

Factory

External Lighting - Light Pollution Study

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P01	Information for planning	Nick Meddows	Chris Lowe	07/12/20

EXTERNAL LIGHTING STRATEGY

Light Pollution

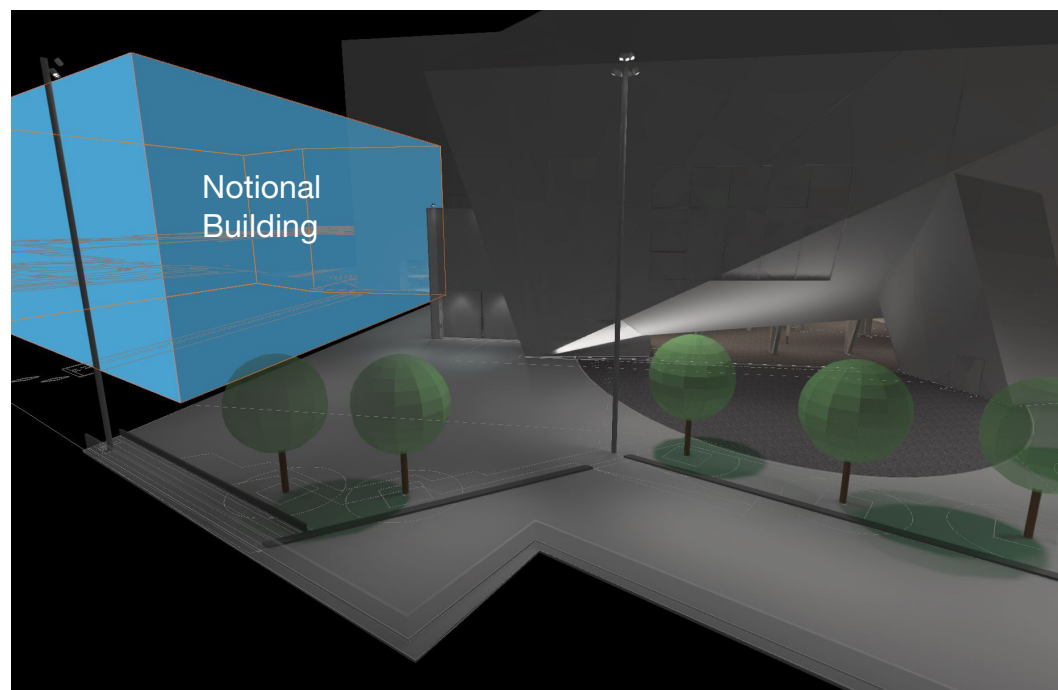
This document provides additional information on the impact of the proposed lighting scheme on the surrounding buildings. It is to be read in conjunction with the Design & Assess Statement.

All luminaires are fully dimmable and controlled from the factory building.

There are no sensitive receptors in close proximity to the site. There is a future development proposed north west of the site but building plans are not available to perform an accurate assessment. To assess the impact of the public realm lighting a notion building has be drawn in a worse case location one meter from the scope line.

The building facades that shall be illuminated are;

1. Theatre facade within Factory Square
2. Warehouse gable ends
3. Plant mesh located on the top of the Towers.

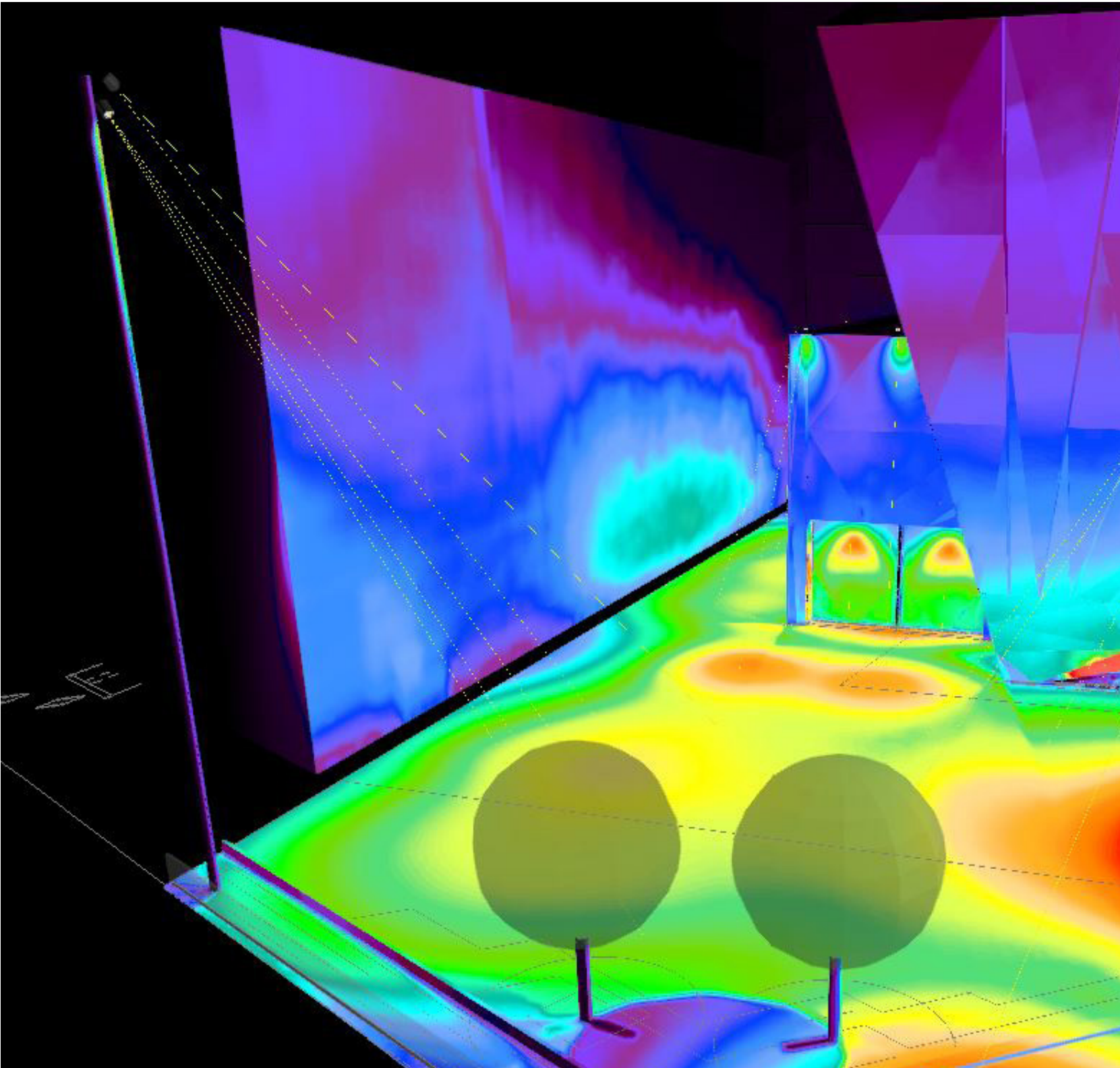
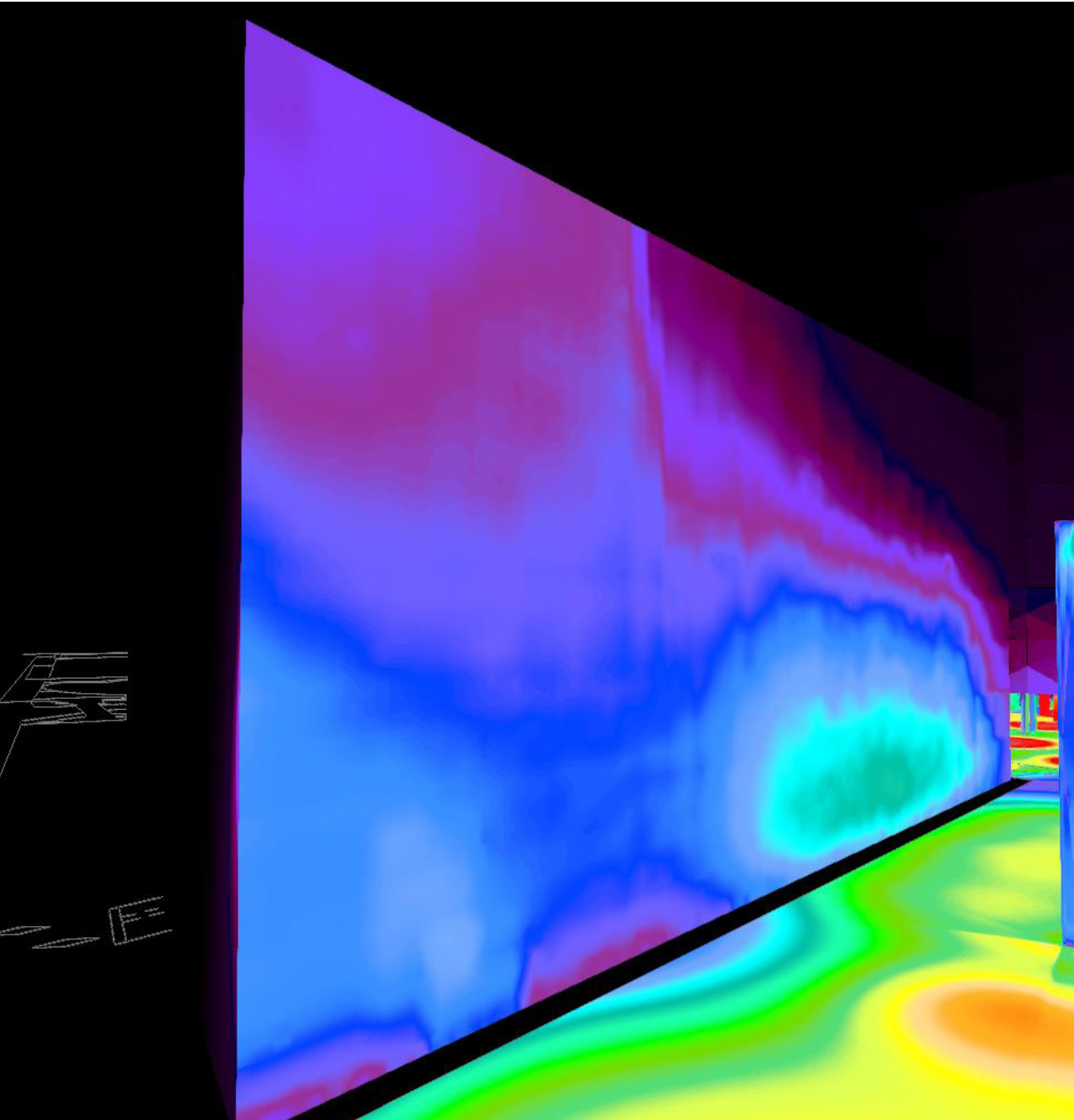


EXTERNAL LIGHTING STRATEGY

Light Pollution - Notion building

Lux plot - Vertical illuminance onto notion building

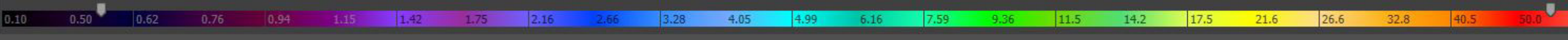
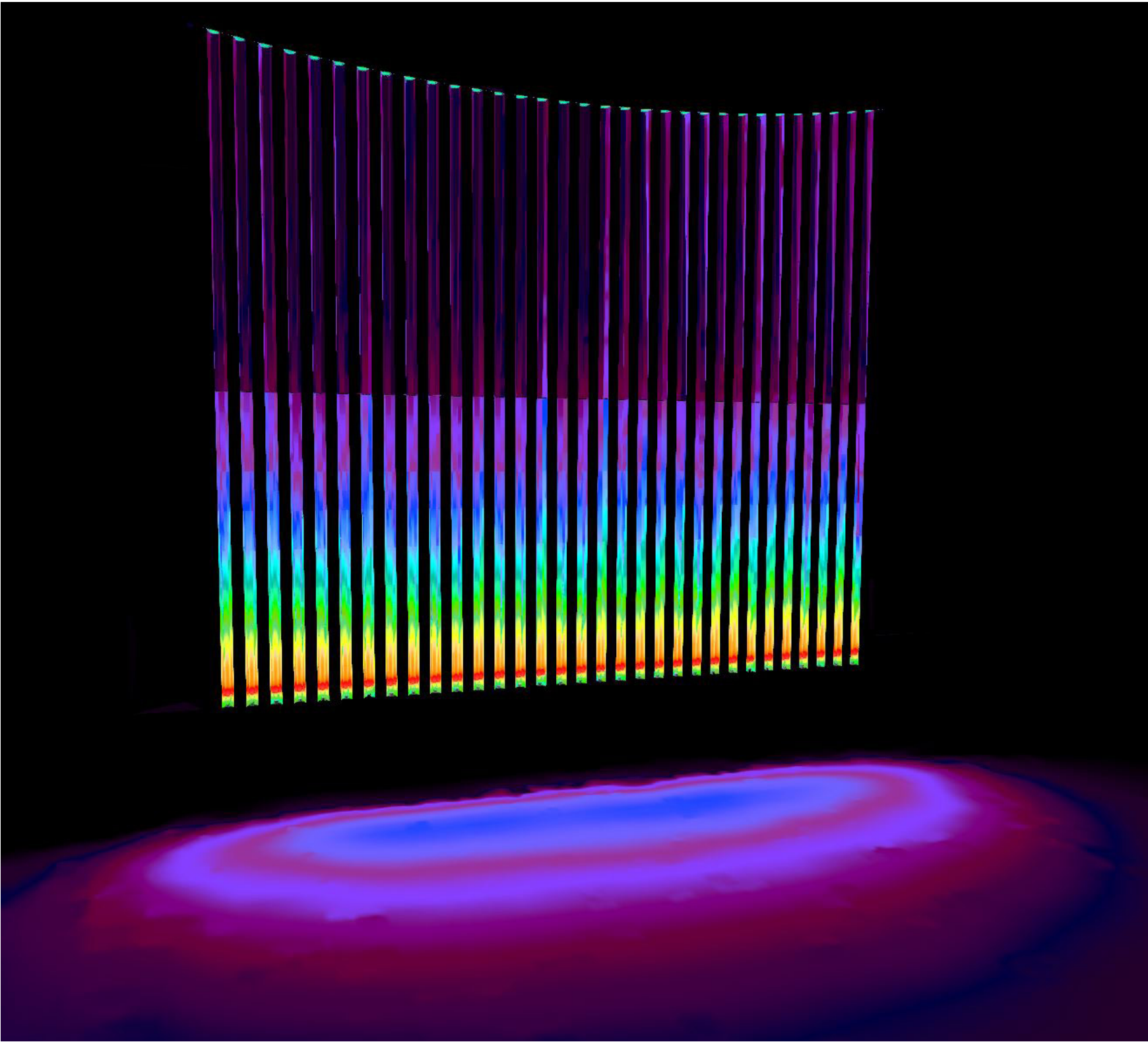
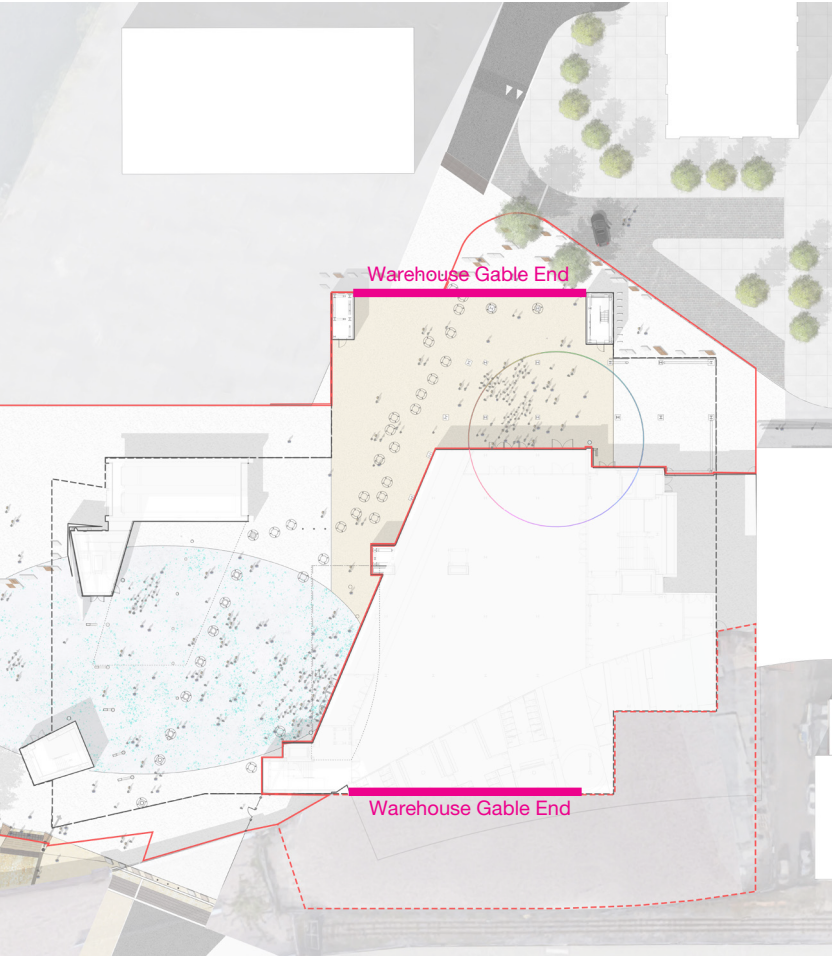
Lux levels do not exceed 5lux on the vertical surface of the notional building. (5lux post-curfew requirement, calculation based on everyday dimming levels for public realm, increased horizontal illuminance required for vehicle turning)



EXTERNAL LIGHTING STRATEGY

Light Pollution - Building brightness (cd/m²)

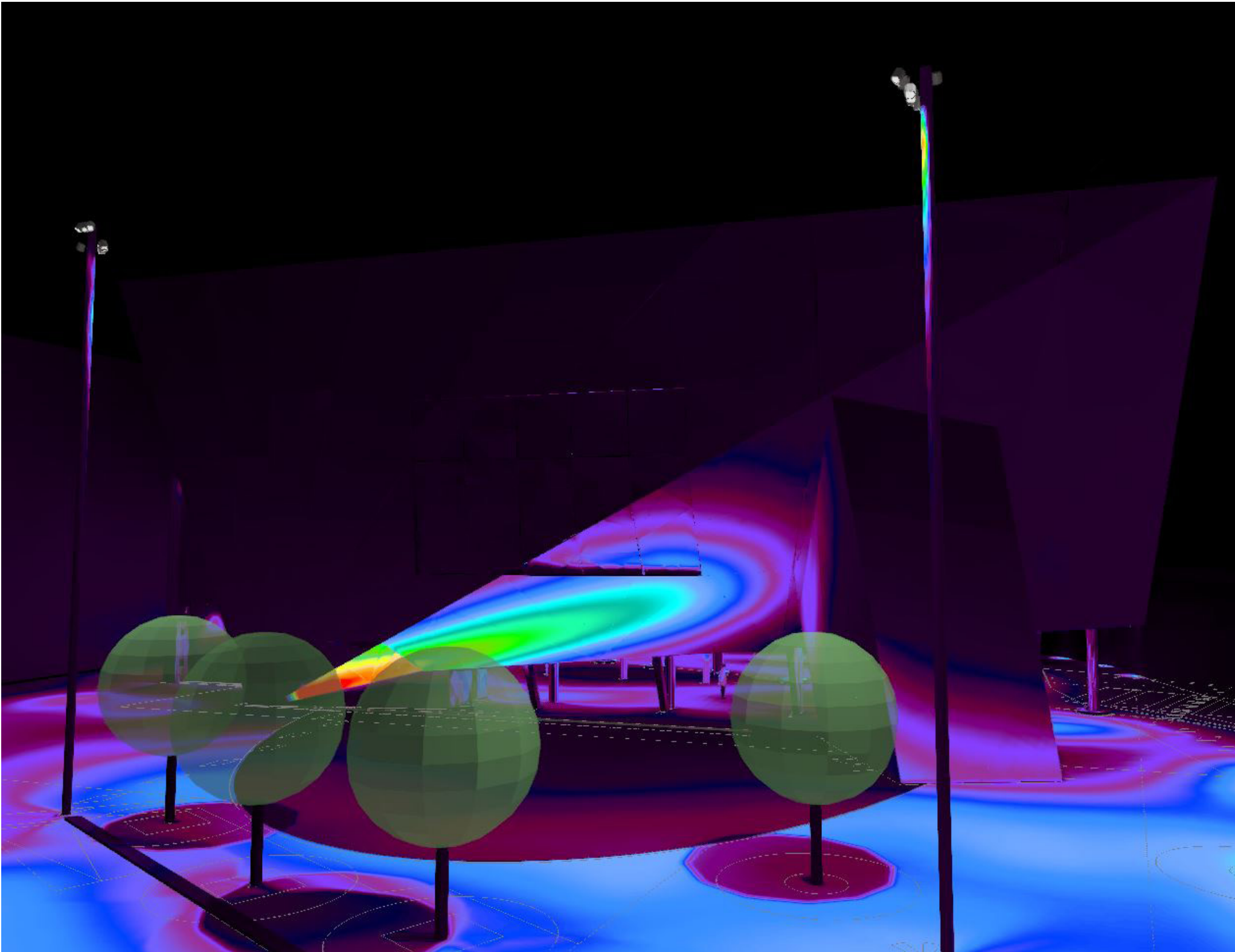
Warehouse Gable End
(Full output calculation results shown)



EXTERNAL LIGHTING STRATEGY

Light Pollution - Building brightness (cd/m²)

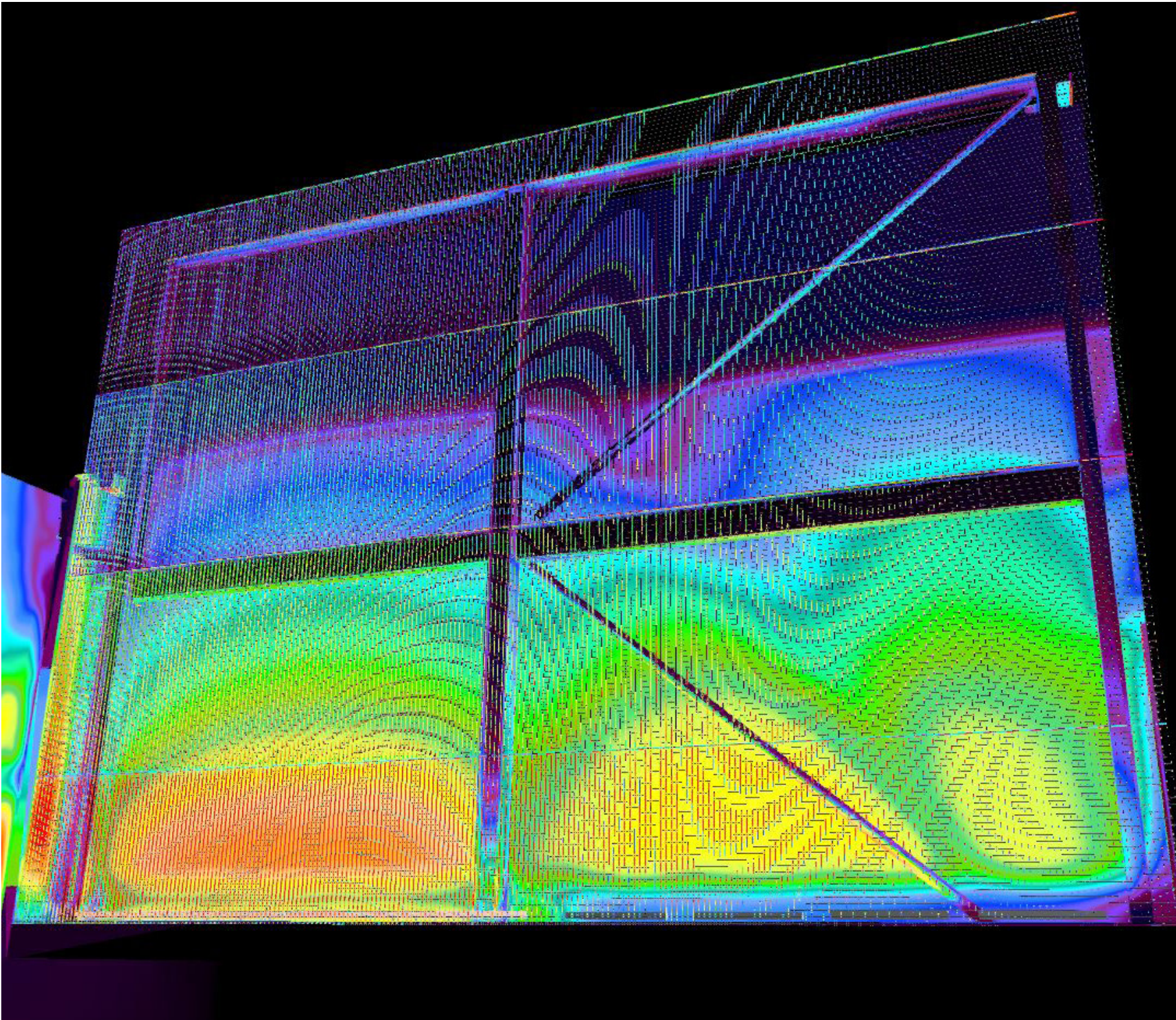
Theatre facade



EXTERNAL LIGHTING STRATEGY

Light Pollution - Building brightness (cd/m²)

Plant Mesh



Technical Appendix

TECHNICAL APPENDIX

Lighting Design Parameters

DESIGN PARAMETERS

The following mandatory, legislative and regulatory requirements, British Standards, Codes of Practice and Best Practice professional guidance publications will form the parameters of the lighting installation:

- BS EN 5489-1:2020 Design of Road Lighting - Part 1: Lighting of roads and public amenity areas
- BS EN 12464-2:2014 - Part 2 Outdoor work places, BSI, 2014
- Guidance Notes for the Reduction of Obtrusive Light GN01:2011, Institution of Lighting Professionals, 2011
- Guide to Limiting Obtrusive Light, SLL, 2013
- Lighting Handbook, SLL 2018
- The Workplace (Health Safety and Welfare) Regulations, HMSO, 2011
- DDA BS 8300-1:2018 - Design of an accessible and inclusive built environment; Part 1: External environment - Code of practise, 2018
- DDA BS 8300-2:2018 - Design of an accessible and inclusive built environment; Part 2: Buildings - Code of practise, 2018

EXTERNAL LIGHTING & BIODIVERSITY

The impact of light to biodiversity within the site, and in particular bats and flying invertebrates should be mitigated through the implementation of sensitive lighting.

The ERAP- ‘ECOLOGICAL SURVEY AND ASSESSMENT March 2018’ reported that no bats or signs of bats were detected anywhere at the site. It is an aspiration of MIF to include Bat and bird boxes on the roof of the site. Location of such boxes will need to be considered during the detailed design stage.

OPERATING HOURS

Public realm lighting will be operated via photocell control. General lighting beneath the undercroft is to have a separate photocell located on the undercroft soffit to represent conditions in this area.

Feature lighting elements to the undercroft and general lighting which includes building entrances and exits will be operated during hours of darkness via photocell control and scene setting.

Feature lighting which includes the buildings facade will be photocell and time clock controlled, luminaires will be programmed to switch off no later than 23:00 curfew. This is the normal situation and is required to meeting ILP Light Pollution guidance and is a BREEAM ‘Pol 04’ requirement. All lighting is controllable and can be adapted to suit later night activity if required.

TECHNICAL APPENDIX

Lighting Design Parameters

EXTERIOR ILLUMINANCE CRITERIA

Exterior illuminance criteria as set out in BS EN 5489-1:2013 is dependant upon the district brightness where the lighting is to be deployed. The district brightness is determined according to criteria set out in ILP publication Guidance Notes for the Reduction of Obtrusive Light and requires knowledge of the local area.

Institute of Lighting Professional (ILP) recommendations

Refer to Guidance Notes for the Reduction of Obtrusive Light GN01:2011, Institution of Lighting Professionals, 2011 for further information.

This area has been classified E4:

E4 represents high district brightness areas, such as town centres and commercial areas.

Refer to the following table for obtrusive light limitations.

The environmental zone categorisation would be unchanged following introduction of committed residential development. All the lighting has controlled optics and is designed to minimise light trespass from the site.

Table 1: Environmental zone descriptions in ILP guidance		
Category	Lighting environment	Examples
E0	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Intrinsically dark landscapes	National parks, areas of outstanding national beauty, etc
E2	Low district brightness areas	Rural, small village or relatively dark urban locations
E3	Medium district brightness areas	Small town centres or urban locations
E4	High district brightness areas	Town/city centres with high levels of night-time activity
UNESCO United Nations Educational, Scientific and Cultural Organization IDA International Dark Sky Association		

Table 2: ILP numerical guidance on obtrusive light						
Obtrusive light limitations for exterior lighting installations						
Environmental Zone	Sky glow ULR (Max %)	Light trespass into windows E (lux)		Source intensity I (kcd)		Building Luminance pre-curfew
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L (cd/m²)
E0	0	0	0	0	0	0
E1	0	2	1*	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25
* ULR E I L	From public road lighting installations only. Upward light ratio of the installation, i.e. the proportion of light from the total installation that goes directly into the sky. Vertical illuminance in lux on nearby domestic windows. Light intensity in kilo-candelas in a potentially obtrusive direction, outside of the area being lit. The ILP guidelines state that these figures are for general guidance only and for some sports lighting applications with limited mounting heights may be difficult to achieve. Luminance in candelas per m². This guideline is intended to apply to buildings that are deliberately floodlit at night. L is a measure of how bright the building appears.					

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LIGHT POLLUTION

Light pollution, or obtrusive light, can create serious physiological and ecological problems. It takes various forms:

Sky glow: the brightening of the night sky above our towns and cities.

Glare: the uncomfortable brightness of a light source in contrast to the background.

Light Trespass: the spilling of light beyond the boundary of the property on which the light source is located.

Light Ingress: the passage of light into buildings from an external source(s). Obtrusive light is a nuisance to both humans and wildlife; it is a waste of energy and contributes to greenhouse gas emissions. The problems of unnecessary, obtrusive light can and should be reduced or eliminated at the design stage.

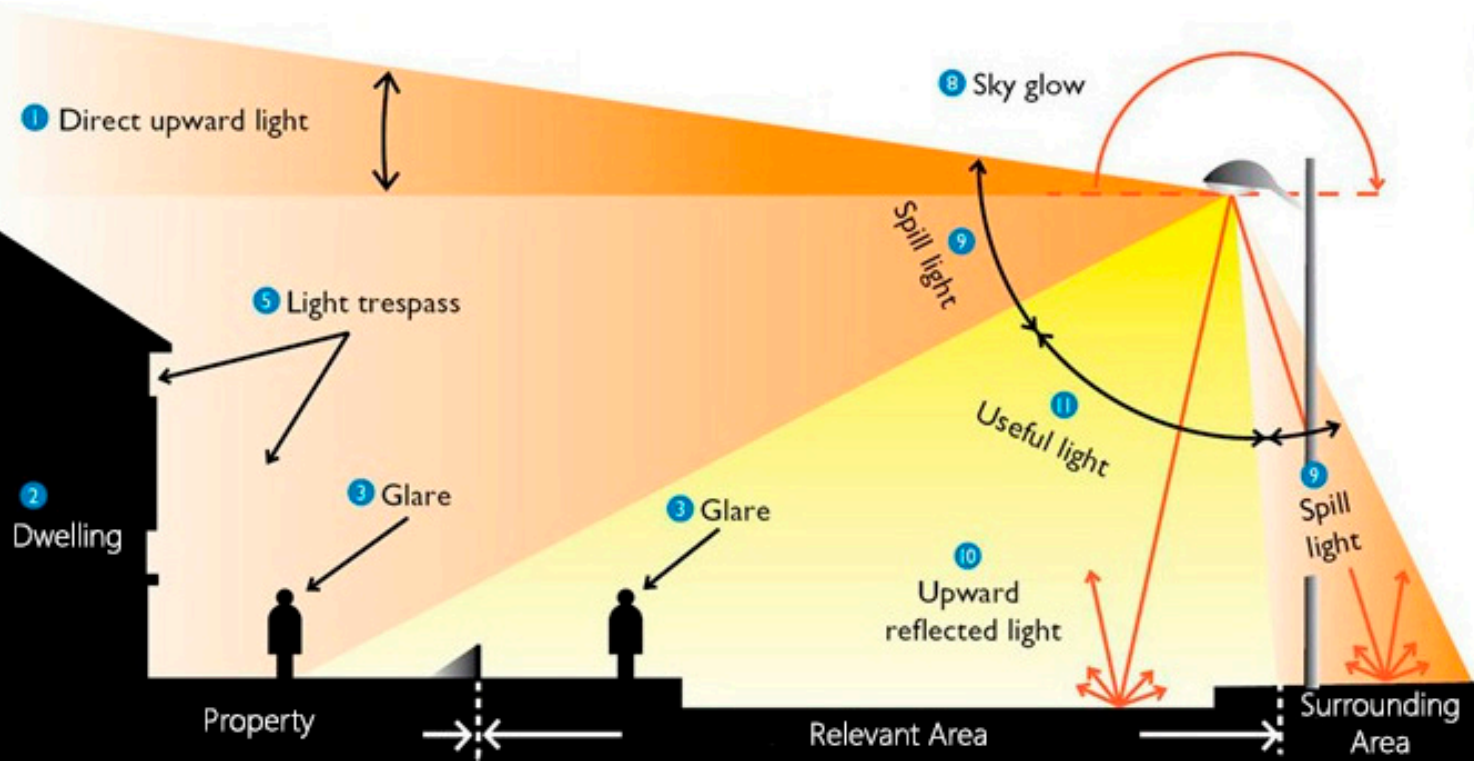
During the design phase of a lighting installation, consideration of the following measures to reduce the occurrence of obtrusive light is taken.

Over-lighting. This is avoided by conducting thorough calculations and carefully selecting the most appropriate lighting equipment and lamp types. Lighting Control to ensure luminaires are only switched on when necessary, a lighting control performance specification is produced.

Luminaire Technology. When specifying luminaires, careful consideration is given to minimising upward light and the use of optical units with precise light intensity distribution: thus ensuring that spill and glare are minimised.

The lighting scheme is designed to have minimal impact on the surrounding environment. Lighting is only installed where a visual task requires it for safety, comfort and wellbeing. Light levels are kept to the minimum levels needed to meet the requirements. Luminaires with a controlled light distribution will be specified in order to ensure that light falls only where it is required. A combination of lighting controls and precise optics will help minimise any impact on the surrounding environment.

Luminaire positioning and direction except in specific locations, where it is desired that elements of the design are up-lit for aesthetic reasons, all general lighting luminaires are positioned to avoid uplighting where possible. Where practical, directional luminaires are utilised to enable the precise projection of light. Proper commissioning will ensure directional luminaires perform as intended.



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