

OPTION IDENTIFICATION



5.0 OPTION IDENTIFICATION

In order to identify the heavy rail alignment to Doncaster that best satisfies the project objectives, the study team developed an option generation and assessment process for route identification and appraisal. This process facilitated creative and innovative option generation, while also permitting a structured and transparent evaluation and filtration process to take place. It used an Objective Based Evaluation Framework as the basis for a Multi-Criteria Assessment (MCA), an industry-standard process that permits robust, transparent comparisons to be made across a number of different assessment criteria. The process applied to the study is shown in Figure 5-1.

5.1 GENERATION OF LONG-LIST OPTIONS

The first aspect of any route assessment is the generation of route options. In order to generate a list of possible rail alignments for this study, a Broad Options Workshop was held early in the study process. The workshop was attended by key study team members and selected representatives from PTV and was designed to facilitate the generation of multiple corridor options for a heavy rail line to Doncaster and beyond, in an unconstrained environment.

During the workshop, consideration was given to a preliminary assessment of needs and opportunities relating to travel demand across the study area. A wide range of potential options were generated to maximise potential benefits for the community across various route options.

Although the purpose of the workshop was for participants to apply unconstrained thinking in the generation of corridor options, it was necessarily bound by an agreed set of criteria to complement the study vision and objectives. These criteria included the requirements that:

- all options were to pass through Doncaster, preferably through either Doncaster Hill or Doncaster Park-and-Ride
- all options were to provide a heavy rail connection to the city, either physically or by way of transfer to an existing service
- corridors beyond Doncaster or the Melbourne CBD could be identified, but these would be treated as possible future extensions to the core line and
- any options to the east of Doncaster, or west of the Melbourne CBD were to be capable of being staged, in order to permit construction to take place in a phased manner.

In the workshop, participants planned a number of possible alignments across the study area. The options developed at this time were schematic in nature and focussed on the best ways to link areas of travel demand and high user need. No consideration was given to cost, engineering feasibility, environmental and community impacts or to any other technical considerations at this point, to avoid pre-empting the transparent option filtering process that subsequently followed. The multiple options developed during this workshop were then collated, as can be seen in Figure 5-2.

The output of the broad options workshop resulted in the creation of hundreds of possible permutations and combinations of route sections. There were too many to permit a robust assessment of every possible option. The options were therefore categorised and a filtration process applied to develop a long-list of route options suitable for the Initial MCA workshop. To facilitate this process, options were divided into a number of different 'regions' for ease of assessment.

At this stage, the broad corridor options were then scrutinised and rationalised to form a long-list. Some options were discounted at this point because of known constraints or incompatibility with the study vision and objectives. Similarly, some options were retained for further assessment after considering community and stakeholder feedback about potential travel needs.

The long-list of 17 options that resulted from this process are shown in Figure 5-3. These options were then taken forward for initial technical assessment by the study team and reviewed through the Multi-Criteria Analysis process.

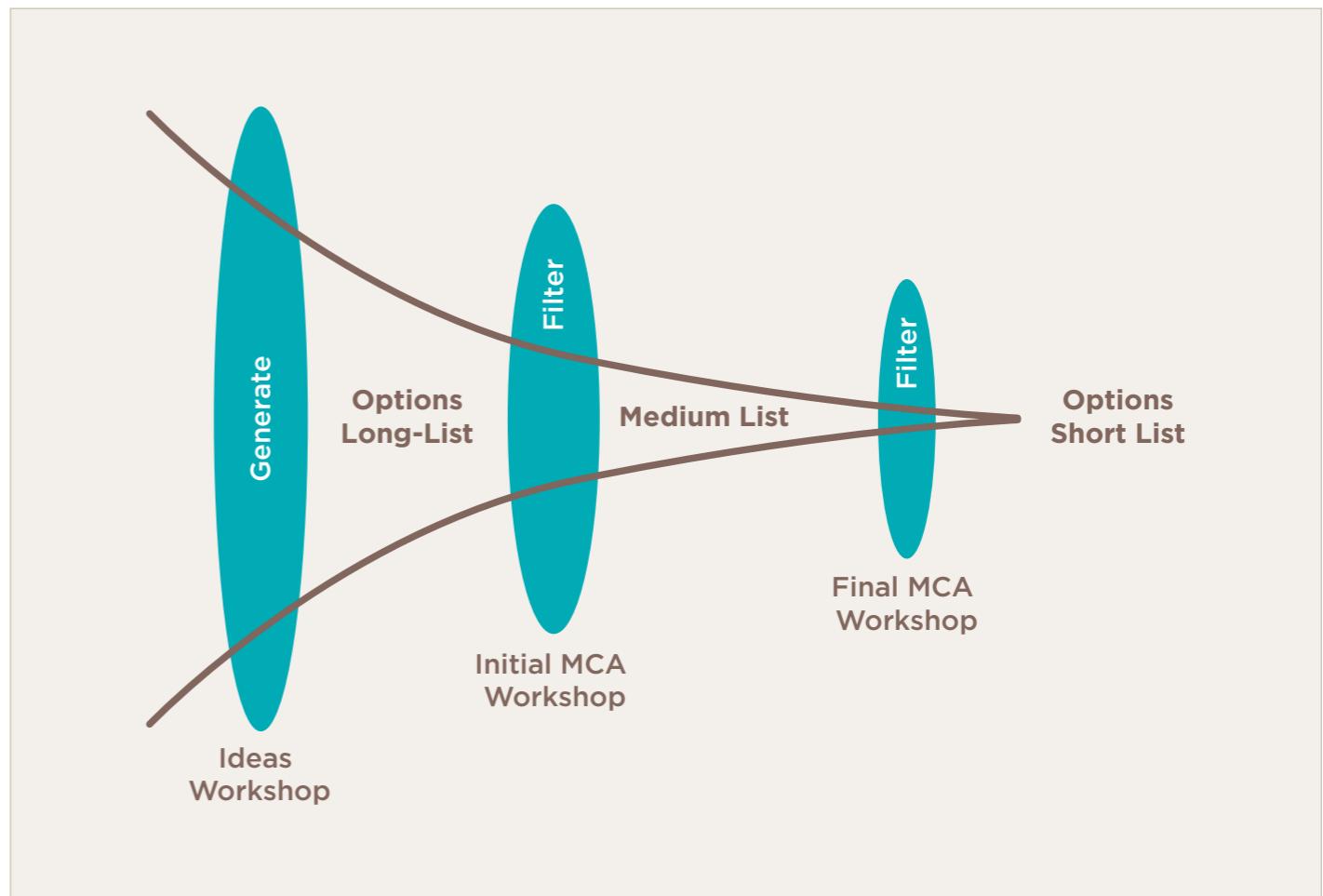


Figure 5-1: The Multi-Criteria Assessment process used throughout the study

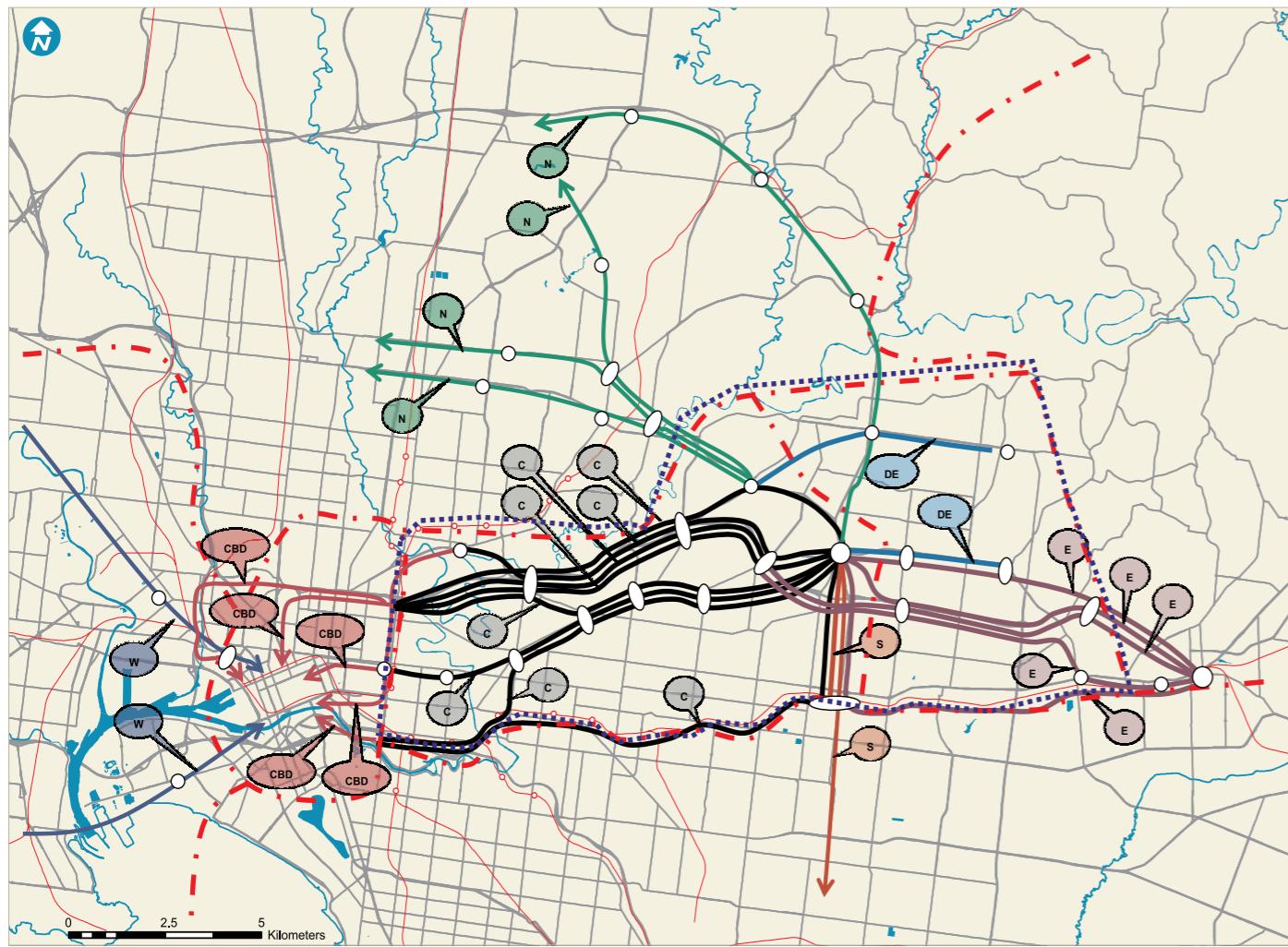


Figure 5-2: Route option schematics developed during early alignment generation workshop

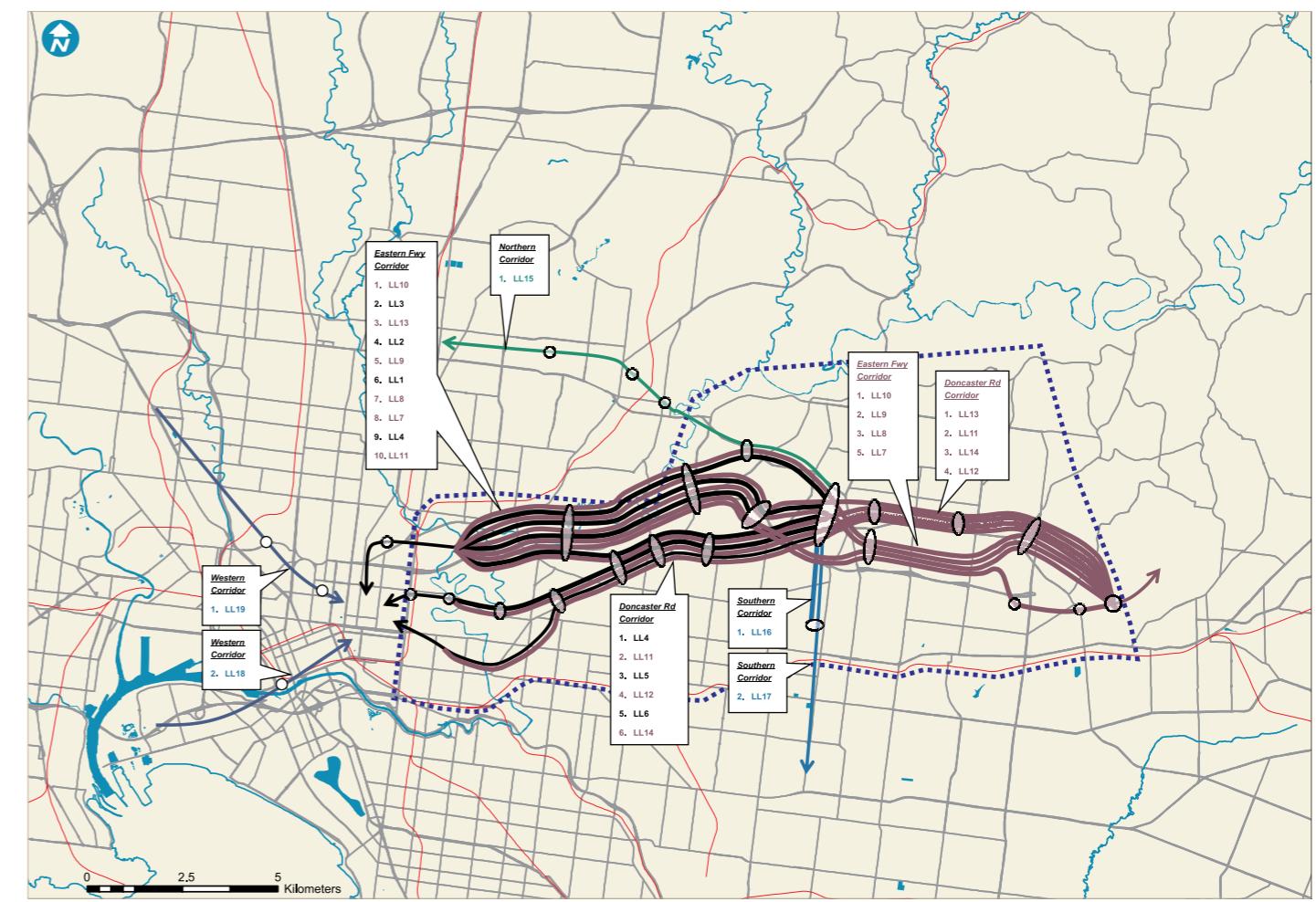


Figure 5-3: The long-list of options considered through the Multi-Criteria Assessment



5.2 ASSESSMENT OF LONG-LIST OF OPTIONS

The key element of the study team's approach to route option assessment was the use of an Objective Based Evaluation Matrix (OBEM), which was developed specifically for this study. This approach used a defined set of objectives to provide a focus for the evaluation of route options across a number of specialist fields. Assessment criteria and performance measures were then agreed for each objective, allowing the study team to compare the impact of each option against the objectives to be tested.

5.2.1 THE OBJECTIVE BASED EVALUATION MATRIX

The evaluation framework for the study was arranged around assessment objectives that were designed to closely match the study objectives. For each of these objectives, a set of assessment criteria were then determined and performance measures agreed. As part of this process, the assessment criteria and performance measures were identified as being relevant to the assessment of the long-list of route options, the medium list, or both.

The evaluation framework was based on a number of criteria, including:

- the **study vision and objectives**: these provided the context and terms of reference for the study, particularly the Phase One Study Goal described in Section 1.5.1 and the limiting requirement that the Study Team assess only heavy rail infrastructure
- a **literature and policy review**: this provided a policy context and understanding of key guidelines for the assessment of development of options in the wider community context. Important policy documents included the *Transport Integration Act* (2010), *Our Cities, Our Future* (2011) and Municipal Strategic Statements from councils within the study area. Other important guidelines included Department of Treasury and Finance, Infrastructure Australia and Australian Transport Council investment decision-making guidelines

- a **lessons learnt** process: the study team undertook a 'lessons learnt' process to benefit from issues encountered on previous major transport projects in Australia and further afield. During this process, participants discussed both the success factors and problems experienced by a range of projects and identified assessment criteria that would allow these issues to be captured and considered early in the options evaluation process for the study.
- specialist technical inputs**: technical specialists provided inputs into the assessment criteria and performance measures across a number of appropriate disciplines. Specialists were also well placed to assign the assessment criteria and performance measures to the relevant MCA and
- an **evaluation of stakeholder and community inputs**: feedback gathered during the study's stakeholder and community engagement process was used to supplement the assessment criteria, particularly in terms of understanding the range of local issues relevant to this study area.

The evaluation framework is provided in Table 5-1.

DONCASTER RAIL STUDY—OBJECTIVE BASED EVALUATION FRAMEWORK				DONCASTER RAIL STUDY—OBJECTIVE BASED EVALUATION FRAMEWORK							
OBJECTIVE	ASSESSMENT CRITERIA	PERFORMANCE MEASURE	STAGE	OBJECTIVE	ASSESSMENT CRITERIA	PERFORMANCE MEASURE	STAGE				
1) To improve transport network efficiency in Manningham and the Eastern Region	Lead Discipline: Transport Integration				Lead Discipline: Rail Operations						
	1.1 Provides inter-modal connectivity and network accessibility	<ul style="list-style-type: none"> Degree of access provided for rail park-and-ride for existing users of the freeway Degree of access provided to existing bus interchanges at Doncaster Shoppingtown and Doncaster Park-and-Ride, or the desirability of providing alternative new interchange locations Compatibility with the extension of Route 48 tram to Shoppingtown (can be deleted if tram not to be extended) Modelled patronage levels (AM peak and daily) Modelled interchange at stations, including pedestrian accessibility 	Initial MCA	3) To integrate with the metropolitan rail network and long-term operational requirements	<ul style="list-style-type: none"> Consistency with current metropolitan rail network plans Capacity to integrate with the broader rail network and improve the overall level of service for customers on the rail network Capacity to integrate with the broader rail network and improve operations and maintenance of the system 	<ul style="list-style-type: none"> Compatibility with current government and DoT plans for the future rail network Improved ability to accommodate additional services Potential to relieve pressure on the City Loop, Flinders Street Station or other key locations on the network. Allows adequately for train stabling and maintenance of Doncaster services Minimises dead running time and maximises overall efficiency 	Initial and Final MCA				
	1.2 Improves travel times by public transport	<ul style="list-style-type: none"> Change in predicted peak travel time between road and rail for the following: <ul style="list-style-type: none"> Doncaster Park-and-Ride to CBD Doncaster Shoppingtown to CBD Ringwood to CBD Doncaster Shoppingtown to Melbourne Airport Doncaster Shoppingtown to Monash University (Clayton) Average modelled travel time for all trips to the CBD (DART versus Bus and Train) 	Initial MCA								
	1.3 Reduces road network congestion and improves road safety outcomes	<ul style="list-style-type: none"> Potential to generate mode shift Change in vehicle trips across identified screen lines: <ul style="list-style-type: none"> Eastern Freeway at Doncaster Road Eastern Freeway at Hoddle Street Victoria Street at Hoddle Street Reduction in net vehicle kilometres as a proxy for changes in the level of road safety 	Final MCA	4) To improve access to and connectivity with employment opportunities, markets, services and recreational facilities for the benefit of the community	Lead Discipline: Social Connections						
	1.4 Improves existing public transport level of service	<ul style="list-style-type: none"> Modelled reduction in trips on existing public transport services 	Final MCA								
	1.5 Addresses scalability (accommodation of long-term travel demands)	<ul style="list-style-type: none"> Ability to meaningfully stage construction in response to demand 	Initial MCA	5) To minimise potential adverse environmental, economic and social impacts	Lead Discipline: Engineering						
2) To promote and support urban growth and productivity in Manningham	Lead Discipline: Strategic Planning & Land Use Economics				<ul style="list-style-type: none"> Cost comparator Constructability Scalability (ability for construction to be staged) 	Initial MCA					
	2.1 Aligns with Government Planning Policy (i.e. policy, plans and guidelines)	<ul style="list-style-type: none"> Compatibility with Federal Government planning requirements. Compatibility with State Government planning requirements. Compatibility with Local Government planning requirements. 	Initial and Final MCA								
	2.2 Supports urban growth and productivity along the route corridor	<ul style="list-style-type: none"> Potential to facilitate development of activity centres via: <ul style="list-style-type: none"> an increase in expected population an increase in employment promoting private sector investment Potential to facilitate development in residential areas via: <ul style="list-style-type: none"> change in housing density change in population real estate uplift supporting strategic residential development sites 	Initial and Final MCA		Lead Discipline: Environment						
					<ul style="list-style-type: none"> Level of environmental impacts in the short and long-term Level of short and long-term environmental impact measured by: <ul style="list-style-type: none"> Air quality Noise Flora and fauna impacts Surface water Groundwater Land contamination Aboriginal heritage Post-settlement heritage 	Initial MCA					
				<ul style="list-style-type: none"> Minimises adverse environmental impacts Minimises adverse land use and social impacts 	<ul style="list-style-type: none"> Level of short and long-term land use impact, measured by: <ul style="list-style-type: none"> Area of land impacted (plus level of use by community) Area/number of properties to be acquired Impact on visual amenity Impacts on neighbourhood character Impacts on public open space Compatibility with current planning controls 	Final MCA					

Table 5-1: The Multi-Criteria Assessment matrix used to assess the long-list (Initial MCA) and medium list (Final MCA) options

5.2.2 THE MCA PROCESS

The initial MCA workshop included key participants from the study team, alongside selected representatives from key stakeholders and representatives from PTV. The purpose of this process was to review specialist reporting of the potential impacts of each of the long-list options, comparing the options against the evaluation framework assessment criteria. In this workshop, ratings provided by specialists regarding each option were challenged by workshop participants, until final ratings for each option were achieved through consensus.

Through the process of considering the options, it was clear that some key strategic corridor themes were emerging: the rapid transit theme, the local access theme and an orbital network theme. Considering these themes in turn:

Rapid Transit Theme

The rapid transit options were common in their aim to provide the fastest possible journey to the CBD by having few stations, each strategically placed to allow the rail service to achieve high speeds between them. All rapid transits option would collect the majority of passengers through integration with the existing road network, relying on park-and-ride, kiss-and-ride and bus and tram interchange facilities. A successful rapid transit solution would improve public transport travel times and reduce road congestion through promoting mode shift. Rapid transit options assessed from the long-list of options included LL1, LL2 and LL3 between Doncaster and the Melbourne CBD and the extensions to these options, known as LL7, LL8, LL9 and LL10.

Local Access Theme

The local access options all aimed to maximise station coverage by penetrating into residential areas and local activity centres. These options would seek to maximise patronage and address demands generated through social connections. In particular, a greater number of passengers would be expected to walk to stations, reducing the need for park-and-ride facilities. Local access options would typically generate distributed land use uplift across local activity centres, increasing local business and investment opportunities. Local access options assessed include LL4, LL5 and LL6 between Doncaster and the Melbourne CBD and the extension to these options LL11, LL12 and LL14. Option LL13, the extension of LL2 (rapid transit) could be considered a hybrid rapid transit/local access option.

Orbital Network Theme

The inclusion of orbital network options was considered because of observed demand from Manningham to LGAs to the north with Melbourne Airport as an attractor and to the south with the Monash area as an attractor. The northern orbital option (LL15) could provide connection from Doncaster Hill to Heidelberg and Northland Shopping Centre and there may be a long-term potential to extend this to Melbourne Airport. The southern orbital options (LL16 and LL17) considered a connection from Doncaster Hill to Box Hill and potentially beyond.

5.3 THE MEDIUM LIST OF OPTIONS

The MCA assessment provided the study team with an understanding of the relative strengths and weaknesses of each of the long-listed options under consideration. From this information a medium list of six options was developed, incorporating the best features from each of the long-listed options. These options, grouped under the rapid transit, local access and orbital network themes, were then taken forward for further analysis as a medium list of route options.

Key points from the specialist assessments, by theme, are as follows:

Rapid Transit

- Of the core options, LL3 appeared to provide the greatest benefits over some of the other options. However, these were largely derived from its similarity to the local access options in the Templestowe area and were to the detriment of the alignment's ability to satisfy its key objectives.
- LL2 provided the 'purest' (i.e. fastest) rapid transit option, with stations only at Doncaster Hill, Doncaster Park-and-Ride and along the freeway.
- Option LL1 would likely be the least expensive of the options considered but was ruled out as it failed to capture what were perceived at that time to be significant transport integration and social connection benefits provided by the node at Doncaster Hill. This position was considered further in the analysis, however and is discussed in more detail in Section 6.0 of this report.
- The options that extended to Ringwood captured transport benefits over the options that terminated at Doncaster, however at significantly greater costs. Further land use planning and social connection benefits provided by options that continued along the freeway were thought to be negligible.

Local Access

- In relation to transport integration, while all core options were expected to reduce traffic congestion, they were considered comparatively poor in their ability to provide inter-model connectivity. Similarly, in comparison to the existing DART system, the potential travel time savings were considered to be less than could be achieved through a Rapid Transit Theme.
- From a land use planning and social connections perspective, all options were rated similarly. Although the general potential for land use uplift was considered to be significant, the potential to enhance social connections was not considered to be great.
- Option LL4 performed similarly to option LL5 except with regard to the likely cost. This was due to the fact that LL4 headed north to re-join the freeway prior to entering the city, replicating the path of other rapid transit options.
- The key differentiator between the core Local Access options was their potential connection methods into the city. Notably, Option LL5 with a standalone line to the city was considered to have significant potential for creating a new improved rail service. The option LL6, which connected to the Burnley group, was considered to be feasible, although the exact location point of any connection would likely be subject to change following further engineering assessment.
- The local access options that extended to Ringwood were considered to have benefits in terms of transport integration, land use planning and social connections. However, all extended options were expected to be far more expensive than the core options, due to the requirement to tunnel for most of this length.

Orbital

- The northern Orbital option rated highly for transport integration and social connections opportunities, however it was deemed to provide only limited benefits in terms of land use planning or rail operations. It was also expected to incur high cost.
- In contrast, the southern Orbital option rated highly for land use planning and social connection, but also rated strongly in terms of transport integration opportunities. However, it was expected to have reduced patronage levels.

A summary of how the various options progressed to form part of the medium list is included, in Table 5-2.

WHY NO CONNECTION TO 'THE PINES'?

Feedback received by the study team through the study community and stakeholder engagement process showed a strong desire from some sections of the community for the Doncaster rail line to continue beyond any station at Doncaster to a new station near The Pines Shopping Centre in East Doncaster. This option was discounted by the study team relatively early in the assessment and shortlisting process, however, as it was assessed as only delivering very marginal benefits in terms of potential passenger numbers or land-use uplift opportunity at a significantly increased cost. The Pines is a small area of high density residential properties within a much wider area of low density housing, arranged in a cul-de-sac urban form. The cost of constructing a railway to The Pines, which would likely need to be inside a tunnel due to the topography and urban form in the area, was determined by the study team to be prohibitive given the minimal potential benefits. For this reason, no options reaching as far as 'The Pines' were included in the medium list of options.



DONCASTER RAIL STUDY—KEY TO OPTIONS CONSIDERED				
BROAD LIST		LONG LIST		MEDIUM LIST
Hoddle Street to Doncaster options				
C1	Doncaster Park-and-Ride to Clifton Hill via the freeway	LL1	Doncaster Park-and-Ride via Freeway to CBD North	< Discounted following the Initial MCA
C2	Doncaster Hill to Clifton Hill via Doncaster Park-and-Ride and the freeway	LL2	Doncaster Hill to CBD North via Doncaster Park-and-Ride Freeway	RT1 Doncaster Hill to Collingwood via the freeway and Doncaster Park-and-Ride, connecting to Clifton Hill group
				RT2 Doncaster Hill to the city via the freeway and Doncaster Park-and-Ride via a standalone line to CBD North
				RT3 Doncaster Hill to the city via the freeway and Doncaster Park-and-Ride via a standalone line to CBD East
C3	Doncaster Hill to Fairfield via Doncaster Park-and-Ride and the freeway	< Discounted due to having a comparatively longer journey time than other core options		
C4	Doncaster Hill to Clifton Hill via the freeway (not including Doncaster Park-and-Ride)	LL3	Doncaster Hill to CBD North via Freeway and Templestowe	< Discounted following the Initial MCA
C5	Doncaster Hill to Fairfield via Fairfield to CBD	LL4	Doncaster Hill to CBD North via Balwyn North	< Discounted following the Initial MCA
C6	Doncaster Hill to Richmond via Kew	LL5	Doncaster Hill to CBD East via Balwyn North and Kew	LA1 Doncaster Hill to the city through the Doncaster Park-and-Ride, Balwyn North and Kew, via a standalone line to CBD East
C7	Doncaster Hill to Hawthorn via Kew Junction	LL6	Doncaster Hill to CBD South via Balwyn North and Richmond	LA2 Doncaster Hill to the city through the Doncaster Park-and-Ride, Balwyn North, Kew and Richmond, connecting to the Burnley group
C8	Doncaster Hill to Box Hill and continuing to the CBD via the Burnley group	LL16	Doncaster Hill to Box Hill	ON1 Doncaster Hill to Box Hill and continuing to the CBD via the Burnley group
Hoddle Street to Melbourne central area option				
CBD1	Via Existing Clifton Hill group to Flinders Street and via the underground loop	—	Not on long-list, but revisited later	RT1 Kew to CBD East via Victoria Parade
CBD2	Via Existing Burnley group to Flinders Street and via the underground loop	LL6	CBD South: to the CBD south via Existing Burnley group, with connection between Hawthorn and Burnley	LA2 Kew to Flinders Street Station and the City Loop, via the Burnley group
CBD3	Via Alexandra Parade and to the CBD as a standalone line	LL1, LL2, LL3, LL4	CBD North: to the CBD north via Alexander Parade including Fitzroy and Parkville	RT2 Clifton Hill to Flagstaff Gardens, via Fitzroy and Parkville
CBD4	Via Alexandra Parade then east-west through the CBD	LL5	CBD East: to the CBD east via Victoria Parade	RT3 Clifton Hill to Saint Vincent's Hospital via Victoria Parade
CBD5	Via Alexandra Parade and then to the CBD West via the Northern group		< Discounted due to journey times and length of tunnelling	LA1 Kew to Saint Vincent's Hospital via Victoria Parade

DONCASTER RAIL STUDY—KEY TO OPTIONS CONSIDERED						
BROAD LIST		LONG LIST		MEDIUM LIST		
Doncaster to Ringwood options						
E1	To Ringwood via the Burnley group	< Discounted due to not being considered cost effective	The study team acknowledged any of these extensions to Ringwood would be feasible, although the preferred option would ultimately be dependent of the preferred option to Doncaster. Subsequently, the medium list focused on the preferred option between the city and Doncaster only, which is the core focus of the study. These options were not further pursued.			
E2	To Ringwood via the freeway alignment heading east including along the EastLink tunnel	LL7 To Ringwood via the freeway alignment heading east including along the EastLink tunnel				
E3	To Ringwood via the freeway alignment heading east and Mitcham	LL8 To Ringwood via the freeway alignment heading east and Mitcham				
E4	To Ringwood via the freeway alignment heading east including along the EastLink tunnel	LL9 To Ringwood via the freeway alignment heading east including along the EastLink tunnel				
E5	To Ringwood via Doncaster Road and then along EastLink tunnel	LL11, LL12 To Ringwood via Doncaster Road and then along EastLink tunnel				
Other eastern options (through Doncaster East)						
DE1	Doncaster Hill to The Pines via Templestowe	< Discounted due to expected lack to demand for capital expenditure required	The medium list did not consider options that extended beyond the Study Area.			
DE2	Doncaster Hill to Donvale	< Discounted in favour of options to Ringwood				
Southern options						
S1	Doncaster Hill to Box Hill	LL16 Doncaster Hill to Box Hill	ON1	Doncaster Hill to Box Hill (as per above)		
S2	Doncaster Hill to Box Hill and continuing further south	LL17 Doncaster Hill to Box Hill and continuing further south	The medium list did not consider options that extended beyond the Study Area.			
Northern options						
N1	From Doncaster to Heidelberg before heading west along Bell Street, Preston	< Rationalised to one northern option in the long-list				
N2	From Doncaster to Heidelberg before heading west along Murray Road with a potential station at Northland and Preston	LL15 From Doncaster to Heidelberg and Preston, via Murray Road	< Discounted following the Initial MCA			
N3	From Doncaster to Heidelberg before heading north west toward La Trobe University in Bundoora	< Rationalised to one northern option in the long-list				
N4	From Doncaster to Heidelberg before heading north west via Greensborough and the Metropolitan Ring Road	< Rationalised to one northern option in the long-list				
Western options						
W1	Link to Werribee Line	< All western options considered beyond the scope of the study				
W1	Link to possible future Airport Line	< All western options considered beyond the scope of the study				

Table 5-2: The route options considered, showing 17 long-list options (LL1–LL17), and six medium list options (RT1–RT3, LA1–LA2, and ON1)

WHAT IS MEANT BY A 'POSSIBLE FUTURE EXTENSION' TO RINGWOOD?

Five of the six medium list options identified within the three corridor themes are marked as terminating at Doncaster Hill, but with a 'possible future extension' continuing to Ringwood.

What is meant by the term 'possible future extension'? When considering the option of extending the Doncaster rail line to Ringwood, the study team undertook some initial engineering assessments of possible route alignments and performed some analysis to gain an understanding of the likely patronage demand that could be expected along these sections of the alignment.

This analysis showed that by connecting the Doncaster rail line to the Belgrave/Lilydale lines at Ringwood, additional passengers would be encouraged to use the new Doncaster rail line, at the expense of patronage on the existing rail services between Ringwood and the CBD. The analysis also showed, that, as was shown with the East Doncaster areas considered in relation to 'The Pines', relatively few new users would be encouraged to use the new rail service. This is mainly due to the lack of dense residential housing and 'impermeable' streetscape, characterised by cul-de-sacs with difficult station access.

The undulating topography and lack of apparent rail corridor between Doncaster and Ringwood would likely mean than any further extension would be of tunnel construction for its entire length, adding a very significant capital cost to the project.

For these reasons of limited benefit, and significant cost, it was not deemed advantageous to the project to proceed further with these extensions. In order not to preclude the future construction of these lines at some later date however, each of the core alignments considered as part of this study were designed as being capable of being extended to Ringwood at a later date.

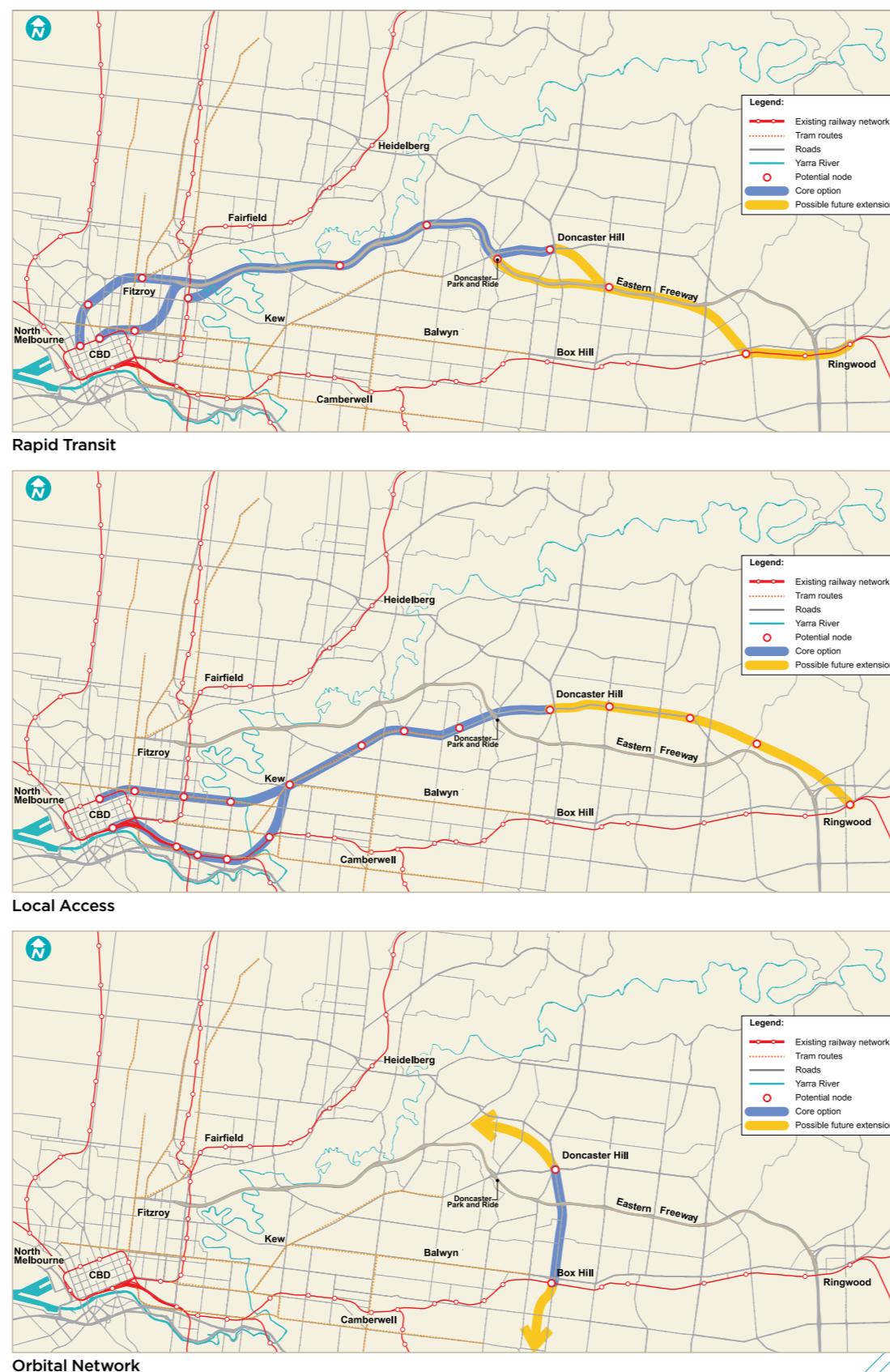


Figure 5-4: The medium list of route options falls into three distinct corridor themes