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TILLICOULTRY QUARRIES LTD

ELY COATED STONE, NEW PLANT

LIGHTING DESIGN AND ASSESSMENT

FEBRUARY 2024

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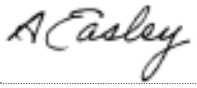
ELY COATED STONE, NEW PLANT

LIGHTING DESIGN AND ASSESSMENT

FEBRUARY 2024

PREPARED BY:

Alan Easley Principal Lighting Designer



REVIEWED
AND APPROVED BY:

Mark Dawson Technical Director

CONTENTS

APPENDICES

DRAWINGS	TITLE	SCALE
NT16548-000-002-001	Luminaire Layout.	NTS
NT16548-000-002-002	Lux Levels.	NTS

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Wardell Armstrong LLP (WA) has been instructed by Tillicoultry Quarries Ltd to provide a lighting design to support a discharge of planning conditions for the proposed new plant at Ely Asphalt Plant (hereafter referred to as the 'site').

1.1.2 The application is for the removal of aggregate storage bays and existing coated stone plant, installation of replacement coated stone plant, erection of dry aggregate bays, weighbridge, the continued storage and distribution of aggregates, associated works and facilities, and biodiversity enhancements.

1.1.3 Lighting – Condition 5 States:

No security or floodlighting shall be erected or installed within or around the application site edged red on drawing number ELL/MC/PW/007 revision D dated 22/12/2022 except in accordance with a scheme submitted to and approved in writing by the Mineral Planning Authority. The details of the scheme shall include the height of floodlighting, intensity of the lights (specified in LUX levels), spread of light including approximate light spillage to the rear of any floodlighting posts (in metres), any measures proposed to minimise the impact of the floodlighting or disturbance through glare (such as shrouding), and the times when such lights will be illuminated. All lighting shall be retained only in accordance with the approved details. Reason: In the interest of neighbour amenity and to protect the character of the surrounding countryside in accordance with Policy ENV 2 and ENV 1 of the East Cambridgeshire Local Plan (2015) and Policy 18 of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2021.

2 SITE CONTEXT AND DEVELOPMENT

2.1.1 Ely Asphalt Plant is located to the east of Ely, Cambridgeshire. Access to the site is via Queen Adelaide Way. The site centred on approximate National Grid Reference (NGR) TL 559808, and postcode CB7 4UB.

2.1.2 The site currently operates between 0600 to 1800 Monday to Friday and between 0600 to 1200 on Saturdays and no working takes place on Sunday or Public Holidays.

2.1.3

The extent of development is shown in Figure 1 below:

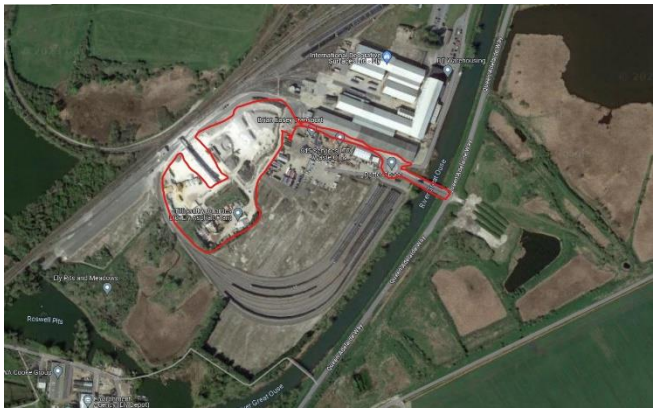


Figure 1: **Ely Asphalt Plant**

3 METHODOLOGY

3.1.1 The lighting scheme uses information provided below along with policy and guidance as per section 3.2.1, to determine lighting design best practice and impacts to human and ecological receptors. The following documents have been considered:

- DWG WA ED13486-004B Proposed Site Layout.
- PDF WA NT16548-001 Landscape planting Plan.
- PDF WA ED13486-023A Weighbridge Office Elevations.
- PDF WA ED13486-021A Covered Storage Elevations.
- PDF Benninghoven – TBA 4000 Plant arrangement Elevations.
- JPEG TB 4000 @ Middlesborough (for comparison) (see appendix A).

3.2 Policy and Guidance

3.2.1 The lighting assessment has considered the following Guidance and Standards:

- British Standard 12464-2:2014 Light & Lighting – lighting of workplaces, Outdoor workplaces (BS 12464-2).
- British Standard 13201-2:2015 Road lighting (BS 13201-2).
- British Standard 5489-1:2020 Design of Road Lighting (BS 5489-1).
- Society of Light & Lighting (SLL) Code for Lighting 2022.
- Chartered Institute of Building Surveyors & Engineers (CIBSE) Lighting Guides (LG 0 - 2, 4 - 22).
- Institute of Lighting Professionals (ILP) Guidance Note 1/21 The Reduction of

Obtrusive Light.

- Institute of Lighting Professionals (ILP) Guidance Note 8/23 Bats and Artificial Lighting at Night.
- International Commission on Illumination. (CIE) 112-1994 Glare Evaluation System for use within Outdoor Sport and Area Lighting.
- Health & Safety Executive (HSE) HSG38 Lighting at Work.

4 DESIGN AND ASSESSMENT

4.1.1 The proposed lighting design covers the development areas split into sections below:

Table A: Areas Covered		
	Area	**Requirement**
1	Front of new covered storage	Horizontal Calculation @ 0.00m
2	Weighbridge Exit	Horizontal Calculation @ 0.00m
3	Weighbridge Entrance	Horizontal Calculation @ 0.00m

4.1.2 The lighting assessment will consider all the requirements of the condition whether any fixed lighting from the Proposed new plant will intrude into the space of local designated receptors. The receptors would be properties surrounding the site. The assessment also takes into account the new designed scheme, existing fixed lighting units within the site boundary, operational hours, and visible views from the receptors. Also, existing lighting units outside of the site boundary would be assessed.

4.1.3 Using the of Institute of Lighting Professionals (ILP) Guidance Note 1 The Reduction of Obtrusive Light, from Table B below, we have selected Zone E3 as the appropriate zone for the Ely site.

Table B: ILP Environmental Zones			
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
a) Rural Zones under protected designations should use a higher standard of policy. b) Zone E0 must always be surrounded by an E1 Zone. c) Zoning should be agreed with the local planning authority.			

4.1.4 From Table C below we can find our illuminance limitations (lux levels) and maximum luminous intensity (cd, candelas), these are the maximum levels of light that would be permitted to hit the receptor at hours of darkness and how bright the light source, within the luminaire, would emit, when viewed from the receptor position.

4.1.5 For our chosen Zone E3 this would be maximum of 10 lux pre-curfew and 2 lux post-curfew. (as a simple comparison, a standard candle at 1 metre would give 1 lux and twilight is judged to be about 1 lux) The maximum luminous intensity allowed would be 10,000 cd pre-curfew and 1,000 cd post-curfew.

4.1.6 Pre-curfew hours would be considered from dusk till 21.00 hours (a reasonable expected time) then from 06.00 till dawn. Post-curfew would be 21.00 – 06.00 hours. As the site will only be operational from 07.00 hours until 18.00 hours the post-curfew limits would not apply.

Table C: Illuminance Limitations & Maximum Luminous Intensity (Ap)				
Zone	**Pre-Curfew (lx)**	**Post-Curfew (lx)**	**Pre-Curfew (cd)**	**Post-Curfew (cd)**
E0	N/A	N/A	0	0
E1	2	<0.1*	2,500	0
E2	5	1	7,500	500
E3	10	2	10,000	1,000
E4	25	5	25,000	2,500
	* If the installation is for public (road) lighting then this can increase to 1 lx		* If the installation is for public (road) lighting then this can increase to 1 lx	

4.1.7 The existing lighting will be removed and replaced when the new plant is installed, there are no other significant existing light sources on the site.

4.1.8 There would be lighting for the site vehicles, the light emitted would be contained within a localised area and unlikely to extend beyond any site boundary.

4.1.9 We have selected appropriate local positions as current light sensitive receptors. See Table D

Table D: Receptor Locations	
Location	**From Site**
Ely Sailing Club (Prickwillow Road)	652m West
Residential (Prickwillow Road)	630m North West
Queen Adelaide Village Hall (Ely Road B1382)	712m North

5 LIGHTING DESIGN AND ASSESSMENT RESULTS

5.1.1 The lighting design scheme has been modelled in Dialux Software to produce lux levels and achieves best practice in accordance with all current guidance. The results are referenced in Appendix B NT16548 – Dialux Calculation Report.

5.1.2 Based on the modelled scheme the results are included in Table 1. and drawings,

NT16548-000-002-002 Lux Levels.

Table 1: Calculation Results				
	Calculation Design Area	**Eav Lux**	**Emin Lux**	**Emax Lux**
1	Front of Proposed Covered Storage	55	13	90
2	Weighbridge Exit	93	37	188
3	Weighbridge Entrance	93	35	187
Note: Areas have been calculated with obstructions, such as existing & proposed buildings. All luminaires were calculated when at 100% illumination.				

5.1.3 The luminaire positions can be referenced in drawing NT16548-000-002-001 Luminaire Layout and coordinates are in Appendix A NT16548 – Dialux Calculation Report.

5.1.4 The proposed plant uses RZB lighting for the gantries - The Planox 33w 4350lm Luminaire has been used within the calculations for spill lighting.

5.1.5 No natural obstructions such as ground contours and vegetation have been included within the calculations.

5.1.6 The luminaire specification for the designed scheme is provided in Table 2 below.

Table 2: Luminaire Specification		
	Type A	**Type B**
Supplier	Robus Lighting (LEDGroup)	Robus Lighting (LEDGroup)
Range	Cosmic Asymmetric	Cosmic Asymmetric
Part Number	RCM17030AS-04	RCM9030AS-04
LED	Integrated Lens	Integrated Lens
Lamp Flux (lm)	20,515	10,414
Colour Temperature (k)	3000	3000
Wattage (W)	166.9	88.6
Mounting	Wall Bracket	Wall Bracket
Control Specification	High Frequency	High Frequency
Image		
Quantity	6	2

Mounting as per Coordinates list in NT16548 – Dialux Calculation Report

5.1.7 It would be advisable to install external Lux level photocells to automatically control the luminaires when light levels reduce or increase. Alternatively, to install Microwave Sensors to detect movement around the covered storage for safety measures. Also, a main switch / timer to ensure lighting is switch off when no one is on site. This would ensure that light and energy is only used when required.

5.1.8 The Plant lighting should incorporate sensors for the higher levels to avoid lighting being on, when not required for safety purposes.

5.1.9 Lighting assessment for receptor locations listed in Table D.

5.1.10 **Ely Sailing Club (Prickwillow Road)** is 652 metres west of the site. Terrain between is a large lake with trees and hedgerows bordering the water, a railway line runs close to the site. There would be some visual light glow in dark hours, the site lighting would be indistinguishable from the railway and other industrial area illumination. Due to distance light from the Tillicoultry site would not exceed the permitted levels.

5.1.11 **Residential (Prickwillow Road)** is 630 metres north west of the site. Terrain between is fields with trees and hedgerows on the boundaries, a railway line runs close to the site. There would be some visual light glow in dark hours, the site lighting would be indistinguishable from the railway and other industrial area illumination. Due to distance light from the Tillicoultry site would not exceed the permitted levels.

5.1.12 **Queen Adelaide Village Hall (Ely Road B1382)** is 712 metres north of the site. Terrain between is fields with trees and hedgerows on the boundaries, three railway lines run between the sites. There would be some visual light glow in dark hours, the site lighting would be indistinguishable from the railway and other industrial area illumination. Due to distance light from the Tillicoultry site would not exceed the permitted levels.

6 CONCLUSION AND RECOMMENDATIONS

6.1.1 The lighting scheme has been designed to meet current industry recommendations and requirement of the conditions.

6.1.2 The proposed lighting design and construction of the new plant will not change the current visual aspect for the site and Environmental Zone E3 – Suburban would be met in full. Currently there are existing lighting columns installed along the railway sidings and a high mast lighting setup just to the north of site on the industrial area. These would still remain the main source of any visual perception for the area.

6.1.3 There would be no obtrusive light from site to any neighbouring properties. See Drawing - NT16548-000-002-002 Lux Levels.

6.1.4 Sky glow and upward light have been minimised and would be only from reflected light, with the exception of the highest mounted luminaires on the plant, if these are put on a control system then they would only be activated for short periods of time.

6.1.5 All designed luminaires are specified 3000k LED colour temperature, The plant lighting supplied by others would be best if supplied as 3000k LED colour temperature.

6.1.6 Controls for the lighting, would assist in reducing any light environmental impact for the site.

6.1.7 Site vehicle lighting (considered localized) would not affect the designated receptors.

APPENDIX A

TB 4000 Middlesborough


TILLICOULTRY
QUARRIES
Middlesbrough

APPENDIX B

NT16548 – Dialux Calculation Report

NT16548 - Ely Coated Stone

Date: 11.12.2023
Operator: Alan Easley MSLL

Wardell Armstrong LLP

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Table of contents

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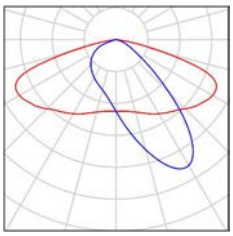
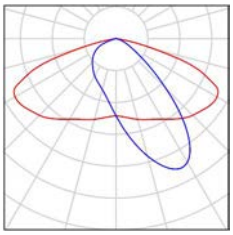
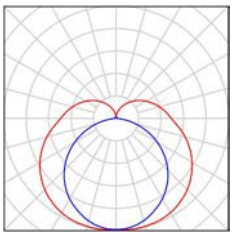
Exterior Scene 1 / Luminaire parts list

6 Pieces	LEDGroup Robus RCM17030AS-04 COSMIC 170W LED flood light IP65 Black 3000K Asymmetric Article No.: RCM17030AS-04 Luminous flux (Luminaire): 20515 lm Luminous flux (Lamps): 20529 lm Luminaire Wattage: 166.9 W Luminaire classification according to CIE: 100 CIE flux code: 43 79 97 100 100 Fitting: 1 x LED (Correction Factor 1.000).	See our luminaire catalog for an image of the luminaire.	
2 Pieces	LEDGroup Robus RCM9030AS-04 COSMIC 90W LED flood light IP65 Black 3000K Asymmetric Article No.: RCM9030AS-04 Luminous flux (Luminaire): 10414 lm Luminous flux (Lamps): 10424 lm Luminaire Wattage: 88.6 W Luminaire classification according to CIE: 100 CIE flux code: 45 81 98 100 100 Fitting: 1 x LED (Correction Factor 1.000).	See our luminaire catalog for an image of the luminaire.	
9 Pieces	RZB 451219.009.2 PLANOX ECO Article No.: 451219.009.2 Luminous flux (Luminaire): 4350 lm Luminous flux (Lamps): 4350 lm Luminaire Wattage: 33.0 W Luminaire classification according to CIE: 79 CIE flux code: 36 65 86 79 100 Fitting: 1 x LED Platine (Correction Factor 1.000).	See our luminaire catalog for an image of the luminaire.	

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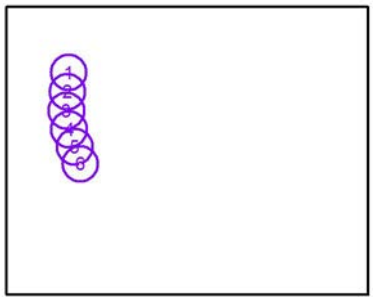
Exterior Scene 1 / Luminaires (coordinates list)

LEDGroup Robus RCM17030AS-04 COSMIC 170W LED flood light IP65 Black 3000K Asymmetric

20515 lm, 166.9 W, 1 x 1 x LED (Correction Factor 1.000).



No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
1	31.556	185.655	7.000	30.0	0.0	-92.7
2	30.731	173.241	7.000	30.0	0.0	-92.7
3	29.893	160.887	7.000	30.0	0.0	-92.7
4	31.749	148.826	7.000	30.0	0.0	-66.7
5	35.334	137.701	7.000	30.0	0.0	-66.7
6	38.919	126.575	7.000	30.0	0.0	-66.7

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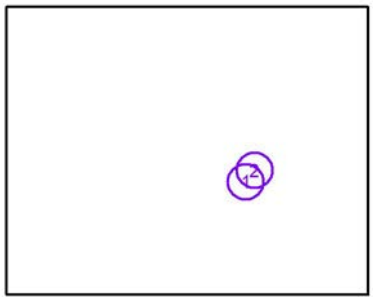
Exterior Scene 1 / Luminaires (coordinates list)

LEDGroup Robus RCM9030AS-04 COSMIC 90W LED flood light IP65 Black 3000K Asymmetric

10414 lm, 88.6 W, 1 x 1 x LED (Correction Factor 1.000).



No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
1	146.346	114.938	3.300	30.0	0.0	-138.5
2	152.074	122.336	3.300	30.0	0.0	24.4

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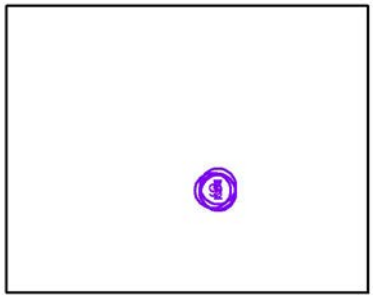
Exterior Scene 1 / Luminaires (coordinates list)

RZB 451219.009.2 PLANOX ECO

4350 lm, 33.0 W, 1 x 1 x LED Platine (Correction Factor 1.000).



No.	Position [m]			Rotation [°]		
	X	Y	Z	X	Y	Z
1	128.288	110.962	9.400	0.0	0.0	39.1
2	128.639	106.949	9.400	0.0	0.0	-49.3
3	128.288	110.962	13.200	0.0	0.0	39.1
4	128.288	110.962	17.000	0.0	0.0	39.1
5	128.288	110.962	20.800	0.0	0.0	39.1
6	128.288	110.962	23.800	0.0	0.0	39.1
7	128.288	110.962	26.900	0.0	0.0	39.1
8	128.025	107.595	5.400	0.0	0.0	-49.3
9	125.093	108.226	26.900	0.0	0.0	39.1

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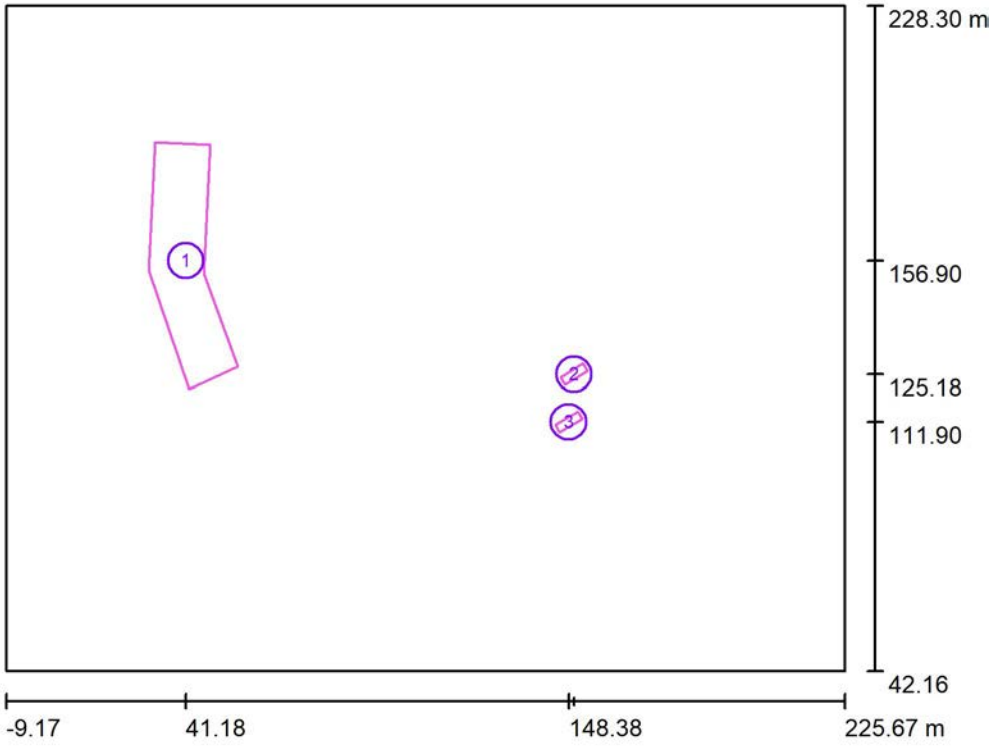
Exterior Scene 1 / Calculation surfaces (results overview)



Scale 1 : 2118

Calculation Surface List

No.	Designation	Type	Grid	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
1	In front of Covered Storage	perpendicular	128 x 128	55	13	90	0.226	0.140
2	Weighbridge Exit	perpendicular	64 x 32	93	37	188	0.395	0.195
3	Weighbridge Entrance	perpendicular	64 x 32	93	35	187	0.372	0.184

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u0	E_{min} / E_{max}
perpendicular	3	57	13	188	0.22	0.07

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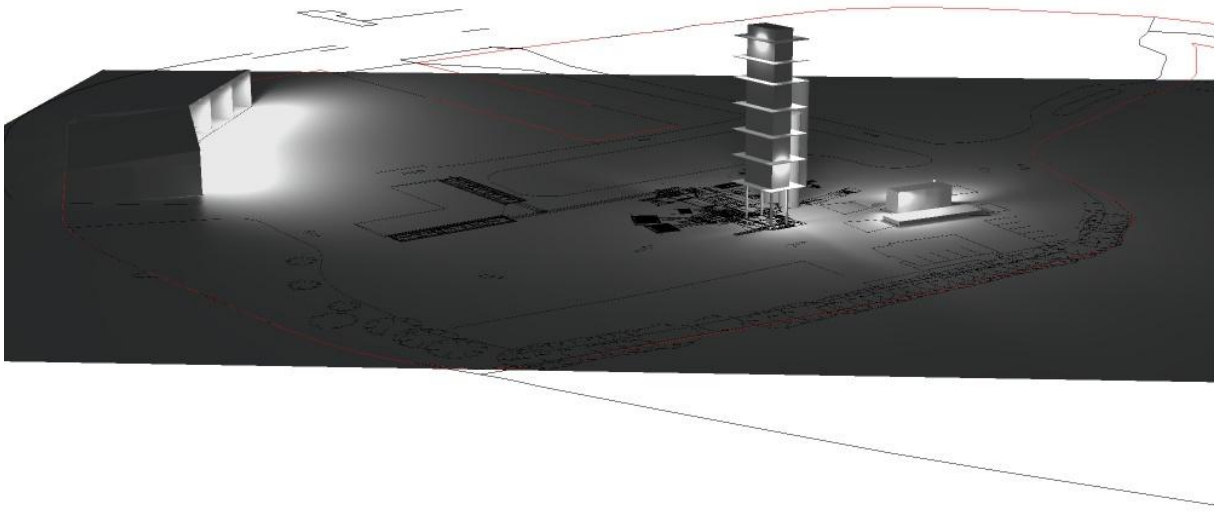
Exterior Scene 1 / 3D Rendering



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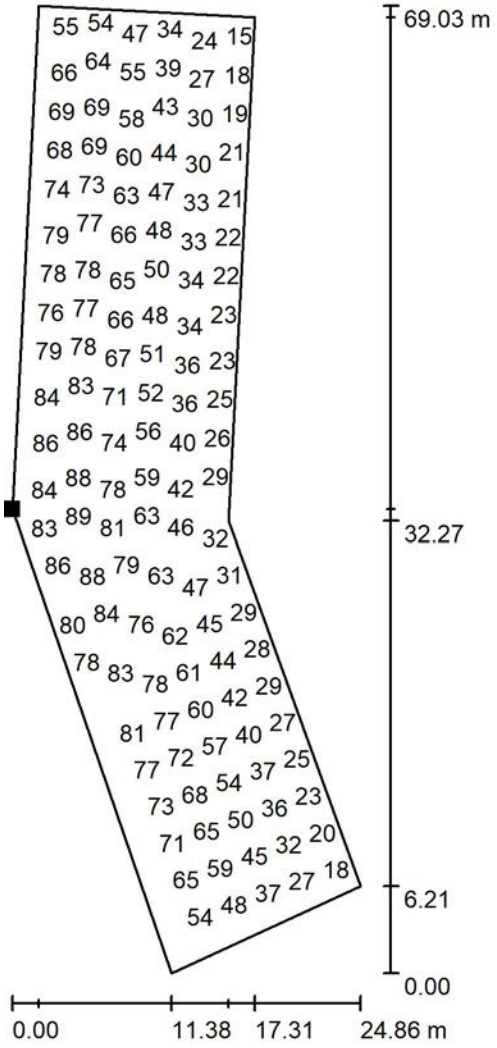
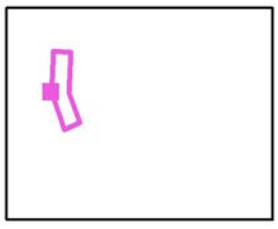
Exterior Scene 1 / In front of Covered Storage / Value Chart (E, Perpendicular)



Values in Lux, Scale 1 : 540

Not all calculated values could be displayed.

Position of surface in external scene:
Marked point:
(30.722 m, 154.142 m, 0.100 m)



Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
55	13	90	0.226	0.140

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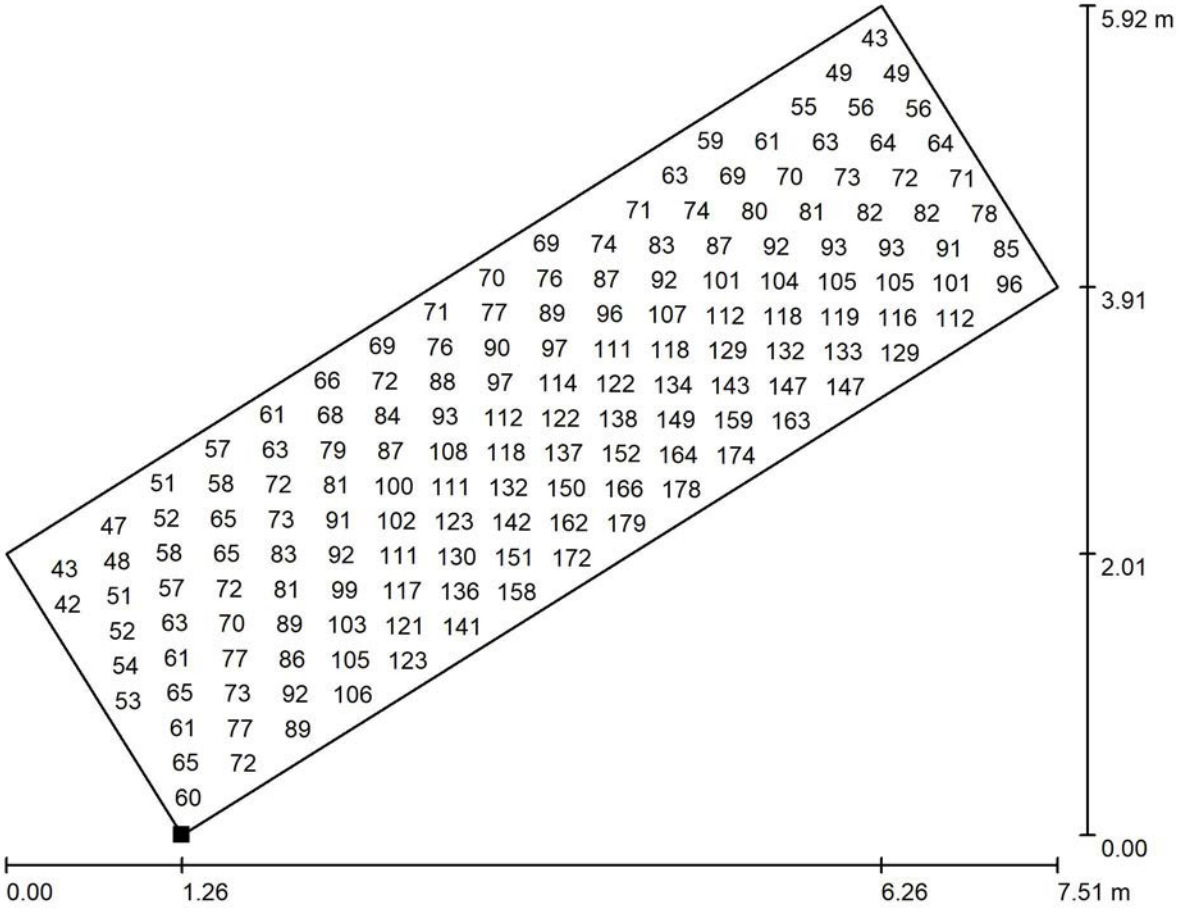
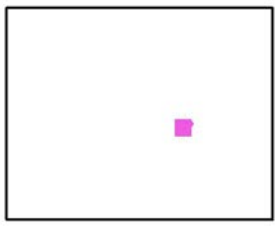
Exterior Scene 1 / Weighbridge Exit / Value Chart (E, Perpendicular)



Values in Lux, Scale 1 : 54

Not all calculated values could be displayed.

Position of surface in external scene:
Marked point:
(147.355 m, 122.222 m, 0.750 m)



Grid: 64 x 32 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
93	37	188	0.395	0.195

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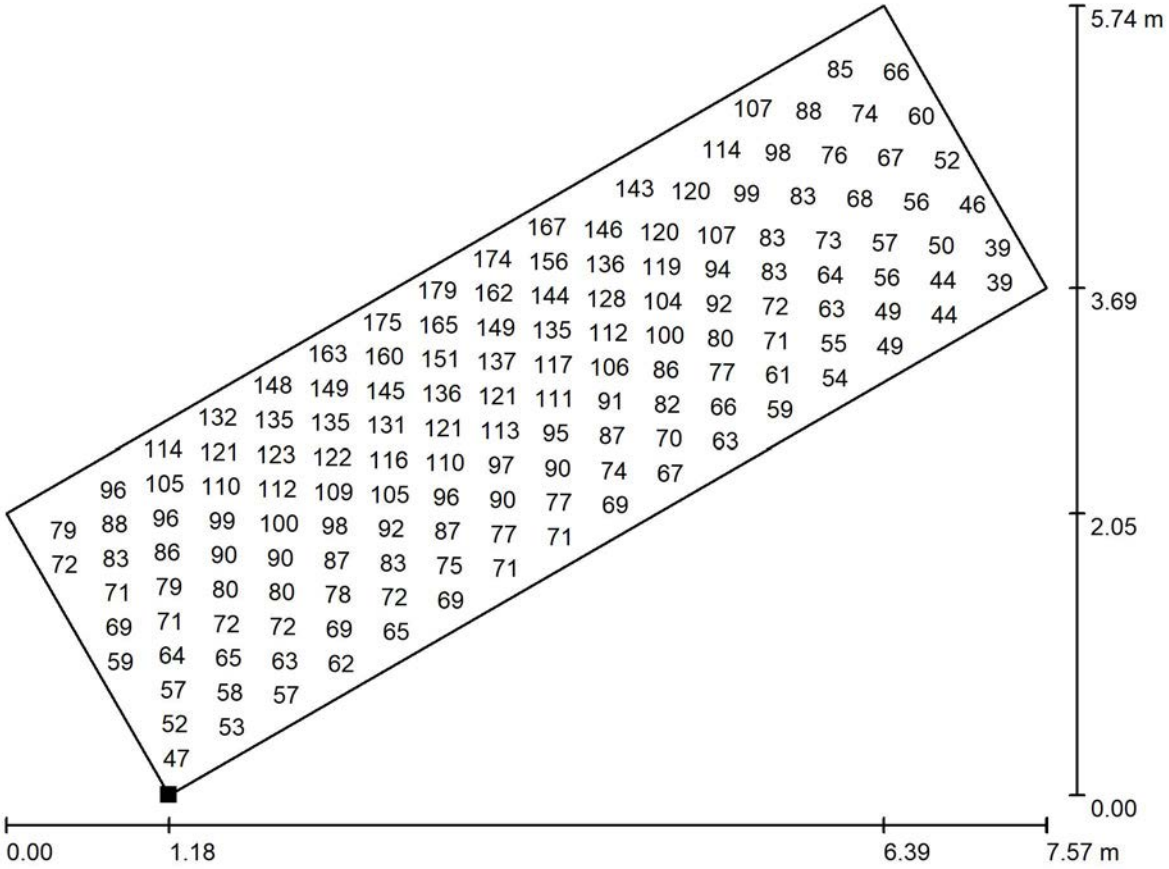
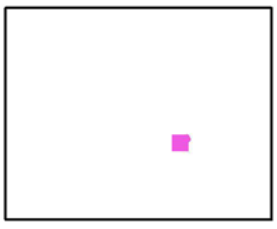
Exterior Scene 1 / Weighbridge Entrance / Value Chart (E, Perpendicular)



Values in Lux, Scale 1 : 55

Not all calculated values could be displayed.

Position of surface in external scene:
Marked point:
(145.775 m, 109.032 m, 0.750 m)



Grid: 64 x 32 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
93	35	187	0.372	0.184

APPENDIX C

Luminaire Data Sheets

ROBUS®

INDUSTRIAL

COSMIC ASYMMETRIC LED FLOOD LIGHT

30W,50W,100W,130W,170W, 300W, IP65

PRODUCT INFORMATION DOCUMENT

FEATURES

- 45° x 150° asymmetric beam angle providing optimized light distribution for area lighting
- Equipped with self-regulating valve to prevent condensation
- Die cast aluminium housing providing optimal heat dissipation and high resistance to weather conditions
- Pre-drilled mounting bracket with 180° adjustable angle

CONSTRUCTION

- Powder-coated die cast aluminium housing
- Tempered glass diffuser
- Steel bracket and stainless steel screws
- Prewired with 1m of rubber flex

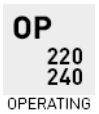
WARRANTY

LIFETIME

LUMENS PER W

IK RATING

IP RATING



OPERATING VOLTAGE

BEAMANGLE

CCT


SAFETY CLASS

Product Code:	RCM3030AS-04 RCM3040AS-04	RCM5030AS-04 RCM5040AS-04	RCM9030AS-04 RCM9040AS-04	RCM12530AS-04 RCM12540AS-04	RCM17030AS-04 RCM17030AS-04	RCM29030AS-04 RCM29040AS-04
Comparable to:	200W Halogen	350W Halogen	800W Halogen	1200W Halogen	2000W Halogen	3000W Halogen
Total Power (W):	31.7/31.5	52.1/51.6	88.6/88.8	127.5/130.0	166.9/166.6	288.3/289.9
Power Factor:	0.95	0.95	0.95	0.95	0.95	0.95
Total Light Output (lm):	3200/3640	5290/5740	10420/10960	16140/17370	20520/21310	36810/39200
Total Emergency Light Output (lm):	NA	NA	NA	NA	NA	NA
Efficacy (lm/cctW):	101/116	102/111	118/123	127/134	123/128	128/135
Lux at 1m (lux):	1220/1420	1900/2030	3670/3750	5430/5960	6940/7240	13400/14620
Emergency Lux at 1m (lux):	NA	NA	NA	NA	NA	NA
CCT (K):	3000/4000	3000/4000	3000/4000	3000/4000	3000/4000	3000/4000
CRI:	80	80	80	80	80	80
IP:	65	65	65	65	65	65
Operation Temperature (°C):	-20 ≤ Ta ≤ +40	-20 ≤ Ta ≤ +40	-20 ≤ Ta ≤ +40	-20 ≤ Ta ≤ +40	-20 ≤ Ta ≤ +40	-20 ≤ Ta ≤ +40
Inrush Current:	0.6A/0.011us	15A/150us	0.7A/0.1us	1.4A/0.1us	20A/ 150us	0.94A/ 11.3ns
RG Value:	0	0	0	0	0	0
SDCM:	6	6	6	6	6	6
P_{ST} LM:	NA	NA	NA	NA	NA	NA
SVM:	NA	NA	NA	NA	NA	NA
Energy Class:	E/E	E/E	E/D	D/D	D/D	E/D
Rated Life to L70B50 (Hrs):	50000	50000	50000	50000	50000	50000
Dimensions LxWxH (mm):	201x235.5x34.5	262x277.5x41.5	304x383.5x57.5	418x487.5x59.5	418x487.5x59.5	444x582x60
Weight (kg):	1.02	1.6	4.28	7.01	7.01	11.8

Separate Control Gear Information						
Type of Light Source:	LED	LED	LED	LED	LED	LED
Full Load Efficiency (%):	92	93	92	93	90	94
P_{NET} (W):	NA	NA	NA	NA	NA	NA
Dimensions (mm):	142x24x15	210x30x30	215x65x29	320x85x29	320x85x29	252x90x45

Product is certified to all the relevant standards.
Please contact our technical department for market specific compliances.

PLEASE NOTE: INFORMATION IN THIS DOCUMENT MAY BE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

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30W,50W,100W,130W,170W, 300W, IP65

Cone Illuminance Diagram

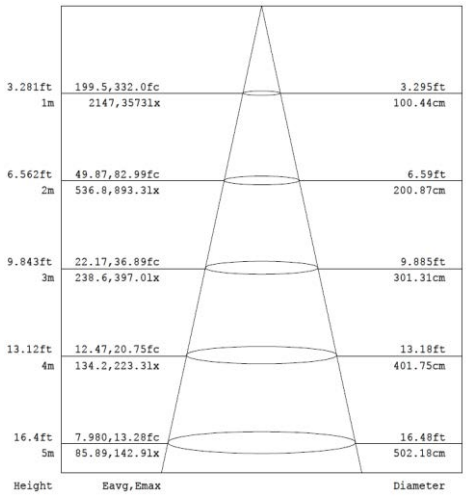


Diagram for RCMA9040AS-04 in 4000K. Other diagrams available on request

Polar Intensity Diagram

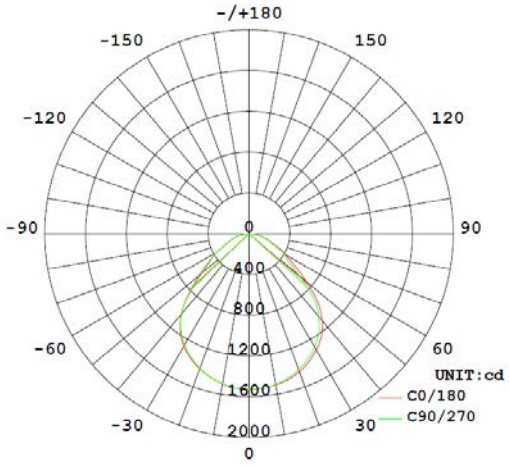
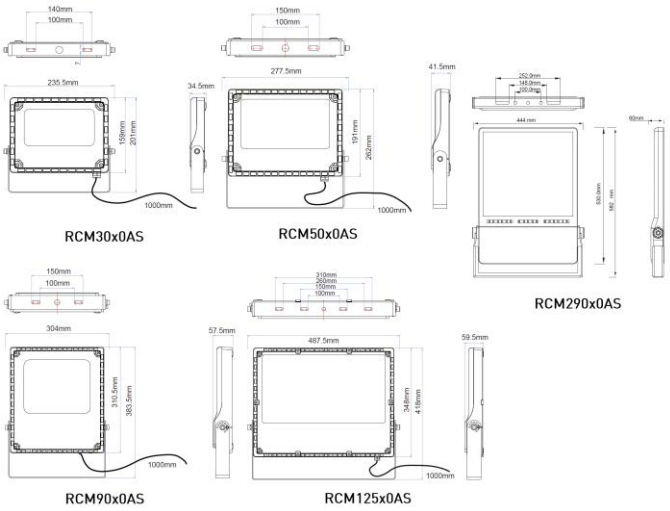


Diagram for RCMA9040AS-04 in 4000K. Other diagrams available on request

Dimension Diagram



Accessories

RCMS-04	COSMIC 300W LED flood light, Spigot Accessory, Black

Sensor Data

Time Off Delay:	NA
Illuminance Switching Range:	NA
Sensitivity Range (%):	NA
Mounting Height (max):	NA
Detection Zone Diameter (max):	NA

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DRAWINGS

NT16548-000-002-001 Luminaire Layout

NT16548-000-002-002 Lux Levels

DO NOT SCALE FROM THIS DRAWING

NOTE. EXISTING LIGHTING LUMINAIRES HAVE NOT BEEN INCLUDED WITHIN THE LAYOUT.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT
TILLICOULTRY QUARRIES LTD

PROJECT
ELY COATED STONE
NEW PLANT

DRAWING TITLE
NT16548-000-002-001 LIGHTING LAYOUT (INDICATIVE)

DRG No. NT16548-000-002		REV A
DRG SIZE A0	SCALE NTS	DATE 12/12/23
DRAWN BY AE	CHECKED BY	APPROVED BY

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DO NOT SCALE FROM THIS DRAWING

Site storage area to remain as existing

NOTE. LUX LEVELS WERE GENERATED WITH BUILDING AND PLANT OBSTRUCTIONS. NATURAL GROUND CONTOURS AND VEGETATION WERE NOT INCLUDED.

REVISION	DETAILS	DATE	DRAWN	CHKD	APVD

CLIENT: TILLICOULTRY QUARRIES LTD

PROJECT: ELY COATED STONE NEW PLANT

DRAWING TITLE: NT16548-000-002-002 LUX LEVELS

DRG No.	NT16548-000-002	REV	A
DRG SIZE	A0	SCALE	NTS
DRAWN BY	AE	CHECKED BY	
DATE	12/12/23	APPROVED BY	

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