EAGA & NAGA

Building Vulnerability Assessments

Assessment sheets

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1 Vulnerability assessment method

1.1 Introduction

The building vulnerability assessment approach developed for the City of Whitehorse by Arup provides Councils with a framework for understanding the potential climate vulnerability of their building stock and the services delivered from them, and for developing prioritised response plans.

This document provides a step-by-step guide to adapting and applying the framework, and options for how the framework can be used in a more targeted way if comprehensive assessments are beyond the available resources of Council.

1.2 Applying the framework to your municipality

This framework was developed for the City of Whitehorse in the east of Melbourne. As such, it is focused around the climate impacts and building types most relevant to that municipality. As such, when applying to other building types, or in other locations, further refinement may be required.

The framework is modular and can be expanded as follows:

- Review the list of functional requirements and building use types shown in Table 1. Confirm that they cover the full range that are relevant to your municipality, location and building. Functional requirements that are not currently covered by the framework, but which may be worth considering include communications and sanitation.
- For any additional functional requirements, identify the building components that contribute to providing them.
- For those building components, review potential direct and indirect climate change events to identify whether there is a potential impact pathway (i.e. a plausible way that the event could detrimentally effect the component and therefore the provision of any functional requirements reliant on that building component).
- Where an impact pathway is identified, develop an assessment sheet in the same style as the others contained in this guide. Consider the potential exposure and sensitivity of the component to the climate event. Seek expert opinion if you do not have the relevant expertise to complete this step.

2 Steps for undertaking an assessment

2.1 Comprehensive assessment

The following steps are the recommended way of using the framework, giving a more comprehensive picture of the building's vulnerabilities to climate events than the targeted approaches.

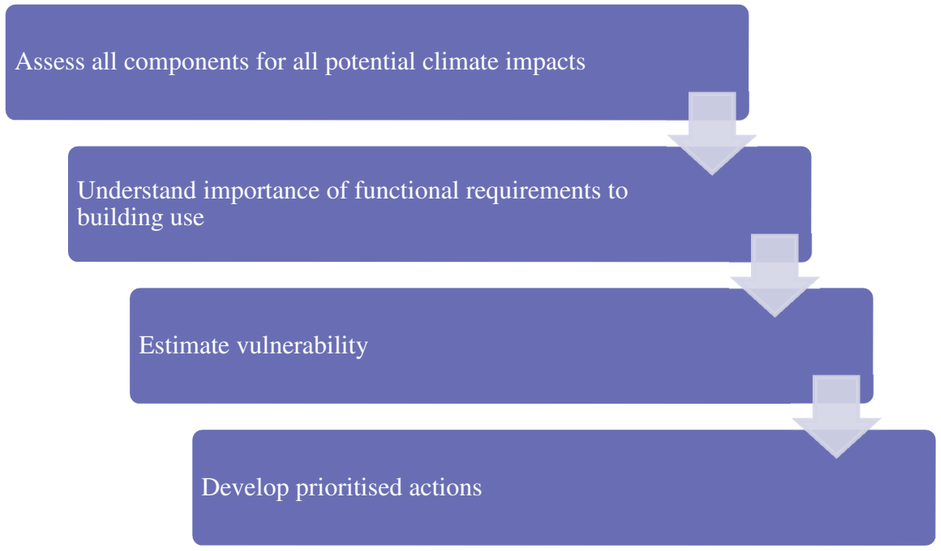

Figure 1 – Steps for a comprehensive assessment

1. Fill out the Building Component Assessment Sheets shown in Section 4.
    a. On each sheet, answer the prompting questions related to *Exposure* and *Sensitivity* as best matches the building.
    b. Use the highest exposure and sensitivity to determine the *Potential Impact Rating*.
        i. If **all** aspects of exposure or sensitivity are not applicable, then select *Not Applicable* at the bottom of the page.
        ii. If aspects of exposure or sensitivity are unknown, then select *Unknown* at the bottom of the page. The only exception is when one aspect is "unknown", but another has a "high" exposure or sensitivity. In this case, use the "high" to determine the impact rating, because it suggests that the component is already particularly exposed or sensitive to the climatic variable in question.
2. Identify the importance of *Building Functional Requirement* to Building Use.
3. Combine the *Potential Impact Rating* and the importance of *Building Functional Requirement* to Building Use to estimate the vulnerability rating.
4. Transfer the vulnerability ratings to the Prioritised Vulnerabilities Action Sheet. Arup recommends the following responses to the vulnerability scores:
    a. "Very high" vulnerabilities should be considered further for priority capital works spending.
    b. "High" and "medium" vulnerabilities be considered at times of refurbishment and replacement.
    c. "Unknowns" should be investigated where practical. Alternatively, a conservative approach could be taken and assume the worst case for the unknown aspect.

2.2 Targeted by building use

One way to prioritise assessments is to focus on those buildings and end-uses that are highly reliant on one or more functional requirements being provided at all times. For example:

- Power and water supply to emergency relief / recovery centres
- Cooling and lift access in aged care facilities
- Power supply and weather-proofing to data centres
- Weather-proofing to libraries, archives and heritage buildings

Note that this is not a comprehensive list.

Because of the high reliance of the building use on one or more functional requirements, a loss of that functional requirement is likely to have a significant impact and therefore should be addressed.

When undertaking an assessment targeted by building use, the steps listed for the comprehensive assessment can be re-ordered as shown in the

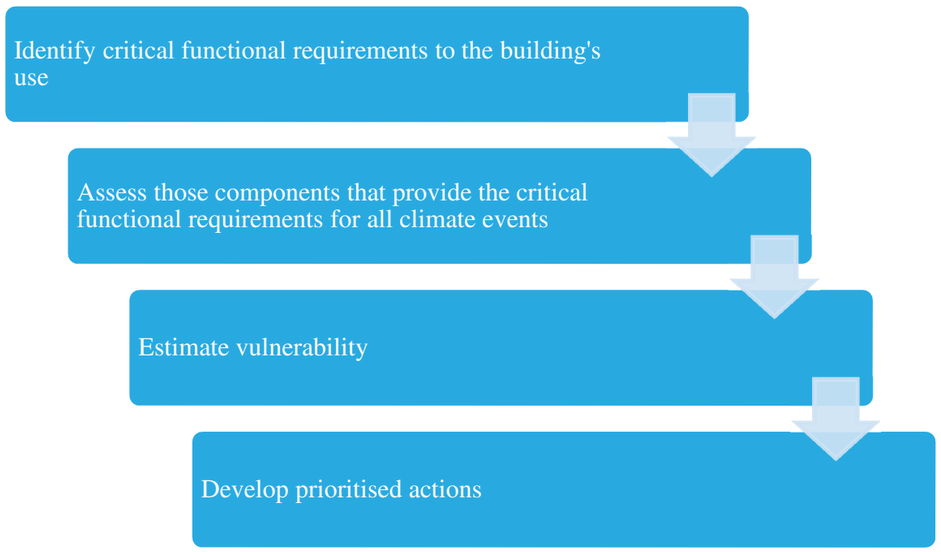

Figure 2 - Steps for an assessment targeted by building use

2.2.1 Targeted by climate event

A second way to strategically apply the framework is by focusing on climate events, such as those known to have caused issues in the past, occur most frequently, are the most severe, or are most different to historical records (and therefore may be exceeding current design standards). When used in this way, the framework is a tool to help understand potential impact pathways and identify appropriate responses.

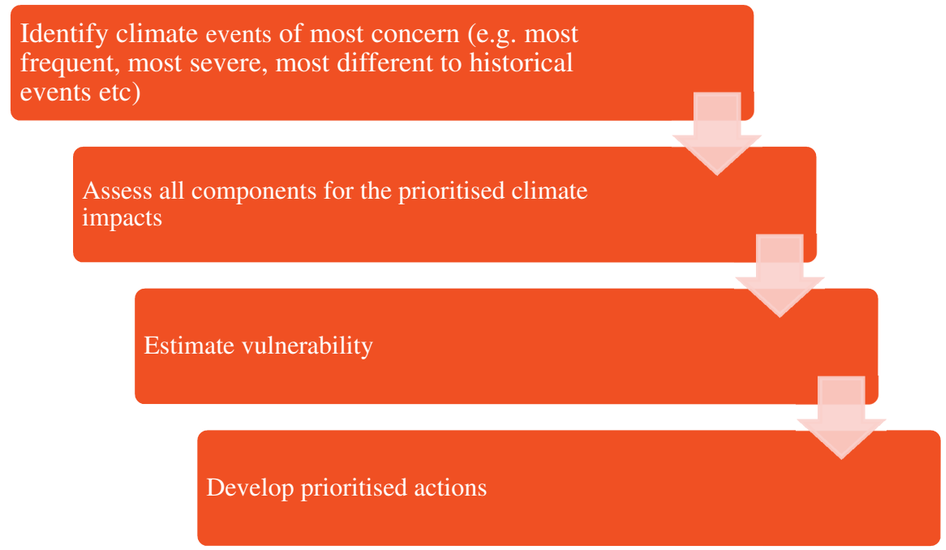

Figure 3 - Steps for an assessment targeted by climate event

3 Importance of Functional Requirement to Building Use

Council buildings are used to provide a wide range of services to the community. These uses and associated occupants have different abilities to cope with a disruption to building functions and these need to be considered when prioritising adaptation responses.

For example, buildings that are designated as emergency relief centres should be available during and immediately after critical events including those related to climate, such as storms and bushfire. A leisure centre, whilst a valuable community asset, does not have a critical role to play during a severe storm event and could therefore be given lesser importance than the emergency relief centres[1].

Table 1 provides examples of possible levels of importance of each functional requirement to the uses of the buildings assessed. The following text provides the rationale for these levels:

- Thermal comfort – Thermal comfort is most important where the people or assets inside are particularly sensitive to extreme temperatures, for example the elderly or young children. At the other end of the scale are buildings where users have lower expectations for thermal comfort and/or users have greater ability to manage their own comfort in terms of how they dress, how strenuously they exert themselves, moving to a cooler location for breaks, and their intake of fluids – for example workshops, garages and leisure centres.
- Air quality – Air quality is most important where the people inside are particularly sensitive to drops in air quality, for example infants and the elderly.
- Power – Electricity is important for the functioning of most buildings; however, the ability for a building use to accept or manage a loss of power varies. Buildings that have emergency functions should be available for use during and immediately after critical events, which could include climate-related events such as storms. Other buildings that may have high reliance on power are those with a critical business function.
- Access (lifts) – The lifts increase accessibility of buildings to those whose mobility is restricted. This means that for buildings with a significant proportion of occupants with restricted mobility (e.g. the elderly), a short-term loss of the lifts have higher importance than those without.
- Structural performance – Because all building uses require structural performance, the importance of structural performance depends more on the potential impact than it does on the building use. The impact pathways related to structure have been divided into three categories. The first is *damage*, which includes cosmetic cracking, sagging, and doors and windows jamming. This is given a medium importance for all buildings. The second is *damage with significant secondary impacts*, which includes cracking in basements (which could lead to water ingress) and damage to retaining walls. This is given a high ranking. The third category is *failure*, which includes roof sheeting tearing off or structures collapsing. This is also given a high ranking.
- Weather proofing – Weather proofing (primarily related to water ingress) is most important where the assets in the building are particularly susceptible to damage and / or costly to repair, such as libraries, galleries and spaces with lots of electronic equipment.
- Fire resistance - The importance of fire resistance for a particular building is related to whether the building is likely to be occupied during periods of fire risk, the impact of the asset being unavailable after a fire, and the cost to repair / rebuild the asset if damaged by fire. These need to be considered carefully for the specific building being assessed.

Table 1. Importance of Functional Requirement to Building Use (***Note*** *– these are not absolute or fixed – they should be reviewed and adjusted as appropriate in the context of the specific building and service delivery being assessed*)

Building use	Importance of function to building use						
	Thermal comfort	**Air quality**	**Power**	**Access (lifts)**	**Structural performance**	**Weather resistance**	**Fire resistance**
Town Hall	Medium	Medium	Medium	Medium	Importance for all buildings is based on potential impact: Damage (e.g. cracking, sagging, doors / windows jamming) – Medium Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High Failure (e.g. roof sheeting tearing off) – High	Medium	The importance of fire resistance for a particular building is related to whether the building is likely to be occupied during periods of fire risk, the impact of the asset being unavailable after a fire, and the cost to repair / rebuild the asset if damaged by fire. These need to be considered carefully for the specific building being assessed.
Administrative offices	Medium	Medium	High	Medium		Medium	
Library	Medium	Medium	Medium	Medium		High	
Gallery	Medium	Medium	Medium	Medium		High	
Theatre / performing arts centre	Medium	Medium	Medium	NA		Medium	
Age care facility	High	High	High	High		Medium	
Council Depot	Medium (office) Low (workshops)	Medium	High	NA		Medium	
Leisure Centre	Low	Medium	Medium	Medium		Medium	
Sport oval and pavilions	Medium	Medium	Medium	Low		Medium	
Childcare centre	High	High	Medium	Low		Medium	
Emergency relief / recovery centre	Medium	Medium	High	Medium		High	

[1] It should be noted that the importance could change in the future if disruptions became more frequent. For example, a loss of power at the leisure centre once a year may be acceptable, but 10 times per year may not.

4 Building description

When undertaking as assessment, it is helpful to record the relevant contextual information that fed into the assessment, as well as the specific technical details captured by the component assessment sheets.

The following table suggests relevant information that should be recorded as part of the assessment.

Building name	
Location / address	
Image	
Primary uses of building (including emergency uses if relevant)	
Typical users of building (including emergency uses if relevant)	

5 Building Component Assessment Sheets

The Building Component Assessment Sheets are grouped by Functional Requirement and presented in the following order.

Functional Requirement	Ref.	Building component	Climatic changes with the potential to damage the building component and disrupt the building function
Thermal comfort	TC 1	Cooling equipment	Hotter extreme temps / More frequent days > critical temp
	TC 2	Cooling by natural ventilation	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 3	Cooling equipment	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 4	Cooling equipment	Higher wind speeds / more frequent winds > critical speed
	TC 5	Cooling equipment	Heavier rainfall
	TC 6	Heating	Higher wind speeds / more frequent winds > critical speed
	TC 7	Heating	Heavier rainfall
	TC 8	Roofs	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 9	External walls	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 10	Windows / doors	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 11	Roofs	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 12	External walls	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures
	TC 13	Windows / doors	Hotter extreme temps / More frequent days > critical temp Warmer average day / night temperatures

Functional Requirement	Ref.	Building component	Climatic changes with the potential to damage the building component and disrupt the building function
Indoor air quality	IAQ 1	Ventilation	Higher wind speeds / more frequent winds > critical speed
Power	P 1	Electricity - grid	Extreme weather
	P 2	Electricity – building	Higher wind speeds / more frequent winds > critical speed
	P 3	Electricity – building	Hotter extreme temps / More frequent days > critical temp
	P 4	Electricity - building	Heavier rainfall
Access (lifts)	L 1	Lifts	Hotter extreme temps / More frequent days > critical temp
Structural performance	SP 1	Foundations and ground slabs	Hotter extreme temps / More frequent days > critical temp Heavier rainfall
	SP 2	Foundations	Hotter extreme temps / More frequent days > critical temp Lower average rainfall
	SP 3	Foundations	Higher wind speeds / more frequent winds > critical speed
	SP 4	Retaining / SPte walls	Heavier rainfall
	SP 5	Basement wall	Heavier rainfall
	SP 6	Roof structure	Heavier rainfall / more
	SP 7	External walkways / balconies	Heavier rainfall
	SP 8	Roof structure	Higher wind speeds / more frequent winds > critical speed
	SP 9	Roof, floor and wall structures	Higher wind speeds / more frequent winds > critical speed
	SP 10	Miscellaneous / lightweight structures	Higher wind speeds / more frequent winds > critical speed
	S1 11	Walls	Higher wind speeds / more frequent winds > critical speed Heavier rainfall
	SP 12	Windows / doors	Higher wind speeds / more frequent winds > critical speed Heavier rainfall
	SP 13	Walls	Hotter extreme temps / More frequent days > critical temp
	SP 14	Windows / Doors	Hotter extreme temps / More frequent days > critical temp
Weather proofing	WP 1	External walls, windows or doors	Heavier rainfall
	WP 2	Roofs	Heavier rainfall
	WP 3	External walls	Heavier rainfall
	WP 4	Windows / doors	Heavier rainfall
Fire resistance	FR 1	Whole building	Increased risk of bushfires

5.1 Thermal Comfort

Building name:			
Date:		Building no. / ref:	
Cooling equipment		**Thermal comfort**	**TC1**
Climate disturbance	Extreme temperature (i.e. Hotter maximum temperatures)		
Impact pathway	Overheating of internal spaces		
	Higher maximum outside air temperatures are likely to increase the heat load on the cooling system. This could occur due to heat transfer through the building envelope (assessed separately) and due to the outside air that may be supplied by the air conditioning system. A second issue is that mechanical cooling equipment may reduce in cooling capacity in hotter weather up to a maximum operating temperature. On extreme days, this could lead to insufficient cooling being available, or in a worst case, being not available at all.		

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Where are the outside air intakes located?**	No outside air brought in through the air conditioning system.	Outside air intakes on the shaded side of the building Outside air intakes near a cool microclimate (e.g. Lush green landscaping)		Outside air intakes located near a hot microclimate (sunny side of the building, dark hard surfaces)
E2	**Where is heat rejection equipment located?**	Naturally ventilated, therefore no heat rejection equipment	Located in a cool, shaded spot		Heat rejection equipment located in direct sun

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Is there a high proportion of outside air in the supply?**	Recirculation only - No outside air brought in through the air conditioning system.	Minimum outside air rate, driven by heat loads rather than occupancy (typical of spaces with few people e.g. open offices). Naturally ventilated.		HVAC system has a high proportion of outside air (typical in densely occupied spaces, e.g. theatres, meeting rooms)
S2	**What sort of cooling system does the space have?**	No cooling equipment.		Air-cooled with a high maximum operating temperature (e.g. >46 deg C) Water-cooled system	Air-cooled with a low maximum operating temperature (e.g. <46 deg C), or Evaporative, or Unknown

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Cooling by natural ventilation	**Thermal comfort**	**TC2**
Climate disturbance	High temperature and higher night time temperatures	
Impact pathway	Overheating of internal spaces	
	During periods of extreme high temperature, naturally ventilated spaces tend to rely on thermal mass (e.g. exposed concrete or brick) and flushing with cool night air to remain cool during the day. If night time temperatures are high, it becomes very difficult to cool the thermal mass. If this happens for successive days, the internal temperature will rise.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Where are the natural ventilation openings located?**	Building uses air conditioning equipment	Outside air intakes on the shaded side of the building Outside air intakes near a cool microclimate (e.g. Lush green landscaping)		Outside air intakes located near a hot microclimate (sunny side of the building, dark hard surfaces)
E2	**Does the air around the building get hot and stay hot at night? (i.e. Is there a strong local heat island effect?)**	Building uses air conditioning equipment		Building is surrounded by natural landscaping and/or water	Building is surrounded by hard surfaces (e.g. Asphalt, concrete, brick or stone)

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Do the windows or other natural ventilation openings have to be open during the day?**	Building uses air conditioning equipment	Openings can be closed during the day to reduce the amount of heat getting into the occupied space		Openings have to be open during the day to help maintain indoor air quality
S2	**How much exposed thermal mass is there in the occupied space?**	Building uses air conditioning equipment	Large amounts of internally exposed thermal mass (i.e. exposed brick or concrete in the occupied space)		Little internally exposed thermal mass (i.e. Not much exposed brick or concrete in the occupied space)

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Cooling equipment	**Thermal comfort**	**TC3**
Climate disturbance	More frequent high temperatures	
Impact pathway	Increased wear and tear, higher running costs, higher carbon emissions	
	More frequent high temperature is likely to mean that mechanical cooling equipment is running at capacity or near capacity for more hours per year. This may increase the wear and tear on the equipment, and is likely to also lead to higher running costs and carbon emissions.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Where are the outside air intakes located?**	No outside air brought in through the air conditioning system.	Outside air intakes on the shaded side of the building or near near a cool micro-climate (e.g. Lush green landscaping)		Outside air intakes located near a hot microclimate (sunny side of the building, dark hard surfaces)
E2	**Where is heat rejection equipment located?**	Naturally ventilated	Located in a cool, shaded spot		Heat rejection equipment located in direct sun

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Will the cooling system "feel" the higher average temperatures? - Ventilation**	No outside air brought in through the air conditioning system.	Minimum outside air rate, driven by heat loads rather than occupancy		HVAC system has a high proportion of outside air (typical in densely occupied spaces)
S2	**Will the cooling system "feel" the higher average temperatures? - Building envelope**	Internal space (i.e. No external walls or roof).	Very well insulated building envelope		Large areas of single glazing Poorly insulated roof and walls
S3	**Will the cooling system "feel" the higher average temperatures? - infiltration**	Internal space (i.e. No external walls or roof).	Well sealed building, demonstrated via building air tightness testing	Air lock at front door. No visible gaps.	No airlock, door often open. Visible gaps around doors and/or windows. Visible gaps in walls and/or roofs.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Cooling equipment	**Thermal comfort**	**TC4**
Climate disturbance	Extreme wind	
Impact pathway	Physical damage of external plant or equipment	
	Extreme wind could damage external plant or equipment either directly, for example by blowing a split system condenser unit off the roof, or indirectly, for example by blowing a branch from a tree onto the equipment. In either case, the damage may be sufficient to disable the air-conditioning system. Extreme winds tend not to co-incide wtih extreme, temperature, so the main issue will be the potential cost and disruption associated with rectifying any damage.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Where is the cooling or heat rejection equipment located?**	Naturally ventilated, therefore no equipment	Indoors (e.g. Plant room) or a well sheltered location	Through the wall	Roof mounted in an open location
E2	**Are there trees near-by that could cause damage?**		Built up area, or cleared (i.e. No trees)	Some trees	Large trees, known to drop branches or have shallow roots, or overhanging branches

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Is the equipment easy to move, or in the likely fall line of branches?**	No air conditioning system.	Very large, commercial sized equipment Well-fastened to a rigid structure	Fastened, but poorly, or with obvious damage or corrosion to the fastenings	Domestic scale condenser unit for a split system or domestic scale evaporative cooler, not fastened to a rigid structure Located very near overhanging braches.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Cooling equipment	**Thermal comfort**	**TC5**
Climate disturbance	Extreme rain	
Impact pathway	Physical damage of external plant or equipment	
	Extreme rain could result in localised flooding or flash flooding, which could in turn damage air conditioning plant or equipment. Extreme rain tends not to co-incide with extreme, temperature, so the main issue will be the potential cost and disruption associated with rectifying any damage.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is the building in a flood prone area?**		No known flooding issues	Flood prone investigation area	Flood basin

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Where is the cooling or heat rejection equipment located?**	Naturally ventilated, therefore no equipment	Roof mounted or high on a wall		Outside in a low-lying area

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Low	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Heating equipment	**Thermal comfort**	**TC6**

Climate disturbance	Extreme wind
Impact pathway	Physical damage of external plant or equipment
	Extreme wind could damage external plant or equipment either directly, for example by blowing equipment off the roof, or indirectly, for example by blowing a branch from a tree onto the equipment. In either case, the damage may be sufficient to disable the heating system. Extreme winds could co-incide with cold temperatures, so there could be a demand for heating at the time of the disruption.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Where is the heating equipment located?**		Indoors (e.g. Plant room) or a well sheltered location	Through the wall	Roof mounted in an open location
E2	**Are there things near-by that could cause damage?**		Built up area, or cleared (i.e. No trees)	Some trees	Large trees, known to drop branches or have shallow roots, or overhanging branches

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Is the equipment easy to move, or in the likely fall line of branches?**	No air conditioning system.	Very large, commercial sized equipment Well-fastened to a rigid structure	Fastened, but poorly, or with obvious damage or corrosion to the fastenings	Domestic scale condenser unit for a split system or domestic scale evaporative cooler, not fastened to a rigid structure Located very near overhanging braches.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Heating equipment	**Thermal comfort**	**TC7**
Climate disturbance	Extreme rain	
Impact pathway	Physical damage of external plant or equipment	
	Extreme rain could result in localised flooding or flash flooding, which could in turn damage heating plant or equipment. Extreme rain could co-incide with cold weather, so there may be a need for heating at the time of the disruption.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	Is the building in a flood prone area?		No known flooding issues	Flood prone investigation area	Flood basin

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Where is the heat equipment located?**		Roof mounted or high on a wall		Outside in a low-lying area

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Low	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – roof	**Thermal comfort**	**TC8**

Climate disturbance	Extreme temperature + Warmer temperatures
Impact pathway	Direct heat + heat transfer
	Heat transfer occurs through the roof system from hot to cool spaces. Hot weather on the outside of the building can enter the building via conduction through materials; materials that are highly conductive, such as metals, will transfer heat to the interior of buildings more quickly than timber. A thermal barrier, such as insulation, mitigates such heat transfer.. This can affect the ability of building services (mechanical equipment) to cool interior spaces (assessed separately). Occupant comfort & health can be a concern during hit periods.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is the roof exposed to outside air & heat**	No			Yes

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Is the roof and/or ceiling insulated?**	New or old building with compliant insulation to current code (NCC 2012 - 3.2 R-value)	Roof or ceiling system with some insulation; R-value between 1.5 and 3.0	Roof system with foil and/or bubble wrap with an R-value between 0.5 and 1.5.	No insulation present within roof or ceiling system
S2	**Is the roof space ventilated to the exterior?**	No roof space.	Roof space is not ventilated and roof is fully insulated. Roof space ventilated to exterior with ceiling insulated		Roof space ventilated to exterior with no ceiling insulated

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating

Not applicable (N/A) Unknown (U)

Sensitivity	Exposure 1	2	3
A	Low	Low	Low
B	Medium	Medium	Medium
C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – exterior walls	**Thermal comfort**	**TC9**

Climate disturbance	Extreme temperature + Warmer temperatures
Impact pathway	Direct heat + heat transfer
	Heat transfer occurs through the walls from hot to cool spaces. Hot weather on the outside of the building can enter the building via conduction through materials; materials that are highly conductive, such as metals, will transfer heat to the interior of buildings more quickly than timber. A thermal barrier, such as insulation, mitigates such heat transfer.. This can affect the ability of building services (mechanical equipment) to cool interior spaces (assessed separately). Occupant comfort & health can be a concern during hit periods.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the orientation of the walls?**		Walls face South & protected from warmer air.	Walls face East; cooler during afternoon.	Walls face North and West; air generally hot adjacent to walls.
E2	**Is there adjacent vegetation to the walls?**		Dense tall trees & vegetation maintain cooler temperatures.	Some trees & thick gardens adjacent to walls.	No trees or thick garden/ vegetation are present near walls.
E3	**What is the microclimate around the walls during hot days?**		Walls adjacent to cool bodies of water& thick vegetation; generally air is cooler.	Air generally only heats up in afternoon after 2pm. Mostly grass or light coloured pavement adjacent.	Air adjacent to walls is hot throughout the day. Hard and dark coloured surfaces adjacent to walls.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Is there insulation within the walls?**		New or old building with compliant insulation to current code (NCC 2012 - 2.8 R-value)	Walls are heavy masonry with no insulation. Some insulation with an R-value of 1.0	No insulation
S2	**What is the wall construction?**	New or old building with wall insulation; refer to above.	Timber siding & wall framing with interior finish (e.g.plasterboard) Concrete, block, or brick with internal finish	Cladding with interior finish (e.g. plasterboard). Concrete, block or brick with no internal finish	Metal sheet only; no finish on interior.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating

Not applicable (N/A) Unknown (U)

Sensitivity	Exposure 1	Exposure 2	Exposure 3
A	Low	Low	Low
B	Medium	Medium	Medium
C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – windows / doors	**Thermal comfort**	**TC10**

Climate disturbance	Extreme temperature + Warmer temperatures
Impact pathway	Direct heat + heat transfer
	Heat transfer occurs through windows and doors from hot to cool spaces. Hot weather on the outside of the building can enter the building via conduction through materials; materials that are highly conductive, such as aluminium frames, will transfer heat to the interior of buildings more quickly than timber. A thermal barrier, such as insulation, mitigates such heat transfer. This can affect the ability of the building services (mechanical equipment) to cool interior spaces (assessed separately). Occupants and services adjacent to the facade will experience increased temperatures of the internal ambient air. Proper seals mitigate infiltration occurrences.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the orientation of the building?**		Windows/doors face South & protected from warmer air.	Windows/doors face East; cooler during afternoon.	Windows/doors face North and West; air generally hot adjacent to walls.
E2	**Is there adjacent vegetation to the building?**		Dense, tall trees & vegetation maintain cooler temperatures.	Some trees & thick gardens adjacent to windows/doors.	No trees or thick garden/ vegetation are present near windows/doors.
E3	**What is the microclimate around the building?**		Windows/doors adjacent to cool bodies of water& thick vegetation; generally air is cooler.	Air around windows/doors generally only heats up in afternoon after 2pm. Mostly grass, gardens or light coloured pavement adjacent.	Air adjacent to walls is hot throughout the day. Hard and dark coloured surfaces adjacent to windows/doors.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the type of windows?**		New insulated glass units or double glazing with thermally broken metal or timber frames. Old insulated glass units (> 10 years old) with timber or metal frames.	Old insulated glass units or double glazing with condensation between glass with metal frames. Single glazed with timber frames.	Single pane of glass with metal frames.
S2	**What is the type of doors?**		New insulated doors Timber solid doors	Metal doors with double glazing Metal solid doors Single glazed doors with air lock	Single glazed doors with no airlock

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – roof	**Thermal comfort**	**TC11**

Climate disturbance	Extreme temperature + Warmer temperatures
Impact pathway	Infiltration of hot air to the interior
	Air infiltration occurs between hot (high pressure) to cool (low pressure) spaces. Hot weather on the outside of the building can enter the building through holes and/or gaps in the facade. This can affect the ability of the building services (mechanical equipment) to cool interior spaces. Occupants and services adjacent to the facade will experience increased temperatures of the internal ambient air. Proper seals mitigate infiltration occurrences. The term penetration includes pipes, vents, mechanical equipment, windows and doors. Seals references the material between the roof and the penetration element.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the orientation of the roof?**		Roof oriented away from prevailing winds or is within a protected internal courtyard	Roof is oriented away from hot summer prevailing winds	Faces North towards prevailing hot summer winds
E2	**What is the height of the building in relation to its surroundings?**		Building is shorter than the height of adjacent buildings and dense vegetation.	Less than 1/3 of the building is exposed above the height of adjacent buildings and dense vegetation.	Greater than 1/3 of the building is exposed above the height of adjacent buildings and dense vegetation.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Are there gaps in roof system / penetrations?**	No gaps.	Some penetrations through roof with seals.	Loose laps between materials creating fine gaps; daylight visible from interior	Roof has large vent gaps & holes; daylight visible from interior
S2	**What is the roof composition?**		Concrete slab with water proof membrane Tile, slate or metal sheet with underlay membrane	Metal sheet, tile or slate.	
S3	**What is the roof slope**		Roof is flat or has a slope less than 5^0	Roof pitch is greater than 5^o	

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – exterior walls	**Thermal comfort**	**TC12**

Climate disturbance	Extreme temperature + Warmer temperatures
Impact pathway	Infiltration of hot air to the interior
	Air infiltration occurs between hot (high pressure) to cool (low pressure) spaces. Hot weather on the outside of the building can enter the building through holes and/or gaps in the facade. This can affect the ability of the building services (mechanical equipment) to cool interior spaces. Occupants and services adjacent to the facade will experience increased temperatures of the internal ambient air. Proper seals mitigate infiltration occurrences.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the orientation of the wall?**		Wall faces away from prevailing winds or is within a protected internal courtyard	Wall faces East or West away from prevailing winds.	Faces North towards prevailing hot summer winds
E2	**Is there surrounding elements that shield the building facade?**		Dense trees or adjacent buildings exist in close proximity, less than 5m away from the facade and maintain cooler air temperatures adjacent to walls.	Some trees or adjacent buildings exist in relative proximity less than 2 x the building height from the facade.	No trees or adjacent buildings within proximity of greater than 2 x the height of the facade. .

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the condition of the seal between the wall & penetration?**	No penetrations	New continuous sealant or gasket around penetration Old continuous sealant or gaskets around penetrations in good condition	Sealant or gaskets have gaps, are cracked and/or loose.	No seal around penetrations; daylight can be seen from interior of building around penetrations.
S2	**What is the type of seals?**	Gasket or sealant; continuous	Gasket or sealant with some cracks or gaps	Cloth or paper seal	No seal around penetrations.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – windows / doors	**Thermal comfort**	**TC13**

Climate disturbance	Extreme temperature + Warmer temperatures
Impact pathway	Infiltration of hot air to the interior
	Air infiltration occurs between hot (high pressures) to cool (low pressure) spaces. Hot weather on the outside of the building can enter the building through holes and/or gaps around or in windows and doors. This can affect the ability of the building services (mechanical equipment) to cool interior spaces. Occupants and services adjacent to the facade will experience increased temperatures of the internal ambient air. Proper seals mitigate infiltration occurrences. Isolated to window and door elements only – seals between these elements and external walls is assessed in the infiltration of walls sheet.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the orientation of the windows / doors?**		Windows/doors are oriented away from prevailing winds or is within a protected internal courtyard		Windows/doors North towards prevailing hot summer winds
E2	**Is there surrounding elements that shield the building facade?**		Dense trees or adjacent buildings exist in close proximity, less than 5m away from the facade and maintain cooler air temperatures adjacent to walls.	Some trees or adjacent buildings exist in relative proximity less than 2 x the building height from the facade.	No trees or adjacent buildings within proximity of greater than 2 x the height of the facade. .

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Do windows and doors have seals?**		Gasket seals in good condition to perimeter of operable windows/doors; no daylight visible or draughts felt.	Gasket seals to perimeter of windows/doors; daylight visible and/or draughts felt.	Brush gasket to portion of perimeter& draughts felt. No seals.
S2	**What is the window or door type?**	Fixed window (in operable)	Doors open outwards. Windows are awning or casement with locking mechanism.	Doors open inwards. Doors slide open with airlock. Windows are sliders or single/double hung windows.	Doors slide open without airlock. Louvre windows; fixed or operable Garage door

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

5.2 Indoor Air Quality

Building name:			
Date:		Building no. / ref:	
Ventilation		**Indoor air quality**	**IAQ1**
Climate disturbance	High wind speeds		
Impact pathway	Poor indoor air quality		
	One of Melbourne's sources of air pollution is dust, either from local sources (e.g. Construction sites) or macro sources such as the Wimmera and Mallee regions of Victoria. More extreme winds could result in more airborne dust, which could in turn lead to lower indoor air quality.		

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Where are the outside air intakes or ventilation openings located?**	No outside air brought in through the air conditioning system, or natural ventilation openings.	Near sealed or landscaped area.	Near dirt, sand or gravel area	

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What sort of ventilation system does the space have?**	No ventilation direct from outside.	Air conditioning system with high efficiency filters.	Filtered outside air via either air-conditioning system or filtered natural ventilation.	Natural ventilation (unfiltered – e.g. open window)
S2	**Can outside air leak into the space?**	Internal space (i.e. No external walls or roof). Well sealed building, demonstrated via building air tightness testing	Air lock at front door. No visible gaps.	No airlock, door often open. Visible gaps around doors and/or windows. Visible gaps in walls and/or roofs.	

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating

Not applicable (N/A)

Unknown (U)

Sensitivity	Exposure 1	Exposure 2	Exposure 3
A	Low	Medium	Medium
B	Medium	Medium	High
C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

5.3 Power

Building name:			
Date:		Building no. / ref:	
Electricity – grid		**Power**	**P1**
Climate disturbance	Electricity grid outage due to extreme weather (wind, rain, temperature etc)		
Impact pathway	Loss of electricity to the building		
	An increasing frequency of extreme events could increase the risk of power outages. While electricity utilities have a responsibility to meet their reliability targets, Councils' have no control over how successfully the utilities do this. As such, Councils should determine which buildings and council services are vulnerable to power outage.		

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	How many points of electrical connection are there to the site (from different zone sub-stations)?	No electricity required from the grid	More than one		One

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	Does the building have back-up power (e.g. UPS and/or generator)?	No electricity required from the grid	Back-up power available on site	Connections in the main switchboard to enable connection of temporary back-up power	No back-up power

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Electricity – building	**Power**	**P2**
Climate disturbance	Extreme wind	
Impact pathway	Damage to incoming power supply	
	Extreme wind could damage external equipment or cabling for example by blowing a branch from a tree onto it. This could result in a loss of power to the building.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Are there things near-by that could cause damage?**		Built up area, or cleared (i.e. No trees)	Some trees	Large trees, known to drop branches or have shallow roots

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Where is the main supply to the building located?**	Underground		Exposed, at high level	Exposed, near overhanging branches

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Electricity – building	**Power**	**P3**

Climate disturbance	Extreme high temperature
Impact pathway	Loss of electricity to the building, damage to building, fire risk
	Electrical systems are designed to operate in specified ambient temperatures. In the current version of AS3000, the Australian wiring rules, the nominated temperature is 40 deg C. At higher temperatures, the electrical resistance of metals increases, meaning that cables become less efficient at carrying electricity (i.e. more energy is dissipated as heat). In extreme situations, the combination of high ambient temperature and increased heat losses could damage the cable insulation. Electrical cabling and infrastructure that is in naturally ventilated locations could be vulnerable on days of extremely high temperature.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	Where are the main electrical switchboard and cables located?	Inside the building	South or east side of the building, in an area with lots of thermal mass (e.g. Concrete or brick)	North / west side of the building, in direct sun, but inside a covered area with good thermal mass (i.e. Concrete or brick)	North or north west side of the building, in direct sun

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	What is the age / condition of the main switchboard and cabling?	No electricity required from the grid	New switchboard and cabling, in excellent condition	Medium condition	Old switchboard and/or cabling in poor condition

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Electricity – building	**Power**	**P4**
Climate disturbance	Extreme rain	
Impact pathway	Physical damage of external plant or equipment	
	Extreme rain could result in localised flooding or flash flooding, which could in turn damage electrical equipment.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	Is the building in a flood prone area?		No known flooding issues	Flood prone investigation area	Flood basin

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Where is the sub-station main switchboard located?**		Above ground level	Ground level	Basement

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Low	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

5.4 Lifts

Building name:			
Date:		Building no. / ref:	
Access (lifts)		**Lifts**	**L1**
Climate disturbance	Extreme temperature		
Impact pathway	Overheating of lift motors, leading to failure		
	Electric motors are design to work up to a recommended ambient temperature, which is typically 40ºC. At higher temperatures, the electrical resistance of metals increases, meaning that cables become less efficient at carrying electricity (i.e. more energy is dissipated as heat). In extreme situations, the combination of high ambient temperature and increased heat losses could damage the cable insulation. Electrical cabling and infrastructure that is in naturally ventilated locations could be vulnerable on days of extremely high temperature.		

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	Where is the lift motor room located?	No lift	On the south side of the building, in a well insulated enclosure	In direct sun, in a well insulated enclosure, or on the south side of the building in a poorly insulated enclosure	In direct sun, in a poorly insulated enclosure

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	How is the lift motor room cooled?	No lift	Air conditioned		Natural ventilation

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

5.5 Structural Performance

Building name:		
Date:	Building no. / ref:	
Foundations and ground slabs	**Structural performance**	**SP1**
Climate disturbance	Extreme Rainfall	
Impact pathway	Differential movement of structure	
	Cycles of dry periods followed and excessive rainfall can contribute to near surface shrink/swell of soils. The shrinking and swelling of soils can cause settlement or heave (upward movement) of foundations and ground slabs. Settlement and heave of ground slabs may cause cracking of slab, a non-structural but possible serviceability issue. Settlement and heave of foundations may cause cracking of walls and floors above the ground (serviceability issue).	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Soil Profile (Assumes basaltic clay over rock in climatic zone 2 as defined by AS2870)**			Clay at depth up to 1.5m OR gravelly or coarse sandy clay	Clay depth greater than 1.5m.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What type of foundation?**		Deep foundations (concrete piles) Raft foundation with deep perimeter beams and surrounding areas paved	Shallow footings. Brick piers.	Foundations not tied together through grade beams or thickened slab elements.
S2	**Superstructure typology**		Steel or concrete frame	Masonry walls with movement joints.	Masonry walls without movement joints. Timber framed structure.
S3	**Construction typology of ground slab?**		Concrete ground slab with control joints.		Concrete ground slab without control joint. Some evidence of cracking / differential settlement apparent.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- ***Damage (e.g. cracking, sagging, doors / windows jamming) – Medium***
- *Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High*
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Foundations	**Structural performance**	**SP2**

Climate disturbance	Decreased Average Rainfall & Extreme/Increased Temperatures
Impact pathway	Settlement of Foundation
	Drying of soil is likely due to decreased average rainfall and extreme/increased temperatures. Sustained dryness may lead to lowering of the ground water level which can lead to settlement of foundations due to changing soil conditions.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Soil Profile (Assumes basaltic clay over rock in climatic zone 2 as defined by AS2870)**			Clay at depth up to 1.5m OR gravelly or coarse sandy clay	Clay depth greater than 1.5m.
E2	**Location of ground water, Presence of historical streams/rivers**		Ground water table well below foundation level	Ground water table near foundation level or presence of historical rivers	

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What type of foundation?**		Deep foundations (concrete piles)	Shallow footings, Concrete or brick	
S2	**Superstructure typology**		Steel or concrete frame	Masonry walls with movement joints. Timber frame construction.	Masonry walls without movement joints.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Low	Medium	High
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- ***Damage (e.g. cracking, sagging, doors / windows jamming) – Medium***
- *Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High*
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Foundations	**Structural performance**	**SP3**

Climate disturbance	Extreme Wind
Impact pathway	Differential settlement of structure
	During extreme wind events, high forces will be transmitted to the foundations through the lateral system. The higher forces must be resisted by the soil. It is possible that the soil will compress more than expected under the higher forces, causing settlement of the structure.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Exposure to wind**		Terrain with numerous large, high (10-30m) obstructions (city centres, well-developed industrial complexes).	Terrain with numerous closely spaced obstructions, low (3-5m height obstructions (areas of suburban housing).	Exposed open terrain with no or few, well-scattered obstructions. Open water surfaces.
E2	**Soil Profile (Assumes basaltic clay over rock in climatic zone 2 as defined by AS2870)**			Clay at depth up to 1.5m OR gravelly or coarse sandy clay	Clay depth greater than 1.5m.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Foundation system**		Deep foundations (concrete piles)	Shallow footings	
S2	**Lateral system**		Well distributed lateral system	Relatively few lateral elements. (Shear walls, braced frames, moment frames).	

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- ***Damage (e.g. cracking, sagging, doors / windows jamming) – Medium***
- *Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High*
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Retaining/site walls	**Structural performance**	**SP4**

Climate disturbance	Extreme Rainfall
Impact pathway	Overturning or sliding of retaining walls. Loss of soil from behind retaining walls
	Retaining wall failures (overturning, sliding) generally occur in saturated soils. More extreme rainfall will contribute to increase incidences of saturated soils. Alternately, retaining walls which allow soil to pass through (such as timber lagging) will see increased amounts of soil washing out from behind the wall.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Soil type**		Clayey soil		Sandy soil
E2	**In a flood zone?**		No known flood issues	In flood investigation area	In flood basin

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Retaining wall construction**		Concrete retaining wall with adequate drainage behind wall Retaining wall is in good condition. No evidence of continuous presence of water (leeching or staining)	Concrete retaining wall without adequate drainage behind wall. Concrete retaining wall shows some movement/tilting. Timber posts with lagging where lagging is tightly spaced and little gap between boards.	Timber posts with lagging where lagging has gaps between boards.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating

Not applicable (N/A) | Unknown (U)

Sensitivity	Exposure 1	Exposure 2	Exposure 3
A	Low	Medium	Medium
B	Medium	Medium	High
C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Basement wall	**Structural performance**	**SP5**

Climate disturbance	Extreme Rainfall
Impact pathway	Leaking of water into internal basement spaces, Corrosion and cracking of basement wall
	During extreme rainfall events, basement walls will be exposed to rainwater travelling through surrounding soils. If water is not adequately drained away from the wall, it may leak through basement walls into the building. The ingress of water may cause damage to the contents of the basement as well as lead to corrosion and cracking in the wall itself.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Soil type**		Permeable soils (sandy / gravelly soils) adjacent to wall and extending below foundation level.	Clay soils adjacent to wall and extending below foundation wall.	Permeable soils adjacent to wall underlain by clay soils within the basement height.
E2	**In a flood zone?**			No	Yes

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Drainage systems**	No Basement	Properly functioning drainage system installed around perimeter of basement. Basement walls appear to be in good condition, no staining or noticeable damp patches.		No drainage system or improperly functioning drainage system. Significant cracking or staining of basement wall. Signs of previous leaks in the form of damaged goods or water stains on the wall or floor.
S2	**Basement material**	No Basement	Concrete basement walls.	Masonry basement walls.	

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Roof structure	**Structural performance**	**SP6**

Climate disturbance	Extreme Rainfall
Impact pathway	Leaking of roof. Sagging or failure of roof structure.
	Rain may pond on rooftops if adequate drainage is not provided or drainage system is blocked. This ponding on the roof can contribute to leaks, and if excessive, can lead to overloading of the structure resulting in sagging or failure of the roof.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Does the roof receive direct rain?**		No		Yes
E2	**Vegetation/Plant debris can collect on roof?**		No		Yes

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Drainage System of Roof**	All roof slopes are to edge of roof (i.e. no water can collect in valleys)	Adequate drainage system which has protection from debris build-up. No reports of ponding during rain events.	Drainage system often blocked by debris. Presence of weep holes or secondary drainage outlet in parapets. Drainage system consists of some internal box gutters	No drainage system or system often blocked by debris. No weep holes or secondary drainage outlet in parapets. Reports of significant ponding of water during rain events. Drainage system predominantly consist of box gutters

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	High
	C	High	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
External walkways/balconies	**Structural performance**	**SP7**

Climate disturbance	Extreme Rainfall
Impact pathway	Sagging or failure of external suspended floor areas
	Rain may pond on balconies or suspended exterior walkways if adequate drainage is not provided or drainage system is blocked. This ponding can contribute to leaks, and if excessive, can lead to overloading of the structure resulting in sagging or failure.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Protected from direct rain?**		Well covered with little rainfall onto walkway or balcony.		No structure above to prevent direct rainfall

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Drainage of External Walkways or balconies**		External walkways or balconies have fall away from building. Balustrades to the walkway/balcony are open and allow free flow of water.	External walkways or balconies have fall away from building. Balustrades to the walkway/balcony are solid with limited points of drainage.	External walkways or balconies are flat or have fall towards building. Balustrades are solid with no points of drainage or points of drainage well above floor level.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	High
	C	High	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Roof structure	**Structural performance**	**SP8**

Climate disturbance	Extreme Wind
Impact pathway	Damage / destruction of roofing material in wind event.
	During extreme wind events, roof material may lift off of the roof or be damaged by flying debris.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Exposure to wind**		Terrain with numerous large, high (10-30m) obstructions (city centres, well-developed industrial complexes).	Terrain with numerous closely spaced obstructions, low (3-5m height obstructions (areas of suburban housing).	Exposed open terrain with no or few, well-scattered obstructions. Open water surfaces.
E2	**Height of Building**		Roof above adjacent structures or trees		Roof at or below adjacent structures or trees

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Roofing System**		Concrete slab. Metal sheet with parapet.	Metal sheet without parapet. Tile or slate roofing	Glass or plastic skylight. Loose metal sheet, tiles or slate.
S2	**Anchorage of Roofing System**		Known fixings at regular spacing (intervals)		Unknown fixings.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- *Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High*
- ***Failure (e.g. roof sheeting tearing off) – High***

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Roof, floor and wall structures	**Structural performance**	**SP9**
Climate disturbance	Extreme Wind	
Impact pathway	Deformation of structure in extreme wind event	
	Excessive deformation in extreme wind event resulting in cracking of walls or other serviceability (non-structural) failures.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Exposure to wind**		Terrain with numerous large, high (10-30m) obstructions (city centres, well-developed industrial complexes).	Terrain with numerous closely spaced obstructions, low (3-5m height obstructions (areas of suburban housing).	Exposed open terrain with no or few, well-scattered obstructions. Open water surfaces.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Height of structure**		1-2 story structure	3-5 story structure	Tall structure (5+ stories)
S2	**Construction Type**		Concrete or masonry construction.	Steel or timber construction.	
S3	**Reports of prior damage**		Users have not noticed any change in structure during strong wind events.		Users have noticed or heard movement of building in wind event and noticed evidence of cracking in walls afterwards or notes of doors or windows sticking after / during wind events.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- ***Damage (e.g. cracking, sagging, doors / windows jamming) – Medium***
- *Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High*
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Miscellaneous/lightweight structures	**Structural performance**	**SP10**
Climate disturbance	Extreme Wind	
Impact pathway	Damage to miscellaneous structures.	
	Excessive deformation in extreme wind event resulting in deformation or damage of architectural appendages (awnings, canopies, sun shades). Overturning of lightweight structures not adequately anchored down.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Exposure to wind**		Terrain with numerous large, high (10-30m) obstructions (city centres, well-developed industrial complexes).	Terrain with numerous closely spaced obstructions, low (3-5m) height obstructions (areas of suburban housing).	Exposed open terrain with no or few, well-scattered obstructions. Open water surfaces.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Material**		Rigid materials not easily damaged by wind or impact from debris. Fabric or other resilient material.		Material is easily damaged by wind or impact from flying debris.
S2	**Fixings**		Adequate fixings directly to structure.		No fixings or attachment to structure or ground.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- ***Failure (e.g. roof sheeting tearing off) – High***

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – exterior walls	**Structural performance**	**SP11**
Climate disturbance	Extreme rains + Extreme wind	
Impact pathway	Impact and damage from debris during extreme wind or rain events	
	Physical damage to walls can occur during heavy rain or wind events due to dislodge debris from adjacent landscaping. Trees or the like that tend to lose branches will have the greatest risk of possible damage to adjacent buildings.	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the type of landscaping and trees adjacent to walls?**	No landscaping or trees adjacent to walls within 100m	Small, young trees or brush	Old trees that tend not to lose branches or the like. Young trees that tend to lose small branches or the like	Trees or brush that lose large branches often Dead trees or brush
E2	**Proximity of walls from adjacent buildings or light weight structures?**	No adjacent buildings or lightweight structures	Adjacent buildings are greater than 50m from the building	Adjacent buildings are 20m to 50m from the building	Adjacent buildings are within 20m from building
E3	**Are the window / door protected by a physical impact restraint barrier (i.e. large, thick concrete wall?**		Yes		No

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the wall material?**		Thick timber or metal materials Thick block, stone, brick or concrete	Thin timber or metal material Thin stone, block, brick or concrete	Glass, plastic or similar brittle material (e.g. polycarbonate)

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – window / doors	**Structural performance**	**SP12**
Climate disturbance	Extreme rains + Extreme wind	
Impact pathway	Impact and damage from debris during extreme wind or rain events	
	Physical damage to windows and/or door can occur during heavy rain or wind events due to dislodge debris from adjacent landscaping. Trees or the like that tend to lose branches will have the greatest risk of possible damage to adjacent buildings. NB: This does not look at damage to due to unlatched or unlocked windows or doors that may open during extreme events causing damage from adjacent elements (i.e. walls or the like).	

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**What is the type of landscaping and trees adjacent to walls?**	No landscaping or trees adjacent to walls within 100m	Small, young trees or brush	Old trees that tend not to lose branches or the like. Young trees that tend to lose small branches or the like	Trees or brush that lose large branches often Dead trees or brush
E2	**Proximity of walls from adjacent buildings or light weight structures?**	No adjacent buildings or lightweight structures	Adjacent buildings are greater than 50m from the building	Adjacent buildings are 20m to 50m from the building	Adjacent buildings are within 20m from building
E3	**Are the window / door protected by a physical impact restraint barrier (i.e. large, thick concrete wall?**		Yes		No

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the window / door material?**		Thick timber, metal or concrete panel	Thin timber or metal material	Glass, plastic or similar brittle material (e.g. polycarbonate)

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – exterior walls	**Structural performance**	**SP13**

Climate disturbance	Extreme temperature + warmer temperature
Impact pathway	Damage or failure of cladding materials
	Physical damage to walls can occur during high temperatures when materials expand and contact adjacent systems possibly dislodging or damaging the materials. Damage is depending on the conductive properties of the materials Extreme conditions may result in safety concern with the integrity/stability of the system. Expansion or control joints within the wall or between elements can accommodate such expansion.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is there surrounding elements that Shade the building walls?**		Dense trees exist in close proximity, less than 5m away from the facade.	Some trees exist in relative proximity less than 2 x the building height from the facade.	No trees within proximity of greater than 2 x the height of the facade.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the wall material?**		Timber or brick cladding or wall system Tile finish Concrete walls Glass walls Weather board or fibre cement sheet	Metals (aluminium or steel) Plastics, e.g. polycarbonate, PVC, etc.	
S2	**Are there expansion / control joints in the walls (vertical & horizontal?**		Yes – > 15mm wide joint at regular centres (<10m) Heritage heavy masonry building with no evidence of cracking (particularly at corners or parapets)	Yes - <15mm wide joints at regular centres (<10m)	No expansion joints or expansion joints at irregular or greater than 10m centres Heritage heavy masonry building with cracking (particularly at corners or parapets)

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – windows & doors	**Structural performance**	**SP14**

Climate disturbance	Extreme temperature + warmer temperature
Impact pathway	Damage or failure of cladding materials Physical damage to windows or doors can occur during high temperatures when materials expand and contact adjacent systems possibly dislodging or damaging the materials. Damage is depending on the conductive properties of the materials Extreme conditions may result in safety concern with the integrity/stability of the system. Expansion or control joints within the wall or between elements can accommodate such expansion.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is there surrounding elements that shield the building walls?**		Dense trees exist in close proximity, less than 5m away from the facade.	Some trees exist in relative proximity less than 2 x the building height from the facade.	No trees within proximity of greater than 2 x the height of the facade.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the window or door frame material?**		Timber Glass walls	Metals (aluminium or steel) Plastics, e.g. polycarbonate, PVC, etc.	
S2	**Are there expansion / control joints in between window or door frame and walls?**		Yes – greater than 15mm wide joint at regular centres	Yes – less than 15mm wide joints)	No expansion joint or hard against wall or adjacent materials.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: For structural performance, the importance rating is related to the potential damage rather than the building use, as shown below. The default importance rating for the impact pathway on this sheet is shown in bold, however this should be reviewed for the specific circumstances of the building being assessed.

- *Damage (e.g. cracking, sagging, doors / windows jamming) – Medium*
- ***Damage and significant secondary impacts (e.g. cracking in basements, damage to retaining walls) – High***
- *Failure (e.g. roof sheeting tearing off) – High*

Given the potential impact and importance ratings obtained above, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

5.6 Weather Proofing

Building name:			
Date:		Building no. / ref:	
Facade – windows, doors & exterior walls		**Weather proofing**	**WP1**
Climate disturbance	Extreme rain		
Impact pathway	Water leaks due to ground runoff		
	The volume and periods of rainfall increasing drastically can result in greater potential of water runoff along the ground towards a building. Design, composition and location of the building amongst its surroundings will have an impact upon both the exposure and sensitivity. The type of landscaping, drainage and resistance of window/door and wall elements will determine overall vulnerability.		

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is the building located in a flood plan?**		No		Yes
E2	**Does adjacent landscaping slope towards the building**		Slope greater than 2^o	Flat or less than 2^o slope	Slope greater than 2^0

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**Drainage systems**		Properly functioning drainage system installed around perimeter & at doors/entry points	No drainage system	
S2	**What is the type of landscaping adjacent to the building**		Loose stone, gardens or similar high drainage material Brick paving or similar permeable paving	Hard pavement or similar Dry soil	
S3	**Where are door & wall elements in relation to grade height?**		Above grade height (greater than 100mm)	At grade height	Below grade

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – roofs	**Weather proofing**	**WP2**

Climate disturbance	Extreme Rainfall
Impact pathway	Water leaks from directional rain.
	The volume and periods of rainfall increasing drastically can result in greater potential of water leaks in current roof construction. Design, composition and location of the building amongst its surroundings will have an impact upon both the exposure and sensitivity. The buildings ability to accommodate increased volumes of water, as well as their ability to shed this water away from the building will be affected, and may see water leaks occur into the building interior if it is unable to cope.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is there surrounding elements that shield the roof?**	Yes			No

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the pitch of the roof?**	Pitch of roof greater than 10º.	Pitch of roof between 5 and 10º.	Pitch of roof less than 5º.	
S2	**What is the roofing material?**	New metal sheet.	Concrete with liquid or torch membrane. Old metal sheet in good condition – corrosion free. New tiles or slate in good condition.	Minor corrosion to metal sheet roofing. Poor condition (chipped or displaced) tiles or slate.	Bare concrete. Corroded or holes in metal sheet Missing tiles or slate.
S3	**How is the water drained from the roof area?**	New exterior gutter (eaves gutter) with overflow and debris guard.	Exterior gutter with overflows. Exterior gutter with debris guard. Old eaves gutter. Concrete roof with new drainage outlet and debris guard. Box gutter with symphonic drainage and overflow	Exterior gutter without overflow. Exterior gutter without debris guard. Concealed or box gutters with debris guards and overflow. Concrete roof with drainage outlet – grate. Shallow box gutters.	Shallow box gutters with low slope; visible ponding. Concrete roof with old drainage outlet –grate. Concrete roof with open drainage outlet – no debris guard. Concealed or box gutter without debris guard or overflow
S4	**Are there gaps in roof system or around penetrations?**	No gaps.	Some penetrations through roof with seals.	Loose laps between materials creating fine gaps; daylight visible from interior Evidence of past leaks	Roof has large vent gaps & holes; daylight visible from interior Current water leaks experienced

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – exterior walls	**Weather proofing**	**WP3**

Climate disturbance	Extreme Rainfall
Impact pathway	Water leaks from directional rain.
	The volume and periods of rainfall increasing drastically can result in greater potential of water leaks in current wall construction. Design, composition and location of the building amongst its surroundings will have an impact upon both the exposure and sensitivity. The buildings ability to accommodate increased volumes of water, as well as their ability to shed this water away from the building will be affected, and may see water leaks occur into the building interior if it is unable to cope.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is there surrounding elements that shield the building facade?**		Dense trees or adjacent buildings exist in close proximity, less than 5m away from the building.	Some trees or adjacent buildings exist in relative proximity between 5m to 10m away from building.	No trees or adjacent buildings within proximity greater than 10m
E2	**What is the height of the building in relation to its surroundings?**		Building is shorter than the height of adjacent buildings and dense vegetation.		Building is taller than adjacent surroundings
E3	**Does an overhang exist on the building facade, relative to the floor-to-floor height?**	Large overhangs (1000mm +) continuous on the facade of the building.	Medium overhang present (150mm – 1000mm) continuous on the facade.	Small overhang (50mm – 150mm) continuous on the facade. Medium overhang (150mm – 1000mm) intermittent on the facade.	No protective overhang present (0mm – 50mm) on the facade. Small overhang (50mm – 150mm) intermittent on the facade.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What is the condition of the seal between the wall & penetration?**	No penetrations	New continuous sealant or gasket around penetration Old continuous sealant or gaskets around penetrations in good condition	Sealant or gaskets have gaps, are cracked and/or loose.	No seal around penetrations; daylight can be seen from interior of building around penetrations.
S2	**Is the material of the facade water resistant and in good condition?**		Old brick/blockwork in good repair. Concrete walls with paint finish. Finished metal. Weatherboard or fibre cement sheet.	Minor corrosion to metal sheet. Brick/blockwork with some mortar damage. Bare concrete. Old metal Old weatherboard or fibre cement sheet.	Corroded metal sheet with gaps Brick/blockwork without mortar or extensive mortar missing. Cracks in Brick, blockwork, concrete. Decayed timber weatherboard
S3	**What is the composition of the wall?**		Rainscreen.	Face-seal with membrane or building paper Cavity brick wall Multi wythe or heavy masonry block/brick; typical of heritage building	Monolithic/Face-seal.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Low
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

	Potential Impact Rating (from previous step)			
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

Building name:		
Date:	Building no. / ref:	
Facade – windows & doors	**Weather proofing**	**WP4**

Climate disturbance	Extreme Rainfall
Impact pathway	Water leaks from directional rain.
	The volume or periods or rainfall increasing drastically will see current building construction tested. Design, composition and location of the building amongst its surroundings will have an impact upon both the exposure and sensitivity. The buildings ability to accommodate increased volumes of water, as well as their ability to shed this water away from the building will tested, and may see water leaks occur into the building interior if it is unable to cope.

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	**Is there surrounding elements that shield the building facade?**		Dense trees or adjacent buildings exist in close proximity, less than 5m away from the building.	Some trees or adjacent buildings exist in relative proximity between 5m to 10m away from building.	No trees or adjacent buildings within proximity greater than 10m
E2	**What is the height of the building in relation to its surroundings?**		Building is shorter than the height of adjacent buildings and dense vegetation.		Building is taller than adjacent surroundings
E3	**Does an overhang exist on the building facade, relative to the floor-to-floor height?**	Large overhangs (1000mm +) continuous on the facade of the building.	Medium overhang present (150mm – 1000mm) continuous on the facade.	Small overhang (50mm – 150mm) continuous on the facade. Medium overhang (150mm – 1000mm) intermittent on the facade.	No protective overhang present (0mm – 50mm) on the facade. Small overhang (50mm – 150mm) intermittent on the facade.

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	**What type of window system is present on building facade?**	Non open able windows.	Awning windows. Casement windows.	Double hung windows Sliding windows Hopper windows.	
S2	**What is the condition of sealant, gaskets and brush seals?**	New, continuous sealant and gaskets.	Old, continuous and reasonable condition sealant and gaskets.	Intermittent sealants and gaskets. Cracked, old sealant or gaskets. Loose seals. Brush seal present, but gap visible.	No seal present.
S3	**What types of doors are present on building facade?**		Doors; small, outward	Doors; small, inwards opening Doors; inward or outward opening Garage doors Sliding door	Doors; with visible daylight. Garage doors with visible daylight.
S4	**What is the framing material to windows and doors?**	.	Finished timber frames. Metal frames (no gaps present in frame).	Unfinished timber frames.	Metal frame with visible gaps between frame elements.

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Low	Medium
	B	Medium	Medium	Medium
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, (see Table 1) estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

5.7 Fire Resistance

Building name:			
Date:		Building no. / ref:	
Whole building		**Fire resistance**	**F1**
Climate disturbance	Bush / grass fire		
Impact pathway	Damage to building and/or injury to occupants		
	Hotter, drier summers will increase the risk of bush and grass fires. The changes to the fire warning system following the Black Saturday fires in 2009 are an example of how changing conditions are resulting in a need for adaptation.		

Step 1: answer the questions related to exposure below.

Ref	Exposure of the system or element	Not applicable	1	2	3
E1	Is the site in a bushfire prone area[2]?	No			Yes

Step 2: answer the questions related to sensitivity below.

Ref	Sensitivity of the system or element	Not applicable	A	B	C
S1	Has the building been built or retrofitted to the current bushfire construction standards (AS3959-2009)?		Yes		No

Step 3: Using the highest value from obtained from the exposure questions and the highest value obtained from the sensitivity questions, assess the potential impact rating from the matrix below.

Potential Impact Rating				
Not applicable (N/A)	Unknown (U)	**Exposure**		
		1	**2**	**3**
Sensitivity	**A**	Low	Medium	Medium
	B	Medium	Medium	High
	C	Medium	High	High

Step 4: Given the potential impact rating obtained above and the importance of building function to building use, estimate the overall vulnerability of the Building Component being assessed, using the following matrix.

The importance of fire resistance for a particular building is related to whether the building is likely to be occupied during periods of fire risk, the impact of the asset being unavailable after a fire, and the cost to repair / rebuild the asset if damaged by fire. These need to be considered carefully for the specific building being assessed. The following is offered for consideration:

- *Low importance may be appropriate for a building that does not deliver critical services, that is fully insured, and/or that will be unoccupied during a fire (e.g. because Council policy is for it to be unused on Extreme and Code Red fire days).*
- *High importance may be appropriate for a building that has limited evacuation routes (e.g. 1 road that could easily become impassable during a fire), or which is needed to act as a relief / recovery centre immediately after the fire.*

		Potential Impact Rating (from previous step)		
		Low	**Medium**	**High**
Importance of Building Function to Building Use (refer Table 1)	**Low**	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	Very high

Step 5: Copy high and very high vulnerabilities into Table 2.

[2] See www.dtpli.vic.gov.au/planning/planning-and-building-for-bushfire-protection/building-in-bushfire-prone-areas#BPA to obtain a site specific report, or to use the interactive map to review bushfire zones.

6 Prioritised Vulnerabilities Action Sheet

Table 2 – Action table

Vulnerability	Option		Pros	Cons	Estimated cost
	Options to reduce exposure				
	Options to reduce sensitivity				
	Options to reduce importance of functional requirement to use				
	Options to reduce exposure				
	Options to reduce sensitivity				
	Options to reduce importance of functional requirement to use				

Vulnerability	Option		Pros	Cons	Estimated cost
	Options to reduce exposure				
	Options to reduce sensitivity				
	Options to reduce importance of functional requirement to use				
	Options to reduce exposure				
	Options to reduce sensitivity				
	Options to reduce importance of functional requirement to use				