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Long List Assessment Report
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1 The Approach

1.1 General

This report outlines the approach taken and the results of the Long List process for the City Centre to Mangere project, to help identify a shorter list of rapid transit options to further investigate in more detail as part of a specific Short List process (see separate Short List report).

As part of the identification of the recommended short list option(s) an assessment of a wide range of options was undertaken. A four-stage process was adopted, being:



This report is for Stage 1 and 2, being the identification of a long list of options, and the recommendation of a number of short-listed options.

The assessment was undertaken by a group of subject matter experts from Waka Kotahi, Auckland Transport, Auckland Council, Kainga Ora and consulting specialists.

1.2 Assessment Approach

Options were assessed using a Multi Criteria Assessment (MCA) approach. This allowed for the consideration of a broad range of criteria when considering the options, in order to discard them or retain them in the process for further consideration and development. It is important to note that the MCA approach is a tool to assist in the overall project decision making and not the point at which a final project decision is made.

The MCA criteria were developed specifically for this project, utilising relevant material from previous rapid transit project planning, however were based heavily on the latest Waka Kotahi MCA guidelines for business cases.

A staggered approach to option assessment was undertaken, using an Early Assessment Sifting Tool (EAST) approach (consistent with Waka Kotahi guidance) as outlined in the figure

below. This allowed non-performing options to be assessed and discounted at an early stage, with more viable options going through for a more comprehensive review.

As the Cabinet paper has requested direction on both the project's route and mode, the Long List options were initially considered from a mode perspective and then a route perspective, and then complete options were put together. Given the length and variability of the characteristics of the project corridor, the route options were assessed initially in standalone sections of the route and then combined to form indicative Short List options for the full route. This report relates to the Long List component of the diagram below.

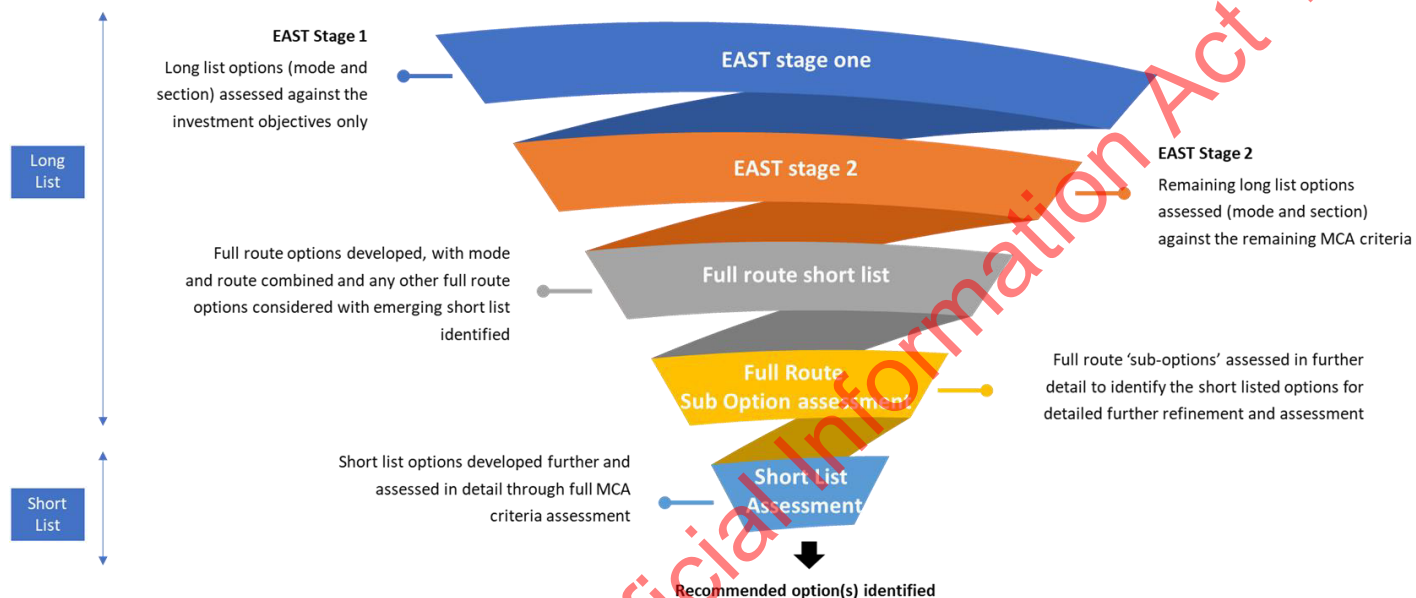


Figure 1 : Long list option sieving process

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2 Key Assumptions

As previously noted, there has been considerable work on rapid transit projects in and around this corridor, and the Cabinet paper provided a range of parameters which were able to guide the scope of the Long List assessment. There were therefore a number of assumptions that underpinned this assessment. These included:

- The Auckland Rapid Transit Plan (ARTP) provides strategic direction to the long term Rapid Transit Network in Auckland and in terms of this corridor:
 - The need for this corridor within the wider rapid transit network
 - How this corridor could integrate with the wider rapid transit corridor in the long term
- The 'Midtown' area within the City Centre is defined as broadly the area around the planned Aotea Station on Wellesley Street and Queen Street
- The project extent will run from Wynyard Quarter through the Midtown area, then to the Airport (noting that the Wynyard Quarter location could potentially be extended to the North Shore as part of a future project) and pass through Mt Roskill, Onehunga and Mangere
- The Airport connection is a direct link from SH20 under the new runway into the Airport Terminals
- Grade-separated options (where these were considered necessary) were generally considered to be underground rather than above ground unless specifically stated
- Future land use assessments were based on the currently enabled land use development (as set out in Auckland Forecasting Centre's land use option i1.6 used for ATAP) as well as an indicative assessment of potential additional development provided by an option

These assumptions were required to be adopted to enable option assessment for the purpose of the Long List process. Some of these assumptions (e.g. the Wynyard Quarter connection, or passing under the second runway at Auckland Airport) will be revisited in the Detailed Business Case (DBC) phase of this project, as the design is further developed, however those issues are not anticipated to affect Long List assessment findings. The focus of the short listing phase will be to confirm (for the purposes of assessment) the optimal version of each option and understand in more detail the benefits, the costs and the key trade-offs of each option. It is recognised that there remain a number of outstanding elements or issues that will require substantial further public consultation before a final project decision can be made, so it should be noted that whilst this Long List to Short List process is appropriate for this phase, further more detailed design and assessment work will be undertaken at the DBC phase, to further refine and optimise the option(s).

3 Assessment Criteria

3.1 The Criteria

An MCA was used to assess all options in the long list. This allowed the options to be ranked against each other with the option ranking informing the development of the routes. The assessment was undertaken in June 2021 by the group noted in section 1.1, and peer reviewed concurrently.

The full assessment criteria framework is included in **Appendix A** and a summary of the main assessment categories is shown below in Table 1. The investment objectives were derived directly from the project's Investment Logic Map and associated objectives, whilst the other criteria were informed by the standard Waka Kotahi MCA framework and previous rapid transit investigations.

Table 1: MCA criteria

Investment Objectives	Objective 1 – Accessibility	Ability of the transport system to enhance accessibility to key destinations and ensure the urban development aspirations (in terms of scale) are achieved
	Objective 2 – Environmental	Reduction in carbon footprint in the corridor and in the wider transport system due to the operation of the project
	Objective 3 – Urban Development	Improved social cohesion and reduced inequality, through the form and location of development enabled
Achievability	Technical	Including implementation, technical risk. Additional criteria to assess the feasibility of achieving the desired land use
	Safety	Will achieve safe outcomes for users, including application of CPTED principles to the scheme and the wider transport system
	Consentability	Level of consenting complexity and risk
Cost	Funding availability and ability to get additional funding (if needed)	Cost of the project and consequential opex changes for rest of the public transport system
	Value for money	Forecast balance between benefits and costs for the project. Options to secure financial value from the investment.
Environmental Effects	Landscape/visual	Extent of effects on the natural environment from a visual perspective
	Water quality/Stormwater	Extent of effects of operational stormwater (both quantity and

		quality) on the receiving environment
	Ecology	Extent of effects on flora and fauna, and water ecology
	Natural hazards	Extent of effects on infrastructure and surrounding urban environments during natural hazard events
	Cultural and historic heritage	Extent of effects on Cultural and Historic heritage (as defined in the RMA 1991, HNZPTA 2014 and ICOMOS NZ Charter 2010)
Social and community	Urban design	The extent to which the option supports a quality environment and the amenity and character of the surrounding environment.
	Social cohesion	Extent of effects on the use, connectivity / accessibility for and to the existing and future communities including use and access to employment, education, retail and recreation opportunities
	Human Health and Wellbeing	Extent to which the option will potentially affect any sensitive receivers, particularly related to air quality, contaminated land, noise and vibration
	Reputation	Reputational risks to partners related to negative feedback from public and key stakeholders.
Impacts on Te Ao Maori	Te Ao Maori	Extent of effects on Te Ao Maori, including areas of significance for Maori, Maori land and kaitiakitanga
Property Impacts	Property Impacts	Scale of public / private land (m ² / number of properties / special status of impacted property) required to deliver the option.

These assessment criteria were endorsed by the Governance Group of the Establishment Team.

The long list options were primarily assessed qualitatively (but also quantitatively where there was data available) against the main criteria (informed by the more detailed criteria shown in **Appendix A**), whilst the subsequent short list options were assessed against the detailed criteria quantitatively where possible. It is important to note that there is a significant amount of analysis undertaken on previous versions of this project that was able to be used to provide a level of quantification to the long list assessment that the qualitative assessment was based upon (e.g. demand modelling of patronage figures in the corridor were used).

3.2 The Scoring



The scoring system used needs to have sufficient range to sufficiently discern the benefits, disbenefits and/or effects of the various options. A 7-point scoring system, as detailed in Table 2 below, was used for this project. It was used to rate quantitative and qualitative measures within the MCA template.

The rating scale comprises a 7-point scale from -3 to +3. The total score or relative ranking of each option was reported as part of the MCA table. The scoring was done based on the scheme assessed. If the effects were able to be mitigated, this mitigation was identified (and if the project team agree this was appropriate), a score with this mitigation in place was provided (and included in costs).

Table 2: MCA scoring criteria

Magnitude	Definition	Score
Major positive (+ve)	Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment.	3
Moderate positive (+ve)	Moderate positive impact, possibly of short-, medium- or long-term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement.	2
Minor positive (+ve)	Minimal positive impact, possibly only lasting over the short term. May be confined to a limited area.	1
Neutral	Neutral – no discernible or predicted positive or negative impact.	0
Minor negative (-ve)	Minimal negative impact, possibly only lasting over the short term, and definitely able to be managed or mitigated. May be confined to a small area.	-1
Moderate negative (-ve)	Moderate negative impact. Impacts may be short, medium or long term and are highly likely to respond to management actions.	-2
Major negative (-ve)	Impacts with serious, long-term and possibly irreversible effect leading to serious damage, degradation or deterioration of the physical, economic, cultural or social environment. Required major rescope of concept, design, location and justification, or	-3

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4 Option Development

4.1 General

There has been a substantial amount of work undertaken on rapid transit options for this corridor in previous studies, however for robustness a comprehensive re-assessment of options has taken place, based on updated project objectives and the latest data relevant to option assessment.

More recently the ARTP as part of broader network development investigations has re-confirmed potential CC2M corridor options within a network context.

The ARTP found that, based on this previous work, Light Rail and Light Metro (as modal options) perform best from a network perspective but identified the need for further work to be undertaken to re-test these findings.

The options development process has drawn upon the ARTP analysis and conclusions, as well as identifying and considering additional options (see following sections), to ensure that a comprehensive Long List assessment was undertaken as part of this business case.

Options were considered in three phases:

- mode options consistent with the ARTP
- route options as described in section 4.3 (considered section by section)
- any other potential options.

A Workshop was held in June 2021 with the project team to identify and develop the Long List of options for assessment. A wide range of options were considered, to ensure no reasonable mode or route was overlooked for assessment. An example of this is the within the city centre, where the City Centre Masterplan envisages a Light Rail option down Queen Street, but the assessment also considers different modes and route options, to see how these deliver against project objectives compared to the initial option.

In total over 50 Long List options were identified for assessment, as will be outlined in the following sections.

It is worth noting that none of the options has a confirmed or detailed design for the corridor, though some modes have had a level of previous work. For the Long List, therefore all of the options were assessed under an assumed design/layout typical of that mode, with specific design work to be undertaken for subsequent Short List options only.

4.2 Mode

Based on the ARTP, the following main modes were considered within the long list:

- **Bus** – Non-segregated bus lanes (same as present operation), driver required
- **Bus Rapid Transit**– Segregated bus lanes, passing lanes provided at larger stations, urban (Eastern Busway) type stations, driver required
- **Trackless Tram** – Guided bus system, segregated from general traffic, driver required
- **Light Rail Transit** – Typically on-street operation, segregated from general traffic, driver required
- **Metro Rail** – Fully segregated rail (typically underground in urban areas), potentially autonomous operation.

- Heavy Rail - Fully segregated rail (typically underground in urban areas), potentially autonomous operation. Ability to run rail freight

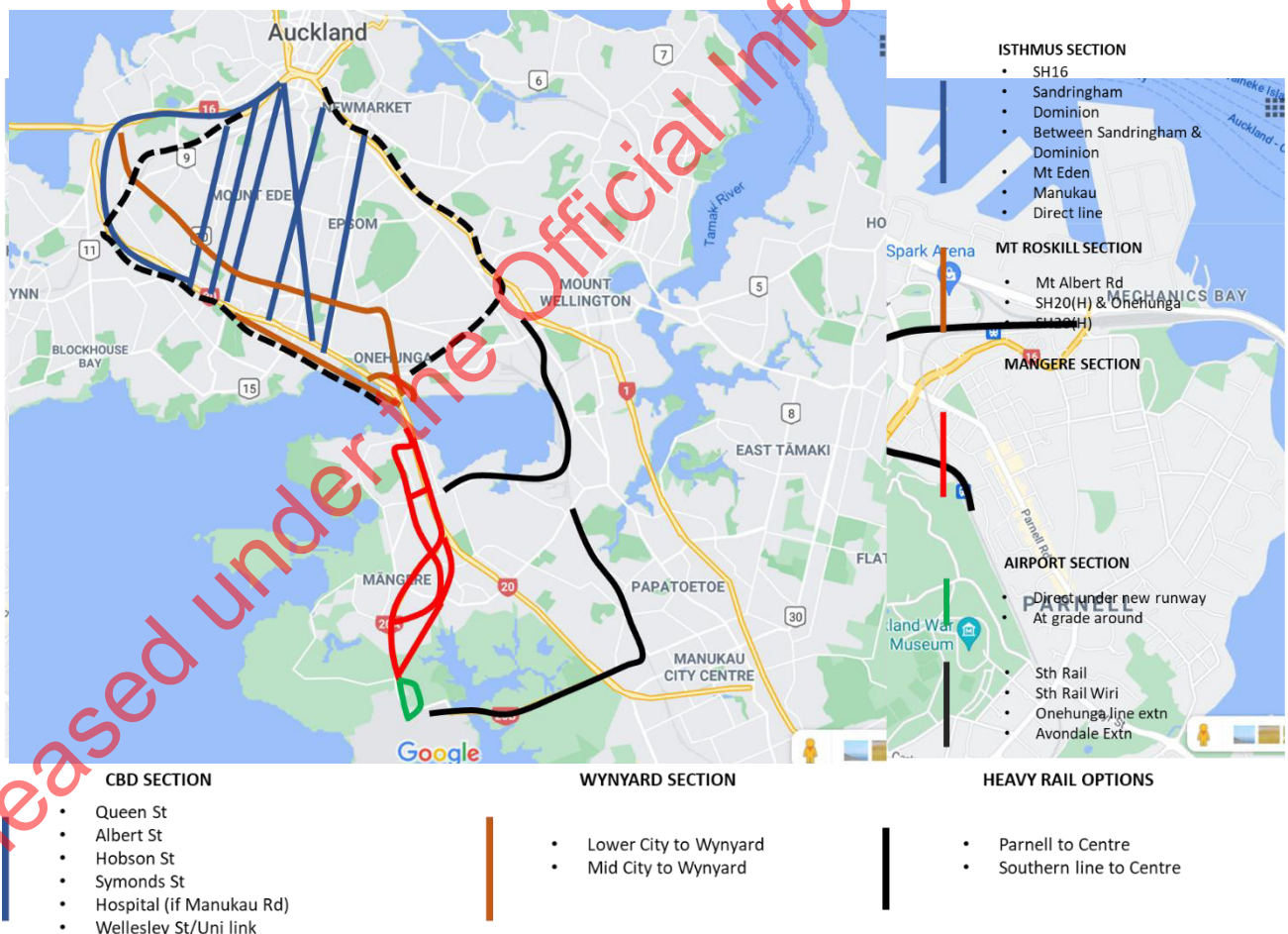
Additional mode options beyond these standard rapid transit modes, such as monorail or Hyperloop, were also considered (see Section 4.4. and the assessment in Section 7) as well as assessment of demand management as an alternative to infrastructure solutions.

4.3 Route

Alternative route alignments were also considered during the long list, due to their distinct characteristics affecting their viability as alignment options. The corridor length is made up of four distinct sections, being:

- Section A: Airport to Onehunga
- Section B: Onehunga to Mt Roskill
- Section C: Mt Roskill to New North Road
- Section D: New North Road to Wynyard Quarter

Options for each of these sections were considered separately. Options for section A to C are shown in the figures below.





4.4 Wider Modal Options

As well as the above mode and route options, the long listing approach also identified a number of other modal options for consideration. These were a mixture of other modal systems, as well as technology options. These wider modal options were considered here, rather than alongside the modes set out in Section 4.2 as that mode assessment focussed on those modes identified in the ARTP.

The wider options identified include:

- Gondola – Elevated cable system, assumed to run along the previous LRT alignment
- Hyperloop – New technology system of tunnelled, high speed, smaller, more frequent vehicles
- Monorail – Elevated rail-style system
- Connected Vehicles – Technology to maximise efficiency of current vehicle operation
- 'Vacuum' trains – Unique train propulsion system
- Tram Train – Trains that can run on a new rail street-based system, as well as the existing system
- Magnetic Trains – High speed trains with fewer stops, but higher speeds
- Cycling Superhighway – Conversion of road space for high capacity, segregated cycling route
- Mobility as a service (MAAS) – Technology-based approach to maximise the connectivity and efficiency of the entire transport system
- Demand management – Initiatives to influence travel behaviour such that higher corridor demands are not realised (can include land use changes)

These are assessed in Section 7.

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5 Mode Assessment

5.1 Initial Sieve

An assessment of the modes was undertaken against the Investment Objective criteria only (as options which failed this step were not taken forward for more detailed assessment against the other criteria). This scoring is summarised in Table 3.

Table 3: Mode Sieve 1

	Bus	BRT	Trackless Tram	Light Rail	Metro Rail	Heavy Rail
Investment Objective 1 – Accessibility	0	1	2	2	3	3
Investment Objective 2 – Environment	0	1	1	2	2	2
Investment Objective 3 – Urban Development	0	1	1	3	3	2

A summary of the rationale for these scores is provided in the following sections.

5.1.1 Investment Objective 1 – Access

There has been a significant amount of work undertaken on mode considerations for this corridor previously, which has been useful for this analysis. **Appendix B** provides a summary of the previous work, the modes considered and the findings.

The transport capacity of the different modes (to deliver access to support the scale and demands of associated land use activities) was an important consideration in this project objective. Indicative transport capacities for each mode were taken from the ARTP business case document as outlined in Figure 2. These capacities were based on the frequency of service and vehicle type from ARTP. Given ARTP had a wider regional focus, these capacities were re-tested and considered to be appropriate for this corridor for the long list assessment.

To these nominal modal capacities, the forecast corridor demands were overlaid. These demands were taken from the most recent transport modelling for 2048 for the corridor (Scenario i1.6 from AFC). The city centre was separately assessed as, depending on the future RTN mode and operation of the system, the corridor could become shared with other RTN lines (and therefore require combined line capacities).

The assessment used 2048 demands, as this is current time horizon of the transport models (at the time of assessment). The life of the CC2M project would obviously be considerably longer than this timeframe and therefore further demand beyond this period needs to also be considered (i.e. how much headroom for further growth the mode provides).

The assessment shows that the rail options have sufficient capacity to meet the forecast demand up to and beyond 2048. A segregated bus system was found to have the potential to meet the forecast demand up to 2048, but with a stretched operation (i.e. it is becoming full).

So an important finding of this assessment is that further growth will be beyond the capacity of the bus system.

The assessment noted that trackless tram systems have not been in commercial operation anywhere globally for long enough to understand their commercial and operational viability, compared to other systems with decades of performance, mature markets for vehicles and equipment, and good competition between suppliers. This somewhat lowers confidence in that mode reliably achieving the required capacity. Both the Metro and Heavy Rail options were given the highest score (three) as they provided the highest capacity and accessibility enhancement for key movements within the corridor (i.e. they were able to move the most people for the demands of the corridor). The Rail modes are also compatible with the future ARTP network, given the high demands expected on the North Shore and Northwest corridors.

Light Rail was scored a two as, although this option provided good accessibility improvements, its capacity was less than the Metro or Heavy rail options.

Segregated bus options were scored less than Light Rail as

- whilst they theoretically have sufficient capacity, this was at a stretched operation,
- hence they have little spare capacity for further growth, so are not long term solutions.
- They are not considered to be compatible with the future North Shore and Northwest RTN lines (as identified in the ARTP) in terms of their ability to serve demands.
- They would result in increased bus volumes in the city centre, for which there is insufficient road space.

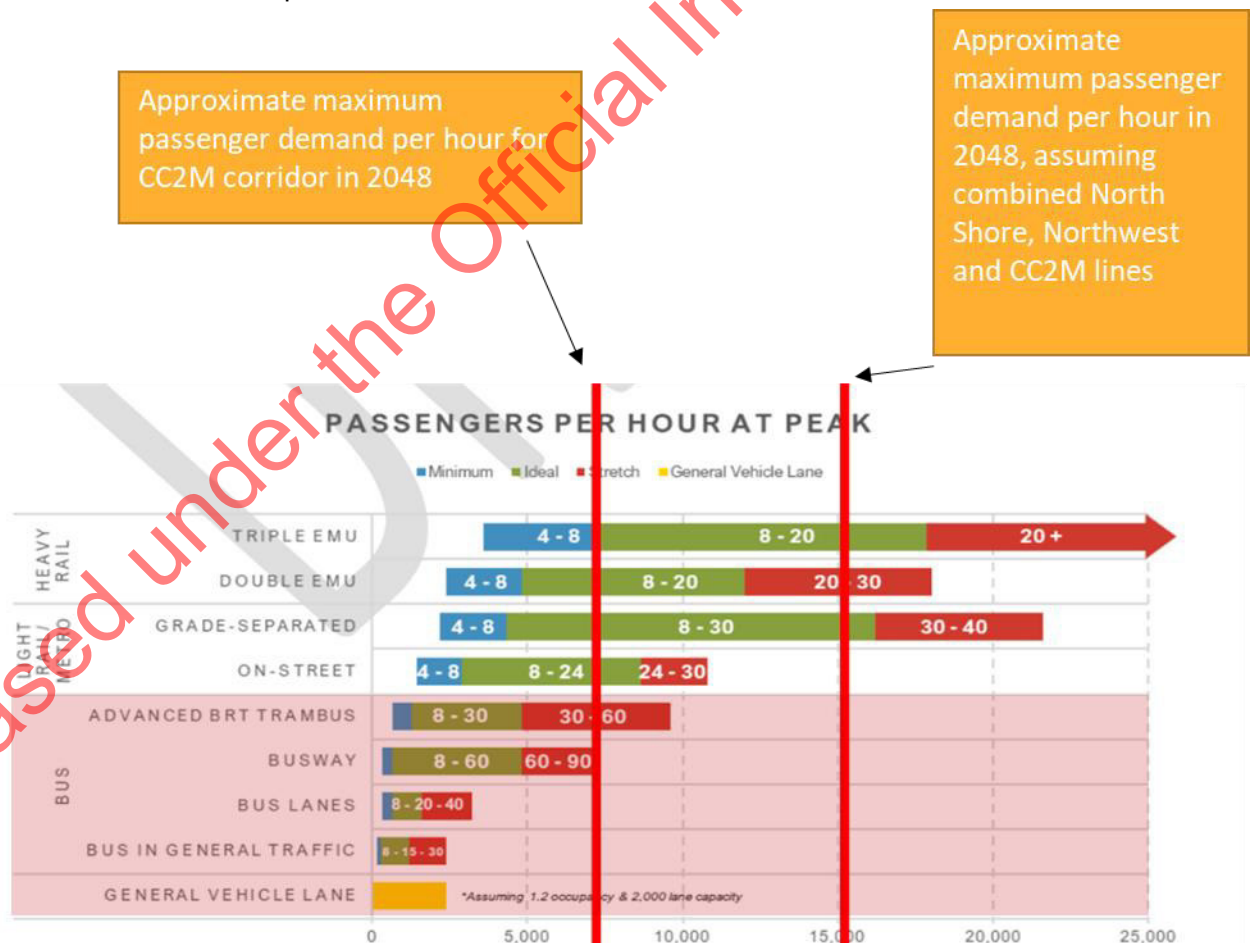


Figure 2 : Forecast Mode Capacity (from ARTP)

5.1.2 Investment Objective 2 – Environment

The ability of the mode options to result in a mode shift (i.e. higher proportion of the public travelling by sustainable modes) was the predominant consideration for this objective, given the objective for this project to assist with carbon reduction.

The Metro and Heavy Rail modes were scored the highest (three) as they had the highest capacity and previous modelling has indicated they would attract the highest patronage and therefore achieve the greatest mode shift, thereby generating the highest carbon reduction. The Light Rail mode was also scored a three as, whilst it provided less capacity and patronage than the other Rail modes, this difference was not considered significant and the mode shift is likely to be similar.

The Trackless Tram option was scored a two as, whilst its capacity is constrained compared to the rail options, it is still considered an attractive mode with good mode shift potential, just not as strong as the rail-based options.

The BRT and bus-based options were scored a one and zero respectively as, given their heightened capacity constraints, the mode shift outcome would be lower, lowering the carbon reduction results when compared to the other options.

5.1.3 Investment Objective 3 – Urban Development

The Rail options, with the highest capacity, have the ability to unlock the greatest urban development potential. The high-capacity stations required for these modes also provide opportunity for focussed land use intensification to deliver the urban and transport integration outcomes sought. The highest score of three was therefore given to the Metro Rail option, however the Heavy Rail option was scored as a two due to the reduction in urban outcomes as a result of large freight trains potentially using the line and running through high density urban areas. Note that the assumption of freight operations is based on the fact that the existing Auckland Heavy Rail network mixes passenger and freight train operations, which is a differentiator compared to the Metro and Light Rail modes. It is possible that a Heavy Rail project could be developed which does not include freight operations, however this would have to be a specification developed further at a detailed design phase.

The Light Rail option was assessed to perform similarly to the Metro Rail option. The on-street running would have a greater impact on urban realm outcomes, however this adverse impact would be offset by the opportunity for increased land use integration along the corridor, involving an assumed higher number of stops in the isthmus section, providing for the quality urban form outcomes sought. Light Rail was therefore assigned the same score as the Metro Rail.

The Trackless Tram option was scored a two as, although it would provide high urban development and integration outcomes, these were assessed to be less than the rail options due to the lower capacity of the mode.

Similar to the Environmental assessment, the BRT and bus-based options were scored a one and zero respectively, as their capacity constraints mean the scale of the urban uplift unlocked by each mode would be reduced. These options would also provide less certainty to developers, in terms of permanence, which would somewhat diminish potential investment in denser land uses.

5.1.4 Through to Sieve 2

Based on this first assessment and the importance of providing the corridor capacity of the mode (which can be considered a critical success factor), it is recommended that the Light Rail and the two Rail options (i.e. Light Metro and Heavy Rail) be taken through to Sieve 2. The other modal options, with their lower capacities and reduced ability to unlock urban development, were not recommended for taking forward for further assessment.

5.2 Second Sieve

An assessment of the three modes which passed the first sieve was then undertaken against the Impacts criteria. This scoring is summarised in Table 4.

Table 4 : Mode Second Sieve

	Bus	BRT	Trackless Tram	Light Rail	Metro Rail	Heavy Rail
Investment Objective 1 – Accessibility	0	1	2	2	3	3
Investment Objective 2 – Environment	0	1	1	2	2	2
Investment Objective 3 – Urban Development	0	1	1	3	3	2
Impacts						
Achievability				-2	-2	-2
Affordability				-2	-3	-3
Environmental Impacts				-2	-2	-2
Social and Community				-1	-1	-2
Te Ao Maori				Not scored		
Property				-2	-1	-1

The summary rationale for these scores is provided in the following sections.

5.2.1 Achievability

All modes would result in significant capital projects and would have planning, design and implementation challenges. The Metro and Heavy Rail modes were assumed to largely be underground in the dense urban areas, with resulting ground condition and station access challenges. The Light Rail mode would have particular interface challenges with the current transport system (given the likely street running and therefore interactions with traffic, buses, pedestrians and cyclists), which would result in technical and operational challenges. All options are considered to be proven technology.

All of these modes are considered achievable, however they would be significant projects with large impacts to manage, hence all were scored at minus-two to reflect the scale and similarity of achievability. At this stage, not enough is known about construction challenges to reliably differentiate between them.

5.2.2 Affordability

Previous studies had identified indicative costs for both Metro Rail and Light Rail schemes. For the purposes of this assessment the Metro Rail option was considered to be in the order of \$10Bn (with Heavy Rail assumed to be more expensive than this), whereas the Light Rail option was considered to be in the order of \$5Bn. All are very expensive options, however the difference (of billions of dollars) is also considered significant. Whilst all options would attract the opportunity for value capture to reduce the financial cost of the project, a score of minus-three for Metro and Heavy Rail options and minus-two for Light Rail was used, as there was a differential in cost.

5.2.3 Environmental

All options were considered to have a similar impact on the environment. There would be long term environmental benefits associated with the mode shift and carbon reductions. The Metro and Heavy Rail options would largely be underground and have impacts on substrate removal and streams, etc, whereas the Light Rail mode would largely be street running, with some stormwater, visual and other impacts. All the modes would both result in substantial projects that would have impacts that would need to be addressed, therefore all options were scored minus-two.

5.2.4 Social and Community

All options were considered to have an adverse impact on communities during construction and implementation, with issues such as noise and vibration, however this was considered to be offset by the expected benefits in increased accessibility and community connection, resulting in a score of at least minus-one.

Due to the potential for freight trains operating on the service through dense urban areas and the loss of amenity as a result, the Heavy Rail option was scored a minus two

5.2.5 Te Ao Maori

This criterion was not scored at this time. This criteria is still considered important and will be fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

5.2.6 Property

The Light Rail option was assumed to be largely street running and has therefore been assessed as having a moderate property impact due to the likely scale of acquisition and disruption during construction to properties. Through the central isthmus there also assumed to be restrictions to current vehicle access (e.g. left in/left out only on side streets off the main corridor).

The Metro and Heavy options were assessed as having a lesser impact than the Light Rail option due to the fact that much of the route would be underground. This would have more substantial construction impacts but was assessed to require reduced long-term property acquisition.

5.2.7 Recommended Modes to proceed to Short List assessment

Based on this initial assessment on modal issues, it was found that all three modal options could provide sufficient capacity for demand, that all would have implementation impacts, and that the Metro and Heavy Rail options were likely to cost more but delivered slightly greater outcomes.

The Heavy Rail option was found to achieve lesser outcomes for this corridor than the Metro Rail option and the impacts were found to be greater. The Heavy Rail option was therefore not considered appropriate to short list as a new mode for this corridor, on the basis that a Metro Rail option was similar but performed better, so was a preferred option to pursue.

Whilst there is a difference between the Light Rail and Metro Rail options on some criteria, these changes are not substantial enough to choose a preference. **It is therefore recommended that more detailed analysis of these two modes (Light Rail and Metro Rail) is required to understand potential differences and that therefore both modes are shortlisted.**

Trackless Tram has had a lot of interest from stakeholders. **Appendix C** includes a specific note on Trackless Tram. In summary this option was not taken through to the short list due to:

- Insufficient capacity to meet the forecast demand
- Unproven technology, with limited implementation elsewhere
- Lower level of mode shift (due to capacity) resulting in reduced carbon reduction

There would still be a high level of disruption during implementation due to the need to enhance pavements along the entire route

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6 Route Assessment

6.1 Section A : Airport to Onehunga

As noted earlier, the corridor has been broken into sections for route assessment purposes. The first is Section A, from Auckland Airport to Onehunga. An assessment of the route options in this section by mode was undertaken against the Investment Objective criteria. This scoring is summarised in Table 5.

Table 5 : Airport to Onehunga Sieve 1

	Existing Rail - Puhinui	Existing Rail - Otahuhu	Coro Bader Mangere TC (at grade)	Coro Bader Mangere TC (grade sep)	Coro SH20 (at grade)	Bader Mangere TC (at grade)	Bader Mangere TC (grade sep)	Bader SH20 (at grade)	Bader SH20 (grade sep)	SH20	SH20 Mangere TC (at grade)	SH20 Mangere TC (grade sep)	SH20 Mangere Airport direct (grade sep)
Investment Objective 1 – Accessibility	0	1	1	1	0	2	2	1	1	1	2	2	2
Investment Objective 2 – Environment	1	1	2	2	2	2	2	2	2	2	2	2	2
Investment Objective 3 – Urban Development	0	1	2	2	1	2	2	2	2	1	1	1	1

The rationale for these scores is provided in the following sections.

6.1.1 Investment Objective 1 – Access

The options that better served areas of known development in this section (Coronation Rd, Bader Dr and Mangere Town Centre) scored higher than those that did not, due to the improvement such development would bring in terms of accessibility for the people in those areas. The options that served Coronation Rd did however result in adverse impacts to the operation of the local transport network that reduced accessibility somewhat and therefore a score for these options was given that was less than those that did not. This resulted in options that went through Bader Dr and Mangere Town Centre, or Mangere Town Centre (due to its proposed larger development scale) getting a score of two and those that went through just Bader Dr or through Coronation Rd getting a score of one. The Coronation Rd/SH20 option was scored a zero as it only went through one development area and had adverse impacts on the local transport network that the other options did not.

The SH20-only option did however score a one because although it did not directly go through one of the identified development areas, it provided the quickest route, providing relatively greater accessibility benefits to the wider network users through this area (i.e. a faster trip for users but less development enabled in this area).

The Existing Rail option from Puhinui was not considered on its own to provide the accessibility outcomes sought for the corridor and therefore was scored a zero. The Existing Rail from Otahuhu option did provide improved access to Mangere Town Centre (from SH20) and was therefore given a score of one.

6.1.2 Investment Objective 2 – Environment

The Existing Rail options were both considered to have some mode shift (and therefore carbon reduction benefits), however these were assessed as being modest compared to other options (which provided enhanced public transport services to a wider Mangere area) and therefore a score of one was given.

All other route options were considered to provide an improved level of mode shift (and therefore carbon reduction) compared to the Existing Rail options. Whilst there were differences between the options, on balance all were scored the same (at two) as the slower



options generally provided greater penetration into development areas, increasing mode shift in those areas, whilst the faster routes provided greater benefits to longer distance trips to the rest of Auckland.

6.1.3 Investment Objective 3 – Urban Development

The options that better served areas of known future planned development in this section (Bader Dr and Mangere Town Centre) scored higher than those that did not. This resulted in options that went through one of these areas being scored at a two.

The Existing Rail from Puhinui option was not considered on its own to provide the urban development outcomes sought and therefore was scored a zero. The Existing Rail from Otahuhu option did provide improved access to Mangere Town Centre (from SH20) and was therefore given a score of one.

6.1.4 Through to Sieve 2

It is therefore recommended that the two Existing Rail and Coronation Rd/SH20 options do not progress through to Sieve Two as they each had scores of zero against at least one of the investment objectives.

6.1.5 Section Airport to Onehunga Sieve 2 Assessment

An assessment of the routes in this section by mode was undertaken against the Impacts criteria. This scoring is summarised in Table 6.

Table 6 Airport to Onehunga Sieve 2

	Existing Rail - Puhinui	Existing Rail - Otahuhu	Coro Bader Mangere TC (at grade)	Coro Bader Mangere TC (grade sep)	Coro SH20 (at grade)	Bader Mangere TC (at grade)	Bader Mangere TC (grade sep)	Bader SH20 (at grade)	Bader SH20 (grade sep)	SH20	SH20 Mangere TC (at grade)	SH20 Mangere TC (grade sep)	SH20 Mangere Airport direct (grade sep)
Investment Objective 1 – Accessibility	0	1	1	1	0	2	2	1	1	1	2	2	2
Investment Objective 2 – Environment	1	1	2	2	2	2	2	2	2	2	2	2	2
Investment Objective 3 – Urban Development	0	1	2	2	1	2	2	2	2	1	1	1	1
Impacts													
Achievability			-2	-2		-2	-2	-1	-1	-1	-1	-1	-3
Affordability			-2	-2		-2	-3	-2	-3	-1	-2	-3	-3
Environmental Impacts			-2	-1		-2	-1	-1	-1	-1	-2	-1	-3
Social and Community			1	1		2	2	1	1	1	1	1	1
Te Ao Maori			Not scored					Not scored					
Property			-3	-1		-2	-1	-2	-1	-1	-2	-1	-2

The summary rationale for these scores is provided in the following sections.

6.1.6 Achievability

All routes would have achievability challenges given the scale of the physical works required. However, these challenges are not considered to be unsurmountable at this stage. All options were therefore given a score of at least minus-one. There are considered to be additional challenges in implementation and operation going through the Coronation Rd area due to the existing town centre, therefore this option attracted a score of minus-two. Options that went through Bader Dr and Mangere Town Centre were also considered to have a cumulative increase in implementation challenges (due to the increased length of works in a constrained urban environment) resulting in a score of minus-two.

The direct option from Mangere to the Airport (underground) was scored a minus-three due to the very poor ground conditions in this area and the associated technical challenges anticipated.



6.1.7 Affordability

Options that just run along SH20 are considered the cheapest of these options and therefore given a score of minus-one (there would also be less opportunity for urban value capture). Options that then went through development areas were given a minus-two for at-grade options and minus-three for grade-separated options, due to the increased cost and complexity of grade separation.

The direct option from Mangere to the Airport (underground) was scored a minus-three due to the very poor ground conditions in this area and the additional costs anticipated in addressing these.

6.1.8 Environmental

Options at-grade were considered to have a greater impact than those that were grade separated (underground), predominantly due to the landscape and visual impacts, and therefore scored minus-two. Those options that were grade-separated were considered to have a lesser impact and scored a minus-one.

The exception to the above scoring was the SH20 option which was at grade but largely within an existing transport corridor and therefore was given a score of minus-one. The at-grade Bader Dr/SH20 option was also given a minus-one due to the relatively small scale of local network interface (compared to other options).

6.1.9 Social and Community

All options were considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts on communities during construction. Grade-separated options had greater impact during construction but less impact once operational, whilst at-grade options had less impact during construction with longer term impacts (such as potential severance). On balance, all options were considered to have a score of one.

The two exceptions to this scoring were options that went through Bader Dr and Mangere Town Centre, which were given a score of two due to the scale of enabled development in these areas and the enhanced community outcomes as a result. The direct option through to the Airport, even though grade-separated, was assessed as minus-one due to the expected challenges in getting a route through this area and the associated community impacts.

6.1.10 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

6.1.11 Property

Options at-grade were considered to have a greater impact than those that were underground, predominantly due to the scale of property impact and therefore scored minus-two. Those options that were grade-separated were considered to have a lesser impact and score minus-one as there would still be considerable property impacts in some locations. The Coronation/Bader Dr option was scored a minus-three due to the forecast impact through the Mangere Bridge town centre.



The exception to the above scoring was the SH20 option, which was at-grade but largely within an existing transport corridor and therefore was given a score of minus-one. The direct option through to the Airport, even though grade-separated was assessed as minus-two due to the forecast challenges in getting a route through this area and constraints that could make property issues more complex.

6.1.12 Recommended Short List Modes

Based on this initial assessment it is considered that the options that go through Coronation Rd have higher impacts and lesser outcomes compared to those options that do not go this way and should therefore not be progressed further.

The Bader Dr options were found to have merit, however the option that goes into Bader Dr and then straight back onto SH20 has the lowest outcome of the Bader Dr options and should therefore not be considered further.

The direct link option from the Mangere Town Centre to the Airport was found to have too great an impact to be considered further.

It is therefore recommended that further analysis of the following options in this section is undertaken by taking these options through to short list consideration:

- **Bader Drive and Mangere Town Centre (On Street and Grade Separated)**
- **SH20 Only**
- **SH20 and Mangere Town Centre (On Street and Grade Separated)**

6.1.13 Section B Onehunga to Mt Roskill

An assessment of the route options in this section was undertaken against the Investment Objective criteria. The crossing of the Manukau inlet was consistent to all options, so was not assessed, but will instead be developed in the DBC phase. This scoring is summarised in Table 7.

Table 7 Onehunga to Mt Roskill Sieve 1

	Mt Albert Road	SH20 Onehunga (at grade)	SH20 Onehunga (grade sep)	SH20 direct
Investment Objective 1 – Accessibility	1	3	3	1
Investment Objective 2 – Environment	1	2	2	1
Investment Objective 3 – Urban Development	1	2	2	1

The summary rationale for these scores is provided in the following sections.

6.1.14 Investment Objective 1 – Access

The options that served Onehunga directly were given the highest score (three) as they provided the maximum accessibility to people within the identified growth areas in this section.

The SH20 direct option (that did not have a direct connection into Onehunga) was scored a one, as whilst it did not have access into Onehunga there was assumed to be a station on SH20 which would provide a low level of improvement in accessibility.

The Mt Albert Road option was assessed as a one, as whilst it served the Onehunga area well, it was over a longer route (which would impact travel time for other users) and also the land use



along Mt Albert Road was not as conducive to intensification, thereby reducing the accessibility benefits of this option.

6.1.15 Investment Objective 2 – Environment

The options that served Onehunga would generate higher patronage and therefore result in a higher mode shift. No difference between on-street and grade-separated options was considered at this stage. Both versions were scored two.

The SH20 direct option would attract less patronage and therefore have a lower mode shift (and lower resulting carbon reduction) and therefore was given a score of one.

The Mt Albert Road option was assessed as one also, as whilst it served the Onehunga area well, the longer travel would affect patronage of the wider route.

6.1.16 Investment Objective 3 – Urban Development

The options that directly served Onehunga would involve a station linked to the existing train station that provided the opportunity for substantial uplift in development in this area and a highly integrated development. These options were scored a two.

The SH20 direct option would offer less opportunity from both a scale and form of development perspective, and therefore was given a score of one.

The Mt Albert Road option was assessed as a one, as whilst the Onehunga opportunity would be maximised, the form of the land use along Mt Albert Road was not as conducive to intensification given the disaggregated land ownership and the multiple ownership (often off long driveways), thereby reducing the urban development potential of this option.

6.1.17 Through to Sieve 2

It is therefore recommended that the SH20 Onehunga options proceed through to the next sieve. The Mt Albert Road and SH20-only options do not sufficiently deliver the outcomes sought to progress further.

6.1.18 Section Onehunga to Mt Roskill Sieve 2 Assessment

An assessment of the routes in this section by mode was undertaken against the Impacts criteria. This scoring is summarised in Table 8.

Table 8 : Onehunga to Mt Roskill Sieve 2

	Mt Albert Road	SH20 Onehunga (at grade)	SH20 Onehunga (grade sep)	SH20 direct
Investment Objective 1 – Accessibility	1	3	3	1
Investment Objective 2 – Environment	1	2	2	1
Investment Objective 3 – Urban Development	1	2	2	1
Impacts				
Achievability		-1	-2	
Affordability		-2	-3	
Environmental Impacts		-2	-1	
Social and Community		1	2	
Te Ao Maori		Not scored		
Property		-1	-1	

The summary rationale for these scores is provided in the following sections.

6.1.19 Achievability

Due to the land use and physical constraints in the area, both options through Onehunga would have their challenges for implementation. However, the grade-separated option was considered to have greater technical implementation challenges due to the proximity to the coast and the brownfields industrial nature of some of the land around Onehunga. The grade-separated option was therefore assessed as a minus-two and the street-running option a minus-one.

6.1.20 Affordability

Both options would have substantial costs associated with them. There would be increased costs associated with the grade-separation option due to the scale and complexity of the construction works. This option was therefore assessed as a minus-three and the street running option a minus-two.

6.1.21 Environmental

The at-grade option was considered to have a greater environmental impact than the grade-separated (underground) option, predominantly due to the landscape and visual impacts and therefore scored minus-two. The grade-separated option was considered to have a lesser impact and scored minus-one.

6.1.22 Social and Community

Both options were considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts on communities during construction. The grade-separated option had greater impact during construction but less impact once operational, whilst the at-grade option had less impact during construction, with longer term impacts (such as creating potential severance). Due to the constraints in the Onehunga area and the proximity of the coast, the grade-separated option was scored a two and the street running option a one.

6.1.23 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

6.1.24 Property

The at-grade option was considered to have a greater impact than the underground option, predominantly due to the scale of property impact and therefore scored minus-two. The grade-separated option was still be considered to have property impacts and so scored minus-one.

6.1.25 Recommended Short List Modes

Based on this further assessment it is considered that both options have considerable impacts to deliver the outcomes sought. The grade-separated option was found to have a wider range of impacts, whilst the at-grade option had a narrower range of impacts. **It is therefore**



recommended that both options are progressed for further analysis through short list consideration.

6.2 Section C: Mt Roskill to New North Road

An assessment of the route options in this section by mode was undertaken against the Investment Objective criteria. This scoring is summarised in Table 9.

Table 9 : Mt Roskill to New North Road Sieve 1

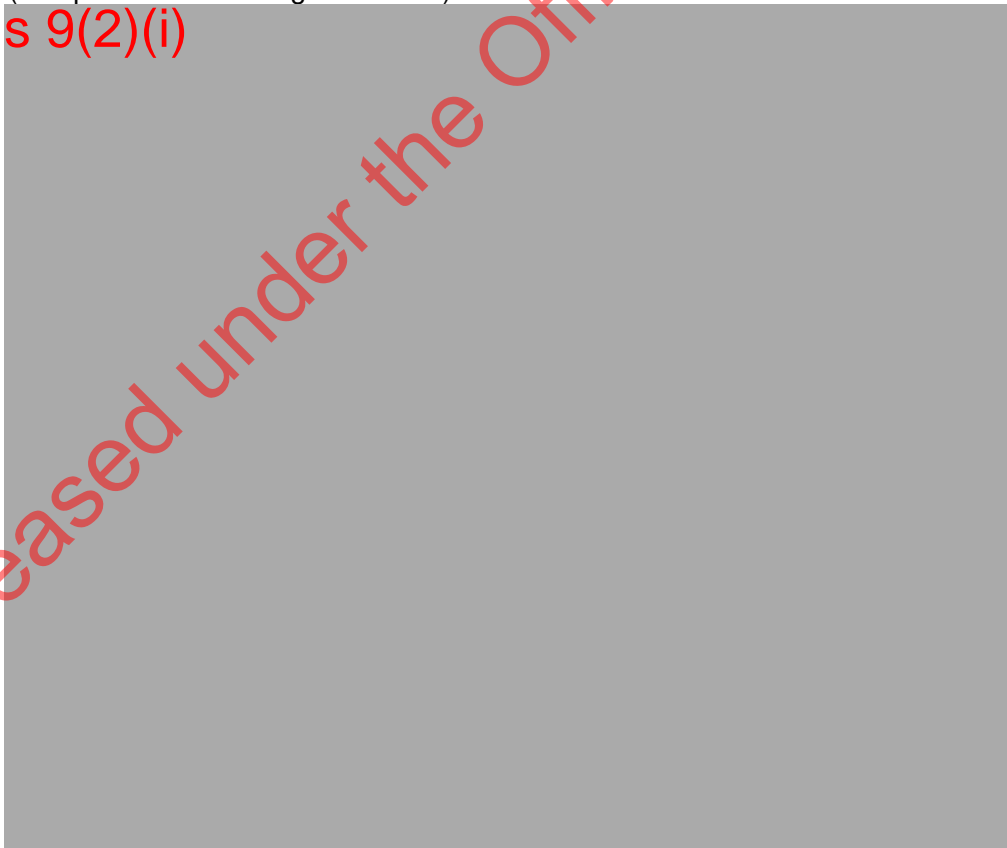
	SH16	Existing Rail Onehunga	Existing Rail - Western	Sandringham at grade	Sandringham underground	Sandringham elevated	Mid Sandringham Dominion (as grade)	Mid Sandringham Dominion (under ground)	Dominion at grade	Dominion underground	Dominion elevated	Mt Eden	Manukau	Direct
Investment Objective 1 – Accessibility	1	1	2	3	3	3	2	2	2	2	2	1	1	1
Investment Objective 2 – Environment	0	1	1	2	2	2	2	2	2	2	2	1	1	1
Investment Objective 3 – Urban Development	0	1	1	2	2	1	2	2	2	2	1	1	0	1

The summary rationale for these scores is provided in the following sections.

6.2.1 Investment Objective 1 – Access

The options that provided access for people in the Mt Roskill development area (as outlined below) were assessed higher than those that did not. Sandringham Road and Dominion Road options therefore scored the highest as they best served this area, maximising the accessibility potential of this section. Sandringham Road options provided the best accessibility to the expected residents of the Kainga Ora area of development and therefore scored a three. Previous patronage forecasts for Dominion Road options suggest a lower level of increase (compared to Sandringham Road) and therefore was scored a two.

s 9(2)(i)





Connecting the existing heavy rail Western Rail Line through to Onehunga using the current Avondale-Southdown rail designation was found to provide a connection with Mt Roskill, however not as well as the Sandringham Rd options and therefore was given a score of two.

All other options provided increased accessibility through the provision of an RTN line, however as they did not connect with Mt Roskill, and were therefore given a score of one.

6.2.2 Investment Objective 2 – Environment

This criterion score was driven by likely mode share outcomes as understood from the previous transport modelling of equivalent options. This was closely linked to the level of accessibility an option provided. The scoring therefore generally matched that for investment objective 1. However, there were two exceptions. The SH16 alignment option is also a lot longer than the other options and the increased travel time associated with this was assessed as reducing the attractiveness of this option and therefore a score of zero was given.

The Sandringham Rd options were also only assessed as having a score of two as the mode shift was similar to that forecast with the Dominion Road options, based on previous modelling.

6.2.3 Investment Objective 3 – Urban Development

The options with the highest levels of accessibility have been assessed as providing the highest uplift in development potential. Sandringham and Dominion Road options were therefore scored at a two. The land use in these corridors is also not seen as a constraint to achieving the development sought, with the exception of the elevated, grade-separated options, which were scored a one given that they were less likely to provide the form of urban outcome sought along the corridor.

The remaining options were assessed as a one as they provided some potential for urban uplift and the ability to realise the form sought. The exception to this scoring were the SH16 option (which was alongside the motorway, reducing the ability to achieve the urban development outcomes sought) and the Manukau Rd option's existing land use was considered an increased challenge to realise the urban development outcomes sought.

6.2.4 Through to Sieve 2

Based on this assessment the Sandringham and Dominion Road options clearly deliver the outcomes more consistently than the other options and therefore it is recommended that these two routes (and their variants) be taken through to Sieve 2.

The existing Avondale-Southdown Rail Option is also recommended to proceed to Sieve 2 as it has sufficient performance against the outcomes to be assessed further.

6.3 Second Sieve

An assessment of the routes in this section by mode was undertaken against the Impacts criteria. This scoring is summarised in Table 10.



Table 10 : Mt Roskill to New North Road Sieve 2

	SH16	Existing Rail - Onehunga	Existing Rail - Western	Sandringham at grade	Sandringham underground	Sandringham elevated	Mid Sandringham Dominion (as grade)	Mid Sandringham Dominion (under ground)	Dominion at grade	Dominion underground	Dominion elevated	Mt Eden	Manukau	Direct
Investment Objective 1 – Accessibility	1	1	2	3	3	3	2	2	2	2	2	1	1	1
Investment Objective 2 – Environment	0	1	1	2	2	2	2	2	2	2	2	1	1	1
Investment Objective 3 – Urban Development	0	1	1	2	2	1	2	2	2	2	1	1	0	1
Impacts														
Achievability		-2	-2	-1	-2	-3	-2	-3	-1	-2	-3			
Affordability		-2	-2	-2	-3	-3	-3	-3	-3	-3	-3			
Environmental Impacts		-1	-1	-1	-1	-2	-1	-2	-1	-1	-2			
Social and Community		0	1	1	2	0	2	1	1	2	0			
Te Ao Maori							Not scored							
Property		-1	-2	-2	-1	-3	-2	-2	-3	-2	-3			

The rationale for these scores is provided in the following sections.

6.3.1 Achievability

All routes would have achievability challenges given the scale of the works required. However, these challenges are not considered to be insurmountable at this stage. All options were therefore given a score of at least minus-one.

The elevated options were assessed as having the most significant achievability challenges. This was due to the scale of structural construction and elevated stations in a reasonably constrained urban environment. This would pose a number of technical, consenting and implementation challenges and these options were scored minus-three.

The below-ground options were also considered to have substantial technical challenges due to the constrained environment and were scored minus-two. The existing Avondale-Southdown Rail option was also scored a minus-two as it was assessed as having a number of technical and planning challenges to implement in a constrained environment.

The on-street options for Dominion Road and Sandringham Road were considered to have a number of technical and practical challenges, however these were considered to be less than the challenges of below-ground construction and were therefore scored minus-one.

6.3.2 Affordability

All options would have substantial costs associated with them. There would be increased costs associated with grade-separated options (above- and below-ground) due to the scale and complexity of the works. These options were therefore assessed as a minus-three and the street-running options scored a minus-two.

The exception to this was the midway Sandringham / Dominion option where at-grade running would have additional cost associated with implementation, due there not be an existing transport corridor to utilise and therefore substantial property take required.

6.3.3 Environmental

The options are all substantial projects that will have impacts on the receiving environment. The elevated options were scored minus-two, primarily due to the impact on landscape and visual amenity. The remaining options were generally assessed as minus-one as the impacts were considered not as substantial.



6.3.4 Social and Community

All options were considered to have an adverse impact on communities during construction and implementation, with issues such as noise and vibration, however this is offset by the benefits in increased accessibility and community connection.

Options were generally considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts on communities during construction. Grade-separated options generally had greater impact during construction but less impact once operational, whilst at-grade options had less impact during construction with longer term impacts (such as potential severance). Due to the scale of existing development in this section, the below-ground options were scored a two and the street-running options a one. The elevated options were however considered to have substantial impacts on the community in the long term and therefore scored a zero.

The existing Avondale-Southdown Rail option was scored a zero as, whilst it had lesser impact due to its location, it also provided a smaller social benefit.

6.3.5 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

6.3.6 Property

The elevated options were assessed as having the highest property impact (minus-three) due to the direct impact on properties during construction and operation, and also the impact on surrounding properties through shading and other effects that could require mitigation.

Underground options were considered to have the least property impacts (these would still have an impact of scale though) and were scored a minus-one. The exception to this was the grade-separated midway Sandringham/Dominion option which was assessed as a minus-three, even though it was underground, due to the impacts at the station location and the need to provide access at these points across many properties.

At-grade options were assessed as being in between these two forms in terms of effect and were scored a minus-two. The exception to this was the midway Sandringham/Dominion option which was assessed as a minus-three due to the impacts on multiple properties along the corridor and at stations.

The existing Avondale-Southdown Rail option was scored a minus-one as there is an existing designation over large parts (but not all) of the likely route.

6.3.7 Recommended Short List

Based on this further assessment it is considered that the existing Avondale-Southdown Rail option should not be progressed further as there were other options that better serve this section and deliver better outcomes. Elevated structure options also should not be progressed further, due to the likely cost and impacts of these options. The options running midway between Sandringham and Dominion Roads had higher impacts than options on either Sandringham or Dominion Rd, for lesser outcomes, and therefore should not be progressed further.



It is therefore recommended that further analysis of the at-grade and underground Dominion Road and Sandringham Road options is required to understand potential differences in further detail.

6.4 Section D New North Road to Wynyard

An assessment of the routes in this section was undertaken against the Investment Objective criteria. This scoring is summarised in Table 11.

Table 11 : New North Road to Wynyard Sieve 1

	Queen St (at grade)	Queen St below ground	Albert Street (at grade)	Hobson Street (as grade)	Symonds Street (at grade)	Symonds Street (grade separated)	Hospital	University Wellesley Street (at grade)	University Wellesley Street (grade separated)	Parrell Rail	Southern Rail
Investment Objective 1 – Accessibility	2	1	2	1	2	2	3	3	3	2	2
Investment Objective 2 – Environment	2	2	2	2	3	3	3	3	3	2	2
Investment Objective 3 – Urban Development	2	2	2	2	3	3	3	3	3	2	2

The rationale for these scores is provided in the following sections.

6.4.1 Investment Objective 1 – Access

Initial transport analysis has highlighted the importance of the city centre as a regional employment destination. The Midtown area was taken to be the key destination of interest within the city centre in this assessment. The University precinct is also a known significant attractor of trips, and in particular public transport trips, due to the student demographic. All options provide an improved level of accessibility to the Midtown area of city centre and therefore provide benefits. Options that directly serve the University precinct were valued higher due to the increase in access to education trips (which is a key performance measure for the project). These options therefore scored a three. The remaining options were assessed at the lower level of access enhancement (but still strong) and scored a two. Symonds Street options were scored a two as, whilst they served the University precinct, they did not serve the Midtown area of the city centre as well and created potential challenges with retaining provision for the existing bus services in the corridor and also along Custom Street.

The exception to this were the Queen Street underground and Hobson Street options, with both scored at a lower level of accessibility at a one. For the Queen Street option this was due to the fact that the service would need to very deep under the street (due to other existing tunnels and poor ground conditions), making access to stations very difficult. The Hobson Street option did not access the Midtown area of the city centre as well as other options.

6.4.2 Investment Objective 2 – Environment

This criterion's scores were driven by likely mode share outcomes. This was closely linked to the level of accessibility an option provided as well as the level of patronage attracted. The scoring therefore generally matched that for Investment Objective 1. However, there were two exceptions. The Queen Street below-ground and the Symonds Street on-street options were both scored a two (compared to a one for Objective 1) due to the fact that both these options will still generate high mode shift given the fact that they provide improved public transport access to the city centre, thereby reducing carbon impacts.



6.4.3 Investment Objective 3 – Urban Development

The city centre is a major development opportunity for both employment and residential activities. Increasing access to the city centre is likely to provide the opportunity to facilitate considerable development uplift. The density of the city centre also supports the urban form outcomes sought.

The options with the highest levels of accessibility have been assessed as providing the highest uplift in development potential. Linkages to the University precinct provided a high level of access to a major attractor in the city centre, and were considered to provide greater opportunities for development potential in and around the University precinct as well as the wider city centre. The Symonds St and University precinct options therefore were assessed as having a score of three.

All other options were assessed as having a high uplift opportunity and therefore scored a two.

6.4.4 Through to Sieve 2

Based on this assessment all of the options performed well against the investment objectives and therefore should be taken through to Sieve 2.

It is noted that the Hospital option was not assessed further as whilst it performed sufficiently to be move to Sieve 2, it relied upon the Manukau Road option in the Mt Roskill to New North Road section, which was not shortlisted.

6.5 Second Sieve

An assessment of the routes in this section by mode was undertaken against the Impacts criteria. This scoring is summarised in Table 12.

Table 12 : New North Road to Wynyard Quarter Sieve 2

	Queen St (at grade)	Queen St below ground	Albert Street (at grade)	Hobson Street (as grade)	Symonds Street (at grade)	Symonds Street (grade separated)	Hospital	University Wellesley Street (at grade)	University Wellesley Street (grade separated)	Parnell Rail	Southern Rail
Investment Objective 1 – Accessibility	2	1	2	1	2	2	3	3	3	2	2
Investment Objective 2 – Environment	2	2	2	2	3	3	3	3	3	2	2
Investment Objective 3 – Urban Development	2	2	2	2	3	3	3	3	3	2	2
Impacts											
Achievability	-2	-3	-3	-2	-3	-3		-3	-3	-3	-3
Affordability	-2	-3	-3	-2	-2	-3		-2	-3	-3	-3
Environmental Impacts	-2	-2	-2	-1	-2	-2		-2	-2	-2	-2
Social and Community	1	1	-2	-1	1	1		2	2	-1	-1
Te Ao Maori											
Property	-2	-1	-2	-2	-3	-1		-2	-1	-2	-2

The rationale for these scores is provided in the following sections.

6.5.1 Achievability

Constructing projects of this scale in the Auckland city centre will be very challenging. There are multiple constraints such as the needs of services, businesses and city centre residents, and employees that all need to be considered and provided with specific mitigation or construction practices, as has been shown in the current CRL construction. The transport system is also finely tuned in the city centre and any disruption will require considerable effort, particularly for the planning and design of pedestrian and bus routes.

For these reasons all of the options were scored a minus-three, as whilst some might be more difficult than others, the assessment concluded that all would be highly challenging and this issue was not a differentiator between options. Even underground options were found to be difficult to achieve in the city centre environment, as shown by the current CRL construction situation. At-grade options on Hobson Street and Queen Street were scored minus-two as the width of Hobson Street provides greater flexibility and the relative lack of buses on Queen Street compared to other corridors also assists.

6.5.2 Affordability

All options would have substantial costs associated with them in this section. All options were considered to have at least a score of minus-two given the costs were assumed to be in the many hundreds of millions at a minimum (based on CRL experience). Some options were then scored minus-three as they were considered to be of an order of magnitude more costly. These included:

- Queen Street below-ground – Due to depth of tunnel and complexity of station access
- Albert Street – Due to complexity in getting to Albert Street and costs of changing the bus services and that the street has recently been upgraded as part of CRL construction.
- Symonds Street grade-separated – Cost of underground works would be greater and costly during construction given the high volume of buses along the route and the likely mitigation required
- Wellesley Street grade-separated - Cost of deep underground works would be greater and the underground interface with other key infrastructure in the city centre (i.e. CRL) would be difficult
- The two heavy rail options would require considerable tunnelling and deep stations which would increase the costs

6.5.3 Environmental

These are all substantial options that will have impacts on the receiving environment. As for the achievability criteria, the receiving environment assessment was considered similar for all options and therefore the assessment was that each option was scored a minus-two, indicating that whilst there would of course be differences between individual options, this criterion was not a differentiator between the options at this time.

6.5.4 Social and Community

All options were considered to have adverse impacts on the city centre community during construction and implementation, with issues such as noise and vibration, however this is offset by the benefits in increased accessibility and community connection, particularly for the options that accessed the university precinct.

Options were generally considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts on communities during construction. Options that provided good access to the University were scored higher as this was considered an important location to improve social connection. The Wellesley St options were therefore scored two as they connected directly to both the University area and the city centre. The Symonds Street options scored a one as they did not serve to the Midtown area. Likewise the Queen Street options were scored a one as they did not connect as well to the University area.

The Albert Street option was scored a minus-two given the fact that this area of the city has recently been subject to years of construction impacts for CRL.



The Hobson Street option was also assessed at a minus-one due to the distance from the Midtown area and the university precinct, resulting in less improvement in social connectedness within the city centre.

The heavy rail options were also scored a minus-one as whilst they provided access benefits, the depth of the stations resulted in communities within the city centre not being as easily connected as other options.

6.5.5 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

6.5.6 Property

Underground options were considered to have the least property impact (still an impact of scale though) and were scored a minus-one. The exception to this were the heavy rail options which were assessed as a minus-two, even though they were underground, due to the additional impacts expected from the need to construct deep stations and the likely need to provide access across more properties.

On-street options were assessed as being a minus-two given the likely greater impact on properties in certain locations.

The Symonds Street at-grade option was assessed as being particularly challenging from a property perspective due to the likely impact of the construction given the high number of buses in the corridor and need to continue to service the University precinct, and the implications this could have on properties.

6.5.7 Recommended Short List Modes

Based on this further assessment it is considered that the heavy rail options should not be progressed further as there were other options that performed better in this section, delivering better outcomes for less impact. Continuing a route from the University area down Symonds Street/Anzac Ave did not connect to the Midtown area as well as other options and had potentially significant impacts on the critical bus corridors of both Customs Street and Symonds St, therefore should not be progressed further.

The Hobson Street and underground Queen Street options did not deliver the same level of outcome as other options for a similar level of impact and therefore should not be progressed further.

The Albert Street option had greater impacts than the parallel Queen Street option (street-running) but delivered a similar level of outcome and therefore should not be progressed further.

It is therefore recommended that further analysis is required of the at-grade option down Queen Street and both the at-grade and underground options from the University precinct via Wellesley Street, to understand these in more detail and are therefore shortlisted.

7 Other Modal Options

An assessment of the other broad range of modes was undertaken against the Investment Objective criteria. This scoring is summarised in Table 13. When considering these modes it was assumed that the route they would travel would be generally in line with the CC2M corridor, from Wynyard Quarter, through the city centre and Isthmus, then Onehunga and Mangere on the way to the Airport.

Table 13 : Other Options Sieve 1

	Gondola	Hyperloop	Monorail	Connected vehicles	Vacuum Trains	Tram Train	Magnetic Trains	Cycling Super Highway	Mobility as a service
Investment Objective 1 – Accessibility	1	0	2	1	1	2	0	1	0
Investment Objective 2 – Environment	1	0	1	0	1	2	0	1	0
Investment Objective 3 – Urban Development	1	1	0	0	0	2	1	0	0

The rationale for these scores is provided in the following sections.

7.1.1 Investment Objective 1 – Access

All of these options were considered to generally improve accessibility and provide in some level for growth. However these options did have some challenges. The gondola option, for instance, has a longer travel time than rail-based modes, the connected vehicles option would provide an increase in capacity, but not to the scale required for the corridor, and the Cycle Super Highway option does not have sufficient capacity to serve as a rapid transit service. These options were therefore assessed as a score of one.

The Hyperloop and Magnetic Train options have high speeds but a low number of stations, reducing the accessibility benefits and were therefore scored at zero. The Mobility as a Service option was also scored zero as whilst it would reduce demand, this impact is assessed to be relatively modest as a standalone intervention.

The Train Tram and Monorail options were scored at a two as they provided a similar level of accessibility enhancement to that of some of the rail options assessed in the main modes section.

7.1.2 Investment Objective 2 – Environment

This criterion scored was driven by likely mode share outcomes. This was closely linked to the level of accessibility an option provided. The scoring therefore generally matched that for Investment Objective 1. However, there were two exceptions. The Monorail and Connected Vehicle options were scored lower, as the Connected Vehicles would have more vehicles on the transport system, even though they were 'connected', thereby decreasing the carbon reduction benefits. The Monorail option was assessed as having a lesser mode shift benefit due to the raised nature of the stations being assessed as reducing the attractiveness of this option to users.

7.1.3 Investment Objective 3 – Urban Development

The options with the highest levels of accessibility have been assessed as providing the highest uplift in development potential. In some cases, however, these options also challenged the form of the Urban Development sought. The Monorail option would be elevated and therefore



not be as aligned with the form of Urban Development sought, resulting in an assessed score of zero. The Connected Vehicles, Cycling Super Highway, Vacuum Trains and Mobility as a Service options were also not considered to provide the form (or scale) of Urban Development sought, resulting in a zero score. The Hyperloop and Magnetic train with their low number of stations would support the form of development to some extent but not to the scale of other options and therefore were assessed as a one.

The Tram Train option was considered to provide in principle a similar level of Urban Development outcome as the other rail modes.

Options using Sandringham or Dominion Road were therefore scored at a two. The existing land use in these corridors is also not seen as a constraint to achieving the land use integration form sought.

7.1.4 Through to Sieve 2

Based on this assessment all options bar two (Gondola and Tram Train) scored a zero in at least one of the objectives and therefore should not be assessed further as they do not deliver the outcomes sought.

The Gondola option scored a one against all objectives. However given other options (such as light rail and light metro options) have scored considerably higher across multiple objective criteria, it is recommended that this option is not short listed.

The Tram Train option is essentially a rail mode that can use a dedicated corridor rail system as well as being compatible with the wider heavy rail system. It is considered that this option is covered by the Light Rail and Light Metro options already shortlisted and the vehicle selection process could address the benefits of this Tram Train option and therefore this option does not need to be short listed as a standalone.

It is therefore recommended that none of these 'other modal options' are short listed.

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8 Potential Full Route Short List Options

8.1 Short listed options by section

Based on the above assessment, Table 14 outlines the options that made it through the short-listing process.

Table 14 : Short listed options by section

Mode	Airport to Onehunga	Onehunga to Mt Roskill	Mt Roskill to New North Road	New North Road to Wynyard Quarter
<ul style="list-style-type: none"> • Light Rail • Light Metro 	<ul style="list-style-type: none"> • SH20 Only • SH20 and Mangere Town Centre (on street and grade separated) • SH20, Bader Dr and Mangere Town Centre (on street and grade separated) 	<ul style="list-style-type: none"> • SH20 and Onehunga (on street and grade separated) 	<ul style="list-style-type: none"> • Dominion Road (on street and grade separated) • Sandringham Road (on street and grade separated) 	<ul style="list-style-type: none"> • Queen Street at grade • Wellesley Street (on street and grade separated)

From this sectional assessment, composite options for the full length of the route were developed. These options were developed based on mode initially, with a Light Rail and a Light Metro option identified, with a number of route variants to be assessed further in the shortlisting stage to identify the best Light Rail and the best Light Metro option for consideration.

Figure 3 sets out these two options and the route variants that should be explored further (and outstanding issues resolved) in the Short List option development phase.

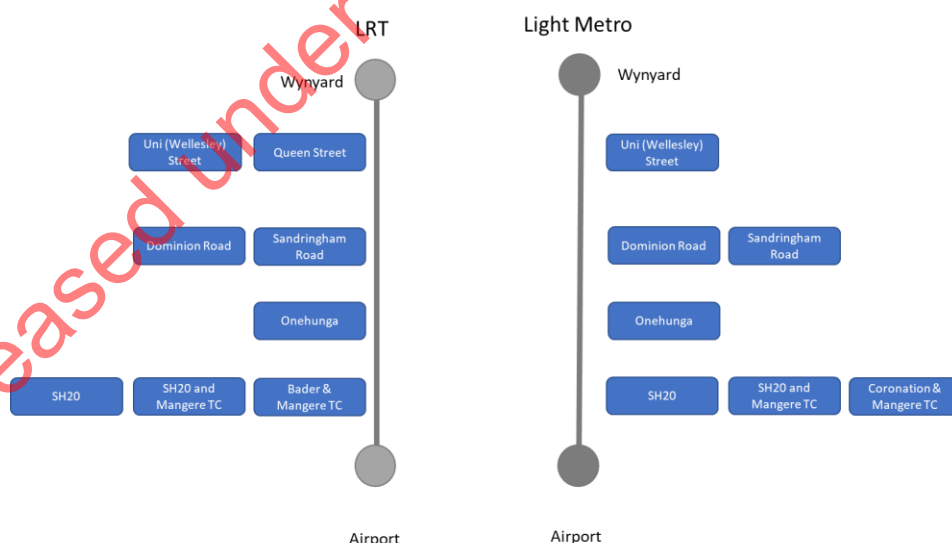


Figure 3 : Sectional Shortlist Options



These two options are consistent with the ARTP options identified for further investigation.

8.2 Full Route Option Review

The preceding assessment of options was focussed on individual corridor sections and this identified the short list options identified above for the full route. There was a risk that this approach discarded options at a sectional assessment level (for good reason), however if a full route lens was applied some of these sectional discarded options might warrant further consideration.

A review of the full route was undertaken, using modes which were found to have the potential to provide well for project objectives. This identified two further options for consideration as outlined below:

- Onehunga Rail Line extension to the Airport and a bus-based solution north of Onehunga to the City Centre
- Western Rail Line extension to the Airport (using the Avondale-Southdown corridor) and a bus-based solution from Mt Roskill to the City Centre

These two options are explored further in the following sections of this report.

8.2.1 Onehunga Rail Line extension to the Airport and a Bus-based solution north of Onehunga to the City Centre

This option is outlined in Figure 4

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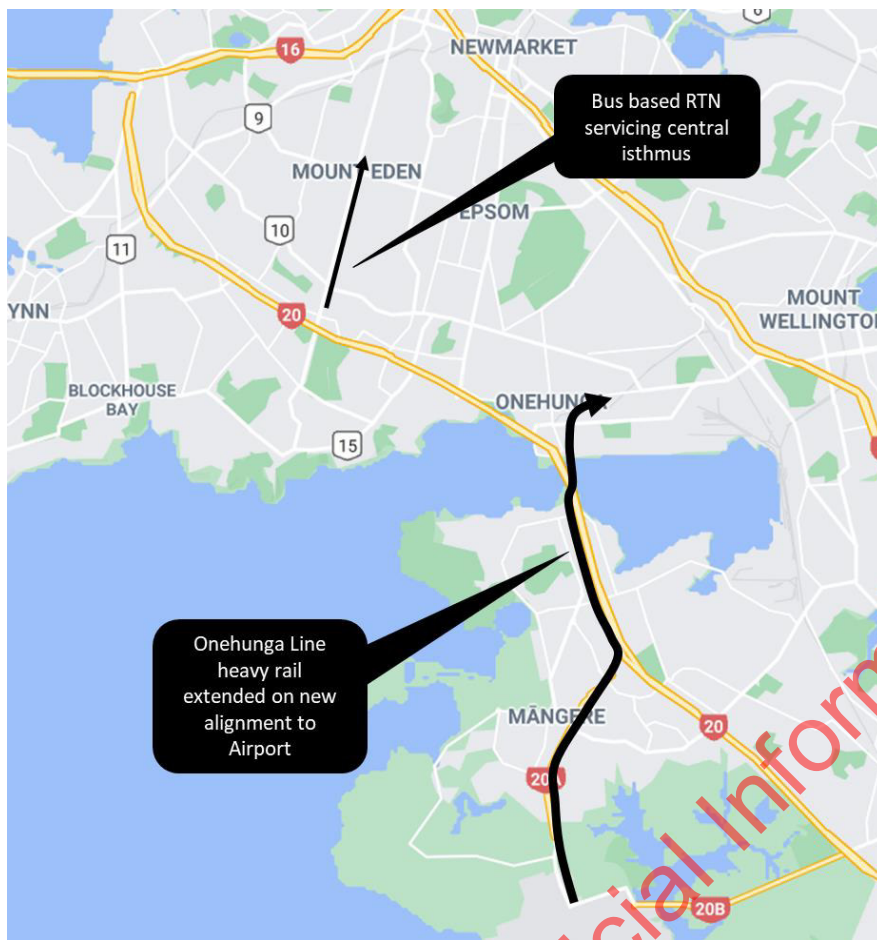


Figure 4 : Onehunga Line Rail Option

The genesis of this option was that bus-based options were discounted due to the lack of capacity, particularly near the city centre and that the Onehunga Rail option was not progressed in part due to the fact that it did not serve the Mt Roskill development area. However, combining these two elements potentially has the ability to work well. The extension of the Onehunga rail line would serve demand from the corridor south of Onehunga (approximately 40% of total demand). This allows the consideration of a bus-based system north of Onehunga, as it is more likely to have sufficient capacity for the lower demand in this area.

A key consideration for this option is the ability for additional train services to be provided on the Onehunga rail line into the city centre. This issue was explored in detail with the AT train operations team who have confirmed that an alternative train plan would be able to be accommodated that would result in six trains/hr from Onehunga to the Airport in 2048.

Additional bus services to the present day volumes would be required to service the area north of Onehunga. To cater for approximately 60% of the demand forecast (the remaining 40% being carried on the Onehunga rail line) a segregated busway style corridor would be required. It is expected that to provide for six trains/hr, the Onehunga rail spur would require double-tracking and level crossing removal.

8.2.2 Western Rail Line extension to the Airport and a Bus based solution from Mt Roskill to the City Centre

This option was developed based on the Onehunga Line option above and adding another rail-based option using the existing Avondale-Southdown rail corridor to serve Mt Roskill. This option was considered in the sectional assessment but discounted largely due to the better

performing alternative routes in the section. However, when considered at the level of the entire route, those differences are diminished and the ability to make use of existing infrastructure (i.e. the existing Western Line) becomes more attractive.

This option is outlined in Figure 5.

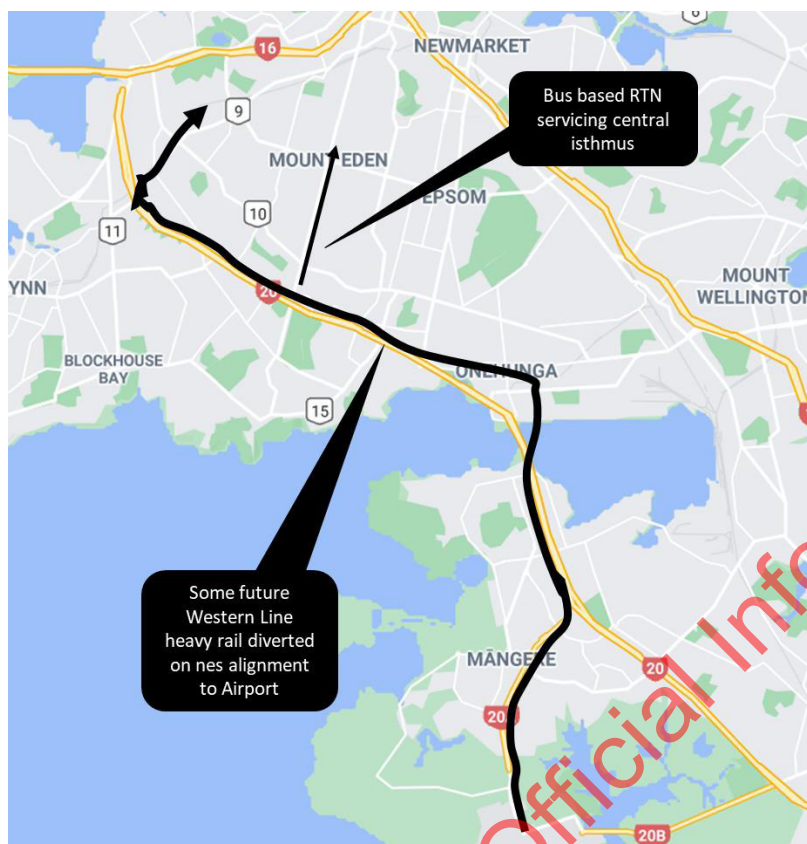


Figure 5 : Western Line Rail Option

This option would make use of KiwiRail's existing Avondale to Southdown Rail designation to Onehunga from Mt Albert, noting that some land acquisition would still be required.

This option has been considered previously (in the SWAMMCP study in 2015), with an Onehunga Line option preferred at that time. One of the main changes since this earlier assessment is the prominence of the Mt Roskill Urban Development opportunity. This option services this area very well.

One of the risks with this option was the inability for CRL to accommodate the additional train services required for this option to provide a sufficient service.

Investigations with the AT Train Operations team have confirmed that there is sufficient capacity within CRL through the diversion of six trains an hour that were otherwise heading out further on the Western line to make use of this new line. There is also the opportunity to run the proposed two trains an hour on the Onehunga line through to the Airport, giving an eight trains an hour peak service to/from the Airport.

Initial analysis also indicates that this option will be within a similar cost range of the other proposed short list options.

Additional bus (or even LRT) services would still need to be provided to service the central isthmus spine of Dominion and Sandringham Roads, to a lesser degree than the Onehunga rail line extension option.



8.2.3 Should these Existing Rail Options be Short Listed?

To determine if the two rail options were to be short listed along with the Light Rail and Light Metro options, they were first compared to each other. This confirmed that whilst both options had merits, the Western Rail Option was considered to outperform the Onehunga option for the following reasons:

- The Western line option provided a higher quality rapid transit connection to the development area of Mt Roskill
- The Western line option provided an additional rail connection, creating an increase network resilience
- The Western line option provided an ability to run freight on an alternative route
- The Western line option also provided the ability to connect with the Onehunga Line, giving greater travel choice and accessibility to customers south of Onehunga
- The Western line option provides the ability to run an increased service (8tph vs 6tph)
- The Onehunga option would still require a dedicated busway-style corridor through the central isthmus section of the route, as well as double-tracking and level crossing removal along the Onehunga rail spur

The Onehunga Rail option was therefore not recommended for short listing, given the Western line Option outperformed it.

Noting that the Western line option has been assessed as the stronger performer of the two heavy rail options, makes good use of existing and future infrastructure, and has a comparable cost profile, it is considered that this option should be short listed for further investigation (along with light rail and light metro) to understand the benefits and challenges of this option in more detail.

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9 Emerging Short Listed Options

9.1 General

Based on this Long List assessment it is recommended that three options, with the identified route variants, are short listed as outlined in Figure 6.

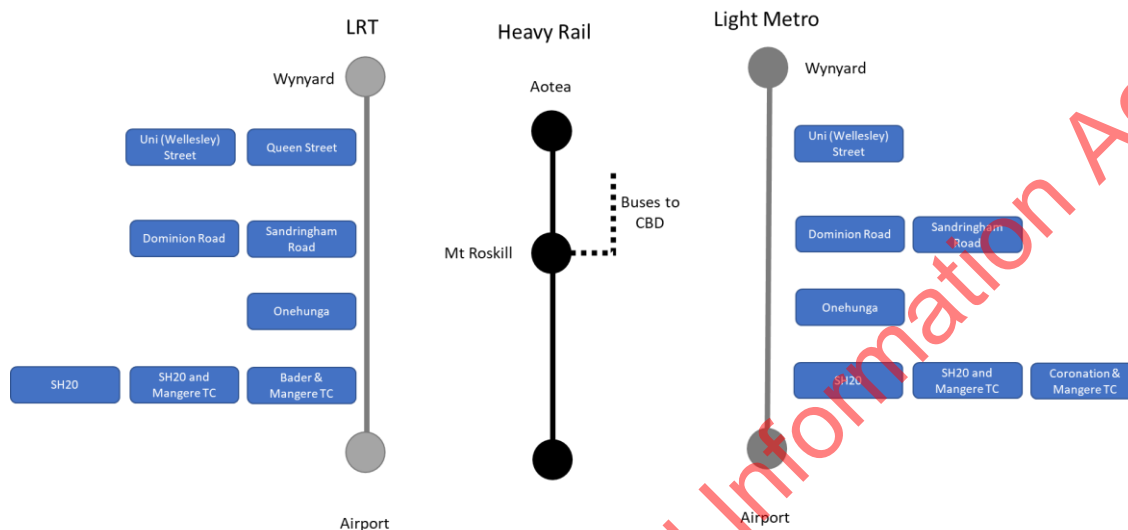


Figure 6 : Recommended Shortlisted Options

The focus of the short listing phase will be to confirm (for the purposes of assessment) the optimal version of each option and understand in more detail the benefits, the costs and the key trade offs of each option. It is recognised that there remain a number of outstanding elements or issues that will require substantial further public consultation before a final decision can be made, so it should be noted that whilst this Long List to Short List process is appropriate for this phase, further more detailed design and assessment work will be undertaken at the Detailed Business Case phase, to further refine and optimise the option(s).

These Light Rail and Light Metro options are consistent with the ARTP options identified for further investigation, and if the heavy rail option emerges as the preferred through the short listing analysis the implications for ARTP will need to be considered.

There are a number of sub elements to the Light Rail and Light Metro Option that were then assessed in more detail to further refine this short list.

9.2 Further Assessment Approach

The identified emerging short listing has identified a number of sub-options within different sections of the route (Central City, Isthmus and Mangere).

These sub-options were then assessed in more detail and taken through the MCA process to identified the final short list options.

The assessment was done at a section basis for each option as the sub-options are sectionally based and mutually exclusive which allows the analysis to be undertaken at a section level.

More detailed information was available from when the original long list assessment was undertaken and therefore there are some changes from the scoring in this earlier analysis.

The following sections summarise this assessment.

10 Light Rail Sub-Option Assessment

10.1 Central City Section

There were two options considered at this stage as shown in Figure 7.

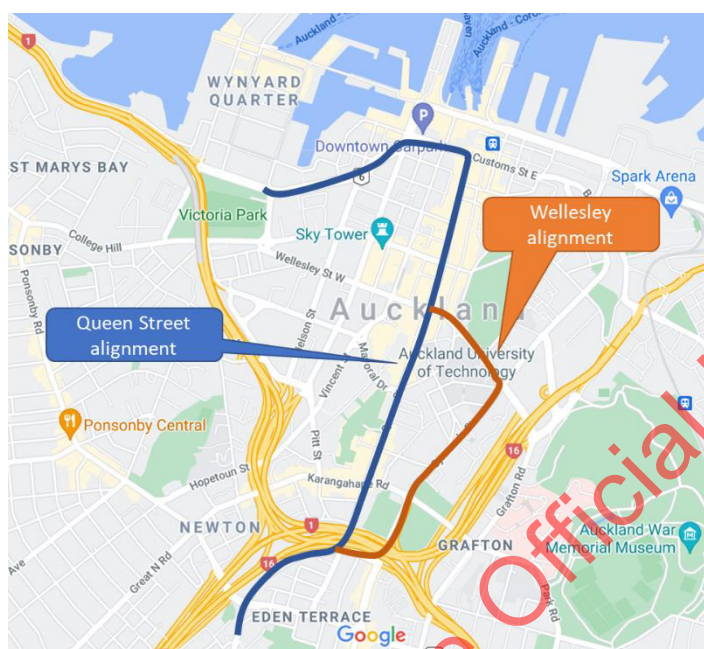


Figure 7 : Central City Light Rail sub-options

This scoring is summarised in Table 11.

Table 15 : Light Rail Central City section

	Queen St (at grade)	University Wellesley Street (at grade)
Investment Objective 1 – Accessibility	2	3
Investment Objective 2 – Environment	2	2
Investment Objective 3 – Urban Development	2	2
Achievability	-2	-3
Affordability	-2	-3
Environmental Impacts	-2	-2
Social and Community	1	2
Te Ao Maori		
Property	-2	-2

The rationale for these scores is provided in the following sections.



10.1.1 Investment Objective 1 – Access

The University precinct is also a known significant attractor of trips, and in particular public transport trips due to the student demographic. Both options provide an improved level of accessibility to the Midtown area of city centre and therefore provide benefits.

Modelling indicates that the University would attract in the order of 3000 trips in the morning peak period from the project corridor. The Queen Street option would however allow students transfer at Wellesley Street to make use of the very frequent buses on this route that link to the University, providing a high level of access to the University also.

The University option would also have a detrimental impact on the operation of the Central City bus network. Given the importance of the top end of Symonds Street and also Wellesley Street to the operation of this network.

On balance the previous scores of two (Queen Street) and three (Wellesley Street) were retained.

10.1.2 Investment Objective 2 – Environment

This criterion's scores were driven by likely mode split outcomes. This was closely linked to the level of accessibility an option provided as well as the level of patronage attracted. The scoring therefore generally matched that for Investment Objective one. However, offsetting the additional benefits of the University from a patronage and accessibility perspective was the disruption to the wider bus network in this area and the resultant impacts on mode shift.

On balance the previous scores of two (Queen Street) was retained for Queens Street, however the additional information for the Wellesley Street option resulted in a reduced score of two.

10.1.3 Investment Objective 3 – Urban Development

The city centre is a major development opportunity for both employment and residential. Increasing access to the city centre is likely to provide the opportunity to facilitate considerable development uplift. The density of the city centre also supports the urban form outcomes sought.

Further consideration of the development uplift around the University was undertaken and this assessed that whilst there was the potential for increased development as a result of the proximity of the University, the University was a strong attractor for users in its own right and its significant land ownership in the area would likely largely negate any additional urban development to that over and above the Queen Street option.

Both options were therefore scored the same (two), which was a point less for the Wellesley Street option for the reasons outlined above.

10.1.4 Achievability

Constructing projects of this scale in the Auckland city centre will be very challenging. There are multiple constraints such as services, businesses and city centre residents, and employees that all need to be considered and provided with specific mitigation or construction practices, as has been shown in the current CRL construction. The transport system is also finely tuned in the city centre and any disruption will require considerable effort for the planning and design of pedestrian and bus routes.



Further analysis indicated the gradient challenges on Wellesley Street would create implementation risks and given the disruption to the Symonds and Wellesley Street bus services localised mitigation would be required resulting in difficult engineering solutions including bridge widening.

This indicated that there was a material difference in the technical challenges of the two options and that this warranted a difference in score between the two options. The existing scores of minus two (Queen Street) and minus three (Wellesley Street) were therefore retained, given this more detailed assessment information.

10.1.5 Affordability

Both options would have substantial costs associated with them in this section. The Wellesley Street option was considered to be more expensive as a result of the likely works required to the existing bus and active modes networks on both Symonds Street and Wellesley Street and the increased length of this option. The total cost difference between these two options was considered to be in the order of tens of millions of dollars.

This indicated that there was a material difference in the cost/affordability of the two options and that this warranted a difference in score between the two options. The existing scores of minus two (Queen Street) and minus three (Wellesley Street) were therefore retained, given this more detailed assessment information.

10.1.6 Environmental

These are substantial options that will have impacts on the receiving environment. Like achievability, the receiving environment was considered similar for all options and therefore the assessment was that both options was scored a minus two, indicating that whilst there would of course be differences between the two options, this criterion was not a differentiator at this time between the options.

The carbon benefits were assessed as being similar as whilst the Wellesley option attracted more patronage (mode shift) there was also increased disruption and inefficiencies to the existing bus network.

10.1.7 Social and Community

Both options were considered to have adverse impacts on the city centre community during construction and implementation, with issues such as noise and vibration, however this is offset by the benefits in increased accessibility and community connection, particularly for the options that accessed the university precinct.

Both options were generally considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts during construction on communities. The Wellesley St option was therefore scored two as they connected both the University area and the city centre increasing social connectedness at a local level.

The Queen Street options were scored a one as they did not connect as well to the University area.

10.1.8 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered

important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

10.1.9 Property

On-street options were assessed as being a minus two given the likely greater impact on properties in certain locations.

The Wellesley Street option could have greater impacts on property as a result of the mitigation likely on Symonds and Wellesley Street to provide an appropriate level of service for bus and active mode users. However it was generally assumed that a built solution would be identified and this manifested itself in the achievability and affordability criteria identified above.

10.1.10 Recommended Short List Modes

Based on this further assessment it is considered that the Queen Street option is the stronger option for the following reasons:

- It is a cheaper option that provides the majority of the outcomes sought.
- Whilst it does not provide direct access to the University, it has a high-quality interchange on Wellesley Street with a direct high frequency bus route to the University that provides high accessibility to the University
- It interfaces with the Central City bus network more effectively and with less disruption

It is acknowledged that both options have considerable merit and whilst the Queen Street option is preferred for the reasons outlined above. If the University connection can be achieved without disruption the existing bus and active mode network for a comparable cost, this would be highly valued.

10.2 Isthmus Section

There were two options considered at this stage as shown in Figure 8.

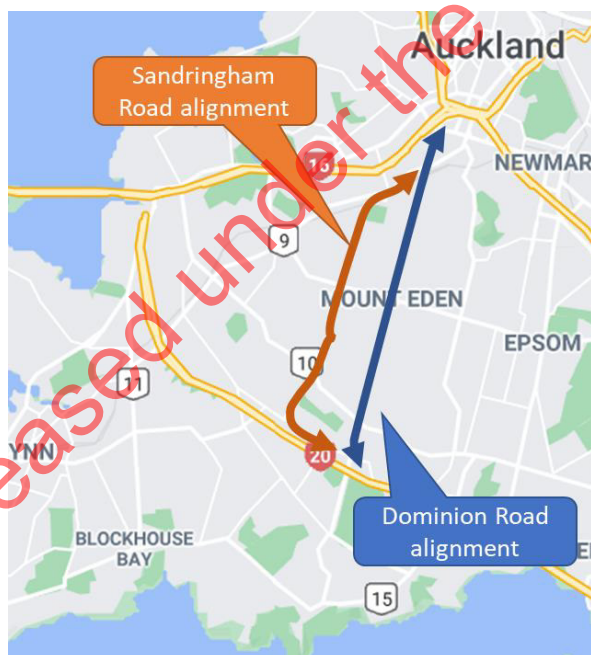


Figure 8 : Light Rail Isthmus sub options

This scoring is summarised in Table 11.

Table 16 : Light Rail Isthmus section

	Sandringham at grade	Dominion at grade
Investment Objective 1 – Accessibility	2	2
Investment Objective 2 – Environment	2	2
Investment Objective 3 – Urban Development	2	2
Achievability	-1	-1
Affordability	-2	-2
Environmental Impacts	-1	-1
Social and Community	1	1
Te Ao Maori		
Property	-2	-2

The summary rationale for these scores is provided in the following sections.

10.2.1 Investment Objective 1 – Access

Initial modelling of these two options identified that through this section the Dominion Road option was approximately 3mins faster, predominantly due to the short length. This has important wider network implications for accessibility as Mangere town centre is on the cusp of being within 45mins from the central city, and this two minutes puts the Mangere town centre stop just outside of this important catchment. This impacts in the order of 150,000 people in 2048 having greater accessibility to employment in the central city.

However the Sandringham alignment provides the best accessibility to the Kainga Ora area of development, with patronage increasing by approximately 600 people in the morning peak hour due to this stop when compared to the Dominion Road option. However along the route, due to the longer travel time, the patronage is similar (approximately 4500 in the morning peak heading to the central city at Kingsland, with a 5% difference between the two alignments, with Dominion Road having slightly greater demand at this point)

Balancing these two important considerations has resulted in both options being scored a 2, given the small difference between the two options..

10.2.2 Investment Objective 2 – Environment

This criterion score was driven by likely mode share outcomes from the previous transport modelling of options. Given the patronage was very similar along both alignments in this section (for different reasons), both options were scored a two as per the previous assessment.

10.2.3 Investment Objective 3 – Urban Development

Initial land use modelling of these two corridors for light rail indicated that the Dominion corridor attracted a slightly greater uplift in development potential as a result of increased accessibility. This was in the order of 16,000m² more (predominantly residential) along the corridor, with total uplift of 363,000m² on Dominion Road fprecast. Sandringham had an increase in potential at Mt Roskill as well given the public ownership and considerable increase in access in this location.

On balance, both options were scored as a two as whilst there was a difference between the two options from an uplift perspective, this was only a 4% difference.



10.2.4 Achievability

Both routes would have achievability challenges given the scale of the works. The Dominion Road and Sandringham Road options were considered to have a number of technical and practical challenges common to both, such as services and access during construction.

The Dominion Road corridor had heritage buildings, more established town centres and view shafts to contend with during implementation. Sandringham Road has however a generally narrower cross section (21m vs 24m) which would create implementation challenges.

On balance it was considered that both options would have a similar level of challenge (for different reasons) and the previous score of minus one for each option remained.

10.2.5 Affordability

Both options would have substantial costs associated with them. Sandringham Road would have a slightly greater cost as a result of the longer length. This additional cost is offset somewhat for Dominion Road which has more established and commercial building resulting in increased property costs. The difference between the two options is therefore considered to be relatively small (at less than 10%).

Therefore both options were scored a minus two. This is a better score for Dominion Road as the property costs vs additional length difference between the two options is now better understood.

10.2.6 Environmental

These are substantial options that will have impacts on the receiving environment. Like achievability, the receiving environment was considered similar for all options and therefore the assessment was that both options was scored a minus one, indicating that whilst there would of course be differences between the two options, this criterion was not a differentiator at this time between the options.

The carbon benefits were assessed as being similar as both options had a similar level of patronage in this section.

10.2.7 Social and Community

Both options were considered to have adverse impacts on the city centre community during construction and implementation, with issues such as noise and vibration, however this is offset by the benefits in increased accessibility and community connection.

Both options were generally considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts during construction on communities.

Both options were similar in this regard, connection similar but slightly different local communities and were therefore scored a one.

10.2.8 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

10.2.9 Property

Both options would require considerable properties. s 9(2)(i)

On balance both options were assessed with a score of minus two. This was an improvement for Dominion Road due to the identification of the properties already owned by Auckland Transport.

10.2.10 Recommended Short List

Both options provide improved outcomes as sought by the project, for a similar impact. The fundamental difference is a trade off between the longer travel time of Sandringham (and impacts on the wider use of the corridor by users from Mangere and beyond) and the increased development potential of the Sandringham corridor and in particular the Kianga Ora land in Mt Roskill. Initial modelling indicates that these two issues somewhat balance each other out.

However this is such a critical issue, it is considered that this area would benefit from a more detailed assessment.

It is therefore recommended that both of these options are short listed for the Light Rail mode.

10.3 Light Rail Mangere Section

There were three options considered at this stage as shown in Figure 9.

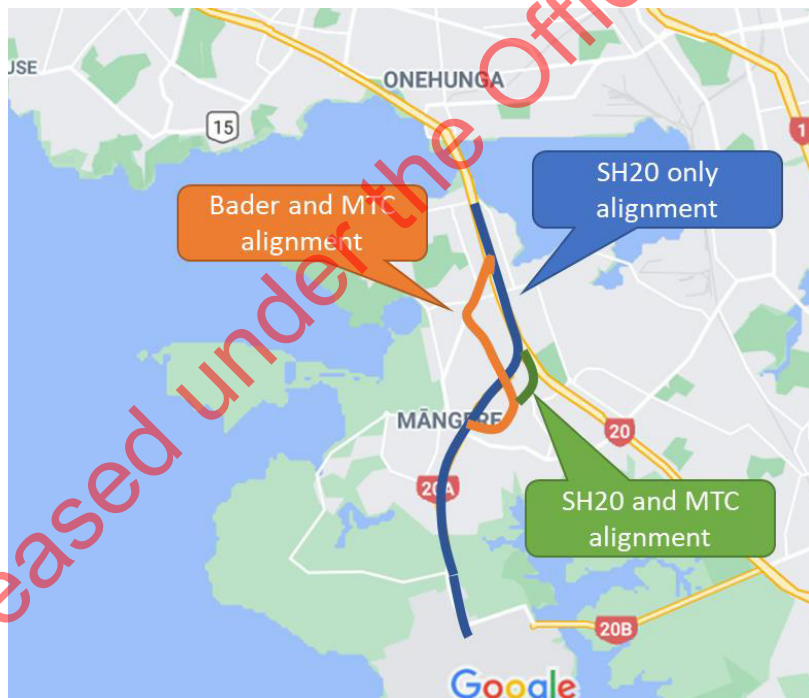


Figure 9 : Light Rail Mangere sub-options

This scoring is summarised in Table 11.



Table 17 : Light Rail Mangere sub option assessment

	Bader Mangere TC (at grade)	SH20	SH20 Mangere TC (at grade)
Investment Objective 1 – Accessibility	2	1	2
Investment Objective 2 – Environment	2	2	2
Investment Objective 3 – Urban Development	2	1	2
Achievability	-2	-1	-2
Affordability	-2	-1	-2
Environmental Impacts	-2	-1	-2
Social and Community	2	1	2
Te Ao Maori			
Property	-2	-1	-2

The rationale for these scores is provided in the following sections.

10.3.1 Investment Objective 1 – Access

The SH20 only option provides improved accessibility to the area through stops at Bader Drive and Favona. This option also provided the quickest route, providing accessibility benefits to the wider network users through this area.

The Bader and Mangere town centre options provide increased accessibility to these development areas which is highly valued.

The transport modelling indicated that there is little difference in patronage between a SH20 option and Bader Drive with a difference in demand of in the order of less than 100 people over two hours, partly due to the large modelling zones in the area and the fact that the SH20 alignment has stations nearby to the development areas.

Based on the modelling results and the assessment that stations closer to the proposed development in the Manger town centre and along Bader Drive the SH20 only option was score a one and the other two options a two.

10.3.2 Investment Objective 2 – Environment

All options provided an improved level of mode shift (and therefore carbon reduction). Whilst there are small differences between the options, the transport modelling indicates that small changes in patronage exist between the options.

Therefore all options were scored the same (at two) as the Bader and town centre options generally provided greater penetration into development areas, increasing mode shift in those areas, whilst the faster routes provided greater benefits to longer distance trips.

10.3.3 Investment Objective 3 – Urban Development

The options that better served areas of known future planned development in this section (Bader Dr and Mangere Town Centre) scored higher than those that did not. The land use modelling results indicated an urban uplift of approximately 43,000m² in this area.

This resulted in options that went through one of these areas being scored at a two. This is an increase in score for the Mangere town centre only option from the earlier scoring based on the fact that a station in this area was high desirable from an urban development perspective to deliver the growth to the scale and form sought and that a station in the town centre was considerably better from an urban development perspective at achieving this.



The SH20 only option provided urban development opportunities, however not as great as those options that went through the development areas (30,000m² for the SH20 option) and was therefore scored a one.

10.3.4 Achievability

All routes would have achievability challenges given the scale of the works. However, these challenges are not considered to be insurmountable at this stage.

The options that went through Bader Dr and Mangere Town Centre was also considered to have a cumulative impact on technical implementation challenges (due to the increased length in a constrained urban environment) resulting in a score of minus two.

Getting an alignment from SH20 through the Mangere town centre was difficult given the constraints in the area, such as the parks, school, community facilities and property in the area. A number of different alignment were considered to minimise these challenges, however they are still considered substantive in this area and therefore a score of minus two was assessed as being appropriate.

The SH20 only option had significantly less constraints being in the motorway corridor, however still needed to deal with the issue of working in or near the motorway and was therefore scored a minus one.

10.3.5 Affordability

The SH20 only option was considered the cheapest of these options and therefore given a score of minus one (there would also be less opportunity for urban value capture). The Mangere town centre options were in the order of tens of millions of dollars more due to increased length and interfaces with the Bader and Mangere town centre option a few more tens of millions.

The Mangere town centre and Bader and Mangere town centre options were scored a minus two to reflect the difference in cost for these options.

10.3.6 Environmental

There was no new information to update the earlier assessment that concluded the options that went through the Bader and Mangere town centre increased impact on the town centre of Mangere from a landscape and visual perspective and were therefore scored a minus two.

The SH20 only option which was at grade but largely within an existing transport corridor and therefore was given a score of minus one.

10.3.7 Social and Community

All options were considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts on communities during construction.

The Bader Drive and Mangere Town Centre options and the Mangere town centre only option were scored a score of two due to the enhanced (direct) community connection these options would provide to other nearby areas and the improved urban outcomes in these areas as a result of the option.



The SH20 only option would provide improved connectivity, however due to the location of the station, this impact would be reduced compared to the other two options. This option was therefore scored a one.

10.3.8 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

10.3.9 Property

The SH20 only option, which was at-grade but largely within an existing transport corridor would have some property impacts through this section, but minimal and this was therefore given a score of minus one.

The greatest property impact of these options was going through the Mangere town centre due to the impact on some businesses in the area as well as s 9(2)(i). The Bader Drive alignment would have impacts on property, but largely frontage widening and therefore both options that went through Mangere town centre were scored a minus two.

10.3.10 Recommended Short List Option

Based on this initial assessment it is considered that all of the options have merit. The SH20 only option provides lesser outcomes compared to the other two options, however it has lesser impacts and is simpler to implement.

The options that go through Bader Drive and also the Mangere town centre penetrate the catchments better and provide improved accessibility for these areas. However the Mangere town centre options in particular come with impacts to the local communities that balance the positive outcomes sought.

Given the trade off between outcomes and impacts on the local community is at the heart of the decision in this areas it is considered critical that the local community be involved in this decision making (which has not happened apart of this process). It is therefore recommended that this option selection take place after engagement with the local community on these options has been undertaken (likely to be in the DBC phase).

One option is however needed to be included in the Light Rail option to allow a complete assessment of the project outcomes, benefits and costs to be undertaken in the short list phase. And whilst this will be an area of focus in the DBC, **it is recommended that the Light Rail option that best serves the local communities is included at this point, which is the Bader Drive and Mangere town centre option.**

10.4 Recommended Light Rail Short Listed Option(s)

s 9(2)(i)

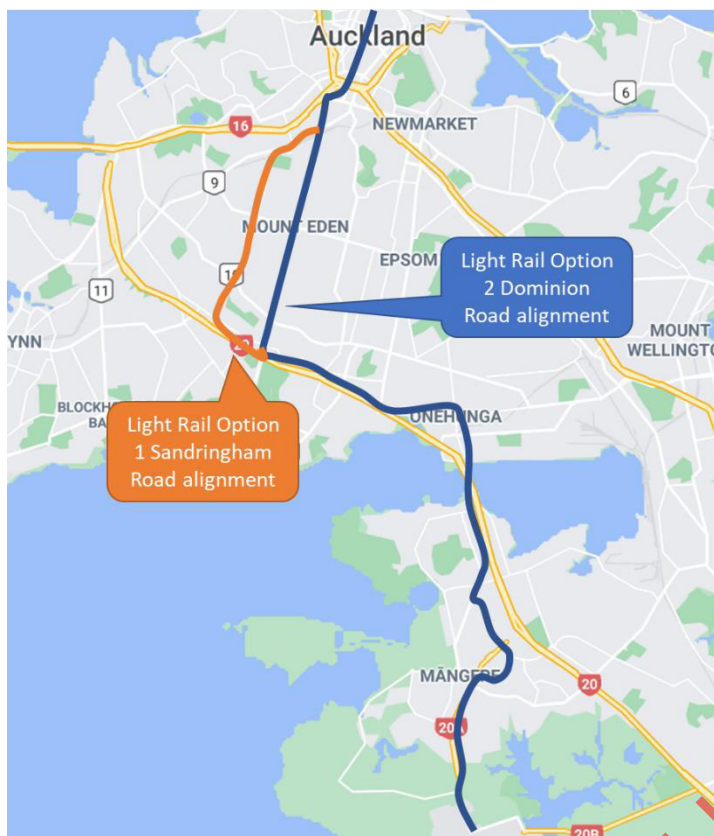


Figure 10 : Light Rail short listed options

11 Light Metro Sub-Option Assessment

11.1 Central City Section

There were two options considered at this stage as shown in Figure 11.

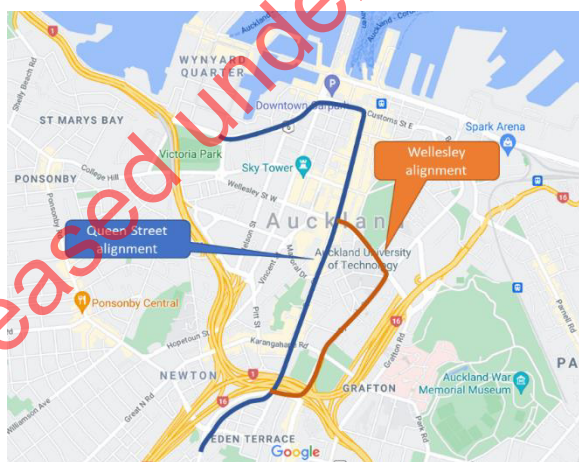


Figure 11 : Light Metro Central City sub-options

This scoring is summarised in Table 18.

Table 18 : Light Metro Central City sub-options

	Queen St below ground	University Wellesley Street (grade separated)
Investment Objective 1 – Accessibility	2	3
Investment Objective 2 – Environment	2	3
Investment Objective 3 – Urban Development	2	2
Achievability	-3	-3
Affordability	-3	-3
Environmental Impacts	-2	-2
Social and Community	1	2
Te Ao Maori		
Property	-1	-1

The rationale for these scores is provided in the following sections.

11.1.1 Investment Objective 1 – Access

Similarly for the Light Rail sub options assessment in this area, the University precinct is also a known significant attractor of trips, and in particular public transport trips due to the student demographic. Both options provide an improved level of accessibility to the Midtown area of city centre and therefore provide benefits.

Modelling indicates that the University would attract in the order of 3,000 trips in the morning peak. The Queen Street option would however allow students transfer at Wellesley Street to make use of the very frequent buses on this route that link to the University, providing a high level of access to the University also.

An underground Light Metro option would not have the detrimental impact on the operation of the Central City bus network, as the Light Rail surface running option in this area did..

On balance the previous scores of three for Wellesley Street was retained, however the Queen Street score was increased to two, as whilst there would be some accessibility challenges given the forecast depth of station in the Queen Street below ground option (in the order of 80-90m deep, fundamentally this option accesses the mid-town area well and provides a high level of accessibility for users.

11.1.2 Investment Objective 2 – Environment

This criterion's scores were driven by likely mode split outcomes. This was closely linked to the level of accessibility an option provided as well as the level of patronage attracted. The scoring therefore generally matched that for Investment Objective one.

On balance the previous scores of two (Queen Street) was retained for Queens Street and a three for Wellesley Street due to the increased patronage and therefore mode shift associated with the University.

11.1.3 Investment Objective 3 – Urban Development

The city centre is a major development opportunity for both employment and residential. Increasing access to the city centre is likely to provide the opportunity to facilitate considerable development uplift. The density of the city centre also supports the urban form outcomes sought.

Further consideration of the development uplift around the University was undertaken and this assessed that whilst there was the potential for increased development as a result of the proximity of the University, the University was a strong attractor for users in its own right and its



significant land ownership in the area would likely largely negate any additional urban development to that over and above the Queen Street option.

Both options were therefore scored the same (two), which was a point less for the Wellesley Street option for the reasons outlined above.

11.1.4 Achievability

Constructing projects of this scale in the Auckland city centre will be very challenging. There are multiple constraints such as services, businesses and city centre residents, and employees that all need to be considered and provided with specific mitigation or construction practices, as has been shown in the current CRL construction. The transport system is also finely tuned in the city centre and any disruption will require considerable effort for the planning and design of pedestrian and bus routes.

Whilst tunnelling reduces some of these impacts, during construction there are still significant challenges. For the Queen Street option the most significant challenge is constructing under Queen Street where there is a known underground water course network.

The Wellesley and University options will have challenges during construction with impacts and disruption to two key bus corridors in the city and around a high active mode area of the Central City (the university).

For these reasons all of the options were scored a minus three, as whilst there are differences between the options, both would be highly challenging, and this issue was not a differentiator between the two options.

11.1.5 Affordability

Both options will be very expensive given the scale, type and challenges of construction in the central city. The Wellesley likely to be more expensive due to the additional length of the option.

However as this difference is a relatively small percentage given the likely overall cost (many billions of dollars) both options were scored minus three.

11.1.6 Environmental

These are substantial options that will have impacts on the receiving environment. Like achievability, the receiving environment was considered similar for all options and therefore the assessment was that each option was scored a minus two, indicating that whilst there would of course be differences between individual options, this criterion was not a differentiator at this time between the two options.

11.1.7 Social and Community

Both options were considered to have adverse impacts on the city centre community during construction and implementation, with issues such as noise and vibration, however this is offset by the benefits in increased accessibility and community connection, particularly for the options that accessed the university precinct.

Both options were generally considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts during construction on communities. The Wellesley St option was therefore scored two as they



connected both the University area and the city centre increasing social connectedness at a local level.

The Queen Street options were scored a one as they did not connect as well to the University area.

11.1.8 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

11.1.9 Property

There would be property impacts as a result of the works during construction and some likely sub-strata acquisitions required for the tunnels. However there was not significant difference considered between the options and the property impact was less than the surface running options and therefore a score of minus one was assessed for each option.

11.1.10 Recommended Short List Modes

Based on this further assessment it is considered that the Wellesley Street option is the stronger option for the following reasons:

- It provides direct access to the University precinct which is highly valued given the importance of this educational hub in the City and the opportunity it provides for the communities along the CC2M route.
- This option also links with the Aotea station area, providing accessibility to the other important destination for the project in the central city.
- This additional accessibility is obtained for a similar cost and impact

This is the reverse option selection to that of the Light Rail assessment, which is due to the cost comparisons being similar and also the downside of the highly valued University connection associated with street running do not occur with an underground Light Metro option.

It is recommended that the Light Metro short listed option in the central city be the University and Wellesley alignment.

11.2 Light Metro Isthmus Section

There were two options considered at this stage as shown in Figure 12.

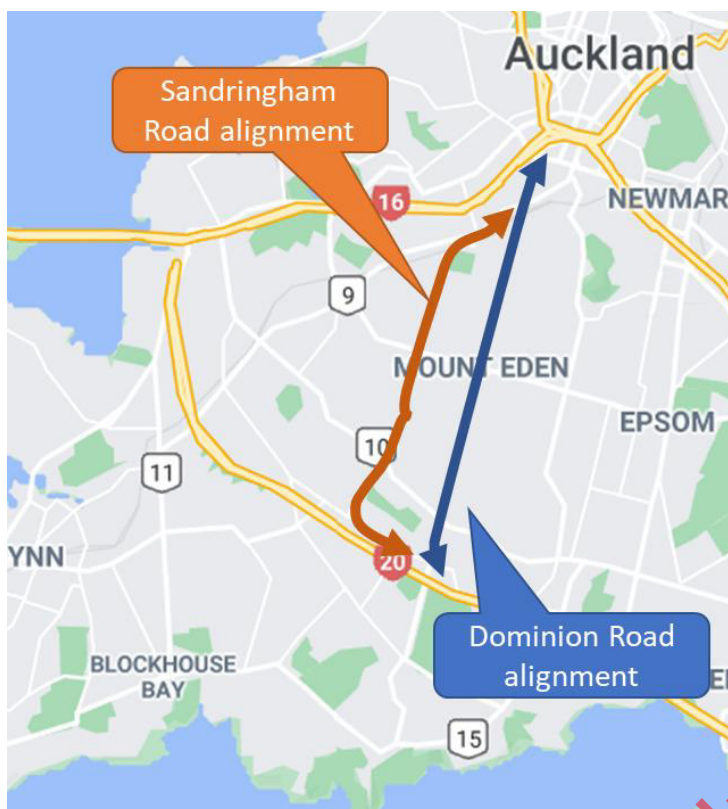


Figure 12 Light Metro Isthmus sub-options

This scoring is summarised in Table 19.

An assessment of the routes in this section by mode was undertaken against the Investment Objective criteria. This scoring is summarised in Table 9.

Table 19 : Light Metro Isthmus sub option assessment

	Sandringham underground	Dominion underground
Investment Objective 1 – Accessibility	3	2
Investment Objective 2 – Environment	3	2
Investment Objective 3 – Urban Development	2	2
Achievability	-2	-2
Affordability	-3	-3
Environmental Impacts	-1	-1
Social and Community	2	2
Te Ao Maori		
Property	-2	-2

The summary rationale for these scores is provided in the following sections.

11.2.1 Investment Objective 1 – Access

Initial modelling of these two options identified that through this section the Dominion Road option was approximately 3mins faster, predominantly due to the short length.

However the Sandringham alignment provides the best accessibility to the Kainga Ora area of development, with patronage increasing by approximately 1700 in the morning peak period at the two Mt Roskill stops when compared to the single Dominion Road stop.

The level of urban development uplift along Sandringham Road is also marginally larger due to more constraints in the Dominion Road corridor. This land use response, combined with the



increased Kainga Ora accessibility is reflected in the transport model with a higher patronage forecast of 7% above the Dominion Road corridor.

This increase in patronage through this corridor and the Kainga Ora accessibility in Mt Roskill was an important consideration in scoring the Sandringham Road option higher (at a three) than the Dominion Road (a two).

11.2.2 Investment Objective 2 – Environment

This criterion score was driven by likely mode share outcomes from the previous transport modelling of options. This was closely linked to the level of accessibility an option provided. The scoring therefore generally matched that for investment objective 1.

The Sandringham Rd option was score was increased to three as the patronage difference (in the order of 7% to Dominion Road) was assessed as being substantial enough to warrant an increase in score.

11.2.3 Investment Objective 3 – Urban Development

The initial landuse modelling indicated that the urban development uplift potential was largely the same (392,000m² for both options). Therefore both options were scored a two.

11.2.4 Achievability

Both routes would have achievability challenges given the scale of the works. The Dominion Road and Sandringham Road options were considered to have a number of technical and practical challenges common to both, such as services and access during construction and the traffic management required for construction

The Dominion Road corridor had heritage buildings, more established town centres and view shafts to contend with during implementation. Sandringham Road has however a generally narrower cross section (21m vs 24m) which would create implementation challenges.

On balance it was considered that both options would have a similar level of challenge (for different reasons) and the previous score of minus one for each option remained.

11.2.5 Affordability

Both options would have substantial costs associated with them. Sandringham Road would have a slightly greater cost as a result of the longer length. This additional cost is offset somewhat for Dominion Road which has more established and commercial building resulting in increased property costs. The difference between the two options is therefore considered to be small (at less than 10%).

Therefore both options were scored a minus two.

11.2.6 Environmental

These are substantial options that will have impacts on the receiving environment. Like achievability, the receiving environment was considered similar for all options and therefore the assessment was that both options was scored a minus one, indicating that whilst there would of course be differences between the two options, this criterion was not a differentiator at this time between the options.



11.2.7 Social and Community

Both options were considered to have adverse impacts on the city centre community during construction and implementation, with issues such as noise and vibration, however this is offset by the benefits in increased accessibility and community connection.

Both options were generally considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts during construction on communities.

Both options were similar in this regard, connection similar but slightly different local communities and were therefore scored a two.

It is forecast that there is more basalt in Dominion Road, which could result in longer construction durations and more blasting, however more detail is required to confirm the implications of this.

11.2.8 Te Ao Maori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

11.2.9 Property

Both options would require properties for construction (and permanent land requirement). Initial analysis indicates s 9(2)(i)

On balance both options were assessed with a score of minus two. This was a worsening of the Sandringham Road score as it was considered that there would be considerable impact, more than previously considered now that actual property numbers are known.

This assessment has assumed a cut and cover construction technique which is the most intrusive. Less intrusive options are still being considered (and will be assessed in more detail in the short list assessment), which would have less impact, but comparatively a similar difference between the two option of not significant.

11.2.10 Recommended Short List

The two options are similar in terms of impacts. They are similar in cost, length and number of stations. However that additional station on the Sandringham alignment is important as it enhances the accessibility to the large and significant Mt Roskill development site. This additional station results in a 7% increase in forecast patronage on the Sandringham alignment. Whilst the Dominion Road alignment is shorter, given the overall speed of the Light Metro system, this shorter distance (and therefore travel time) does not have the same impact on accessibility as the different routes for the slower Light Rail option.

Whilst the Sandringham Road alignment attracts more patronage, more detailed landuse analysis (that is currently being undertaken) has the possibility of identifying greater land use opportunity on Dominion Road (due to some earlier constraints no longer applying). **It is therefore considered prudent at this time to short list both alignments to allow a more detailed assessment to be undertaken.**

11.3 Light Metro Mangere Section

There were two options considered at this stage as shown in Figure 13.



Figure 13 : Light Metro Mangere sub-options

This scoring is summarised in Table 20.

Table 20 : Light Metro Mangere sub option assessment

	SH20	SH20 Mangere TC (grade separated)	SH20 Bader & Mangere TC (grade separated)
Investment Objective 1 – Accessibility	1	2	2
Investment Objective 2 – Environment	2	2	2
Investment Objective 3 – Urban Development	1	2	2
Achievability	-1	-2	-2
Affordability	-1	-2	-3
Environmental Impacts	-1	-1	-1
Social and Community	1	2	2
Te Ao Maori			
Property	-1	-2	-2

The rationale for these scores is provided in the following sections.

11.3.1 Investment Objective 1 – Access

The SH20 only option provides improved accessibility to the area through stops at Bader Drive and Favona. This option also provided the quickest route, providing accessibility benefits to the wider network users through this area.

The Bader and Mangere town centre options provide increased accessibility to this identified development area which is highly valued.

The transport modelling indicated that there is little difference in patronage between a SH20 option and Mangere Town Centre option with a difference in demand of in the order of less than 100, partly due to the large modelling zones in the area and the fact that the SH20 alignment has stations nearby to the development areas.



Based on the modelling results and the assessment that stations closer to the proposed development in the Mangere town centre the SH20 only option was score a one and the Mangere town centre options a two.

11.3.2 Investment Objective 2 – Environment

All options provided an improved level of mode shift (and therefore carbon reduction). Whilst there are small differences between the options, the transport modelling indicates that small changes in patronage exist between the options.

Therefore like the Light Rail assessment, all options were scored the same (at two) as the town centre option generally provided greater penetration into development areas, increasing mode shift in those areas, whilst the faster routes provided greater benefits to longer distance trips.

11.3.3 Investment Objective 3 – Urban Development

The Mangere town centre option that better served areas of known future planned development in this section) scored higher than those that did not. The land use modelling results indicated an urban uplift of approximately 43,000m² in this area.

This resulted in this option being scored at a two. This was higher than the previous assessment as the lack of a Bader station impacted the previous scoring, however the additional modelling indicates that this is beneficial, but not significant enough to warrant a full score difference. Therefore both the Bader and Mangere town centre only option were both scored a two.

The SH20 only option provided urban development opportunities, however not as great as those options that went through the middle of the Mangere town centre development area and was therefore scored a one.

11.3.4 Achievability

All routes would have achievability challenges given the scale of the works. However, these challenges are not considered to be insurmountable at this stage.

The options that went through Bader Dr and Mangere Town Centre was also considered to have a cumulative impact on technical implementation challenges (due to the increased length in a constrained urban environment) resulting in a score of minus two.

Getting an alignment from SH20 through the Mangere town centre was difficult given the constraints in the area, such as the parks, school, community facilities and property in the area. A number of different alignment were considered to minimise these challenges, however they are still considered substantive in this area and therefore a score of minus two was assessed as being appropriate. There are many different options considered including raised structures and underground alignments. A largely underground option through the Mangere town centre area was selected as the above ground options were considered to have much greater impacts and equity issues.

The SH20 only option had significantly less constraints being in the motorway corridor, however still needed to deal with the issue of working in or near the motorway and was therefore scored a minus one.

11.3.5 Affordability

The SH20 only option was considered the cheapest of these options and therefore given a score of minus one (there would also be less opportunity for urban value capture). The Mangere town centre options were in the order of tens of millions of dollars more due to increased length and interfaces with the Bader and Mangere town centre option a further few tens of millions.

The Mangere town centre and Bader and Mangere town centre options difference was considered substantial enough to warrant a differentiation in scoring, with the Bader and Mangere town centre option given a minus three and the Mangere town centre only scored a minus two to reflect the difference in cost for these options.

11.3.6 Environmental

There was no new information to update the earlier assessment that concluded the options that went through the Bader and Mangere town centre increased impact on the town centre of Mangere from a disruption perspective and were therefore scored a minus one.

The SH20 only option which was at grade but largely within an existing transport corridor and therefore was also given a score of minus one.

11.3.7 Social and Community

All options were considered to provide enhanced community access and cohesion and therefore result in net benefit, even when considering the short-term impacts on communities during construction.

The Bader Drive and Mangere Town Centre options and the Mangere town centre only option were scored a score of two due to the enhanced (direct) community connection these options would provide to other nearby areas and the improved urban outcomes in these areas as a result of the option.

The SH20 only option would provide improved connectivity, however due to the location of the station, this impact would be reduced compared to the other two options. This option was therefore scored a one.

11.3.8 Te Ao Māori

This criterion was not scored at this time. It was considered that this criterion would be unlikely to differentiate between options if it had been undertaken. This criteria is still considered important and will be more fully assessed in the short list process following mana whenua engagement and more clarification of the specific issues that may influence project design.

11.3.9 Property

The SH20 only option, which was at-grade but largely within an existing transport corridor would have some property impacts through this section, but minimal and this was therefore given a score of minus one.

The greatest property impact of these options was going through the Mangere town centre due to the impact on some businesses in the area as well as residential properties near s 9(2)(i). The Bader Drive alignment would have impacts on property, but largely frontage widening and therefore both options that went through Mangere town centre were scored a minus two.

11.3.10 Recommended Short List Option

Like the Light Rail assessment, based on this initial assessment it is considered that all of the options have merit. The SH20 only option provides lesser outcomes compared to the other two options, however it has lesser impacts and is simpler to implement.

The options that go through Bader Drive and also the Mangere town centre penetrate the catchments better and provide improved accessibility for these areas. However the Mangere town centre and Bader Light Metro options in particular come with impacts to the local communities that balance the positive outcomes sought.

Given the trade off between outcomes and impacts on the local community is at the heart of the decision in this areas it is considered critical that the local community be involved in this decision making (which has not happened apart of this process). It is therefore recommended that this option selection take place after engagement with the local community on these options has been undertaken (likely to be in the DBC phase).

One option is however needed to be included in the Light Metro option to allow a complete assessment of the project outcomes, benefits and costs to be undertaken in the short list phase. And whilst this will be an area of focus in the DBC, **it is recommended that the Light Metro option that best balances the serving the local communities with impacts is included at this point, which is the Mangere town centre option.** This differs to the Light Rail option for Bader Drive as there is a high cost for the Light Metro than the Light Rail option which has been considered in this selection (albeit subject to community engagement).

11.4 Recommended Light Metro Short Listed Option(s)

Based on the above more detailed assessment it is recommended that two variants of the Light Rail mode be short listed for more detail assessment as outlined in Figure 14 below.

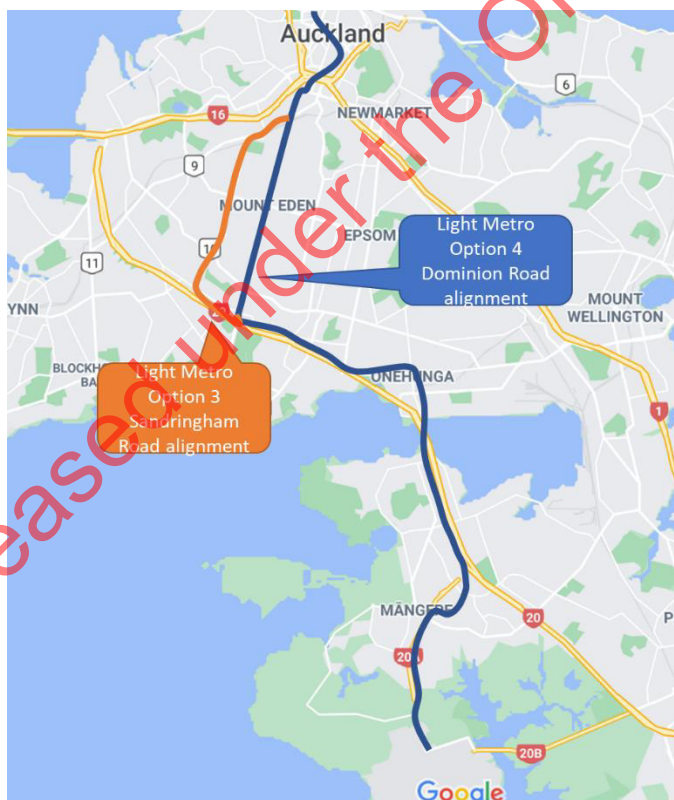


Figure 14 : Light Metro short listed options

12 Heavy Rail Assessment

12.1 General

Further consideration was given to the Western Line extension option. This included more detailed consideration of the likely service pattern as well as the wider impacts and outcomes of the options to consider if it should indeed be short listed.

Figure 15 sets out the option being considered.

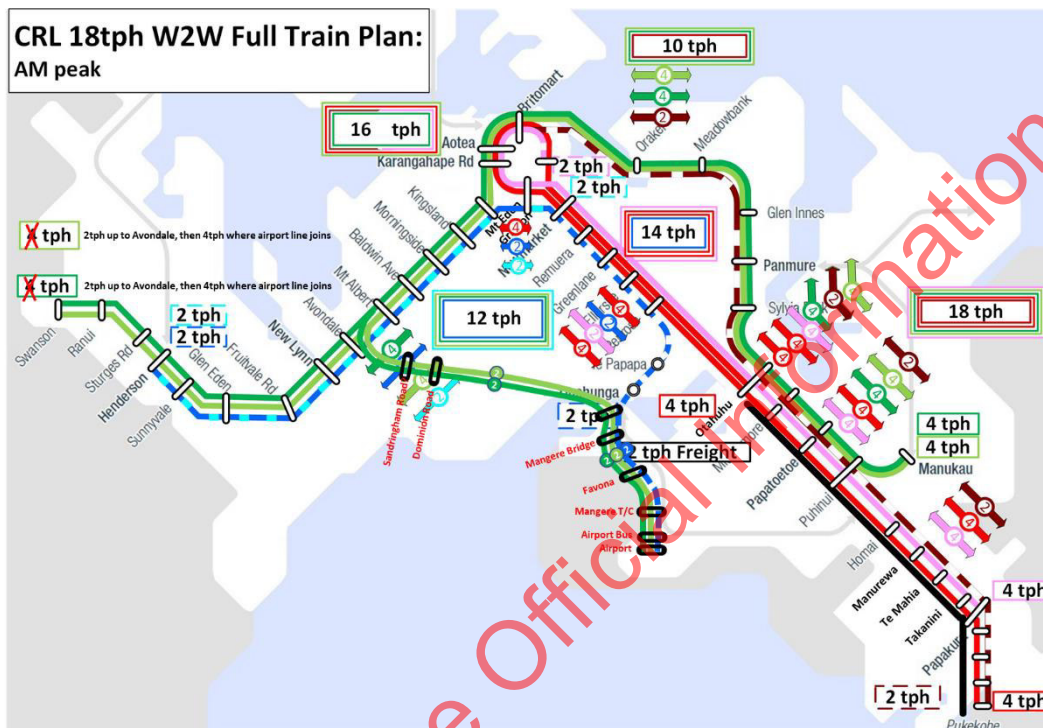


Figure 15 : Western Rail service option

12.2 Further consideration

This heavy rail option potentially provides a strong linkage to the identified development areas of Mangere, Onehunga and Mt Roskill with heavy rail.

This option does however assume that there will be a high-quality bus-based system from Mt Roskill, through the central isthmus to the CBD. This two-mode response is different to the Light Rail and Light Metro short listed options which are a single mode solution along the entire route of the project.

There are therefore two key considerations in the further assessment of this option:

- The level of the accessibility for communities along the entire route
- The potential urban development response of the option

12.2.1 Accessibility

The accessibility improvements of this option are considered to be strong. The Mangere, Onehunga and Mt Roskill communities will have heavy rail access which will make a step change in accessibility at these locations.



The heavy rail route will use the less direct Western Line alignment, which is estimated at being in the order of 7 mins slower than the Light Metro options and 3 minutes quicker than the Light Rail option. This will slightly reduce the accessibility benefits of this option.

The section of the route through the central isthmus north of Mt Roskill will be bus based in this option. This will provide accessibility similar to the current system, which is also bus based. The Western Line rail corridor will become the key RTN connection in this area of the network, with the central isthmus continuing to be serviced by buses. This level of accessibility in the central isthmus will be less for this area than the Light Metro or Light Rail options.

12.2.2 Urban Development

Urban development along the route is a key driver for the project. This option will provide urban uplift opportunities at the three important communities of Mangere, Onehunga and Mt Roskill. The scale of this uplift is assessed as being similar to that of the Light Metro option given the similarities in the two modes.

The impact of providing this mode through these communities is considered to be greater than Light Metro, due to the more onerous design standards and likely need to carry freight.

The central isthmus section north of Mt Roskill will continue to be serviced by busses. This will reduce the urban uplift in this section of the corridor by approximately 347,000m². Whilst additional uplift could be anticipated around the existing rail stations along the western line, this is not considered to be to the transformational scale that could be achieved running through the central isthmus due the current corridor form and function. The form of urban development is also likely to be of a lesser quality.

12.3 Recommendation

The heavy rail option has a number of benefits, including improved accessibility and urban uplift potential.

However compared to the Light Rail and the Light Metro options the level of outcome achieved in these two areas is forecast to be substantively smaller. This is predominantly through the central isthmus section of the corridor.

We anticipate that the heavy rail option, comparatively to the Light Metro and Light Rail options will:

- Deliver less accessibility
- Deliver smaller urban uplift
- Result in an urban form to a lesser quality
- Have a larger impact along the route during implementation

So whilst this option has a number of positive attributes, for this project and when compared to the other two forecast short list options to be short listed it does not deliver as strongly against the objectives of the project and it is **therefore recommended that this option is not investigated further.**

13 Recommended Short List Options

Based on the above assessment it is recommended that four options are short listed including:

- Option 1 : LRT Option Sandringham
- Option 2 : LRT Option Dominion
- Option 3 : Light Metro Sandringham
- Option 4 : Light Metro Dominion

Following the confirmation of these four options a further option was considered appropriate to consider in the short-listing process, being a hybrid Light Rail and Light Metro option. This option was considered a valuable addition to the option assessment process as the demand profile for the project increases the closer to the Central City and this is also the area where providing segregation for a rail (light or metro) system is more important due to the level of interaction with rest of the transport system. It was therefore considered that a 'Hybrid' option that provided higher capacity full segregation north of Mt Roskill (effectively a Light Metro option) and lesser capacity south of this point would be worth understanding in more detail. For the purposes of this assessment the Sandringham alignment was chosen as this alignment (for Light Metro) has the higher patronage and this will allow a comparison between the Sandringham Light Rail and Light Metro options to understand the relative benefits/disbenefits of a 'hybrid' option.

Including this option results in five short listed options as set out in Figure 16 below.

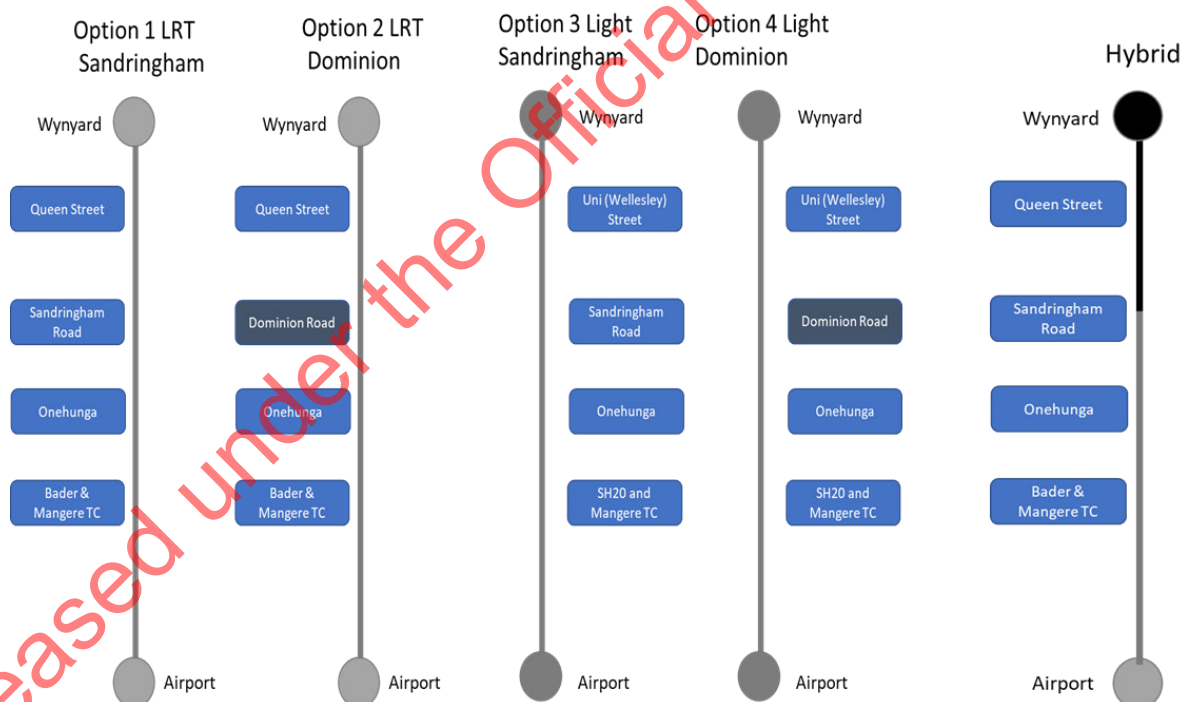


Figure 16 : Final Short List Options