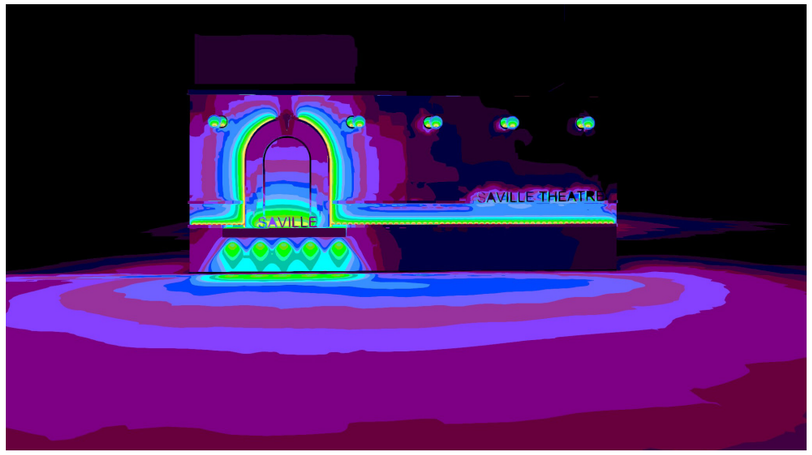
Saville Theatre

Lighting Operation, Early Evening

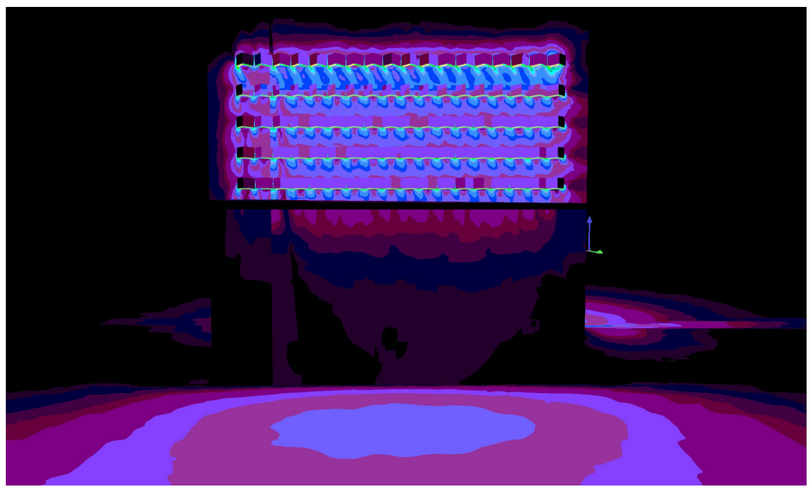
Preliminary lighting calculations have been produced to assess the effect of proposed facade lighting to surrounding areas, this includes assessments of any spill light, upward light and reflected light. Modelling the building allows the lighting specifications to be tailored to suit the existing and proposed architecture. Various options exist to control the beam angle and spread of light, by selection of optics or glare control accessories. The calculation model will be developed alongside the building architecture.

These false colour renderings show contribution from the facade lighting when Lighting Scene 1 is active. Please refer to the scenes and timings list on the plan.

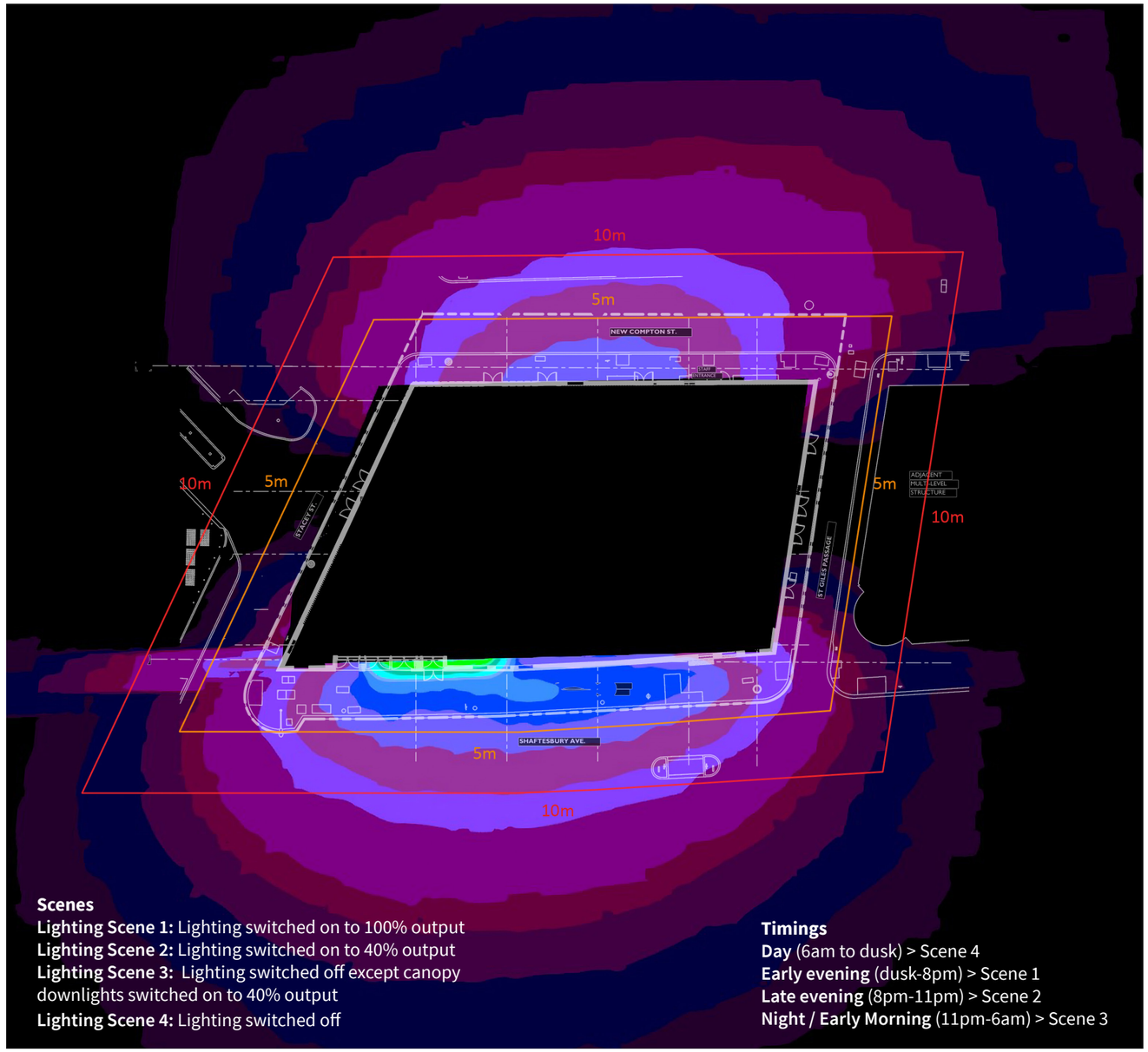
NOTE: lighting from internal spaces, neighbouring buildings and road lighting have not been included within this calculation.



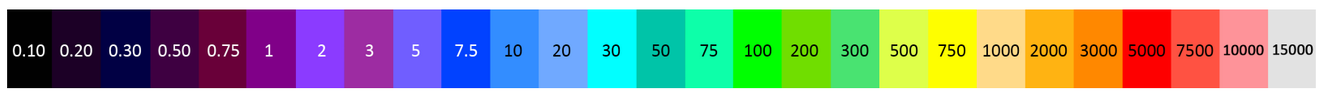
False colour rendering image, Shaftsbury Avenue



False colour rendering image, New Compton St.



False colour rendering image, plan view



False colour Key (illuminance in Lux)

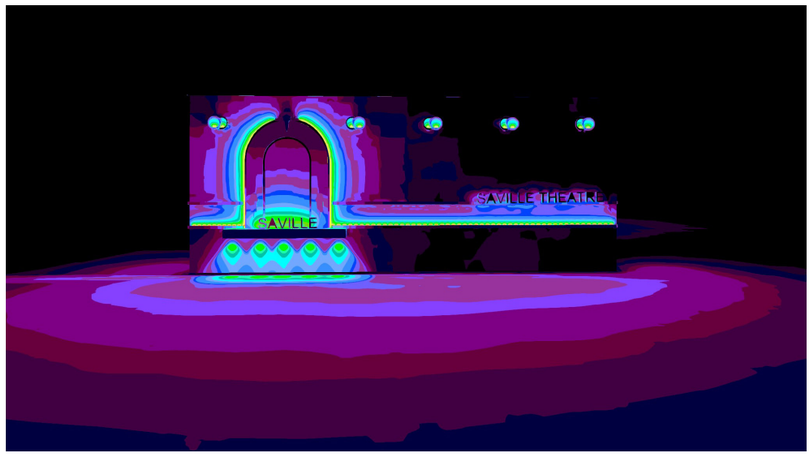
Saville Theatre

Lighting Operation, Late Evening

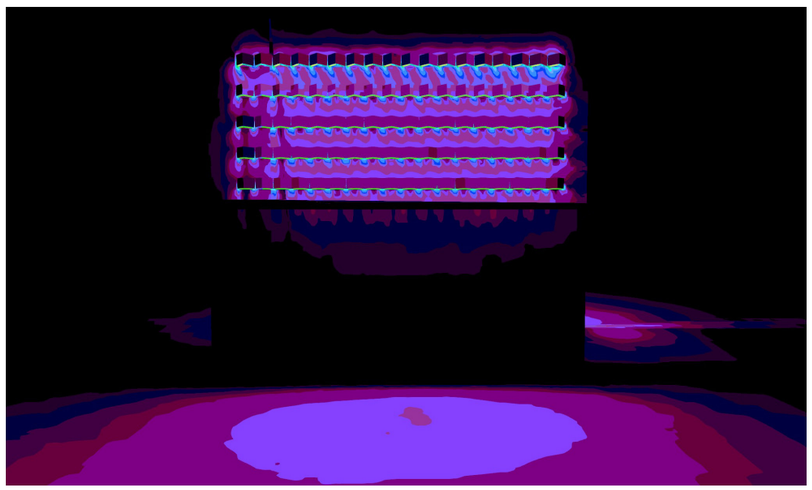
Preliminary lighting calculations have been produced to assess the effect of proposed facade lighting to surrounding areas, this includes assessments of any spill light, upward light and reflected light. Modelling the building allows the lighting specifications to be tailored to suit the existing and proposed architecture. Various options exist to control the beam angle and spread of light, by selection of optics or glare control accessories. The calculation model will be developed alongside the building architecture.

These false colour renderings show contribution from the facade lighting when Lighting Scene 2 is active. Please refer to the scenes and timings list on the plan.

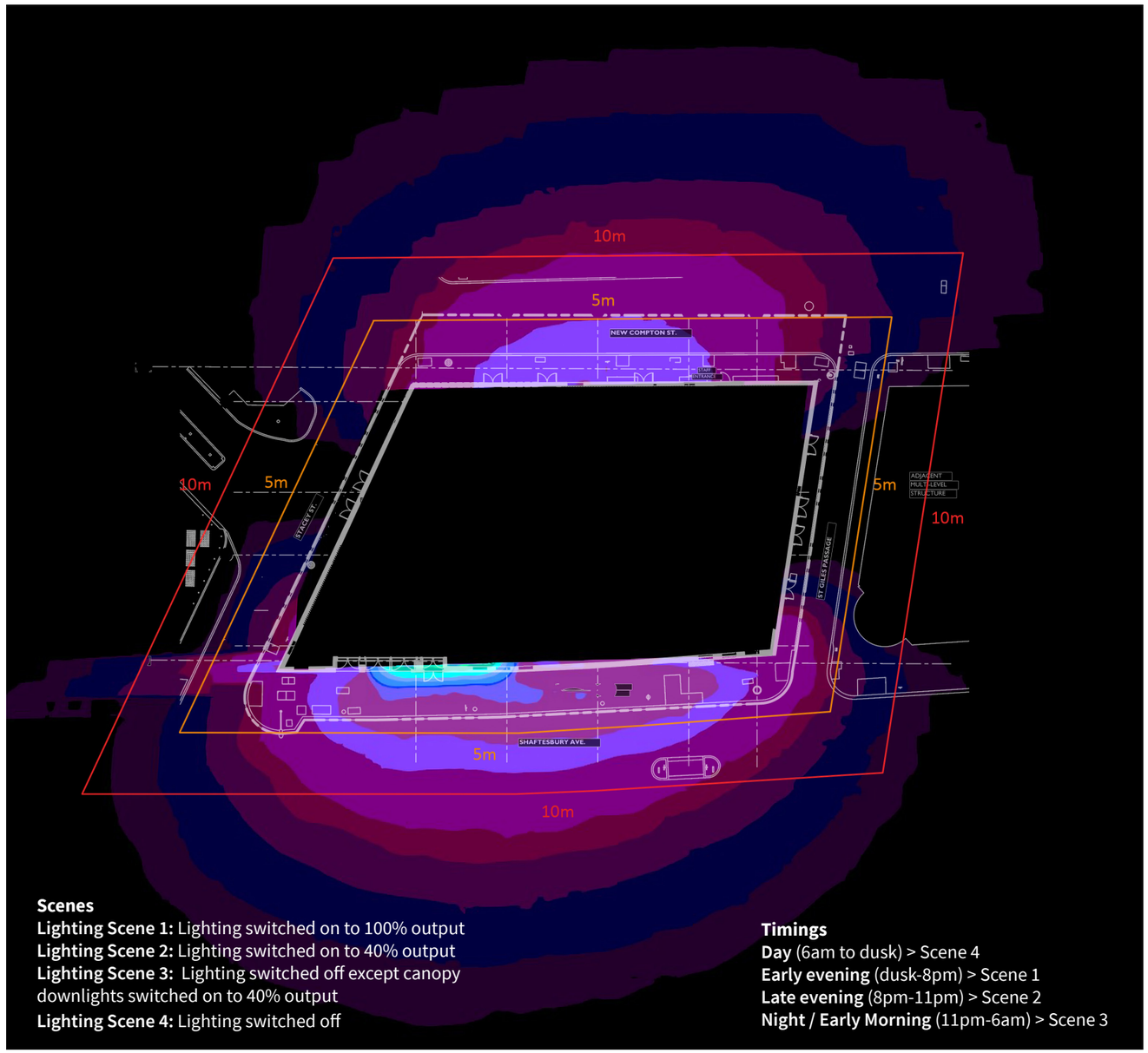
NOTE: lighting from internal spaces, neighbouring buildings and road lighting have not been included within this calculation.



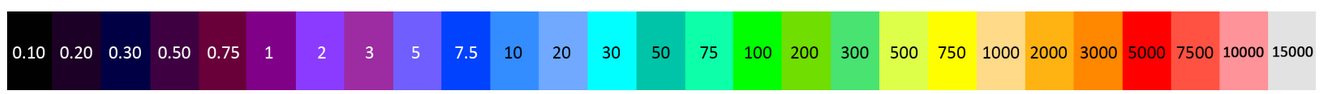
False colour rendering image, Shaftsbury Avenue



False colour rendering image, New Compton St.



False colour rendering image, plan view



False colour Key (illuminance in Lux)

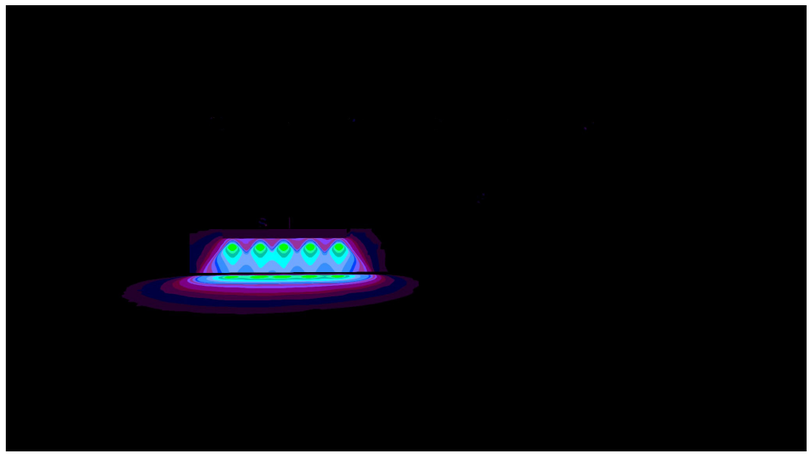
Saville Theatre

Lighting Operation, Night / Early Morning

Preliminary lighting calculations have been produced to assess the effect of proposed facade lighting to surrounding areas, this includes assessments of any spill light, upward light and reflected light. Modelling the building allows the lighting specifications to be tailored to suit the existing and proposed architecture. Various options exist to control the beam angle and spread of light, by selection of optics or glare control accessories. The calculation model will be developed alongside the building architecture.

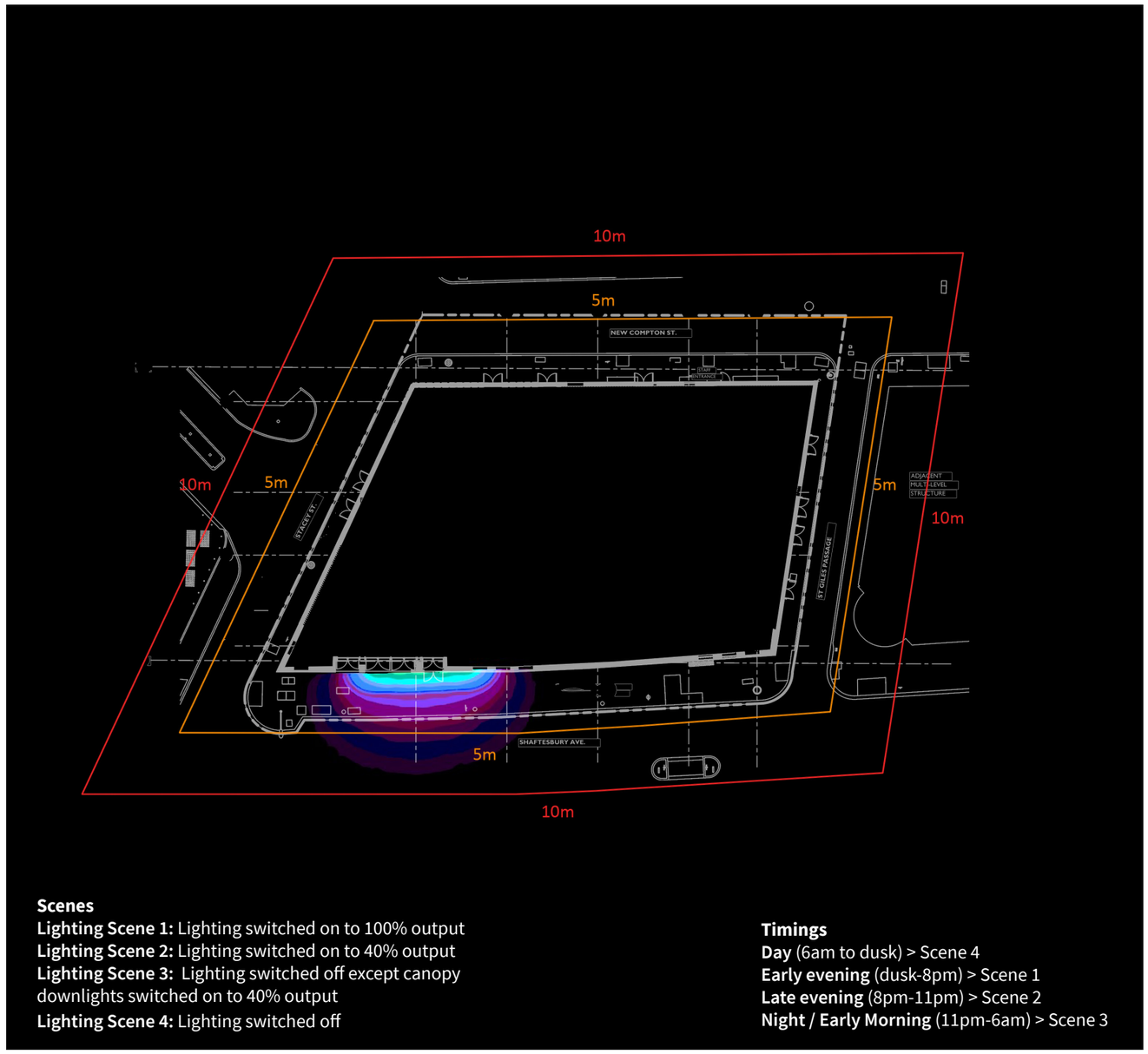
These false colour renderings show contribution from the facade lighting when Lighting Scene 3 is active. Please refer to the scenes and timings list on the plan.

NOTE: lighting from internal spaces, neighbouring buildings and road lighting have not been included within this calculation.



False colour rendering image, Shaftsbury Avenue

False colour rendering image, New Compton St.



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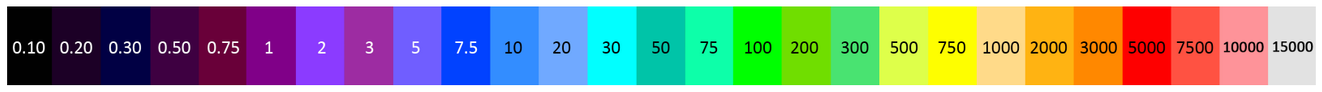


False colour Key (illuminance in Lux)

Saville Theatre

Technical Requirements

Lighting Standards and Guidelines

The following Lighting Standards and Guidelines will be referenced when designing the lighting scheme and specifying lighting equipment. The following list is a minimum, additional standards may be required for specific projects.

BS5489 - BSEN13201-02 (2020)

SLL LG6 :The Exterior Environment (2016)

CIE136: Guide to the lighting of Urban Areas (2000)

ILE TR24: A practical Guide to the Development of Public Lighting Policy for Local Authorities (1999)

ILE A Guide for Crime & Disorder Reduction
through a Public Lighting Strategy (2013)

ILE The Outdoor Lighting Guide (2013+2019)

BS 8300:2001 – Design of buildings and their approaches to meet the needs of disabled people

SLL/CIBSE – Commissioning Code L – Lighting (2003)

Lighting Factfile 7 - Design and Assessment of Exterior Lighting Schemes (Oct 2019)

SLL Lighting Guide 7 - Lighting for the built Environment (2015)

ILP Guide to Limiting Obtrusive Light (2021)

Lighting Factfile 8 - Lighting for People who are Visually Impaired (Dec 2012)

CIBSE TM66 - Creating a circular economy in the lighting industry (2021)

CIBSE TM65 - Embodied Carbon in building services (2021)

Lighting Control

An automated lighting control system will be selected to provide the following benefits;

- The selective dimming / switching of all lighting will reduce energy consumption, greatly increase lamp life, reduce maintenance cycles and lower running costs.

Photocells, PIR's and timeclock controls will be utilised. All external lighting will be switched on at dusk and the timeclock control will allow non security lighting to be switched off at an agreed curfew time.

Lighting required for security can remain on until being automatically switched off at dawn.

LED Light Sources

- Colour Appearance - this is simply what colour the lighting appears to be. It is very important in creating overall effect. For this project it is intended that all external lighting will be 3000K in colour temperature.
- Colour Rendering - the ability of the light to render colour accurately. For this project it is intended that all LED lighting will have a colour rendering index of not less than 80.
- Lamp Life - the average life of a lamp in a large installation. This has an Importance for maintenance costs.
- Efficacy - the output of the lamp in relation to its energy usage, measured in lumens per watt. This has often been the consideration in choosing sources, the desire being economy.
- All lamps will be latest technology, operated via energy efficient, high frequency control gear.

Lighting Equipment

Considerations affecting the lighting designs and equipment selections include;

- Ensure Lighting locations are considered carefully to ensure both aesthetic balance and technical efficiencies are achieved.
- The location must be chosen with due regard to access, maintenance, safety and cable routes.
- The fitting selected and the location should ensure glare to users is minimised. Where necessary, glare reducing devices such as cowls or louvres should be utilised.
- Fittings should be finished in a colour which matches that of the building structure on which they are fixed.
- The choice of lighting equipment and light source is a critical part of the lighting design process. It is a primary goal to ensure the best possible lit environment is created using the lowest possible energy consumption and minimised light spill and light pollution. To achieve this, specific lighting products will be selected to perform specific functions.
- Light fittings must have superior optical control, using reflector design and internal and external accessories to ensure precise beam control and minimised light spill.
- Lighting equipment selected will be covered by a suitable manufacturers warranty and should possess sufficient operational life to suit operational criteria. Lighting equipment will be mounted in easy to access conditions. It is important that the fitting can be maintained without unnecessary effort.
- All fittings must demonstrate value for money

Saville Theatre

Technical Requirements

Design
Equipment locations need to be considered carefully. Initially the decision will depend on the location that creates the most pleasing lighting effect. But additionally the following must be borne in mind:

The location must not be chosen just because there is a convenient place to position the fitting. Too often the lighting is compromised because there is a convenient canopy or shelf for mounting the fitting.

The location must relate to the architecture so the fitting is sympathetically positioned.

The location must have validity. Too frequently equipment positioned to light a feature does not in fact do so due to an inappropriate combination of position and optical system.

The location must be chosen with due regard to access, maintenance, safety and cable routes.

Where possible, the location should be concealed. It is worth seeking out smaller, compact equipment to achieve concealment, particularly when using close-offset fittings.

The location should pay due regard to potential glare. Do not locate a fitting high up pointing down if the same job can be achieved using a fitting mounted low down pointing down.

Fittings should be finished in a colour which matches that of the building structure on which they are fixed.

Economics
The process is a balancing act between aesthetics and cost. The specification of fittings needs to be tailored to the match the capital and running costs of the installation. It is, however, possible to use apparently expensive combinations of lamps and fittings while keeping within the owner's budgets. These are a few methods that can be employed:
Use of dimming will have the impact of reducing energy consumption, greatly increasing lamp life, reduce maintenance cycles and lower running costs.
The design should include for the variable lighting scenes where different amounts of lighting are used at different times of the week, month or year. This can again reduce running costs on a potentially expensive scheme without compromising design intent.

The reduction in surface brightness and the use of lower wattage fittings. Modern flood and amenity lighting is often too bright wasting valuable energy with high efficacy lamps.

Careful selection of highlighting feature building, facades or landscape elements rather than attempting to flood / wash light across everything.

Lighting Equipment
Physical Appearance – all lighting equipment should be selected to exhibit as small an appearance as possible. The design intent is to have a lighting effect rather than a display of lighting equipment.

The choice of lighting equipment and light source is a critical part of the lighting design process. It is a primary goal to ensure the best possible lit environment is created using the lowest possible energy consumption and minimised light spill and light pollution. To achieve this, specific lighting products should be selected to perform specific functions. Factors that will be taken into consideration when choosing the final specification;

Optical performance – light fittings must have superior optical control, using reflector design and internal and external accessories to ensure precise beam control and minimised light spill.

Quality – the lighting equipment selected should be covered by a suitable manufacturers warranty and should possess sufficient operational life to suit operational criteria.

Ease of Maintenance – lighting equipment is often required to be mounted in difficult to access conditions. It is important that the fitting can be maintained without unnecessary effort.

Cost – all fittings must demonstrate value for money

Light Sources
Colour Appearance - this is simply what colour the lighting appears to be. It is very important in creating overall effect.

Colour Rendering - the ability of the light to render colour accurately. Although less important in exterior lighting, poor colour rendering can have a deadening effect on an area.

Lamp Life - the average life of a lamp in a large installation. This has an Importance for maintenance costs.

Efficacy - the output of the lamp in relation to its energy usage, measured in lumens per watt. This has often been the consideration in choosing sources, the desire being economy.

All lamps will be latest technology, operated via energy efficient, high frequency control gear.

Operation and Maintenance
It is recommended that a coordinated approach to the operation of the above lighting is implemented to ensure the successful day-to-day appearance and functionality of the full lighting installation. Proposals will be developed in conjunction with the maintenance team, client and local council to ensure satisfactory operation.
The maintenance of the lighting installation is of vital importance to the long term success of this strategy.

Sustainability
Aspects/criteria which should be included within any lighting design.
High Efficiency light sources and control gear
Dimming for extended life of fixtures and reduced energy consumption
Lighting Control and assessment of daylight linking opportunities
Combining colour and white light sources to reduce lighting equipment
Cleaning surfaces and fixtures for optimum operation.
Recycling and sustainable disposal of old fixtures and lamps.
Periodic review to ensure full operation.

Saville Theatre

Technical Requirements

Design Requirements

Based on the criteria set out in BS EN 5489 -01 the following classifications have been used for these projects.

Lighting Classes (As set out in BS EN 5489-01)

Type of traffic	Lighting class			
	Normal traffic flow		High traffic flow	
	E3[A)]	E4[A)]	E3[A)]	E4[A)]
Pedestrian thoroughfare	P2	P1	P2	P1
Pedestrian only	C4	C3	C3	C2
Mixed vehicle and pedestrian with separate footways	C3	C2	C2	C1
Mixed vehicle and pedestrian on same surface	C2	C1	C1	C1

A) Environmental zone, as given in ILP GN01 [N2].

Lighting Classes (As set out in BS EN 13201-02)

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

[a] To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

Environmental zone (As give in ILP GN01)

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Control of Obtrusive Light

Exterior lighting requirements are set out in BS EN 5489 and are dependent upon the district brightness of the locations being illuminated. The district brightness is determined within the Institution of Lighting Professionals (ILP) publication Guidance Notes for the Reduction of Obtrusive Light.

Lighting is needed to provide safety, comfort and accessibility and enhance nighttime environments and commercial activities. However, the incorrect application or poor positioning or control of lighting can be detrimental to human and non-human health and wellbeing. Equally, this can negatively affect wildlife, flora and fauna in the local environment.

Obtrusive light or light pollution is defined as emitted light that falls outside the area required to be illuminated. This can take the forms of Sky Glow, Glare and Light Spill. To help reduce and control obtrusive light, luminaires should aim the light at the required surface only, controlling the light as needed via the
use of optical control devices such as lens, cowls and baffles/doors, as well as controlling the intensity of light coming from the fittings, which can be varied depending on the time of day/night.

All lighting should consider the latest lighting bodies, such as the ILP, CIBSE and SLL and WELL standards, as part of the design process.

Guidelines from ILP GN01 and Control of Light Pollution and Spill

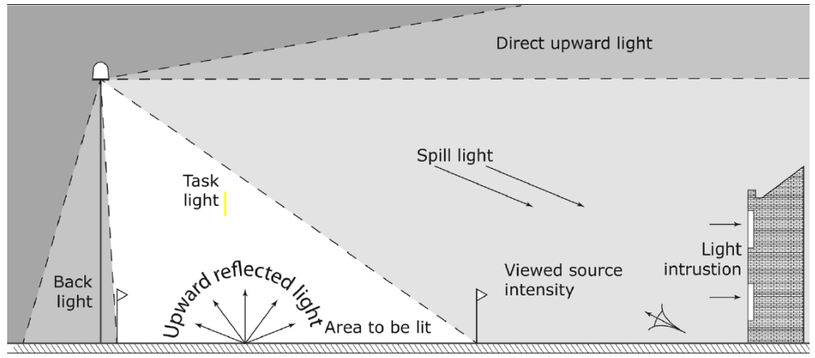
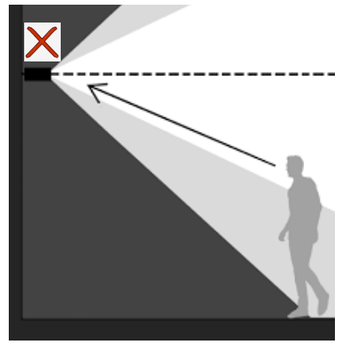
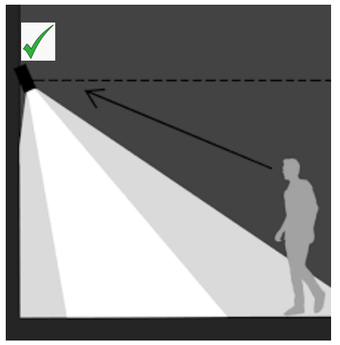


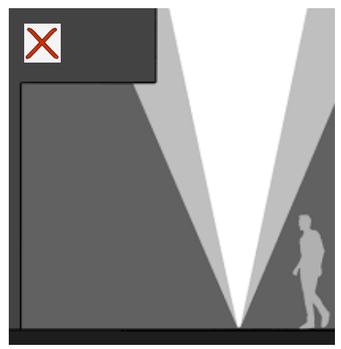
Figure 1: Types of obtrusive light



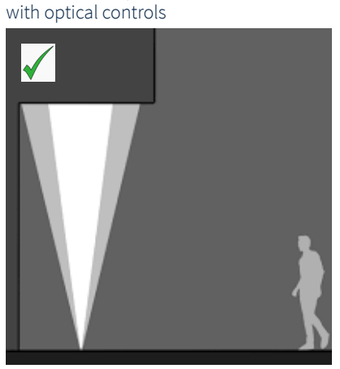
Schemes should avoid glare, skyglow and intrusive light into wildlife



Ambient light directed downwards to light the surfaces required and luminaires fitted with optical controls



Schemes should avoid skyglow



Schemes should ensure any light directed above the horizontal is targeted at the surfaces to be lit only.