



# TfNSW Sustainable Design Guidelines Supporting Tools Document

ST-146/1.1

Standard – Applicable to Infrastructure and Place

## Divisional Management System

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Project lifecycle:	<input type="checkbox"/> Feasibility; <input type="checkbox"/> Scoping; <input checked="" type="checkbox"/> Definition; <input checked="" type="checkbox"/> Construction readiness; <input checked="" type="checkbox"/> Implementation; <input checked="" type="checkbox"/> Finalisation; <input type="checkbox"/> Not applicable
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Transport  
for NSW

# Sustainable Design Guidelines

## Supporting Tools Document



# 1. Appendix A – Scoring

A project’s rating will be automatically calculated through the use of the reporting tool that accompanies the guidelines, refer to section 3.3 of the Sustainable Design Guidelines version 4 (SDGv4.0) document. The scoring is based on a points based system.

The following section provides a brief summary of how the scoring works.

- Each compulsory requirement has between 1 and 5 performance levels with the minimum P1 level reflected in the wording of the compulsory requirement.

<b>Compulsory requirement 1</b>	<b>All projects with a CapEx &gt; \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).</b>				
	P1	P2	P3	P4	P5
Performance levels for rating	≥5%	≥10%	≥15%	≥20%	≥25%
<b>Compulsory Requirement 3</b>	<b>All projects with a CapEx &gt;\$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to IP Climate Risk Assessment Guide for further guidance.</b>				
Performance levels for rating	Mitigate all extreme and high risks*		Mitigate all extreme, and high risks and 10% of medium risks	Mitigate all extreme, and high risks and 25% of medium risks	Mitigate all extreme, and high risks and 50% of medium risks

\* Compulsory requirement 3 has a combined performance level for P1 and P2.

- Each performance level is assigned a raw score between 0 and 4. The P1 column is awarded a 0 as P1 levels are the minimum and must be met in order to comply with the guidelines (i.e. – achieve a pass). The points achieved by a project are only relevant if a project is trying to achieve a rating above a pass level.

<b>Compulsory requirement 1</b>	<b>All projects with a CapEx &gt; \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).</b>				
	P1	P2	P3	P4	P5
Raw score for rating	0	1	2	3	4
<b>Compulsory Requirement 3</b>	<b>All projects with a CapEx &gt;\$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to IP Climate Risk Assessment Guide for further guidance.</b>				
Raw score for rating	0		2	3	4

Cover image: Kogarah Transport Interchange urban design treatment.

- Each compulsory requirement has been prioritised and assigned an importance rating between 3.25 and 12.75, with 12.75 being the highest importance and 3.25 being the lowest. The importance rating is a quadruple bottom line weighting (environment, social, economic and governance) and has been determined through a series of internal pairwise comparison workshops to ensure the importance rating reflects key priority areas for IP. The importance rating for each compulsory requirement is shown in Section 4.3 of the SDGv4.0.
- The weighted score for each level (P1 – P5) against each compulsory requirement has been calculated using the following formula:

**Weighted score = importance rating x raw score**

**Assuming an importance score of 11.25 and 12.75 respectively**

<b>Compulsory requirement 1</b>	<b>All projects with a CapEx &gt; \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).</b>				
	P1	P2	P3	P4	P5
Weighted score for rating	0	11.25	22.5	33.75	45
<b>Compulsory Requirement 3</b>	<b>All projects with a CapEx &gt;\$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to IP Climate Risk Assessment Guide for further guidance.</b>				
Weighted score for rating	0		25.5	38.25	51

- The total points available for each rating is the total of the weighted score for each of the five performance levels. *Note: The total points available will vary from project to project as not all compulsory requirements will be applicable to every project.*

In order to achieve a rating a project must achieve the specified percentage applicable points for the specified rating as per table 1 below.

**Table 1: Requirements to achieve Sustainable Design Guidelines rating**

Rating	Percentage of points
Pass	All applicable P1 performance level requirements must be met.
Bronze	All applicable P1 performance level requirements and minimum 85% of the total applicable points in the P2 column.
Silver	All applicable P1 performance level requirements and minimum 85% of the total applicable points in the P3 column.
Gold	All applicable P1 performance level requirements and minimum 85% of the total applicable points in the P4 column.
Platinum	All applicable P1 performance level requirements and minimum 85% of the total applicable points in the P5 column.

**Total applicable points for the rating assuming only compulsory requirements C1 and C3 are applicable in this example.**

	P1	P2	P3	P4	P5
Total of weighted points available*	0*	11.25*	48*	72*	96*
Target rating	Pass	Bronze	Silver	Gold	Platinum
Target points to achieve rating	NA - All applicable P1 performance levels must be achieved	9.56**	40.8	61.2	81.6

\* Total weighted points are the total of the weighted score for C1 and C3, noting that this example assumes that only C1 and C3 are applicable to the project.

\*\* Target points for Bronze - platinum is 85% of the total weighted score.



Bio-retention garden beds (raingardens) at Leppington Station car park which remove pollutants from stormwater before it enters local waterways.

## Scoring example

Project X is a large station upgrade and interchange with a CapEx of \$53million, and will produce less than 300m<sup>3</sup> of spoil. The level achieved for relevant compulsory requirements are marked by the red cells in the table below. Requirements that are not applicable to the project have been marked by the grey cells.

Compulsory Requirement	Weighted Score				
	P1	P2	P3	P4	P5
C1	0*	11	23	34	45
C2	0*		25	37	49
C2A	0*				
C3	0*		26	38	51
C4	0*	6	12	18	24
C5	Grey cell				
C6	0*	8	15	23	30
C7	0*	6	11	17	22
C8	0*	7	13	20	26
C8A	0*				
C9	0*				
C10	0*				
C11	0*				
C12	0*	12	24	36	48
C13	0*	11	22	33	44
C14	0*		23	35	
	<b>PASS</b>	<b>BRONZE</b>	<b>SILVER</b>	<b>GOLD</b>	<b>PLATINUM</b>
Total points available based on weighted score	0	61	194	291	374
Target points in order to achieve rating (i.e. - 85% of total)	NA - All applicable P1 performance levels must be achieved	51.85	164.49	247.35	317.9
Points achieved	179				
Project Rating	Silver				

## 2. Appendix B – How to use the electronic checklist

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### 2.1 Introduction

As outlined in section 3.1 SDGv4.0 document, reporting against the sustainable design guidelines is required at:

- Feasibility stage/ business case/ definition design.
- Preliminary design.
- Detailed design (SDR and CDR or equivalent).
- Six monthly during construction.
- At project completion.

At each stage, from preliminary design through to project completion, the project must submit an electronic checklist. Note that a project may use the electronic checklist to help inform the feasibility stage/business case/definition design.

#### 2.1.1 Structure

The electronic checklist, has been structured to enable the user to input data across a range of stages from preliminary design through to project completion.

The tool is structured across four core tabs:

1. **Project tab** – data input required – requires the user to input relevant project information.
2. **Selection tab** – data input required – requires the user to input information as to whether the threshold is triggered and whether the requirement is in scope for each compulsory requirement. Note: this will determine how many compulsory requirement tabs appear in the checklist.
3. **Compulsory requirement tabs** – data input required – this requires the user to input data in up to 16 separate compulsory requirement tabs. Note: the number of compulsory requirement tabs will depend on the number of compulsory requirements that are applicable to the project.
4. **Report tab** – information only tab, no data input required. The report page provides a summary of the projects performance across all applicable requirements and shows the project rating achieved at each reporting stage.

## 2.1.2 Enabling Macros

**TIP:** When opening the electronic checklist the user should ensure that the macros are enabled in order for the checklist to work. The user can do this by selecting 'Enable Macros' in the Microsoft Excel Security Notice pop up box as well as clicking on the 'Enable Content' button in the yellow security warning bar in the top left corner of the page (refer to below images).



## 2.1.3 Updating the checklist across relevant project stages

To keep track of the SDGv4.0 electronic checklist submissions across the respective project reporting stages, it is recommended that each submission is saved using a unique name. The following naming convention is suggested:

SDGv4 - [project name] - [reporting period] - [submission date]

For example: "SDGv4- Newcastle Light Rail - CDR - 30 September 2016". When reporting against each reporting period, it is recommended the last version of the file is used and is renamed/updated according to the relevant reporting period.

## 2.1.4 Types of data entry cells

Within each of the tabs there are associated data entry cells that enable the user to enter relevant information. The data entry cells are colour coded as follows:

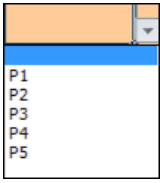
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Project ID	
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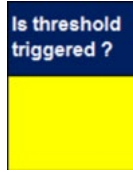
**Orange cells:** represent editable data input cells – the user is required to enter information directly into these cells.

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**Orange cells:** When a dropdown is available, a value from the dropdown menu must be selected (or the cell should remain empty if not relevant to that reporting period).



**Yellow cells:** identify cells where data is missing (e.g. - on the Selection tab).



**Light grey cells:** represent non-editable cells. The data in these cells are automatically generated by carrying information from other data entry cells e.g. - the weighted score achieved for a given compulsory requirement will be automatically generated based on the performance level selected by the user.



**Blue Cells:** represent evidence cells - the user is required to enter evidence e.g. - document references and comments to support the information entered into the electronic checklist.



**White cells:** are information cells only. They do not require any action by the user.

6 Month Construction Report	6 Month Construction Report
Jul-16	
Dec-16	
Target	
P2	
11.25	

**Dark grey cells:** indicate that the cells are not relevant and therefore no user input is required e.g. - construction periods that are not required as the project duration is less than what is allowed for in the excel tool, note: the excel tool allows for up to 6 construction reporting periods.


Requirement	Reference Design	Detailed Design SDR
1		
2		
2A	P1 0	P5 0

**Black cells:** indicate that the compulsory requirement is not applicable to the project. The requirement has been automatically blacked out in subsequent report pages.



## 2.2 Project tab

Once the user has opened the electronic checklist and ensured macros are enabled, they will see the Project Tab first (as shown in the figure below).



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Sustainable Design Guidelines version 4.0

**Please complete the following table.**

Project ID	
Project name	
Person completing form	
Phone number	
Email address	
Project CapEx (\$ M)	
Form last updated	
Submission	
Expected construction start date	
Expected construction completion date	
Expected number of reporting periods during construction	

**Data input: colour legend**

- Cell for user input
- Incomplete data warning
- Evidence
- Auto-generate data
- Information
- Not applicable
- Not relevant

**Step 1** – Complete the project details (including the project’s capital value). The Submission can be selected from the drop down box (i.e. – Reference design, Detailed design SDR etc.). Note: the “Submission” should be updated every time the project submits a checklist. Contact details need to be updated if there is change to the key personnel completing the checklist

**Step 2** – It is important to enter the expected start and completion dates (**month and year only**) as this information will automatically update the number of six monthly reporting columns within the checklist

**Step 3** – click on the “Proceed to next page” button

Proceed to next page

Once the details have been completed the user should click on the ‘Proceed to next page’ button in the bottom left corner (refer to figure above). This will take the user to the Selection tab.

## 2.3 Selection tab

The selection tab is what determines which compulsory requirements will appear in the remainder of the electronic checklist. The information entered in this tab should be based on the applicability test output outlined in section 2.2.3 of the SDGv4.0. The selection page includes the compulsory requirement details and three data input columns (as per the figure below).

Initiative #	Theme	Description	Threshold	Is the requirement triggered?		Comments
				Help	Help	
1	Energy and greenhouse gases	All projects with a CapEx > \$5 million to reduce consumption of GHG emissions by a maximum 1% from the project baseline GHG footprint established using the Carbon Emissions and Reporting Tool (CERT)	All projects with CapEx > \$5 million			
2	Energy and greenhouse gases	General & increased areas of building-related assets and activities: buildings are required to be designed and built to reduce energy consumption. (General & increased areas shall follow the demand to reduce: P1) lighting (equivalent to the P1P2 level), P2) office buildings (equivalent to the P1P2 level) or the energy model (P1-P2) office buildings. (Specialised building types: CapEx < \$10 million, the energy modelling pathway (P1-P2) shall be followed.)	All projects with CapEx > \$10 million			
2A	Energy and greenhouse gases	All new electrical equipment to be at least market average energy rating. In categories where no star rating is available, equipment purchased should be recognised as high efficiency either by being ENERGY STAR accredited, or a high efficiency model under Australian TradeMark or being above average energy rating. Greenhouse and Energy House (GEM) requirements.	All projects			
3	Climate resilience	All projects with a CapEx > \$5 million to undertake a climate risk assessment that addresses all extreme and high residual risks. Refer to NS Climate Risk Assessment Guide for further info.	All projects with CapEx > \$5 million			
4	Materials and waste		All projects with CapEx > \$5 million			
5	Materials and waste		All projects generating 1000m <sup>3</sup> of spoil			
6	Water		All projects with non-potable requirements with a continuous area 1000m <sup>2</sup>			
7	Water	recognition where practicable.	All projects with CapEx > \$5 million			
8	Water	All projects with a CapEx > \$5 million to undertake a water balance study and identify and implement appropriate and proportional operational water efficiency measures. Appropriate and proportional generally means identifying and quantifying at least 1% reduction in water usage from business as usual (BAU). Appropriate and proportional means identifying and quantifying at least 1% reduction in water usage from business as usual (BAU).	All projects with CapEx > \$5 million			
8A	Water	All new water using appliances, shower heads, taps and toilets must be within the Energy Water Efficiency Labelling Scheme (WELS) after rating by product type.	All projects			
9	Pollution control	All surface coatings to comply with the Australian Paint Approval Scheme (APAS) Volatile Organic Compound (VOC) limits where fit for purpose.	All projects			
10	Pollution control	All mobile non-road diesel plant and equipment (with an engine greater than 19kW) to report engine conformity with relevant United States Environmental Protection Agency (EPA) (European Union (EU)) or equivalent emissions standards and the fitting of any relevant after-treatment devices. Reporting should be in accordance with the Air Emissions Data Workbook - BTP-PT-433.	All projects			
11	Biodiversity	All projects with non-significant biodiversity impacts to comply with the Infrastructure and Services Vegetation Offset Guide, as applicable.	All projects with non-significant biodiversity impacts			
12	Community benefit	Completion Requirement 10: All projects with a CapEx > \$50 million must: (i) develop a project sustainable procurement strategy compliant with ICA's IS Rating Tool procurement credits Pre-1, Pre-2, Pre-3 and Pre-4; (ii) must meet and deliver sustainable procurement requirements; and (iii) undertake sustainable procurement training for high impact suppliers.	All projects with a CapEx > \$50 million			
13	Community benefit	All projects to address the white design principles in the TNEV Intake Urban Design Best Practice Guidelines within their white design and landscaping plan (LSDP).	All projects			
14	Community benefit	The project is awarded at least 1 point for a single initiative against the TCA Innovation Credit list-1 OR The project makes a contribution to industry and/or the local community in line with the project legacy categories specified (Note: the requirements are determined by CapEx).	All projects			

Compulsory requirement details including theme, description and threshold

Data input columns



Auburn Stabling Yard – as much of the site was contaminated, spoil was kept on site and capped rather than taken to landfill.

The user must fill out the following details for each of the compulsory requirements.

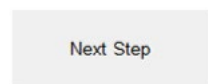
**Step 1:** Select “Yes” or “No” to outline whether the threshold for the compulsory requirement has been triggered or not.

Is threshold triggered ?		Is the requirement within scope ?	Comments
Help	Help		
Yes	Yes		
Yes	No		
No			
<input type="button" value="Yes"/> <input type="button" value="No"/>			

**Step 2:** Select “Yes” or “No” to outline whether the requirement is within scope (refer to section 2.2.3 of the SDGv4.0).

**Step 3:** If a “No” is selected in either column the comments cell will change colour to orange indicating that user input is required and a justification must be provided.

Once completed the user must click on the ‘Next Step’ button at the bottom of the page. The relevant compulsory requirements will then appear on the subsequent tabs within the checklist.



*Note: All cells within the threshold and scope columns must be completed otherwise the checklist will not allow the user to proceed and a message will appear notifying the user how many cells require data input. Cells with missing data will be highlighted yellow.*

Microsoft Excel

Data input incomplete. 2 missing data in column F and 2 missing data in column G.

Is threshold triggered ?		Is the requirement within scope ?
Help	Help	
Yes		
	Yes	
Yes	Yes	

The user must complete all cells in order to proceed.

## 2.4 Compulsory requirements tabs

Once the selection tab has been completed and the 'Next Step' button has been pressed, all applicable compulsory requirements will appear on individual tabs within the checklist and the user will be taken to the first applicable compulsory requirement. This section outlines how the user should go about completing a specific compulsory requirement tab.

This process needs to be repeated for all applicable compulsory requirements in order for a rating to be achieved.

*Note: If there is a change in the scope of the project that results in a compulsory requirement no longer being applicable or vice versa, the selection tab must be adjusted accordingly to ensure that the relevant compulsory requirements appear in the electronic checklist.*

All the compulsory requirements are formatted the same way, with the structure consisting of:

- Information cells including the compulsory requirement, performance levels and importance rating.
- User input cells including achievement level, comments and supporting initiatives sections.
- Evidence cells.

### 2.4.1 Information cells

Each compulsory requirement tab includes information cells of the relevant compulsory requirement. The details provided include the:

- Theme.
- Description of the requirement.
- Performance levels.
- Importance rating.

**Compulsory requirement 1 - Energy and greenhouse**

All projects with a CapEx > \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).

**Performance levels**

P1	P2	P3	P4	P5
5%	10%	15%	20%	25%

**Importance rating**

11.25

[Goto Report Page](#)

## 2.4.2 User input cells

### 2.4.2.1 Achievement level

The user is required to input data for the achievement level for the relevant submission. E.g. – if the SDG submission relates to the reference design then the reference design column is all that needs to be filled out.

The user should use the drop down menu to select the rating type “target” or “achieved”.

*Note: The “achieved” rating type should only be selected when it is known that the compulsory requirement has been met and evidence documents can be provided. For some compulsory requirements the “achieved” rating type should only be selected at the completion stage.*

Achievement level												
	Reference Design	Detailed Design SDR	Detailed Design CDR	6 Month Construction Report Jan-16	6 Month Construction Report Jul-16	6 Month Construction Report Jan-17	6 Month Construction Report Jul-17	6 Month Construction Report Jan-18	6 Month Construction Report Jul-18	6 Month Construction Report Jan-18	6 Month Construction Report Jul-18	Completion
Report Period				Jan-16	Jul-16	Jan-17	Jul-17	Jan-18	Jul-18	Jan-18	Jul-18	
Help	Rating Type											
	Performance Level											
	Weighted Score											

Once the rating type has been selected, the performance level (P1 – P5) that is being targeted or has been achieved needs to be selected. The performance levels relate back to the information cells located at the top of each compulsory requirement tab.

Achievement level												
	Reference Design	Detailed Design SDR	Detailed Design CDR	6 Month Construction Report Jan-16	6 Month Construction Report Jul-16	6 Month Construction Report Jan-17	6 Month Construction Report Jul-17	6 Month Construction Report Jan-18	6 Month Construction Report Jul-18	6 Month Construction Report Jan-18	6 Month Construction Report Jul-18	Completion
Report Period				Jan-16	Jul-16	Jan-17	Jul-17	Jan-18	Jul-18	Jan-18	Jul-18	
Help	Rating Type	Target										
	Performance Level											
	Weighted Score											
Comments		P1 P2 P3 P4 P5										
Help	Reference											

Note: If there is less than five performance levels for a given compulsory requirement e.g. – the Compulsory requirement 3 has a combined P1 and P2 level.

**Performance levels**

P1	P2	P3	P4	P5
Mitigate all extreme and high risks		Mitigate all extreme and high risks, and 10% of medium risks	Mitigate all extreme and high risks, and 25% of medium risks	Design out all extreme and high risks and 50% of medium risks

The dropdown will still provide 5 options (P1 – P5). It does not matter which of the two levels projects select (P1 or P2) as the calculations will default to the correct scoring (i.e. – the same score is awarded for the P1 level or P2 level). Likewise if the project only has one performance level the project can select any of the performance levels in the dropdown as the calculations will default to the same score.

**Performance levels**

P1	P2	P3	P4	P5
All new electrical equipment to be at least market average. In categories where no star ratings are available, all equipment must be Energy star accredited or above average GEMS registered				

Once the performance level has been selected the weighted score will auto-generate in the grey cell below the selected performance level.

Achievement level											
	Reference Design	Detailed Design SDR	Detailed Design CDR	6 Month Construction Report	6 Month Construction Report	6 Month Construction Report	6 Month Construction Report	6 Month Construction Report	6 Month Construction Report	6 Month Construction Report	Completion
Report Period				Jan-16	Jul-16	Jan-17	Jul-17	Jan-18	Jul-18		
Help				Jun-16	Dec-16	Jun-17	Dec-17	Jun-18	Dec-18		
Rating Type	Target										
Performance Level	P3										
Weighted Score	22.50										

At each SDG submission the next column will need to be completed e.g. – Detailed Design SDR, Detailed Design CDR etc.



### 2.4.2.2 Comments

Each compulsory requirement tab includes a comments section that relates to each of the SDG reporting submission stages. The user is required to add an overarching statement with regard to what performance level the project is targeting, tracking toward or achieving.

Comments			
Help	Reference Design		Project is currently targeting a P1 level against this requirement
	Detailed Design SDR		Project is currently targeting a P1 level against this requirement
	Detailed Design CDR		Project is tracking to achieve a P2 level against this requirement as a result of design innovation that will reduce GHG emissions by up to 10%
	6 Month Construction Report	Jan-16 Jun-16	Project is tracking to achieve a P2 level against this requirement as a result of design innovation that will reduce GHG emissions by up to 10%
	6 Month Construction Report	Jul-16 Dec-16	Project is tracking to achieve a P2 level against this requirement as a result of design innovation that will reduce GHG emissions by up to 10%
	6 Month Construction Report	Jan-17 Jun-17	Project is tracking at a P3 level against this requirement as the construction contractor has implemented a number of GHG reduction initiatives such as alternative fuels in construction vehicles and purchasing renewable energy for electricity supply
	6 Month Construction Report	Jul-17 Dec-17	
	6 Month Construction Report	Jan-18 Jun-18	
	6 Month Construction Report	Jul-18 Dec-18	
	Completion		



Artwork at Beecroft Station on the Epping to Thornleigh Third Track project, which used local children's interpretation of the native plants and wildlife to create a six-panel artwork named 'Our Place'.

### 2.4.2.3 Supporting initiatives

A list of supporting initiatives is provided on each of the compulsory requirement tabs. The list reflects the supporting initiatives listed in Appendix C of the Sustainable Design Guidelines.

The user must select from the dropdown menu any supporting initiatives that are being implemented to meet the compulsory requirement. A comment should be provided where “yes” is selected.

Supporting initiatives		
Supporting initiatives utilised		Comments
Alternative Fuels in Construction Vehicles - Use alternative fuels to reduce greenhouse gas emissions in construction vehicles e.g. – biodiesel.	Yes	Biodiesel has been used in all onsite construction vehicles
Combined services corridor - Provide services corridor for energy, water or other buried infrastructure. This will reduce multiple occupancies and trenches and ultimately GHG emissions through minimising on site plant and equipment movements.		
Correct site layout - Layout construction sites (including plant and equipment) to be designed to reduce travel distances and double carrying.	Yes No	
Façade reuse - Incorporate existing building facades in station upgrades.		
Local suppliers - Preference for local suppliers to reduce material/product transport distances.		
Lower embodied energy bar and mesh - Source at least 60 per cent of all reinforcing steel is produced using energy reducing processes in its manufacture (measured by average mass by steelmaker annually).		
Member spacing - Optimise the spacing of structural members in beam and post type designs.		
Open cess drains - Maximise use of open cess drains versus subsoil drains to reduce use of resources.		
Optimise design - Apply value engineering principles and processes to design decision making to improve resource and cost efficiencies.		
Optimise track support system - Optimise track support system design to minimise tunnel diameter.		
Pretabrication - Use prefabricated building and civil components to reduce construction waste, material usage, and on site vehicle/equipment movements.		

If a project is using supporting initiatives other than those listed to meet the relevant compulsory requirement, the user must specify what initiatives are being implemented and provide information in the cells provided.

Other - must specify below	Yes	
	Yes No	

### 2.4.3 Evidence cells

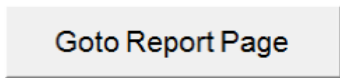
Once a project has selected that a certain performance level has been “achieved” for a given compulsory requirement, evidence documents should be provided and referenced in the evidence cells provided at the bottom of the relevant compulsory requirement tab.

*Note: A project team can also provide evidence that demonstrates how a project is tracking toward a given requirement.*

Document	Reference	Comments
TNSW CERT v1 - WTI - Completion - 30 December 2016	Dashboard Tab	The completed CERT tool demonstrates a 10% GHG emissions reduction from the basecase scenario

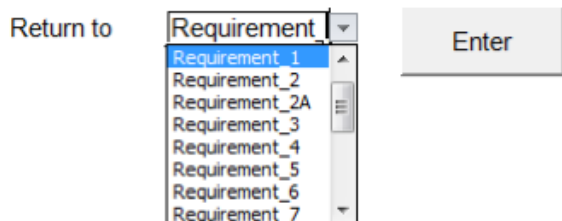
### 2.4.4 Go to report page button

Each compulsory requirement tab has a “Go to report page” button located in the top right corner.

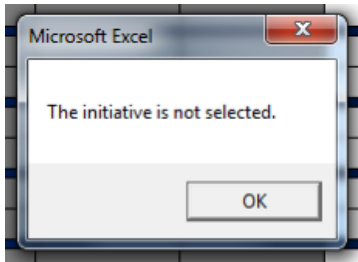


This button takes the user to the Report tab. Refer to Section 2.5 for further details on the functionality of the Report tab.

If the user wishes to return to the compulsory requirement tab they were on or another compulsory requirement tab in the tool, there is a drop down menu in the bottom right hand corner of the Report tab that can be used to navigate to compulsory requirement tabs. The user must select the requirement that they wish to return to from the drop down menu and click the “Enter” button.



*Note: If the user chooses to try and navigate to a compulsory requirement that is marked as not applicable on the Selection tab then the user will be given the following message. The user must click “OK” and select a compulsory requirement that is marked applicable on the Selection tab.*



Alternatively the user can navigate between compulsory requirement tabs by manually selecting the relevant requirement from the tabs at the bottom of the excel spreadsheet.



## 2.5 Report tab

The Report tab provides a summary of how a project is tracking at each of the SDG submission stages.

*Note: This tab does not require any user input*

For each compulsory requirement the report tab shows the:

- Performance level selected.
- Associate weighted score.

For each submission stage the report tab shows the following:

- **Rating type** – options for ratings are either “achieved” or “target” at each submission stage. **Note:** The rating will only appear as “achieved” on the Report tab if the “achieved” rating type has been selected for all applicable compulsory requirements.
- **Total score achieved** – this is the total points score being achieved at each submission stage.
- **Rating achieved** – either “Pass”, “Bronze”, “Silver”, “Gold” or “Platinum” will be shown at each submission stage. Note the rating achieved is based on the total score achieved on the project. **Note:** If the rating says “Non-compliant” there is a performance level missing in one of the compulsory requirement tabs. The user should revisit the relevant compulsory requirement and update the performance level as appropriate.

The below screenshot shows the key features of the Report tab.

The screenshot shows a detailed report interface with several callouts:

- Performance level achieved at each submission stage:** Points to the 'Rating' row at the bottom of the table, which shows 'Bronze' for the first three stages and 'Silver' for the last three.
- Weighted score associated with the performance level:** Points to the '85% Score' row, showing scores like 51 for Bronze and 164 for Silver.
- Rating achieved at each submission stage, based on the scores achieved by the project:** Points to the 'Target' row, showing target scores for each stage.
- General information on the total score a project must target in order to achieve a given rating. Note this will vary from project to project based on the number of applicable compulsory requirements:** Points to the 'Available Score' and '85% Score' rows.
- Missing data resulting in the "Non-compliant" rating in the 4th construction period report. To correct this issue the user must revisit the relevant compulsory requirement and update the performance level as appropriate:** Points to a 'Non-compliant' rating in the 4th construction period.
- Rating type, note this will only say "achieved" once "achieved" has been selected for all compulsory requirements:** Points to the 'Achieved' rating in the final 'Completion' column.

### 2.5.1 Speedometer

In the top right corner of the report tab there is a speedometer that indicates what rating the project has achieved at each project stage. The user must use the drop down box to select which project stage they want the speedometer to show. The number in the centre of the speedometer is the number of points achieved at the relevant project stage.

The screenshot displays the 'Sustainable Design Guidelines version 4.0 Report' interface. It includes a speedometer in the top right showing a score of 192. Below it is a summary table:

	Pass	Bronze	Silver	Gold	Platinum
Available Score	0	60	193	289	374
85% Score	0	51	164	245	317

Below the table is a dropdown menu for 'Completion' with options for various construction periods and a 'Completion' button.

### 3. Appendix C – Supporting initiatives

This Appendix includes a list of supporting initiatives that could be used to help meet each compulsory requirement. Note projects can utilise initiatives from outside this list.

When selecting supporting initiatives the following requirements must be applied. The sustainability initiatives must:

- Minimise (or reduce from business as usual) whole of life costs over the life of the project (refer to **Life Cycle Costing Management Standard T MU AM 01001 ST** for guidance).
- Demonstrate equal or reduced (from business as usual) operational and maintenance burden/costs as a measure of their effectiveness.

Project must apply the life cycle costing process and supporting tool described in Appendix E (refer section 5).

*Note: Not all compulsory requirements have associated supporting initiatives as some compulsory requirements are quite prescriptive as to what needs to be implemented or there are associated guidelines or appendices that provide further guidance e.g. – compulsory requirement 2 or 2A.*

Supporting Initiatives	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory requirement 1</b>	<b>All projects with a CapEx &gt; \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).</b>
Alternative Fuels in Construction Vehicles	Use alternative fuels to reduce greenhouse gas emissions in construction vehicles e.g. – biodiesel.
Combined services corridor	Provide services corridor for energy, water or other buried infrastructure. This will reduce multiple occupancies and trenches and ultimately GHG emissions through minimising on site plant and equipment movements.
Correct site layout	Layout construction sites (including plant and equipment) to be designed to reduce travel distances and double carrying.
Façade reuse	Incorporate existing building facades in station upgrades.
Local suppliers	Preference for local suppliers to reduce material/product transport distances.
Lower embodied energy bar and mesh	Source at least 60 per cent of all reinforcing steel is produced using energy reducing processes in its manufacture (measured by average mass by steelmaker annually).
Member spacing	Optimise the spacing of structural members in beam and post type designs.
Open cess drains	Maximise use of open cess drains versus subsoil drains to reduce use of resources.
Optimise design	Apply value engineering principles and processes to design decision making to improve resource and cost efficiencies.
Optimise track support system	Optimise track support system design to minimise tunnel diameter.
Prefabrication	Use prefabricated building and civil components to reduce construction waste, material usage, and on site vehicle/equipment movements.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory requirement 1</b>	All projects with a CapEx > \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).
Reduce cement	Increasing supplementary cementitious materials (SCM) content in concrete mix designs subject to meeting performance requirements.
Replace sand with recycled glass	Reuse crushed glass to minimise use of raw materials (e.g. sand).
Renewable Energy	Purchase a given percentage of site based electricity needs from GreenPower or renewable sources during construction of the asset.
Reuse construction waste	Reuse of ballast and/or other construction waste materials on site e.g. – access tracks.
Synthetic fibre shotcrete	Use bar chip synthetic fibres shotcrete in place of steel fibre shotcrete subject to performance requirements e.g. – in the tunnel lining.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory requirement 2</b>	Buildings are required to be designed and built to reduce energy consumption: <ul style="list-style-type: none"> <li>• Covered or uncovered areas shall meet pre-requisite requirements for services (Appendix F, Section 3)</li> <li>• Enclosed building spaces shall meet the performance targets of the energy modelling pathway (P2-P5)</li> <li>• Where enclosed building space cost &lt; \$10million the prescriptive pathway may be followed in lieu of energy modelling (P1).</li> </ul>

There are no suggested supporting initiatives. Refer to Appendix F for further details.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory requirement 2A</b>	All new electrical equipment (for the final asset) to be at least market average star rating. In categories where no star ratings are available, equipment purchased should be recognised as high efficiency either by being ENERGY STAR accredited, in a high efficiency band under Australian Standards or being above-average efficiency of Greenhouse and Energy Minimum Standards (GEMS) registered products.

There are no suggested supporting initiatives.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory requirement 3</b>	All projects with a CapEx >\$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to IP Climate Risk Assessment Guide for further guidance.
Back up power supply	Incorporate back up or auxiliary power sources to supply essential services during power outages or extreme events.

<b>Supporting Initiatives</b>	<b>The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.</b>
<b>Compulsory requirement 3</b>	<b>All projects with a CapEx &gt;\$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to IP Climate Risk Assessment Guide for further guidance.</b>
Design for flood/inundation risk	Specify vent levels and portal drainage to address predicted increases in rainfall intensity, future flood conditions and sea levels.
Equipment resilience to temperature	Select equipment that will be resilient to increased temperature and more frequent and severe heat waves.
Heat islands	Use light coloured materials on roofs and pavements to both shade from and reflect sunlight, in order to decrease heat islanding.
Passenger Comfort	Review levels of passenger comfort to take account of climate change e.g. - provision of additional shelter, wind breaks and driving rain and increased shading from sun in locations where customers wait for transport.
Protect sensitive assets	Protect sensitive assets (e.g. - lifts, escalators) from the effects of extreme climate and weather.
Shading	Provide shade through vegetation or structures over platform, concourse, car parks and pedestrian pathway areas and work/lunch areas.
Thermal Comfort	Select ventilation systems to provide a satisfactory environment during severe heat waves (refer to compulsory requirement 2).
<b>Supporting Initiatives</b>	<b>The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.</b>
<b>Compulsory requirement 4</b>	<b>90% of construction waste and demolition waste (by weight) to be diverted from landfill for all projects with a CapEx &gt; \$15 million.</b>
Mulching	Mulch all appropriate waste vegetation for use on site or send it to an off-site compost facility.
On site waste segregation	Enable on site waste segregation where space permits to maximise reuse opportunities both on and off site.
Reuse construction waste	Reuse of ballast and/or other construction waste materials on site e.g. - access tracks.
Reuse of structures	Retain or refurbish existing structures where possible.
Selection of waste contractors	Selecting waste contractors that have proven waste separation and reporting processes.



<b>Supporting Initiatives</b>	<b>The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.</b>
<b>Compulsory Requirement 5</b>	<b>100% of usable spoil (by weight) to be beneficially reused for all projects generating &gt;300m<sup>3</sup> of spoil.</b>
Cut-fill balance	Balance site works to avoid excess or import of spoil.
Excavated materials	Investigate future use opportunities for excavated materials (e.g. Yellowbrick sandstone).
Integrated transport solution	Consider the most efficient integrated transport solution for the removal of spoil (e.g. - use of rail).
Off-site spoil reuse	Where clean spoil cannot be used on site prioritise off-site uses that have biodiversity or community/development benefit, and require minimum transport distances.
On-site spoil reuse	Reuse any excess spoil as backfill, a landform feature, visual screen and/or for noise attenuation.
Recycled materials in formations	Use recycled materials in formations. Formations are defined as the surface on which track (including ballast) is laid. The material is to be analysed for its ability to meet related standard requirements.
<b>Supporting Initiatives</b>	<b>The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.</b>
<b>Compulsory Requirement 6</b>	<b>All new effective impervious area with a continuous area &gt;1000 m<sup>2</sup> to be treated through water sensitive urban design.</b>
Bioretention basins	Bioretention basins operate with the same treatment process as bioretention swales with the exception that they are non-linear and do not convey stormwater but they may be designed to provide a detention function.
Bioretention swales	Bioretention swales (or bioretention trenches) are linear systems that include a vegetated swale and subsurface filter.
Climate resilience	Demonstrate stormwater design excellence that links with climate change CR3 risk (medium or above).
Constructed Wetlands	Constructed wetlands are extensively vegetated water bodies that provide enhanced sedimentation fine filtration and biological processed to remove stormwater pollutants.
Education and community engagement	Include education signage/interactive elements around water sensitive urban design initiatives and/or involve the community in the design and/or construction phases.
Exfiltration Systems	Exfiltration systems encourage the infiltration of stormwater into the surrounding soils or aquifers (layers of rock or sand which can hold and store water underground). This initiative would need to be part of broader regional program with other stakeholders.
Gross Pollutant Traps	Gross pollutant traps are used to remove debris items larger than around 5 millimetres. Typically includes litter (such as paper and plastics) and vegetation (such as leaves and twigs), which are transported by stormwater and runoff.
Habitat connectivity	Demonstrate that water sensitive urban design elements implemented enhance habitat connectivity

<b>Supporting Initiatives</b>	<b>The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.</b>
<b>Compulsory Requirement 6</b>	<b>All new effective impervious area with a continuous area &gt;1000 m<sup>2</sup> to be treated through water sensitive urban design.</b>
Permeable and porous surfaces	Design for permeable and porous surfaces to allow for stormwater infiltration (preferably with other treatments such as vegetated swales) Porous and permeable pavements are generally only applicable under light traffic loads due to them usually being laid on a sand or fine gravel.
Ponds/Wetbasins	Ponds target the removal of coarse and fine sediments through sedimentation, as well as some adsorption of nutrients from fringe plants (although less than wetlands).
Retain hydrology features	Retain hydrology features (i.e. - streams and ponds).
Soft landscaping	Demonstrate a minimum 10% additional soft landscaping design excellence from that in the existing area to be developed/upgraded.
Sediment Basins	Sediment basins are primary treatment elements used mainly to trap coarse sediment however they may also be designed to function as a detention and/or retention component of the stormwater system.
Silt and oil separators	Silt and oil separators will assist in removing scum and particulates from stormwater.
Vegetated swales	Vegetated swales are linear features that convey stormwater along the surface within a wide, shallow channel, typically at grades <5%.
Water storage, irrigation or other reuse opportunities	Particular land uses within or adjacent to the project such as rest areas, compounds, recreational open space and other areas needing irrigation may mean it is beneficial to consider using land or stormwater harvesting and reuse. Stormwater storage devices could include underground storage tanks as well as surface pond and wetlands.
<b>Supporting Initiatives</b>	<b>The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.</b>
<b>Compulsory Requirement 7</b>	<b>All projects with a CapEx &gt; \$15 million to monitor and report water consumption during project construction and reduce potable water consumption where practicable.</b>
Filter press	Using a filter press to separate water from slurry waste from non-destructive digging etc. Water should be treated (where required) for reuse on site.
On site capture and reuse	Maximising non-potable water use during construction e.g. - by collecting rain/stormwater in settle ponds or in water tanks at site compounds and treating (where needed) for reuse (e.g. for dust suppression spraying).
Water efficiency in site offices	Install rainwater tanks for non-potable water supply to site offices. Install water efficient fittings in site offices.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory Requirement 8</b>	All projects with a CapEx >\$15million to undertake a water balance study and identify and implement appropriate and proportionate* operational water efficiency measures.
Drip feed irrigation	Use drip feed irrigation or similar water efficient technology from a non-potable water source where irrigation is necessary.
Grey or black water	Harvest grey or black water from all sources on-site for non-potable uses (e.g. for uses in toilets, irrigation or wash down facility).
Planting	Select plant species that require minimal or no irrigation after establishment.
Rain water	Store rain from roofs or shade structures in water tanks. Connect water tanks to a new or existing non-potable water reticulation system. Connect sub-meter to all outflow pipes from tanks.
Water efficient controls	Specify sensors, timers or spring loaded devices for taps where possible to reduce water loss from taps that are left running.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory Requirement 8A</b>	All new water-using appliances, shower heads, taps and toilets must be at least the average Water Efficiency Labelling Scheme (WELS) star rating by product type.

There are no suggested supporting initiatives.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory Requirement 9</b>	All surface coatings to comply with the Australian Paint Approval Scheme (APAS) Volatile Organic Compounds Limits where fit for purpose.

There are no suggested supporting initiatives.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory Requirement 10</b>	All mobile non-road diesel plant and equipment (with an engine greater than 19kW) to report engine conformity with relevant United States Environmental Protection Agency (US EPA), European Union (EU) or equivalent emissions standards and the fitting of any exhaust after-treatment devices. Reporting should be in accordance with the Air Emission Data Workbook – 9TP-FT-439.

There are no suggested supporting initiatives.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
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<b>Compulsory Requirement 11</b>	All projects with non-significant biodiversity impacts to comply with the Infrastructure and Place Vegetation Offset Guide as applicable.
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There are no suggested supporting initiatives. Refer to **Infrastructure and Place** Vegetation Offset Guide for further guidance.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
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<b>Compulsory Requirement 12</b>	<p>All projects must:</p> <ul style="list-style-type: none"> <li>i meet steel and timber sustainable procurement requirements; and</li> <li>ii undertake sustainable procurement training for high impact suppliers.</li> </ul>
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There are no suggested supporting initiatives. Refer to Appendix G for further details.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
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<b>Compulsory Requirement 13</b>	All projects to address the urban design principles in the TfNSW Interim Urban Design Best Practice Guidelines within their urban design and landscaping plan (UDLP) or equivalent.
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There are no suggested supporting initiatives. Refer to Interim Urban Design Best Practice Guidelines for further detail.



North Strathfield Rail Underpass Concord West Station on Queen Street.

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory Requirement 14</b>	The project is awarded at least 1 point for a single initiative against the ISCA Innovation Credit Inn-1  OR  The project makes a contribution to industry and/or the local community in line with the project legacy categories specified (Note: the requirements are determined by CapEx).
<b>Project Legacy Area</b>	<b>Initiative</b>
Community facilities or community identity related initiatives.	<ul style="list-style-type: none"> <li>• Consult with local conservation groups on opportunities for collaboration (e.g. - maintaining publicly accessible bushland.</li> <li>• Participate in Clean Up Australia Day with or without involvement of a community group.</li> <li>• Participate in Schools Tree Planting Day.</li> <li>• Clean up of local parks.</li> <li>• Clean up of local waterways.</li> <li>• Working with local bush care groups to remediate local bushland sites.</li> <li>• Involve local artists in the design and implementation of public art.</li> <li>• Upgrading access to nearby community facilities.</li> <li>• Remediation of local waterways to natural state.</li> <li>• Provision of new public facilities working in consultation with local councils e.g. parks, playing equipment, active transport links, sporting fields, toilets, community buildings, and community gardens.</li> <li>• Provision of commercial/retail spaces for local area.</li> </ul>
Future proofing initiatives.	<ul style="list-style-type: none"> <li>• Design multi storey car parks to be easily adapted for additional parking to be added at later stages or to be reconfigured for other uses e.g. - office spaces.</li> <li>• Design and build larger footprint substations to allow for future electricity demands and future equipment installations or allow space to provide alongside rail energy storage.</li> </ul>
Initiatives to monitor resource use within buildings.	<ul style="list-style-type: none"> <li>• Water metering linked to central building management system: link water metering to a central building management system.</li> <li>• Water real-time metering: monitor and record water use patterns.</li> <li>• Water sub-metering: Install water sub-meters on all major potable and recycled water uses.</li> <li>• Digital control system: Install digital control systems to modify flow rates, compressors, pumps, fans, valves etc.</li> <li>• Sub-metering: Provide separate sub-meters or sub-metering for all substantive energy uses (e.g. - all energy uses of 100kVa or greater - lighting, small power and individual tenancies). Make sure that metering can effectively separate tenant loads from base building loads.</li> <li>• Real time (smart) metering: Monitor and record data of energy use patterns in real time. For tunnels, relay to the Master Control System.</li> <li>• Software-based Building Management and Control System (BMCS): Install BMCS to intelligently manage stations and buildings, accessible from any nominated location.</li> </ul>

<b>Supporting Initiatives</b>	The designer/contractor can select from the following list of supporting initiatives in order to meet compulsory requirements. Note that the designer/contractor is not limited to the initiatives that are listed here.
<b>Compulsory Requirement 14</b>	The project is awarded at least 1 point for a single initiative against the ISCA Innovation Credit Inn-1  OR  The project makes a contribution to industry and/or the local community in line with the project legacy categories specified (Note: the requirements are determined by CapEx).
<b>Project Legacy Area</b>	<b>Initiative</b>
Initiatives to provide communication networks in metro areas.	<ul style="list-style-type: none"> <li>• Wireless access points to be located in station awnings built for outdoor wifi users.</li> <li>• Provision of power outlets and seating to support high speed internet services.</li> <li>• Design wider than minimum footpaths to enhance safety and service, keep corners clear of obstructions and improve intersections.</li> </ul>
Initiatives to support active transport and integration with other modes and forms of transport.	<ul style="list-style-type: none"> <li>• Optimise local pedestrian links to and between community facilities such as sports grounds etc. Plan pathways within the asset to connect directly with existing pedestrian routes, centre activities and station entries. During station building in a way to prevent it becoming a visual or psychological barrier to crossing the railway. Outcomes: Unobstructed pedestrian access ways from the asset to the surrounding town centre to the train station along design lines.</li> <li>• Provide sheltered bicycle lock ups and/or lockers in or near entrances to stations. Allow for at least 5% of staff use at maintenance facilities. See section 3.9.3.1 of the ASA station Design Standard Requirements for further information on bicycle parking requirements at stations.</li> <li>• Separate cycle ways and footpaths to decrease the likelihood of collisions and decrease pathway congestion.</li> </ul>
Initiatives to support biodiversity outcomes.	<ul style="list-style-type: none"> <li>• Create habitats for winged species for sites that do not pose a health and safety risk e.g. – Bird and bat boxes.</li> <li>• Install fauna crossings such as fauna underpasses, combined fauna drainage/bridge structures and associated fauna fencing as required.</li> </ul>
Initiatives to support renewable energy transport forms.	<ul style="list-style-type: none"> <li>• Allow capacity for electric cars to charge now and in the future e.g. – installation of conduits to allow future installation.</li> <li>• Install electric car charge points.</li> </ul>
Knowledge sharing/Educational initiatives.	<ul style="list-style-type: none"> <li>• Implement knowledge sharing in line with minimum level 1 of the IS Rating Tool Management and Governance Category Man-6 (knowledge sharing) credit.</li> <li>• Implement knowledge sharing in line with minimum level 2 of the IS Rating Tool Management and Governance Category Man-6 (knowledge sharing) credit.</li> <li>• Implement knowledge sharing in line with minimum level 3 of the IS Rating Tool Management and Governance Category Man-6 (knowledge sharing) credit.</li> <li>• Engaging with high school and university groups to run environment related competitions.</li> <li>• Educational materials/signs developed and included in finished project for sustainability.</li> <li>• Partnerships with Universities/TAFEs or local community groups during works.</li> </ul>
Shared/adaptive reuse initiatives.	<ul style="list-style-type: none"> <li>• Design in adaptive use on the weekends/non-peak periods (e.g. consider how the car park may be converted into market or festival space on the weekend).</li> </ul>

## 4. Appendix D – Templates

This section provides relevant templates for use when applying the sustainable design guidelines including:

- Compulsory requirement applicability memo template.
- Reporting timeline memo template.
- Compulsory requirement 14 self-assessment memo template.

### 4.1 Compulsory requirement applicability memo template

This memo template is to be used when seeking agreement that a given compulsory requirement is “not applicable” to the project despite having triggered the relevant threshold.

Dear [INSERT NAME],

[INSERT PROJECT NAME] is seeking agreement from the TfNSW Sustainability and Systems Team that the following Sustainable Design Guidelines compulsory requirements are not applicable to the project based on the justifications outlined in the below table and attached evidence documentation.

Should you have any questions please contact [INSERT NAME] on [INSERT PHONE NUMBER] or [INSERT EMAIL] to discuss further.

#### Compulsory requirement applicability memo

Project name

Compulsory requirement	Has the requirement been deemed not applicable despite triggering the threshold?	Justification	Evidence (if relevant)
1	Yes/No		
2	Yes/No		
2A	Yes/No		
3	Yes/No		
4	Yes/No		
5	Yes/No		
6	Yes/No		
7	Yes/No		
8	Yes/No		
8A	Yes/No		
9	Yes/No		
10	Yes/No		
11	Yes/No		
12	Yes/No		
13	Yes/No		
14	Yes/No		

## 4.2 Reporting timeframes memo template

This memo template is to be used when seeking agreement on reporting timeframes due to:

- Multiple design packages spanning different timeframes.
- Distinct packages of work being delivered by different designers, contractors etc.

Dear **[INSERT NAME]**,

**[INSERT PROJECT NAME]** is seeking agreement from the TfNSW Sustainability and Systems Team that the following reporting timelines for the Sustainable Design Guidelines v4.0 are appropriate based on the timing for finalisation of various design packages/packages of work that make up the project.

Should you have any questions please contact **[INSERT NAME]** on **[INSERT PHONE NUMBER]** or **[INSERT EMAIL]** to discuss further.

### Reporting timeframes memo SECTION 1 - PROJECT DETAILS

Project name

Anticipated construction start date

Design packages/ package of works	Scope	Company delivering the works
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### SECTION 2

Question	Yes/No	Action
1 Will the project submit a separate checklist for different works packages? Note: this is recommended particularly where large packages of works may be being delivered by different designers and/or contractors etc.	Yes/No	If yes, proceed to question 2. If no, proceed to section 3.
2 Does each package of work have multiple design packages within it?	Yes/No	If yes, each works package should fill out section 3 and submit a separate memo to agree on reporting timeframes for each package of works. If no, each works package should submit reporting in line with the timeframes outlined in section 3.1 of the SDGv4.0.



## Reporting timeframes memo

### SECTION 3 - PROPOSED REPORTING TIMEFRAMES

Note: The proposed timeframes for reporting identified in this section should align with a time where majority of works in the project scope are at the relevant reporting stage.

Reporting stage	Proposed timeframe for submission
Definition design	
Preliminary design	
Detailed design SDR	
Detailed design CDR	
Construction	
Completion	

### 4.3 Compulsory requirement 14 self-assessment memo template

This memo template is to be used when a project is pursuing 'pathway 2: other project legacy and community initiatives' in order to comply with compulsory requirement 14.

Dear [INSERT NAME],

[INSERT PROJECT NAME] is seeking agreement from the TfNSW Sustainability and Systems Team that the points awarded to each of the proposed project legacy and community initiatives are appropriate based on the criteria outlined in the table below.

Points	Criteria
1 point	<ul style="list-style-type: none"><li>Indirect benefit AND/OR tangible benefit.</li><li>Benefits are of a temporary nature (during the construction period only).</li><li>Benefits are of a localised nature (i.e. benefit a specified local community group only).</li></ul>
2 points	<ul style="list-style-type: none"><li>Tangible benefit.</li><li>Benefit is anticipated to continue beyond the construction period for up to five years.</li><li>The initiative provides a benefit that contributes to a broader local community.</li></ul>
3 points	<ul style="list-style-type: none"><li>Considerable/substantial benefits.</li><li>The benefit is anticipated to continue beyond a five year period after construction completion.</li><li>The initiative provides a benefit that contributes to broader community.</li></ul>

The project is proposing [INSERT NUMBER OF INITIATIVES] initiatives. The [INSERT PROJECT NAME] project team has undertaken a self-assessment against the above criteria for each of the proposed initiatives as outlined in the table below.

Initiative	Description of Scope	Proposed points	Justification based on criteria. Please provide evidence where possible.

Should you have any questions please contact [INSERT NAME] on [INSERT PHONE NUMBER] or [INSERT EMAIL] to discuss further.

# 5. Appendix E – Whole of life costing process

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## 5.1 Background

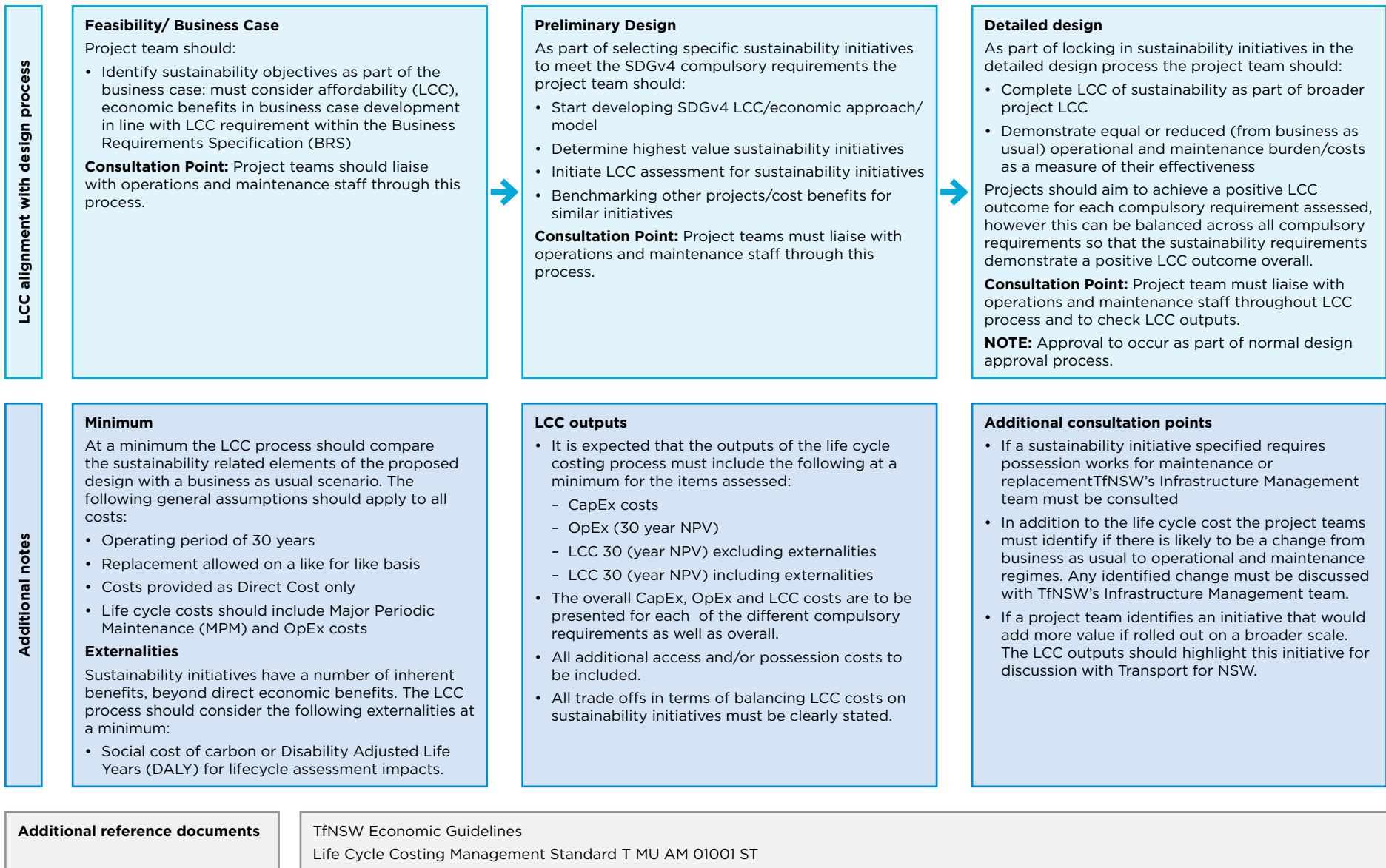
As stated in section 2.4 of the Sustainable Design Guidelines version 4 (SDGv4) document a key component of the guidelines process is undertaking life cycle costing (LCC), this is particularly relevant to selecting supporting initiatives (refer to section 2.2.4 of the SDGv4 document).

When selecting supporting initiatives the following requirements must be applied.

The sustainability initiatives must:

- Minimise (or reduce from business as usual) whole of life costs over the life of the project (refer to Life Cycle Costing Management Standard T MU AM 01001 ST for guidance)
- Demonstrate equal or reduced (from business as usual) operational and maintenance burden/costs as a measure of their effectiveness.

The process below provides guidance around key considerations, assumptions and exclusions, hold points and outputs for life cycle costing and how it aligns with different design stages.



# 6. Appendix F – Compulsory Requirement 2 (CR2)

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## 6.1 Performance requirements

Section 4.3.2 of SDGv4.0 stipulates that enclosed buildings and covered / uncovered areas of building-related assets are required to be designed and built to reduce annual kWh energy consumption. Parameters referred to in National Construction Code (NCC) (Building Code of Australia (BCA)) Section JV3 *Verification using a reference building* or an agreed alternative benchmark shall be used as basis for comparison.

The purpose of Appendix F is to consider different means leading to reducing the energy consumption and elaborate how the energy usage requirements of SDG CR2 may be met.

This appendix:

- Defines Specific Requirements for Covered and Uncovered areas
- Provides Energy Modelling requirements to achieve P2 – P5 performance level
- Provides a list of Prescriptive Requirements that satisfy P1 performance level
- Provides a non-exhaustive reference list of common ‘good practice’ measures.

In addition, CR2 allows for an approach that constitutes an alternate *performance solution* under the NCC (BCA) Ref clause A0.2, A0.3, where Verification Methods for NCC (BCA) compliance (listed in NCC (BCA) clause A0.5) enhanced to meet the aims of SDG, other than comparison with the NCC (BCA) Deemed to Satisfy requirements could be used, resulting in energy efficient buildings.

The energy saving measures contained herein are made in isolation of other requirements such as functional requirements, statutory requirements and effective lifecycle costing etc., mandated in other documents, legislation and standards which must not be compromised in any solution. This guidance, if followed, does not guarantee that these other requirements can be met, and it is the responsibility of the designer to develop and evaluate all feasible options related to all parameters as they pertain to a particular project at each relevant project stage.

**Acknowledgments:** Elements of Appendix F are based on the design guideline, *Advances Energy Design Guide for Small Retail Buildings* (2011) published by ASHRAE, and the guideline, *I am your optimisation guide: HVAC systems* (2015) published by AIRAH and Office of Environment and Heritage (OEH).

## 6.2 CR 2 pathway

Projects shall be subdivided by works type and cost into '*Building*' and '*Non-Building*' components. CR2 is only applicable to the '*Building*' component.

The '*Building*' component is further subdivided by building works type and cost into the following components:

- '*Covered and Uncovered Areas*': Covered and Uncovered areas have limited building services for which energy saving measures can be applied. Typically the main service is lighting and HVAC is non-existent.
- '*Enclosed Building*' (enclosed building space): Enclosed Building means *Proposed Building* for the purpose of energy modelling.

The *Enclosed Building* portion of the project is evaluated separately from *Covered and Uncovered Areas*.

## 6.3 Covered and Uncovered Areas Specific Requirements

It is recognised that some parts of transport buildings are technically not covered under the jurisdiction of NCC (BCA) Section J despite the existence of building services operating in that area. SDG requires that these areas shall be included in the kWh energy reduction strategy.

The energy use of *Covered and Uncovered Areas* (C&UA) is reported separately.

Regardless of the project *Building* component size, the *Covered and Uncovered Areas* shall fulfil the following C&UA Specific Requirements:

Lighting	
<b>L1</b>	<b>Lighting of covered walkways and external platforms under canopy</b>
	C&UA Specific Requirement: The illumination power density shall be at least 10% less than the value stipulated in NCC (BCA) Table J 6.2.a Note: J 6.2.b adjustment factors for a control device do not apply.
<b>L2</b>	<b>Lighting of open external areas: carparks, uncovered walkways and platforms etc.</b>
	C&UA Specific Requirement: The illumination power density shall be no more than 4 W / m <sup>2</sup> . Note: J 6.2.b adjustment factors for a control device do not apply.
<b>L3</b>	<b>Exterior lighting controls</b>
	C&UA Specific Requirement: In addition to requirements of ASA standard T HR SS 80003 ST, automatically dim or switch relevant luminaires in response to changing natural light.

## 6.4 Enclosed Building: Energy Modelling pathway

The Enclosed Building shall follow the energy modelling pathway to prove at least 10% improvement over NCC (BCA) Section J. Available overall score: (P2 – P5).

An *Enclosed Building* is awarded a performance level rating P2, P3, P4, P5 based on the *Proposed Building* exceeding annual kWh energy consumption saving thresholds of 10%, 15%, 20%, 25% respectively compared to the NCC (BCA) Section J Reference Building.

The project team is required to submit a report to TfNSW outlining any non-Section J initiative quantifying the operational energy savings associated with the initiative.

Suitable software for energy modelling shall be compliant with the *ABCB Protocol for building energy analysis software* (Ver 2006.1) and have been subjected to testing against BESTEST (ANSI/ASHRAE STD 140) *Method of Test for the evaluation of Building Energy Analysis Computer Programs* for quality assurance. Acceptable modelling software includes:

- EnergyPlus
- EDSL TAS
- DOE-2
- Carrier HAP
- IES-VE
- Trane Trace 700
- eQuest

Buildings can be complex and inappropriately applied measures may result in no improvement in energy consumption. Therefore, the building energy modeller (software operator) shall be a competent professional that has:

- Recognised qualifications in building services / mechanical / electrical engineering or other buildings-related degree.
- Certification or demonstrated training in the simulation package used and a demonstrated degree of familiarity in producing building simulation models.
- A current accreditation in one of more of the following accreditation schemes: NABERS or Greenstar – or shall be directly overseen by someone who has this accreditation.
- A background/experience in the design, construction or operation of buildings.
- Relevant experience to articulate the shortcomings of simulation and take this into account in the analysis and resulting conclusions.

## 6.5 Enclosed Building: Prescriptive Requirements pathway

A concession is extended to smaller projects to follow the Prescriptive Requirements pathway without conducting energy modelling.

The project cost component for *Enclosed Building* is measured against the \$10million CapEx threshold. The Prescriptive Requirements pathway is available only to *Enclosed Buildings* with cost < \$10million. Available overall score: P1. An *Enclosed Building* is awarded a performance level rating P1 on the basis of satisfactorily meeting the following performance requirements:

Building Envelope		
<b>EN1</b>	<b>Roof Insulation R Values</b>	
	SDG Performance Requirement: achieve 20% improvement over BCA minimum requirements	
<b>EN2</b>	<b>Door Insulation U Values for doors without transparent / translucent elements</b>	
	SDG Performance Requirement: As tabulated below ('SDG PR' column).	
	<b>Component</b>	<b>NCC JV3</b>
	Door U value Swinging	No requirement
	Door U value Non-swinging	No requirement
		<b>SDG PR</b>
		max. 3.97 W/m <sup>2</sup> .K
		max. 2.84 W/m <sup>2</sup> .K
<b>EN3</b>	<b>Glazing Thermal U and SHGC values</b>	
	SDG Performance Requirement: achieve 10% improvement over BCA minimum requirements	
Lighting		
<b>L4</b>	<b>Lighting of internal spaces</b>	
	SDG Performance Requirement: The illumination power density in a space shall be at least 10% less than the value stipulated in NCC (BCA) Table J6.2.a. Note: J6.2.b adjustment factors for a control device do not apply.	
<b>L5</b>	<b>Interior lighting controls</b>	
	SDG Performance Requirement: In addition to requirements of ASA standard T HR SS 80003 ST, in areas with daylight automatically dim or switch relevant luminaires in response to changing natural light.	

## Heating, Ventilation, Air Conditioning (HVAC)

### HV1 Air Conditioning system: Packaged air conditioning appliances minimum efficiency

In the majority of cases, the type of air conditioning system is expected to be air-to-air DX packaged and split units

SDG Performance Requirement: The selection of air cooled packaged/split air conditioning units shall comply with the SDG Compulsory Requirement 2A – Energy efficient appliances.

### HV2 Air Conditioning system: Other system types and minimum efficiency

SDG Performance Requirement: When a chilled water hydronic system is used the chiller efficiency shall meet the minimum EER as tabulated below ('SDG PR' column).

Component (Chillers $\leq$ 350kW <sub>r</sub> )	NCC JV3	SDG PR
Water Cooled Chiller (Full Load) $\leq$ 350kW <sub>r</sub>	4.2 EER	Min. 4.6 EER
Water Cooled Chiller (Integ. Part Load) $\leq$ 350kW <sub>r</sub>	5.2 EER	Min. 5.7 EER
Air Cooled/Evap Chiller (Full Load) $\leq$ 350kW <sub>r</sub>	2.5 EER	Min. 2.8 EER
Air Cooled/Evap Chiller (Integ. Part Load) $\leq$ 350kW <sub>r</sub>	3.4 EER	Min. 3.8 EER

Variable Air Volume Systems (VAV):

SDG Recommendation: VAV systems should be considered as an alternative to constant volume AHU systems.

When VAV is used:

- SDG Performance Requirement: Minimum outside air compliant with AS1668.2 shall be achieved even at the lowest 'turn down' air flow rate.
- SDG Performance Requirement: VAV Systems  $\geq$  1000L/s supply air maximum capacity shall incorporate duct static pressure reset (DSPR). This strategy controls supply air fans variable speed drives (VSD) to minimise the energy consumption of air handling units (AHUs) and AC systems during part-load conditions. It involves dynamic reset of the duct static pressure set point when demand for supply air reduces at the VAV terminals

Variable Refrigerant Flow Systems (VRF):

A VRF system can take advantage of disparate simultaneous cooling and heating requirements in the building to generate energy savings over conventional systems.

SDG Recommendation: VRF type DX systems should be considered as an alternative to conventional DX systems where appropriate.

### HV3 HVAC Building Heating source and efficiency

SDG Performance Requirement: Heating shall be by reverse cycle DX heat pump.

- Gas fired heaters are excluded due to the rarity of gas service at existing buildings and the inherent risks of gas in a transport environment
- NCC Spec. J5.2d option of electric resistance heater as the primary heating source is excluded due to relatively poor energy efficiency

SDG Performance Requirement: Heating equipment efficiency and maximum load per square meter rates shall be as listed in the table below ('SDG PR' column)

Component	NCC JV3	SDG PR
Heating Electric (Conditioned Floor $\leq$ 500m <sup>2</sup> ) Climate Zone 5/6	max. 55 W/m <sup>2</sup> / 65 W/m <sup>2</sup>	Elect. Heating is excluded
Heating Electric (Conditioned Floor $>$ 500m <sup>2</sup> ) Climate Zone 5/6	max. 45 W/m <sup>2</sup> / 55 W/m <sup>2</sup>	Elect. Heating is excluded



## Heating, Ventilation, Air Conditioning (HVAC)

### HV4 Energy Recovery Ventilation systems

SDG Performance Requirement: Energy recovery ventilation systems shall be considered for ducted systems where the opportunity arises.

Energy Recovery Ventilation (ERV) equipment can provide an energy-efficient means of dealing with the outdoor air cooling loads during hot outdoor conditions, or reduce the required heating of outdoor air in cold conditions. Systems based on other technologies performing similar energy recovery functions may also be considered.

For maximum benefit, energy recovery designs should provide as close to balanced outdoor and exhaust airflows as is practical, taking into account the need for building pressurization and any exhaust that cannot be incorporated into the system.

SDG Performance Requirement: (when ERV is used) Provision shall be made to bypass the ERV to permit outside air economiser operation, or control the ERV in conjunction with economiser operation.

### HV5 Demand Control Ventilation – CO<sub>2</sub> and CO

SDG Performance Requirement: Demand Control Ventilation (DCV) based on CO<sub>2</sub> monitoring shall be installed for ventilation systems >1000L/s capacity serving occupied spaces.

SDG Performance Requirement: The demand ventilation controls shall maintain CO<sub>2</sub> and CO concentrations in accordance with the recommendations of AS1668.2.

### HV6 Optimum Start/Stop Programming

SDG Performance Requirement: Use a HVAC controller (or BMCS where available) to optimise timing of HVAC equipment Start/Stop (OSS).

This will reduce the system operating hours while maintaining desired occupant comfort level, contribute to savings in energy use, maintenance costs and greenhouse gas (GHG) emissions.

The control strategy shall define the shortest period of time required to bring each zone to the set point temperature and when to shut off each zone heating and cooling for the indoor temperature to remain within specified limits.

## 6.6 Good practice recommendations

The following items are not part of the Prescriptive Requirements pathway. In some cases the energy savings are not easily quantified but their application should result in improvement. In some cases their inclusion improves other aspects of building performance at the expense of increased energy consumption. Improved indoor air quality, improved occupant comfort, or other important aspects of building performance are examples of other building performance factors which can be improved.

These recommendations are provided for consideration in achieving good mechanical design on all projects regardless of CapEx or pathway taken.

### 6.6.1 Envelope

The building envelope can affect energy consumption in many ways.

The form, proportion and orientation of the building, including the location, size and nature of openings is usually determined relative to functional, site and environment constraints. Given these constraints, there still may be some planning or design discretion which contributes to optimising those parts of the envelope in order to contribute to energy use optimisation.

This should take place in the Feasibility and Early Design Stages of a project where required function, site and environment are important early determinates of built space, form and fenestration.

Seasonal and diurnal characteristics of the external environment (from an agreed data set) must be well understood and related to the desirable characteristics and uses of any modified environment provided by the building. Where possible the transformation in environment from external to internal should occur by passive means.

Subsequently, Detailed Design and Documentation phases of a project must break down the individual elements of form, proportion, orientation, fenestration and the like into detailed building elements such as walls, roofs, floors, windows and doors. Considerations of the energy related characteristics of potential materials and assemblies shall be made according to what those elements are attempting to achieve in relation to the environmental transformation.

This knowledge, fed back, iteratively into the Feasibility and Early Design phases of the process, and with due consideration for imposed or contractual milestones will assist to optimise physical solutions at all scales.

These passive options relating to building envelope shall be considered in parallel with active means of environmental modification offered by building services (such as electric lighting, mechanical ventilation and air conditioning, and building automation) to achieve an overall energy efficient building design.

### **6.6.2 Cooling and Heating Load**

Cooling and heating system design loads should be calculated in accordance with engineering best practice and with reference to generally accepted handbooks and guidelines such as AIRAH DA09 *Load Estimation and psychometrics*, and ASHRAE *Handbook—Fundamentals*. On variable air volume systems, the minimum outside air requirements should be maintained in all operating modes.

For the purposes of estimating the HVAC requirements and capacity, the building should be divided into thermal zones based on area, part-load performance requirements, space layout and function, number of occupants and tenants, and the needs of the user. At least one thermal zone for the interior and at least one zone for each exposed perimeter should be allocated for air conditioning purposes. If perimeter facades have significant glass area, additional zones may be needed.

The leakage of conditioned air and infiltration of large volumes of unconditioned air into conditioned spaces should be controlled in partially open spaces such as transport buildings concourses.

The preference is for offices, staff areas as well as retail tenancies to have closing entrances. Other strategies include using air curtains and/or self-closing doors. Untreated open frontages to air conditioned spaces are forbidden (NCC Section J3.4).

### **6.6.3 Humidity Control**

AC systems should be capable of keeping space humidity below 60% at all times under design ambient conditions. Humidity control should be maintained when AC systems operate at 'part-load' or when VAV systems operate at a turn-down flow rate.

Designers should consider other potential causes for loss of humidity control such as excessive infiltration and internal sources of humidity (e.g. steam leak, water leaks), before looking to increase AC unit capacity. A singular focus on increasing AC cooling capacity to control humidity should be avoided.

#### **6.6.4 Part load staging AC Units/Compressors**

When appropriate, multiple compressor AC systems should be used to allow efficient operation and control at part loads. Compressor staging within units should be used to match capacity to the cooling demand.

#### **6.6.5 Provision of outside air for improved IAQ**

For transport buildings a minimum 10L/s per person outside air is required (AS1668.2 Table A1). Air-conditioning systems serving occupied zones should have an outdoor air connection through which outside air is introduced and may mix with return air at the appropriate rate. Automatic outside air volume control should be used. Outside air supply should be restricted during unoccupied periods except during an economizer cycle.

Demand Control Ventilation (DCV) should be used in areas that have varying and high occupancy loads during the occupied periods. The outdoor air rate is modulated in response to CO<sub>2</sub> concentration in the space as measured by CO<sub>2</sub> sensors. A controller will operate the outdoor air, return air, and relief air dampers to maintain proper ventilation.

An increased rate of introduced outside air improves Indoor Air Quality (IAQ) but at the cost of increased energy consumption. The designer should balance the statutory and project requirements for IAQ against the energy targets to determine the most appropriate outside air quantity delivered into the building.

#### **6.6.6 Ductwork**

Ductwork system pressure classification should be in accordance with AS4254.2. Rigid ductwork should be used for main branches. Ductwork should be as direct as possible, minimizing the number of elbows, abrupt contractions and expansions, and transitions. Long-radius elbows, with turning guide vanes and 45° lateral take-offs should be used wherever possible. Where variable air volume systems are used, they should have single-duct air terminal units to control the volume of air to the zone based on the space temperature sensor.

The following sizing criteria should be used for the duct system components:

- Diffusers and registers should be sized with a static pressure drop no greater than 20Pa
- Supply ductwork (main branches) should be sized with a pressure drop no greater than 1.5 Pa/m of duct run. Other Supply air ductwork should be sized with a pressure drop no greater than 0.8 Pa/m
- Return ductwork should be sized with a pressure drop no greater than 0.8 Pa/m of duct run
- Transfer ductwork should be sized with a pressure drop no greater than 0.6 Pa/m
- Supply diffusers should not be so close to return intakes so that 'short-cycling' of supply air occurs. Flow patterns should be designed so that no pockets of stagnation exist in the room

Flexible ductwork should be of the insulated type and should be:

- limited to connections between duct branch and diffusers
- limited to 6m (fully stretched length) or less
- installed without any kinks
- installed with no more than 15% compression from fully stretched length
- hanging straps, if used, need to use a saddle to avoid crimping the inside cross sectional area

Significant main runs of Supply and Return Air ductwork should not be installed outside the building envelope. Any exposed ductwork connecting to rooftop AC units should enter the building envelope in as short a distance as practicable. Exposed ductwork should be insulated in accordance with NCC Section J.

### **Duct Transitions:**

Abrupt changes in duct cross-section can cause extreme disruption to aerodynamic flow lines and turbulent energy losses. Concentric duct expansion and contraction angles should be no greater than 45° and 60° respectively. Eccentric duct expansion and contraction angles should be no greater than 30°. Fans and duct systems with open intakes or discharges should be fitted with an appropriate bell-mouth or expansion piece to reduce losses.

### **Bends:**

Bends in ductwork should be kept to a minimum. The bend type should be selected to minimise the loss coefficient,  $k_T$ .

### **Branches:**

Branch take-off types should be selected to minimise the total loss coefficient,  $k_T$ .

### **Dampers:**

Curtain fire dampers should be oversized such that the folded curtain leaves sit just outside of the air stream minimising friction losses, but not excessively so that fusible links or other triggering device do not function as intended.

Guidelines such as AIRAH DA03 *Ductwork for air conditioning* should be consulted during the detailed design of the duct system. DA03 provides loss coefficient tables for duct fittings, including bend type and branch take-off type.

### **Duct sealing and leakage:**

Ductwork with a capacity  $\geq 3000\text{L/s}$  should be sealed to AS4254.2 and leak-tested at 1.25x the design operating pressure. The leakage should not exceed 5% of the design air quantity in the tested duct section. In practice, smaller capacity systems should also benefit from leakage testing and rectification. It is recommended that this criteria is applied to systems  $\geq 1000\text{L/s}$ .

### **6.6.7 Acoustic attenuation in mechanical ventilation systems**

ESB 002 Section 2.6.3.6 *Acoustics* shall be complied with.

Acoustic requirements may necessitate attenuation of the noise associated with the supply and/or return air, but the impact on fan energy consumption should be considered and compensated for in other duct or fan components.

Acoustic concerns may be particularly critical in short, direct runs of ductwork between the fan and supply or return outlet. The first 3-6 metre length of ductwork either side of an inline fan should be lined with internal acoustic insulation. Introduced acoustically lined bends in ductwork downstream of a fan/noise source can substantially reduce in-duct noise travelling further down the system and can be an acceptable substitute for an attenuator so long as the increased static pressure from introducing the bend is accounted for.

Unpodded attenuators are preferred to podded.

Air conditioning units shall be positioned with due consideration for the noise control principles detailed in ESB 002 Section 2.6.3.6.12 *Air conditioning, Supply and Exhaust System Design*.

### **6.6.8 Building Management and Control System**

BMCS can contribute to direct energy savings for buildings. In addition, the potential for detailed building performance analysis and subsequent energy savings from integrating the analysis with a maintenance response are clear in most transport buildings scenarios.

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NOTE: For the purpose of CR2, references to Rail ASA standards T HR SS 80003 and ESB 002 apply to all transport modes.

## 7. Appendix G – Steel and Timber Sustainable Procurement Requirements

Requirements	Suggested Evidence	Scope	Further Information
<b>All Steel</b>			
S.1 All Steel: to be sourced from a steelmaker that is a current member of the Worldsteel Climate Action Programme.	Website listing screenshot and/or membership certificate.	<p><b>Structural</b></p> <ul style="list-style-type: none"> <li>Welded, Universal, Tapered Flange Beams.</li> <li>Welded, Universal Columns.</li> <li>Parallel Flange Channels.</li> <li>Universal Bearing Piles.</li> <li>Equal Angles.</li> <li>Unequal Angles.</li> <li>Rail Track.</li> <li>Pipes and Tubes.</li> <li>Structural Merchant Bars.</li> <li>Structural Plates.</li> <li>Structural Steel Rods and Cables.</li> <li>Purlins and Girts.</li> <li>Lightweight Steel Framing.</li> <li>Steel Façade Systems.</li> </ul> <p><b>Reinforcing</b></p> <ul style="list-style-type: none"> <li>Steel Reinforcement Bars.</li> <li>Steel Reinforcement Mesh and Fabric.</li> <li>Sheet-metal (cladding and roofing).</li> <li>Rainwater goods (guttering/downpipes).</li> <li>Wire.</li> <li>Prefabricated reinforcing columns and cages.</li> </ul>	<ul style="list-style-type: none"> <li>Worldsteel members represent around 85% of world steel production.</li> <li>Programme recognises steel producers that participate in the Worldsteel CO2 emissions data collection programme, which enables comparison against both average and best performance and identifies scope for improvement.</li> <li>Participation is open to all steel-producing sites or companies, Worldsteel members and non-members alike.</li> <li>There is no cost to signing up.</li> <li>Evidence in form of certificate issued to members or website listing.</li> <li>As at March 2016, 49 members worldwide (or 35% of Worldsteel members) - including members from China and India.</li> <li>Green Star credit - steelmakers and principal contractors used to seeing this requirement.</li> </ul>

Requirements	Suggested Evidence	Scope	Further Information
<p>S.2</p> <p>All Steel: to be sourced from a steelmaker with an ISO 14001 certified EMS.</p>	ISO Certificate.	<p><b>Structural</b></p> <ul style="list-style-type: none"> <li>• Welded, Universal, Tapered Flange Beams.</li> <li>• Welded, Universal Columns.</li> <li>• Parallel Flange Channels.</li> <li>• Universal Bearing Piles.</li> <li>• Equal Angles.</li> <li>• Unequal Angles.</li> <li>• Rail Track.</li> <li>• Pipes and Tubes.</li> <li>• Structural Merchant Bars.</li> <li>• Structural Plates.</li> <li>• Structural Steel Rods and Cables.</li> <li>• Purlins and Girts.</li> <li>• Lightweight Steel Framing.</li> <li>• Steel Façade Systems.</li> </ul> <p><b>Reinforcing</b></p> <ul style="list-style-type: none"> <li>• Steel Reinforcement Bars.</li> <li>• Steel Reinforcement Mesh and Fabric.</li> <li>• Sheet-metal (cladding and roofing).</li> <li>• Rainwater goods (guttering/downpipes).</li> <li>• Wire.</li> <li>• Prefabricated reinforcing columns and cages.</li> </ul>	<ul style="list-style-type: none"> <li>• Reputable ISO standard therefore can gain certificate as evidence.</li> <li>• Does not prohibit international participation in Australian/NSW market or favour any private enterprises.</li> <li>• Lifts standard of environmental practice.</li> </ul>

Requirements	Suggested Evidence	Scope	Further Information
<p>S.3</p> <p>All Steel: If the contractor is sourcing steel from a steel maker and/or fabricator that sources from a developing country, the contractor undertakes to ensure that the supplier's operations are in compliance with local regulations and do not contravene internationally accepted human rights standards (through compliance with the International Labour Organization's Fundamental Conventions and commitment to the UN Global Compact principles).</p>	<p>Letter/statement of commitment of compliance with (or engaging suppliers that comply with) the 10 UN Global Compact principles and the ILO fundamental conventions.</p>	<p><b>Structural</b></p> <ul style="list-style-type: none"> <li>• Welded, Universal, Tapered Flange Beams.</li> <li>• Welded, Universal Columns.</li> <li>• Parallel Flange Channels.</li> <li>• Universal Bearing Piles.</li> <li>• Equal Angles.</li> <li>• Unequal Angles.</li> <li>• Rail Track.</li> <li>• Pipes and Tubes.</li> <li>• Structural Merchant Bars.</li> <li>• Structural Plates.</li> <li>• Structural Steel Rods and Cables.</li> <li>• Purlins and Girts.</li> <li>• Lightweight Steel Framing.</li> <li>• Steel Façade Systems.</li> </ul> <p><b>Reinforcing</b></p> <ul style="list-style-type: none"> <li>• Steel Reinforcement Bars.</li> <li>• Steel Reinforcement Mesh and Fabric.</li> <li>• Sheet-metal (cladding and roofing).</li> <li>• Rainwater goods (guttering/downpipes).</li> <li>• Wire.</li> <li>• Prefabricated reinforcing columns and cages.</li> </ul>	<ul style="list-style-type: none"> <li>• This is a key risk area given poor manufacturing practice/human rights violation case studies increasingly coming to light.</li> <li>• There are no formal ISO/AS standards that can be called up.</li> <li>• Legislation differs markedly from country to country and sometimes local laws are weak or non-existent; or difficult to enforce.</li> <li>• The UN Global Compact provides a universal language for corporate responsibility (including 10 principles) and provides a framework to guide all businesses regardless of size, complexity or location.</li> </ul>



Requirements	Suggested Evidence	Scope	Further Information
<b>Structural Steel</b>			
<p>S.4</p> <p>Structural Steel: at least 60% of fabricated structural steelwork is supplied by a steel fabricator / steel contractor accredited to the ASI Environmental Sustainability Charter (ESC) or equivalent scheme to be approved by TfNSW.</p>	<p>Membership certificate (or interim letter advising application being processed); or ISO 14001 Certificate.</p> <p><b>Note:</b> A fabricator having an ISO certified Environmental Management System (EMS) automatically means this requirement is met i.e. ESC membership is not required.</p>	<p><b>Structural</b></p> <ul style="list-style-type: none"> <li>• Welded, Universal, Tapered Flange Beams.</li> <li>• Welded, Universal Columns.</li> <li>• Parallel Flange Channels.</li> <li>• Universal Bearing Piles.</li> <li>• Equal Angles.</li> <li>• Unequal Angles.</li> <li>• Rail Track.</li> <li>• Pipes and Tubes.</li> <li>• Structural Merchant Bars.</li> <li>• Structural Plates.</li> <li>• Structural Steel Rods and Cables.</li> <li>• Purlins and Girts.</li> <li>• Lightweight Steel Framing.</li> <li>• Steel Façade Systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence that participation in ESC program drives tangible improvements e.g. in energy, waste and subsequent cost savings (refer testimonials from ESC members and ASI case studies provided).</li> <li>• It is not a prerequisite of the ESC scheme for Charter signatories to be ASI members i.e. the ESC is an open scheme.</li> <li>• International applicants must demonstrate that they purchase their steel from a steelmaker who is compliant with ISO 14001 and who is a member of Worldsteel's Climate Action Programme, then follow the normal process.</li> <li>• Refer: <a href="http://steel.org.au/asi-committees/environmental-sustainability-charter">http://steel.org.au/asi-committees/environmental-sustainability-charter</a>.</li> </ul>
<p>S.5</p> <p>Structural Steel: major structural elements and cladding to be permanently marked during manufacture to ensure that opportunities for reuse are maximised.</p>	<p>Letter/statement; specification document; photos.</p>	<p><b>Structural</b></p> <ul style="list-style-type: none"> <li>• Welded, Universal, Tapered Flange Beams.</li> <li>• Welded, Universal Columns.</li> <li>• Parallel Flange Channels.</li> <li>• Universal Bearing Piles.</li> <li>• Equal Angles.</li> <li>• Unequal Angles.</li> <li>• Rail Track.</li> <li>• Pipes and Tubes.</li> <li>• Structural Merchant Bars.</li> <li>• Structural Plates.</li> <li>• Structural Steel Rods and Cables.</li> <li>• Purlins and Girts.</li> <li>• Lightweight Steel Framing.</li> <li>• Steel Façade Systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Greatly improves ability for reuse following deconstruction.</li> <li>• Linked to quality management in production and quality outcomes.</li> </ul>

Requirements	Suggested Evidence	Scope	Further Information
<b>Reinforcing Steel</b>			
S.6 Reinforcing Steel: at least 60% of all reinforcing steel is produced using energy-reducing processes in its manufacture (measured by average mass by steelmaker annually).	Letter of average mass produced annually by steelmaker using energy-reducing processes.	<b>Reinforcing</b> <ul style="list-style-type: none"> <li>• Steel Reinforcement Bars.</li> <li>• Steel Reinforcement Mesh and Fabric.</li> <li>• Sheet-metal (cladding and roofing).</li> <li>• Rainwater goods (guttering/downpipes).</li> <li>• Wire.</li> <li>• Prefabricated reinforcing columns and cages.</li> </ul>	<ul style="list-style-type: none"> <li>• This includes polymer injection technology (or equivalent) which EAF steel makers internationally can/ do use (e.g. NatSteel in Singapore).</li> <li>• Evidence available in form of letter from steel maker.</li> <li>• Still current % in Green Star and confirmed as applicable by OneSteel.</li> <li>• Green Star credit – steelmakers and principal contractors used to this requirement.</li> </ul>
S.7 Reinforcing Steel: for buildings or other relevant structures a portion of all reinforcing steel is assembled using off site optimal fabrication techniques.	Letter/statement of technical/product specification; supplier information; photos.	<b>Reinforcing</b> <ul style="list-style-type: none"> <li>• Steel Reinforcement Bars.</li> <li>• Steel Reinforcement Mesh and Fabric.</li> <li>• Sheet-metal (cladding and roofing).</li> <li>• Rainwater goods (guttering/downpipes).</li> <li>• Wire.</li> <li>• Prefabricated reinforcing columns and cages.</li> </ul>	<ul style="list-style-type: none"> <li>• Mainly relevant to building structures (pre-fabricated cages).</li> <li>• Reduces waste, saves time onsite and improves safety.</li> </ul>

Requirements	Suggested Evidence	Scope	Further Information
<b>Timber</b>			
<p>T.1 95% by cost of all timber products are either re-used timber, post-consumer recycled timber or Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC) certified timber.</p>	<p>Memo describing how the requirement has been met including:</p> <ul style="list-style-type: none"> <li>An as-installed timber schedule prepared by a quantity surveyor, cost manager, cost planner, cost estimator, or project engineer showing cost calculations to demonstrate that reused and certified timber jointly account for at least 95% of timber costs in the project.</li> </ul> <p>The timber schedule must provide:</p> <ol style="list-style-type: none"> <li>Descriptions of each timber use or timber product including whether the timber is reused or certified timber.</li> <li>The name of the forest certification scheme responsible for certifying the source of the timber.</li> <li>Chain of custody codes or serial numbers (where applicable).</li> <li>The quantity of timber and/or timber products measured by area (m<sup>2</sup>), lineal metres (lm), or number of items (no).</li> </ol> <p>Total material cost of timber and/or timber products.</p> <p>A short description of where the reused timber was sourced (e.g. demolition site, second hand retailer).</p>	<ul style="list-style-type: none"> <li>The requirement is for 95% of timber used in a project (measured by cost) to be compliant with the requirement.</li> <li>Certified timber and timber products must satisfy the requirements of the FSC-International and PEFC-accredited certification schemes.</li> <li>Reused timber is defined as timber that is pre-existing in a fitout or existing building/structure, or timber and /or timber products procured from a second hand source.</li> <li>Recycled timber refers to postconsumer recycled timber (not pre-consumer recycled wood and wood fibre, industrial by-products or sawmill co-products).</li> <li>Typical timber uses include, but are not limited to: <ul style="list-style-type: none"> <li>Formwork and other temporary installations of timber (e.g. hoardings).</li> <li>Structural and non-structural timber, including internal walls, floors and roof structures.</li> <li>External and internal cladding.</li> <li>Flooring, wall, and ceiling finishes.</li> <li>Internal and external joinery, windows, doors, and other specialist uses of timber, such as installed furnishings or balustrades.</li> <li>Furniture items made from timber or including timber components.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Timber shall only be considered as 'certified' if it has been sourced from forests that have been certified by forest certification schemes that, at a minimum, are deemed to satisfy the requirements of the FSC-International and PEFC-accredited certification schemes.</li> <li>Green Star Timber Requirements – Mat-7</li> <li>FSC: <a href="https://au.fsc.org/en-au">https://au.fsc.org/en-au</a></li> <li>PEFC: <a href="http://www.forestrystandard.org.au/">http://www.forestrystandard.org.au/</a></li> </ul>

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