SUSTAINABLE TRANSPORT PERFORMANCE PATHWAY CALCULATOR GUIDE

DECEMBER 2015

This Guide is to be used for the Performance Pathway in the 'Sustainable Transport' credit in both Green Star – Design & As Built and Green Star – Interiors.

greenstar Developed by the Green Building Council of Australia

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This document is updated regularly. It can be found at www.gbca.org.au

Change Log

Release	Date	Summary of Changes
1	16/10/2014	Initial release.
2	19/01/2015	Editorial changes following the release of *Green Star – Interiors v1.*
3	16/09/2015	Updates to user functionality, including 'Total Mode Share' adjustments. Updated criteria for multi-unit residential projects. Additional project examples provided.
Green Star – Design & As Built v1.1 *Release; and* Green Star – Interiors v1.1 *Release 1*	03/12/2015	Re-released for Green Star – Interiors v1.1, no changes.

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1 INTRODUCTION

The Green Building Council of Australia (GBCA) and AECOM have developed a Sustainable Transport Calculator ('the Calculator') that may be used to validate the Performance Pathway for the 'Sustainable Transport' credit in both *Green Star – Design & As Built* and *Green Star – Interiors*.

Points awarded in the 'Sustainable Transport' credit can be achieved using the Performance Pathway or a Prescriptive Pathway (see Figure 1). The Calculator determines the number of points awarded out of the available points under the Performance Pathway for the 'Sustainable Transport' credit. This Calculator Guide ('the Guide') should be used in conjunction with the Calculator.

The Calculator determines the number of points awarded based on the proposed travel plan for the building or fitout ('the project'). Points are awarded based on the proposed emissions reduction, active mode encouragement, vehicle kilometres travelled (VKT) reduction and walkable location.

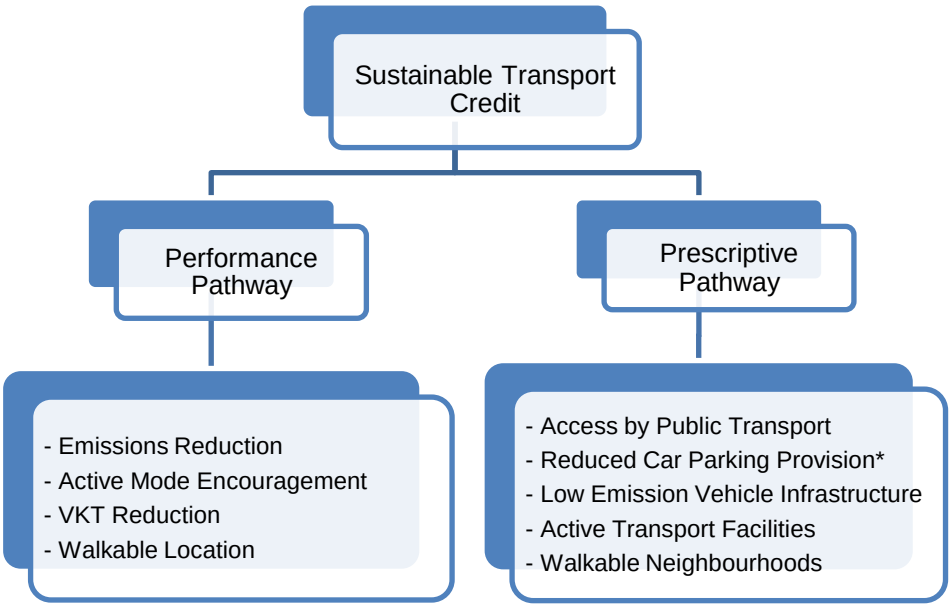


Figure 1: 'Sustainable Transport' Credit Pathways

*The 'Reduced Car Parking Provision' criterion is only applicable for *Green Star – Design & As Built.*

A Travel Plan (or equivalent sustainable transport strategy) must be developed to ensure that all aspects of transport for regular project occupants have been considered and addressed as part of the Performance Pathway. Points are then awarded, based on a holistic approach to reducing the impacts from transport, where the Proposed Project's performance is improved when compared to a Reference Project. Points are awarded by completing the Calculator with the predicted transport mode split as defined in the Travel Plan.

Compliance with the Performance Pathway requires project teams to demonstrate the carbon emissions from transport generated from the project's typical operations (the 'Proposed Project'). This value is then compared to carbon emissions from transport for a comparable project of a similar type in a similar location (the 'Reference Project').

The Calculator provides carbon emissions reductions as a result of transport design initiatives, such as removal of a car parking space, provision of cyclist facilities or carpooling initiatives. Points are rewarded based on carbon emissions reduction as well as active mode encouragement, vehicle kilometres travelled reduction, and walkable location. The Calculator determines the number of points awarded based on the inputs made from the Travel Plan.

2 GLOSSARY OF TERMS

Mode Share – The proportion of commuting trips that take place by a given mode of transport (e.g. bus, car, bicycle).

Project Population – Refers to the population of regular building or fitout users within the project being rated. For example, in an education facility, the project population would include office staff or teachers and not visitor or student populations. This is on the basis that the 'Sustainable Transport' credit aims to capture the emissions attributed to the project being rated, and therefore, does not take into account visitor populations.

Proposed Project – The building or fitout to be rated by the Green Star rating tool, as designed by the project team.

Reference Project – A hypothetical building or fitout of a similar type in a similar location to the proposed project.

Suitably Qualified Transport Professional – The suitably qualified transport professional shall hold a relevant tertiary qualification (including, but not limited to, architecture, engineering, sustainability and planning) and have produced a sustainable Travel Plan for a previous project of similar scale.

Walk Score® – A measure of pedestrian accessibility to amenities (e.g. supermarkets, restaurants etc.) that is publicly available for every address in Australia from the following website: http://www.walkscore.com.

ACRONYMS

ABS – Australian Bureau of Statistics.

MTWP – Method of Travel to Work (a Census statistic).

SA2 – Statistical Area Level 2, a Census geographical unit representing a population of 3,000 to 25,000 people.

VKT – Vehicle Kilometres Travelled.

3 BREAKDOWN OF CRITERIA

Based on the rating tool being used for the project, there are a differing number of total points available. The Calculator assigns points as detailed in Table 1 and Table 2. The total number of points available are:

- **10 points** for *Green Star – Design & As Built*; and
- **7 points** for *Green Star – Interiors*.

The four criteria within the Calculator are described below:

Criterion 1. Emissions Reduction

Criterion 1 relates to a reduction in transport emissions directly related to commuting trips to and from the site. Criterion 1 is calculated from commuting trips mode share, average trip length and the proportion of trips that may be avoided (e.g. by working from home). Criterion 1 considers reduction in greenhouse gas emissions which contribute to climate change.

Criterion 2. Active Mode Encouragement

Criterion 2 relates to an increase in the mode share of walk and bicycle commuting trips, referred to collectively as "active modes". Criterion 2 considers encouragement of transport modes that promote health and fitness to commuters as well as having financial benefits and reducing the societal cost of healthcare.

Criterion 3. Vehicle Kilometres Travelled Reduction

Criterion 3 relates to a reduction in vehicle kilometres travelled (VKT) for commuting trips, which may be affected by either or both of a reduction in average trip length or a reduction in the mode share of car trips. Criterion 3 considers lessening car dependence which, in addition to reducing greenhouse gas emissions, also reduces local pollution, vehicle crashes, and improves social equality as well as having potential financial benefits to commuters.

Criterion 4. Walkable Location

Criterion 4 relates to a site that is located in a "walkable" location. Criterion 4 is not related to commuting trips but instead considers that motorised trips may be avoided by allowing project users to accomplish errands on foot (e.g. during a lunch break).

Table 1: Points Breakdown for Green Star – Design & As Built

Green Star – Design & As Built	Points Available					
	0.5	1	2	3	4	5
1. Emissions Reduction	-	10-15%	15-25%	25-35%	35-45%	>45%
2. Active Mode Encouragement	> 50%	100%	-	-	-	-
3. VKT Reduction	> 10%	> 20%	-	-	-	-
4. Walkable Location (Walk Score®)	-	71 - 80	81 - 90	91 - 100	-	-
Total						**10 points**

Table 2: Points Breakdown for Green Star – Interiors

Green Star – Interiors	Points Available					
	0.5	**1**	**1.5**	**2**	**2.5**	**3**
1. Emissions Reduction	15%-25%	25-30%	30%-35%	35%-40%	40%-45%	>45%
2. Active Mode Encouragement	-	> 50%	-	-	-	-
3. VKT Reduction	>5%	> 10%	-	-	-	-
4. Walkable Location (Walk Score®)	-	80 - 89	-	90 - 100	-	-
Total						**7 points**

4 HOW THE CALCULATOR WORKS

The Calculator works by comparing the Proposed Project with a Reference Project against the criteria listed under Section 3.

The Reference Project characteristics are automatically calculated within the Calculator. Points are achieved by comparing the performance of the Proposed Project with the Reference Project. For information on how the Reference Project is generated refer to Section 7.

The 'Walkable Neighbourhoods' criterion considers the walkability score of the location of the project being rated. Points are achieved using outputs from the Walk Score® website.

5 WHERE TO FIND THE CALCULATOR AND HOW TO ENTER DATA

The Calculator may be found on the GBCA website at the following web address:

- For *Green Star – Design & As Built:* http://www.gbca.org.au/green-star/green-star-design-as-built/the-rating-tool/
- For *Green Star – Interiors*: http://www.gbca.org.au/green-star/green-star-interiors/the-rating-tool/

Step 1: Enter the address of the building or fitout to be assessed. The address must be entered in the following format:

<Street Number>, <Street Name>, <Street Type>, <Suburb>, <State Code (e.g. NSW)>, <Postcode>

Step 2: Enter the building or fitout type. There is a drop down box with a list of possible types. These are listed below:

- Office, for example office buildings, administration centres.
- Education, for example primary schools, high schools, TAFEs, universities.
- Healthcare, for example hospitals, clinics.
- Industrial, for example warehouses, distribution centres.
- Retail Centre, for example shopping centres.
- Public Building, for example libraries, swimming pool complexes, community centres.
- Multi-unit Residential, for example apartment buildings, town-houses.

Step 3: Press the 'Find/Reset' button. This is used to populate the reference data for the address and building or fitout type entered, and may also be used at any time to reset the assessment to its starting point.

The SA2[1] and State fields are automatically determined from the address. If these are incorrectly calculated, please adjust the address until the SA2 and State correctly represent the project's location (see Step 1 above).

Steps 1-3 are shown in Figure 2 (taken from the *Green Star – Design & As Built: Sustainable Transport Calculator*).

Figure 2: Steps 1-3 – Enter the building address, building type, and press the Find/Reset button

[1] SA2 maps can be found at the following website on the "downloads" tab: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1270.0.55.001Main+Features1July%202011?OpenDocument>

Step 4: The mode share percentages, avoided trips, average trip length and work weeks per annum are automatically populated based on the building or fitout type and location.

Adjust any of those values by manually entering the adjusted figure into the blue cells shown in Figure 3. The cells will change colour to indicate that a user change has been made. The other fields, including total emissions, total VKT and percentage of trips using active modes are automatically calculated.

Refer to Section 8 for guidance on how to justify changes in mode share.

	Reference	Adjusted	Proposed	
Train	42.6%	42.6%	42.6%	
Bus	25.2%	25.2%	25.2%	
Ferry	2.8%	2.8%	2.8%	
Tram	0.2%	0.2%	0.2%	
Car Driver	15.5%	15.5%	15.5%	
Car Passenger	3.1%	3.1%	3.1%	
Motorbike	1.1%	1.1%	1.1%	
Bicycle	1.7%	1.7%	1.7%	
Walk	7.7%	7.7%	7.7%	
Total Mode Share	100.0%	100.0%	100.0%	Update Mode Shares
Avoided trips	2.0%	2.0%	2.0%	%
Ave Trip Length	18.3	18.3	18.3	km
Work weeks	48	48	48	weeks / annum

Figure 3: Step 4 – Adjust mode share, avoided trips, average trip length and work weeks data for the building being assessed

Step 5: The emissions intensity of each transport mode is automatically calculated. The train and tram emissions intensities are based on the emissions intensity of the local electricity grid and therefore vary by State (see Section 7 of this Guide for additional information).

The blue cells containing the emissions intensity of car drivers and motorbikes can be modified. Note that car emissions intensity is per VKT and is applied to the driver only, not to passengers. The interface is shown in Figure 4.

Refer to Section 8 for guidance on how to justify improvements in vehicle emissions intensities.

Emissions Intensity	Reference	Current	Unit
Train	141	141	g CO_{2-e} / passenger km
Bus	131	131	g CO_{2-e} / passenger km
Ferry	131	131	g CO_{2-e} / passenger km
Tram	152	152	g CO_{2-e} / passenger km
Car Driver	258	258	g CO_{2-e} / vehicle km
Car Passenger	0	0	g CO_{2-e} / passenger km
Motorbike	104	104	g CO_{2-e} / passenger km
Bicycle	0	0	g CO_{2-e} / passenger km
Walk	0	0	g CO_{2-e} / passenger km
Total	**138**	**138**	**g CO_{2-e} / passenger km**

Figure 4: Step 5 – the emissions intensity of each mode is used to calculate transport emissions

6 TRAVEL PLAN

A Travel Plan (or equivalent alternative transport strategy) must be completed at a stage early enough in the design phase to ensure that the recommendations can be considered and implemented in the project.

The project team must report how the recommendations of the Travel Plan have been included in the project. The Travel Plan must be prepared by a suitably qualified Transport Professional (see Glossary section).

The Travel Plan must include, as a minimum, the items listed below:

Site-specific Transport Assessment

The assessment must be carried out before the Development Approval and reviewed at the final design stage (prior to or during construction). The assessment must consider:

- The local environment for pedestrians and cyclists;
- Public transport links serving the site;
- Facilities for cyclists; and
- Car parking provisions (with a view to minimising the use of private cars).

Design Features for Alternative Transport

This section must be based on the site-specific transport assessment and, as a minimum, provide recommendations on the following issues:

- Provision of priority parking spaces for car share schemes;
- Provision of a dedicated path for pedestrians and cyclists from the site entrance to the major building entrance and bicycle parking facilities (where appropriate);
- Provision of dedicated cycle storage facilities and cycle lanes on-site, and adjoining lanes off-site where applicable;
- Improvements to bus services (where appropriate), e.g. altering bus routes or offering discounts;
- Restricting and/or charging (metering) for car parking; and
- Considerations in the location and design of all alternative transport design features to encourage maximum utilisation of these facilities.

Operational Opportunities for Alternative Transport

This section must include a plan of measures that encourage travel options with low environmental impact during building operation and, as a minimum, address the following:

- Reduction in single occupancy car journeys to and from the facility. e.g. car sharing;
- Promotion of walking;
- Promotion of cycling;
- Promotion of public transport;
- Deliveries and contractor vehicles;
- Visitors' transport; and
- Set targets for the mode share for project users transport to and from the building. The targets must be based on design and operational initiatives recommended by the Plan.

Building / Fitout Users' Information

This section must provide recommendations on how information about alternative transport facilities will be communicated to the project users e.g. walking, cycling and public transport.

7 DETERMINING THE REFERENCE PROJECT

This Section describes how the Reference Project's emissions, VKT and active mode benchmarks are determined.

7.1 Mode Share

Mode share data is determined using SA2 level data from the ABS 2011 Census Method of Travel to Work (MTWP) data. The Reference Project is a building (or fitout within a building) which has the average mode share characteristics of places of employment within the SA2 area with its centroid closest to the location of the building being assessed.

The exception to the above is where the user selects "multi-unit residential" as the primary building type. In this instance the mode share data has the average characteristics of residents leaving an SA2 zone to travel to a place of employment elsewhere.

7.2 Avoided Trips

Avoided trips refer to the propensity of employees to work from home or otherwise not take a commuting trip during a work week. Avoided trips are not differentiated by SA2 due to the large fluctuations and the difficulty of separating working from home data in the Census between employees who work from home occasionally compared to self-employed persons who work from home the majority of the time.

The standard value for avoided trips is 2% which is the 2011 Census value for working from home for all of Australia.

7.3 Average Trip Length

Average trip length for the Reference Project is determined using the same data as described above. Using transport network analysis along the public road network combined with the number of employees who travel to a given SA2 from every other SA2, it is possible to determine the average trip length for employees who commute to the SA2 of interest. This work was undertaken by AECOM and applied to the Calculator.

7.4 Work Weeks

'Work weeks' refers to the number of normal working weeks per annum for employees of the Reference Project.

This is assumed to be 48 weeks (assuming 4 weeks of annual leave). Healthcare workers are assumed to work 47 weeks per annum and Education workers assumed to work 40 weeks per annum. This is separate from avoided trips (see Section 7.2) which only refers to additional avoided trips.

7.5 Walk Score®

The publicly available Walk Score® website (http://www.walkscore.com) is used to determine the walkability of the building's location. Unlike other Performance Pathway criteria (1, 2 and 3), criterion 4 is not calculated by comparison with a Reference Project.

Walk Score® is available for every address in Australia and is automatically calculated within the spreadsheet tool. The Walk Score® is updated directly from the Walk Score® website and therefore always represents the most recently available data.

7.6 Emissions Intensity

Emissions intensity is estimated using a report prepared by SKM MMA in 2011 for the former Department of Energy Efficiency and Climate Change[2]. For ferry and bus, supplementary data is used from the United Kingdom Government 2012 greenhouse gas conversion factors for company reporting from the Department for Environment, Food and Rural Affairs (DEFRA)[3]. Finally, the Australian National Greenhouse Factors (July 2013) are used to represent the emissions intensity of electricity used to power trains and trams.

Table 3: Emissions intensity values

Mode	GJ per km	g CO2-e per GJ	g CO2-e per km
Car Driver	0.00370[A]	69,600[C]	257.5[D]
Motorcycle Driver	0.00150[A]	69,600[C]	104.4[D]
Bus Passenger	0.01130[A]	69,600[C]	123.8[F]
Tram Passenger	0.00052[B]	Varies with each state[E]	Calculated from the two cells to the left of this one[D]
Train Passenger	0.00048[B]		
Ferry Passenger	-		19.3[F]

Source: SKM MMA Report

[A]: Shown as MJ / vehicle kilometre (2008) in Table 6-4 of the SKM MMA report.

[B]: Shown as MJ / passenger kilometre (2006) in Table 6-7 of the SKM MMA report. Values are urban, heavy rail (Train) and urban, light rail (Tram).

[C]: Shown as kg CO_2-e per GJ of energy in Table 3-3 of the SKM MMA report for Gasoline (other than for use in an aircraft).

[D]: Calculated from the two cells to the left of this one. These values are per VKT – the calculation assigns all of the vehicle emissions to the driver and none to the passengers.

[E]: This value varies according to the emissions intensity of the local electricity grid. See Table 4 for values.

[F]: Calculated from the two cells to the left of this one. Bus occupancy of 6.36 (calculated as an average across a day) was assumed, in order to produce a similar result to the table in Annex 6, DEFRA 2012 (Local bus, not London). Ferry was set to the same value as Annex 6, DEFRA 2012 (foot passengers).

[2] Accessed from http://www.climatechange.gov.au/sites/climatechange/files/files/climate-change/skmmma-transport-modelling-pdf.pdf, 21st March 2014

[3] Accessed from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69554/pb13773-ghg-conversion-factors-2012.pdf, 21st March 2014

Table 4: Emissions intensity of grid

State	kg CO2-e per GJ
Australian Capital Territory	293
Northern Territory	213
New South Wales	293
Queensland	265
South Australia	202
Tasmania	61
Victoria	368
Western Australia	234

Source: National Greenhouse Accounts (NGA) factors, July 2013

8 CLAIMING IMPROVEMENTS

This Section outlines the documentation required to claim improvements for the Proposed Project against the Reference Project.

The justifications must be included in a site-specific Travel Plan developed early in the design phase (i.e. Schematic Design phase). The Travel Plan must include a site-specific transport assessment, and the recommendations of the Plan should be included in the design, construction and operation of the project. Refer to Section 6 of this Guide for specific requirements of the Travel Plan.

8.1 Submission Requirements

8.1.1 Mode Share Changes

Making changes to mode share automatically adjusts other mode shares proportionally to their existing mode share to ensure that all modes sum to one hundred percent (100%).

The following justifications are to be considered when filling out the appropriate Submission Template for assessment:

Walk: Demonstrate that the claimed percentage of project users live (or in the case of a residential building, work) within walking distance of the building. The definition of walking distance depends on the project type. For example, students at a tertiary institution may have a higher tolerance for walking distance compared with office staff. Students at a primary school are likely to have the lowest tolerance for walking distance. It is the responsibility of the project team to justify the definition of walking distance appropriate to the project.

The project team must also justify the assumption that project users live nearby. For example, education or healthcare institutions with associated student or staff accommodation may be able to justify this. The project team is encouraged to submit a Credit Interpretation Request to the GBCA to provide justification of their assumptions.

Cycle: Demonstrate that cycle facilities are available for the claimed proportion of project users. Building / fitout initiatives should be in place to facilitate cycle use, including secure bicycle parking, weather protection, changing facilities with provision of showers and lockers etc. Secure bicycle parking is defined as that which is in accordance with AS 2890.3.

Car (Driver, Passenger): Demonstrate that car parking is only available for the claimed proportion of car drivers and parking is not freely and readily available near the site for occupants to use. An incentive scheme for carpooling or to give up a parking space may also be claimed with documentation of how the scheme works and a justification for the proportion of reduced car trips claimed.

Public Transport (Train, Tram, Bus, and Ferry): Demonstrate that a scheme has been developed for incentivising public transport use. The claimed increase must be proportional to the incentive scheme.

8.1.2 Trip Length Changes

Evidence must be produced that the workforce for this project commutes shorter distances than the Reference Project. For example, education or healthcare institutions with associated student or staff accommodation may be able to justify this. This could also apply to a primary or secondary school with a zoning policy for enrolments. The project team is encouraged to submit a Credit Interpretation Request to the GBCA to provide justification of their assumptions. Route distances should be calculated via the route that is taken, rather than in a straight line (‘ as the crow flies’).

8.1.3 Avoided Trips Changes

An incentive scheme must be demonstrated or evidence of past rates of working from home must be produced to justifying increasing the avoided trips percentage for the company or workers/residents in the project. This does not apply to populations such as students, who would not typically receive incentives for working from home.

8.1.4 Work Weeks Changes

Evidence must be produced of a company policy with a higher than standard allowance for annual leave (i.e. greater than four weeks per annum)

8.1.5 Emissions Intensity Changes

Evidence must be produced of a company provided green fleet including vehicle specifications demonstrating the grams of CO_2-e per VKT. The vehicles must be available for staff travel between home and work. A fleet made available solely for staff transport during working hours cannot meet the requirements of this credit, as the credit covers only travel between home and the project.

8.2 Documentation Requirements

Refer to the respective Submission Guidelines for the Documentation Requirements.

APPENDIX A: PROJECT EXAMPLES

The following examples are based on *the Green Star – Design & As Built: Sustainable Transport Calculator*. In *Green Star – Interiors* the relevant sections of the Calculators are identical, however the point distribution differs.

These worked examples are not intended to cover all possible ways to achieve points using the Calculator, given the flexibility intended by the Performance Pathway. Project teams are encouraged to propose additional avenues for achieving emissions reductions, increasing active transport modes, and reducing vehicle kilometres travelled.

Example 1

This example is for an office building in a regional town in Victoria. The building's employees are offered small financial incentives for participating in a carpooling program and a larger incentive for cycling to work.

The project team is able to demonstrate, by way of program statistics or through an employee survey that 10% of employees are currently participating in, or willing to participate in a future carpooling scheme operated by the company residing in the building.

In addition, cycling facilities are sufficient to accommodate 5.3% of the building's employees.

This evidence allows the building to claim higher rates of car passenger and bicycle mode share relative to the Reference Project. Other mode shares are automatically adjusted downwards by the Calculator proportionally to maintain a total mode share of 100%.

To enter this into the Calculator:

- Update the Adjusted mode split for car passenger to 10%.
- Update the Adjusted mode split for bicycle to 5.3%.
- Press the "Update Mode Shares" button to maintain a total mode share of 100%.

	Reference	Adjusted	Proposed	
Train	0.8%	0.8%	0.7%	
Bus	2.5%	2.5%	2.3%	
Ferry	0.0%	0.0%	0.0%	
Tram	0.0%	0.0%	0.0%	
Car Driver	83.8%	83.8%	77.1%	
Car Passenger	6.4%	10.0%	10.0%	
Motorbike	0.5%	0.5%	0.5%	
Bicycle	1.6%	5.3%	5.3%	
Walk	4.4%	4.4%	4.0%	
Total Mode Share	100.0%	107.3%	100.0%	Update Mode Shares
Avoided trips	2.0%	2.0%	2.0%	%
Ave Trip Length	16.7	16.7	16.7	km
Work weeks	48	48	48	weeks / annum
trips per annum	470		470	trips / annum
Emissions per trip	3688		3395	g $CO_{2\text{-}e}$ / trip
Total emissions	**1.74**		**1.60**	**tonnes / person / annum**
Total vkt	**6575**		**6052**	**vkt / person / annum**
Active modes	**6.0%**		**9.3%**	**Mode Share % for Active Modes**

In addition, the company that occupies the building supplies company cars that are low emission vehicles in comparison to the average emissions intensity for cars and is able to verify this with supporting documentation. As such, the project team are able to claim lower emissions intensity for those who drive to work. These low-emission company vehicles occupy 20 of the available 40 car spaces on the project site, with a given emissions intensity of 130 g $CO_{2\text{-}e}$/passenger km.

Therefore the project team can enter the following emissions intensity for the project:

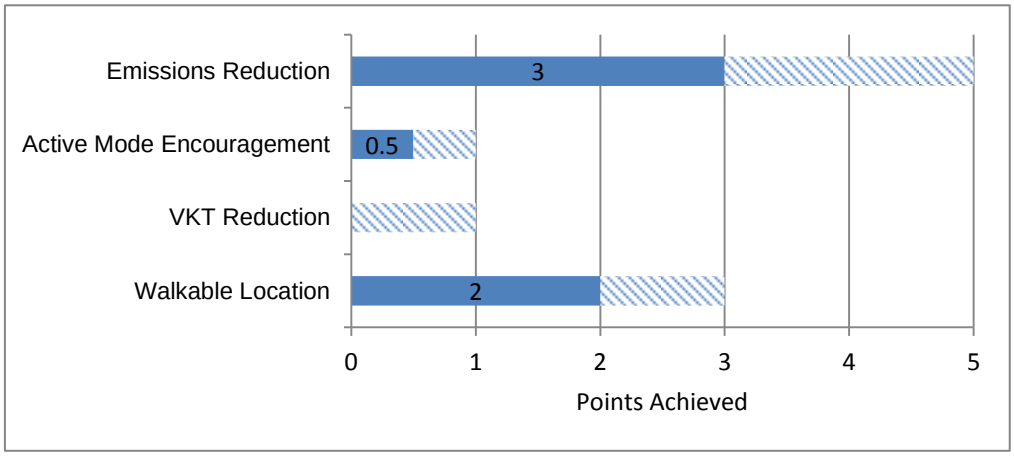
$$\frac{(258 \times 20) + (130 \times 20)}{40\ vehicles} = 194$$

To enter this into the Calculator:

- Update the Car Driver emissions to the equivalent emissions calculated

Emissions Intensity	Reference	Current	Unit
Train	177	177	g $CO_{2\text{-}e}$ / passenger km
Bus	131	131	g $CO_{2\text{-}e}$ / passenger km
Ferry	131	131	g $CO_{2\text{-}e}$ / passenger km
Tram	191	191	g $CO_{2\text{-}e}$ / passenger km
Car Driver	258	194	g $CO_{2\text{-}e}$ / vehicle km
Car Passenger	0	0	g $CO_{2\text{-}e}$ / passenger km
Motorbike	104	104	g $CO_{2\text{-}e}$ / passenger km
Bicycle	0	0	g $CO_{2\text{-}e}$ / passenger km
Walk	0	0	g $CO_{2\text{-}e}$ / passenger km
Total	**221**	**168**	**g $CO_{2\text{-}e}$ / passenger km**

This building is able to claim 5.5 out of 10 points, with the following points breakdown:



Example 2

This example is an industrial site in suburban Sydney. The building occupier offers subsidised train passes to employees and due to staff accommodation managed by the company, the occupier is also able to demonstrate that their employees are more likely to live locally than the Reference Project. The project is therefore able to claim shorter trip lengths.

The project team is able to demonstrate, by way of program statistics that 25% of employees are currently receiving subsidised public transport passes through the company.

In addition, staff accommodation is provided on site for 20% of staff. This is demonstrated through providing confirmation from the building occupier.

This evidence allows the building to claim higher rates of train, bus, ferry and tram (where available in at that location) and a reduction in average trip length relative to the Reference Project. Other mode shares are automatically adjusted by the Calculator proportionally to maintain a total mode share of 100%.

The increase in public transport mode share split is increased by applying the following formula:

$$Proposed\ train\ mode\ split = \frac{25}{(9.5 + 6.2)} \times 9.5 = 15.1\%$$

$$Proposed\ bus\ mode\ split = \frac{25}{(9.5 + 6.2)} \times 6.2 = 9.9\%$$

$$Average\ trip\ length = (18.5km\ x\ 80\%) + (0km\ x\ 20\%) = 14.8km$$

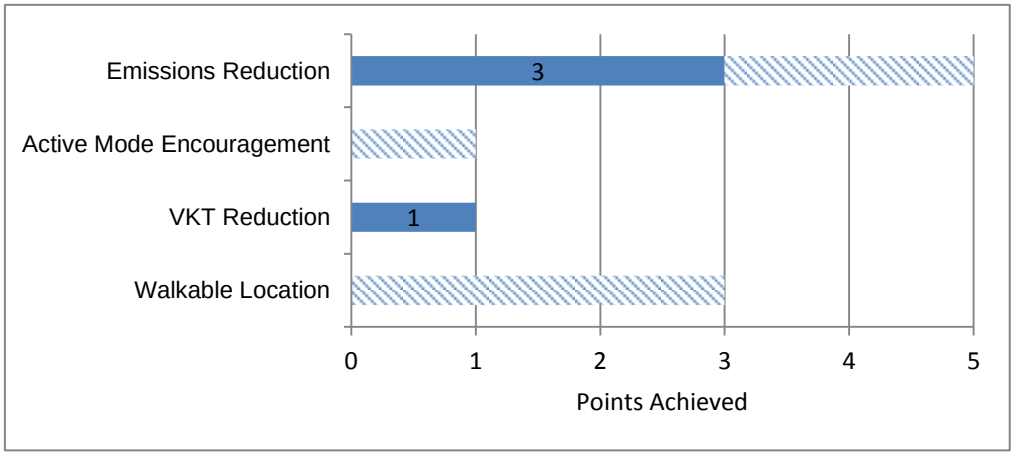
To enter this into the calculator:

- Update the Adjusted mode split for trains to 15.1%
- Update the Adjusted mode split for buses 9.9%
- Update the Adjusted Ave Trip Length to 14.8km
- Press the “Update Mode Shares” button to maintain a total mode share of 100%

	Reference	Adjusted	Proposed	
Train	5.8%	15.1%	15.1%	
Bus	2.0%	9.9%	9.9%	
Ferry	0.0%	0.0%	0.0%	
Tram	0.0%	0.0%	0.0%	
Car Driver	85.0%	85.0%	69.2%	
Car Passenger	4.8%	4.8%	3.9%	
Motorbike	0.8%	0.8%	0.6%	
Bicycle	0.7%	0.7%	0.5%	
Walk	0.9%	0.9%	0.7%	
Total Mode Share	100.0%	117.2%	100.0%	Update Mode Shares
Avoided trips	2.0%	2.0%	2.0%	%
Ave Trip Length	20.6	14.8	14.8	km
Work weeks	48	48	48	weeks / annum
trips per annum	470		470	trips / annum
Emissions per trip	4750		3154	g $CO_{2\text{-}e}$ / trip
Total emissions	**2.23**		**1.48**	**tonnes / person / annum**
Total vkt	**8237**		**4818**	**vkt / person / annum**
Active modes	**1.5%**		**1.2%**	**Mode Share % for Active Modes**

The occupier is not able to demonstrate that their employees drive lower emissions cars than the Reference Project, so no change in emissions intensity is claimed.

This building is able to claim 4 out of 10 points, with the following points breakdown:



Example 3

This example is for a student residential accommodation building in Melbourne. The building is located 800m from the main university campus, does not offer any student parking facilities, but has incorporated bicycle storage for 50% of students residing within the building. The building is occupied for 40 weeks per year to align with the university calendar.

The project team is able to demonstrate, by way of providing a marked-up location map that the development is within 800m of the main university campus. Therefore the project team can show that the average trip length for building occupants is reduced.

The project site does not provide any car parking facilities for student vehicles. Therefore the project team can justify a reduction in the car driver mode split to 0%.

The project team can also demonstrate that the “work weeks” for both the Reference and Proposed building projects are 40 weeks, to reflect the university calendar.

In addition, cyclist facilities have been provided for 50% of students.

This evidence allows the building to claim higher rates of bicycle mode share and lower rates of car driver mode share relative to the Reference Project. Other mode shares are automatically adjusted by the Calculator proportionally to maintain a total mode share of 100%. In addition, the project team is able to demonstrate a reduction in average trip length and an adjustment to the work weeks for this project.

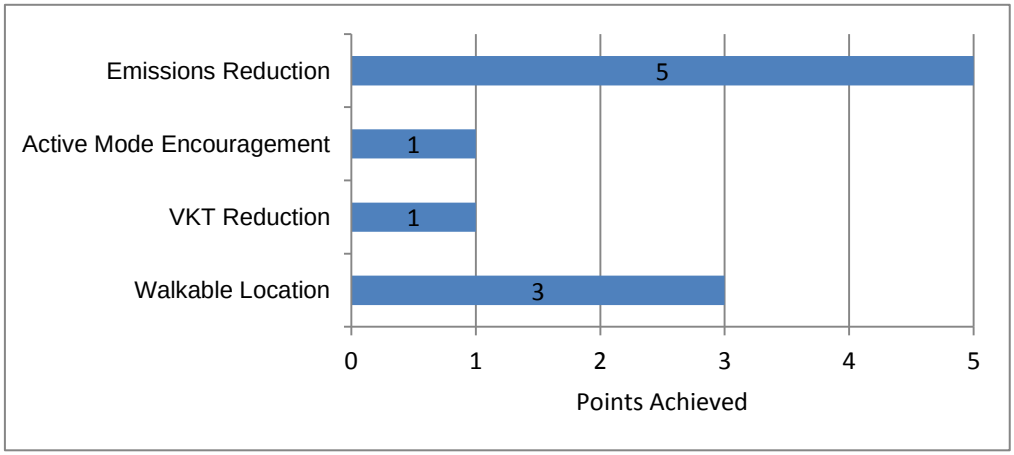
To enter this into the Calculator:

- Update the Adjusted mode split for car drivers to 0%
- Update the Adjusted mode split for bicycles to 50%
- Update the Adjusted Ave Trip Length to 0.8km
- Update both the Reference and the Proposed Work Weeks to 40 weeks
- Press the “Update Mode Shares” button to maintain a total mode share of 100%

	Reference	Adjusted	Proposed	
Train	5.1%	5.1%	5.3%	
Bus	3.1%	3.1%	3.3%	
Ferry	0.0%	0.0%	0.0%	
Tram	33.6%	33.6%	35.3%	
Car Driver	39.9%	0.0%	0.0%	
Car Passenger	3.8%	3.8%	3.9%	
Motorbike	1.0%	1.0%	1.1%	
Bicycle	12.5%	50.0%	50.0%	
Walk	1.0%	1.0%	1.1%	
Total Mode Share	100.0%	97.7%	100.0%	Update Mode Shares
Avoided trips	2.0%	2.0%	2.0%	%
Ave Trip Length	15.6	0.8	0.8	km
Work weeks	40	40	40	weeks / annum
trips per annum	392		392	trips / annum
Emissions per trip	2820		66	g $CO_{2\text{-}e}$ / trip
Total emissions	**1.11**		**0.03**	**tonnes / person / annum**
Total vkt	**2432**		**0**	**vkt / person / annum**
Active modes	**13.5%**		**51.1%**	**Mode Share % for Active Modes**

The occupier is not able to demonstrate that the occupants drive lower emissions cars than the Reference Project, so no change in emissions intensity is claimed.

This building is able to claim 10 out of 10 points, with the following points breakdown:



Example 4

This example is for a commercial office building in the Brisbane CBD. The building is located in close proximity to public transport and has therefore been able to reduce the number of car parking spaces provided on-site. The building owner has also provided additional motorbike spaces and electric charging stations.

The project site provides 60 car parking spaces in total. With a building population of 3000 people, this means that 2% of building occupants are able to drive and park on-site. Therefore the project team can justify a reduction in the car driver mode split to 2%.

The project site also provides 100 motorbike parking spaces. With a building population of 3000 people, this means that 3.3% of building occupants are able to ride and park their motorbikes on-site. Therefore the project team can justify an increase in the motorbike mode split to 3.3%.

This evidence allows the building to claim higher rates of motorbike mode share and lower rates of car driver mode share relative to the Reference Project. Other mode shares are automatically adjusted by the Calculator proportionally to maintain a total mode share of 100%.

To enter this into the Calculator:

- Update the Adjusted mode split for car drivers to 2%
- Update the Adjusted mode split for motorbikes to 3.3%
- Press the “Update Mode Shares” button to maintain a total mode share of 100%

	Reference	Adjusted	Proposed	
Train	25.6%	25.6%	33.0%	
Bus	29.5%	29.5%	38.0%	
Ferry	2.0%	2.0%	2.5%	
Tram	0.0%	0.0%	0.0%	
Car Driver	24.8%	2.0%	2.0%	
Car Passenger	7.0%	7.0%	9.0%	
Motorbike	1.7%	3.3%	3.3%	
Bicycle	3.0%	3.0%	3.9%	
Walk	6.5%	6.5%	8.3%	
Total Mode Share	100.0%	78.8%	100.0%	Update Mode Shares
Avoided trips	2.0%	2.0%	2.0%	%
Ave Trip Length	16.7	16.7	16.7	km
Work weeks	48	48	48	weeks / annum
trips per annum	470		470	trips / annum
Emissions per trip	2330		1733	g $CO_{2\text{-}e}$ / trip
Total emissions	**1.10**		**0.82**	**tonnes / person / annum**
Total vkt	**1948**		**157**	**vkt / person / annum**
Active modes	**9.5%**		**12.2%**	**Mode Share % for Active Modes**

In addition, of the 60 car spaces provided, 10 spaces are provided with electric vehicle charging stations. As such, the project team are able to claim lower emissions intensity for these car spaces. The type of electric vehicle permitted by the charging station has an emissions intensity of 90 g $CO_{2\text{-}e}$/passenger km, when driven in Queensland.

Therefore the project team can enter the following emissions intensity for the project:

$$\frac{(258 \times 50) + (90 \times 10)}{60\ vehicles} = 230$$

To enter this into the Calculator:

- Update the Car Driver emissions to the equivalent emissions calculated

Emissions Intensity	Reference	Current	Unit
Train	127	127	g $CO_{2\text{-}e}$ / passenger km
Bus	131	131	g $CO_{2\text{-}e}$ / passenger km
Ferry	131	131	g $CO_{2\text{-}e}$ / passenger km
Tram	138	138	g $CO_{2\text{-}e}$ / passenger km
Car Driver	258	230	g $CO_{2\text{-}e}$ / vehicle km
Car Passenger	0	0	g $CO_{2\text{-}e}$ / passenger km
Motorbike	104	104	g $CO_{2\text{-}e}$ / passenger km
Bicycle	0	0	g $CO_{2\text{-}e}$ / passenger km
Walk	0	0	g $CO_{2\text{-}e}$ / passenger km
Total	**139**	**82**	**g $CO_{2\text{-}e}$ / passenger km**

This building is able to claim 7 out of 10 points, with the following points breakdown: