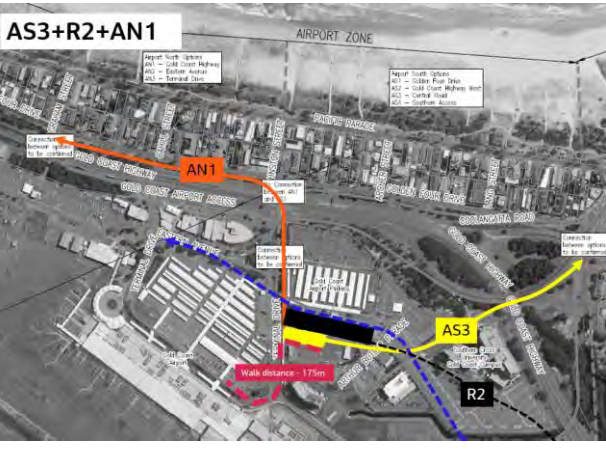
Figure 6-10: Airport alignment options (Image source: Metromap 2020)

Table 6-8: Airport longlist alignment option development

Option		Rail corridor alignment option R1 – closer to Gold Coast Highway			Rail corridor alignment option R2 – closer to Airport terminal			
		AN1	AN2	AN3	AN1	AN2	AN3	
		Gold Coast Highway	Eastern Avenue	Terminal Drive	Gold Coast Highway	Eastern Avenue	Terminal Drive	
AS1	Golden Four Drive	AS1+AN1+R1 	AS1+AN2+R1 	Does not align with service requirements of creating a multi-modal passenger transport hub given significant distance between LRT and heavy rail (R1 alignment).	Does not align with service requirements of creating a multi-modal passenger transport hub given distance between LRT and heavy rail (R2 alignment).	Does not align with service requirements of creating a multi-modal passenger transport hub given distance between LRT and heavy rail (R2 alignment).	AS1+AN3+R2 	
AS2	Gold Coast Highway - west	AS2+AN1+R1 	Does not align with service requirements of creating a trunk LRT spine that utilises Gold Coast Highway, instead majority of track is located within airport land.		Does not align with service requirements of creating a multi-modal passenger transport hub given distance between LRT and heavy rail (R2 alignment).	Does not align with service requirements of creating a multi-modal passenger transport hub given distance between LRT and heavy rail (R2 alignment).	AS2+AN3+R2 	
AS3	Central road through airport	AS3+AN1+R1 					AS3+AN1+R2 	Does not align with service requirements of creating a trunk LRT spine that utilises Gold Coast Highway, instead majority of track is located within airport land.
AS4	Via new southern access within airport	AS4+AN1+R1 					AS4+AN1+R2 	

Route Strategy: Tugun to Coolangatta

Table 6-9: Airport long list of alignment options (combination of AS, AN and rail options)

R1 alignment options (closer to Gold Coast Highway)	R2 alignment options (closer to Airport terminal)
<p>AS1 + R1+ AN1</p> <p>Light Rail distance – 1.21km & Walk distance to airport – >300m</p> 	<p>AS1 + R2 + AN3</p> <p>Light Rail distance – 2.17km & Walk distance to airport – 150m</p> 
<p>AS1 + R1 + AN2</p> <p>Light Rail distance – 1.77km & Walk distance to airport - <300m</p> 	<p>AS2 + R2 + AN3</p> <p>Light Rail distance – 2.18km & Walk distance to airport – 150m</p> 
<p>AS2 + R1 + AN1</p> <p>Light Rail distance – 1.53km & Walk distance to airport – 350m</p> 	<p>AS3 + R2 + AN1</p> <p>Light Rail distance – 1.72km & Walk distance to airport – 175m</p> 

Route Strategy: Tugun to Coolangatta

R1 alignment options (closer to Gold Coast Highway)	R2 alignment options (closer to Airport terminal)
<p>AS3 + R1 + AN1</p> <p>Light Rail distance – 1.68km & Walk distance to airport – <300m</p>	<p>AS4 + R2 + AN1</p> <p>Light Rail distance – 2.28km & Walk distance to airport – 150m</p>
<p>AS4 + R1 + AN1</p> <p>Light Rail distance – 2.27km & Walk distance to airport – <300m</p>	

6.3.3 Kirra

Key inputs to the development of a longlist of options in Kirra included:

- The transport requirements identified in Section 5.3
- LRT alignment options only within the preferred corridor of preferred corridors of Musgrave Street / Marine Parade or Coolangatta Road as discussed in Section 6.1
- Two potential station investigation areas, taking into account the location of an airport station to the north-west and theoretical 800m (10 min) catchment areas. Two station investigations areas, namely North Kirra and South Kirra, were considered appropriate to provide sufficient coverage to the extensive catchment area to the south and to serve a relatively high density of trip attractors.

Figure 6-11 and Table 6-10 summarises the long list of alignment options developed for Kirra that sit (at least in part) within the preferred Musgrave Road / Marine Parade and Coolangatta Road corridors.



Figure 6-11: Kirra alignment options

Table 6-10: Kirra long list of alignment options overview

Option	Key features (high level), issues and opportunities
K1 (Musgrave Street / Marine Parade)	<p>Musgrave Street:</p> <ul style="list-style-type: none"> ▪ 15m road reserve with carriageway and car parking extended into parkland (18m) ▪ Total width required = 23m (extends into current angled parking area, impacting on trees) ▪ Includes on road cycle lanes ▪ Mixture of parallel and angled parking with significant friction <p>Marine Parade:</p> <ul style="list-style-type: none"> ▪ Approximately 10m carriageway including on road cycle lanes ▪ Constrained on both sides (Oceanway shared path and Kirra Hill) ▪ Total length = 1.56km ▪ Road reserve not able to accommodate both a dedicated LRT and other traffic (without need for additional structures). <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ To avoid tree/ park impacts likely to need to remove traffic/ parking in one direction on Musgrave St. ▪ Corridor widening limited by buildings / active uses and pine trees/ park ▪ Potential for LRT and active modes only along Marine Parade, east of Myles Street <p>Refer to Figure 6-12 and Figure 6-13 for indicative cross sections.</p>
K2 (Musgrave Street and	<p>Musgrave Street (esplanade):</p> <ul style="list-style-type: none"> ▪ 15m road reserve but carriageway and car parking extend into parkland (18m)

Option	Key features (high level), issues and opportunities
<p>mined tunnel or cut-and-cover tunnel and retained cut)</p>	<ul style="list-style-type: none"> ▪ Includes on road cycle lanes ▪ Mixture of parallel and angled parking with significant friction ▪ Total width required = 23m (extending into current angled parking & impacting on trees) <p>Musgrave Street (mined tunnel or cut-and-cover tunnel or retained cut):</p> <ul style="list-style-type: none"> ▪ Approximately 30m road reserve – local traffic only ▪ Total length = 1.39km ▪ Road reserve 30m wide but needs to accommodate LRT transition into tunnel while local traffic diverges around tunnel portals to access ridgeline. <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ Musgrave Street - corridor widening limited by buildings / active uses and pine trees/ park ▪ To avoid tree/ park impacts on Musgrave Street likely to need to remove traffic/ parking in one direction ▪ LRT along Musgrave Street (tunnel) assumed to be in cut and cover tunnel due to steep grades. <p>Refer to Figure 6-12 and Figure 6-14 for indicative cross sections.</p>
<p>K3 (Coolangatta Road/cutting - former rail corridor)</p>	<p>Coolangatta Road:</p> <ul style="list-style-type: none"> ▪ Approximately 40-45m wide corridor with wide median and two to four through traffic lanes and parking ▪ Some sections with cycle lanes (not continuous) ▪ Mixture of 40 km/h (school), 50km/h and 60km/h <p>Cutting:</p> <ul style="list-style-type: none"> ▪ Total length = 1.45km ▪ 18-20m wide corridor but narrow formed cutting likely requiring widening and retaining structures <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ Some sections with cycle lanes (not continuous) ▪ Requires relocation of Coolangatta Police Station ▪ Combination of retaining walls and battered slopes required to provide a 14m right of way for two-way LRT and separated pedestrian/cycle paths (shared path slightly narrower). <p>Refer to Figure 6-15 and Figure 6-16 for indicative cross sections.</p>
<p>K4 (Coolangatta Road/ Tweed Street)</p>	<p>Coolangatta Road:</p> <ul style="list-style-type: none"> ▪ Approximately 40-45m wide corridor with wide median and two to four through traffic lanes and parking ▪ Some sections with cycle lanes (not continuous) ▪ Mixture of 40 km/h (school), 50km/h and 60km/h <p>Tweed Street (tunnel):</p> <ul style="list-style-type: none"> ▪ Total length = 1.39km ▪ Road reserve 30m wide but needs to accommodate LRT transition into tunnel while general traffic diverges around tunnel portals. <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ Tweed Street road reserve of 30m wide corridor but with significant elevation requiring large cutting or tunnel. Significant property access impacts to manage during construction. <p>Refer to Figure 6-15 and Figure 6-17 for indicative cross sections.</p>
<p>K5 (Winston Street/ cutting)</p>	<p>As per K3 but located along Winston Street.</p> <p>Winston Street:</p>

Option	Key features (high level), issues and opportunities
-former rail corridor	<ul style="list-style-type: none"> ▪ Approximately 20m wide corridor with no median and two traffic lanes and parking ▪ Some sections with cycle lanes (not continuous) ▪ 50km/h speed <p>Cutting: as per K3</p>



Figure 6-12: Musgrave Street – Alignment K1/K2 indicative cross section



Figure 6-13: Marine Parade – Alignment K1 indicative cross section



Figure 6-14: Musgrave Street tunnel – Alignment K2 indicative cross section

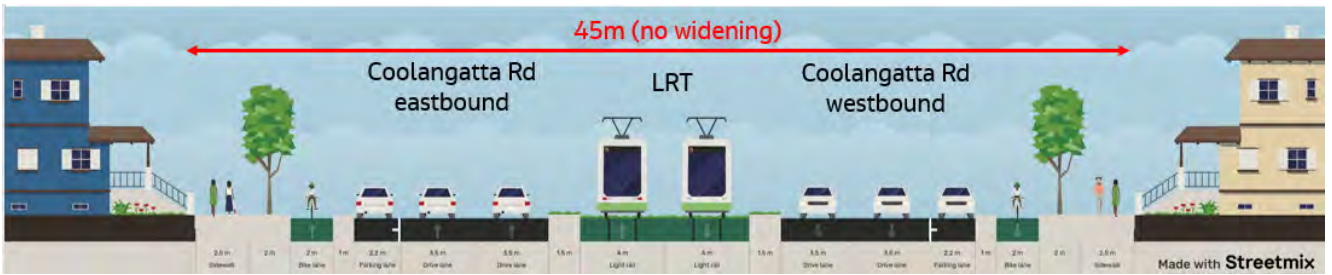


Figure 6-15: Coolangatta Road – Alignment K3/ K4 indicative cross section



Figure 6-16: Coolangatta Road railway cutting – Alignment K3/ K4 indicative cross section



Figure 6-17: Tweed Street tunnel – Alignment K4 indicative cross section

6.3.4 Coolangatta

Key inputs to the development of a longlist of options in Coolangatta included:

- The transport requirements identified in Section 5.3
- LRT alignment options only within the preferred corridor of preferred corridors of Marine Parade, Griffith Street or Chalk Street / Lanham Street / Gerrard Street as discussed in Section 6.1
- One potential station investigation area. From the 800m station spacing methodology and noting the need to serve the Coolangatta Major Regional Activity Centre, a Coolangatta station investigation area is proposed to be located between Lanham Street, Marine Parade, Dutton Street and Warner Street. Based on feedback from stakeholders during Workshop 2, the long list of option diagram identifies the potential for an optional additional LRT station towards the eastern end LRT alignment on either Marine Parade or Griffith Street to serve the catchment further east.

Figure 6-18 and Table 6-11 summarises the long list of alignment options developed for Coolangatta that sit within the preferred Marine Parade, Griffith Street and Chalk Street/ Gerrard Street corridors.



Figure 6-18: Coolangatta alignment options

Table 6-11: Coolangatta long list of alignment options overview

Option	Key features (high level)
C1 (Marine Parade)	<ul style="list-style-type: none"> Assumed to be compatible with option K1 only 22m overall including 90-degree parking - 12m carriageway including on road cycle lanes south of Norfolk Pines 40km/h zone with high pedestrian volumes and six zebra crossings 1.16km (to Bay/ Wharf) <p>Issues and opportunities:</p> <ul style="list-style-type: none"> Significant street activation – restaurants/ shops on southern side Highly valued Norfolk Pines to north limits/ prevents road widening Significant 'side friction due to angled parking <p>Refer to</p>

Option	Key features (high level)
	Figure 6-19 for an indicative cross section.
C2 (Griffith Street)	<ul style="list-style-type: none"> ▪ Assumed to be compatible with options K2 or K3 ▪ 30m corridor with carriageway varying from 9m to 22m where 45-degree parking on both sides and 'cycle lanes' ▪ No opportunity to widen corridor ▪ 50km/h zone but with high pedestrian volumes and eight zebra crossings (more suited to 40 km/h) ▪ 1.12km (to Bay/ Wharf) <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ No opportunity to widen corridor ▪ 'High street' environment with street activation and landscaping <p>Refer to Figure 6-20 for an indicative cross section.</p>
C3 (Chalk Street – former heavy rail corridor)	<ul style="list-style-type: none"> ▪ Assumed to be compatible with options K2 or K3 ▪ Approximately 20m corridor with potential to widen into adjacent at grade car parking to south. ▪ 50km/h zone with low ped crossing volumes and three zebra crossings ▪ 0.88km (to Bay/ Wharf) <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ Approximately 20m corridor with potential to widen into adjacent at grade car parking to south. ▪ Currently exists as rear service lane to Griffith Street shops <p>Refer to Figure 6-21 for an indicative cross section.</p>
C4 (Tweed Street / Goodwin Park / Chalk Street)	<ul style="list-style-type: none"> ▪ Compatible with option K4 only ▪ Narrow corridor with significant side friction/ level differences ▪ Total route = 1.15km (to Bay/ Wharf) <p>Issues and opportunities:</p> <ul style="list-style-type: none"> ▪ Tweed Street gradients likely unsuitable for LRT especially at eastern end connecting to Goodwin Park. ▪ Limited opportunity for segregated LRT corridor in park. ▪ Route through Goodwin Park likely to be low speed with side friction.

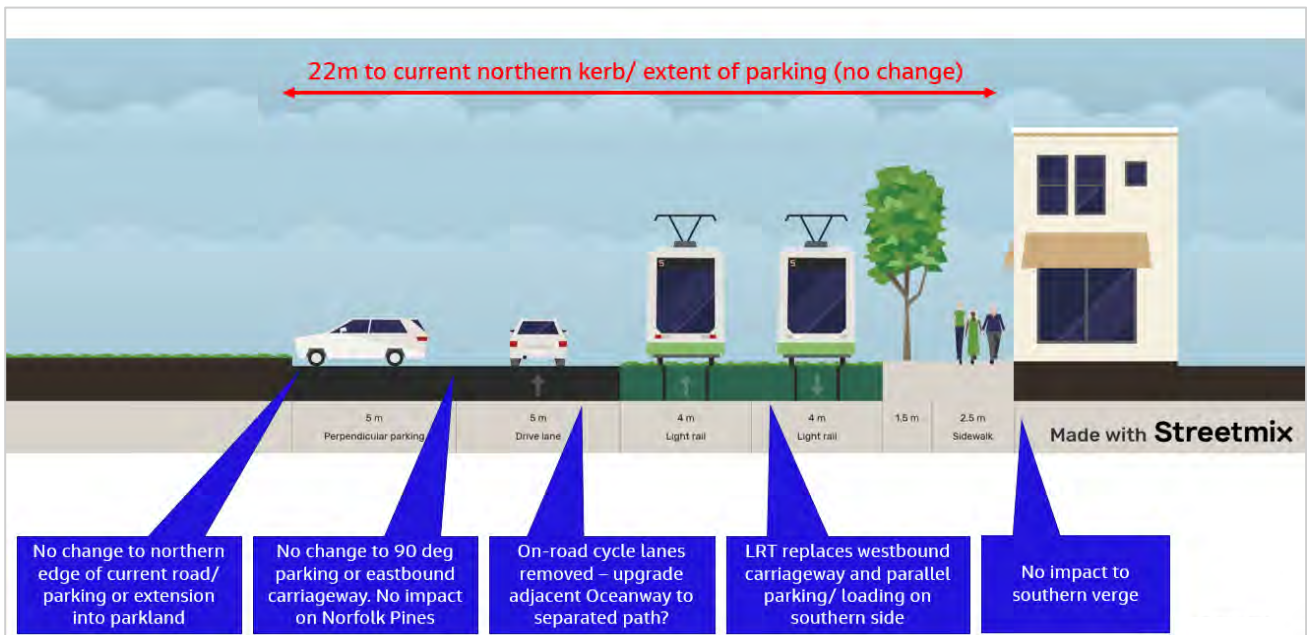


Figure 6-19: C1 – Marine Parade indicative cross section

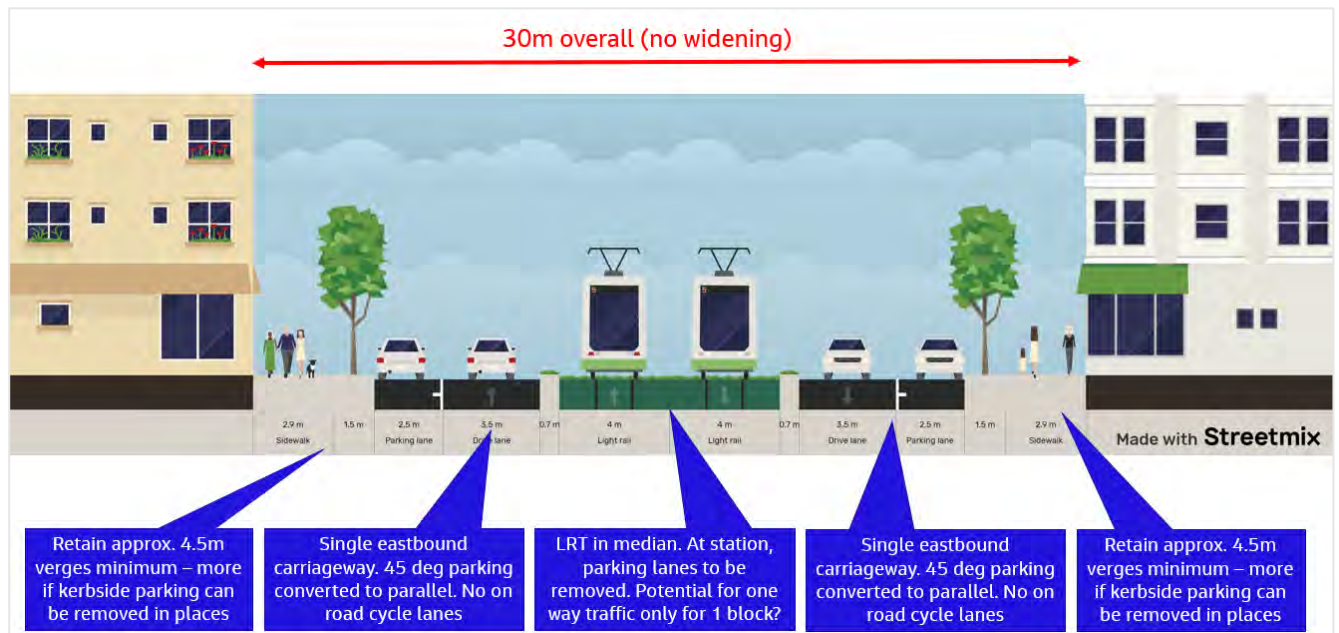


Figure 6-20: C2 - Griffith Street indicative cross section

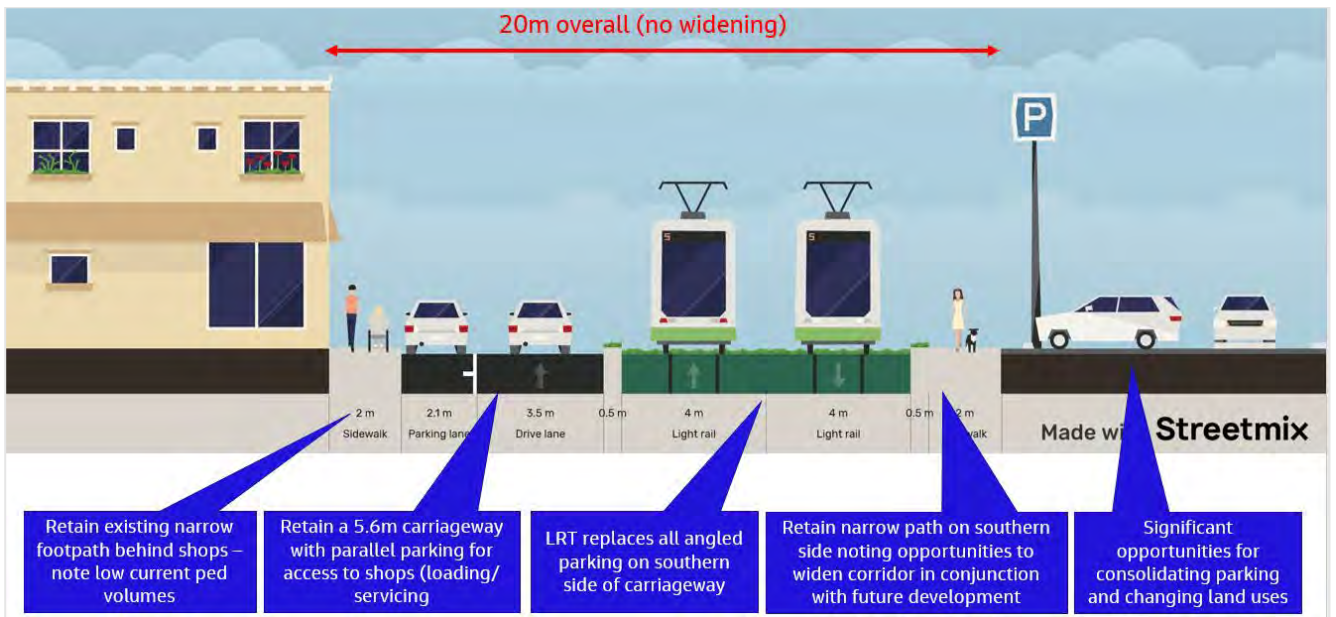


Figure 6-21: C3 - Chalk Street indicative cross section

6.4 Longlist assessment framework

A framework was developed to help ‘filter’ the long list corridor options down to a short list, using the same higher order categories proposed for the multi criteria analysis (MCA) which in turn was developed to be consistent with TMR Smarter Solutions MCA tool. The detailed MCA is described further in Section 7.2. The specific issues that were considered in the longlist assessment filter are summarised in Table 6-12.

Table 6-12: Long list of options filtering assessment

Category (using Smarter Solutions MCA tool, TMR)	Long list measurement of performance	Score Guide (outer limits + base)
Cost	High level discussion of likely scale of implementation costs identifying any differentiators in terms of operating costs	Scoring of each option is relative to the other options: Very Positive - lowest cost, specifically capital cost (in comparison to other options) - involving the shortest Light Rail distance <i>Shortest route = lower capital cost and operating cost</i> Negative - mid level cost (in comparison to other options) includes capital and operating cost. Very Negative - higher cost (in comparison to other options) includes capital and operating cost. <i>Longer route = higher capital cost and operating cost.</i>
Land use	Maximise opportunities for stimulating and encouraging land use growth in a way that is consistent with regional and local planning	Very Positive - aligns with regional planning and local planning objectives with encouraging land use growth and creates opportunity for local precinct enhancements Neutral - does not create opportunities for stimulating and encouraging land use growth consistent with planning.
Transport outcomes	Public transport (PT) accessibility and connectivity (for current and future	Very Positive – PT travel time reduced and accessibility improved (from existing PT travel times and accessibility) that will drive better PT mode share.

Category (using Smarter Solutions MCA tool, TMR)	Long list measurement of performance	Score Guide (outer limits + base)
	customers) – qualitative assessment of likely benefit	Neutral - no changes to existing PT mode share Very Negative - PT travel time increased significantly from existing, less accessible that will impede PT mode share.
	Active transport safety, comfort and access – qualitative discussion	Very Positive - creates additional active transport links (from existing) and improves safety for both pedestrians and bike riders (e.g., more signalled intersections mean more safer/ controlled crossing opportunities) Neutral - no changes to active transport infrastructure and safety - pedestrian and cycle (as existing) Very Negative - net loss in active transport infrastructure (pedestrian and cycle)
	Provides adequate/ appropriate/ safe traffic capacity – qualitative discussion on likely extent of impact/ redistribution of traffic	Very Positive - capacity significantly improved, road safety/speed significantly improved and no net loss change to parking (compared to existing). Neutral - no changes to traffic capacity, road safety Very Negative - significant reduction in road capacity and/or road safety negatively impacted and net loss in car parking (compared to existing).
Construction and contractability	Qualitative discussion of likely construction risks and issues including traffic management, community disruption or technical risks	Negative - creates traffic management risks/issues during construction Very Negative - creates traffic management, community disruption and technical risk during construction Fatal flaw - construction not feasible.
Environmental impact	Qualitative discussion on the potential extent of environmental impacts focussing on noise and air quality but noting any impact on flora and fauna where relevant	Negative - creates manageable noise or air quality implications during operation. Very Negative - creates significant noise or air quality implications during operation and/or significant impacts to flora and fauna. Fatal flaw - extent of environmental impacts significant and option not feasible.
Social factors	Minimising impacts to adjacent land owners and the wider community.	Neutral - does not impact visual amenity/ urban quality, with minimal impact to local land uses, property and businesses during operation. Very Negative - causes significant impact on visual amenity/ urban quality and/or creates significant impact to local land uses, property and businesses during operation. Fatal flaw - Adjacent land owners and relevant stakeholders would reject idea completely.

6.5 Longlist assessment findings

6.5.1 Bilinga

Table 6-13 and Table 6-13 summarises the results of the assessment of the long list alignment options in Bilinga. Alignment Option B1 and B2 were taken forward as the shortlisted alignment options for further refinement and MCA. Refer to Appendix D for the detailed commentary associated with the scoring.

Table 6-13: Bilinga – long list assessment scoring

Category	B1 - East of GCH	B2 - Centre of GCH	B3 - West of GCH
Cost	Neutral	Neutral	Neutral
Land use planning	Positive	Positive	Neutral
Public transport outcomes	Very Positive	Positive	Negative
Active transport outcomes	Very Positive	Positive	Negative
General traffic outcomes	Positive	Positive	Positive
Construction and contractability	Negative	Negative	Negative
Environmental impact	Negative	Negative	Negative
Social factors	Neutral	Neutral	Neutral
RECOMMENDATIONS	PROCEED	PROCEED	DO NOT PROCEED

Table 6-14: Bilinga - long list assessment results

Option	Decision	Rationale
B1	PROCEED	<p>This option was taken forward for the following reasons:</p> <ul style="list-style-type: none"> improved PT accessibility for major land uses, replicating Route 700 but with faster travel times and less stops (all catchment still within 800m of LRT stops). road safety is potentially improved with increase in number of signalised crossings of Golden Four Drive at stations aligns with local planning with positioning Light Rail and associated with stations adjacent to land uses with the most significant uplift potential.
B2	PROCEED	<p>This option was taken forward for the following reasons:</p> <ul style="list-style-type: none"> improved PT accessibility for major land uses, replicating Route 700 but with faster travel times and less stops (all still within 800m of stops). aligns with local planning with positioning Light Rail and associated with stations adjacent to land uses with the most significant uplift potential.
B3	DO NOT PROCEED	<p>This option was not taken forward due to the following reasons:</p> <ul style="list-style-type: none"> reduced PT accessibility and access to land uses where Gold Coast Highway is a major barrier from LRT to the major land uses (medium density residential) located to the east of Gold Coast Highway. This impairs PT accessibility to/from its catchment in comparison to existing.

6.5.2 Airport

Table 6-15 to Table 6-18 summarise the results of the assessment of the long list alignment options in the airport. The assessment identified two LRT alignment options, AS2+R1+AN1 and AS3+R2+AN1, to be progressed as the shortlisted alignment options for further refinement to undertake comparative assessments for the MCA. Refer to Appendix D for the detailed commentary associated with the scoring.

Table 6-15: Heavy rail alignment option 1 – closer to Gold Coast Highway - long list assessment scoring

Category	AS1+R1+AN1	AS1+R1+AN2	AS2+R1+AN1	AS3+R1+AN1	AS4+R1+AN1
Cost	Very Positive	Negative	Positive	Negative	Very Negative
Public transport outcomes	Very Negative	Positive	Very Positive	Positive	Very Negative
Active transport outcomes	Positive	Positive	Positive	Positive	Positive
General traffic outcomes	Very Positive	Very Negative	Very Positive	Positive	Positive
Construction and contractability	Very Negative	Very Negative	Negative	Very Negative	Negative
Environmental impact	Very Negative	Very Negative	Very Negative	Negative	Negative
Social factors	Neutral	Neutral	Neutral	Neutral	Neutral
RECOMMENDATIONS	DO NOT PROCEED	DO NOT PROCEED	PROCEED	DO NOT PROCEED	DO NOT PROCEED

Table 6-16: Heavy rail alignment option 2 – closer to airport - long list assessment scoring

Category	AS1+R2+AN3	AS2+R2+AN3	AS3+R2+AN1	AS4+R2+AN1
Cost	Negative	Negative	Very Positive	Very Negative
Public transport outcomes	Neutral	Neutral	Very Positive	Negative
Active transport outcomes	Positive	Positive	Positive	Positive
General traffic outcomes	Very Negative	Very Positive	Positive	Positive
Construction and contractability	Very Negative	Negative	Very Negative	Negative
Environmental impact	Very Negative	Very Negative	Negative	Negative
Social factors	Fatal Flaw	Fatal Flaw	Neutral	Neutral
RECOMMENDATIONS	DO NOT PROCEED	DO NOT PROCEED	PROCEED	DO NOT PROCEED

Table 6-17: Airport long list assessment results – heavy rail alignment option 1 – closer to Gold Coast Highway

Option	Decision	Rationale
AS1+R1+AN1	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> due to lack of PT accessibility from airport to station (longest walking distance out of all alignment options) due to proximity to residences on the east of Gold Coast Highway and with LRT located along Gold Coast Highway, traffic management and community disruption would create significant impacts.
AS1+R1+AN2	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> LRT crosses Gold Coast Highway twice which would significantly impact highway capacity and travel time along Gold Coast Highway in both directions.

Option	Decision	Rationale
AS2+R1+AN1 (now known as A2)	PROCEED	<p>This option was taken forward for the following reasons:</p> <ul style="list-style-type: none"> Option on the outer extents of airport land with less impact (compared to other AS options) to internal airport roads. Light Rail distance is 1.53km so more direct and faster for through trips with lower operating and capital cost than other options. LRT crosses Gold Coast Highway at Terminal Drive which will run at the same time as the dominant southbound right turn into the airport, so capacity is retained, and safety improved. LRT then runs along the outer extent of the airport, avoiding impact to the internal roads.
AS3+R1+AN1	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> crosses Gold Coast Highway once at Terminal Drive but requires significant construction of existing airport land. To be taken into consideration during Airport Master Plan to manage construction risks.
AS4+R1+AN1	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> Longest Light Rail distance of 2.27km, and longest route through the airport owned land, therefore highest operating and capital cost.

Table 6-18: Airport long list assessment results – heavy rail alignment option 2 – closer to airport terminal

Option	Decision	Rationale
AS1+R2+AN3	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> Due to security, traffic and pedestrian safety concerns associated with a Light Rail in close proximity to airport terminal that will not be accepted by Gold Coast Airport. This is considered a fatal flaw based on feedback from Queensland Airports Limited.
AS2+R2+AN3	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> Due to security, traffic and pedestrian safety concerns associated with a Light Rail in close proximity to airport terminal that will not be accepted by Gold Coast Airport. This is considered a fatal flaw based on feedback from Queensland Airports Limited.
AS3+R2+AN1 (now known as A1)	PROCEED	<p>This option was taken forward for the following reasons:</p> <ul style="list-style-type: none"> LRT distance is approximately 1.72km, shortest distance so lowest operating and capital cost. LRT crosses Gold Coast Highway at Terminal Drive which will run at the same time as the dominant southbound right turn into airport, so capacity is retained, and safety improved. LRT then runs along the outer extent of the airport, avoiding impact to the internal roads. Proximity to airport terminal for convenient customer access compared to highway alignment
AS4+R2+AN1	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> Longest Light Rail distance of 2.28km, and longest route through the airport owned land, therefore highest operating and capital cost.

6.5.3 Kirra

Table 6-19 and Table 6-22 summarises the results of the assessment of the alignment options in Kirra. Alignment options K2 and K3 were taken forward as the shortlisted alignment options for further refinement and MCA. Refer to Appendix D for the detailed commentary associated with the scoring.

Table 6-19: Kirra – long list alignment option assessment scoring

Category	K1 - Musgrave St / Marine Pde	K2 - Musgrave St / tunnel	K3 - Coolangatta Rd / cutting	K4 - Coolangatta Rd / Tweed St (tunnel)	K5 - Winston Street
Cost	Very Negative	Very Negative	Negative	Very Negative	Very Negative
Land use planning	Positive	Positive	Very Positive	Very Positive	Very Positive
Public transport outcomes	Neutral	Neutral	Very Positive	Positive	Neutral
Active transport outcomes	Negative	Negative	Very Positive	Positive	Neutral
General traffic outcomes	Fatal Flaw	Positive	Positive	Positive	Negative
Construction and contractability	Very Negative	Very Negative	Neutral	Very Negative	Very Negative
Environmental impact	Very Negative	Negative	Negative	Very Negative	Very Negative
Social factors	Fatal Flaw	Negative	Neutral	Neutral	Neutral
RECOMMENDATIONS	DO NOT PROCEED	PROCEED	PROCEED	DO NOT PROCEED	DO NOT PROCEED

Table 6-20: Kirra long list alignment options assessment results

Option	Decision	Rationale
K1 - Musgrave St / Marine Pde	DO NOT PROCEED	This option was not taken forward for the following reasons: <ul style="list-style-type: none"> requires complete removal of traffic lanes along Marine Parade and if lanes were retained, addition of structures over water or retaining the hill is likely to be a fatal flaw in terms of cost and/or visual impact.
K2 - Musgrave St / tunnel	PROCEED	This option was taken forward for the following reasons: <ul style="list-style-type: none"> aligns with the underlying current land use and density mix which is orientated towards the foreshore, and opportunity to generate significant precinct enhancements (urban realm upgrades) close proximity to beach improved PT accessibility with reduced travel times to/from Coolangatta.
K3 - Coolangatta Rd / cutting	PROCEED	This option was taken forward for the following reasons: <ul style="list-style-type: none"> alignment with the local planning by introducing opportunities for activating and stimulating land use growth away from the foreshore better catchment (i.e., larger number of people within 800m catchment of frequent PT) minimal impacts to retail and commercial land uses during construction and operation (due to distance from the main activity centres). Catchment is located on both sides of alignment, compared to K1/K2 that limits catchment to one side given proximity to beach.
K4 - Coolangatta Rd / Tweed St (tunnel)	DO NOT PROCEED	This option was not taken forward due to significant cost associated with a tunnel and construction risks/ impacts (in terms of amenity impacts, PUP risks and geotechnical risks)
K5 – Winston Street	DO NOT PROCEED	This option was not taken forward due to significant cost associated with construction of drainage infrastructure needed for the corridor and associated construction risks/ impacts. This option also significantly impacts on local residences along corridor creating disruption to the community. It is also a slower and more circuitous route.

6.5.4 Coolangatta

Table 6-21 and Table 6-22 summarises the results of the assessment of the alignment options in Coolangatta. Option C2 and C3 are taken forward as the shortlisted alignment options for further refinement and MCA. Refer to Appendix D for the detailed commentary associated with the scoring.

Table 6-21: Coolangatta – long list alignment options assessment scoring

Category	C1 - Marine Parade	C2 - Griffith Street	C3 - Chalk Street	C4 - Tweed St / Goodwin Park / Chalk St
Cost	Very Negative	Very Negative	Negative	Fatal Flaw
Land use planning	Very Positive	Very Positive	Very Positive	Neutral
Public transport outcomes	Very Negative	Neutral	Very Positive	Negative
Active transport outcomes	Negative	Negative	Neutral	Neutral
General traffic outcomes	Very Negative	Negative	Neutral	Very Negative
Construction and contractability	Very Negative	Very Negative	Negative	Fatal Flaw
Environmental impact	Very Negative	Very Negative	Negative	Very Negative
Social factors	Very Negative	Very Negative	Neutral	Very Negative
RECOMMENDATIONS	DO NOT PROCEED	PROCEED	PROCEED	DO NOT PROCEED

Table 6-22: Coolangatta long list alignment option assessment results

Option	Decision	Rationale
C1 - Marine Parade	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"> reduction in road capacity (from two lanes to one lane) shifting traffic to Griffith Street or Lanham Street. implications for events which currently rely on the temporary closure of Marine Parade for festivals etc Light Rail track impacting the visual amenity of the beach location, changing the beach character of Marine Parade. reduced number of people within walk up catchment, compared to existing buses on Griffith Street
C2 - Griffith Street	PROCEED	<p>This option was taken forward for the following reasons:</p> <ul style="list-style-type: none"> alignment with local planning aspirations by introducing opportunities for precinct enhancements. close proximity to beach consistent with current high frequency bus route and bus stop location road safety is improved with speeds reduced to 40km/hr complementing the pedestrian activity of the road.
C3 - Chalk Street	PROCEED	<p>This option was taken forward for the following reasons:</p> <ul style="list-style-type: none"> alignment with local planning aspirations by introducing opportunities for precinct enhancements. minimal impacts to retail and commercial land uses during construction and operation (due to locations just behind the main retail high street). increases PT catchment (including a greater number of land uses to the south). PT travel time reduces from existing with shorter LRT travel distance and better geometry (higher operating speeds) compared to existing bus routes.

Route Strategy: Tugun to Coolangatta

Option	Decision	Rationale
C4 - Tweed St / Goodwin Park / Chalk St	DO NOT PROCEED	<p>This option was not taken forward for the following reasons:</p> <ul style="list-style-type: none"><li data-bbox="523 342 1469 468">▪ fatal flaw of Tweed Street gradients likely unsuitable for LRT especially at eastern end connecting to Goodwin Park. This would require extensive structures (cuttings/tunnels) to overcome which is likely to cause unacceptable noise and access impacts during construction as well as being very high capital cost.