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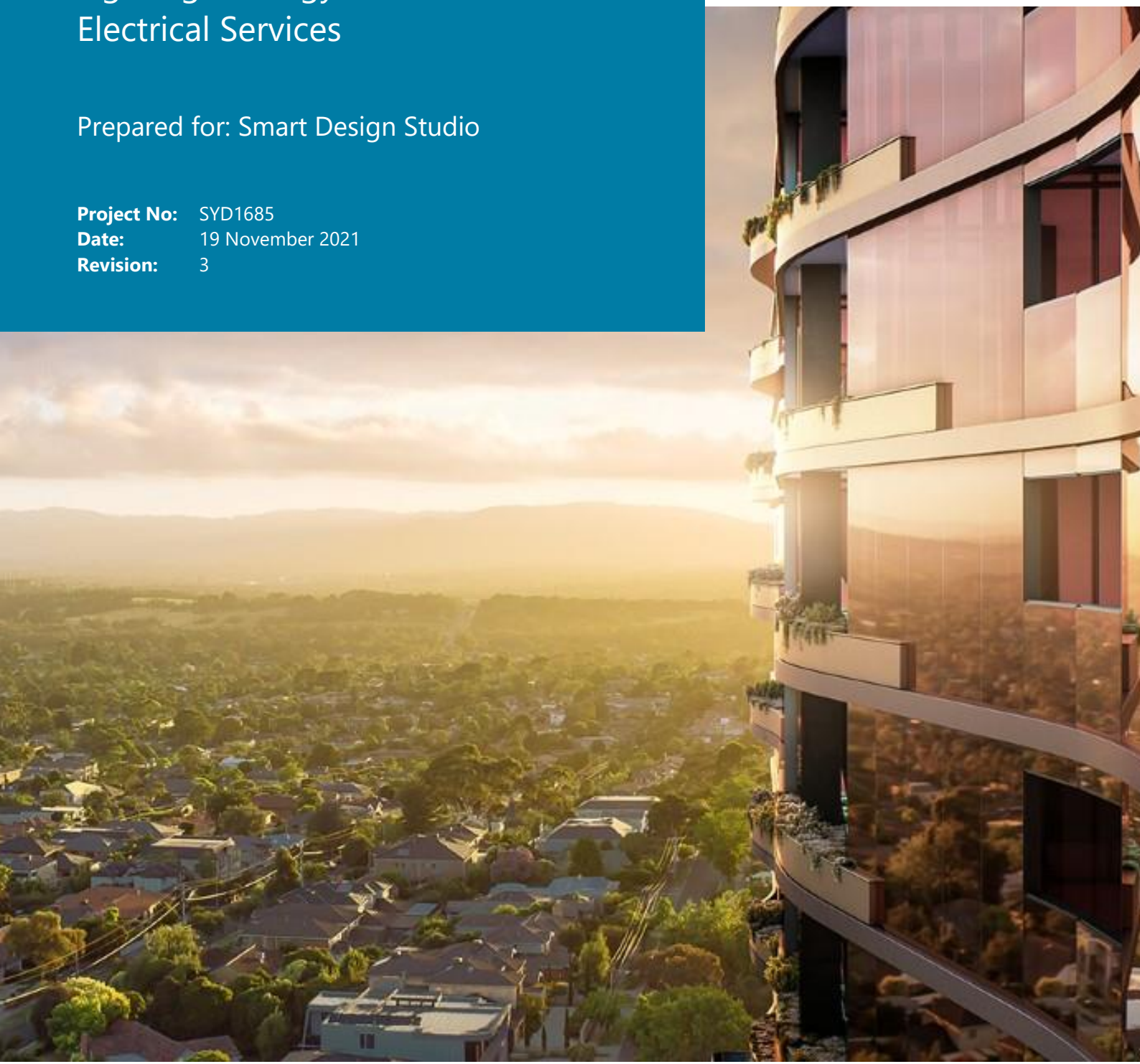
Consulting : Engineering

SCEGGS Adaptive Re-use of Wilkinson House

Lighting Strategy
Electrical Services

Prepared for: Smart Design Studio

Project No: SYD1685
Date: 19 November 2021
Revision: 3



Project:	SCEGGS Adaptive Re-use of Wilkinson House
Location:	215 Forbes St, Darlinghurst, NSW 2010
Prepared by:	ADP Consulting Pty Ltd Level 3, 8 Spring Street Sydney NSW 2000
Project No:	SYD1685
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Executive Summary

The following report documents the proposed lighting strategy to be adopted for the SCEGGS Adaptive Re-use of Wilkinson House. The Lighting strategy will help to address the technical requirements (Item 5),

"Provide an analysis of proposed lighting that identifies lighting on-site that will impact surrounding sensitive receivers and includes mitigation management measures to manage any impacts."

of the Secretary's Environmental Assessment Requirements (SEARs), in support of the SSD-19989744.

The lighting strategy identifies three (3) key areas where the light spill has an opportunity to negatively impact neighbouring sensitive receivers.

- The indoor recreational facility
- The Southern extension
- The Rooftop Courtyard

The strategy document addresses the above point by allowing for the selection of light fittings in these areas with

- precision optics and locating fittings within the space to indirectly light surface requiring illumination.
- Lighting control in the form of motion detectors and time clocks to switch off or dim fittings outside of school operating hours

SCEGGS Wilkinson House Redevelopment *Source: SCEGGS Client Presentation*

1. Introduction

ADP has been engaged by Sydney Church of England Girl's Grammar School (SCEGGS), Darlinghurst (the Applicant), via Smart Design Studio (the Architect), to prepare this lighting strategy report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD-19989744 for Adaptive Re-use of Wilkinson House at SCEGGS, Darlinghurst.

Specifically, this report addresses the following SEARs:

Table 1: Sears Matrix Item 5

SEARs	Report Reference
Item 5	Contents in this Report in particular:
Provide an analysis of proposed lighting that identifies lighting on-site that will impact surrounding sensitive receivers and includes mitigation management measures to manage any impacts.	Page 8 – Sensitive Receivers Page 16 – Indoor Recreational Facility Page 17 – Level 3 Courtyard Page 18 – Southern Extension

Contained within this document is a summarised written description on the lighting strategy to be adopted to the Adaptive Re-use of Wilkinson House. This document also aims to identify the recommended lighting levels and specific requirements as laid out in the Australian Standards and will be used as a guide for the detailed design development.

The intent of this document is not to serve as a specification, a bill of materials nor provide a selection of fittings or services.

1.1 SCEGGS Campus and the surrounding context

The site is located within the highly urbanised inner-city Sydney suburb of Darlinghurst. Darlinghurst is located approximately 1.5km east of the Sydney CBD.

The locality immediately north, south, and east of the campus boundaries consists of two to three storey terrace housing with interspersed small to medium size commercial, retail and workshop facilities.

The locality immediately to the west of the campus boundary consist of medium rise to high rise residential and mixed-use buildings, including the Horizon Apartments.

The SCEGGS Darlinghurst campus comprises of primary school, secondary school buildings for general learning, recreational facilities, performance arts, specialist learning, performance arts and administration buildings. The principal street address for the SCEGGS campus is 215 Forbes Street, Darlinghurst. The campus is located between Forbes Street, to the east, St Peter's Lane, to the north and Bourke Street to the west. The secondary school is accessed from Forbes Street, whilst the access to the primary school is via Forbes Street.

1.2 Description on Site

The SCEGGS campus is approximately 1.476 hectares spread over three (3) allotments as detailed in Table 2.

Table 2: SCEGGS Campus Allotments

Address	Legal Description
215 Forbes Street	Lot 200//DP1255617 Lot 1//DP1586075
161 Forbes Street	Lot 1//DP557311

It is noted that the Wilkinson House is located at the north-east portion of Lot 200//DP1255617 on the corner of corner of St Peter's and Forbes Street. Refer to Figure 2 for more detail.

Figure 1: SCEGGS Campus *Source: SIX Maps*

Key school elements that surround the site within the SCEGGS campus include:

- The recently developed Joan Freeman Science, Art, and Technology Center to the west.
- The Centenary Sports Hall to the south.

> The Diana Bowman Performing Arts Center to the north.

Figure 2: Key surrounding elements *Source: Google Maps*

1.3 Project Description

The proposed works comprise of the following:

> Demolition of existing internals of the Wilkinson House to support new General Learning Areas, Meeting and Staff rooms.

> Excavation and expansion of the basement to support a new indoor Recreational Facility.

> Reconfiguring the roof space to support new General Learning Areas and Mixed-use Spaces.

> A southern extension of the building to accommodate new meeting room and Lift to facilitate disability access to all levels of the site.

2. Lighting Strategy

2.1 Aspirational Brief

The lighting design for the Redevelopment aims to achieve the following:

- Provide a discrete and elegant lighting solution that will preserve the aesthetic qualities and enhance the heritage character of the Wilkinson House.
- Provide a sustainable lighting solution that is adaptable and responds to site conditions as required.

The aspirations of the overall lighting design will be delivered via a careful selection and placement of light fittings, in line with best practices and Australian Standards and support the various functionalities of the Redevelopment's internal and external spaces. The design aims to achieve a high visual comfort, whilst seamlessly integrating with the building fabric and the surrounding environment. The lighting design will also consider the following key points:

- Co-ordination with emergency, fire, and life safety services
- Energy efficiency
- Technology
- Reliability
- Cost-effectiveness

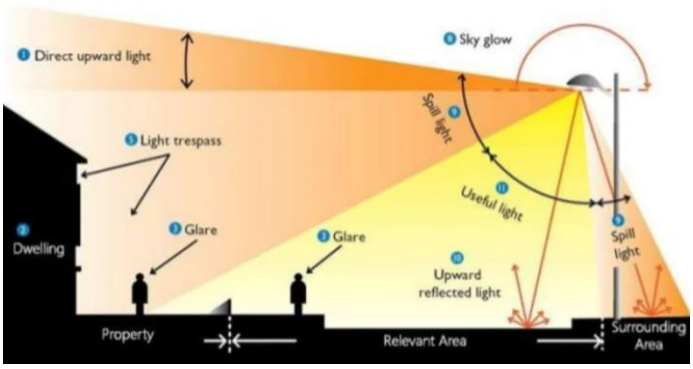
2.2 Energy

The design of the artificial lighting system will consider a holistic approach to achieve a solution that is both energy efficient and sustainable.

2.3 Sensitive Receivers

The locality immediately to the west of the campus boundary consists of medium to high rise residential and mixed-use buildings, including the Horizon Apartments. These localities can be considered as sensitive receivers due to their proximity to the Wilkinson House. The design of the artificial lighting system will focus the selection of light fittings with precision optics to deliver appropriate illumination where required, whilst mitigating the impacts of light pollution into the night sky and spill lighting in the direction if Sensitive Receivers in compliance with AS4282. The lighting design will also consider a lighting control strategy that allows for dimming and switching off light fittings in areas likely to negatively impact sensitive receivers outside of school operating hours.

Figure 3: Spill Lighting, Glare and Sky Glow *Source: SlideShare*



2.4 Lighting Design Objectives and Guidelines

The design objective is to respond to the client brief whilst adopting best practice recommendations in accordance with the relevant Australian Standards and the Building Code of Australia as listed below:

- Building Code of Australia NCC 2019 Amdt 1
- AS4282 – Control of the Obtrusive Effects of Outdoor Lighting
- AS1680 – Safe Movement and Interior Lighting
- AS2560 – Sports Lighting

2.5 Quantitative and Qualitative Lighting Design Criteria

The interior lighting design will consist of multiple lighting elements working together within and between spaces to tie each space and ultimately the building together as one cohesive entity. The lighting elements can be broken down into the following types:

- Base light fittings will be used to provide ambient light that is uniform throughout the space.
- Accent light fittings will be used to deliver illumination to dedicated task areas, wall features or other features in the room requiring emphasis. These fittings could be in the form of
  - task or floor standing lamps
  - pendant lights over meeting tables or stairwells
- Cove light fittings will used to indirectly light walls and ceiling surfaces.
- Wall lights can be used in place of cove light fittings where ceiling mounted light fittings are impractical.

Figure 4: Lighting types Left to Right; Base Lighting, Accent Lighting, Cove Lighting & Wall Lighting *Sources: Pinterest*

Table 4 details recommended lux levels to spaces as per Australian Standards AS 1680. It is to be noted that these lighting levels are recommendations only. Actual lighting levels will depend on room composition and specific lighting requirements for the space.

Table 3 Recommended Lighting Levels as per AS1680

Room description	Recommended Lux Levels
Entrance, Lobbies and Foyers	80 lux
Circulation areas incl. ramps	40 lux
Stairwells and Lifts	80 lux
Amenities	80 lux
Staff Rooms	240-320 lux
General Learning Areas	240-320 lux
Meeting Rooms and Break-Out Rooms	240-320 lux
Level 3 Rooftop Courtyard	80 lux
Gymnasium Multipurpose Court	240-320 lux

2.6 Lighting Design Considerations

Light plays a key role in various parts of the Redevelopment as it will serve to:

- highlight heritage elements of the external façade of the building.
- provide an environment that is conducive for learning and collaboration.
- facilitate indoor recreational activities.
- facilitate mixed use space for student and community events.

To achieve the above-mentioned outcomes, the lighting design should consider the following key factors:

Table 4: Lighting Design Consideration

Design Considerations	Description
Lighting Levels	Refer to Table 3 for lighting levels by space
Luminaire Aesthetics	Fittings will integrate with architectural vision for the Redevelopment. Fittings will integrate emergency lighting where possible.
Luminaire Optics	In areas where light spill or obtrusive light is an issue, luminaires will use precision optics and louvers to deliver light to the intended surfaces in a controlled manner

Correlated Colour Temperature (CCT)	Cooler lighting temperatures will be used in learning and recreational spaces (General Learning Areas approx. 4000K, Indoor Multi Court Area. approx. 5000K). Warmer lighting temperatures will be used for evening and night-time illumination of mixed-use spaces (Level 3 Courtyard approx. 2700-3000K).
Colour Rendering Index (CRI)	Light fittings with a CRI of 90 and above will be used in learning spaces to facilitate a more faithful colour reproduction of the illuminated subject to the observer.
Lighting Intensity and Uniformity	Placement and light out put of light fittings will be considered to provide a uniformly lit space and reduce glare throughout the redevelopment
Lighting Control	A combination of dimmable light fixtures, local switches, motion detectors, timer clocks and daylight sensors will be used to allow for the lighting design that is adaptable and conserves power
Daylight Sensing	Daylight sensors will be used in areas where natural light is available to conserve power.

A further detailed explanation of the above-mentioned factors is provided in Appendix A.

2.7 Lighting Design and Methodology

2.7.1 Entrance, Lift Lobby and Circulation Areas

This area will serve as the main entry point into the Wilkinson House and therefore set the tone of the building.

Table 5: Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting to floor level. **Accent Lighting**: To areas of visual interest. Areas to be determined during design development stage. **Cove/Wall Lighting**: To ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare in the direction of the observer and reduced light spill light in the direction of sensitive receivers. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K
Colour Rendering Index	80+

Lighting Control	Timer clock set to the school's operating hours, Motion Detector, Daylight Sensors and Manual Switch

Figure 5: School Lobby *Source: Ecole South Pointe School, Winnipeg, Manitoba*

2.7.2 Staff Rooms

This area will serve as the staff administration hub in the Wilkinson House.

Table 6: Staff Room Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting to floor level. **Accent Lighting**: To areas of task areas. Areas to be determined during design development stage. **Cove/Wall Lighting**: To ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare in the direction of the observer. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K
Colour Rendering Index	90
Lighting Control	Timer clock set to the school's operating hours, Motion Detector and Manual Switch

Figure 6: Staff Room Configuration *Source: Rap Interiors*

2.7.3 Meeting Rooms

The meeting rooms are a space dedicated to group interactions, collaboration, content delivery and engagement.

Table 7: Meeting Room Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting to desk level. **Accent Lighting**: To areas of task areas. Areas to be determined during design development stage. **Cove/Wall Lighting**: To ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare in the direction of the observer. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K
Colour Rendering Index	90
Lighting Control	Timer clock set to the school's operating hours and Motion Detectors. Manual Switch to allow for various lighting scenes

Figure 7: Meeting room configuration *Source: Meeting Room stock images*

2.7.4 Break-Out Rooms

The Break-Out rooms usually have a relaxed atmosphere. Meetings held in these rooms would be less formal and therefore illumination levels can be lower.

Table 8: Break-Out Room Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting to desk level. **Accent Lighting**: To areas of task areas and vertical surfaces. Areas to be determined during design development stage. **Cove/Wall Lighting**: To ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare in the direction of the observer. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K
Colour Rendering Index	90
Lighting Control	Timer clock set to the school's operating hours and Motion Detectors. Manual Switch to allow for various lighting scenes

Figure 8: Break Out rooms *Source: constructionspecifier.com*

2.7.5 General Learning Areas

This space will be designated for student learning and content delivery.

Table 9: GLA Rooms Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting to desk level. **Accent Lighting**: To areas of task areas and vertical surfaces. Areas to be determined during design development stage. **Cove/Wall Lighting**: To ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare to the observer. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K
Colour Rendering Index	90
Lighting Control	Timer clock set to the school's operating hours and Motion Detectors. Manual Switch to allow for various lighting scenes

Figure 9: Typical General Learning Area Artist Impression *Source: SCEGGS*

2.7.6 Indoor Recreational Facility

The recreational facility is indoor and in the basement level. The walls consist of brickwork; however, portions of the existing brickwork walls will be replaced with glass brickwork to allow for natural light to penetrate the space. It is noted that the use of glass brick treatment is specific to the St Peter's Street façade of the Wilkinson House. Any light spill onto St. Peters street from artificial lighting from within the recreational facility as a result of the semi-transparent brickwork façade is anticipated to be minimal.

St. Peters Street and the building opposite Wilkinson House, the Diana Bowman Performance Art Center are considered part of the wider school campus. Since the campus buildings are not considered to be sensitive receivers, the negative impact of any light spill is considered to be within acceptable limits.

Table 10: Indoor Recreational Facility Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting floor level. **Accent Lighting**: To areas of to perimeter of the courts. Areas to be determined during design development stage. **Cove/Wall Lighting**: As required to ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare to the spectator and light spill in the direction of the St. Peter's Street Facade. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K

Colour Rendering Index	90
Lighting Control	Timer clock set to the school's operating hours and Motion Detectors. Manual Switch to allow for various lighting scenes

The selection of light fittings in this space should also be impact resistance due to low ceiling heights. Also, additional treatment may be required in the form of motorised blinds or louvers to the interior side of the glazed brickwork portions of the St. Peter's Street Building façade.

Figure 10: Indoor Recreational Facility *Source: Margaret Whitlam Recreation Center*

2.7.7 Level 3 Courtyard

The lighting in this space will be carefully considered due to the construction of the courtyard and its proximity to a high-rise residential building (sensitive receiver). An Oculus in the roofing above the courtyard provides visual access to the sky. It also presents an opportunity for uncontrolled light to escape and cause unwanted glare in the direction of the residential development in contravention of AS4282. The lighting design will consist of fitting that minimise uncontrolled light spill by use of precise optics and louvers as required.

Table 11: Level 3 Courtyard Lighting Design Factors

Lighting Design Factor	**Description**
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting floor level.

	Accent Lighting: To areas of visual interest. Areas to be determined during design development stage. **Cove/Wall Lighting**: As required to ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement to reduce glare and light spill in compliance with AS4282. Lighting levels as per Table 3.
Colour Temperature	Approx. 2700-3000K
Colour Rendering Index	80+
Lighting Control	Timer clock set to the school's operating hours and Motion Detectors. Manual Switch to allow for various lighting scenes

Figure 11: Level 3 Courtyard Artist Impression *Source: SCEGGS*

2.7.8 Southern Extension

The southern extension will be constructed as a glass box extension of levels two and three of the Wilkinson House Southern façade above the adjacent Centenary Sports Hall. This extension will also house a lift well and lobby to serve all three (3) storeys of the redevelopment. The extension faces into the wider school campus which is not considered to be a sensitive receiver. The lift well is not expected to be artificially illuminated. The lift car is expected to have occupancy lighting.

Table 12: Southern Extension Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting floor level.

	Accent Lighting: To areas of visual interest. Areas to be determined during design development stage. **Cove/Wall Lighting**: As required to ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for control of light spill past the Redevelopment boundary in compliance with AS4282. Lighting levels as per Table 3.
Colour Temperature	Approx. 2700-3000K
Colour Rendering Index	80+
Lighting Control	Timer clock set to the school's operating hours and Motion Detectors.

Figure 12: Southern Extension Architect Render *Source: Architect Presentation*

2.7.9 Amenities

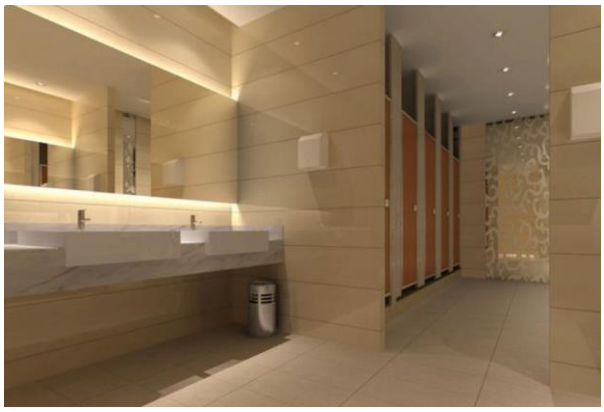
Amenities lighting will adopt a mix of ceiling recessed and integrated lighting fixtures to illuminate bench tops and stalls accordingly.

Table 13: Amenities Lighting Design Factors

Lighting Design Factor	Description
Lighting Profile/ Characteristics	**Base Lighting**: Uniform lighting floor level. **Accent Lighting**: To areas of sinks and benches. **Cove/Wall Lighting**: As required to ceiling and wall surfaces. **Obtrusive Lighting control methodology**: Lighting design will consist of fitting selection and placement that allows for reduced glare and precise control of light output. Lighting levels as per Table 3.
Colour Temperature	Approx. 4000K
Colour Rendering Index	80+

Lighting Control	Timer clock set to the school's operating hours and Motion Detectors.

Figure 13: Amenities Lighting options *Source: Pinterest, Google*



2.8 ESD Initiatives

The lighting design will consider the following Environmentally Sustainable Design (ESD) initiatives:

- Artificial lighting that has been designed for energy efficiency and occupant comfort and will encourage well-lit spaces that are fit for purpose
- Efficiency measures such as timers or motion sensors will be provided for common areas and areas of transient activity such as the entry foyer, lobby, circulation spaces, communal spaces, lounge, gym, and corridors
- High efficiency LED lights to provide adequate lighting levels with minimal energy expenditure
- Careful design of daylighting controls to adjust artificial lighting in response to daylight levels without causing undesirable noticeable switching effects or interactions
- Use of sensors including motion and photoelectric sensors to ensure back of house and outdoor lighting is automatically switched off when not required
- Whole of life considerations such as maintenance costs and access for easy maintenance in practice will also be considered.

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Appendix A
Lighting Design Factors for Consideration

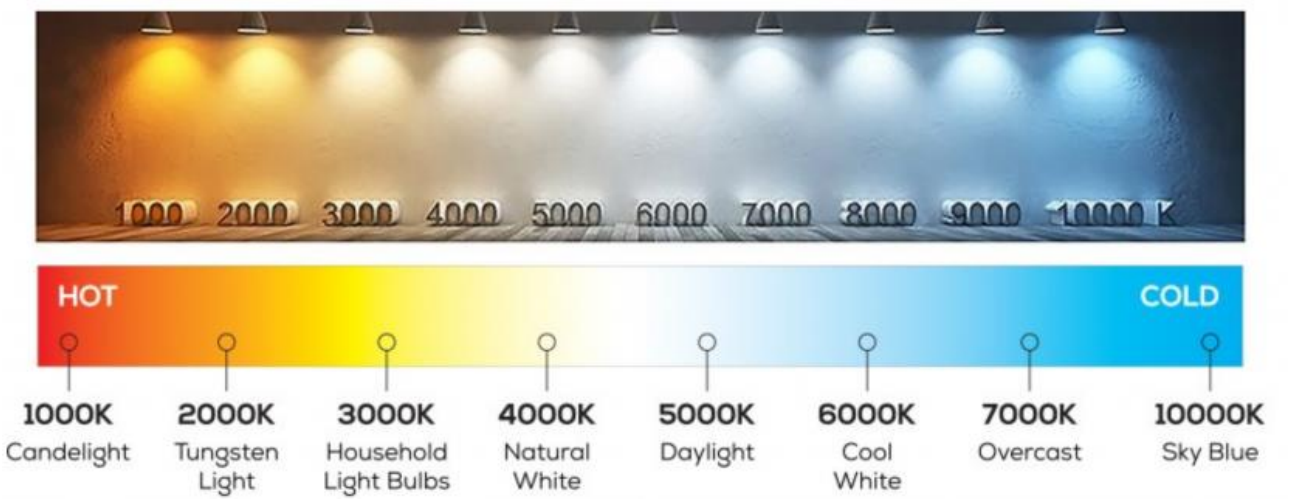
A.1 Lighting Design Factors for Consideration

The lighting design will consider the selection on luminaires based on the following attributes of light to enhance the character of the space.

A.1.1 Correlated Colour Temperature (CCT)

Correlated Colour Temperature (CCT) is a measure of the hue of white light as it is emitted from the light source. This lighting attribute is measured in Kelvins (K). depending on the Kelvin value, the hue of the white light is regarded as being either 'warm' or 'cool'. Cooler hues are closer to the shade of white and promote alertness and improved cognitive function. Warmer hues are closer to the shade of yellow and promote relaxation and sleep. Warmer CCT lighting with a warmer CCT value is saturated with red, yellow, and orange wavelengths and thus also helps to enhance the character of heritage buildings that use stonework of a similar appearance i.e., sandstone. The lighting design will consider the function of the space and select fittings that not only illuminate the surfaces appropriately but also set the mood of the space for the observer.

Figure 14: Correlated Colour Temperature Chart *Source: Tachyon Light*



A.1.2 Colour Rendering Index (CRI)

Colour Rendering Index (CRI) is the ability of the artificial light source to reveal colours of objects faithfully in comparison to an ideal or natural light source. This attribute is critical in environments such as schools, hospitals, art galleries and museums as light fittings with high CRI values (typically 90+) provide an accurate representation of the subject's appearance with regards to colour. The lighting design will consider fittings with high CRI values to enhance the learning experience.

Figure 15: Colour Rendering Index *Source: Westinghouse Lighting*

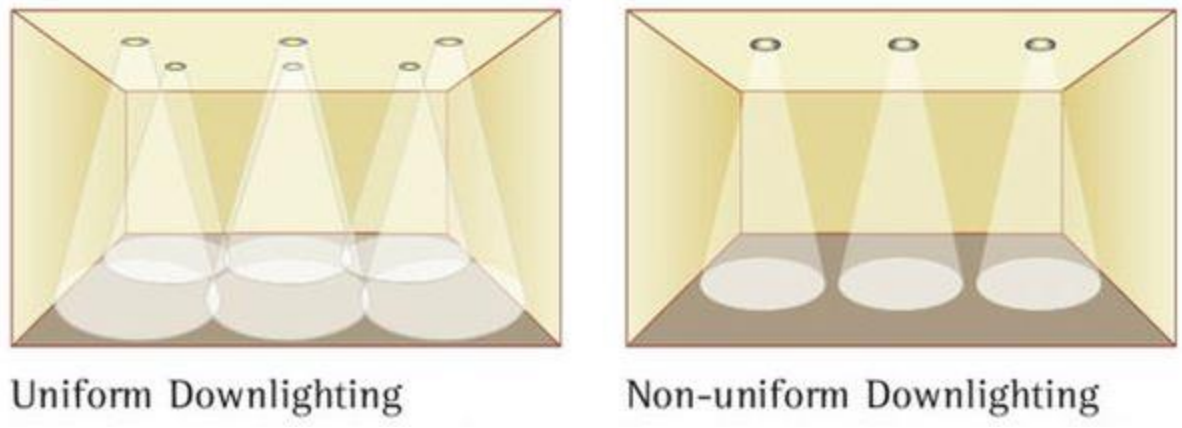
A.1.3 Lighting Intensity and Uniformity

Light intensity and uniformity determine the quality of visual comfort in an artificially lit environment. Intensity determines the amount of light falling within a set area. Poorly located light fittings with high lumen intensities lead to visual discomfort or glare which is not desirable.

Uniformity determines the difference between the minimum and average lighting levels. The closer the minimum lux level is to the average value the more uniform the light distribution is.

The lighting design will consider light fittings that deliver the required lux levels without causing visual discomfort and light room surfaces evenly.

Figure 16: Uniform vs Non-Uniform Lighting *Source: 1Stop Lighting*



A.1.4 Day Lighting Control Design

The northern and eastern facades allow for sunlight to penetrate the interior spaces of the Redevelopment during the morning hours. The lighting design will use daylight sensors to utilise natural lighting contribution during this time and supplement with artificial lighting where required.

Figure 17: Daylight Harvesting over normal workday *Source: ADM*

A.1.5 Integrated Design

It is important for the lighting design to blend in with the architecture such that the heritage character of the building is not only preserved but also enhanced. An effort will be made to integrate emergency lighting functionality into the standard fitting selection. The fit and finish of any externally mounted light fittings need to compliment the character of the Redevelopment.

Figure 18: Linear Lighting integrated into Timber Batten Ceiling finishes *Source: archetech.co.uk*

A.1.6 Artificial Lighting Control

The lighting control system should operate seamlessly, enhance the visual aesthetics of the space, and help to reduce energy consumption. Luminaires are to be grouped buy room or by function and programmable with scenes. The control system should be based on existing technologies that are robust in their implementation, regarded for their ease of use and ongoing support. The central control unit of the control system should be located away from public access.

Figure 19: Lighting Control mechanisms Right to Left Motion Detector, Daylight Sensor, Lighting Control Panel Sources: Clipsal, Legrand

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