ECOGLO INTERNATIONAL LIMITED

Designers' Handbook for

Ecoglo S20 Photoluminescent Signs

To meet the requirements of NZBC F8 'Signs'

ecoglo®

VISIBLY BETTER

This handbook provides guidance for designing systems using Ecoglo S20 photoluminescent exit signs to meet the requirements of NZBC Clause F8 'Signs'.

www.ecoglo.co.nz

V19.3

Introduction

Ecoglo S20 photoluminescent exit signs (S20 signs) can provide low cost, reliable, low carbon footprint, low maintenance, long life exit signage in and around buildings. Ecoglo International Ltd provides a 30 year warranty for these signs when installed indoors.

However, because S20 signs require available light to charge them sufficiently to ensure they remain code compliant, they are not suitable in all situations. In situations where S20 signs are not suitable, Ecoglo Hybrid photoluminescent exit signs (Hybrid signs) can be used.

Ecoglo Hybrid signs have a fully integrated dedicated electrical light source that ensures the photoluminescent material is always sufficiently charged. Because they do not require a battery, they require less inspection and maintenance than conventional battery-back-up electrical exit signs, and because they have fewer electrical components they can be expected to be more reliable, and last longer than conventional battery-back-up electrical exit signs.

However, Ecoglo Hybrid signs are more expensive and have a shorter life than Ecoglo S20 signs, so the best system for any specific project will use S20 signs wherever suitable, and Hybrid signs elsewhere, rather than Hybrid signs throughout.

This document provides specific design advice to show where Ecoglo S20 signs are appropriate to be installed to meet the New Zealand Building Code (NZBC) for Risk Group C buildings (as defined in NZBC Clause F6) where the fire safety design has been carried out in accordance with an Acceptable Solution (C/AS1-7).

In locations where Ecoglo S20 signs are not appropriate, Ecoglo Hybrid signs can be used. Refer to the Ecoglo Hybrid Exit Sign Compliance Report, available for download from www.ecoglo.co.nz.

For an overall technical justification for the use of Ecoglo S20 signs in New Zealand and a greater level of technical detail, refer to Technical Justification for Ecoglo S20 Signs document, available for download from www.ecoglo.co.nz.

1. Suitable spaces for S20 signs

Indoor Spaces

1) Dead-end spaces (a dead-end space does not have exit signage directing people into it) and primary access spaces (a primary access space will be occupied whenever it could be used as an escape route from another space) that will always be lit by daylight or electrical lighting when that part of the building is occupied, for example:

- classrooms
- changing rooms
- toilets
- store rooms
- plant rooms
- reception areas
- office areas
- assembly areas, gymnasiums, etc. that are not used for lights-out performances

2) Walk-through spaces (normally unoccupied), for example:

- corridors
- interconnecting lobbies
- cloakrooms
- stairwells

Walk-through spaces that are normally unoccupied **must** have light switching controls to ensure whenever the building is occupied, the spaces will be sufficiently lit with daylight and/or the supplied lighting.

See the drawings in Appendix 2 for examples of dead end spaces, primary spaces and walk through spaces.

Suitable light switching controls include:

- Lighting is switched on whenever the building's security alarm system is de-activated. It would seem reasonable to consider this to be deemed equivalent to '5 minutes before occupation' in many circumstances;
- Lighting is switched on by a conservatively-programmed timer;
- A master switch is turned on by the first occupier that turns on all the required lighting;
- Lighting is switched on manually (only suitable for staff-only areas - staff induction requires first occupier to switch on lighting, and clear instruction signs are permanently located by all relevant light switches. See Appendix 1).

Individual lights may have daylight sensing switching so they do not activate when there is sufficient natural light available.

Outdoor spaces

Outdoor daylight provides much greater charging of Ecoglo signs than building interiors, so that electric lighting is not normally needed to charge up Ecoglo exit signs installed outside of built structures. This includes locations that are up to 4m inside a roof overhang.

When an S20 sign is installed outdoors, and needs to be visible 24/7, it is suitable for a viewing distance 50% (half) of its rated maximum viewing distance.
If the sign does not need to be seen 24/7, it can be used at its full rated maximum viewing distance for a period of 7 hours after sunset.
[See Section 3.3 of the Technical Justification for Ecoglo S20 Signs document (Technical Justification Alternative Solution for Ecoglo S20 Photoluminescent Exit Signs), available for download from www.ecoglo.co.nz, for a full justification of this.]

Therefore, with due regard for the appropriate viewing distances, Ecoglo S20 signage can be specified and installed outside without the need for electrical lighting to provide charging.

Note that 'outdoor coated' Ecoglo S20 signs are to be used in outdoor spaces. The coating is designed to protect the sign's print from fading and deteriorating in outdoor conditions (the photoluminescent material is naturally robust in outdoor conditions).

2. How much light is required on signs installed indoors?

Use the following table to determine how much light is required, and whether it needs to be switched on prior to occupation.

How much natural light through windows or skylights is on the face of the sign?	Is lighting in the space turned on prior to occupation?	How much light (with a colour temperature of 4000K or greater) is required on the face of the sign from the installed lighting?[3]
55 lux for at least 6 hours a day	No	55 lux[1,2]
20 lux for at least 6 hours a day	No	100 lux[1,2]
20 lux for at least 6 hours a day	Yes – 5 minutes before occupation	55 lux[1,2]
Less than 20 lux	No	200 lux[1]
Less than 20 lux	Yes – 5 minutes before occupation	100 lux
Less than 20 lux	Yes – 10 minutes before occupation	55 lux

Notes:

1. The space that the exit sign serves must have an evacuation time no more than 10 minutes. Most 1-2 storey buildings in NZ will have evacuation times less than 10 minutes (see Appendix 3).
2. The installed lighting does not need to be switched on if natural light provides the same lux.
3. See Appendix 3 of the Technical Justification for Ecoglo S20 Signs document, available for download from www.ecoglo.co.nz, for detailed justification of the required light levels.

3. How can the designer ensure the lighting is sufficient and suitable for signs inside buildings?

By confirming the following:

1) The Dedicated Light Source* for the S20 signs inside the building consists of the installed electrical luminaires that are within 4m of each S20 sign.
2) The colour temperature of each Dedicated Light Source is 4000K or greater.
3) The illuminance from each Dedicated Light Source is sufficient:
   - This has been checked using a lighting model for the building; or
   - This has been checked using onsite measurements; or
   - This has been checked based on comparison with similar designs such as those shown in Appendices 4 and 5.

*Dedicated Light Source: means a new or existing designated light source or designated group of light sources that are assigned to charge one or more Photoluminescent Exit Signs when natural daylight is below the Charging Illuminance Level (as defined in Photoluminescent Lighting Council Standard PLCS101 Photoluminescent Exit signs, Part A: Definitions)

If the lighting is sufficient and suitable, and the space is suitable, Ecoglo S20 signs can be specified because they meet the requirements of NZBC Clause F8.
See Appendix 4 for example lighting models in daylight, and Appendix 5 for example lighting models with electric lighting.

4. Recommended Compliance Schedule Information

Specified System SS15/4 Exit Signs
[only required if any of specified systems 1-6, 9, or 13 are required in the building]

System Description
Photoluminescent exit signage

Make
Ecoglo

Product Code and Quantity
See drawing(s) titled "XXXX", attached.

Location
To identify escape routes as per the Fire Report

Relevant Performance Standard
NZBC Clause F8.3.1 and F8.3.3 as they relate to exit signage.

Relevant Inspection and Maintenance Standard
Photoluminescent Lighting Council Standard PLCS101 Photoluminescent Exit signs, Part C: Inspection and Maintenance. The relevant requirements are detailed below.

Inspection and Maintenance Procedures
Planned preventative maintenance and responsive maintenance should be carried out in accordance with the corresponding table below to ensure signs remain correctly positioned and legible.

Action	Complete
All signs are still configured as at installation and there is no material damage to any of these products.	
All signs are clean from general dust build up and any other specific obscuring deposits.	
All signs are clearly visible and have not been covered up.	
All lights within 4m of **internal** Ecoglo S20 exit signs have been checked that the positions have not altered from design.	
All lights within 4m of **interna**l Ecoglo S20 exit signs are in working order and clean.	
All light switching control systems are operational as per design. (Specify the light switching control systems)	

Monthly:
Inspect the system and carry out any maintenance necessary to confirm each statement in the corresponding table.

Annually:
Inspect the system to confirm each statement in the corresponding table.

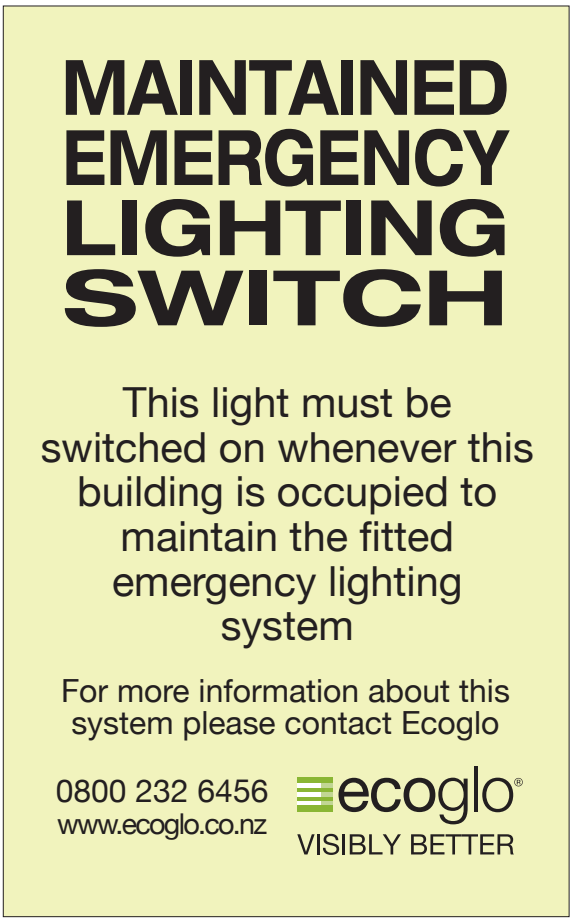
Immediate corrective action
Signs shall be replaced before they become illegible, and shall be replaced immediately should they be missing. Defects in illuminated signs shall be fixed immediately as they are apparent.

Reporting procedure
All inspection and maintenance records of the above work are to be held on site in a durable, hard-bound log book, and are to be available to any authorised inspection agency.

Responsibilities
Monthly inspections and maintenance are to be carried out by the owner or their appointed agent.
Annual inspections are to be carried out by an Independent Qualified Person. Inspection and maintenance records are to be maintained by the owner or their appointed agent.

Appendix 1

Example of Instruction Sign to be placed by Light Switch

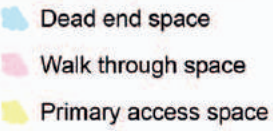


Appendix 2

Examples of dead-end spaces, walk through spaces and primary access spaces

Fig. 1.

Typical small scale medical office. The corridor is not normally occupied.



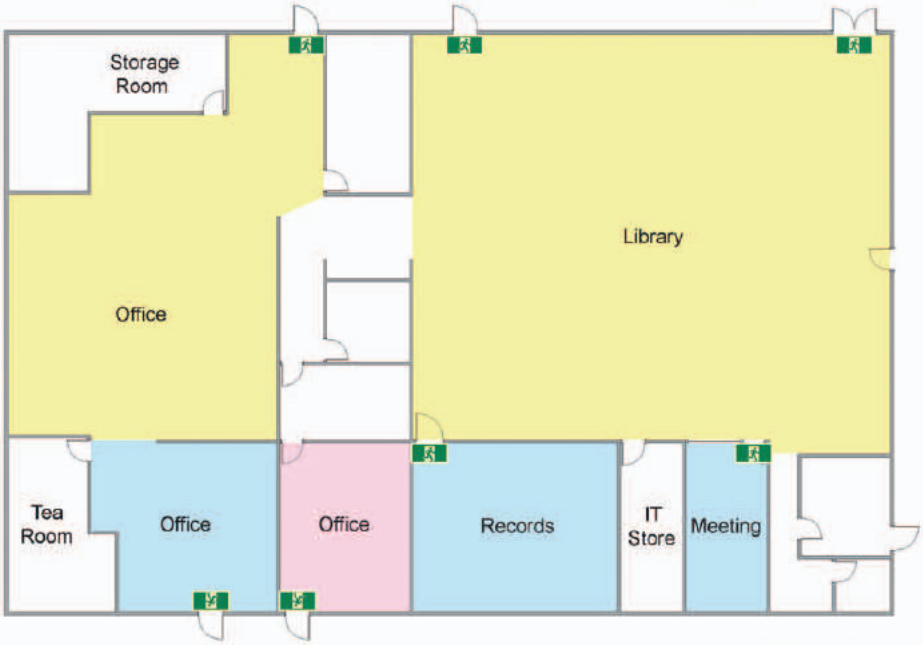


Fig. 2.

School Library and Admin area. The pink office space may not be occupied when used as an escape route from the adjoining office space.

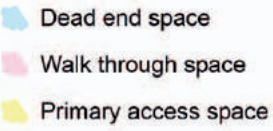


Fig. 3a.

Typical early childcare centre. Some exit signs are in spaces that are not always occupied.

Dead end space
Walk through space
Primary access space

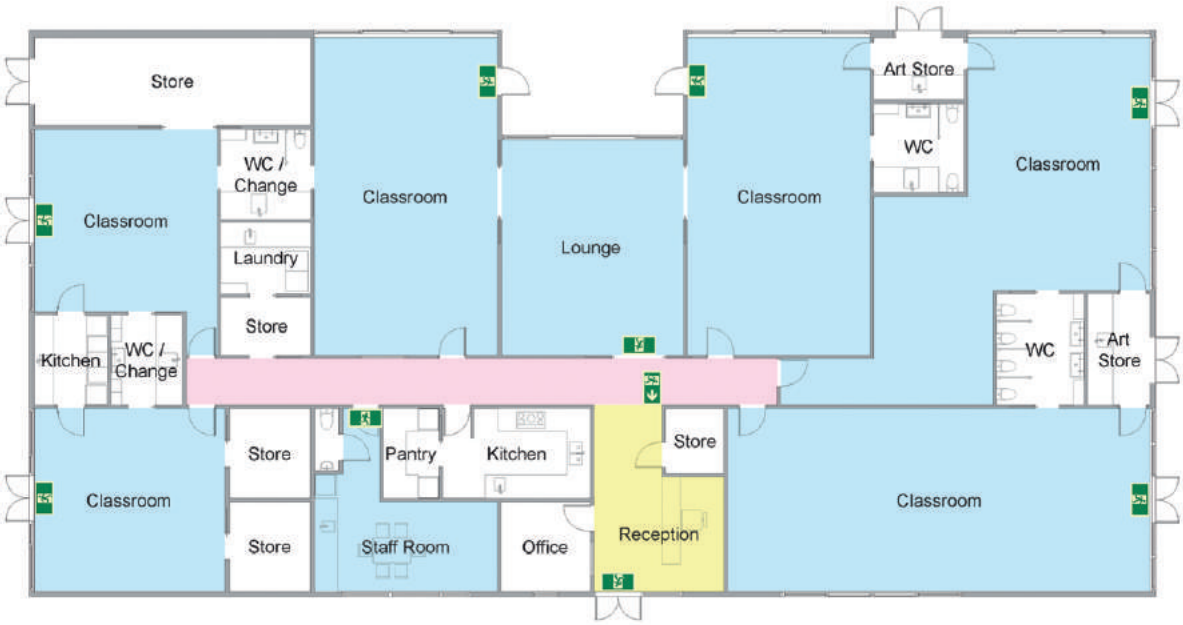


Fig. 3b.

Same building as 3a. above, but used for after school activities.

Dead end space
Walk through space
Primary access space

Fig. 4a.

A warehouse building where the escape route from the main warehouse passes through a normally unoccupied space.

Dead end space
Walk through space
Primary access space

Fig. 4b.

A warehouse building where the escape route from the main warehouse area is not through an unoccupied space

Dead end space
Walk through space
Primary access space

Fig. 5a.

School Block

Dead end space
Walk through space
Primary access space

Fig. 5b.

School Block where the escape routes are through adjacent classrooms that may not be occupied.

Dead end space
Walk through space
Primary access space

Appendix 3

Evacuation Time Examples

Refer to the New Zealand Building Code Clause C/VM2 for further details and explanations of terms used here.

RSET can be calculated in accordance with Clause C/VM2, using values of zero for Td and Tn, since occupants will be immediately aware of a black-out requiring evacuation. For photoluminescent exit signage, the relevant 'evacuation time' is the time between when the lighting fails (requiring the photoluminescent properties of the sign to provide adequate identification of the escape route) and the occupant leaves the space that the exit sign serves. Looking at table 3.3 in C/VM2, a conservative pre-travel activity time would be 60 seconds. A conservative travel speed can be taken as 1m/second, (including stairways no steeper than 180mm riser, 280mm tread), and a conservative flow rate at a doorway is 50 people per minute per door leaf. An escape route serving up to 100 people through single leaf door sets and up to 120 metres long would have an evacuation time of 3 minutes. An assembly space with capacity for 450 people will require 3.2m of exit door width (which could be two double doors), so if one of these is unusable the evacuation time would be about 5 minutes. If the space had three double doors, the evacuation time with one of these unusable would be 3-4 minutes. This indicates that an evacuation time of less than 10 minutes is realistic in many Risk Group C buildings.

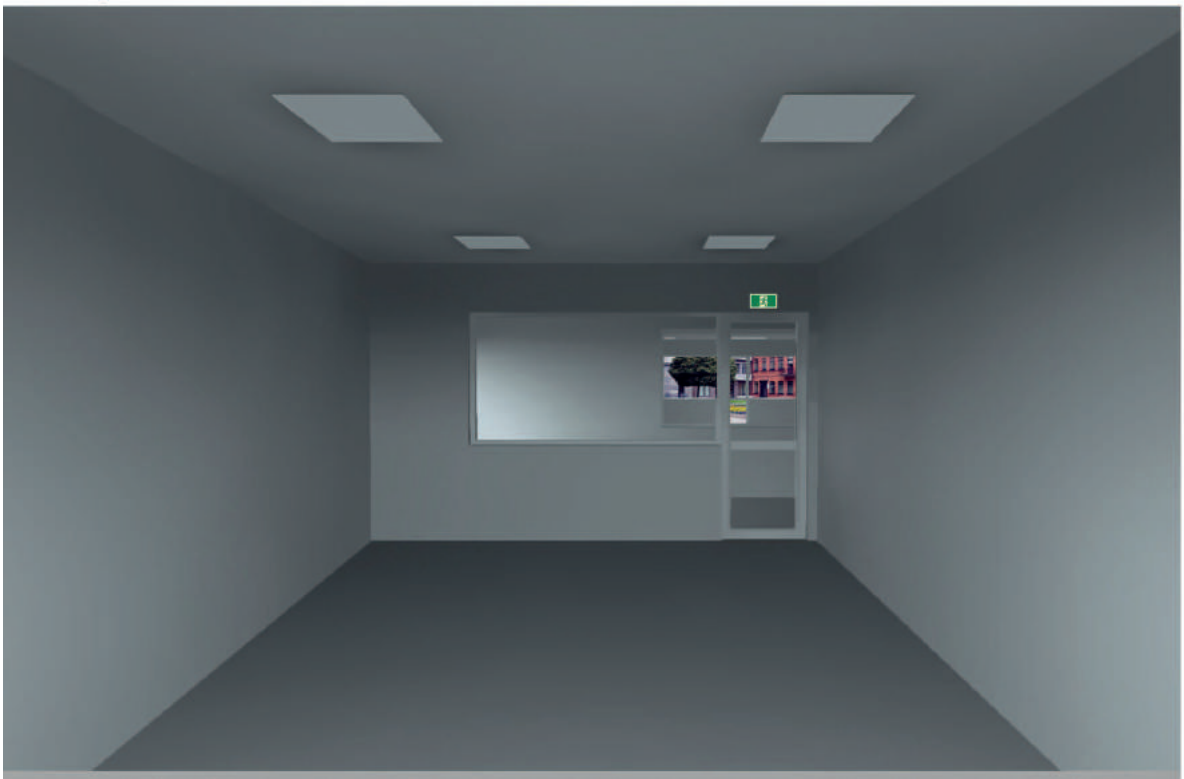
Appendix 4

Lighting Models - daylight

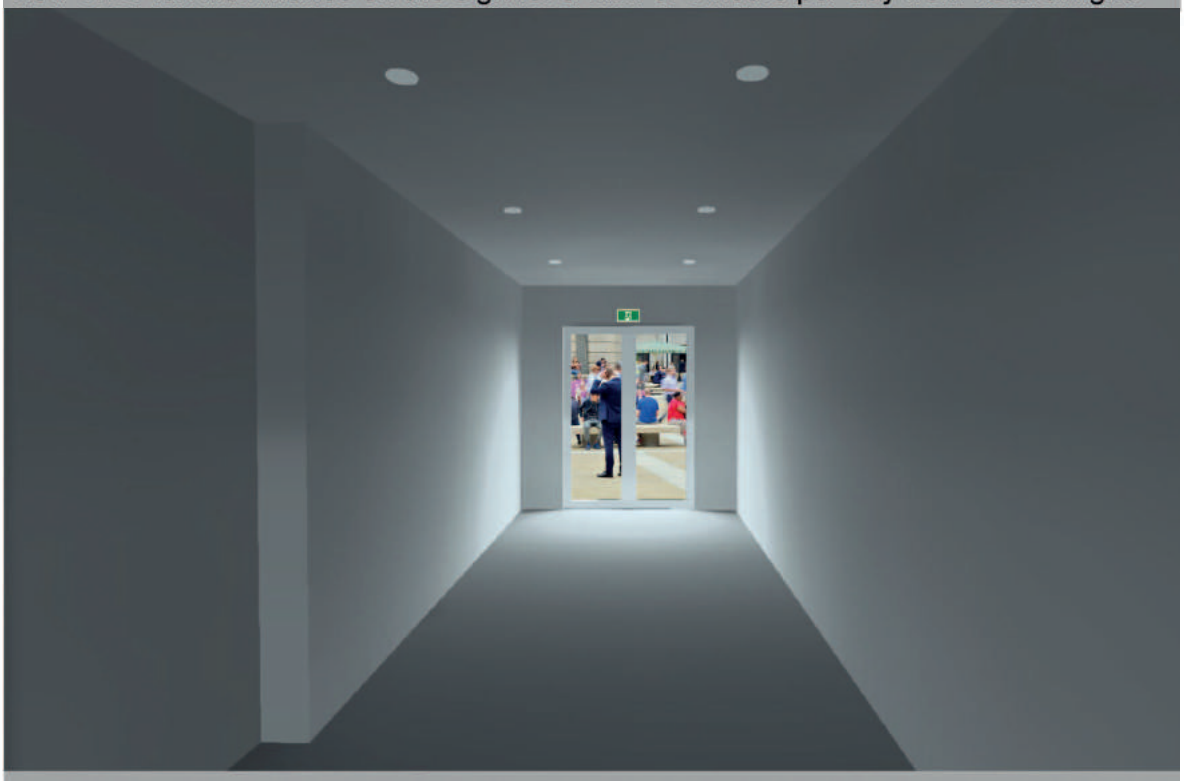
Room layout used for natural lighting model (electric lights turned off)

View 1. 65 lux illuminance on the sign for a min. of 6 hours per day from natural light.

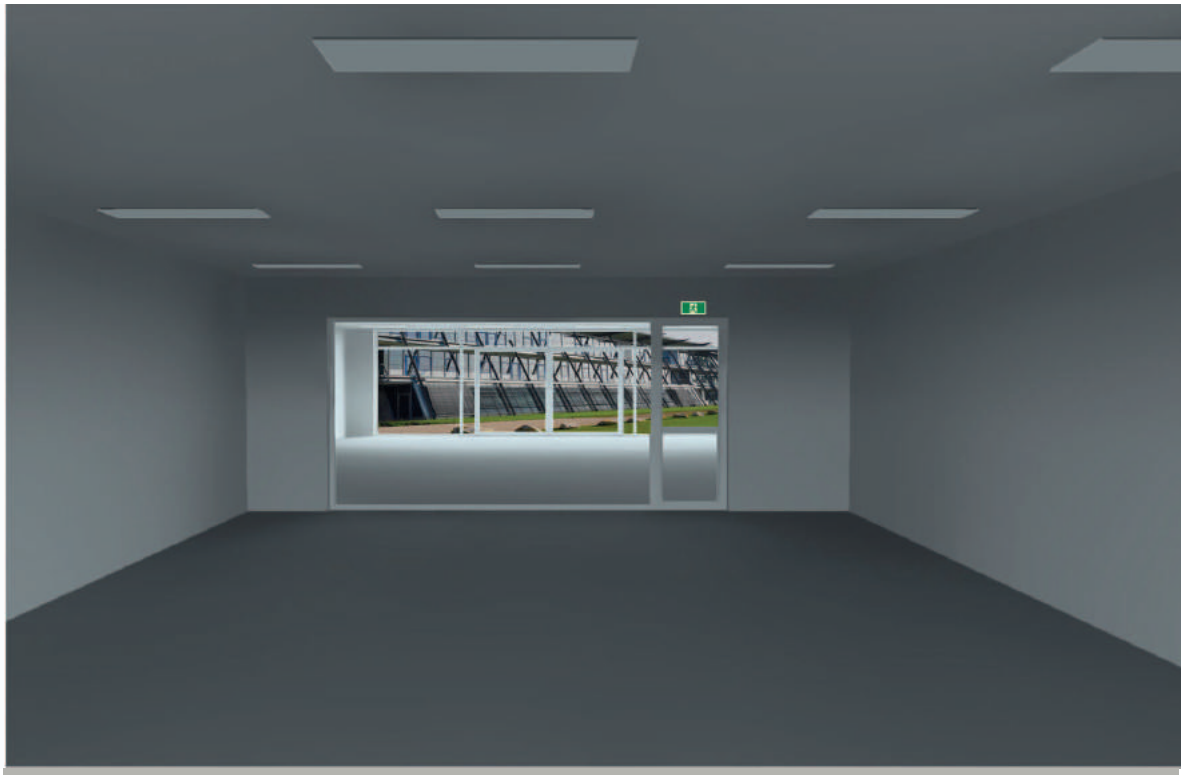
View 2. 40 lux illuminance on the sign for a min. of 6 hours per day from natural light.



View 3. 25 lux illuminance on the sign for a min. of 6 hours per day from natural light.



View 4. 30 lux illuminance on the sign for a min. of 6 hours per day from natural light.

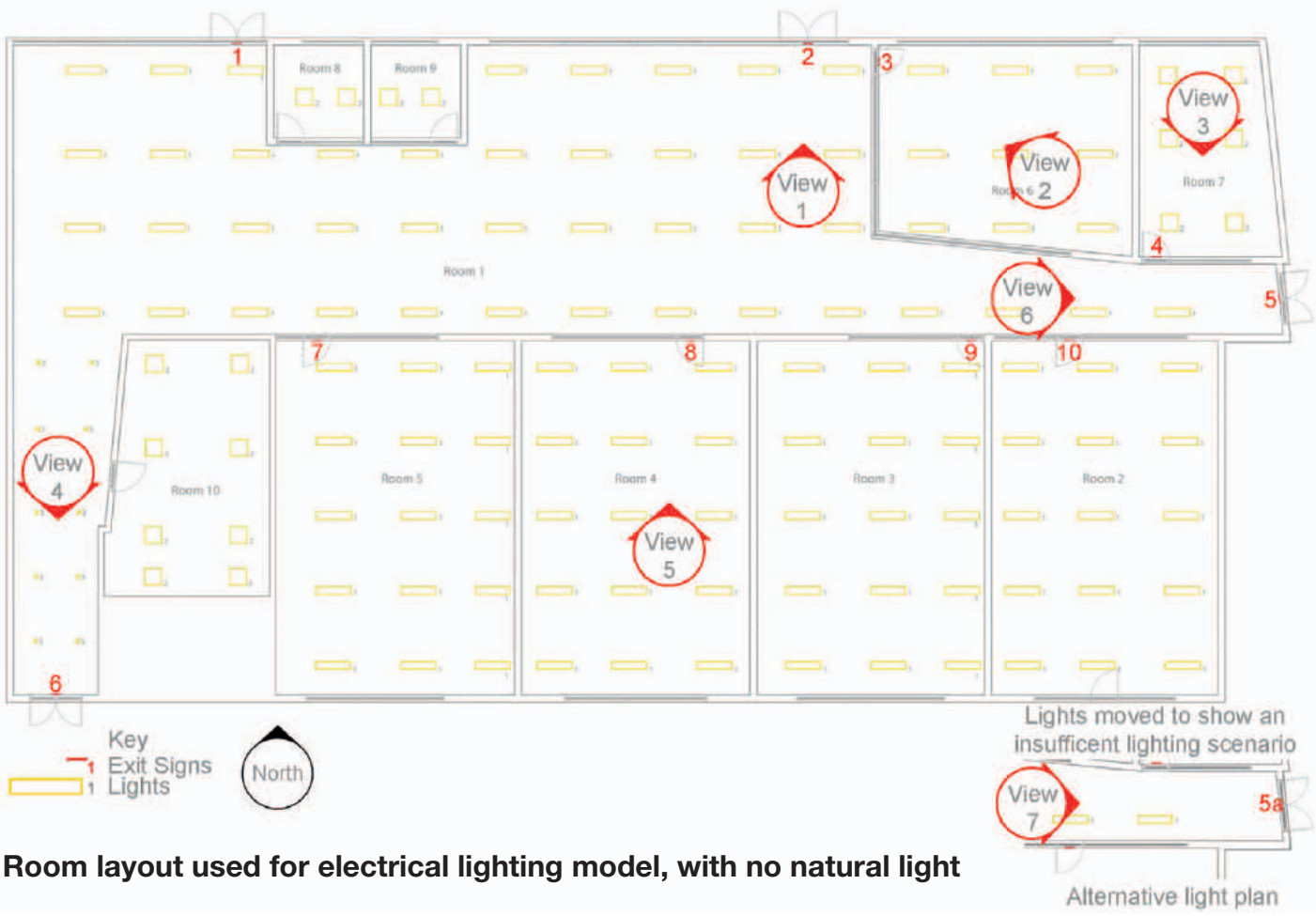


View 5. 5 lux illuminance on the sign for a min. of 6 hours per day from natural light. Insufficient natural lighting scenario

View 6. 20 lux illuminance on the sign for a min. of 6 hours per day from natural light.

Appendix 5

Lighting Models - electric lighting



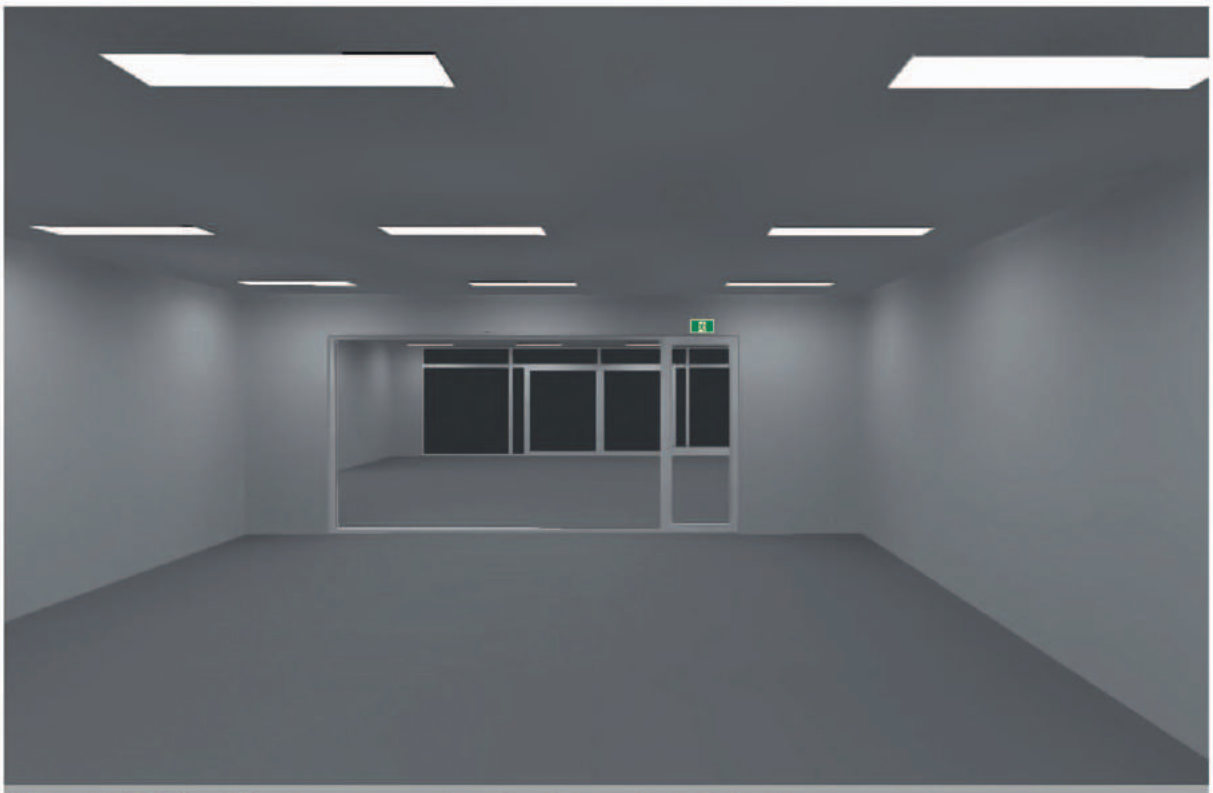
Room layout used for electrical lighting model, with no natural light

View 1. 167 lux illuminance on the sign from electric lighting.

View 2. 136 lux illuminance on the sign from electric lighting.

View 3. 214 lux illuminance on the sign from electric lighting.

View 4. 98 lux illuminance on the sign from electric lighting.



View 5. 258 lux illuminance on the sign from electric lighting.

View 6. 65 lux illuminance on the sign from electric lighting.

View 7. 50 lux illuminance on the sign from electric lighting. Insufficient lighting scenario.

Lighting model details

Luminaire Parts List								
	Manufacturer	Luminaire type	Item number	Fitting flux	Luminous factor	Light loss load	Connected	Quantity
1	Versalux Pty Ltd	ASTI series Opal LED panel luminaire	ATP.L140.4080.22-800	1x	3223 lm	0.80	32W	112
2	Versalux Pty Ltd	ASTI series Opalescent LED panel luminaire 800mA driver setting	ATP.M140.4080.22-800	1x	3175 lm	0.80	32W	18
3	Nimbus Lighting Group	Aesthetics Lighting Turama LED Downlight	TM3598P/40/A937-FG/01	1x	2690 lm	0.80	34.9W	10

Measured illuminance values on the face of the signs in the lighting model

Name	Illuminance on the sign from electric lighting	Illuminance from daylight (for a minimum of 6 hours per day throughout the year)
Exit sign 1	314 lx	65 lx
Exit sign 2	167 lx	65 lx
Exit sign 3	136 lx	40 lx
Exit sign 4	214 lx	25 lx
Exit sign 5	65 lx	20 lx
Exit sign 5a	50 lx	20 lx
Exit sign 6	98 lx	30 lx
Exit sign 7	272 lx	10 lx
Exit sign 8	258 lx	5 lx
Exit sign 9	416 lx	5 lx
Exit sign 10	250 lx	5 lx

Dialux model uses	70% Ceiling reflectance
	50% Wall reflectance
	20% Floor reflectance

Lighting has been designed to meet Ministry of Education requirements

ECOGLO INTERNATIONAL LIMITED

ecoglo®

VISIBLY BETTER

Phone: 03 348 3781 **Email**: info@ecoglo.com

www.ecoglo.co.nz