

# Green Star

# Daylight and Views Hand Calculation Guide

11 April 2019

## Changelog

Date	Release	Change
16/06/2013	1	Draft Issued for Comment
11/04/2019	NZv1.0	Initial release in New Zealand.

## Contents

Changelog.....	1
Contents.....	2
1.0 Introduction .....	3
1.1 Rating Tools & Credits .....	3
2.0 Daylight.....	4
2.1 Overshadowing Requirements.....	4
2.2 Visual Transmittance of Glazing.....	4
2.3 Calculating the Zone of Compliance .....	5
3.0 Views .....	8
3.1 Line of Sight .....	8
3.2 Conditions .....	8
3.2.1 All View Types.....	8
3.2.2 External Views.....	8
3.2.3 Daylit Atrium Views .....	9
3.2.4 High Quality Internal Views .....	10
3.3 Calculating Compliant Area.....	11
4.0 Documentation Guidelines .....	12
4.1 Daylight.....	12
4.2 Views .....	12
5.0 References.....	13
Appendix A.....	14
Appendix B.....	15

## 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 NZv1.0	Visual Comfort, 12.2 Daylight.	This guide must be used when demonstrating compliance with compliance pathway 12.2A 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, 12.3 Views.	This guide must be followed when demonstrating compliance with criterion 12.3 Views. Both Internal and External high quality views can be considered for this rating tool.

NZGBC 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:

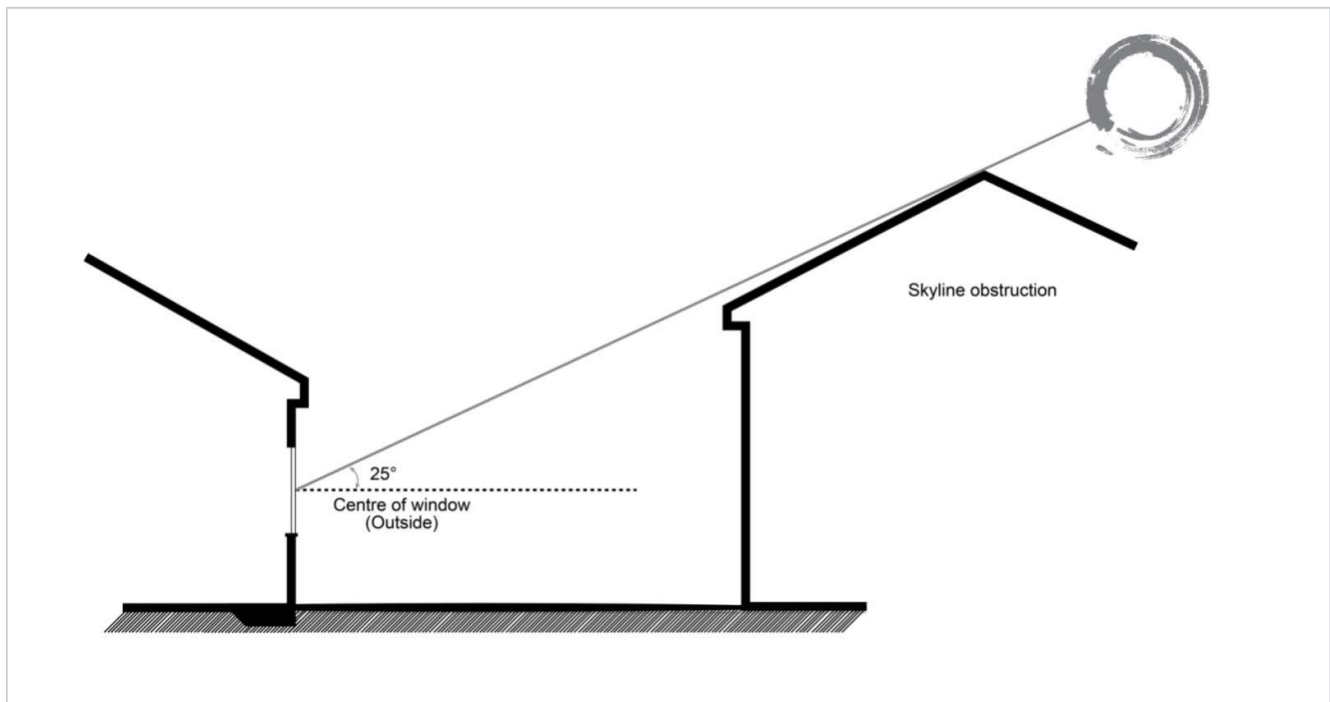
- The project must not be overshadowed, in accordance with the overshadowing requirements outlined in section 2.1 of this guide; and
- The building glazing must have a visual light transmittance (VLT) of equal to or greater than 40% as outlined in section 2.2 of this guide.

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  $25^\circ$  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*

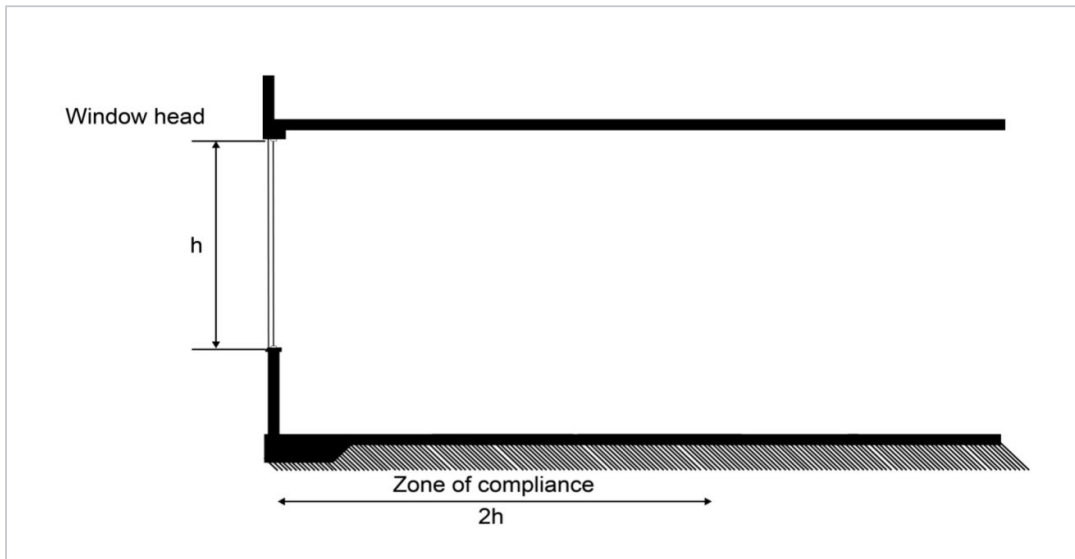
*Zone of Compliance =  $h \times 2 \times w$*

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.

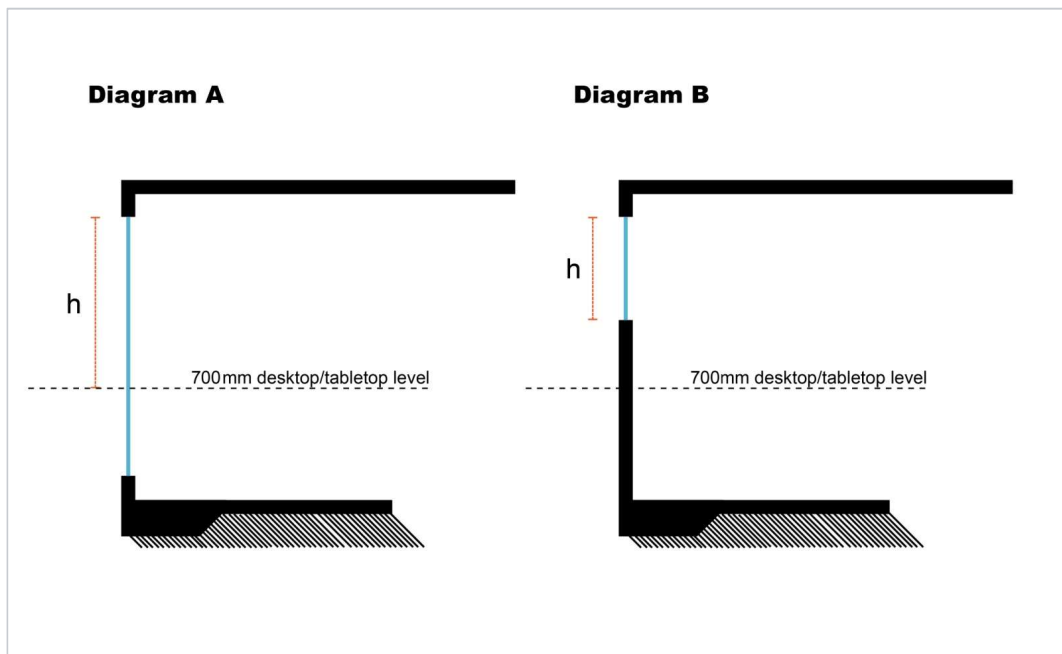
When determining the dimension for 'h' the following applies (see the Figure 3 below for further guidance):

**Figure 2: Dimensions for calculating the zone of compliance.**



- '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 4: External Views

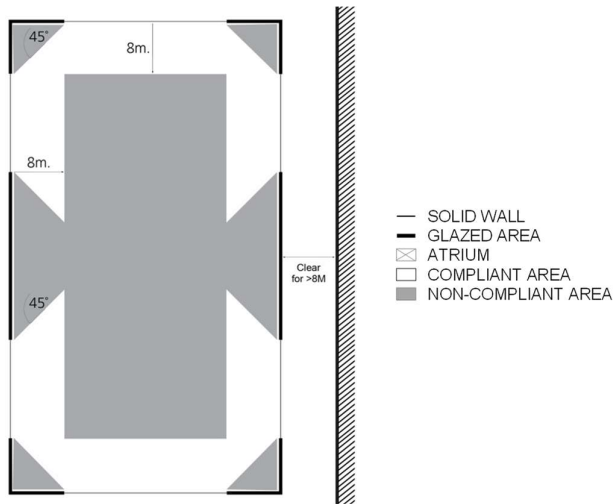
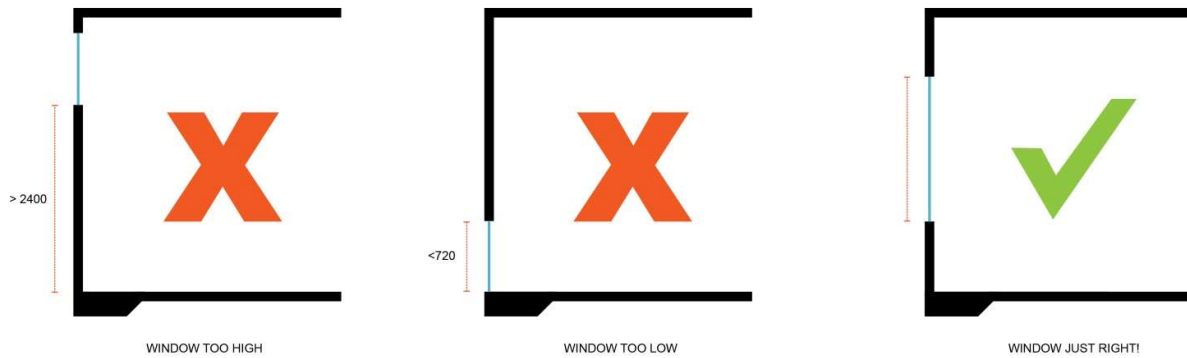


Figure 5: Vision Glazing



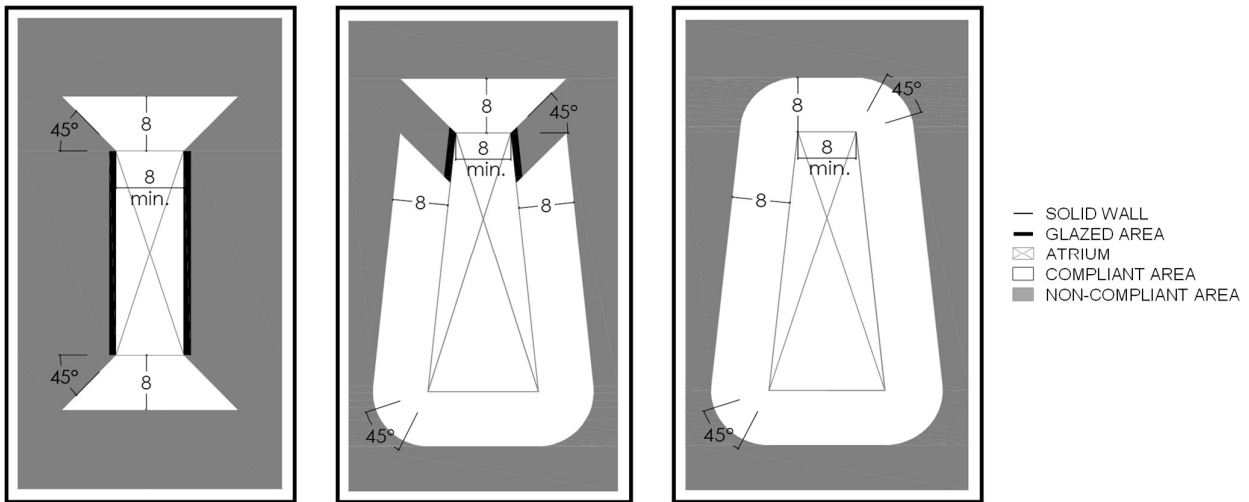
### 3.2.3 Daylit Atrium Views

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 6: Daylit Atrium Views

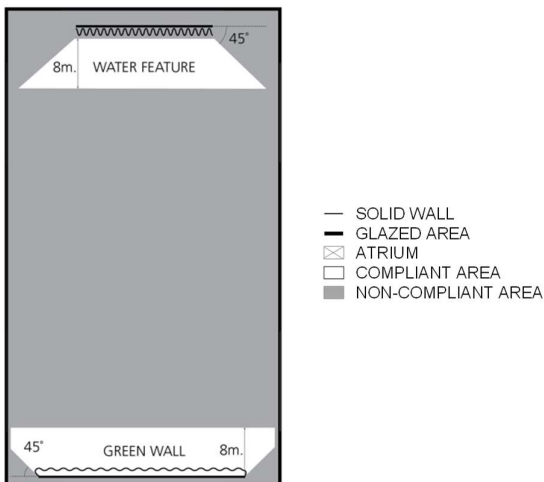


### 3.2.4 High Quality Internal Views

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 7: 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

Please refer to the Submission Guidelines for documentation requirements.

## 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.



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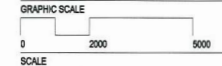
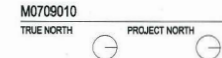
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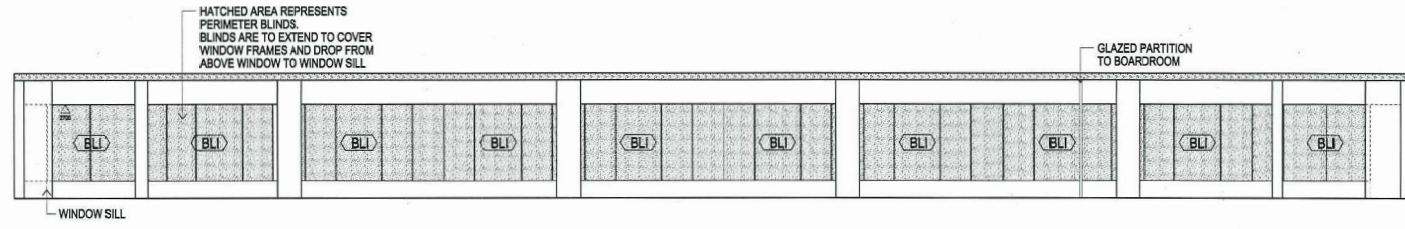


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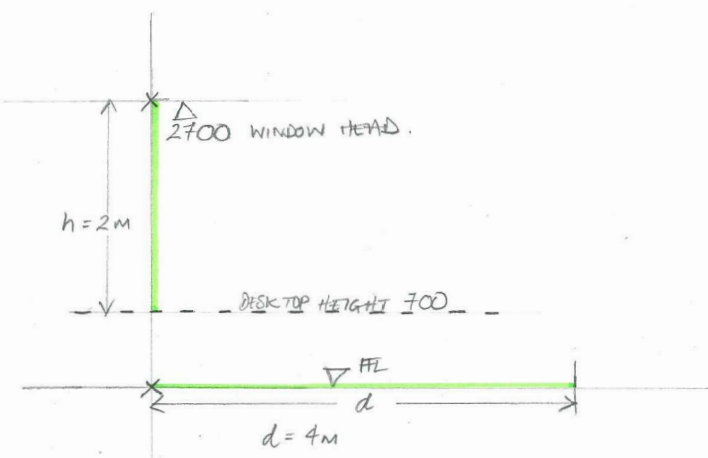
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 DRAWING

PERIMETER BLIND  
 ELEVATION PLAN

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 1:100



*Calculating the Zone of Compliance.*

Depth of the zone of Compliance =  $h \times 2 = 4m$  \*  
 'w' width of the Zone of compliance = width of glazing \*\*  
 Zone of Compliance =  $h \times 2 \times w$

\*  
 The zone of Compliance may not be drawn past solid or glazed partitions.

\*\*  
 Any column or mullion < 0.5m in width can be disregarded and the glazing is treated as continuous.

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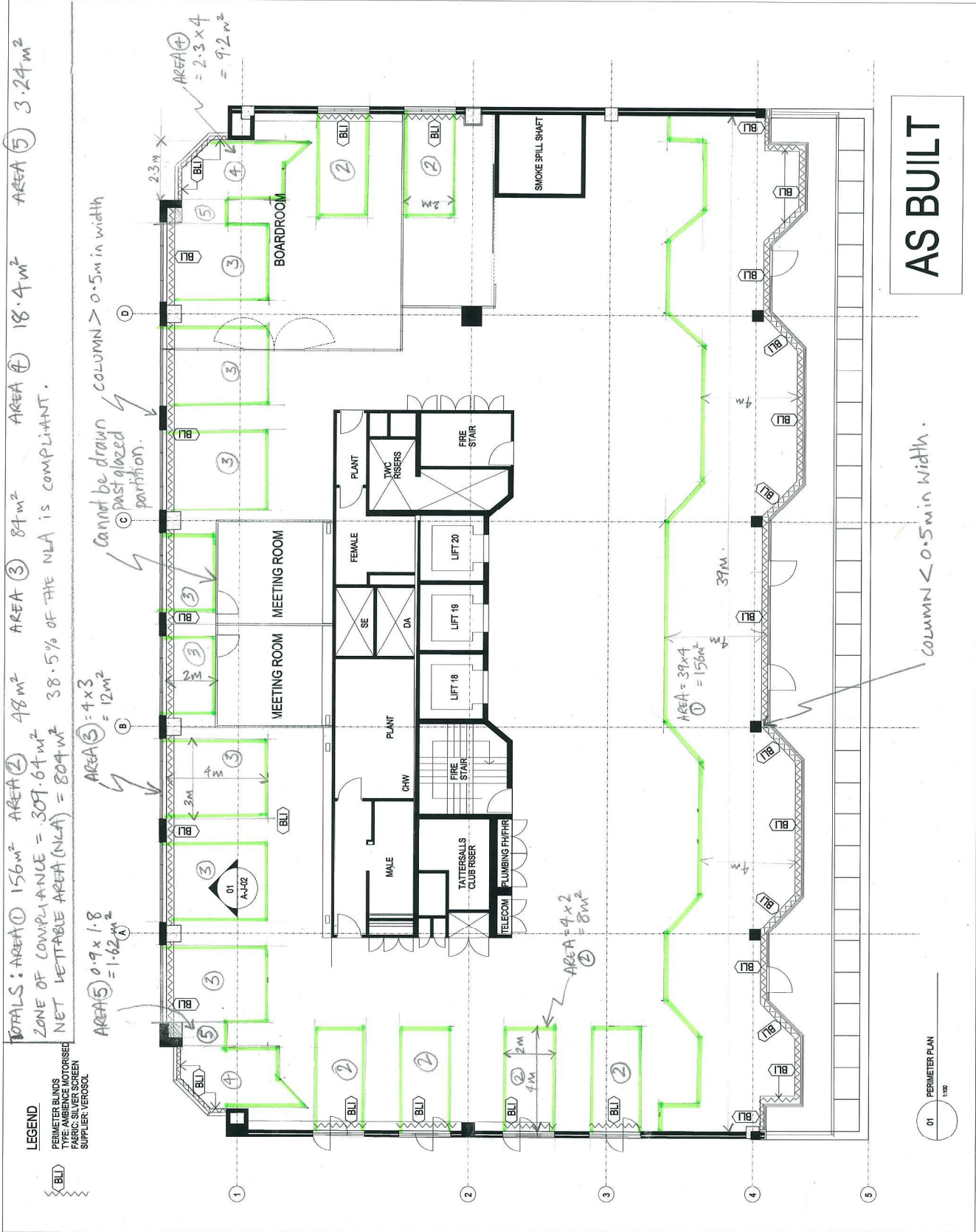
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PERIMETER BLIND PLAN

DRAWING NUMBER

ISSUE

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## 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.



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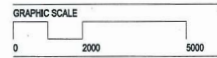
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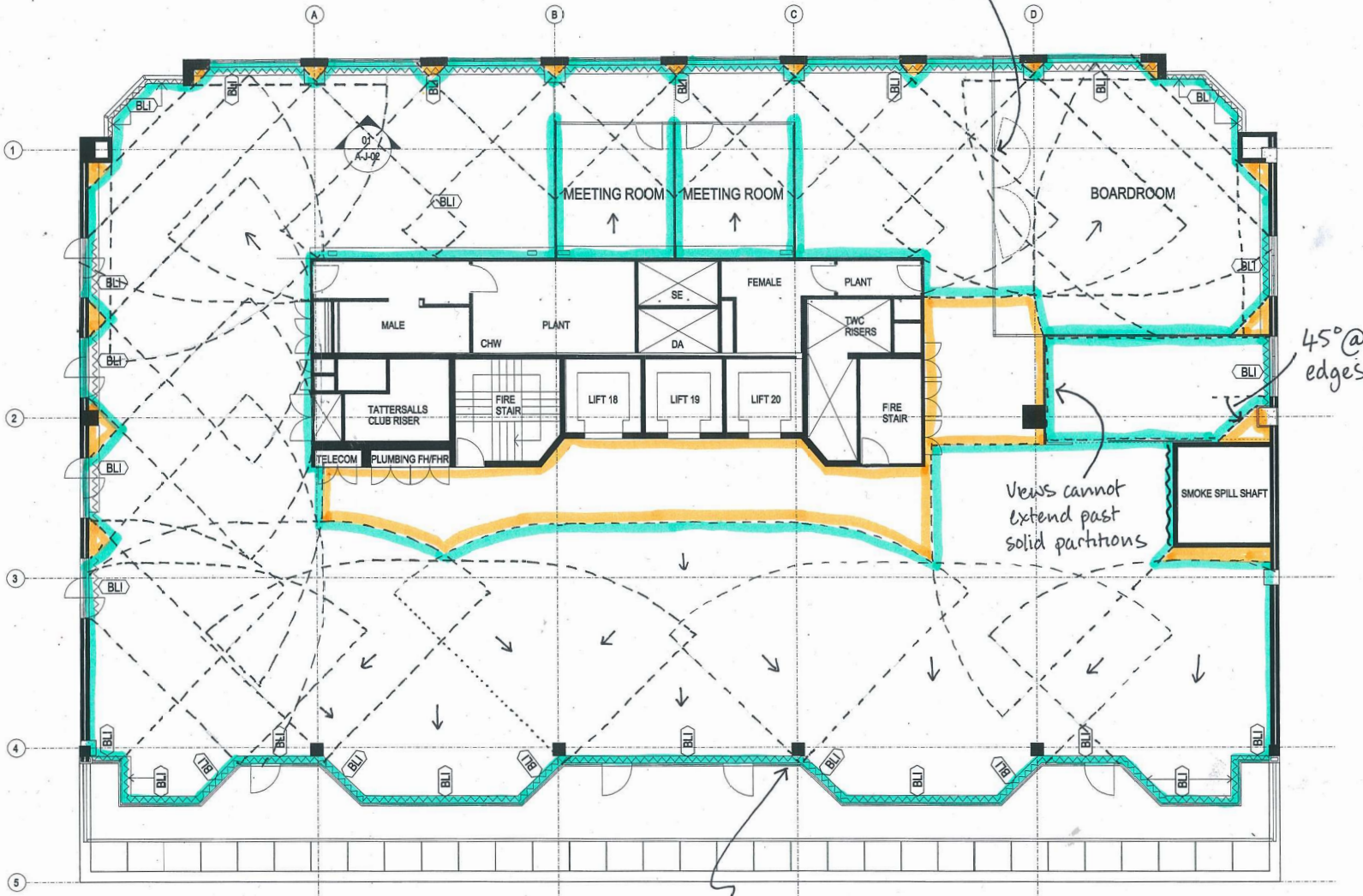
A-J-01 A

LEGEND

BLI PERIMETER BLINDS  
TYPE: AMBIENCE MOTORISED  
FABRIC: SILVER SCREEN  
SUPPLIER: VEROSOL

- Views
- No views

Internal, fully glazed  
partitions ignored



45°@  
edges

Views cannot  
extend past  
solid partitions

Columns ignored

**AS BUILT**

01 PERIMETER PLAN  
1:100