

MILLER GOODALL
ACOUSTICS - AIR QUALITY - LIGHTING

EXTERIOR LIGHTING DESIGN AND LIGHTING IMPACT ASSESSMENT

On Behalf Of

TEAKWOOD INVESTMENTS LTD

for

CONTAINER STORAGE FACILITY AT THE FORMER BEN SHAW CAR PARK, WILLOW LANE, HUDDERSFIELD

REPORT DATE: 12TH JUNE 2024

REPORT NUMBER: 103154V2

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Summary

A lighting impact assessment and exterior lighting design have been prepared to accompany the planning application for the change of use of a 1970's tarmaced car park to container storage facility off Will Lane in Huddersfield. A lighting design and assessment of potential lighting impact on surrounding sensitive receptors has been undertaken.

Lighting is required for the movement area that comprises a mix of vehicles and pedestrians. Residential dwellings are located to the north and west of the site. The containers will form a perimeter wall around the full boundary of the site, providing a ground level obstruction to light spill.

A lighting design has been prepared meeting the relevant lighting level standards for the intended use as per British Standard Guidance. Various best practices and embedded design mitigation measures have been included during the design process to control light and reduce levels of light spill, meeting the Institution of Lighting Professionals guidance recommendations.

Illuminance light spill contour plots and an impact assessment to consider vertical lux levels to surrounding sensitive receptors have been completed. The impact assessment indicates there are no adverse effects on surrounding sensitive receptors and the overall effect of lighting can be concluded as not significant.

There is, therefore, no reason for this application to be refused on the grounds of lighting.

Prepared By	Philip Walton	Reviewed By	Lesley Goodall
Signed		Signed	
Date	12th June 2024	Date	12th June 2024

Record of changes

Version	Date	Change	Initials
1	12th June 2024	Final issue	PW
2	4th July 2024	Minor description revisions following review	PW
3	12th July 2024	Minor description revisions following final review	PW

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1 Introduction

1.1 Miller Goodall Ltd has been instructed to prepare an exterior lighting design and lighting impact assessment for a Container Storage Facility at the former Ben Shaw Car Park, Willow Lane, Huddersfield (the site). The site lies within the administrative area of Kirklees Council (KC).

1.2 A lighting design has been prepared for the development which will meet the relevant lighting standards set by British Standard Guidance using the industry-adopted and widely used 2D lighting software Lighting Reality. The design is supported by drawings, contour plots, impact assessment and the design process rationale.

1.3 A lighting impact assessment has been undertaken to provide a baseline review and an assessment of the potential obtrusive lighting impacts associated with the development at the surrounding human sensitive receptors. The assessment has been prepared in accordance with relevant guidance issued by the Institution of Lighting Professionals and British Standard Institution.

2 Site Description

2.1 The site is located on the former Ben Shaw Car Park, to the north of Willow Lane, Huddersfield. The site is located in the urban area and located approximately 900 m to the north of the town centre. Trees and thick vegetation encircle the site, all of which will be retained as part of the design.

2.2 Properties on Bay Hall (a road) border the site to the north. The distance between the site red line boundary to a residential window is approximately 25 m, gardens occupy the space between. A private access and future site access for the development borders the site to the north east, with an operational commercial building located beyond. Willow Lane borders the site to the east and south, with a mix of residential and commercial units located beyond. St John's Road borders the site to the west, with residential dwellings located beyond. A café and barber shop borders the site to the north west.

2.3 Existing lighting surrounding the site includes street lighting, car park lighting and floodlights on the façade of the business to the north east of the site. The site location is shown in **Appendix A.**

3 Proposed Development

3.1 The proposal is for a storage site comprising some 93 metal shipping containers. The containers will not be stacked, and they will be positioned around the perimeter of the site facing inwards, forming a natural screen.

3.2 Proposed hours of business are set out by the client as follows:

- 07:00 – 19:00 hours Monday to Saturday
- 10:00 – 16:00 hours on Sundays

3.3 For the purpose of the planning application for the proposed development, the assessment will look at 24/7 operation to understand the potential for future flexibility of the site. This application, however, is only for the proposed daytime business hours.

4 Relevant Guidance

4.1 National Planning Policy Framework

4.1.1 Paragraph 191 of the National Planning Policy Framework[1] states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: […] c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

4.2 Planning Practice Guidance

4.2.1 Planning Practice Guidance (PPG) includes guidance on light pollution[2]. The PPG discusses when and where lighting is needed and important matters to consider in the design, such as dark sky areas and avoiding light pollution. The guidance emphasises *'it is important to get the right light, in the right place and for it to be used at the right time'.* The three-Rs phrase is often observed in the lighting industry for the basis of good design practices.

4.2.2 The PPG is organised by a series of questions and answers, in addition to open-ended questions that encourage the developer and lighting designer to contemplate the design and lighting needs. The PPG continues by outlining good practice such as limiting upward light spill and selecting appropriate luminaire for the task.

4.3 Institution of Lighting Professionals

[1] Ministry of Housing, Communities & Local Government, 2023. National Planning Policy Framework.

[2] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, 2019. Planning Practice Guidance, Light Pollution.

Guidance Note 1, The Reduction of Obtrusive Light

4.3.1 The Institution of Lighting Professionals (ILP) GN1 [3] provides methodologies to reduce the adverse effects of artificial light. The document identifies best practice installation and designs to limit the environmental effects of poor lighting that may lead to adverse levels of light spill, sky glow and glare to surrounding sensitive uses.

4.3.2 Different environments may be more tolerant of light than others. The ILP has created a series of Environmental Zone (EZ) definitions that comprise limits for pre- and post-curfew[4]. The EZ and illuminance (lux) levels for intrusion into windows (such as dwellings) are provided in **Table 1**.

Table 1: Environmental Zones

Environmental Zone & Definition	Light Intrusion (into windows) Ev (lux)	
	Pre-curfew	Post-curfew
E0: Dark sky parks, UNESCO Starlight Reserves	0	0
E1: Intrinsically dark landscapes. Examples: National Parks, Areas of Outstanding Beauty	2	(1*)
E2: Low district brightness. Examples: rural, small village, relatively dark urban location	5	1
E3: Medium district brightness. Examples: small town centres or urban locations	10	2
E4: High district brightness areas. Examples: town/city centres with high night-time activity levels	25	5

Ev: Vertical illuminance

*Permitted only from public road light installation

The EZ table also includes levels for sky glow, luminaire intensity (luminance) and building luminance. Sky glow, luminance and glare can be controlled through the luminaire selection and design.

Example levels of lux include: daytime (50,000), overcast sky (5,000), office & task (500), street lighting (5 to 20), full moon (0.25 to <1)

Professional Lighting Guide 4, Guidance on Undertaking Environmental Lighting Impact Assessments

[3] Institution of Lighting Professionals, 2021. Guidance Note 01 The Reduction of Obtrusive Light.

[4] The guide does not define a specific curfew. 23:00 to 07:00 is often taken to be curfew, which corresponds to other planning and environmental disciplines such as acoustics, and sleeping patterns of humans. A stricter curfew may apply, such as dark sky.

4.3.3 ILP Professional Lighting Guide (PLG) 04 [5] is the industry standard document outlining the approach, content recommendations and general advice and mitigation for completing lighting impact assessments in the UK. The aim of this guidance is to outline best practice measures in lighting design and provide practical guidance on the production and assessment of lighting impacts within new developments.

4.3.4 A key requirement of the guidance is that obtrusive light impact assessment must be modelled using a maintenance factor of 1.0 in the design and results. This ensures the scheme is assessed to the full lumen output at installation, representing worst-case exposure to sensitive receptors when lumen output is at the maximum at installation, rather than the lumen output representing the design level after degradation has occurred overtime.

4.4 British Standard 12464-2:2014 Lighting of Work Places

4.4.1 The British Standard Institution (BSI) has issued British Standard (BS) documentation for lighting. Several BS documents provide luminance and illuminance levels for a variety of situations and scenarios in relation to lighting needs and use. The lighting of outdoor workplaces, Part 2 [6] is of relevance to this project.

4.4.2 The BS documents provide a general 'guide-to' for all aspects of lighting, such as best practice, lighting standards and other aspects, but not inclusive, such as risk assessments, colour temperature, glare control and design of lighting installations. The guidance contains lighting standards for commercial uses including horizontal average illuminance (lux), minimum lux maintained and uniformity percentages across the lit areas and uses.

5 Methodology

5.1 Model and Assessment Methodology

5.1.1 The lighting design has been modelled using Lighting Reality and its software package Reality Outdoor (v 2.3.0). An exterior lighting design has been prepared for the movement areas.

[5] Institution of Lighting Professionals, 2013. Professional Lighting Guide 4, Guidance on Undertaking Environmental Lighting Impact Assessments.

[6] British Standards Institution, 2021. BS EN 12464-2:2014 Light and Lighting – Lighting of Work Places, Part 2: Outdoor Work Places

5.1.2 The design incorporates best practice design and mitigation, including the selection of appropriate luminaires and optics, heights and placement positions. Measures to reduce obtrusive light are inherent to the design, meeting the requirements of ILP GN1 [3].

5.1.3 The potential impact on surrounding human sensitive receptors has been assessed by preparing a series of horizontal and vertical illuminance plots. Lux levels are compared to the limit in EZ E3.

5.1.4 The design has been prepared using calculated maintenance factors to ensure the correct lighting levels are maintained for the installation lifespan. An impact assessment has then been completed by applying a maintenance factor of 1.0, per the requirements of the ILP PLG4 Guidance[5].

5.2 Environmental Zone

5.2.1 The site is in Huddersfield, which is a built-up urban area, and it is determined to be within EZ E3 *'Medium district brightness, Examples: small town centres or urban locations'*.

5.3 Lighting Requirements

5.3.1 The uses comprise a mix of vehicles, pedestrians and obstacles such as container doors extending outwards into the movement area. The lighting standard applied is *'regular vehicle traffic'* from *'Table 5.1 General Requirements'* of the BS 12464-2 [6]. **Table 2** shows the lighting standard applied.

Table 2: Relevant Lighting Requirements for this Assessment, BS12464-2:2014

Type of Area, task or activity	Maintained Illuminance (Ēm, lx)	Min Illuminance Uniformity (U_o)	Min colour rendering index (R_a)	Application
Traffic areas	20	0.40	20	General circulation area

5.3.2 The Applicant is intending to install infrared CCTV (i.e. night vision). This type of product has less reliance on maintaining a constant level of light for the camera overnight.

5.4 Sensitive Receptors

5.4.1 Residential dwellings are located to the north and west of the site. The site is located in an urban area and sits at a lower level to the surrounding road network. Trees wrap around the site.

5.4.2 Vertical lux intrusion at existing sensitive receptors (ESR) is compared to the limits of an EZ E3 in **Table 1** for pre- and post-curfew periods with maintenance factor 1.0. The ground-floor window height of 1.5 m and estimated first-floor window height of 4.5 m were used to set the modelled vertical grid height.

5.4.3 **Table 3** shows the locations of sensitive receptors. The ESR locations are shown in **Appendix A.**

Table 3: Sensitive Receptors

Receptor	Location and Description	Coordinates*		Type
		X	Y	
ESR 1	Residential dwelling at Bay Hall (north of site)	414150	417849	Human
ESR 2	Residential dwelling at St John's Road (west of site)	414090	417793	Human
*grid reference represents a central location along the vertical grid line				

5.5 Model Limitations

5.5.1 The light model does not take into account intervening vegetation, buildings or obstructions. Obstruction to light spill is, therefore, not accounted for in the model outputs.

5.5.2 The containers are solid objects, positioned inward and will provide a ground level obstruction to light. This should be taken into account qualitatively during the review.

5.5.3 The model is prepared on the assumption of flat ground. There are no significant topographic changes in the specific task lighting areas. All luminaires will be located beneath the heights of the canopies.

6 Baseline Assessment

6.1 The proposed development site is located in an urban location and the existing lighting near the site is typical of this setting. Existing lighting near the site includes street lighting (on Willow Lane and St John's Road) and commercial lighting to the southeast. One of the commercial units to the south is the Magic Rock Brewing company, with operations up to 23:00.

6.2 There are several lighting fixtures on the Britvic commercial building to the northeast of the site, including an open yard with lights pointing into it. The building is currently in operational use and assumptions can be made that the external lighting is used when required.

6.3 Copse of trees are present around the full perimeter of the site. The Applicant intends to retain as many of these as possible for the final design. An environmentally friendly lighting design has been prepared to minimise impact to the surrounding environment.

6.4 There are no power lines, structures or obstructions passing through the development site.

7 Proposed Lighting Design

7.1 Lighting Positions

7.1.1 Luminaire spacing is approximately every 5 containers. Each luminaires will be positioned on a 2-foot pole above the 8-foot high container, equating to a metric height of 3.35 m above ground level. A stirrup bracket will fix the floodlight to the pole. Luminaires will be positioned at the corner of the container above the doors.

7.1.2 Alternative lighting designs were considered, such as columns in the centre, but localised and low-level lighting positioned at the container doors was the preferred option for the customer. Floodlights were also preferred due to their versatility. Low level and directed lighting is also beneficial for surrounding sensitive receptors.

7.2 Maintenance Factor

7.2.1 During the lifespan of a luminaire, the lumen output naturally degrades and suffers light loss. This effect is accounted for in the design by applying a maintenance factor (MF) which models the end-of-life lighting level to account for this degradation. This process ensures the lighting standard is met for the installation duration. An adverse effect of this process is that the calculated MF model is based on the lighting levels arising from the post-degradation lumen output. At the day one installation, the lumen output will be higher as no degradation has yet to occur.

7.2.2 For lighting impact assessment, the ILP[5] recommends that MF 1.0 be used to assess the potential impact on surrounding sensitive receptors, ensuring the light spill is assessed at worst-case conditions, representing day one installation lighting levels.

7.2.3 The lighting design has been initially prepared using a calculated MF and then for the impact assessment, the model is rerun with the MF set to 1.0. The calculated MF is provided in **Appendix B**.

7.3 Equipment and Design Detail

7.3.1 The luminaire used in the design is the Phillips Coreline Tempro Small Gen2. The specifications of this product are:

- 3000 K colour temperature;
- ingress protection IP66,
- impact protection rating, IK08
- colour rendering index 70.

7.3.2 A 5° tilt angle was applied to all luminaires in the model, to maximise and improve uniformity across the site.

7.3.3 The DX50 (extra wide projection) Phillips luminaire optic was used in the lighting design. This optic is ideal for projecting the light along the lengths of the narrow pathways between the containers. The optic has excellent backspill control.

7.3.4 The product has excellent upward light control. Contributions to skyglow are, therefore, zero. The effect of glare is eliminated due to the product selection and limited tilt angle. The luminaires are positioned on every fifth container, providing even distribution and the same lumen output for all luminaires, reducing glare effects.

7.3.5 **Table 4** details the lighting design equipment inventory.

Table 4: Equipment Inventory

Product	Type & Optic	Lumen Output (flux klm)	Wattage (W)	Quantity
Phillips	Coreline Tempro Small Gen2 (DX50)	4.90	31	13

7.4 Wattage

7.4.1 The total power requirement of the design (**Table 4**) is 403 watts (0.4 kW). This assumes full operation at installation. No revisions are made for switch-off or dimming.

8 Results

8.1 A lighting design to meet BS 12464-2:2014 has been prepared. The design meets the requirements for '*regular vehicle traffic*' (**Table 2**).

8.2 The Reality Outdoor output report provides equipment selections, optic images, positions and results for each grid and area of use, shown in **Appendix C.** The Reality Outdoor appendix lists the results for MF1.0 for the purpose of the impact assessment.

8.3 **Appendix D** shows the horizontal lux contour plan displaying results for each grid from the calculated MF (0.73). This AutoCAD drawing output also shows luminaire positions and other pertinent information relating to the design.

9 Impact Assessment

Horizontal Lux

9.1 The average horizontal lux levels at surrounding sensitive receptors is <0 lux. No exceedance of the pre- or post-curfew limits for EZ E3 occurs for the horizontal plane.

Vertical Lux: Pre-curfew (07:00 to 23:00)

9.2 The lux predictions for the pre-curfew vertical lux at the ESRs are shown in **Table 5**. The model outputs and vertical grid results are contained in **Appendix C.**

Table 5: Vertical Lux Pre-Curfew Results

ESR	Limit (lux)	Maximum Model Prediction (lux)	Result
ESR 1 (Bay Hall)	10	0.26	No Exceedance
ESR 2 (St John's Road)	10	0.11	No Exceedance

Vertical Lux: Post-curfew (23:00 to 07:00)

9.3 The lux predictions for the pre-curfew vertical lux at the ESRs are shown in **Table** 5**6**. The model outputs and vertical grid results are contained in **Appendix C.**

Table 6: Vertical Lux Pre-Curfew Results

ESR	Limit (lux)	Maximum Model Prediction (lux)	Result
ESR 1 (Bay Hall)	2	0.26	No Exceedance
ESR 2 (St John's Road)	2	0.11	No Exceedance

Impact Assessment Summary

9.4 The potential impact to the existing sensitive receptors is not significant and below the illuminance limits for EZ E3 in both pre- and post-curfew. The potential impact to the existing sensitive receptor is negligible and not significant.

10 Operational Controls

10.1 There is no predicted exceedance of the EZ limits, therefore, no specific mitigation is required to limit impact to sensitive receptors. However, further operational control overnight is suggested if 24/7 operations are planned, as this will provide environmental, energy reductions and financial benefits.

Post-curfew operating procedure (23:00 to 07:00)

10.2 Overnight usage levels are expected to be lower than in the daytime, as there are fewer customers and, by association, a reduced risk. The site also benefits from infrared CCTV overnight and, therefore, does not require continuous lighting.

10.3 Reducing lighting levels overnight is viable. One of the following two options is suggested:

- Reduce overnight lighting levels to a minimum (such as 5 lux, 75% dimming) and specify a motion detection system. This will reduce overnight lux levels but maintain the system in a ready state in case a customer visits or a security risk is found.
- Maintain a continuous, but reduced, lighting level overnight, such as half of the daytime level (10 lux, 50% dimming).

10.4 The motion detection on-time would need to be configured with customer habits and time spent on-site to ensure lighting remains on whilst customers are attending, for safety.

11 Designers Risk Assessment

11.1 This design has been prepared for a planning application. Specifics surrounding installation, connection and maintenance have yet to be defined.

11.2 In accordance with the Construction Design and Management Regulations 2015, the following assumptions and considerations should be noted. The Institution of Lighting Professionals has also published Guidance Note 4 (2016) '*CDM 2015 Overview*' to aid this process.

- The design and output calculations are based on the products used, presented in **Appendix C**. Any revisions to this may alter the final lighting profile and should be accounted for in a redesign.
- Luminaires are positioned below tree canopies and on the container corners to reduce obstructions, based on the plans provided and presented in **Appendix D**.
- The design provided in this report and appendices is for the purpose of the planning application. It is not a finalised construction design.

- The design does not account for installation or electrical installation considerations, site conditions or provide an installation or maintenance risk assessment. Future maintenance needs have been accounted for in the design (for example, stirrup bracket to the pole).
- The luminaires and electrical connections will be fixed to container roofs, a metal structure. The principal contractor and installer must ensure appropriate electrical connections and earthing to avoid electrifying, or loose connections, to the metal container.
- The contractor shall liaise with the District Network Operator (DNO) (UK Power Networks) and/or appointed electrical engineer to organise or action electrical amendments and connections. Competent person(s) certified to handle electrical installations shall install the equipment.
- The contractor shall identify any overhead or underground obstacles or infrastructure that may pose risk or harm associated with the installation of the design before the physical installation (i.e. utility drawings). The contractor shall consult with relevant Bodies, as necessary upon identifying any issues.
- Tree canopies and vegetation are assumed to be well above the luminaires. Future maintenance will require these to be trimmed back to avoid obstructing the light.
- The design assumes there are no obstacles. Obstacles identified in the site layout plan have been accounted for in the design (for example, structures and vegetation). Luminaires are placed at the front of the container.
- Future maintenance should be carried out according to appropriate standards, health & safety procedures and the manufacturer's requirements/standards.
- The installation shall be carried out according to relevant British Standard Institution guidance relevant to the activity and/or required action.

12 Conclusion and Summary

12.1 An exterior lighting design and lighting impact assessment has been completed for a proposed container storage site.

12.2 The relevant lighting requirement for the site from British Standard 12464-2:2014 is met. The design includes best practice designs and measures to reduce obtrusive light impacts meeting the requirements of relevant Institution of Lighting Professionals Guidance. The lighting levels are appropriate for the site and sufficient for security and CCTV requirements.

12.3 The potential impacts to surrounding existing human sensitive receptors are concluded to be not significant in both the pre- and post-curfew time periods, meeting the lighting limits set by Environmental Zone E3.

12.4 No specific mitigation measures are required. An overnight running profile is suggested comprising reduced lighting level and motion detection, which would provide environmental benefits and energy and financial reductions.

12.5 The assessment demonstrates an appropriate lighting design for the intended uses. There is no impact on surrounding sensitive receptors and the adverse effects to the surrounding environment are limited due to the inclusion of mitigation. There is no reason for the application to be refused on lighting.

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APPENDICES

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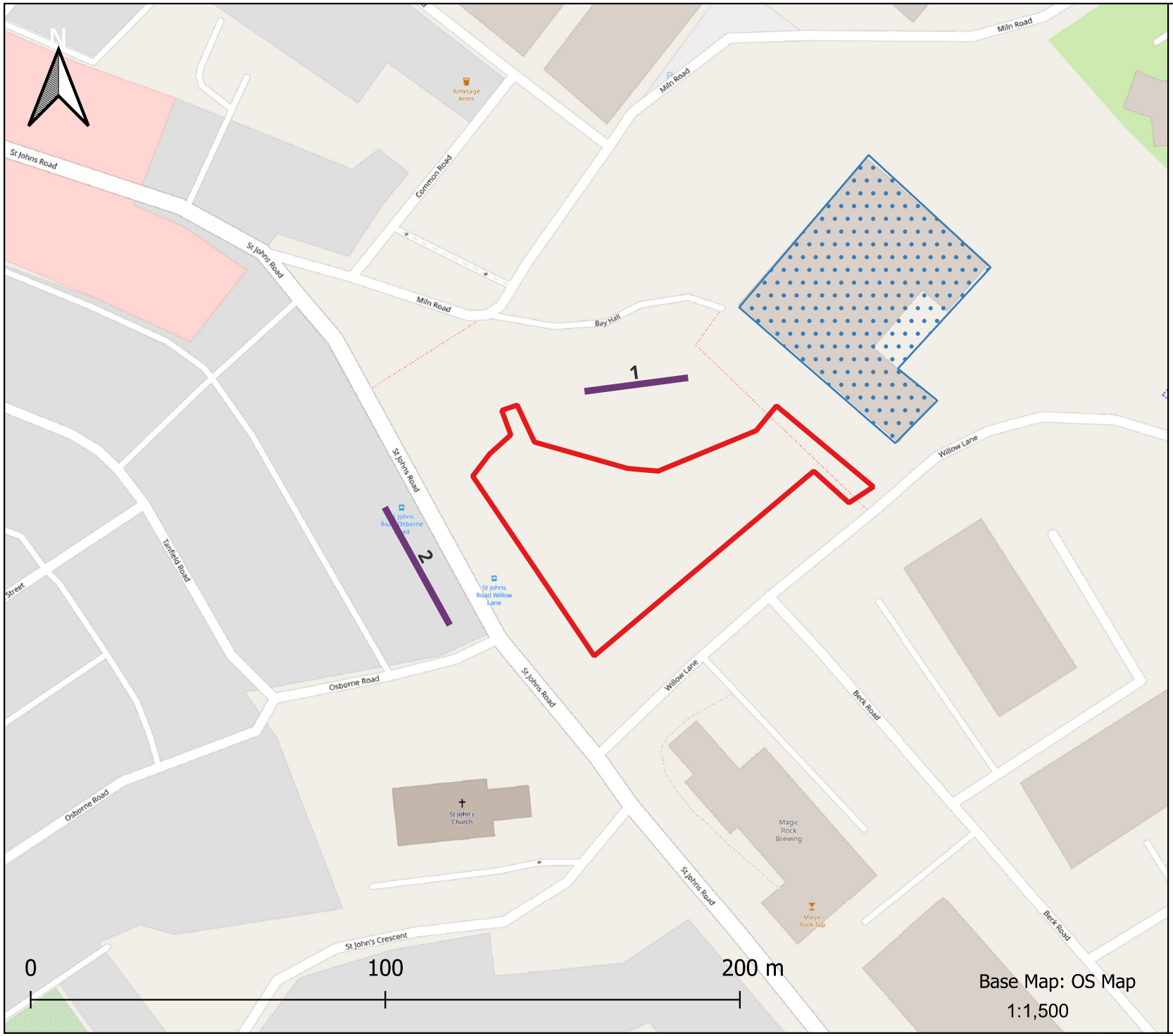
Appendix A – Site Location and Baseline Environment



Legend

- Red Line Boundary
- Existing Sensitive Receptor
- Former Britvic Building

Project: Container Storage at Former Ben Shaw Car Park Willow Lane Hudderfield

Report Number: 103154

Drawn by: PW

Disclaimer: the scale is for indicative purposes only as the map may be skewed once it is an image, for instance during printing.

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Date: 12/06/2024

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Appendix B – Details of the Lighting Design

Equipment

The details of the equipment, imagery and practical details of each product used are shown in **Table A1**. All products are 3000 K colour temperature.

Table A1: Equipment Details

Product	Type, Height & Optic	Ingress Protection (IP)	IK Rating	CRI	Image
Phillips Coreline Tempro Small Gen2	Floodlight, 3.35 m, DX50	IP66	IK08	70	

Maintenance Factor

The maintenance and choice of luminaire manufacturer is an important aspect to a future lighting design. During the lifespan of the luminaire, the product will gradually experience loss of light output. It is important that this managed appropriately in the design of the lighting installation, as a considerable proportion of light may be lost over the lifespan of the installation. This may ultimately make the installation unsafe as it could no longer be lit to the relevant light standard over the installation period.

The maintenance factor (fm) is calculated by multiplying four parameters: the luminous flux factor (fLF), survival factor (fS), luminaire maintenance factor (fLM) and surface maintenance factor (fSM). The surface maintenance factor is used for interior luminaires only, a value of 1 is used for exterior luminaires. A description of the three relevant parameters is provided below:

- Luminous Flux Factor (fLF): this value is obtained from the manufacturer's datasheet. The value is typically displayed as median useful life L##, which is the length of time during which 50% of a population of operating LED based luminaires of the same type have flux degraded to less than their initial luminous flux.
- Survival Factor (fS): this relates to the replacement of luminaires after they have failed. If the luminaires are directly replaced for new (without delay), then a factor of 1 can be assumed.

However, the ILP GN11/20 [7] proposes a standard value of 0.97, which represents an arbitrary 3% failure rate of LED.

- Luminaire Maintenance Factor (fLM): this represents the dirt build-up and other deterioration of the optic surface/material during the installation lifespan. Luminaire maintenance factors are defined in Annex C of BS 5489-1:2020. This parameter selection depends on whether the column height is above or below 6 m, the EZ and the cleaning schedule.

The calculated maintenance factor and one applied to the lighting design is provided in **Table A2**.

Table A2: Maintenance Factor

Parameter	Data Source	Value
Luminous flux factor (f_{LF})	Phillips website	0.90
Survival factor (f_S)	ILP GN 11	0.97
Luminaire maintenance factor (f_{LM})	Taken from BS 5489-1:2020 Annex C	<6 m column, EZ E3, 72 month clean: 0.84
Calculation: $f_{LF}*f_S*f_{LM}$		0.90*0.97*0.84
Maintenance Factor (f_m) – Final Value		**0.73**

The design has been prepared using the calculated MF. For the impact assessment, a second model is rerun with MF set to 1.0. The model output (Appendix B) displays the results from MF 1.0. The lux contour plan (Appendix C) shows the maintenance factor calculated lighting levels.

[7] Institution of Lighting Professionals, 2020. Guidance Note 11, Maintenance Factor Determination of LED Luminaires

Appendix C – Lighting Reality: Reality Outdoor, Design Output

The model output shows the results of MF 1.0. The design was initially prepared using the relevant calculated MF to ensure installation meets the relevant lighting requirements for the lifespan of the installation. The design levels with the calculated MF are shown in Appendix D.

DATE: **10 June 2024**

DESIGNER: **Philip Walton**

PROJECT No: **103154**

PROJECT NAME: **Exterior Lighting Design**

MILLER GOODALL
ACOUSTICS - AIR QUALITY - LIGHTING

Lighting design prepared using proposed development drawing "024026-SK02_Proposed Site Plan_Rev-_A1"

Lighting standard: 'regular vehicle traffic' from 'Table 5.1 General Requirements' of the BS 12464-2
Average Horizontal Lux: 20
Uniformity 0.4 (40%)

Outdoor Lighting Report

PREPARED BY: Miller Goodall Ltd

c:\users\philip.walton\miller goodall ltd\projects - documents\103100 - 103199\103154 - na & la container storage at former ben shaw car park willow lane

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Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Movement Area	414095.06	417758.11	109.27	97.57	1.48	1.48
2	Vertical - ESR 1 (Bay Hall...	414135.15	417844.51	28.66	3.00	1.30	0.50
3	Vertical - ESR 2 (St John'...	414108.95	417762.82	46.07	3.00	0.77	0.50
4	Spill Grid Contours	414069.53	417755.19	135.72	104.34	1.49	1.49

Luminaires

Luminaire A Data

Supplier	
Type	BVP111 T25 LED49-4S/730 PSD DX50
Lamp(s)	LED49-4S/730
LampFlux(klm)/Colour	4.90 3000/70
File Name	BVP111 T25 LED49-4S_730 PSD DX50 - Coreline tempo small gen2.ldt
Maintenance Factor	1.00
Imax70,80,90(cd/klm)	555.2, 65.9, 0.0
No. in Project	13

Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
13	A	414158.69	417814.90	3.35	280.00	5.00	0.00	0.20			
9	A	414125.14	417806.15	3.35	32.00	5.00	0.00	0.20			
4	A	414165.61	417802.27	3.35	131.00	5.00	0.00	0.20			
10	A	414118.51	417822.13	3.35	298.00	5.00	0.00	0.20			
8	A	414136.62	417798.38	3.35	214.00	5.00	0.00	0.20			
7	A	414140.01	417780.91	3.35	87.00	5.00	0.00	0.20			
11	A	414135.83	417817.04	3.35	265.00	5.00	0.00	0.20			
12	A	414147.90	417815.41	3.35	265.00	5.00	0.00	0.20			
6	A	414149.65	417787.21	3.35	131.00	5.00	0.00	0.20			
5	A	414154.06	417800.20	3.35	298.00	5.00	0.00	0.20			
3	A	414174.48	417810.58	3.35	131.00	5.00	0.00	0.20			
2	A	414183.38	417818.88	3.35	131.00	5.00	0.00	0.20			
1	A	414185.35	417830.34	3.35	298.00	5.00	0.00	0.20			

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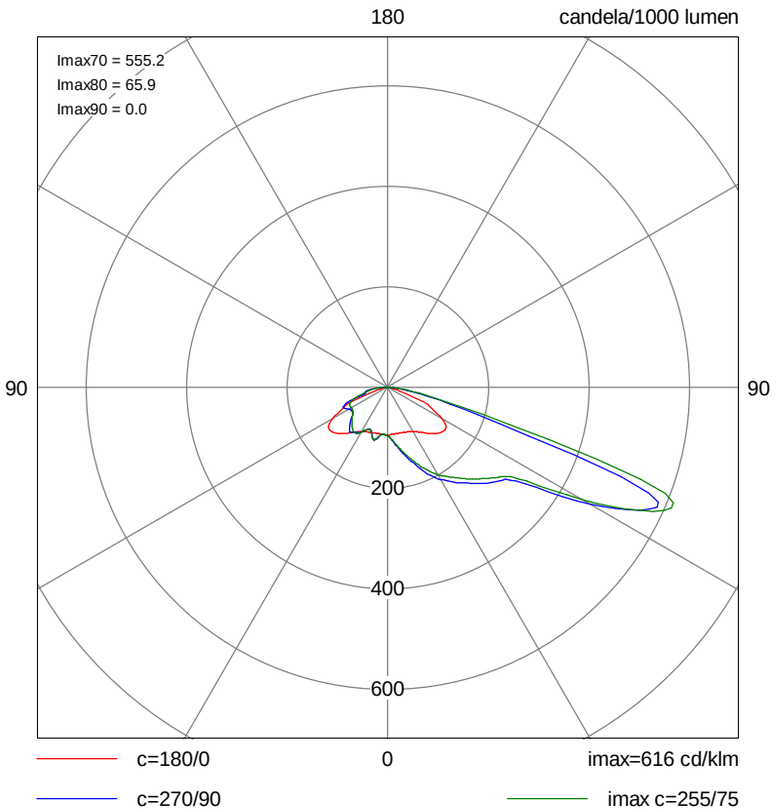
Polar Diagram

Luminaire A BVP111 T25 LED49-4S/730 PSD DX50



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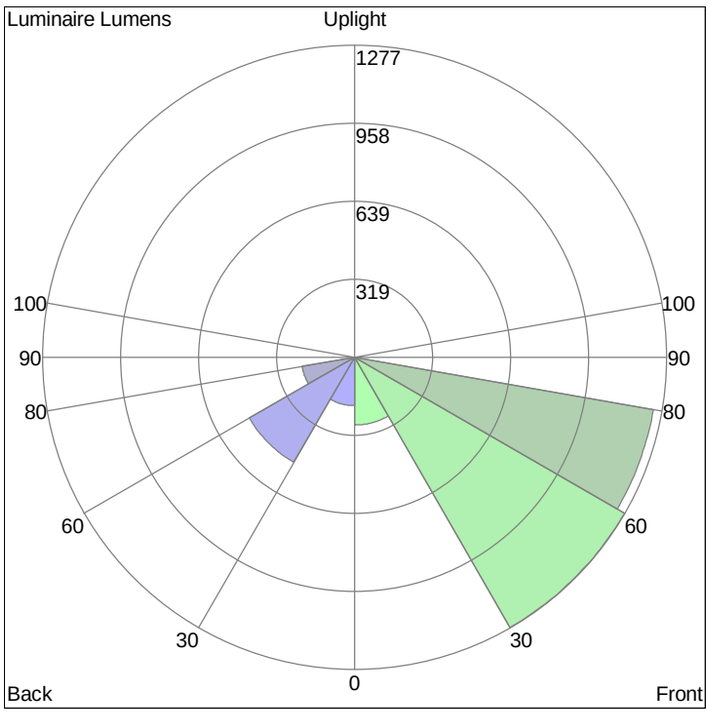
Luminaire Classification System (LCS) Graph

Luminaire A BVP111 T25 LED49-4S/730 PSD DX50



LCS	Lumens	%Lamp	%Lum
FL	278.5	5.7	7.4
FM	1277.3	26.1	34.0
FH	1243.7	25.4	33.2
FVH	26.7	0.5	0.7
BL	198.9	4.1	5.3
BM	496.8	10.1	13.2
BH	217.5	4.4	5.8
BVH	12.1	0.2	0.3
UL	0.0	0.0	0.0
UH	0.0	0.0	0.0
Total	3751.5	76.6	100.0

BUG rating=B1-U0-G1

9196314374

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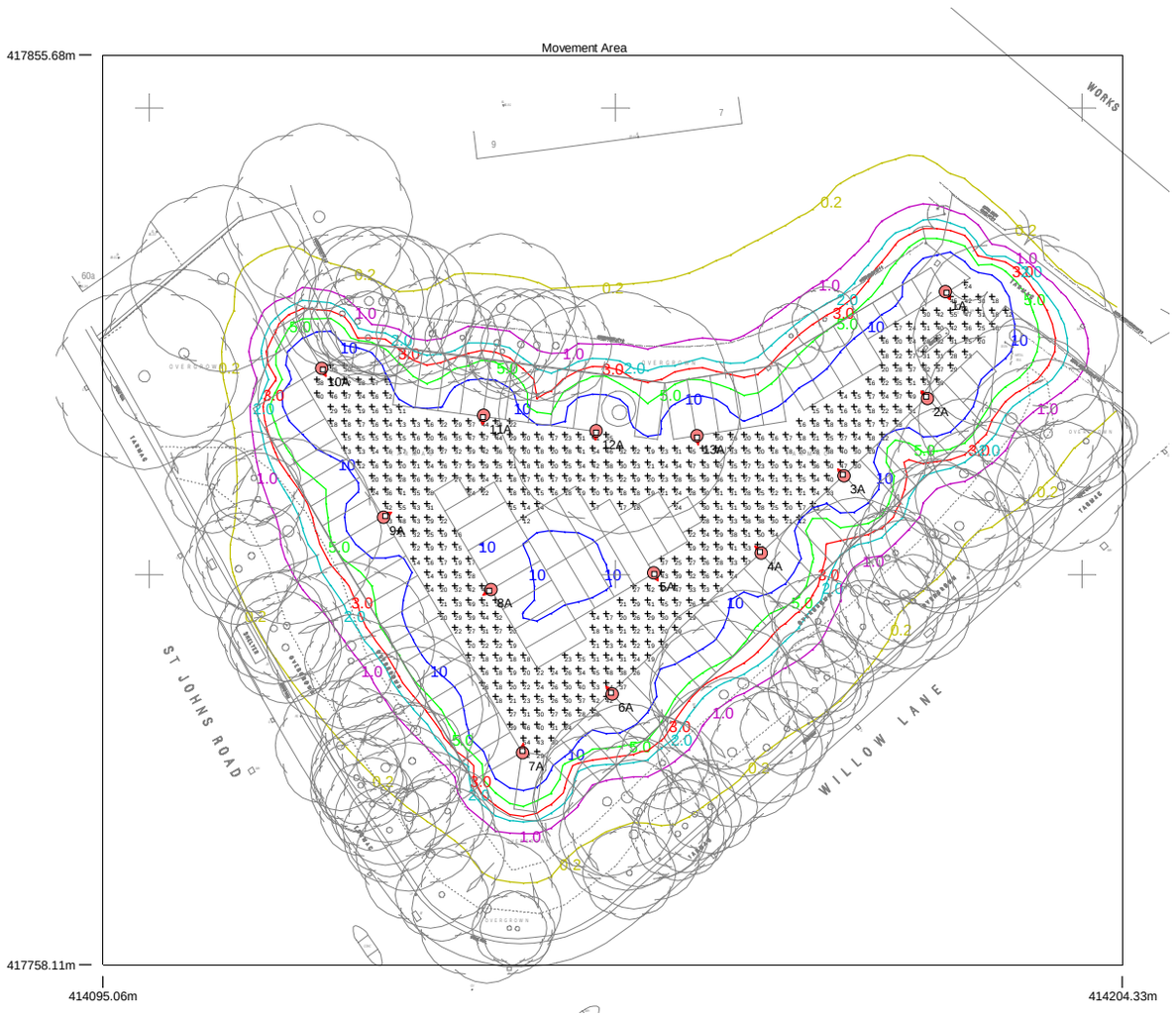
DATE: 10 June 2024 **DESIGNER: Philip Walton**

PROJECT No: 103154 **PROJECT NAME: Exterior Lighting Design**

MILLER GOODALL
ACOUSTICS – AIR QUALITY – LIGHTING

Horizontal Illuminance (lux)

Movement Area



Results

Eav	27.11
Emin	10.91
Emax	57.02
Emin/Emax	0.19
Emin/Eav	0.40

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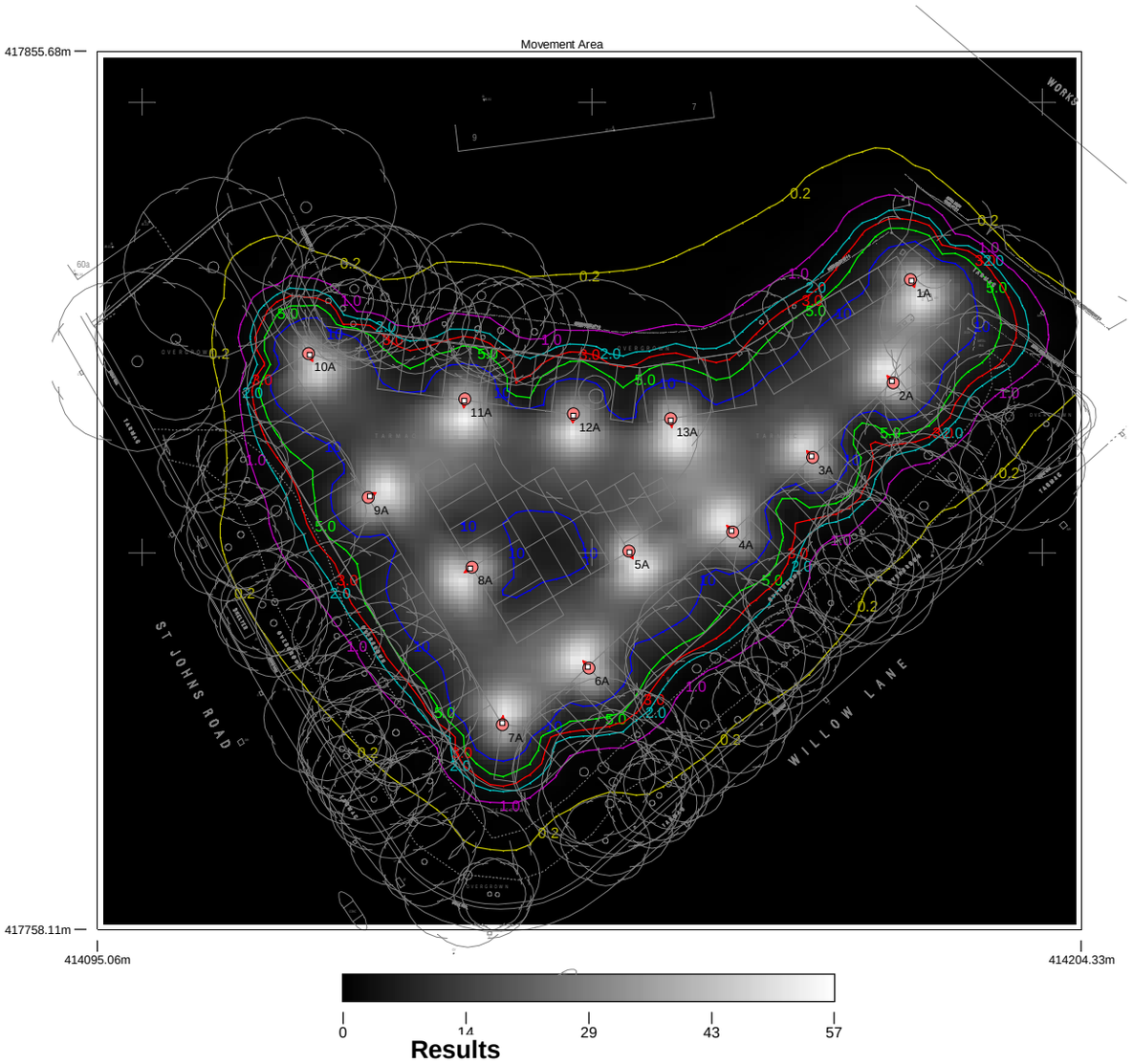
DATE: 10 June 2024 DESIGNER: Philip Walton

PROJECT No: 103154 PROJECT NAME: Exterior Lighting Design

MILLER GOODALL
ACOUSTICS – AIR QUALITY – LIGHTING

Horizontal Illuminance (lux)

Movement Area



Results

Eav	27.11
Emin	10.91
Emax	57.02
Emin/Emax	0.19
Emin/Eav	0.40

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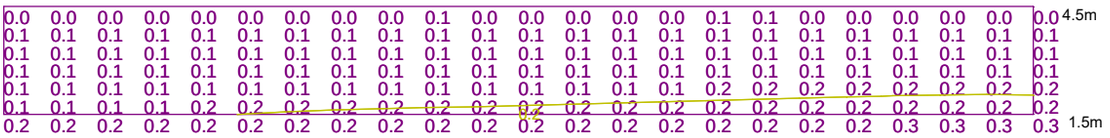
DATE: 10 June 2024 DESIGNER: Philip Walton

PROJECT No: 103154 PROJECT NAME: Exterior Lighting Design

MILLER GOODALL
ACOUSTICS – AIR QUALITY – LIGHTING

Illuminance (lux)

Vertical - ESR 1 (Bay Hall)



Results

Eav	0.12
Emin	0.04
Emax	0.26
Emin/Emax	0.15
Emin/Eav	0.33

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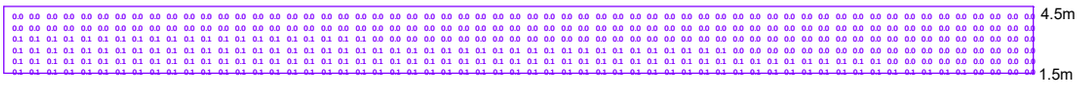
Illuminance (lux)

Vertical - ESR 2 (St John's Road)



Results

Eav	0.05
Emin	0.01
Emax	0.11
Emin/Emax	0.10
Emin/Eav	0.20

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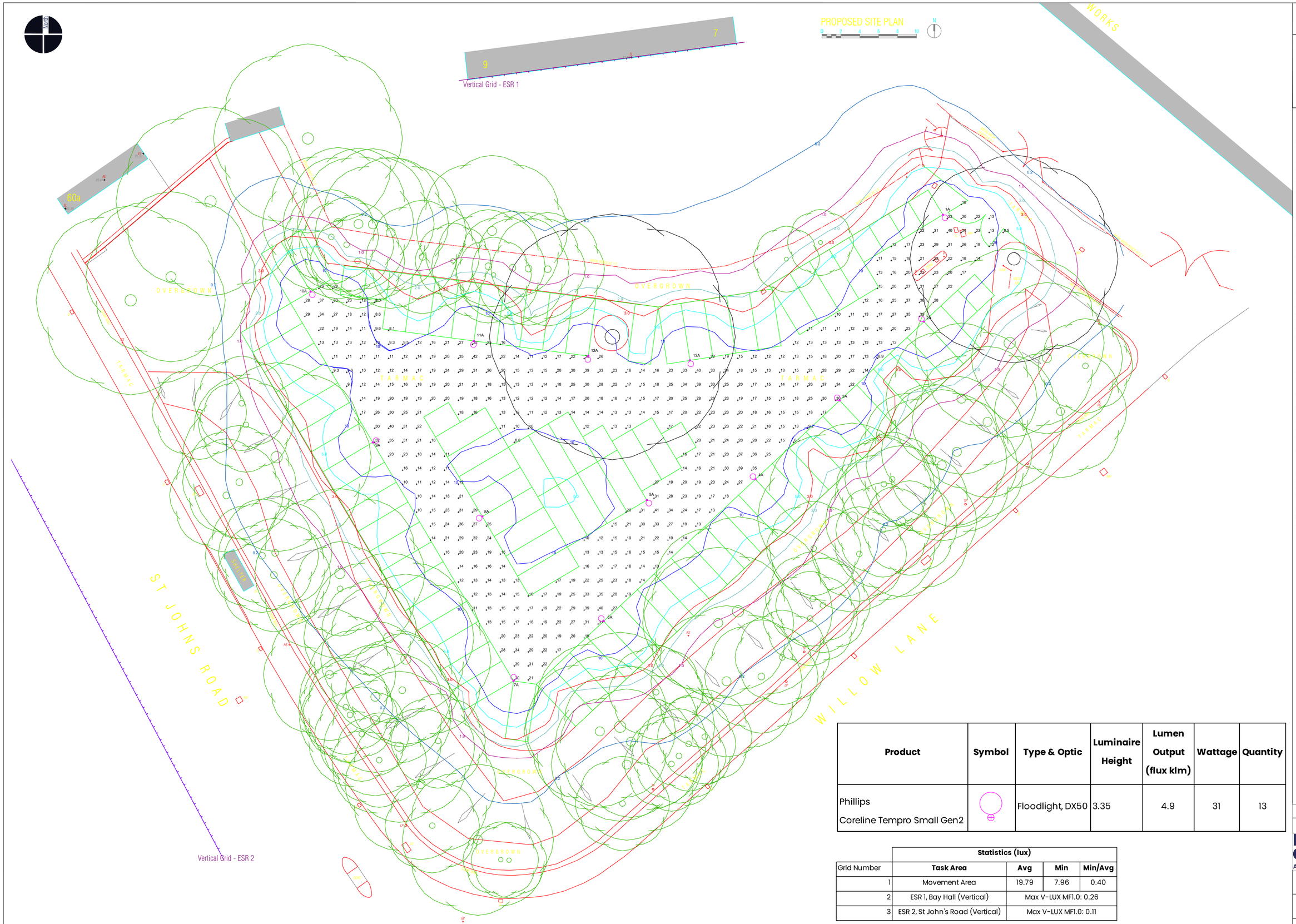
Appendix D – Lighting Design (A1 Print, AutoCAD Drawing)



Exterior Lighting Design

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E-mail: info@millergoodall.co.uk
www.millergoodall.co.uk

The lighting design has been prepared for the development planning application. The design is subject to comment and approval by the local authority and/or overseeing organisation. **It is a preliminary design not for construction.**

Installation is subject to technical approval and sign off.

The design has been prepared in accordance with Construction Design Management Regulations 2015, Part 3 Health and Safety Duties and Roles, Duties of Designer.

See the accompany lighting impact assessment and Reality Outdoor model outputs for details of relevant CDM risks and technical details of the prepared lighting design.

Installation constraints associated with civil, electrical and engineering disciplines require further consideration post-planning and before installation. Installation and constraints must be identified in accordance with specific standard, British Standards relevant to the discipline.

The lux drawing shows the outputs of the calculated maintenance factor (0.73). The vertical grid summary values presented are quoted from maintenance factor 1.0.

Lighting standard
'regular vehicle traffic' from 'Table 5.1
General Requirements' of the BS 12464-2
Average Horizontal Lux: 20
Uniformity 0.4 (40%)

Specification
Product: Phillips Coreline Tempro Small Gen2
Colour Temperature: 3000K
IK08, IP66
Tilt angle: 5 degree
Install height: 3.35 m
Mounting: Stirrup bracket on pole above container

Product	Symbol	Type & Optic	Luminaire Height	Lumen Output (flux klm)	Wattage	Quantity
Phillips Coreline Tempro Small Gen2		Floodlight, DX50	3.35	4.9	31	13

	Statistics (lux)			
Grid Number	Task Area	Avg	Min	Min/Avg
1	Movement Area	19.79	7.96	0.40
2	ESR 1, Bay Hall (Vertical)	Max V-LUX MF1.0: 0.26		
3	ESR 2, St John's Road (Vertical)	Max V-LUX MF1.0: 0.11		

Rev.	Date.	Purpose	Drawn by	Approved by
1	11/06/2024	Initial issue	PW	PW

MILLER GOODALL
ACOUSTICS - AIR QUALITY - LIGHTING

Project: Former Ben Shaw Car Park, Willow Lane, Huddersfield

Client: Teakwood Investments Ltd

Scale @ A1: 0.000219. See drawing metre scale

Project Number: 103154

Glossary of Terms

Arrangement The pattern in which the luminaires are sited in plan (e.g. regular, along one edge or around the perimeter, staggered, opposite etc).

Average Illuminance Illuminance (lux) averaged over the specified area, road

Average Luminance Luminance (cd/m^2) averaged over the specified area or solid angle

Base Plate [of the lighting column] Plate below ground level fixed to a planted lighting column to prevent the column sinking into the ground and to help prevent the column overturning

Beam Angle The total angle over which the luminous intensity of a beam drops to 50% of the peak value

Bracket A component used to support a luminaire at a definite distance from the axis of the lower straight position of a column

Calculation Grid A series of calculation grids set out in grid formation. Modelled at 1.5 * 1.5 m grid spacing.

Candela SI unit of luminous intensity (cd).

Carriageway That part of the road normally used by vehicular traffic

Colour Appearance The apparent colour of light emitted by a particular light source – often expressed in terms of 'cool' (4000 Kelvin (K)), 'intermediate' (3500 K) and 'warm' (3000 K). These terms are generalisations but are commonly used to describe light colour appearances

Colour Rendering Index (Ra) Measure of the degree to which the colour and appearance of an object appears 'naturally' when compared to a basis of reference e.g. artificial light, daylight.

Colour Temperature Temperature of the light measured in Kelvin (K)

Conflict Area Areas where different classes mix or cross. Examples such as road intersections, roundabouts, queuing locations, pedestrian crossings.

Contrast The difference in appearance of two or more parts of a field seen simultaneously or successively. E.g. brightness contrast, one object appearing more in dark than the other.

Curfew The time after which stricter requirements will apply. Planning conditions covering hours of operation or cessation lighting post-curfew will often be specifies by a planning authority. There is no set definition of curfew and it can vary by location, however, 23:00 to 07:00 is often cited.

Disability Glare Glare that impairs the vision of objects without necessarily causing discomfort

Discomfort Glare Glare that causes discomfort without necessarily impairing the vision of an object

District Network Operator (DNO) The company responsible for the distribution of electrical energy in a predefined area

Environmental Zone Designated zone (area) where additional controls on exterior lighting are imposed

Glare Condition of vision in which discomfort or a reduction in the ability to see details or objects, caused by unsuitable distribution or range of luminance, or to extreme contrast

Horizontal Illuminance The illuminance on a horizontal plane at a specified height (ground level, unless otherwise specified)

Illuminance The amount of light (lumens) landing on a surface area. Measured as lux. The lighting of surfaces, object or surroundings so they may be seen

Light Pollution The spillage of light into areas where it is not desired

Light Trespass Light, normally measured in illuminance (lix) that impacts onto a surface outside of the area designed to be lit by the installation concerned

Lighting Column Support intended to hold one or more luminaires, consisting of a post, possibly an extension piece and a bracket.

Louvre Shield fitted to the luminaire exterior to reduce light in a particular direction. Used to reduce spill light.

Lumen SI unit of luminous flux. Luminous flix emitted in unit solid angle (steradian) by a uniform point source having a luminous intensity of 1 cd

Luminaire Apparatus which distributes, filters or transforms the light transmitted from one or more lamps. The light source i.e. LED

Luminance The amount of light that reaches the eye by reflection or direct transmission from an area

Lux SI unit of illuminance

Maintenance Factor The depreciation of light from a luminaire over the life cycle of it

Obtrusive Light Light outside the area to be lit that causes annoyance, discomfort, distraction or a reduction in the ability to see essential information e.g. at signal lights

Photometer Meter used to measure light. Minolta T10 is used by Miller Goodall Ltd to record illuminance (lux) levels

Sky Glow The brightening of the night sky that results from the reflection of radiation, scattered from the constituents of the atmosphere (e.g. gaseous molecules, aerosols and particulate matter), in the direction of observation

Spacing The distance between luminaires in an installation

Spill Light (stray light) Light emitted by an installation, which falls outside the boundaries that is being lit

Threshold Increment (TI) Measure of the loss of visibility caused by the disability flare of luminaires of a road lighting installation

Uplighter A light placed or designed to throw illumination upwards, usually for architectural purposes

Upward Light Ratio (ULO) Proportion of the light flux of a luminaire and/or installation that is emitted at and above the horizontal when the luminaire is mounted at an installation position. A measurement of sky glow.

Vertical Illuminance The illuminance on a vertical plane at a specified point.

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ACOUSTICS - AIR QUALITY - LIGHTING