



Green Star

Daylight and Views Hand Calculation Guide

12 May 2015

Changelog

Date	Release	Change
16/06/2013	1	Draft Issued for Comment
12/05/2015	2	Included guidance on calculating views
22/07/2015	3	Minor edits to confirm applicability to Design & As Built v1

Contents

Changelog.....	1
Contents.....	2
1.0 Introduction	3
1.1 Rating Tools & Credits	3
2.0 Daylight	5
2.1 Overshadowing Requirements.....	5
2.2 Visual Transmittance of Glazing.....	6
2.3 Calculating the Zone of Compliance	6
3.0 Views	9
3.1 Line of Sight	9
3.2 Conditions	9
3.2.1 All View Types	9
3.2.2 External Views.....	9
3.2.3 Daylit Atrium Views	10
3.2.4 High Quality Internal Views	11
3.3 Calculating Compliant Area.....	12
4.0 Documentation Guidelines	13
4.1 Daylight	13
4.2 Views	14
5.0 References.....	15
Appendix A.....	16
Appendix B.....	19

1.0 Introduction

This guide presents a methodology for calculating daylight and views for the purposes of Green Star. Section 2 outlines the hand calculation methodology to be used to identify areas within buildings with high levels of daylight. Section 3 outlines the methodology to be used to identify areas within building which have access to views.

1.1 Rating Tools & Credits

Please review this table to understand how this guide applies to your project

Rating Tool	Credit / Criterion	Notes
Green Star – Design and As Built v1, v1.1	Visual Comfort, 12.1 Daylight.	This guide must be used when demonstrating compliance with compliance pathway 12.1A Prescriptive Method. The area of the building calculated to be within the zone of compliance as per this guide will be considered to have high levels of daylight.
	Visual Comfort, 12.2 Views.	This guide must be followed when demonstrating compliance with criterion 12.2 Views. Both Internal and External high quality views can be considered for this rating tool.
Green Star – Interiors v1.	Visual Comfort, 11.1 Daylight.	This guide must be followed when demonstrating compliance with compliance pathway 11.1A Prescriptive Method. The area of the building calculated to be within the zone of compliance as per this guide will be considered to have high levels of daylight.
	Visual Comfort, 11.2 Views	This guide must be followed when demonstrating compliance with criterion 11.2 Views. Both Internal and External high quality views can be considered for this rating tool.
Green Star - Office v3, Green Star - Education v1 (first 3 points only) and Green Star - Public Building v1	IEQ Daylight	Compliance with the credit criteria is demonstrated by calculating the percentage of the nominated area which has a Daylight Factor of 2% or greater. The hand calculation method detailed in section 2.0 of this guide is deemed acceptable to identify the area within the building which has compliant daylight levels, from which the compliant percentage of floor area can be calculated. It can be assumed for the purposes of these credits that the zone of compliance outlined in this guide has a daylight factor of 2% or higher at desk height.
	IEQ External Views	To calculate views for the tools listed above, compliance is demonstrated by calculating the percentage of the nominated area which is within line of sight of a view (compliant window or atrium only). The calculation methodology in section 3.0 of this guide is deemed acceptable to identify the areas within the building which comply with the External Views requirements, from which the compliant percentage of floor area can be calculated.

Green Star – Office Interiors v1.1	IEQ-3 Daylight	Compliance is demonstrated by identifying the percentage of work settings located in an area of the floor plate that has a daylight factor of 2.5% or greater, as measured at finished floor level. The hand calculation detailed in section 2.0 of this guide is deemed acceptable to identify the area within the building which has compliant daylight levels. Any worksettings that are located within the zone of compliance are deemed to comply. It can be assumed for the purposes of these credits that the zone of compliance outlined in this guide has a daylight factor of 2.5% or higher at finished floor level.
	IEQ-7 External Views	For this rating tool, compliance achieved by demonstrating the percentage of work settings that are within 8 meters of a view (compliant window or atrium only). The calculation methodology in section 3.0 of this guide is deemed acceptable to identify the areas within the building which comply with the External Views requirements, from which the compliant percentage of workstations can be calculated.
Other rating tools		Projects registered under Green Star rating tools not covered by this guide are required to submit a credit interpretation request proposing how the guide can be applied to their project.

GBCA encourages project teams to use this guide to claim points instead of performing daylight modelling.

2.0 Daylight

This section of the guide provides a hand calculation methodology for identifying areas within buildings which have high levels of daylight. To use the daylight hand calculation method the project must meet the following requirements:

- The project must not be overshadowed, in accordance with the overshadowing requirements outlined in section 2.1 of this guide; and
- The building glazing must have a visual light transmittance (VLT) of equal to or greater than 40% as outlined in section 2.2 of this guide.

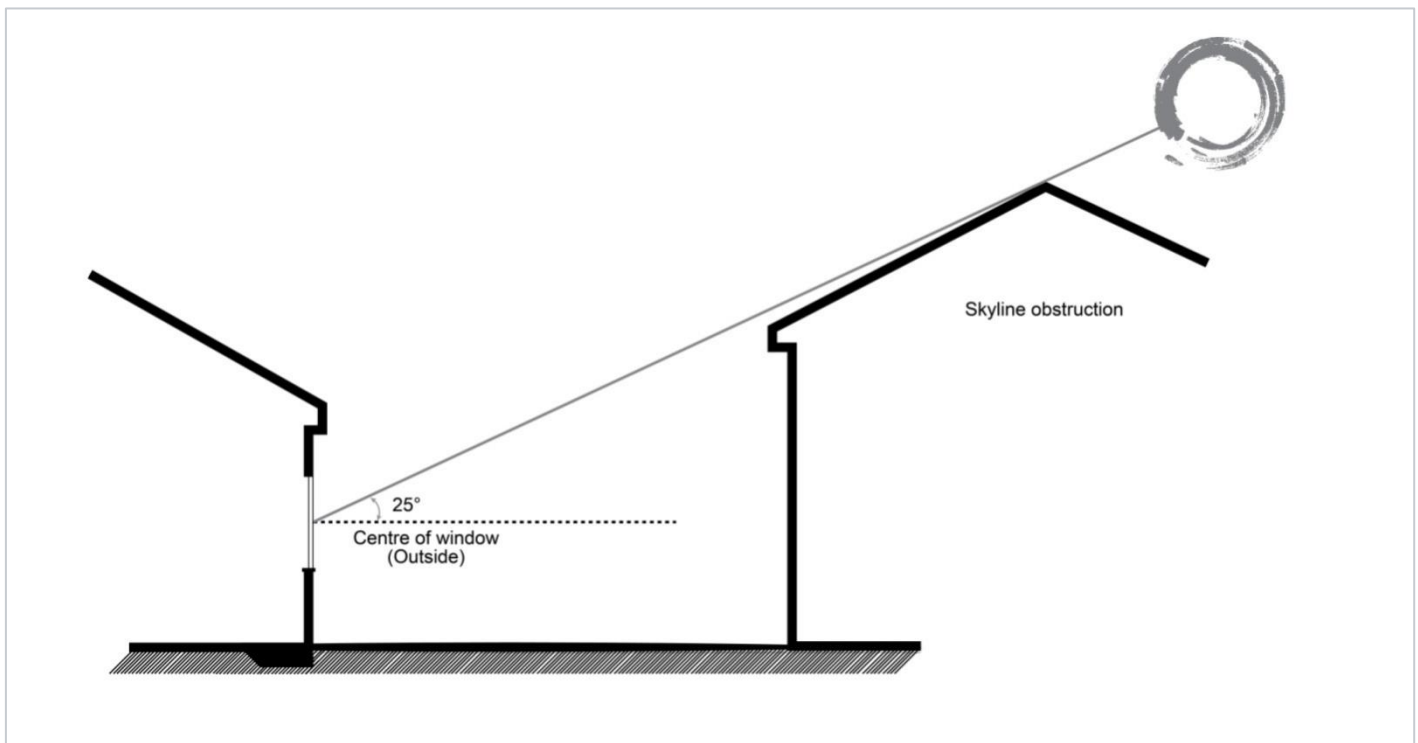
It should be noted that for an Education v1 submission this method cannot be used to demonstrate compliance with the additional point.

The foundation for this method of hand calculation is taken from the DETR Good Practice Guide 245, Desktop guide to daylighting - for architects.

2.1 Overshadowing Requirements

Projects where external shading does not impinge on the direct 25 degree line from the mid-height (centre) of the window are deemed to not be overshadowed. External shading includes: buildings, cliffs, and any other solid structure. External shading does not include trees. Please refer to Figure 1 below for further guidance.

Figure 1: Angle of obstruction for external shading.



2.2 Visual Transmittance of Glazing

This hand calculation method assumes that there is no significant loss of light due to external obstructions, tinted glazing or interior screening.

For this hand calculation method the glazing must have a visible light transmittance equal to, or greater than, 40%.

The following is an indication of typical VLT values for various glazing types. Project teams may use this table for reference however it must be confirmed that the actual glazing used in the project has a VLT of 40% or greater:

Glazing Type	VLT Range
Clear single glazing	~70 - 90%
Tinted single glazing (green)	~70%
Tinted single glazing (grey)	~20%
Clear double glazing	~70 - 80%
Double glazing with a low emissivity coating	~40 - 70% (but can be as low as 10%)

NB: dirt can give a further 5% reduction in VLT with normal cleaning in an urban setting. Reductions in VLT due to dirt do not need to be included for the purposes of a Green Star Daylight assessment.

2.3 Calculating the Zone of Compliance

The zone of compliance is an area (in the horizontal plane) that is the width of the window by a depth which is twice the height of the window head above desktop/table top level as illustrated in the Figure 2 below.

Depth of the Zone of Compliance = $h \times 2$

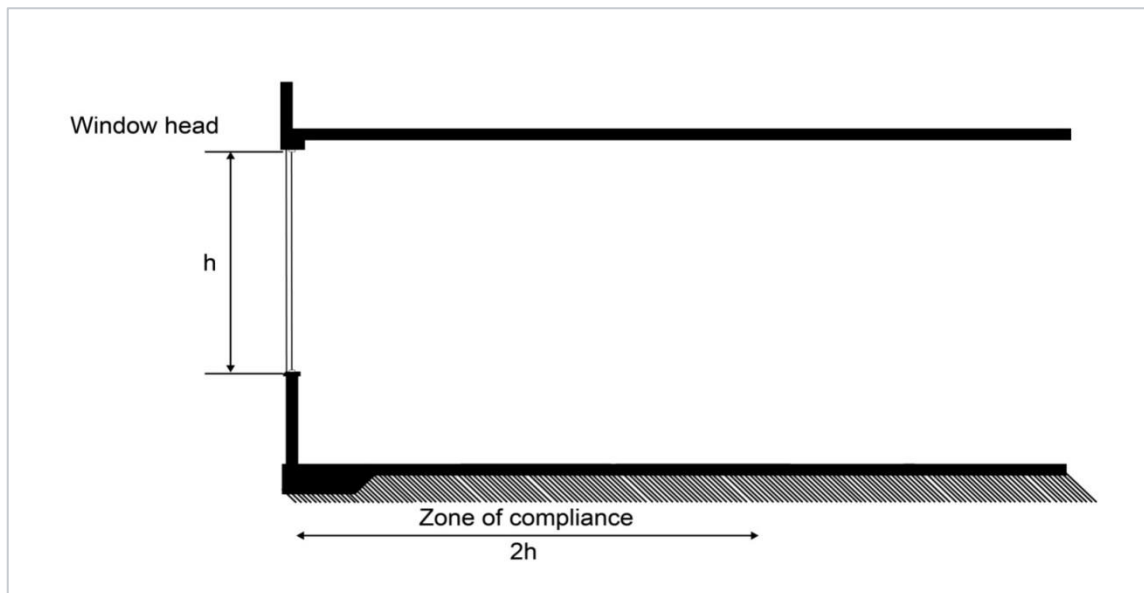
'w'width of the Zone of Compliance = Width of the glazing

Zone of Compliance = $h \times 2 \times w$

Additional Notes:

- When plotting the depth of the Zone of Compliance the zone may not be drawn past permanent solid or glazed partitions.
- Any column or mullion < 0.5m in width can be disregarded and the glazing can be considered to be continuous in width.
- For the purposes of this hand calculation desktop/table top level is set at 700mm AFFL for all rating tools.

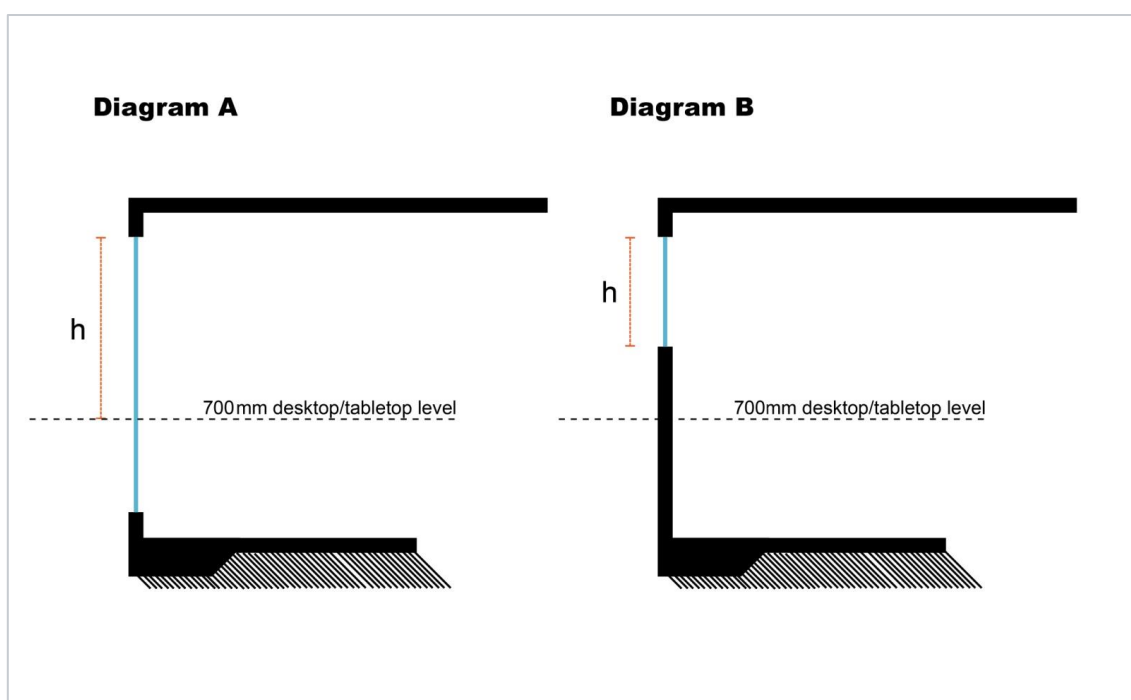
Figure 2: Dimensions for calculating the zone of compliance.



When determining the dimension for 'h' the following applies (see the Figure 3 below for further guidance):

- 'h' is the height of the window head above desktop/table top level (700mm) (Diagram A)
- If the bottom sill of the glazing is above desktop/table top level (700mm) the dimension for 'h' is taken from the bottom sill of the glazing (Diagram B).

Figure 3: How to determine the dimension for 'h'.



Once the area of the zone of compliance has been calculated the percentage of compliant nominated area can be calculated.

Area based credits:

$$\text{Zone of Compliance} = h \times 2 \times w \text{ (m}^2\text{)}$$

$$\text{Nominated area} = A_{\text{Nominated}} \text{ (m}^2\text{)}$$

$$\text{Percentage of compliant area} = (\text{Zone of Compliance}) / (A_{\text{Nominated}}) \times 100 \text{ (\%)}$$

Worksetting based credits:

Once you have identified the zone of compliance you will be able to calculate the number of worksettings which are located within that zone of compliance.

$$\text{Worksettings within the Zone of Compliance} = W_{\text{Compliant}}$$

$$\text{Total number of worksettings} = W_{\text{Total}}$$

$$\text{Percentage of compliant area} = (W_{\text{Compliant}}) / (W_{\text{Total}}) \times 100 \text{ (\%)}$$

Please refer to Appendix A for a worked example of this hand calculation methodology.

3.0 Views

This section of the guide demonstrates how project teams are to identify the areas within their building which have access to views.

3.1 Line of Sight

The line of sight is determined by drawing a line from the qualifying view (window, atrium or high quality internal view depending on the rating tool) to the eye of the building occupant. The occupant is expected to be seated or standing at a work setting or mobile within a retail, industrial or another space. A line at 45° can be used at the corners of high quality views.

The line of sight to the view is used to determine the area of compliance, or a complying workstation. A primary space or workstation that has direct line of sight within 8 meters of a qualifying view is found to be compliant. When calculating the distance to the view, the thickness of external walls must be taken into account.

3.2 Conditions

3.2.1 All View Types

Where calculating views using all view types, the following conditions apply:

- Permanent partitions must be accounted for. If the view is obscured by a permanent partition, the area behind this partition must be excluded from the area of compliance. If the view is obscured by a temporary partition which can be removed during occupied hours, then this area can be counted towards the area of compliance. Workstations and partitions which are less than 1.5m tall can be ignored;
- Internal and external columns can be ignored;
- Internal, fully glazed partitions may be ignored.

3.2.2 External Views

Where calculating views using external views, the following conditions apply:

- The view must extend from the perimeter of the building and be unblocked by any permanent solid structure (i.e. there must not be another building within 8m);
- The area behind any solid portion of the perimeter of the external wall must be excluded from the calculations;
- Glazing which is below 720mm or above 2,400mm cannot contribute to external views. Please note, there is no minimum dimension for glazing prescribed within this guide, however project teams are encouraged to consider the intent of the credit in the context of their building to establish whether the glazing provided within their project will have the capacity to provide views to occupants. For example it is unlikely that a 400mm high window at 2,000mm above floor levels would have the capacity to provide high quality views to occupants.

Figure #: External Views

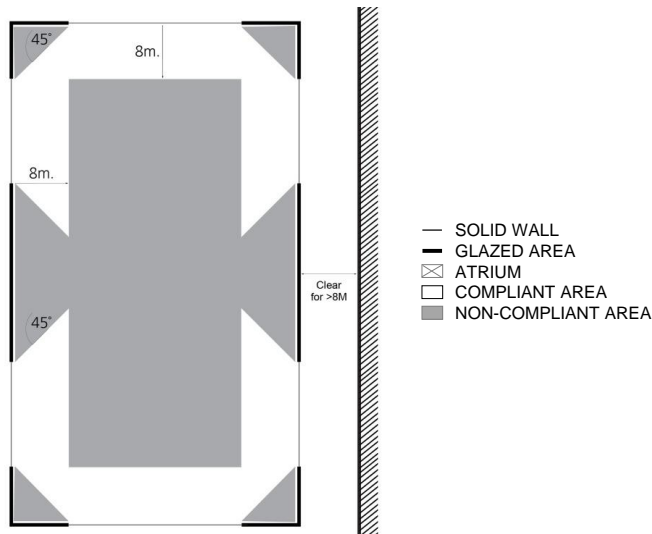
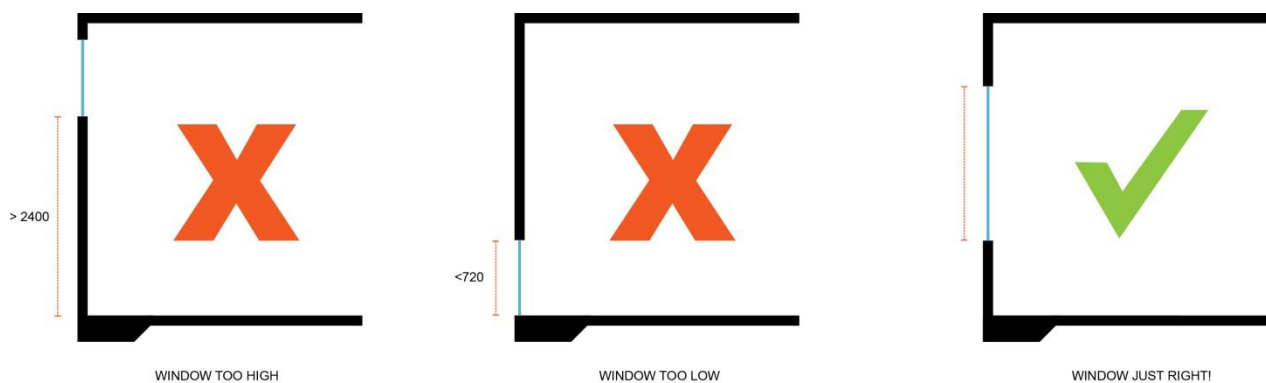


Figure #: Vision Glazing



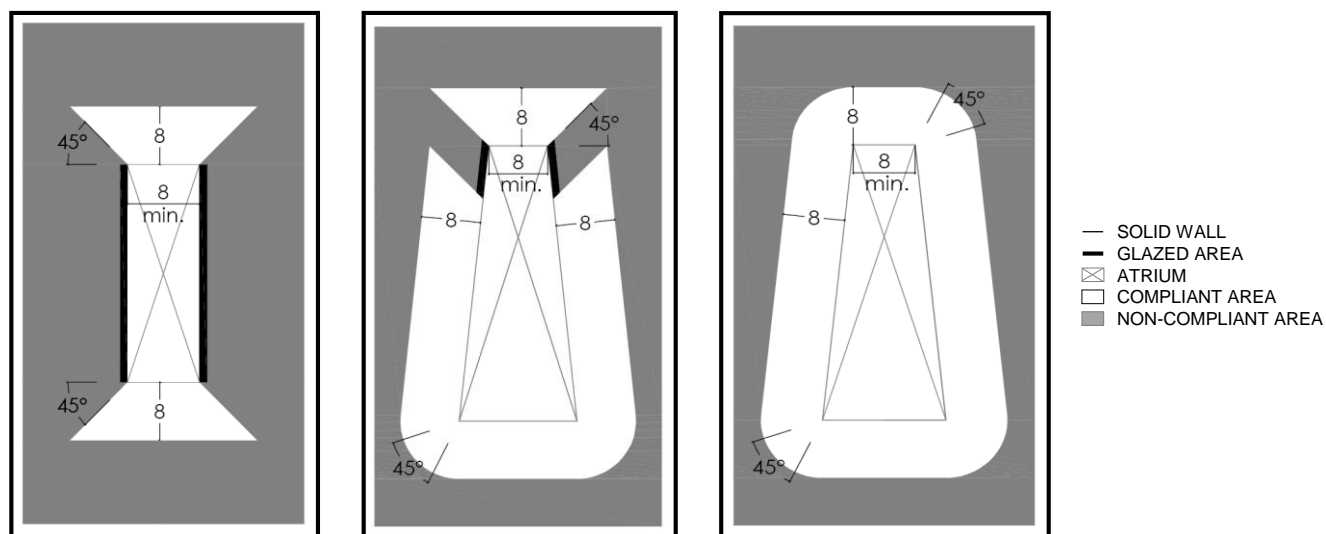
3.2.3 Daylit Atrium Views

When calculating views using a daylit atrium, the following conditions apply:

- The atrium must be at least 8m wide and 8m deep (depth across the atrium, this is not referring to the height of the atrium) at any point to which the line of sight is demonstrated;
- If the space opens directly onto the atrium, calculations must be made from the vision glazing or from the internal perimeter of the atrium if no internal glazing is installed;
- The area behind any solid portion of the atrium perimeter must be excluded from the calculations;
- A minimum daylight factor of 3% must be achieved for 90% of the atrium area on the lowest level for which compliance is claimed;

- A combination of external and atrium views may be used to demonstrate compliance.

Figure #: Daylit Atrium Views



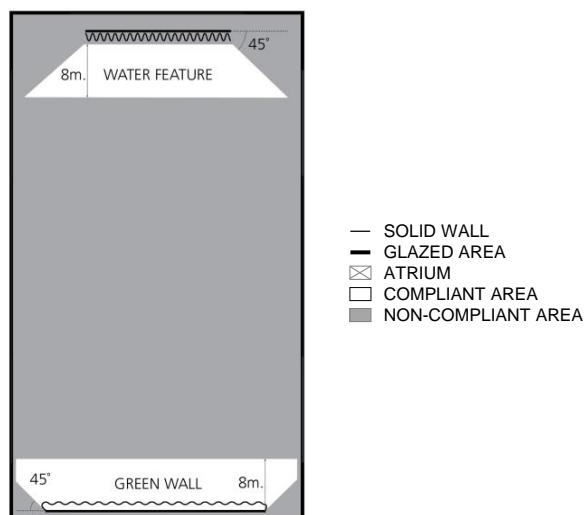
3.2.4 High Quality Internal Views

Relevant only to Green Star – Design and As Built v1, v1.1 and Green Star – Interiors v1

When calculating views using a high quality internal view, the following conditions apply:

- Please refer to the relevant Submission Guidelines for the definition of an Internal View;
- A combination of multiple internal views and external or atrium views may be used to demonstrate compliance.

Figure #: High Quality Internal Views



3.3 Calculating Compliant Area

Once the complying views within your building have been identified, it will be possible to calculate the area within your building which is within 8m of these views.

Area based credits:

Area with views

$$\begin{aligned} &= (\text{width of compliant external view} \times 8\text{m} + \text{area within } 45^\circ) \\ &+ (\text{width of compliant atrium view} \times 8\text{m} + \text{area within } 45^\circ) \\ &+ (\text{width of compliant internal view} \times 8\text{m} + \text{area within } 45^\circ) \end{aligned}$$

*Nominated area** = $A_{Nominated}$ (m^2)

Percentage of compliant area = $(\text{Area with views}) / (A_{Nominated}) \times 100$ (%)

*Refer to Technical Manual or Submission Guidelines to identify the nominated area for your project. This may be Class 5 NLA or Primary Space for example.

Worksetting based credits:

Once the complying views within your building have been identified, you will be able to calculate the number of worksettings which are located within 8m of these views.

Worksettings with views

$$= (\text{worksettings within 8m of an external view}) + (\text{worksettings within 8m of an atrium view})$$

Total number of worksettings = W_{Total}

Percentage of compliant area = $(\text{Worksettings with views}) / (W_{Total}) \times 100$ (%)

Please refer to Appendix B of this guide for a worked example of this view methodology.

4.0 Documentation Guidelines

4.1 Daylight

For **Green Star – Design & As Built** and **Green Star – Interiors**, please refer to the Submission Guidelines for documentation requirements.

For **Green Star - Office v3**, **Green Star - Education v1** (first 3 points only), **Green Star - Public Building v1** and **Green Star – Office Interiors v1.1*** please refer to the documentation requirements below.

Where this hand calculation methodology is being used, please nominate this on the cover page and refer to the documentation requirements outlined here. The documentation outlined here is to be provided in lieu of the documentation outlined within the Technical Manual.

Documentation Guidelines
Submit all the evidence and ensure it readily confirms compliance.
<input type="checkbox"/> Short report
Drawings and plans must be Tender or As Built in line with the rating being sought.
<input type="checkbox"/> Floor Plans
<input type="checkbox"/> Façade Drawings
<input type="checkbox"/> Site Plan
For a Design Submission
<input type="checkbox"/> Extract(s) from the Specification(s)
For an As Built Submission
<input type="checkbox"/> Confirmation from the Head Contractor
<p>Short report prepared by a suitably qualified professional that describes how the Credit Criteria have been met using the hand calculation method for Deemed to Satisfy and referencing the supporting drawings. The short report must:</p> <ul style="list-style-type: none"> • Description of nominated areas; • Description of nominated hours; • Nominate the spaces where the Credit Criteria has been met, and their area; and • Provide a summary table to demonstrate that compliant spaces jointly account for the stipulated proportion of the nominated area. <p>Floor Plans clearly identifying those areas deemed to satisfy using the hand calculation method. All measurements and areas for the calculation must be shown on the plan.</p> <p>Façade Drawings identifying the façade materials in the design and indicating the dimension for 'h' in the hand calculation. The drawings must also show the length for windows and any areas of skylights.</p> <p>Site Plan extending to the surrounding area, identifying the heights and location of any surrounding buildings</p> <p>Where a Design Rating is being sought, extract(s) from the Specification(s) where all glazing properties and minimum visual transmittance levels are nominated.</p> <p>Confirmation from the Head Contractor that the specified glazing products or an equivalent were installed in the building.</p>

*Green Star – Office Interiors v1.1 projects are to use the As Built documentation requirements.

4.2 Views

For all rating tools, please refer to the documentation requirements outlined within the Submission Guidelines or Technical Manual.

5.0 References

- The Department of Environment, Transport and the Regions (DETR), 1998, Good Practice Guide 245 'Desktop guide to daylighting – for Architects', <http://www.cibse.org/pdfs/GPG245.pdf>

Appendix A

Please note that the plans in this appendix are provided as an example of how the daylight hand calculation is applied, and can be illustrated. It is not an example of illustrating compliance or non-compliance.

Appendix B

Please note that the plans in this appendix are provided as an example of how the view calculation is applied, and can be illustrated. It is not an example of illustrating compliance or non-compliance.