ORBITAL NETWORK THEME OPTION

8.0 ORBITAL NETWORK THEME OPTION

The proposed Orbital Network Corridor Theme is the shortest option for a heavy rail connection between Doncaster and the Melbourne CBD. The proposed option provides a direct connection into the Burnley group at Box Hill, providing a link to Flinders Street station via the existing rail infrastructure. In a tunnel along its entire length, the line would include new stations at Doncaster Hill and under the Eastern Freeway in the vicinity of Middleborough Road. Originally considered as the potential first section of a wider orbital network, the engineering requirements of allowing trains to run directly from Doncaster Hill to Flinders Street station would mean that a portion of the proposed rail infrastructure would become redundant if wider connections were constructed.

8.1 ROUTE ALIGNMENTS AND STATION LOCATIONS

8.1.1 ORBITAL ROUTE OPTION (OR1)

The Orbital Route Option (OR1) would provide a city connection from Doncaster Hill via the existing Belgrave/ Lilydale lines, through a connection at Box Hill.

The proposed railway line would start at Doncaster Hill with a station located deep below Doncaster Road, accessible from street level and Westfield Doncaster Shopping Centre.

From here, the line would head underground in an easterly direction, generally along Doncaster Road, before curving south to a new station below the Eastern Freeway at Middleborough Road. The Middleborough Road station would be located so as to provide a convenient location for motorists travelling along the Eastern Freeway and Middleborough Road to park and catch the train.

From the freeway, the alignment would then continue in a southerly direction, before curving west at around the intersection of Middleborough and Whitehorse Roads. It would then break ground and connect to the Belgrave/Lilydale lines east of Box Hill station. Platform 1 at Box Hill is not currently used and it is proposed that this platform could service Doncaster trains.

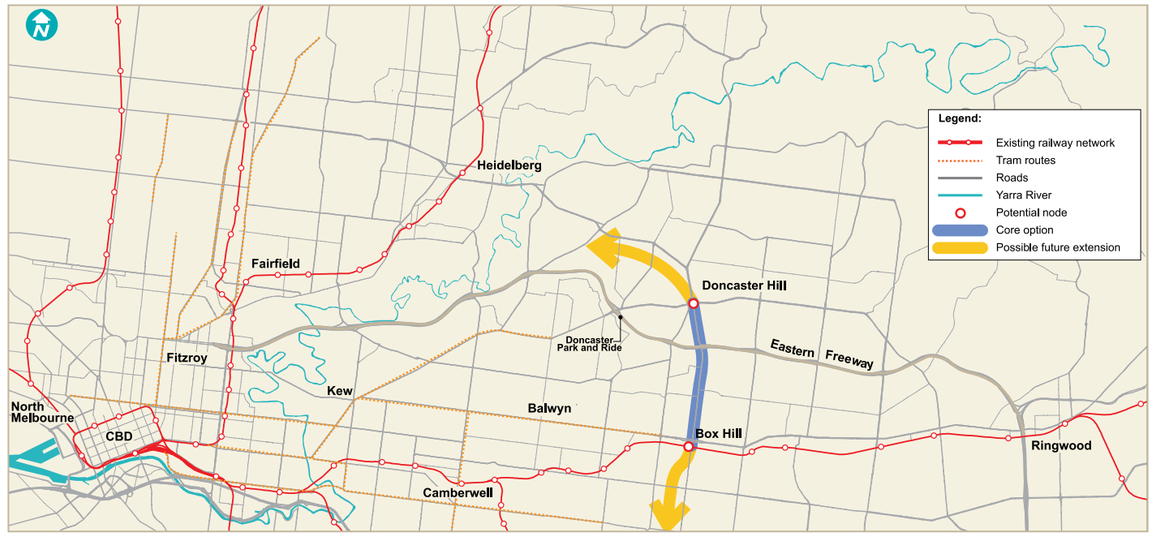


Figure 8-1: The Orbital Network Corridor Theme

Travel time from Doncaster Hill to Box Hill would be approximately seven minutes, with onward journey times dependent upon timetabling and operational constraints. Assuming the Doncaster train would continue as a 'stopping all stations' service to Flinders Street Station and the City Loop, the expected total travel time would be around 32 minutes.

Only two new stations are required for the proposed alignment: one at Doncaster Hill and one at Middleborough Road. Further details of the proposed stations are included below, although it is again stressed that this proposed route option is based upon a limited, high-level assessment of possible station types and positions. Further work is required before station designs and locations can be finalised.

ORBITAL OR SPUR?

We recognise that the option considered here is a 'spur' option rather than a genuine 'orbital' option. As the study team, we have constrained our analysis in this respect for three key reasons:

- within the context of this being a heavy rail study, this option must readily connect to the existing network to enable train stabling and maintenance
- the 'spur' arrangement avoids another interchange at Box Hill and
- we can take advantage of reallocating the Blackburn 'stopping all stations' service to start at Box Hill, using existing train paths

As such, the potential benefits of having a proper orbital network connection, from approximately Heidelberg–Doncaster–Box Hill–Mount Waverley –Huntingdale connecting the Hursbridge, Lilydale/ Belgrave, Glen Waverley and Dandenong lines has not been investigated.

Figure 8-2: Proposed Orbital Route Option

Doncaster Hill Station

Located in the same place proposed by both the Rapid Transit and Local Access Corridor Themes, the proposed Doncaster Hill station would have an entrance centrally located over deep underground platforms. However, with the longer 'approach' to the steep Doncaster Hill that this alignment uses, the depth of the proposed station can be raised to around 40 metres below ground, significantly higher than other options developed by the study team.

As proposed for the other route options, the main entrance to the station is shown as being located on the south side of Doncaster Road, where it could become the focal point of a newly created quality public realm. Provision would be included for kiss-and-ride drop-off and pick-up, as well as for taxi use. The space could connect to a possible multi-storey car park integrated with a bus terminal located further south if desired.

The surrounding environment is largely commercial, and dominated by the Westfield Doncaster Shopping Centre, with the wider surrounding area largely consisting of residential detached housing. Pedestrian connectivity could be improved through the provision of a public underpass across the busy Doncaster Road, connecting to a further station entrance to the north. A potential connection with a dedicated entrance from Westfield Doncaster Shopping Centre may also be possible with this solution, should that be desirable.

Middleborough Road

Located in East Doncaster under the Eastern Freeway at its intersection with Middleborough Road, the proposed station would incorporate a large park-and-ride car park adjacent to the freeway. The proposed station precinct is currently comprised of mixed use developments but the larger surrounding is dominated by detached residential housing. Car parking is expected to be in very high demand at this location, with dedicated kiss-and-ride and taxi bays also proposed. Secure bicycle parking is expected to be in high demand.

It is proposed that a new public realm could be created in front of the station building to accommodate the required kiss-and-ride, taxi and potential bus interchange areas. The entrance building is proposed to be the focus of a multi-storey car park spanning the freeway, efficiently claiming the unused space above the existing carriageways. The bridging structure would also provide opportunity for improved bicycle and pedestrian connections from the residential area north of the highway. The required station ventilation could be integrated with the car park building.

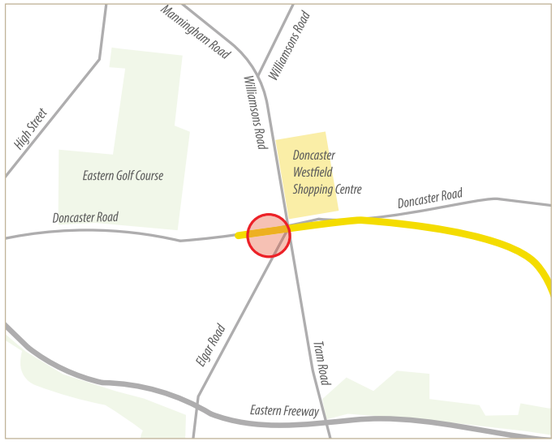


Figure 8-3: Proposed Doncaster Hill station location

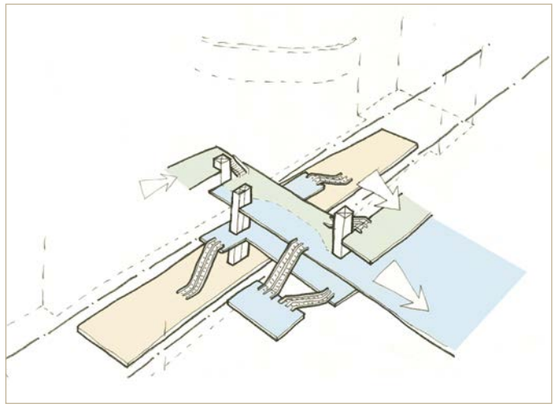


Figure 8-4: The depth of the Doncaster Hill station would likely require two levels of escalators to reach the platform, as shown in this sketch. Alternatively, high capacity lifts may be used.

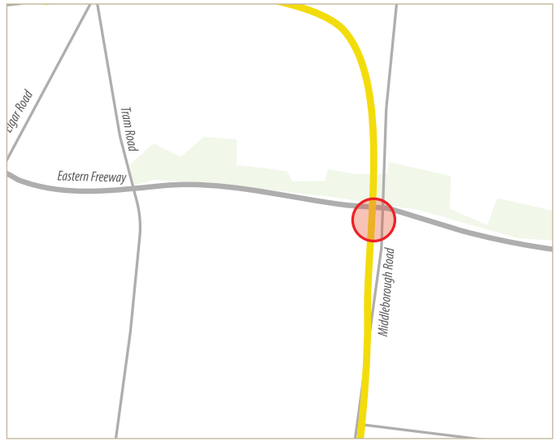


Figure 8-5: The Proposed Middleborough Road station

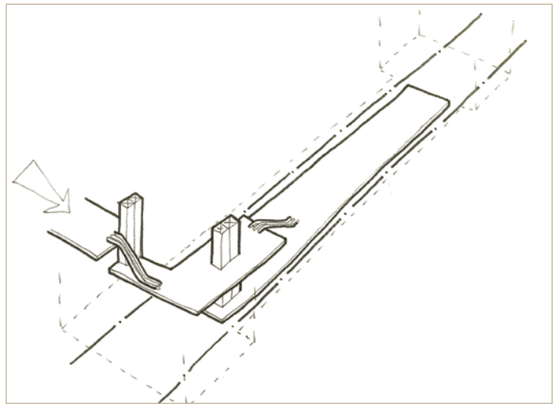


Figure 8-6: With a large car park proposed over the Eastern Freeway, a single platform entrance is proposed with escalators providing access to the platform for the majority of passengers

8.2 ENGINEERING/ENVIRONMENTAL ASSESSMENT AND COST ESTIMATES

8.2.1 ENGINEERING CHALLENGES

The Orbital Network Theme Option is significantly shorter in length than both the Rapid Transit and Local Access Corridor Themes discussed earlier, which has an impact upon the extent of engineering challenges likely to be faced during the construction process. The proposed alignment is also wholly located in tunnels. Although this is a complex construction method in itself, tunnelling would limit interfaces with other complicating factors in construction. Further information regarding the challenges associated with constructing rail tunnels is included in Section 6.0 of this report.

8.2.2 ENVIRONMENTAL IMPACTS

Flora and fauna effects

The OR1 Route Option, like the Local Access options, is predominantly expected to be constructed using a driven tunnel method. Only limited potential exists for flora and fauna impacts as only the station construction would result in surface disturbance. Of the three stations proposed as part of this alignment, only one has the potential to impact significant flora and fauna values, that being the proposed Middleborough Road station. This station is proposed to be located on the northern side of the Middleborough Road Eastern Freeway overpass, an area that is currently densely vegetated when compared to the surrounding landscape.

This vegetation is part of a larger patch stretching along the Eastern Freeway and is likely to represent some of the most intact vegetation in the immediate locality, providing an important wildlife corridor associated with several water bodies that are likely to provide fauna habitat. Potential also exists for the degradation of water quality and aquatic habitat in nearby waterways should water runoff not be appropriately managed during the construction and operation of the car park.

Historical Heritage

As encountered during the assessment of environmental impacts, the tunnel construction method proposed for the OR1 Route Option results in only limited impact upon the surrounding environment, around the proposed station locations.

An assessment of the station locations proposed for this option led the study team to consider that there are no sites of historical heritage significance located along the proposed OR1 Route Option.

Aboriginal Cultural Heritage

Following an assessment of the proposed alignment, it is the opinion of the study team that there are no potential Aboriginal cultural heritage impacts anticipated along the proposed corridor.

8.2.3 COST ESTIMATES

A cost estimate was prepared for the OR1 Route Option, in the same manner as those prepared for the rapid transit and local access options.

As discussed previously, the cost estimates developed are high-level, indicative cost estimates, which will allow for the fair comparison of the various route options considered here. The assessment was largely based upon the lengths of tunnel required and indicative unit costs for the major construction components required to build the proposed rail lines. The estimates quoted are total project costs, including new rolling stock requirements, planning and design costs and are based upon 2012 prices.

The estimates provided here should not be considered as detailed cost estimates for the route options considered, as only high-level assessments of the route options have been carried out as part of this study process. It is recommended that more detailed cost estimates be provided for any options that are taken through for further investigation in Phase Two of the Study.

Orbital Network

The OR1 Route Option is only seven kilometres in length, however this would all be constructed in a tunnel. This offsets some of the potential savings that may otherwise have been realised by the reduced length.

The estimated, comparative cost of this option is expected to be as follows:

TOTAL ESTIMATED COMPARATIVE COST OF OR1:
$2.5 billion — $3.5 billion

CASE STUDY—EAST LONDON RAILWAY EXTENSIONS

The East London Line Extension (ELLX) project is a British railway engineering project in London, managed by Transport for London. The project involves extending the East London Line and making it part of the mainline London 'Overground' heavy rail network.

Like the orbital network corridor theme considered as part of the study, this line comprises extensions and links to the existing rail network to form an orbital railway around London.

The project comprises two phases. The first phase was completed in 2010 with a service from Dalston Junction via the Thames Tunnel under the River Thames and along part of the Brighton Main Line to West Croydon and Crystal Palace. In 2011 the line was connected at its northern end to the North London Line at Highbury & Islington. In the second phase of the project, due for completion in December 2012, a branch is being connected enabling services to run to between Surrey Quays and Clapham Junction.

The extension of the network from Clapham Junction to Highbury & Islington via Surrey Quays will complete the orbital railway around the Capital.

A key benefit of ELLX is the reduction of congestion on radial routes and at central London interchange stations.

Trains will run every 15 minutes between Clapham Junction and Highbury & Islington. There are no plans to operate trains through from the South London line to the West London line, so passengers from one to the other will have to change at Clapham Junction.

Initial reports by Transport for London in 2010 were that ridership was significantly ahead of forecast at 92,000 a day.

8.3 TRAVEL DEMAND AND TRANSPORT INTEGRATION

Expected Patronage Levels

As described in Section 6.3 of this report, VITM analysis was undertaken for the corridor themes on an unconstrained basis and this has permitted an evaluation of the likely passenger demand in 2031, as seen in Table 8-1.

The demand for passenger boardings at each station and associated modes of access and egress was developed by the study team, showing that the largest demand is expected to come from park-and-ride customers wishing to use the new Middleborough Road station on the Eastern Freeway.

Potential Changes to the Bus Network

The existing bus network provides good coverage to each of the railway stations proposed as part of this option, particularly Box Hill station and the proposed Doncaster Hill station (both featuring established shopping centres) and is highly valued by the community. Some minor amendments were proposed by the study team, primarily to divert services to stop as close to the rail stations as possible in order to provide a better connection for passengers. It has been assumed that the design of all new stations will provide for good bus interchange facilities, with bus services located adjacent to the station.

Additionally, it is recommended that a new local route be introduced along Doncaster Road to reduce the gap between bus routes and make the proposed Middleborough Road station more accessible. All other recommendations are minor amendments to provide improved interchange for the buses and railway station.

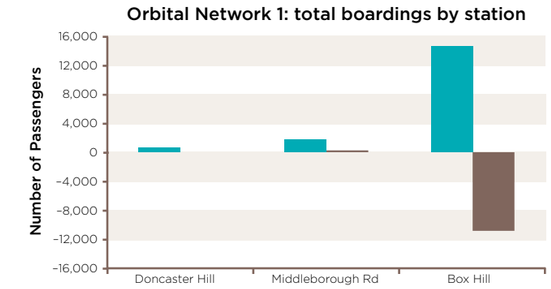
Walking and Cycling Opportunities

Very little is recommended to alter the Principle Bicycle Network for the proposed OR1 Route Option. Both the existing and proposed PBN provide very good coverage in relation to the locations of the proposed new railways stations. The alterations proposed by the study team are minor and consist largely of extensions to the PBN to provide improved linkages to the railway stations.

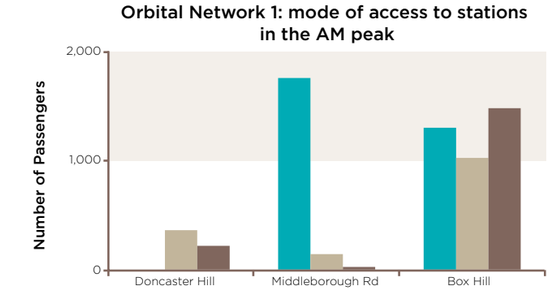
The main recommendation is the introduction of an overpass between Middleborough Road and the station proposed here, to provide cyclist access from the proposed train station to the south of the Eastern Freeway.

	2031 PATRONAGE ON THE BUSIEST INBOUND SECTION OF LINE DURING THE MORNING PEAK PERIOD (7.00 AM TO 9.00 AM)	2031 PATRONAGE ON THE BUSIEST OUTBOUND SECTION OF LINE DURING THE MORNING PEAK PERIOD (7.00 AM TO 9.00 AM)	2031 DAILY TRIPS IN EACH DIRECTION
Orbital Network	2,200	850	6,000

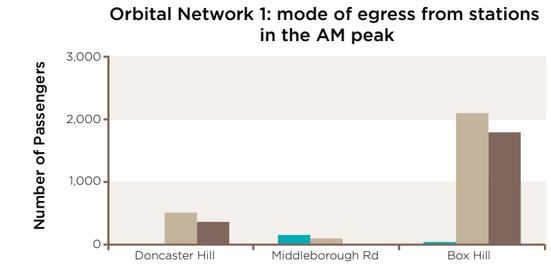
Table 8-1: Expected patronage levels for Orbital Network Option in 2031



	Doncaster Hill	Middleborough Rd	Box Hill
Inbound	582	1,746	14,687
Outbound	0	170	-10,866



	Doncaster Hill	Middleborough Rd	Box Hill
Park-and-Ride	0	1,764	1,306
Walk	363	143	1,028
Tram/Bus	219	9	1,486



	Doncaster Hill	Middleborough Rd	Box Hill
Park-and-Ride	0	146	32
Walk	502	90	2,092
Tram/Bus	354	4	1,784

Figure 8-7: Expected passenger boardings for Orbital Network Option in 2031

8.4 RAIL OPERATION IMPACTS

The proposed OR1 Route Option would require some adjustments to the existing rail timetables and service provision along the Burnley group of railway lines. However, there is expected to be capacity within the rail system for these additional trains to operate without incurring significant problems.

The inclusion of the proposed OR1 Route Option would change passenger demand throughout the existing rail network, with the VITM modelling undertaken by the study team suggesting that the following changes in loading would occur across the existing train and tram network:

	CHANGE IN LOADING DURING THE MORNING PEAK (7.00 AM TO 9.00 AM) (2031)
	Orbital Route
Glen Waverley line	0 (0%)
Hurstbridge line	-40 (0%)
South Morang line	-140 (0%)

Table 8-2: Change in loading on existing rail and tram network after the opening of an Orbital Route Theme Doncaster rail line

8.5 LAND USE, DEMOGRAPHIC CHANGE AND SOCIAL CONNECTIONS

Given the regional significance and role of both the Doncaster Hill Principal Activity Area and the Box Hill Central Activities Area, it is anticipated that the opportunity to connect these two centres would have a positive impact from an employment and land use development perspective. However, it is difficult to ascertain how much of this development will proceed irrespective of a Doncaster rail line given other metropolitan planning influences and the existing connectivity offered to Box Hill on the Lilydale and Belgrave lines and the 109 tram.

Increasing residential densities would be consistent with the Structure Plans adopted for these activity areas. The proposed Middleborough Road station is estimated to generate an additional 600 residents in the walkable catchment to the station by 2031, thereby offering some limited development potential.

Population and employment growth potential projections for the OR1 Route Option can be seen in Table 8-3.

The OR1 Route Option is considered to improve social connections access from the Doncaster Hill area to the concentration of regional and higher order community facilities located in Box Hill. In addition, it would provide the benefit of opening up public transport access from the Doncaster area to key destinations such as Camberwell, Glenferrie and the MCG sports precinct along the existing railway line.

CORRIDOR OPTION	NO. OF HOUSEHOLDS		POPULATION		FURTHER INCREASE ATTRIBUTED TO RAIL	
	2006	2031 (Forecast)	2006	2031 (Forecast)	Possible additional population in 2031	Total population 2031 forecast
Orbital Network Option (OR1)	12,150	19,185	30,054	49,341	950	50,291

Table 8-3: Projected walkable resident population and household growth between 2006 and 2031 (walk-up population assumed to live within 800 metres and one kilometre of station locations)

8.6 COMMUNITY AND STAKEHOLDER FEEDBACK

The feedback collected and analysed throughout the study to date can be grouped into two parts: the initial feedback received related to issues, as well as ideas-gathering to address the community's concerns and understand potential opportunities and constraints. The engagement feedback process then moved on to responding to the three corridor themes that were launched for community input in March 2012.

Throughout the engagement process relating to the three potential corridor themes, community and stakeholder views were particularly sought in relation to three key viability drivers. These were determined by the study team to be the most significant factors in assessing the viability of each option. These were:

- **Customers:** the level of patronage each option could be expected to attract
- **Cost:** the estimated cost of constructing and operating each option
- **Land Use Potential:** the types of changes around station locations that could make best use of existing infrastructure and help off-set the costs of constructing the new rail line.

The principal aim of gaining community and stakeholder input on each theme using this structured format was to explore how each option could be strengthened by reducing its weaknesses and highlighting the positive aspects. At the three Community Workshops held in March 2012, a series of prompt questions were used by table facilitators to help generate group discussion. For the Orbital Network Theme Option, these were:

- How attractive might this alternative be to travellers, including those not needing to go all the way into the CBD?
- To what extent might the reduced costs in the short-term offer sufficient benefits to the community?
- What are the implications for potential land use change along a future orbital corridor of which this might be the first link?

Following is a summary of feedback relating to the OR1 Route Option viability drivers of customers, cost and land use potential.

Customers

There were some inherent assumptions made by the community about the OR1 Route Option that influenced the feedback received. It was often assumed that passengers travelling from Doncaster to the CBD would need to change to a city service at Box Hill station and this raised concerns about people's willingness to interchange. It was also perceived that Box Hill services are at or near capacity already, raising questions about the efficiency of this proposal. It was raised that an additional track would need to be built.

There was some recognition among feedback received that this option could ultimately serve a broad catchment area, given its orbital potential, on the proviso it was fully implemented. It was also recognised that this option would provide good connectivity between popular local areas. The corresponding concern that was commonly raised, however, is that this option does not cater broadly enough as a standalone option, given there would only be one station at Doncaster Hill. It was also suggested that while this option offers some benefits to the Manningham and Whitehorse communities, the option was perceived to do nothing to improve a heavy rail link for the Boroondara community to the CBD.

Comments identified that existing services provide good connectivity to Box Hill and that patronage will be largely shifting existing bus users to a rail service. However, it was noted by participants that the rail service would need to provide a superior journey and travel time to bus travel to be worthwhile.

There was generally recognition that people could benefit from accessing the southern part of Melbourne without needing to travel to the CBD to do so. Comments also identified the potential for this option to support a longer-term vision for Melbourne's public transport network, with orbital links possible. Conversely, a large proportion of comments suggested that this option is not the best solution for providing CBD access.

Cost

There was recognition that this option was cheaper than the other options to construct, as well as potentially quicker to build. However, this option would likely have little benefit in the short-term. There was some concern raised from the community that although it may be the cheapest option, it could involve spending substantial amounts of money for little gain.

Land Use Potential

Generally, participants perceived that very little commercial benefit or development potential would be generated by this option for either Doncaster Hill or Box Hill. Participants felt that a benefit of the OR1 Route Option was that the decreased land development potential and route corridor proposed would see less risk to the surrounding environment.

Summary

From the quantitative data collected from a total of 133 community participants during the engagement activities relating to the three theme options, it can be determined that:

- 13 per cent of respondents rated Orbital Network Theme Option as their first preference
- 19 per cent or respondents rated Orbital Network Theme Option as their second preference
- 68 per cent of respondents rated Orbital Network Theme Option as their third preference

There was general consensus amongst all of the community and stakeholder feedback received that the OR1 Route Option as a spur line would provide the least benefits of a rail connection to Doncaster. It was seen to be duplicating the existing bus service and this was reflected in the small percentage of people that ranked it as their first preference. This option was largely considered to have limited benefit in the short-term, with the exception to this commentary being that there is substantial potential for a truly 'orbital route' that could extend west beyond Doncaster and south beyond Box Hill as a strategic long-term investment in Melbourne's rail infrastructure.

8.7 KEY OPPORTUNITIES

Opportunity to Consider a 'True' Orbital

Due to the key constraint that any new Doncaster rail line must connect to the existing heavy rail network for maintenance and stabling, the OR1 Route Option considered as part of this study could be described as forming more of a 'spur' line rather than a true 'orbital' connection. This has meant that the potential city-wide benefits of a larger scale orbital alignment across Melbourne's eastern suburbs have not been considered.

The opportunity still exists, therefore, to undertake further network-wide modelling of an orbital rail connection that connects the South Morang, Hurstbridge, Ringwood, Glen Waverley and Dandenong lines. This could be beneficial as it would allow for a better understanding of:

- patronage that such an option could attract and how much this would reduce demand on the current rail and road network and
- what long-term change in activity centres this could create to reduce demand on CBD-based travel.

VIABILITY DRIVERS	POSITIVES	NEGATIVES
Customers	• Good to be able to travel south without going to CBD • Connects major centres	• Concerns regarding interchange at Box Hill • Not the best for CBD access or additional connectivity • Replacing existing bus
Cost	• Cheapest to build	• Least congestion cost savings • Cost of tunnelling and fourth track to city
Land Use Potential	• Less impact on green space	• Very limited commercial or development opportunity

Table 8-4: Summary of feedback relating to the proposed Orbital Network Theme from the three community workshops undertaken in March 2012

ORBITAL—AT A GLANCE

- **Peak Hour Frequency:** 10 minutes minimum
- **Doncaster to City Journey Time:** around 30 to 35 minutes
- **DART Service:** remains largely unchanged
- **Patronage:** forecast to be 12,000 average weekday boardings in 2031
- **Car Parks:** new park-and-ride station provide at the freeway crossing
- **Network Enabling Works:** none initially required, however, a fourth track from Burnley to Box Hill will eventually be required
- **Cost Estimates:** $2.5 billion — $3.5 billion