

North East Public Transport Study

O-Bahn Extension Options

Report

October 2020

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Government of South Australia
Department for Infrastructure
and Transport

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1 EXECUTIVE SUMMARY

1.1 Background

The State Government has committed to investigate an extension of the O-Bahn between Tea Tree Plaza and Golden Grove.

The Public Transport Project Alliance (PTPA), including partner organisations McConnell Dowell, Mott MacDonald and ARUP, were selected to investigate an extension of the O-Bahn as part of the North East Public Transport Study (NEPTS).

NEPTS was supported by a community and stakeholder engagement program aimed at understanding user views on O-Bahn optimisation, barriers to public transport access, and its perceived effectiveness.

1.2 Objectives

The objectives of the study specific to the O-Bahn were to provide recommendations to:

- advise whether an extension to the O-Bahn would deliver tangible benefits and if so what solution should be adopted
- get people out of cars and onto public transport;
- enhance or improve access to public transport;
- gain more efficient and effective use of existing transport infrastructure; and
- conduct planning and design with reference to sound sustainable and social principles, recognising social and technological changes.

1.3 O-Bahn Extension Options

The following six (6) potential options were considered:

- O-Bahn guided busway following Golden Grove Road
- Bus priority at intersections
- Dedicated bus lanes
- A combination of guided busway and dedicated bus lanes
- O-Bahn guided busway following Golden Grove Road and Dry Creek
- Base case (ie current transport network)

Four options were shortlisted for detailed assessment including concept design, traffic modelling and cost estimation. Social, environmental and economic evaluations were undertaken to compare these options and determine the preferred option.

The option to provide bus priority at intersections was preferred. This option involves upgrading intersections to provide bus priority on Golden Grove Road at North East Road, Milne Road, Grenfell Road and The Grove Way. The indicative estimated cost is \$13 million, subject to more detailed investigations. This option is estimated to provide a Benefit Cost Ratio (BCR) of 2.3. A BCR greater than 1 indicates that the project generates benefits which outweigh the costs.

Key findings:

- The preferred solution makes best use of existing infrastructure and has minimal environmental impact.
- The level of road congestion, now or into the foreseeable future, would unlikely be of sufficient magnitude to warrant the capital cost of a large dedicated infrastructure solution, such as a new guided busway.

2 KEY STUDY INPUTS

2.1 Community and Customer Consultation

The study was supported by a community and stakeholder engagement program aimed at understanding users' views on O-Bahn optimisation, barriers to public transport access, and its perceived effectiveness.

The engagement program included an online survey with 1624 responses, staffed promotions, community sessions, public displays, and consultation with local government.

The key findings from the engagement were:

- Community respondents identified service improvements as a way of making public transport more useful to them, including increased service frequency, capacity during peak periods, network coverage and speed of services.
- Convenience was identified as the primary motivator of decision making for people accessing public transport services. Accessibility and timing of public transport services are significant factors for convenience.
- Interchange improvements were raised by many of the consultation participants as an opportunity to improve the experience of using public transport, including increased car parking, safety and amenity, and improved infrastructure.
- A range of user interface improvements to increase user satisfaction were identified, including information provision, ticketing administration and bus driver behaviour.

2.2 Problem and Opportunities

In reference to the objectives for the study, the following key problems and opportunities relevant to the O-Bahn were identified:

Problem 1: Limited accessibility to public transport, Park 'n' Ride capacity issues, lack of effective parking, and encourages a high reliance on private car use and congestion leading to increasing private user costs, business costs, greenhouse gas and pollutant emissions.

Problem 2: Pedestrian and cycling priority at interchanges that is not user-friendly, safety issues and unattractive environments around interchanges that contributes to reduced uptake of active transport.

Opportunity 1: Optimise O-Bahn infrastructure and operations as a key part of the Adelaide Metro public transport system.

Opportunity 2: Modify bus services to increase the level of accessibility to opportunity and key destinations by public transport for north-eastern populations.

Opportunity 2 is within the purview of the SA Public Transport Authority and not covered by this report.

3 O-BAHN EXTENSION OPTIONS

The following methodology was adopted to upgrade the O-Bahn service from Tea Tree Plaza to Golden Grove:

- Development of a long list of options.
- A rapid Multi-Criteria Analysis (MCA) to identify a short list of options.
- Development of 5% concept designs for the short list of options.
- A detailed analysis of the short list options.
- An MCA assessment to identify the preferred option.

3.1 Long List of Options

The long list of options included five O-Bahn extension options from Tea Tree Plaza to Golden Grove (designated LL1 to LL5), which were analysed against a base case scenario (designated LL6).

TABLE 1: LONG LIST OF OPTIONS

Option	Description
Option LL1	A dedicated O-Bahn guided busway, separate from the existing road carriageway, terminating in the Golden Grove catchment. The guided busway followed the existing alignment of Golden Grove Road and The Grove Way. An intermediate interchange was proposed near Grenfell Road.
Option LL2	Bus priority at intersections. This was considered a minimum intervention scenario, aiming to make use of the existing road network to improve service. This option was expected to require widening works at intersections.
Option LL3	Dedicated bus lanes on Golden Grove Road and bus priority at intersections. This option included converting existing traffic lanes to dedicated bus lanes between North East Road and Grenfell Road and on The Grove Way. Duplication of the existing carriageway between Grenfell Road and The Grove Way was expected to be required to provide dedicated bus lanes in this section.
Option LL4	A combination of guided busway between North East Road and Grenfell Road and new dedicated bus lanes between Grenfell Road and The Grove Way. As in Option LL3, this option was expected to require duplication of Golden Grove Road
Option LL5	A guided busway, following the alignment of Golden Grove Road to a proposed intermediate interchange, and the alignment of Dry Creek to Golden Grove Road.
Option LL6	The road network and bus services in their current state. Used as a baseline to assess options.

3.2 Short List of Options

A rapid MCA process was conducted for the long list of options focussing on performance against strategic objectives of; reducing journey times, improving journey time reliability, maximising use of existing transport infrastructure, minimising social, environmental & green space impacts, minimising community severance, and minimising impacts on property.

As a result of the analysis, the following were taken forward to the short list analysis (refer Table 2):

- Option SL1: Bus Priority (formerly Option LL2)
- Option SL2: Dedicated Lanes (formerly Option LL3)
- Option SL3: Combination (formerly Option LL4)

In addition to the three short list options, Option LL5 was identified as a “comparative case” option and was progressed to the next phase of assessment.

TABLE 2: SHORT LIST

Short List Option	Description
SL1 Bus Priority	Based on Option LL2. Designed as a minimum intervention strategy comprising upgrades to the intersections on Golden Grove Road at North East Road, Milne Road, Grenfell Road and The Grove Way/ Yatala Vale Road to provide priority to buses.
Option SL2 Bus Lanes	Based on LL3. Comprises three components: <ul style="list-style-type: none"> • Modification to the existing carriageway on Golden Grove Road (currently two traffic lanes in each direction) between North East Road and Grenfell Road to provide one traffic lane and one dedicated bus lane in each direction. • Duplication of the existing carriageway (one traffic lane in each direction) between Grenfell Road to Golden Grove Road/ Yatala Vale Road to provide one traffic lane and one dedicated bus lane in each direction. • Realignment of the existing staggered t-intersections at Milne Road and Grenfell Road to provide four-way intersections.
Option SL3 Combination	Based on LL4. Comprised two components: <ul style="list-style-type: none"> • Provision of a guided busway from Tea Tree Plaza to Grenfell Road, including several grade separations. • Duplication of the existing carriageway on Golden Grove Road (one traffic lane in each direction) between Grenfell Road to Golden Grove Road/ Yatala Vale Road to provide one traffic lane and one dedicated bus lane in each direction.
Comparative Case	The comparative case (based on LL5), comprised provision of a guided busway from Tea Tree Plaza to Golden Grove, following the alignment of Golden Grove Road to the south and Dry Creek to the north.

4 DETAIL ANALYSIS

Each short list option, and the comparative case option, was designed to a nominal 5% level of design, considering the following design elements:

- geometric design;
- geotechnical considerations;
- structural considerations;
- stormwater management; and
- impact to existing services.

The analysis of the short list options and the comparative case included:

- traffic modelling to understand the effect of each option on traffic within the project corridor and the wider road network;
- transport modelling to understand the implications of each option relative to the base case;
- environmental impacts;
- social impacts; and
- construction impacts.

An assessment of monetised (those aspects which are assigned a value in the economic analysis) and non-monetised (those aspects which are assessed qualitatively) aspects of the options is shown in Table 3.

TABLE 3: MONETISED AND NON-MONETISED ASSESSMENT OF SHORT LIST

Short List	Monetised Assessment	Non-Monetised Assessment
SL1 Bus Priority	Slight positive benefits for traffic resulting from intersection upgrades. There was a moderate positive public transport benefit due to decreases in travel time. This option resulted in a BCR of 2.3.	Generally had a neutral impact to non-monetised outcomes. A slightly negative impact was expected for noise and air quality, due to intersection upgrades bringing vehicles closer to sensitive receptors. A slight negative impact was expected for non-aboriginal heritage, biodiversity and traffic disruptions during construction. A slight negative impact was expected for landscape due to loss of trees, albeit a smaller impact than Option SL2. A slight positive impact was expected for reliability for commuters and other users.
Option SL2 Bus Lanes	Slight negative benefits for traffic due to the conversion of one traffic lane to a dedicated bus lane in each direction between North East Road and Grenfell Road. Traffic modelling MASTEM results indicated a reduced performance at the Milne Road and Grenfell Road intersections due to the removal of the staggered t-intersections, however it was considered likely that this is the result of limitations in the strategic model. There was a moderate positive public transport benefit due to decreased travel times. Again, it was considered likely that these benefits were understated due to limitations in the strategic model. This option resulted in a BCR of 0.3.	Generally had neutral to slight negative impacts on non-monetised outcomes. A moderate negative impact was expected for noise, air quality, biodiversity, the water environment and traffic disruption during construction. A large negative impact was expected for landscape due to loss of trees, and severance. A slight positive impact was expected for reliability for commuters and other users.
Option SL3 Combination	Slight positive benefits for traffic and moderate positive public transport benefit due to decreased travel times. The level of benefits was influenced by the residual values benefit that forms \$16.5m of the \$33m benefits. This option resulted in a BCR of 0.16.	Generally had slight negative to large negative impacts on non-monetised outcomes. Large negative impacts were expected for noise, landscape, townscape (private domain) and the water environment. Slight positive impacts were expected for townscape (public domain), the reliability on commuting and other users, and infrastructure quality.
Comparative Case	The traffic benefits adopted for the comparative case were Option SL3 benefits due to issues with the model outputs. There was a large positive public transport benefit due to decreased travel times. The level of benefits was influenced by the residual values benefit that forms \$13.5m of the \$36m benefits. This option resulted in a BCR of 0.20.	Generally had slight negative impacts to large negative impacts on non-monetised outcomes, with large negative impacts expected for noise, air quality, landscape, townscape (private domain), biodiversity and the water environment. Moderate negative impacts were expected for urban design, severance and accessibility during construction. This option was expected to result in a moderate positive impact for reliability for commuters and other users and a large positive impact for infrastructure quality.

TABLE 4: SUMMARY OF KEY METRICS

Option	P90 Cost (\$m) 2019 dollars*	Trees Impacted*	Properties Impacted*
SL1 Bus Priority	13	55	No full acquisitions of properties required. Minor partial acquisition of less than 5 property frontages may be required
Option SL2 Bus Lanes	70	180	No full acquisitions of properties required. Minor partial acquisition of less than 15 property frontages may be required.
Option SL3 Combination	310	200	Approximately 29 properties required for full acquisition and moderate impact to council reserves
Comparative Case	250	290	Approximately 41 properties requiring full acquisition and significant impact to council reserves

*Indicative subject to final design

4.1 Preferred Solution

Having considered the monetised and non-monetised options and recognising the lack of congestion along the corridor, Option SL1 was identified as preferred. The assessment identified that the level of road congestion along the corridor, both now and into the foreseeable future, would unlikely be sufficient to warrant the capital cost of a new dedicated guided busway.

A summary of the analysis is shown in Table 5.

TABLE 4: MCA OUTCOME SUMMARY

		Option SL1	Option SL2	Option SL3	Comparative Case
Economic	Present Value (Benefits)	\$ 24.86	\$ 17.57	\$ 40.57	\$ 43.10
	Present Value (Costs)	\$ 10.61	\$ 59.83	\$ 259.35	\$ 214.88
	Net Present Value	\$ 14.25	-\$ 42.27	-\$ 218.78	-\$ 171.78
	Benefit Cost Ratio	2.3	0.3	0.2	0.2
	Regeneration (land development opportunity)	-	-	-	-
	Wider Economic Impacts (agglomeration impacts)	-	-	-	-
Environmental	Noise	-	-	-	-
	Air Quality	-	-	-	-
	Greenhouse gas emissions - post completion	-	-	-	-
	Greenhouse gases - during construction	-	-	-	-
	Landscape (trees)	-	-	-	-
	Townscape - Private Domain	-	-	-	-
	Townscape - Public Domain	-	-	-	-
	Urban Design	-	-	-	-
	Non-Aboriginal Historic Environment	-	-	-	-
	Biodiversity	-	-	-	-
Water Environment (Flood risk and quality)	-	-	-	-	
Social	Physical activity	-	-	-	-
	Reliability impact on Commuting and Other users	-	-	-	-
	Infrastructure Quality (previously known as Journey Quality)	-	-	-	-
	Security	-	-	-	-
	Access to services	-	-	-	-
	Severance	-	-	-	-
Construction	Public Transport Needs Gap (akin to a social equity message)	-	-	-	-
	Traffic Disruption/Delays	-	-	-	-
	Social - Severance / Accessibility	-	-	-	-
Cap / Ops	Environmental - ecosystem/species	-	-	-	-
	Annual Maintenance	-	-	-	-

Large Negative	Moderate Negative	Slight Negative	Neutral	Slight Positive	Moderate Positive	Large Positive
1	2	3	4	5	6	7

NOTES:

Present Value (benefits) represents the value of benefits over a 30-year period brought back to a current day dollar figure and typically includes: travel time savings, reduced vehicle operating costs, improved safety, and environmental.

Present Value (costs) represents costs of delivering the project including capital and operating costs over a 30 year period brought back to a current day dollar figure. For the purposes of comparison full cost allowances for risk are excluded.

Net present value = Present Value (benefits) *minus* Present Value (costs)

Benefit Cost Ratio = Present Value (benefits) *divided by* Present Value (costs)

(A BCR greater than 1 indicates that the project generates benefits which outweigh the costs)