



Austroads

Research Report
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Australasian Pedestrian Facility Selection Tool [V2.0] User Guide

Australasian Pedestrian Facility Selection Tool [V2.0]: User Guide

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Abstract

This user guide describes the operation and outputs of the *Australasian Pedestrian Crossing Facility Selection Web Tool* located at <http://www.austrroads.com.au/road-operations/network-operations/pedestrian-facility-selection-tool>

This guide describes the user interface of the tool, including:

- how to access the tool
- the types of facilities that can and cannot be assessed
- computer requirements
- a quick-start guide to using the tool
- a description of the usability features
- inputs and outputs relating to each section of the tool
- known issues and troubleshooting.

The 2018 tool updates include economic values, save/load function, maintenance costs, crossing upgrades and unfeasibility reasons.

Keywords

pedestrian crossing, pedestrian facility, walkability, raised platforms, kerb extensions, median refuges, zebra crossings, signals, grade separation, project assessment, user guide

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- Roads Corporation Victoria
- Queensland Department of Transport and Main Roads
- Main Roads Western Australia
- Department of Planning, Transport and Infrastructure South Australia
- Department of State Growth Tasmania
- Department of Infrastructure, Planning and Logistics Northern Territory
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- Australian Government Department of Infrastructure, Regional Development and Cities
- Australian Local Government Association
- New Zealand Transport Agency.

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The Australasian Pedestrian Crossing Facility Selection Web Tool ("the tool") tool is a free web service provided by Austrroads and is intended to assist practitioners in selecting an appropriate pedestrian crossing facility for a certain location. The tool is based on literature, analytical and behavioural research coupled with a number of mathematical models. As with all mathematical models care must be taken to understand input limitations and background assumptions when interpreting the outputs. The tool does not replace professional engineering or planning advice and neither Austrroads nor Abley Transportation Consultants Limited accept any responsibility regarding the tool. While we have endeavoured to ensure the information output by the tool is appropriate, we make no representations or warranties of any kind about the completeness, accuracy, reliability, suitability or availability with respect to the outputs. Any reliance you place on such information is strictly at your own risk and it is your responsibility to check all information output by the tool.

This report has been prepared for Austrroads as part of its work to promote improved Australian and New Zealand transport outcomes by providing expert technical input on road and road transport issues.

Individual road agencies will determine their response to this report following consideration of their legislative or administrative arrangements, available funding, as well as local circumstances and priorities.

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Contents

1. Introduction	1
Updates	1
Help within this document.....	1
Accessing the tool	1
Types of facilities	2
Computer requirements.....	2
2. Quick-start Guide	3
3. Usability Features	4
Help tips.....	4
Error checking	4
Site characteristics	4
Automatic calculation.....	4
Notes	4
Printing.....	4
Saving.....	5
Loading a saved file.....	5
Clearing inputs.....	5
4. Inputs	6
Site information.....	6
Physical/environmental variables	6
Operational variables.....	7
Site layout diagram.....	8
Overall site characteristics.....	8
Crash information	8
Model parameters.....	9
Economic assessment parameters	9
Economic update factors	9
Expected crash reduction factors	10
Existing facility	10
5. Feasibility	11
Suitable for site?.....	11
Built parameters	11
Platform	11
Kerb extensions.....	11
Median refuge	12
Kerb extensions with median refuge	12
Zebra crossing facilities.....	12
Signals	12
Construction cost.....	13
Annual maintenance cost	13
Show in final output?	13

6. Assessment	14
Suitable for site?	14
Pedestrian delay	14
Vehicle delay	14
Predicted crash rate	14
Sight distance	14
Pedestrian walkability	15
Economic outputs	15
7. Troubleshooting	17
8. Example Use of the Tool	18
Appendix A Australasian Pedestrian Facility Selection Tool Economic Evaluation Update	22
A.1 Introduction	22
A.2 ATAP guidance	22
A.3 EEM update	23
A.4 Further considerations	24
A.4.1 Health benefits	24
A.4.2 Pedestrian amenity	24
A.4.3 Facility operating cost	25
A.4.4 Base case definition	25
A.4.5 Sensitivity testing	25
A.5 Implemented Changes	25
A.6 Save and load functionality	26
Appendix B Australasian Pedestrian Facility Selection Tool version 2.0.0 update	27
B.1 Introduction	27
B.2 Visual style enhancements	27
B.3 Improved save/load function	27
B.4 Maintenance costs	27
B.5 Crossing upgrades	28
B.6 Wombat crossings	28
B.7 Summary of unfeasibility	28
B.8 Multi-lane crossings	28
B.9 Assessing crossing facilities with existing medians	28
B.10 Zebra crossing pedestrian delays	29
B.11 Site information collection form	29

1. Introduction

This user guide describes the operation and outputs of the *Australasian Pedestrian Crossing Facility Selection Web Tool* located at <http://www.austroads.com.au/road-operations/network-operations/pedestrian-facility-selection-tool>. The tool is the product of Austroads research project NS 1912 and is fully documented in the research report AP-R472-15 *Development of the Australasian Pedestrian Crossing Facility Selection Web Tool*. Chapter 6 of the research report fully describes the mathematical models underlying the tool, including all equations, assumptions, default values and sources of information used in the tool.

This guide describes the user interface of the tool, including:

- how to access the tool
- the types of facilities that can and cannot be assessed
- computer requirements
- a quick-start guide to using the tool
- a description of the usability features
- inputs and outputs relating to each section of the tool
- known issues and troubleshooting.

Updates

The user guide has been updated to reflect changes embodied in various updates to the tool. Specific details of each update are included in the appendices.

Help within this document

This guide includes both help tips (corresponding to the help tips available in the tool) and warnings.

 Help tips

 Warnings

Accessing the tool

The tool is accessed through a landing page <http://www.austroads.com.au/road-operations/network-operations/pedestrian-facility-selection-tool>.

Users should review the information contained on that page, which includes sign-up for an Austroads mailing list regarding the tool and recorded webinars describing use of the tool. The tool is accessed by clicking the *Access the tool* link near the top of the page.

Types of facilities

The tool allows the facility types indicated in the following table to be assessed:

Crossing aids	Control type		
	Uncontrolled	Zebra	Signals
No facility	Yes	Yes	Yes
Platform	Yes	Yes	
Kerb extensions	Yes	Yes	Yes
Median refuge	Yes	Yes	
Platform and kerb extensions		Yes	
Kerb extensions with median refuge	Yes	Yes	Yes ¹
Grade separation	Yes		

The tool cannot be used to assess crossings in locations with more than two lanes in any direction, signals or grade separation are recommended for wider corridors.

Situations where an existing median (either painted or raised) is currently used by pedestrians can be assessed by the tool, reducing crossing times and sight distances for no facility and signals assessments. However, the user must apply on-site observation or engineering judgment as to whether this is appropriate (consideration should be given to sensitive pedestrians, particularly if the width is less than one metre or the median is raised). Restrictions are placed upon the types of facilities that are allowed in such situations.

The tool allows the existing facility at the site to be specified, against which the financial benefits of the proposed facilities are compared.

It is not appropriate to use this tool to assess school crossings, for which criteria other than economic suitability and pedestrian level of service may apply.

The following facility variations can also be assessed by the tool:

- **Puffin signals:** the default signal type assessed by the tool, in which all pedestrian green phases are associated with pedestrians actually crossing.
- **Wombat crossing (Australia):** treat as *Zebra with platform* or *Zebra with platform and kerb extensions* and adjust posted/approach speed if required. This is now explicitly highlighted in the tool when an Australian jurisdiction is selected.

Computer requirements

- A modern web browser (such as Internet Explorer 10 or newer) is recommended
- Monitor resolution should be set to 1366x768 or higher
- JavaScript must be enabled in web browser settings (it is enabled by default in all web browsers but may be disabled if certain extensions are installed, such as NoScript)

See Troubleshooting section of this document.

¹ In the situation where there is an existing median Signals with kerb extensions is treated as Signals with kerb extensions and median refuge

2. Quick-start Guide

1. Help tips are available for most inputs. To display, hover your mouse over the icon (?)
2. This Quick-start guide can be viewed at any time in the tool by clicking the *Quick-start guide* link in the top bar.
3. Gather your inputs – if going on site print a copy of the Site information collection form (PDF) that is available through the tool page. A detailed list of required inputs is provided in this User Guide.
4. Open the tool on a desktop computer using a modern web browser (such as Internet Explorer 10 or newer) with JavaScript enabled in your browser settings.
5. Enter the project name, location and date of assessment.
6. Enter the **site information, physical/environmental and operational inputs**. Note that the tool cannot be used to assess crossings in locations with more than two lanes in any direction, signals or grade separation are recommended for wider corridors. The assessment requires that all inputs relating to the site and facilities have been entered.
7. To review the **model parameters**, click on the show/hide link.
8. Use the **existing facility** dropdown to test crossing upgrades in situations where there is an existing facility at the site.
9. Click the **Calculate feasibility button**. This will present the *feasible facilities* table, showing which facilities are appropriate for the site based upon the inputs entered.
10. Enter the **design inputs** for the facilities to be evaluated.
11. Include or exclude facilities from the assessment by checking or unchecking the boxes in the column **Show in final output?** Non-feasible facilities can be included in the final facility assessment but these will only be listed and no assessment outputs will be shown.
12. Click the **Calculate assessment** button to display the outputs for each facility including delays, crash rate, sight distances, pedestrian Level of Service and economic evaluation.
13. Additional comments or observations can be entered in the **Notes**.
14. To **print** use the *Print page* link in the top bar. The page may be set to landscape orientation if content does not fit correctly.
15. Inputs and tool configuration can be **saved** to CSV file and then loaded at a later date.

3. Usability Features

Help tips

Additional information is available for some inputs and can be viewed by hovering the mouse cursor over the help icon: 

 All help tips contained in the tool are also shown in this user guide

Error checking

Invalid inputs will be highlighted in red when a calculation is run that requires these inputs.

Site information collection form

This printable form, which is hosted through the tool page, is designed to act as a checklist and template for collecting relevant on-site information.

Site characteristics

Below the site layout diagram an output box displays:

- exposed crossing distance
- estimated pedestrian crossing time (exposed)
- total peak hourly vehicle flow

Automatic calculation

Once the calculation is complete the user can check the **Automatically calculate when inputs are updated?** checkbox, after which the tool will automatically recalculate and then update outputs if any inputs to the tool are changed.



This option should be unchecked before making large changes, otherwise the page may produce a large number of dialog boxes relating to inputs that are now invalid

Notes

The **notes** text area below the Facility assessment table can be used to record additional information or observations about the site.

Printing

A record of the specific inputs and outputs relating to a given assessment can be created by printing the page. Due to the width of the tool the page may be printed in Landscape orientation. To attain an electronic copy the page can be printed to PDF (this may require the installation of a print to PDF driver).

Saving

The specific inputs relating to a given assessment can be saved electronically as a CSV file and loaded at a later time, during the same or a subsequent session. To save inputs the user should enter an appropriate name in the box next to Save parameters in the top right hand corner of the tool and then click Save (note that a default file name is automatically generated by the tool). The file will be saved to the **default download location** specified in the web browser options (it is not possible to browse for an alternate location). It is recommended that users back up their files as appropriate.

Loading a saved file

To load inputs from a previously saved assessment, click *Choose File* in the Save/load box (top right hand corner of the page) and navigate to the location of the desired CSV file. Once selected, click *Load* and the values will be imported into the tool. The tool will warn if the file was saved with an older version of the tool, to highlight potential compatibility issues.

Clearing inputs

Inputs can be cleared by:

- clicking the “Reset all” button in the Save/load box (top right hand corner of the page)
- refreshing the page in your browser (some browsers may require you to hold the Shift key while clicking the refresh button to properly clear all fields).

4. Inputs

The **Project details** area of the page allows the user to enter optional information stating the name and location of the project, as well as the option/assessment number and date of assessment.

 All tool inputs below this point are **required** for the assessment

 Inputs that are underlined in this user guide may be hidden in some situations. If an input is currently hidden it is not required for the assessment

Site information

High level information describing the site.

- **Jurisdiction:** Selecting the location allows the tool to be populated with the corresponding economic factors, including years of economic assessment, discount rate, update factors and value of delay appropriate to that location. Changing the jurisdiction will prompt for confirmation, to avoid accidental changes. If an Australian jurisdiction is selected the tool will show a dismissible alert box describing how Wombat crossings may be assessed using the tool.
- **Midblock or intersection?:** Specifies if the crossing is situated at a midblock or intersection location.

 Midblock location if more than 50 metres from an intersection

Physical/environmental variables

Inputs that describe the physical site and surrounding environment.

- **Number of flow directions:** *One* or *two*. At intersections this only includes flow directions of the road being crossed, not the additional flows of entering traffic. The value does not include cycle lanes. Multi-part crossings (i.e. signalised intersections with slip lanes or two-stage signalised crossings) may need to be assessed in separate analyses.
- **Centre treatment:** *No treatment*, *Painted median* or *Raised median*. Specifies the type of median present at the crossing.
- **Median width:** Width of median in metres.
- **Median acts as refuge:** whether pedestrians are currently using the existing median as a refuge.

 Apply on-site observations to determine if pedestrians are currently using the existing median as a refuge. If 'Yes' the tool will split the 'no facility' crossing into two stages and if 'No' the tool ignores the median when assessing 'no facility'.

- **Parking/shoulder:** Specifies if the road being crossed has vehicle parking or a road shoulder.

 Option applies to both sides of the road. If no parking exists the user is advised to apply caution when assessing the suitability of kerb extensions

- **Pedestrian visibility:** Distance in metres that pedestrians can see/be seen, affects the Pedestrian Level of Service.

 Should be the lowest (worst) value of all directions

- **Direction – flow:** The flow direction as shown in the site layout diagram.

 Directions are for illustrative purposes only

- **Direction – trafficked lanes:** Number of vehicle lanes.

 Excludes cycle lanes. Note that the tool cannot be used to assess crossings in locations with more than two lanes in any direction. Signals or grade separation are recommended for corridors with more than two lanes in any direction.

- **Direction – crossing distance:** Crossing distance in metres.

 Distance from where pedestrian is first exposed to traffic to where pedestrian is clear of passing traffic stream in this direction; in many cases this is the carriageway width less kerbside parking

Operational variables

Inputs that describe the operational characteristics of the site.

- **Posted speed limit:** Speed limit defined at the crossing location. This includes reduced speed areas that may be implemented to facilitate pedestrians crossing. The maximum of posted speed and approach speed is used as part of the feasibility assessment for some facilities.

 There is a risk that in extreme cases whereby the posted speed is significantly greater than the approach speed, some suitable options may be precluded from consideration. It is recommended that users be cognisant of the operational speed environment and may need to modify the posted speed down if it does not suitably reflect the speed environment.

- **Approach speed (85th percentile):** 85th percentile value of measured vehicle approach speeds at the site.
- **Traffic volume (AADT):** Average annual daily traffic (AADT) volume at the crossing location.

 Summed AADT of all traffic lanes under analysis; should be derived from traffic counts or estimates

- **Peak sensitive pedestrian volume:** The number of sensitive pedestrians using the facility in peak demand hour.

 Average value from five surveyed peak periods. Sensitive pedestrians include: elderly, vision and mobility impaired, and pedestrians under 12 years of age

- **Peak non-sensitive pedestrian volume:** The number of non-sensitive pedestrians using the facility in peak demand hour.

 Average value from five surveyed peak periods

- **Estimated daily pedestrian volume:** Typical daily pedestrian volume including sensitive and non-sensitive users.

? Should be derived from pedestrian surveys

- **Average vehicle occupancy:** The average number of occupants in each vehicle; default value 1.3 persons/vehicle in all jurisdictions.

? This value may vary significantly in some situations, for example, on public transport corridors

- **Degree of pedestrian/turning vehicle conflict:** Estimate of the degree of conflict between pedestrians and turning vehicles, classified as High or Low.

? A high volume of turning vehicles can affect pedestrian perception of safety

- **Direction: flow type:** Determination of vehicle flow status in traffic direction as either *interrupted* or *uninterrupted*.

? Interrupted: if within 500m of traffic signal or similar device which interrupts flow and there is little scope for additional traffic to enter the stream and fill the gaps

- **Direction: peak vehicle volume:** The peak hourly traffic volume at the crossing location.

? Average value in this direction from five surveyed peak periods

Site layout diagram

A schematic diagram of the site layout; allows checking of general input parameters that relate to the site.

Overall site characteristics

These intermediate outputs assist the user by showing some derived characteristics for the site. Exposed crossing distance is the sum of crossing distance in each direction plus the median width, if the pedestrian is exposed to traffic. If the pedestrian is able to use an existing median as a refuge the exposed distance is reduced. The total peak hourly vehicle flow is the sum for all flows under analysis. The estimated pedestrian crossing time is calculated from the total crossing distance divided by the weighted average walking speed (determined by sensitive/non-sensitive walking speeds and peak hourly pedestrian volumes).

Crash information

- **Use crash model or crash history?:** The tool includes a pedestrian crash prediction model, although crash history data should be used if possible. If *model* is selected the other crash inputs do not need to be entered. A significant deviation between modelled and historical crashes for a given site may indicate that crashes are underreported.

? Crash model should be used if data is unavailable or it is suspected that crashes are underreported

- **Years of crash history**: Number of years for which crash history is known.
- **Number of pedestrian injury crashes**: Reported pedestrian injury crashes over crash period specified above.

Model parameters

- **Walk speed of average sensitive pedestrians**: Average walk speed in metres per second; default value 1.0 m/s.
- **Walk speed of average non-sensitive pedestrians**: Average walk speed in metres per second; default value 1.2 m/s.
- **Average cost of pedestrian crashes**: The average cost per pedestrian crash, as is appropriate for the country/state under analysis and speed environment (maximum of posted or 85th percentile approach speed).
- **Value of delay**: The value of vehicle occupant and pedestrian travel time in \$/hour as is appropriate for the country/state under analysis.



Applies to both pedestrians and vehicle drivers/passengers

- **Pedestrian conversion factor**: This value estimates the average daily pedestrian delay across the entire day from the peak hour pedestrian delay; default value 0.6. For example, if peak pedestrian delay is 30s, the average daily pedestrian delay would be calculated to be 18s. If considered necessary by the user, there may be value in evaluating peak and off-peak conditions separately and then carefully aggregating results.
- **Vehicle conversion factor**: This value estimates the average daily vehicle delay across the entire day from the peak hour pedestrian delay; default value 0.4. For example, if peak vehicle delay is 30s, the average daily pedestrian delay would be calculated to be 12s. If considered necessary by the user, there may be value in evaluating peak and off-peak conditions separately and then carefully aggregating results.

Economic assessment parameters

- **Evaluation days per annum**: The number of days per year considered in the assessment.
- **Project lifetime**: Total number of years included in the economic analysis; default value determined by the discounting procedures for the jurisdiction under analysis.
- **Discount rate**: The discount rate applied within the economic analysis; default value determined by the discounting procedures for the jurisdiction under analysis.

Economic update factors

Update factors account for the change in expense from the base date of a published value to the present date. New Zealand update factors are released annually by the NZ Transport Agency. In the absence of any information pertaining to Australian settings the factors are all assumed to have a value of 1.0 when assessing Australian facilities.



Applicable for New Zealand evaluations; values default to 1.0 in Australian settings

Expected crash reduction factors

The expected reduction in crashes, compared to the base scenario, for each pedestrian facility type analysed. Default values from the NZ Transport Agency Economic Evaluation Manual and Pedestrian Planning and Design Guide (NZ Transport Agency, 2009; NZ Transport Agency, 2016).

? Values may be negative (indicating an increase in crashes) or zero

Existing facility

Many pedestrian crossing assessments are in fact upgrades of existing facilities. In situations where a facility already exists at the site the *existing facility* option can be used to allow upgrades to be assessed. The default selection is "No facility". The existing facility is used in the financial assessment of savings and BCR.

? Used for savings and BCR calculation in the facility assessment. Parameters for the existing facility must be entered in Feasible facilities table (even if it is not suitable for the site).

5. Feasibility

The tool uses some of the above inputs to determine which facilities are appropriate candidates for the site. A description of the facility feasibility process is contained in the full report and can also be viewed by clicking the [Click here to view a description of the facility feasibility process](#) link beside the *Calculate feasibility* button.

The feasibility calculation will output the feasible facilities table, which displays each possible facility, its overall suitability for the site and a list of the reasons why it is unfeasible or only feasible under certain conditions at the site.

The feasible facilities table allows the user to enter as-built facility parameters, and construction and maintenance costs. It also provides the user with the ability to show/hide facilities in the final assessment.

Suitable for site?

This column displays the output of the feasibility assessment. *Yes* indicates that the facility is appropriate for the site. *Maybe*, *May require approval* and *Only as part of total CBD Traffic Management plan* indicate that care should be taken in interpreting the outputs of the tool for these facilities. *No* indicates that the facility is not appropriate for the site. The tool will shade table rows and disable inputs of those facilities deemed inappropriate for the site unless the facility is the *existing facility* at the site (in which case its information must be entered so that BCR can be calculated).

The tool lists the specific reasons why certain facilities are determined as unfeasible (or only feasible under conditions). Facilities which are combinations of other facilities, such as **zebra with median refuge** (which is a combination of **zebra only** and **median refuge**) will indicate if one of the parent facilities is not (or may not be) feasible at the site.

Built parameters

Built parameters must be specified for all facilities to be assessed in the final output, the existing facility, and all facilities from which another facility is derived; for example, to assess **zebra with median refuge** (which is a combination of **zebra only** and **median refuge**) information must be entered for both **zebra only** and **median refuge**.

Platform

- **Vehicle negotiation speed:** The speed at which vehicles will negotiate the raised platform in kilometres per hour. The tool will raise an error message if this speed is greater than or equal to the average vehicle approach speed (which is estimated as 91% of the 85th percentile vehicle approach speed).

Kerb extensions

- **Total crossing distance:** Crossing distance in metres after facility has been installed.



Total crossing distance (all directions) from where pedestrian is first exposed to traffic to where pedestrian is clear of traffic streams

Median refuge

- **Direction 1 and 2 crossing distance** and **median width**: Crossing distance and median width in metres after facility has been installed.

? Distance from where pedestrian is first exposed to traffic to where pedestrian is clear of passing traffic stream in this direction

? Austroads guidelines specify that median refuge width should not be less than 1.8 metres, values smaller than this cannot be entered

Kerb extensions with median refuge

- **Direction 1 and 2 crossing distance** and **median width**: Crossing distance and median width in metres after facility has been installed.

? Distance from where pedestrian is first exposed to traffic to where pedestrian is clear of passing traffic stream in this direction

? Austroads guidelines specify that median refuge width should not be less than 1.8 metres, values smaller than this cannot be entered

Zebra crossing facilities

No user inputs are required for **zebra only** crossings. For derived facilities, such as **zebra with kerb extensions**, valid information must be entered for the major facility (for example **kerb extensions**). *Zebra with platform* and *Zebra with platform and kerb extensions* facilities include the following help tip to indicate that they can be used to assess Wombat crossings:

? Functionally similar to a Wombat crossing (Australia)

Signals

The web tool performs a simplified analysis for signalised pedestrian crossings, and makes assumptions around pedestrian and vehicle arrival rates, delay probability and timing effects. To perform a thorough assessment, particularly for more complex situations, the analysis of pedestrian and vehicle delays at signals should be conducted using specialised intersection modelling software such as SIDRA. The inputs required for signals depend on the location (midblock or intersection) and signal control methodology (if pedestrian phase is activated by call button).

Signals activated by pedestrian call button?

Only applies to midblock locations and is used to specify whether the phase is activated by button. Note that puffin/intelligent signals will reduce vehicle delays through pedestrians crossing non-compliantly, resulting in pedestrian phase cancellation. To assess this effect users could perform sensitivity testing with regard to vehicle delays by reducing pedestrian flows.

? If signals are linked to adjacent intersection signals the phase is not considered to be activated by the button. Note that green time in the following calculations refer to effective green time (i.e. time where the green man and flashing red man is displayed)

If the signals are activated by the pedestrian call button the following inputs are required:

- **Delay before green pedestrian phase:** Delay between pedestrian pushing button and receiving green signal in seconds.



Delay between pedestrian pushing button and receiving green signal

- **Pedestrian walk + clearance time:** Time allocated for pedestrians to cross plus clearance time in seconds.
- **Pedestrian platoon size:** Assessment of pedestrian arrival clustering will be higher in busier locations.



Average size of pedestrian platoons (i.e. 1 means that all pedestrians arrive alone; 5 would indicate that, on average, pedestrians arrive in groups of 5)

If the signals are located at an intersection, or are not activated by the pedestrian call button, the following inputs are required:

- **Cycle time:** Average signal cycle time in seconds.
- **Percent of time in green pedestrian phase:** Percent of cycle time that is green pedestrian phase. This is the effective green time so includes time where a flashing red man is displayed but not time where a steady red man is displayed, since the model assumes that pedestrians comply with signals.

Construction cost

The construction cost must be entered for each of the facilities to be assessed, except for the existing facility.

Annual maintenance cost

The annual maintenance cost may be entered for each of the facilities to be assessed including the existing facility, as it is incorporated into the BCR evaluation. It will default to \$0.

Show in final output?

The checkbox can be used to:

- Hide facilities that are feasible from the final output, if, for example, they are not to be considered at the site for other reasons
- List non-feasible facilities as such in the final output

6. Assessment

The tool uses all the above inputs to perform the assessment. Technical information regarding all calculations, assumptions and limitations is contained in the full report.

After clicking “Calculate assessment” the tool will display the facility assessment tables, which list the selected facilities, with suitability, delay, safety, sight distances, pedestrian level of service, and economic outputs. The facility selected above as the existing facility is used as the base facility for comparison and is listed in the top row of the output tables with baseline information. The saving, benefit and Benefit Cost Ratio calculations are relative to the existing facility, using parameters that have been entered in the Feasible facilities table.

Suitable for site?

This column replicates the suitability determination from the feasible facilities table, but not the reasons. Facilities that are not feasible for the site will be displayed in a shaded row, and no outputs will be shown (unless the facility is the existing facility at the site).

Pedestrian delay

The sum of pedestrian queuing delay and confirmation time when using the facility, in seconds.

Vehicle delay

The delay experienced by vehicles resulting from the facility or pedestrians crossing, in seconds.

- ? Additional vehicle delay as a result of pedestrians using the facility or increased travel time from negotiating raised platforms (equals zero at intersection signals)

Predicted crash rate

- ? Pedestrian injury crashes per year

Sight distance

- **Minimum Crossing Sight Distance (CSD)**

- ? Minimum Crossing Sight Distance (CSD): calculated on the basis of sensitive pedestrian walking speed, using the 85th percentile vehicle approach speed for all facilities

- **Minimum Approach Sight Distance (ASD)**

- ? Minimum Approach Sight Distance (ASD): calculated without accounting for road gradient, using the 85th percentile vehicle approach speed for all facilities, reaction time 1.5 seconds, coefficient of deceleration is 0.36

- **Minimum Safe Intersection Sight Distance (SISD)**

? Minimum Safe Intersection Sight Distance (SISD): calculated without accounting for road gradient, using the 85th percentile vehicle approach speed for all facilities, decision time 4.5 seconds, coefficient of deceleration is 0.36

Pedestrian walkability

- **Perceived delay:** The perception of delay as experienced by the pedestrians using the facility.

? Perception of crossing without having to wait: **A:** Very good ... **F:** Very bad

- **Perceived safety:** The perception of safety as experienced by the pedestrians using the facility.

? Perception of safety from vehicle danger: **A:** Very good ... **F:** Very bad

- **Pedestrian LOS:** Walkability based pedestrian level of service, as experienced by the pedestrians using the facility.

? Perception that crossing is walking friendly: **A:** Very good ... **F:** Very bad

Economic outputs

- **Pedestrian delay cost:** Net present value over project lifetime of pedestrian delay at the facility.

? Net present value (NPV) over project lifetime

- **Pedestrian delay saving:** Net present value over project lifetime of pedestrian delay savings, relative to the existing facility.

? Saving with facility compared to existing facility. Net present value (NPV) over project lifetime

- **Vehicle delay cost:** Net present value over project lifetime of vehicle delay at the facility, including travel time and vehicle operating costs when negotiating raised platforms.

? Product of additional vehicle delay as a result of pedestrians using the facility or increased travel time from negotiating raised platforms (equals zero at intersection signals). Includes Vehicle Operating Costs due to slowing at facilities with platforms. Net present value (NPV) over project lifetime.

- **Vehicle delay saving:** Net present value over project lifetime of vehicle delay savings at the facility, relative to the existing facility, including travel time and vehicle operating costs when negotiating raised platforms.

? Saving with facility compared to existing facility. Net present value (NPV) over project lifetime

- **Crash cost:** Net present value over project lifetime of pedestrian crash cost.

? Net present value (NPV) over project lifetime

- **Safety saving:** Net present value over project lifetime of safety savings, relative to the existing facility.

? Saving with facility compared to existing facility. Net present value (NPV) over project lifetime

- **Total benefits:** Net present value over project lifetime of sum of benefits less sum of costs at the facility.

? Total benefits = (Pedestrian delay saving) + (Vehicle delay saving) + (Safety saving). Net present value (NPV) over project lifetime

- **BCR:** Overall benefit cost ratio calculated for the facility, assumes construction in current financial year.

? Benefit Cost Ratio (BCR) = (Total benefits + Net Present Value of Existing Facility Maintenance cost) / (Construction cost + Net Present Value of Maintenance cost). Assumes construction in current financial year, does not include health benefits or attractiveness.

7. Troubleshooting

Issue	Affects	Severity	Solution
Error message "JavaScript must be enabled in your web browser settings" is displayed at the top of the page	Internet Explorer	Critical	Click 'Allow blocked content' in the box at the bottom of the screen. This option disappears after a short amount of time so the page may have to be refreshed.
	All browsers	Critical	Check your browser extensions, disable script blocking extensions such as NoScript (or add the tool to trusted pages for the extension).
Webpage content strangely laid out, tool may not work	Internet Explorer	Critical	Ensure you are using Internet Explorer version 10 or higher .
			If using a higher version of Internet Explorer the browser may be forcing the page to be rendered as if you are using an older version. To override this press the F12 key, then under Emulation > Mode > Document mode select Edge . You must keep the Emulation pane open while you use the tool (although it can be resized).
	Other browsers	Critical	Ensure you are using a modern desktop web browser that is up to date. Check with your internal IT provider that firewalls or security settings are not blocking some parts of the website. If problems persist, try accessing the website from a computer on a different network (i.e. not at work).

8. Example Use of the Tool

The images below provide a fully-populated example of the tool in operation. The inputs and parameters shown, including facility costs, are shown for indicative purposes only. They should not be assumed as default values unless stated otherwise in this document, nor should they be included in assessments in lieu of site-specific data inputs.

Project details

Project name:

Project location:

Option/assessment number:

Date of assessment:

Site information

Jurisdiction:

Midblock or intersection?

Wombat crossings

The tool can be used to assess Wombat crossings. A Wombat crossing is functionally similar to a "Zebra with platform" or "Zebra with platform and kerb extensions" (if the crossing includes kerb extensions). To assess a Wombat crossing please select the appropriate crossing type in the Feasible facilities table and continue with the assessment as normal.

Physical/environmental variables

Number of traffic directions:

Centre treatment:

Median width: metres

Median acts as refuge:

Parking/shoulder:

Pedestrian visibility: metres

Direction 1	Direction 2
Flow: <input type="text" value="Left to Right"/>	Flow: <input type="text" value="Right to Left"/>
Traffic lanes: <input type="text" value="1"/>	Traffic lanes: <input type="text" value="1"/>
Crossing distance: <input type="text" value="4.7"/> metres	Crossing distance: <input type="text" value="4.6"/> metres

Operational variables

Posted speed limit:

Approach speed (85th percentile):

Traffic volume (AADT): veh/day

Peak sensitive pedestrian volume: ped/hr

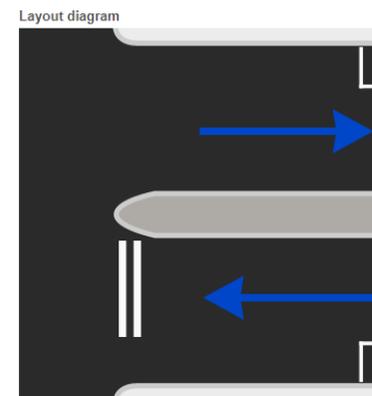
Peak non-sensitive pedestrian volume: ped/hr

Estimated daily pedestrian volume: ped/day

Average vehicle occupancy: pers/veh

Degree of pedestrian/turning vehicle conflict:

Direction 1	Direction 2
Flow type: <input type="text" value="Interrupted"/>	Flow type: <input type="text" value="Interrupted"/>
Peak vehicle volume: <input type="text" value="1061"/> veh/hr	Peak vehicle volume: <input type="text" value="531"/> veh/hr



Site characteristics

Exposed crossing distance:
 $4.7 + 2 + 4.6 = 11.3$ metres

Est. pedestrian crossing time (exposed):
 10.1 seconds

Total peak hourly vehicle flow:
 $1061 + 531 = 1,592$ veh/hr

Crash information

Use crash model or crash history? Model

Model parameters [SHOW/HIDE](#)

Walk speed of average sensitive pedestrians:	<input type="text" value="1"/> m/s	Economic assessment parameters	Economic update factors
Walk speed of average non-sensitive pedestrians:	<input type="text" value="1.2"/> m/s	Evaluation days per annum:	<input type="text" value="250"/>
Average cost of pedestrian crashes:	<input type="text" value="\$ 233298"/>	Project lifetime:	<input type="text" value="30"/> years
Value of delay:	<input type="text" value="\$ 29.77"/> /hr	Discount rate:	<input type="text" value="7"/> %
Pedestrian conversion factor:	<input type="text" value="0.6"/>		
Vehicle conversion factor:	<input type="text" value="0.4"/>		

	Base date	Update factor to current date
Travel time costs/savings	<input type="text" value="June 2010"/>	<input type="text" value="1"/>
Vehicle operating costs/savings	<input type="text" value="June 2010"/>	<input type="text" value="1"/>
Crash costs/savings	<input type="text" value="June 2010"/>	<input type="text" value="1"/>

Expected crash reduction factors

Platform	Kerb extensions	Median refuge	Kerb extensions with median refuge	Zebra only	Zebra with platform	Zebra with kerb extensions	Zebra with platform and kerb extensions	Zebra with median refuge	Zebra with kerb extensions and median refuge	Signals	Signals with kerb extensions	Grade separation
<input type="text" value="30"/> %	<input type="text" value="35"/> %	<input type="text" value="56"/> %	<input type="text" value="56"/> %	<input type="text" value="0"/> %	<input type="text" value="30"/> %	<input type="text" value="35"/> %	<input type="text" value="35"/> %	<input type="text" value="56"/> %	<input type="text" value="56"/> %	<input type="text" value="45"/> %	<input type="text" value="45"/> %	<input type="text" value="86"/> %

Existing facility

Kerb extensions

CALCULATE FEASIBILITY

[Click here to view the facility feasibility process \(PDF\)](#)

Automatically calculate when inputs are updated?

Feasible facilities

	Suitable for site?	Built parameters	Construction cost	Annual maintenance cost	Show in final output? <small>SELECT ALL/NONE/FEASIBLE</small>
No facility	N/a	No parameters	\$ 10000	\$ 0	<input checked="" type="checkbox"/>
Platform	No Not appropriate without formal median refuge	Vehicle negotiation speed: 40 km/h	\$	\$	<input checked="" type="checkbox"/>
Kerb extensions *	No Not appropriate without formal median refuge	Total crossing distance: 10.4 metres	\$	\$ 0	<input checked="" type="checkbox"/>
Median refuge	Yes	Direction 1 crossing distance: 4.2 metres Median refuge width: 2.8 metres Direction 2 crossing distance: 4.3 metres	\$ 45000	\$ 500	<input checked="" type="checkbox"/>
Kerb extensions with median refuge	Yes	Direction 1 crossing distance: 3.8 metres Median refuge width: 2.8 metres Direction 2 crossing distance: 3.8 metres	\$ 57000	\$ 1000	<input checked="" type="checkbox"/>
Zebra only	No Intersection location Not appropriate without formal median refuge	No parameters	\$	\$	<input checked="" type="checkbox"/>
Zebra with platform	No Zebra not suitable Platform not suitable	Applies vehicle negotiation speed from Platform above	\$	\$	<input type="checkbox"/>
Zebra with kerb extensions	No Zebra not suitable Kerb extensions not suitable	Applies total crossing distance from Kerb extensions above	\$	\$	<input type="checkbox"/>
Zebra with platform and kerb extensions	No Zebra not suitable Platform not suitable Kerb extensions not suitable	Applies vehicle negotiation speed from Platform and total crossing distance from Kerb extensions above	\$	\$	<input type="checkbox"/>
Zebra with median refuge	No Zebra not suitable	Applies distances and refuge width from Median refuge above	\$	\$	<input type="checkbox"/>
Zebra with kerb extensions and median refuge	No Zebra not suitable	Applies distances and refuge width from Kerb extensions with median refuge above	\$	\$	<input type="checkbox"/>
Signals	Yes	Cycle time: 120 seconds Percent of time in green pedestrian phase: 15 %	\$ 94000	\$ 7000	<input checked="" type="checkbox"/>
Signals with kerb extensions	Yes	Applies parameters from Signals above, plus: Direction 1 crossing distance: 3.8 metres Median width: 2.8 metres Direction 2 crossing distance: 3.8 metres	\$ 105000	\$ 8000	<input checked="" type="checkbox"/>
Grade separation	No Intersection location	No parameters	\$	\$	<input type="checkbox"/>

CALCULATE ASSESSMENT

Facility assessment

	Suitable for site?	Pedestrian delay	Vehicle delay ?	Predicted crash rate ?	CSD ?	ASD ?	SISD ?
Kerb extensions *	No	44 sec	0 sec	0.03 /year	159 m	56 m	102 m
No facility	N/a	55 sec	0 sec	0.05 /year	173 m	56 m	102 m
Platform	No						
Median refuge	Yes	12 sec	0 sec	0.02 /year	66 m	56 m	102 m
Kerb extensions with median refuge	Yes	11 sec	0 sec	0.02 /year	58 m	56 m	102 m
Zebra only	No						
Signals	Yes	44 sec	0 sec	0.03 /year	173 m	56 m	102 m
Signals with kerb extensions	Yes	44 sec	0 sec	0.03 /year	58 m	56 m	102 m

	Perceived delay ?	Perceived safety ?	Pedestrian LOS ?	Pedestrian delay cost ?	Pedestrian delay saving ?	Vehicle delay cost ?	Vehicle delay saving ?	Crash cost ?	Safety saving ?	Total benefits ?	BCR ?
Kerb extensions *	E	F	F	\$ 88,000		\$ 0		\$ 95,000			
No facility	E	F	F	\$ 110,000	-\$ 22,000	\$ 0	\$ 0	\$ 147,000	-\$ 51,000	-\$ 74,000	-7.4
Platform											
Median refuge	B	D	D	\$ 24,000	\$ 64,000	\$ 0	\$ 0	\$ 65,000	\$ 31,000	\$ 94,000	1.9
Kerb extensions with median refuge	B	D	C	\$ 21,000	\$ 66,000	\$ 0	\$ 0	\$ 65,000	\$ 31,000	\$ 97,000	1.4
Zebra only											
Signals	C	B	B	\$ 89,000	-\$ 2,000	\$ 0	\$ 0	\$ 81,000	\$ 15,000	\$ 13,000	0.1
Signals with kerb extensions	C	B	B	\$ 89,000	-\$ 2,000	\$ 0	\$ 0	\$ 81,000	\$ 15,000	\$ 13,000	0.1

Notes

[Return to top of the page](#)

Appendix A Australasian Pedestrian Facility Selection Tool Economic Evaluation Update

A.1 Introduction

This appendix documents updates made to the economic appraisal within the Australasian Pedestrian Facility Selection Tool (the Tool). The existing Tool and corresponding economic appraisal methodologies are compared and changes made to the Tool are documented. These changes take effect with version 1.3.0 of the Tool which was uploaded to replace version 1.2.0 on the Austroads server on 23 March 2017.

The Australian guidelines have been updated from the Austroads Project Evaluation Guides to the Australian Transport Assessment and Planning Guidelines (ATAP) published in 2016. The New Zealand guidelines replaced the 2013 version of the NZ Transport Agency's Economic Evaluation Manual (EEM) with the 2016 updated manual.

A.2 ATAP guidance

The ATAP guidance documents are available online from <http://atap.gov.au/> and provide practitioners with a methodology to undertake cost and benefit appraisal (CBA) to support investment. Two levels of appraisal are recommended; rapid appraisal and detailed appraisal. Document F3 *Options Generation Assessment* states that rapid appraisal is generally valid for projects with values less than or equal to \$15 million. It is considered that the majority of pedestrian crossing facilities considered in the tool are of an appropriate magnitude to be appraised using the rapid methodology. Rapid appraisal requires the valuation of benefits that are easily monetised and comprise a large portion (greater than 10%) of all benefits only.

Document M4 *Active Travel* provides active transport specific guidance and benefit values. Other more general benefit values and methodologies are provided in document T2 *Cost Benefit Analysis* and document PV2 *Road Parameter Values*. Document M4 suggests the following benefits for inclusion in active transport CBA, and it is noted that not all of these benefits are relevant for pedestrian crossing facilities:

- Health
- Vehicle operating costs
- Parking
- Travel time
- Change in crash risk
- Noise reduction
- Air pollution reduction
- Congestion reduction
- Relevant aspects of the existing CBA methodology for Australian jurisdictions within the Tool and the updated ATAP guidance are compared in Table A1.

Table A 1: Comparison of the Tool with EEM 2016

Existing Austroads Tool		ATAP Guidance	ATAP Ref
Denominator vs numerator in BCR calculation	Numerator contains benefits and disbenefits to users of the transport system and monetised externalities. All costs to transport agency and other authorised parties in the denominator. Defined as National BCR (BCR _N) in New Zealand guidance.	Two options provided: <ul style="list-style-type: none"> • BCR1: Current calculation • BCR2 (preferred): Numerator contains benefits and disbenefits to users of the transport system and monetised externalities less operating costs. Denominator contains expenditure required before the facility is operational.	T2
Expected crash reduction factors	Crash reduction factors by facility type taken from New Zealand guidance.	Crash reduction factors by facility type provided for use in Australia based on international research.	M4
Pedestrian crash cost	Based on NSW and Austroads guidance dependent on speed.	Values provided by severity for each state, see Tables 18-23, Document PV2	PV2
Value of delay	Based on NSW and Austroads guidance.	Values provided by trip purpose and vehicle type, see Table 12, Document PV2.	PV2
Vehicle Occupancy	Default value of 1.2 assumed	Values vary by state from 1.21 to 1.26, see Table 11, Document PV2.	PV2
Vehicle Operating Cost	Not included	Values for vehicle operating costs provided. However no speed change cycle values included.	PV2
Project lifetime	Default value is 30 years	Recommends 30 years for roading projects.	T2
Discount rate	Default value is 7%	7% required by Infrastructure Australia, 4% and 7% required by the Commonwealth department for Transport and Regional Development.	T2
Net Present Value	Not calculated however all necessary values provided in outputs.	Recommended for use alongside BCR in decision making. The BCR does not communicate the difference in the scale of benefits between options.	T2
First Year Rate of Return	Not calculated	Calculation required in CBA	T2

Based on ATAP the existing methodology for calculating the benefit cost ratio (BCR1) is satisfactory, especially for the purposes of the tool to allow comparison between options. Alternative values for key benefit unit values are provided in ATAP and have been updated in the Tool.

A.3 EEM update

Since the initial release of the Tool, an updated (2016) version of the EEM has been published by the NZ Transport Agency to replace the corresponding 2013 version. The following section reviews changes between the original EEM used in the development of the Tool and the updated version of the EEM. The review was limited to sections of the EEM which were used to inform the original development of the Tool. Key updates are shown in Table A 2.

Table A 2: Key EEM Updates

Existing Austroads Tool		EEM Update	EEM Ref
Expected crash reduction factors	Values taken from 2016 EEM.	Some updated factors by facility type provided for use in New Zealand based on international research including a correction to the reduction factor for platforms which has decreased from	Crash Estimate Compendium
Pedestrian crash cost	Values taken from 2016 EEM.	Updated value.	EEM Appendix 6
Vehicle Occupancy	Default value of 1.2 assumed	Values vary by travel purpose in Table A2.4.	EEM Appendix 2
Vehicle Operating Costs	Values taken from 2016 EEM.	Updated values for speed change cycles are provided.	EEM Appendix 3
Economic update factors	Values taken from 2016 EEM.	Updated factors to adjust to July 2016.	EEM Update Factors A12.3

A.4 Further considerations

This section considers benefits and additional analysis of pedestrian facilities that are not included in the Tool currently but are often considered in active transport economic appraisal and could be add-ons for future versions of the tool. Key considerations proposed are:

- Health benefits
- Pedestrian amenity
- Operating cost
- Base case definition
- Sensitivity testing

Health benefits

Generally health benefits comprise the largest single benefit of active transport facilities. Not all pedestrian crossing facilities will produce health benefits, however if the crossing reduces severance in the pedestrian network the health benefits could be significant. This may be particularly relevant outside schools for example where providing or upgrading a crossing may encourage parents to allow their children to walk to school.

In order to apply this calculation users would need to enter 'before' and 'after' daily pedestrian volumes into the tool. The 'after' volumes may differ by facility type. Where numbers are not anticipated to change no health benefits would be generated.

The New Zealand Simplified Procedure 11 for walking and cycling activities (SP11) addresses this situation through multiplying the increased pedestrian demand by the average walking trip length to estimate health benefits, see SP11 worksheet 5, section 4 for 'improvements at hazardous sites'. Detailed guidance is provided in ATAP document M4 for valuing the health benefits of active transport facilities.

Pedestrian amenity

Amenity benefits are listed as 'non-monetised benefits' in the ATAP guidance (see document T2, Pg 14). In the New Zealand guidance amenity benefits for cycle route facilities are partially valued through applying relative attractiveness factors (ranging from 1 – 2) time and using travel time savings to approximate amenity.

Relative attractiveness of the various facility options is already quantified in the pedestrian LOS score. It may be possible to monetise this for inclusion in the cost benefit analysis.

Facility operating cost

Currently the facility operating cost is not included in the CBA. The methodology for including the operating cost in the BCR is the key difference between BCR1 and BCR2. A simple methodology for including operating cost in the Tool could be to approximate annual operating cost as a percentage of the construction cost that differs by facility type.

Base case definition

The tool currently assumes that the base case for all analyses is '**no crossing facility**'. Definition of the base case is one of the initial steps listed in ATAP for CBA. Inclusion of the ability to define a different base scenario would make the tool more flexible for a range of applications.

For example if the existing scenario includes a zebra crossing with high pedestrian demand the vehicles will experience delay savings if the crossing is upgraded to signals. Exclusion of the zebra in the base case does not allow these savings to be measured.

Sensitivity testing

Sensitivity testing is required in both the ATAP and New Zealand EEM guidance for funding applications. In order to make the tool more directly applicable for this purpose a sensitivity testing option could be included. This would require the user to specify the variables to be tested and value ranges.

A.5 Implemented Changes

Table A 3 shows the implemented changes to the Tool considering the review of both ATAP and the EEM as well as the original research.

Parameter	Changes	Comments
Average Vehicle Occupancy	Updated to 1.3 persons/vehicle for all jurisdictions	This value represents a compromise between the values stipulated in the EEM and ATAP guidelines. One value was retained for all jurisdictions to remain consistent with the original Tool methodology
Average cost of pedestrian crashes	NZ - Updated to match Table A6.5 in the EEM Australian jurisdictions – updated using Table 20 in ATAP with crash type breakdowns in Table A10 of the <i>Guide to Project Evaluation Part 4: Project Evaluation Data</i>	
Vehicle operating costs	Updated to match Table A5.37 in the EEM for all jurisdictions.	Australian values unavailable so NZ values have been used for all jurisdictions.
Value of delay	NZ – No change Australian jurisdictions – updated to \$29.77/hour using figures in Section PV2 of ATAP	Australian value was calculated based on the same split of private to business travel used in the original research.
Economic update factors	NZ – Vehicle operating cost update factor changed to 1.0 and July 2015 based on Table A5.37 in the EEM	

Parameter	Changes	Comments
Crash reduction factor - platform	NZ – updated to 20% based on Table 36 in the Crash Estimate Compendium ¹ Australian jurisdictions – updated to 30% based on Table 21 of ATAP	Australian value based on a pedestrian crash reduction factor.
Crash reduction factor – median refuge	NZ – updated to 15% if kerbside parking is present or 45% if no kerbside parking is present based on Table 36 in the Crash Estimate Compendium. Australian jurisdictions – updated to 56% based on Table 21 of ATAP	
Crash reduction factor – kerb extensions with median refuge	NZ – updated to 45% based on Table 36 in the Crash Estimate Compendium. Australian jurisdictions – updated to 56% based on Table 21 of ATAP.	The highest reduction factor of kerb extensions with median refuge was taken for Australian jurisdictions.
Crash reduction factor – Zebra with platform	NZ – updated to 20% based on Table 36 in the Crash Estimate Compendium. Australian jurisdictions – updated to 30% based on Table 21 of ATAP.	The highest reduction factor of zebra and platform was taken for NZ and Australian jurisdictions.
Crash reduction factor – Zebra with platform and kerb extensions	Updated to 35% for all jurisdictions based on Table 36 in the Crash Estimate Compendium.	The highest reduction factor of zebra, platform and kerb extensions was taken for NZ and Australian jurisdictions. Australian values unavailable so NZ values have been used for all jurisdictions.
Crash reduction factor – Zebra with median refuge	NZ - Updated to 15% if kerbside parking is present or 45% if no kerbside parking is present based on Table 36 in the Crash Estimate Compendium. Australian jurisdictions – updated to 56% based on Table 21 of ATAP.	The highest reduction factor of zebra and kerb extensions was taken for NZ and Australian jurisdictions.
Crash reduction factor – Zebra with kerb extensions with median refuge	NZ – updated to 45% based on Table 36 in the Crash Estimate Compendium. Australian jurisdictions – updated to 56% based on Table 21 of ATAP.	The highest reduction factor of zebra, kerb extensions with median refuge was taken for NZ and Australian jurisdictions.
Crash reduction factor – Grade separation	NZ – updated to 85% based on Table 36 in the Crash Estimate Compendium. Australian jurisdictions – updated to 86% based on Table 21 of ATAP.	

A.6 Save and load functionality

A plugin for the current web application was developed that allows users to save their input values and settings from the tool and restore the values later during the same or a subsequent session.

The plugin allows users to save their inputs from the form to a comma-separated value (CSV) file. This is accomplished using JavaScript and HTML. By tagging all the input fields with a unique identifier, a data dump of all the values with their associated input identifications is exported. This data is then written to a CSV file and made available for download. The user is allowed to define a unique file name and the resultant CSV file is saved to the user's default downloads folder.

To load a CSV file, the user accesses the website, clicks the “choose file” button, browses to the file and then loads it to the website. The upload function checks for appropriate selections on the form and fills in values from the CSV accordingly.

Appendix B Australasian Pedestrian Facility Selection Tool version 2.0.0 update

B.1 Introduction

This appendix documents updates made to the Australasian Pedestrian Facility Selection Tool (the Tool). These changes take effect with version 2.0.0 of the Tool which was uploaded to replace version 1.3.0 on the Austroads server in April 2018.

B.2 Visual style enhancements

The appearance of the tool has been updated, with the following major differences:

- More legible font
- Version number included in page title
- Improved icons and colours
- Better use of horizontal screen width
- Improved display of units (\$, %, etc.) on inputs
- Improved cross-browser performance of help tips and page alert/confirmation dialogues
- Incorporated disclaimer and quick-start guide into tool landing screen

B.3 Improved save/load function

The updated save/load system:

- Incorporates version checking, will warn if loading data saved by an older version of the tool. Testing has not revealed breaking compatibility issues with versions prior to 2.0.0 but it is possible that future versions may break compatibility with older versions.
- Includes information regarding which parts of the tool were visible when the file was saved:
 - Model parameters
 - Feasible facilities
 - Facility assessment
- “Show in final output” selections are now correctly saved and loaded

B.4 Maintenance costs

The feasible facilities table now includes a field for maintenance costs, which will default to \$0 for each facility. If set, the maintenance cost will be incorporated into the BCR figure as part of the facility assessment, along with the maintenance cost of the existing facility.

B.5 Crossing upgrades

As many crossing installations are upgrades to existing facilities the tool now incorporates the option for the user to specify the *existing facility* at the site. Information regarding the existing facility must be entered in the feasible facilities table, even if the existing facility is determined not to be suitable for the site (as the data is used in the assessment economic calculation).

The existing facility is presented as the top row of the two facility assessment tables, and is incorporated into the savings, benefits and BCR figures of the other facilities. Additionally:

- **Vehicle delay saving** field has been added to the facility assessment table
- Construction cost input is disabled for the existing facility
- BCR calculation incorporates the maintenance cost of the existing facility as a benefit (where the maintenance cost of the tested facility is a cost).

B.6 Wombat crossings

A “Wombat crossing” is a type of pedestrian crossing in Australia that consists of a zebra crossing on a platform or a zebra crossing on a platform with kerb extensions.

The update has added the following two features:

- When an Australian jurisdiction is selected in the tool a dismissible information alert is displayed to indicate how a Wombat crossing can be assessed within the tool
- Help tips have been added to the zebra with platform and zebra with platform and kerb extensions rows in the feasible facilities table to highlight that these are functionally similar to Wombat crossings.

B.7 Summary of unfeasibility

The feasible facilities table now includes a list of reasons *why* certain facilities are determined to be unfeasible (or only feasible under certain conditions). The user can view diagrams of the facility feasibility process through the link on the tool page.

Facilities which are combinations of other facilities, such as **zebra with median refuge** (which is a combination of **zebra only** and **median refuge**) will indicate if one of the component facilities is not, or may not be, feasible at the site.

B.8 Multi-lane crossings

Comment added to tool (quick-start guide and help tips): “Note that the tool cannot be used to assess crossings in locations with more than two lanes in any direction, signals or grade separation are recommended for wider corridors”.

B.9 Assessing crossing facilities with existing medians

In situations where a raised/painted median exists and is used by pedestrians (even though it has no formal protection) the tool can assess “no facility” to account for this reduced delay and Crossing Sight Distance (CSD). In these situations, Kerb Extensions, Platforms and Zebras are no longer determined to be suitable without a formal Median Refuge. CSD for Signals calculated to account for the existing median, as with no facility. Inputs for Signals with Kerb extensions account for existing median, if present, affecting the CSD. The change included the addition of a centre treatment type (painted/raised), a new dropdown menu in the Physical/environmental variables section, additional feasibility criteria and further help tips.

B.10 Zebra crossing pedestrian delays

Confirmation delay at pedestrian crossings was formerly set at a constant five seconds. The tool now determines this delay on the basis of traffic volumes: $0.311 + 0.004 * (\text{Average hourly two-way traffic volume})$ (reference: <https://ir.canterbury.ac.nz/handle/10092/9197>) with a maximum value of seven seconds.

B.11 Site information collection form

A printable PDF form, hosted by the tool, has been developed as a checklist and template to assist in collecting tool data during site visits.

B.12 Support moved to ticket-based system

Support requests through the tool are now sent to a ticket-based support system, which improves the traceability of the support process.



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