Australian Government

Department of Infrastructure, Transport, Cities and Regional Development

BCA Tool Guidance – Appendix A: Commuter carparks

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Great Cities. Strong Regions. Connecting Australians.

Introduction

The Notes on Administration require proponents to provide the Benefit Cost Ratio (BCR) for projects seeking Commonwealth funding.

The Department recognises that the expense and time required to commission a detailed benefit cost analysis may place a disproportional and excessive burden on non-state delivery agencies such as local governments for low value projects including commuter carparks.

The Department has developed an Excel-based tool to assist proponents to determine a reasonable estimate of the benefit cost ratio for low-value projects, including this version applicable to commuter carparks. This guidance explains the assumptions underpinning the calculations within the tool, and its use.

Proponents should continue to use their own existing tools and processes rather than this tool where they are likely to achieve more accurate outcomes.

Expected benefits from carparks

In order to determine how to calculate a reasonable estimate of the benefits of a new or enlarged carpark, the anticipated behavioural changes of a number of different users must be considered:

- Compared to the base case, there will be a number of whole-of-trip car travellers who divert to car-rail. This will give rise to decongestion and reduced crash costs on the rest of the network, and reduced environmental impacts (externalities). On an individual basis, some of these users may experience reduced travel times as well as reduced travel costs depending on the cost of the fare and carparking.
- Car-rail travellers who park elsewhere such as nearby streets should experience timesaving benefits. In turn, that behaviour may give rise to additional rail travellers who fill up the vacated parking places.
- Although likely to be a small number, travellers who go from home to the railway station by modes such as bus, bicycle or walking and divert to car-rail will see time saving benefits. This diversion from active or other public transport will give rise to some externality disbenefits including increased pollution. Pedestrians and cyclists may also experience health disbenefits as a result of reduced exercise.
- New train travellers who did not travel at all in the base case. In the short term they are likely to be so small that they can be ignored but, by making the suburb more attractive to commuters, some people may relocate in the long term.

Other benefits may include:

- Benefits that accrue to the entire community such as reduced environmental pollution; and
- Other benefits from improved accessibility for possible future trips not yet anticipated, even if not used.

The aim of this tool is to provide a reasonable estimate of the benefit cost ratio through providing additional commuter car spaces. As such, for simplicity and ease of calculation it is assumed that benefits will accrue from three sources:

1. Decongestion benefits on the rest of the road network;
2. Reduced crash costs on the rest of the road network (assuming that vehicle crashes are a function of vehicle kilometres travelled); and
3. Reduced environmental impacts as a result of fewer vehicle kilometres travelled.

Roughly speaking, the tool will calculate benefits as being somewhat proportional to a combination of the distance to destination and the level of reduced congestion on the network. In other words, if the number of car spaces is held constant, the benefit cost ratio will increase as a function of the distance travelled and the level of congestion.

Avoiding double-counting

While some proposed carparks may impose parking fees, they should not be counted as a disbenefit (to users) or a benefit (to the carpark operator). In such a case, the transaction involves money moving around without anything of economic value being created or consumed – in other words parking fees are a transfer payment.

Including transfer payments can be avoided by focusing on whether or not there is consumption or savings of real resources with economic value (time, clean air, and materials such as fuel) whether or not there is an actual market for those resources. That is the reason that payments such as carpark fees, train fares, avoided tolls, etc. can be excluded in this analysis.

Interface and data entry

The tool contains several tabs. Only the first tab – "Input sheet" requires data entry (see figure below). All cells highlighted orange require data entry. Summarised instructions for each required input are contained within Column B.

The discount rate (4% or 7%) should be selected from the drop down in Cell D8.

The "Model" tab is where calculations are performed in the background but it should not be altered. All formulae are intact for transparency and traceability.

The Benefit Cost Ratio will auto-populate at Row 35.

Car Park Model - Input Sheet

Instructions	Category	Value
Please populate cells highlighted in this colour		
Project Discount Rate Data	**Project Discount Rate Data**	*Drop Down Box*
Select 4% or 7%	Discount Rate (%)	**7%**
Project Cost Data	**Project Cost Data**	
Enter unescalated project capital cost including contingency (P50 or P90)	Capital Costs ($)	**$ 15,000,000**
Car Park Typology	**Residual/Salvage Value Data**	*Drop Down Box*
Select type of car park Options are at-grade or multi-storey	Type of car park	**At-grade**
General Project Data	**General**	
Enter number of spaces/bays being provided	Number of spaces	**1,000**
Estimate average distance of commuters from carpark to destination	Distance to destination (km)	**5**
Enter assumed number of working days per year	Working days (annual)	**220**
Congestion	**Network congestion**	
Estimate proportion of congestion levels on the network between the carpark and assumed destination		
Heavy	Heavy	**50%**
Medium	Medium	**30%**
Light	Light	**20%**
	Must sum to 100%	**100%**

Discounted cost and benefits	Value
Capital	$ **15,000,000**
Maintenance	$ **124,090**
Benefits	$ **30,109,510**
BCR	**1.99**

Maintenance Costs - Project Case

Maintenance Cost ($)

Year	Value ($)
1	10,000
2	10,000
3	10,000
4	10,000
5	10,000
6	10,000
7	10,000
8	10,000
9	10,000
10	10,000
11	10,000
12	10,000
13	10,000
14	10,000
15	10,000
16	10,000
17	10,000
18	10,000
19	10,000
20	10,000
21	10,000
22	10,000
23	10,000
24	10,000
25	10,000
26	10,000
27	10,000
28	10,000
29	10,000
30	10,000

Project Costs

Capital costs

Enter the unescalated capital cost including contingency at Cell D11. The capital cost must include contingency (P50 or P90).

Maintenance costs

The estimated operation and maintenance costs for the project case (in today's dollars) should be entered in the years they are anticipated to be incurred in column G.

Annual O&M costs for at-grade car parks will be minimal but may be significant in the case of a multi-storey car park with features including vertical transport, security systems, fire detection systems, or electric vehicle charging stations.

Benefits

1.1.1 General Project Data

Enter the number of spaces/bays to be provided under the project case at Cell D18.

Benefits are heavily driven by cars removed from the network. It is critical that a reasonable estimate of the average distance from the carpark to destination is made at Cell D19. The main challenge is that commuters accessing public transport from any one particular location will not all travel to the same destination (e.g., not all will travel from the station to the CBD). Only distance to destination needs to be entered – for calculation purposes the model will account for return trips.

1.1.2 Decongestion benefits

Under the project case, benefits will accrue to those who continue to use private road vehicles in the form of reduced traffic congestion as some former car drivers divert to public transport. Determining the extent of this benefit normally requires:

- An estimate of the quantity of road traffic removed from the road system – both the number of cars and the average distance travelled;
- The level of congestion experienced under the base case which will be dynamic (i.e. vary along the route;
- An estimate of the change in travel speed; and
- A value of travel time for car occupants in order to estimate the saving that will accrue to road users.

Clearly, the calculations required are difficult without a dedicated traffic model. However, table 11 from ATAP guidance[1] (Mode Specific Guidance) provides indicative default congestion values which are suitable for the purposes of this model. The values cover time and vehicle operating cost changes and allow for any induced traffic effects resulting from reduced car travel demand. Values in the table below have been adjusted to 2019 prices.

Time period	Congestion level	Benefit ($/veh-km, 2019 prices)
Peak	Heavy	1.29
	Moderate	0.92
	Light	0.24
Off-peak	All	0.24

[1] Australian Transport Assessment and Planning Guidelines: Mode Specific Guidance M1 – Public Transport

An approximation should be made of the proportion of travel expected to be made at each congestion level in cells D24 to D26. While most travel would be expected to be made during peak times, depending upon location of the carpark and expected destination, it would be unreasonable to expect all congestion to be heavy.

1.1.3 Crash reductions

Analysis has been undertaken by various transport agencies and organisations to identify accident exposure rates for various road types, expressed as expected accidents per 100 million kilometres of travel. Unsurprisingly, accident rates vary between undivided roads, divided roads, and freeways. Width of undivided road also makes a difference with accident rates on roads <5.8m in width being approximately twice as high as those wider than 8.2m.

For simplicity, NSW whole-of-state fatality and casualty rates for the 12-month period ending December 2019[2] have been used in the model, rather than complicating matters by attempting to split out by road type.

The following accident rates (accidents per 100 million km) have been used in the model:

Rates per 100 million vehicle kilometres travelled	
Fatality	Casualty
0.5	20

These values are pre-loaded. Crash reduction benefits will be automatically calculated. No data entry is required by the user for this parameter.

1.1.4 Externalities

Externalities can be thought of as side effects of an initiative on third parties. Examples include noise, atmospheric pollution and climate change caused by greenhouse gas emissions.

This model applies default values to obtain the estimate of reduced externality costs as a result of removing vehicles from the road network. The default values are expressed as cents per vehicle-kilometre travelled.

Applying a CPI adjustment to the default externality values from Appendix C of Volume 3 of the NGTSM[3] gives a total externality value of 6.692 cents per vehicle km (passenger vehicles, urban).

These values are pre-loaded. Externality benefits will be automatically calculated. No data entry is required by the user for this parameter.

[2] Available at https://roadsafety.transport.nsw.gov.au/statistics/index.html
[3] Australian Transport Council (2006) National Guidelines for Transport System Management in Australia, Volume 3: Appraisal of Initiatives