



PROJECT TITLE:	PARKMORE
CLIENT:	WATFORE LTD.
DOCUMENT TITLE:	EXTERNAL LIGHTING REPORT
DOCUMENT NUMBER:	D24007-EDC-XX-XX-RP-Z-0002

Rev.	Status	Date	Originator	Checker	Approved By
0	ISSUED FOR INFORMATION	13.08.2024	AZ	GM	GM
1	ISSUED FOR INFORMATION	11.09.2024	AZ	GM	GM
2	ISSUED FOR PLANNING	17.10.2024	AZ	GM	GM
3	ISSUED FOR PLANNING	04.03.2025	AZ	GM	GM

TABLE OF CONTENTS

1 INTRODUCTION 3

2 PROPOSED DEVELOPMENT DESCRIPTION 3

3 LIGHTING STANDARDS 4

4 LIGHTING DESIGN CRITERIA 5

4.1 LIGHTING DESIGN PROCESS STAGES 5

4.2 COMPETENCY FOR DESIGNERS & QUALITY ASSURANCE 5

4.3 DESIGN FILE 5

4.4 CONTROL OF OBTRUSIVE LIGHTING 5

4.5 ECOLOGICAL REPORT 6

4.6 LUX LEVELS 6

5 KEY DEFINITIONS 10

6 PROPOSED LIGHT FITTINGS 11

7 CONTROL STRATEGY 11

Appendix A – External Lighting Layout

Appendix B - External Lighting Calculation Report

1 INTRODUCTION

This external lighting report has been developed for the development at Parkmore Industrial Estate, Long Mile Rd, Robinhood, Dublin, 12. The report will outline the design criteria, luminaire types proposed for the development and how the proposed design will meet the relevant public lighting standards.

The aim for road and public space lighting schemes can include any or all the following:

- Facilitation of safe movement of vehicles and people.
- Discouragement of illegal acts.
- Contributing to the prestige and amenity of an area through increased aesthetic appeal.
- Minimum light spill and glare.

The lighting system was designed to achieve the level of Lux and set up a plan to bring up the overall to the desired limits.

The lighting guidelines being used for the study require that in no event shall any light element associated with the buildings adversely impact the operation of motor vehicles on entire roads. Additionally, the Lux light levels shall not significantly adversely impact the workers community, nearby heritage, and ecological sensitive receptors.

2 PROPOSED DEVELOPMENT DESCRIPTION

The development will comprise a Large-Scale Residential Development (LRD) on a site at Parkmore Industrial Estate, Long Mile Rd, Robinhood, Dublin, 12. The proposed development will comprise the demolition of existing industrial units, and construction of a mixed use, residential-led development within 4 no. blocks ranging in height from 06 to 10 storeys over semi-basement. The development will comprise the following: 436 no. apartments (studios; 1 beds; 2 beds and 3 beds) with commercial/employment units, creche, café and library. Provision of car, cycle and motorbike parking.

Vehicular accesses from Parkmore Estate Road and additional pedestrian/cyclist accesses from the Long Mile Road and Robinhood Road. Upgrade works to the estate road and surrounding road network. All associated site development works and services provision, open spaces, ESB substations, plant areas, waste management areas, landscaping and boundary treatments.



Figure 1 – Proposed Site Layout

3 LIGHTING STANDARDS

The lighting design will follow guidance from the following standards:

- SLL Code for Lighting – Society of Light and Lighting
- BS5489-1:2020 – Design of Road Lighting
- BS EN 13201-2:2015 Road Lighting. Part 2: Performance requirements
- SDCC Public Lighting Specification
- DCC Public Lighting Specification

Compliance with the above lighting standards will ensure a uniform level of light suitable to the task at hand is provided across the public areas.

4 LIGHTING DESIGN CRITERIA

4.1 LIGHTING DESIGN PROCESS STAGES

The lighting design process stages used to design the external lighting of the development will be considered to comprise of three key steps:

- a) Concept (valid for this stage).
- b) Preliminary (will be developed in Preliminary Design Stage)
- c) Detailed (will be developed in Tender Stage)

Concept Design:

The concept design stage was the first stage of the lighting design process that was used to develop the following aspects:

- a) Identify the approximate extents of the area to be lit.
- b) Undertake an initial assessment for the options using the energy performance indicators identified in IS EN 13201-5.
- c) Identify constraints and hazards.
- d) Initial risk assessments.
- e) Prepare an outline design methodology summarising lighting aspect to be included as part of the design file and the assumptions that have been made in developing the concept lighting design.
- f) Prepare the Lighting Design File

4.2 COMPETENCY FOR DESIGNERS & QUALITY ASSURANCE

The design of lighting was undertaken by competent and experienced Team who could demonstrate an appropriate understanding of road lighting design principles.

4.3 DESIGN FILE

This report has been prepared as a concept stage and this shall be developed during the preliminary and detailed design phases.

4.4 CONTROL OF OBTRUSIVE LIGHTING

To safeguard and enhance the night-time environment it is necessary to control obtrusive light (Also known as light pollution), which can present physiological and ecological problems to the surrounding areas and people. The limits of intrusive light for exterior installations, to minimise problems for people are given in the below table extracted from IS EN 12464-2 Lighting of Outdoor Workplaces. The designer proposes that the figures outlined in E4 are utilised. The external lighting design will ensure the positions of each luminaire are designed in such a way to limit obtrusive light.

Table 2 — Maximum obtrusive light permitted for exterior lighting installations

Environmental zone	Light on properties		Luminaire intensity		Upward light ratio	Luminance	
	E_v lx		I cd			R_{UL} %	L_b cd·m ⁻²
	Pre-curfew ^a	Post-curfew	Pre-curfew	Post-curfew		Building facade	Signs
E1	2	0	2 500	0	0	0	50
E2	5	1	7 500	500	5	5	400
E3	10	2	10 000	1 000	15	10	800
E4	25	5	25 000	2 500	25	25	1 000

where

E1 represents intrinsically dark areas, such as national parks or protected sites;

E2 represents low district brightness areas, such as industrial or residential rural areas;

E3 represents medium district brightness areas, such as industrial or residential suburbs;

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

E_v is the maximum value of vertical illuminance on properties in lx;

I is the light intensity of each source in the potentially obtrusive direction in cd;

R_{UL} is the proportion of the flux of the luminaire(s) that is emitted above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position and attitude, and given in %;

L_b is the maximum average luminance of the facade of a building in cd·m⁻²;

L_s is the maximum average luminance of signs in cd·m⁻².

^a In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits.

4.5 ECOLOGICAL REPORT

As per the recommendations of the ecological report, the private external lighting for the courtyards and the proposed footpath/cycle track connecting Parkmore Industrial Estate Road with Walkinstown Avenue Park will be designed to limit overspill and prevent light pollution. The key design features include:

- All luminaires shall be designed to minimize the spill of upward light and should not emit any up-light.
- All luminaires shall lack UV elements when manufactured and shall be LED
- A warm white spectrum (ideally ≤ 2700 Kelvin) shall be adopted to reduce blue light component
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats

The public lighting will be designed in accordance with SDCC/DCC lighting standards, adhering to the recommendation for neutral white light (4000K). This approach ensures that all installations meet the requisite specifications for safety, efficiency, and environmental considerations, while providing optimal illumination for public areas.

4.6 LUX LEVELS

The lighting design for the Hostel will follow guidance from the following standards:

- BS5489-1:2020 – Design of Road Lighting
- BS EN 13201-2:2015 Road Lighting. Part 2: Performance requirements

Public Lighting:

The existing public lighting along Long Mile Road and Robinhood Road provides the required illumination to meet standards. No changes or additional lighting installations are needed, as the current setup adequately ensures visibility and safety.



Figure 2 –Long Mile Road Existing Public Lighting



Figure 3 – Robinhood Road Existing Public Lighting

The existing lighting column No.156 is proposed to be relocated approximately 4 meters to the west, into the green area, to accommodate the revised Long Mile Road / Parkmore Industrial Estate Road junction layout (refer to Appendix A, B for details). Calculation confirms that the conflict zone at the junction will still meet C3 class requirements following the relocation.

Table 2 — C lighting classes based on road surface illuminance

Class	Horizontal illuminance	
	\bar{E} [minimum maintained] lx	U_o [minimum]
C0	50	0,40
C1	30	0,40
C2	20,0	0,40
C3	15,0	0,40
C4	10,0	0,40
C5	7,50	0,40



Figure 4 – Long Mile Road / Parkmore Industrial Estate Road Junction Existing Public Lighting

The public lighting along Parkmore Industrial Estate Road has been upgraded with additional lights installed on the opposite side of the road. These enhancements provide adequate lighting for the newly added footpath/cycle track and are designed to meet class P4 standards.

Table 3 — P lighting classes

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.



Figure 5 – Parkmore Industrial Estate Road Existing Public Lighting

External Private Lighting:

The Courtyards / Open public space lighting has been designed to meet P4 class standards.

Table 3 — P lighting classes

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.				

5 KEY DEFINITIONS

In accordance with the Guidance Notes for the Reduction of Obtrusive Light, the following definitions are used to describe lighting effects in this assessment:

- **Average Road Luminance:** Road Luminance is a measure of the visibility of the road and it is based on the principle of illuminating the road enough to see the outline of the obstacle.
- **Uniformity:** Uniformity is an index to measure the uniformity of light distribution on the road, which can be expressed as overall uniformity (U0) and longitudinal uniformity (UI).
- **Glare:** Glare is the blinding sensation that occurs when the brightness of light exceeds the level of adaptation of the human eye to light.
- **Light spill:** the unwanted spillage of light onto adjacent areas and may affect sensitive receptors, particularly residential properties; (this includes the spill of light from a badly aimed floodlight stray in beyond the task area such as light into windows or a neighbouring property).
- **Colour Rendering Index:** The colour rendering index measures the ability of artificial light sources to display or reproduce the colour of the road or objects on the road relative to natural light sources.

6 PROPOSED LIGHT FITTINGS

The proposed light fittings will all be of the LED type:

- Fittings A - Bollard
- Fittings B – Post Top Light
- Fittings I – Street Light



Fitting A – Bollard



Fitting B – Post Top Light



Fittings I – Street Light

7 CONTROL STRATEGY

It is proposed that external luminaires will be controlled via photocells. The controls strategy aims to provide the necessary level of light at the time when it is needed in the most energy efficient manner.

APPENDIX A
External Lighting Layout



EXISTING LIGHTING COLUMN TO BE
RELOCATED TO THE REAR OF THE
NEW FOOTPATH

EXISTING LIGHTING COLUMN No.156
TO BE RELOCATED

EXISTING LIGHTING COLUMN TO BE
DEMOLISHED

NOTES

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ARCHITECTS, STRUCTURAL ENGINEERS, BUILDING SERVICES, SPECIFICATIONS & SCHEDULES
- ALL DIMENSIONS ARE IN MILLIMETERS
- THE CONTRACTORS SHALL NOTE THAT THIS DRAWING IS INDICATIVE AND ILLUSTRATES DESIGN INTENT ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED DESIGN AND COORDINATION WITH OTHER SERVICES

LEGEND

PUBLIC LIGHTING:

PROPOSED FITTINGS:

- TYPE I - PUBLIC LIGHTING FITTING CREE ENERGY UNO 1.5km, 10w, 4000K, 6m column

EXISTING FITTINGS:

- TYPE D - EXISTING PUBLIC LIGHTING FITTING SON250, 250W, 12m column
- TYPE E - EXISTING PUBLIC LIGHTING FITTING THORN 15400, 85W, 12m column
- TYPE G - EXISTING PUBLIC LIGHTING FITTING AMPERA MDI, 135W, 12m column
- TYPE H - EXISTING PUBLIC LIGHTING FITTING SCHREDER AKA, 25.5W, 6m column

Junction - Conflict Zone

Results - Horizontal Illuminance (lux)

E_{avg}= 31.52

E_{min}= 20.38

E_{max}= 49.58

E_{min}/E_{max}= 0.41

E_{min}/E_{avg}= 0.65

E_{max}/E_{avg}= 1.57

Long Mile Road

Results - Horizontal Illuminance (lux)

E_{avg}= 23.14

E_{min}= 8.77

E_{max}= 40.37

E_{min}/E_{max}= 0.22

E_{min}/E_{avg}= 0.38

E_{max}/E_{avg}= 1.74

Parkmore Industrial Estate Rd

Results - Horizontal Illuminance (lux)

E_{avg}= 5.71

E_{min}= 1.12

E_{max}= 27.46

E_{min}/E_{max}= 0.04

E_{min}/E_{avg}= 0.20

E_{max}/E_{avg}= 4.81

PRIVATE LANDLORD LIGHTING:

- TYPE A - BOLLARD TRT LIGHTING VIA ASY 0.276m, 44w, 2700K, 1m

- TYPE B - POST TOP FITTING SCHREDER FLEXIA BRASO MDI 1.506m, 13.7w, 2700K, 5m column

Block ABC Courtyard / Public Open Space

Results - Horizontal Illuminance (lux)

E_{avg}= 0.08

E_{min}= 1.25

E_{max}= 21.09

E_{min}/E_{max}= 0.06

E_{min}/E_{avg}= 0.21

E_{max}/E_{avg}= 3.47

Block D Courtyard

Results - Horizontal Illuminance (lux)

E_{avg}= 0.37

E_{min}= 1.25

E_{max}= 18.46

E_{min}/E_{max}= 0.07

E_{min}/E_{avg}= 0.20

E_{max}/E_{avg}= 2.90

0	04-03-2025	ISSUED FOR PLANNING	AZ	GM
Rev	Date	Description	Orig	App

Client

WATFORE LTD.

Project

PARKMORE, LONG MILE ROAD,
DUBLIN 12

Title

EXTERNAL LIGHTING LAYOUT

Drawing No

D24007-ZZ-ZZ-DR-EDC-E-70101

RIBA Work Stage	Status Code	Revision
STAGE 2	P3	0
Scale @ A0	Model Manager	Project Manager
1:350	TB	GM

EDC Mechanical & Electrical Consulting Engineers

Con Office
Tel: +353 (0)1 4284751
Email: info@edcengineers.com

London Office
Tel: +44 (0)20 3450450
Email: info@edcengineers.com

ISO 9001

APPENDIX B

External Lighting Calculation Report

DATE: 12 February 2025
DESIGNER: Andrii Zaporozhchenko
PROJECT No: D24007
PROJECT NAME: Watfore LTD-Parkmore



Lighting to BS5489:1 2020

Courtyards lighting to P4
Conflict zone Junction lighting to C3
Long Mile Rd lighting to M3/P1
Parkmore Industrial Estate Rd lighting to P4
Public Open Space lighting to P4

Lights type E, D, G, H are existing

Outdoor Lighting Report

PREPARED BY: EDC-Mechanical & Electrical Consulting Engineers
Cork Office Tel: +353(0)21 4280476
Dublin Office Tel: +353(0)1 5313693
London Office Tel: +44 (0)2030040062
www.edcengineers.com

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	Block ABC Courtyard / P...	-179.72	-59.26	115.57	99.08	1.48	1.48
2	Block D Courtyard	-202.95	-139.19	79.64	77.76	1.77	1.62
3	Junction - Conflict Zone...	-27.36	-12.89	56.40	35.32	1.48	1.47
4	Long Mile Road	-155.86	-23.43	130.31	34.70	1.50	1.45
5	Parkmore Industrial Estate...	-113.98	-191.52	206.96	33.70	1.50	1.47

Luminaires



Luminaire A Data

Supplier	TRT Lighting
Type	VIA ASY 190mA 2700K LED
Lamp(s)	42 0006 0000 100
Lamp Flux (klm)	0.27
File Name	VIA_ASY_190mA_274LM_2.7K.ies
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	606.1, 387.8, 53.8
No. in Project	23

Luminaire B Data

Supplier	
Type	FLEXIA BRASO MIDI 5301 Flat glass 10 L H351C@400mA WW 727 230
Lamp(s)	10 LH351C@400mA WW 727 230V 01-37-037
LampFlux(klm)/Colour	1.90 WW 2700K/70
File Name	13.7W 563952 Flat glass 230V EF .ldt
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	505.5, 38.4, 1.5
No. in Project	13



Luminaire D Data

Supplier	Demo
Type	250W Main road posn 3
Lamp(s)	SONT250
Lamp Flux (klm)	32.00
File Name	mr250c.pmo
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	282.0, 29.0, 0.0
No. in Project	2

Luminaire E Data

Supplier	
Type	IP 48L70-740 WS BP 3550 CL1 M42 GY-S
Lamp(s)	Thorn Isaro IP48L70-740WS 95W
LampFlux(klm)/Colour	15.32 4000/70
File Name	92905157_(STD).LDT
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	744.7, 174.4, 0.0
No. in Project	2



Luminaire G Data

Supplier	
Type	AMPERA MIDI 5117 Flat glass 64 OSLO SQUARE GIANT@700mA NW
Lamp(s)	64 OSLO SQUARE GIANT@700mA NW 740 230V
LampFlux(klm)/Colour	21.20 NW 4000K/70
File Name	AMPERA MIDI 5117 64 OSLO SQUARE GIANT 700mA NW 740 135W 403172 Flat...
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	595.0, 49.0, 0.0
No. in Project	8

Luminaire H Data

Supplier	Urbis Schreder
Type	AXIA 3.1 5295 Integrated lenses 16 OSLO SQUARE GIANT@480mA
Lamp(s)	16 OSLO SQUARE GIANT@480mA NW 740 230V 01-37-041
LampFlux(klm)/Colour	3.51 NW 4000K/70
File Name	AXIA 3.1 5295 16 OSLO SQUARE GIANT 480mA NW 740 25.5W 435822 Integrated ...
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	711.2, 23.8, 0.0
No. in Project	6

Luminaires



Luminaire I Data

Supplier	Cree Lighting
Type	TRSA-02-ARS-4L40719W
Lamp(s)	8lu4L19W4K
Lamp Flux (klm)	3.04
File Name	TRSA-02-ARS-4L-407 19W-203-QL21-S05. IES
Maintenance Factor	0.80
Imax70,80,90(cd/klm)	235.0, 18.4, 0.0
No. in Project	13

Layout

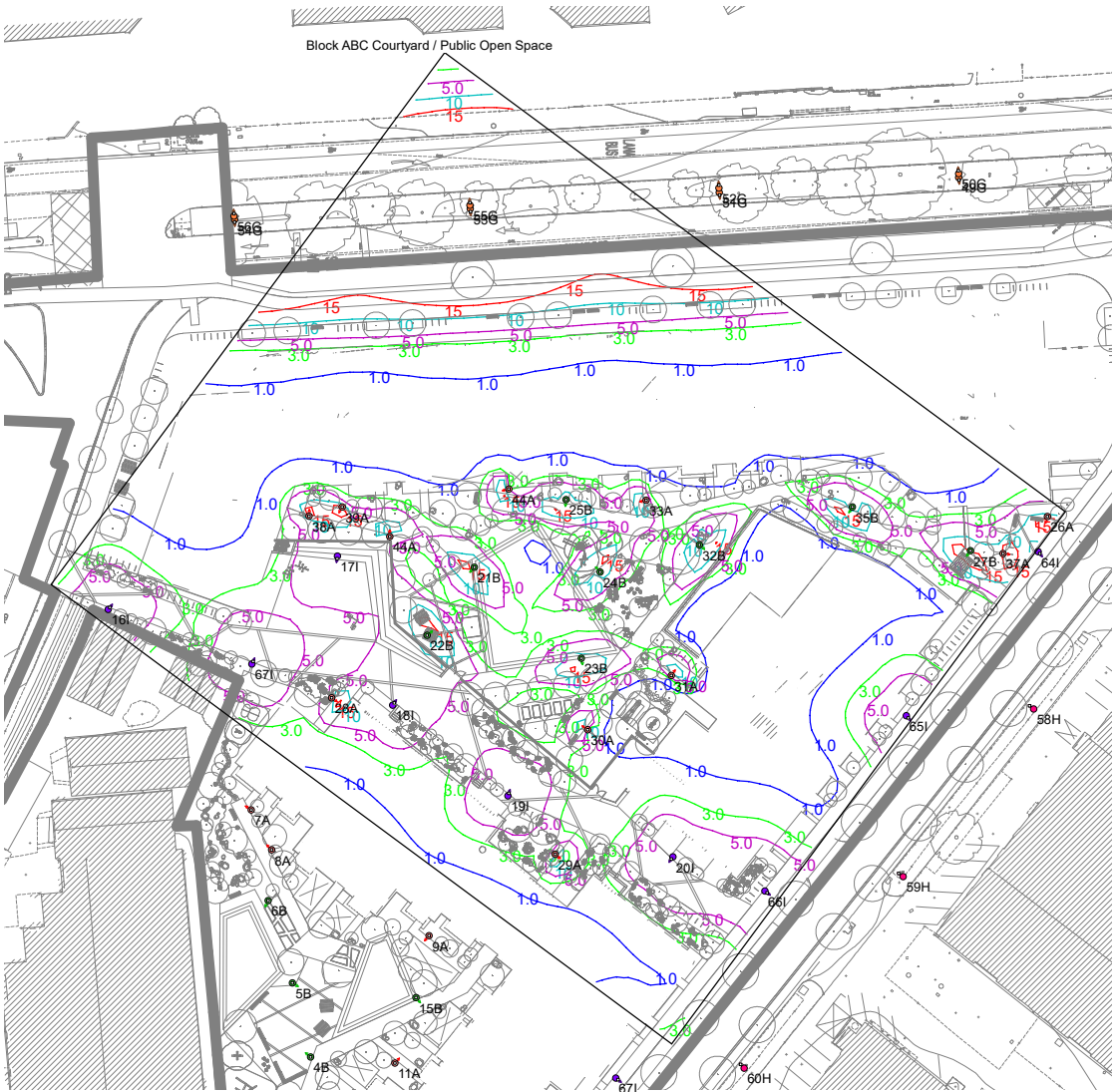
ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Dimmed to	Target X	Target Y	Target Z
1	A	-149.40	-159.38	1.13	5.00	0.00	0.00	0.00	100%			
2	A	-149.07	-145.40	1.13	315.00	0.00	0.00	0.00	100%			
4	B	-140.86	-129.97	5.00	140.00	0.00	0.00	0.00	100%			
5	B	-143.59	-118.90	5.00	330.00	0.00	0.00	0.00	100%			
6	B	-147.24	-106.57	5.00	245.00	0.00	0.00	0.00	100%			
7	A	-149.78	-92.98	1.13	145.00	0.00	0.00	0.00	100%			
8	A	-146.70	-98.94	1.13	135.00	0.00	0.00	0.00	100%			
9	A	-123.15	-111.79	1.13	230.00	0.00	0.00	0.00	100%			
11	A	-128.27	-130.87	1.13	45.00	0.00	0.00	0.00	100%			
13	A	-142.05	-147.71	1.13	45.00	0.00	0.00	0.00	100%			
14	A	-145.78	-152.95	1.13	235.00	0.00	0.00	0.00	100%			
15	B	-125.08	-121.07	5.00	310.00	0.00	0.00	0.00	100%			
16	I	-171.17	-62.96	6.00	50.00	0.00	0.00	0.40	100%			
17	I	-136.83	-54.97	6.00	260.00	0.00	0.00	0.40	100%			
18	I	-128.58	-77.31	6.00	55.00	0.00	0.00	0.40	100%			
19	I	-111.34	-90.88	6.00	70.00	0.00	0.00	0.40	100%			
20	I	-86.64	-99.99	6.00	235.00	0.00	0.00	0.40	100%			
21	B	-116.33	-56.65	5.00	225.00	0.00	0.00	0.00	100%			
22	B	-123.40	-66.83	5.00	40.00	0.00	0.00	0.00	100%			
23	B	-100.32	-70.26	5.00	280.00	0.00	0.00	0.00	100%			
24	B	-97.54	-57.36	5.00	130.00	0.00	0.00	0.00	100%			
25	B	-102.62	-46.51	5.00	265.00	0.00	0.00	0.00	100%			
26	A	-30.54	-49.06	1.13	255.00	0.00	0.00	0.00	100%			
27	B	-42.06	-54.16	5.00	235.00	0.00	0.00	0.00	100%			
28	A	-137.72	-76.18	1.13	325.00	0.00	0.00	0.00	100%			
29	A	-104.27	-99.61	1.13	320.00	0.00	0.00	0.00	100%			
30	A	-99.39	-80.98	1.13	145.00	0.00	0.00	0.00	100%			
31	A	-86.85	-72.84	1.13	55.00	0.00	0.00	0.00	100%			
32	B	-82.64	-53.32	5.00	320.00	0.00	0.00	0.00	100%			
33	A	-90.63	-46.60	1.13	195.00	0.00	0.00	0.00	100%			
35	B	-59.76	-47.63	5.00	240.00	0.00	0.00	0.00	100%			
37	A	-37.18	-54.58	1.13	350.00	0.00	0.00	0.00	100%			
38	A	-141.12	-49.02	1.13	85.00	0.00	0.00	0.00	100%			
39	A	-136.13	-47.63	1.13	240.00	0.00	0.00	0.00	100%			
44	A	-129.00	-52.07	1.13	90.00	0.00	0.00	0.00	100%			
44	A	-111.20	-44.93	1.13	195.00	0.00	0.00	0.00	100%			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Dimmed to	Target X	Target Y	Target Z
44	B	-146.97	-137.51	5.00	210.00	0.00	0.00	0.00	100%			
44	A	-147.49	-176.17	1.13	90.00	0.00	0.00	0.00	100%			
45	A	-139.26	-179.40	1.13	65.00	0.00	0.00	0.00	100%			
46	A	-135.69	-175.16	1.13	95.00	0.00	0.00	0.00	100%			
156	D	-16.42	-10.95	12.00	91.00	0.00	0.00	0.40	100%			
155	E	-14.15	17.18	12.00	276.00	15.00	0.00	0.40	100%			
154	D	21.60	-8.12	12.00	93.00	0.00	0.00	0.40	100%			
153	E	19.46	19.19	12.00	272.00	15.00	0.00	0.40	100%			
49	G	-43.83	1.70	12.00	274.00	0.00	0.00	0.40	100%			
50	G	-43.86	2.28	12.00	95.00	0.00	0.00	0.40	100%			
51	G	-79.68	-0.54	12.00	274.00	0.00	0.00	0.40	100%			
52	G	-79.72	0.14	12.00	95.00	0.00	0.00	0.40	100%			
53	G	-116.96	-2.99	12.00	274.00	0.00	0.00	0.40	100%			
54	G	-152.25	-4.59	12.00	274.00	0.00	0.00	0.40	100%			
55	G	-117.00	-2.45	12.00	95.00	0.00	0.00	0.40	100%			
56	G	-152.32	-4.08	12.00	95.00	0.00	0.00	0.40	100%			
57	H	-6.90	-45.16	6.00	150.00	0.00	0.00	0.80	75%			
58	H	-32.59	-77.88	6.00	141.00	1.00	0.00	0.80	75%			
59	H	-52.16	-102.94	6.00	146.00	5.00	0.00	0.80	75%			
60	H	-75.94	-131.64	6.00	133.00	5.00	0.00	0.80	75%			
61	H	-93.09	-153.31	6.00	147.00	0.00	0.00	0.80	75%			
62	H	-117.80	-186.06	6.00	102.00	0.00	0.00	0.80	75%			
63	I	-19.50	-28.05	6.00	9.00	0.00	0.00	0.40	100%			
64	I	-31.94	-54.30	6.00	309.00	5.00	0.00	0.40	100%			
65	I	-51.69	-78.90	6.00	313.00	0.00	0.00	0.40	100%			
66	I	-72.84	-105.13	6.00	322.00	0.00	0.00	0.40	100%			
67	I	-95.15	-133.12	6.00	322.00	0.00	0.00	0.40	100%			
68	I	-110.48	-152.21	6.00	321.00	10.00	0.00	0.40	100%			
69	I	-128.24	-171.28	6.00	329.00	15.00	0.00	0.40	100%			
66	A	-136.50	-137.10	1.13	220.00	0.00	0.00	0.00	100%			
67	I	-149.66	-71.14	6.00	65.00	0.00	0.00	0.40	100%			

Horizontal Illuminance (lux)

Block ABC Courtyard / Public Open Space

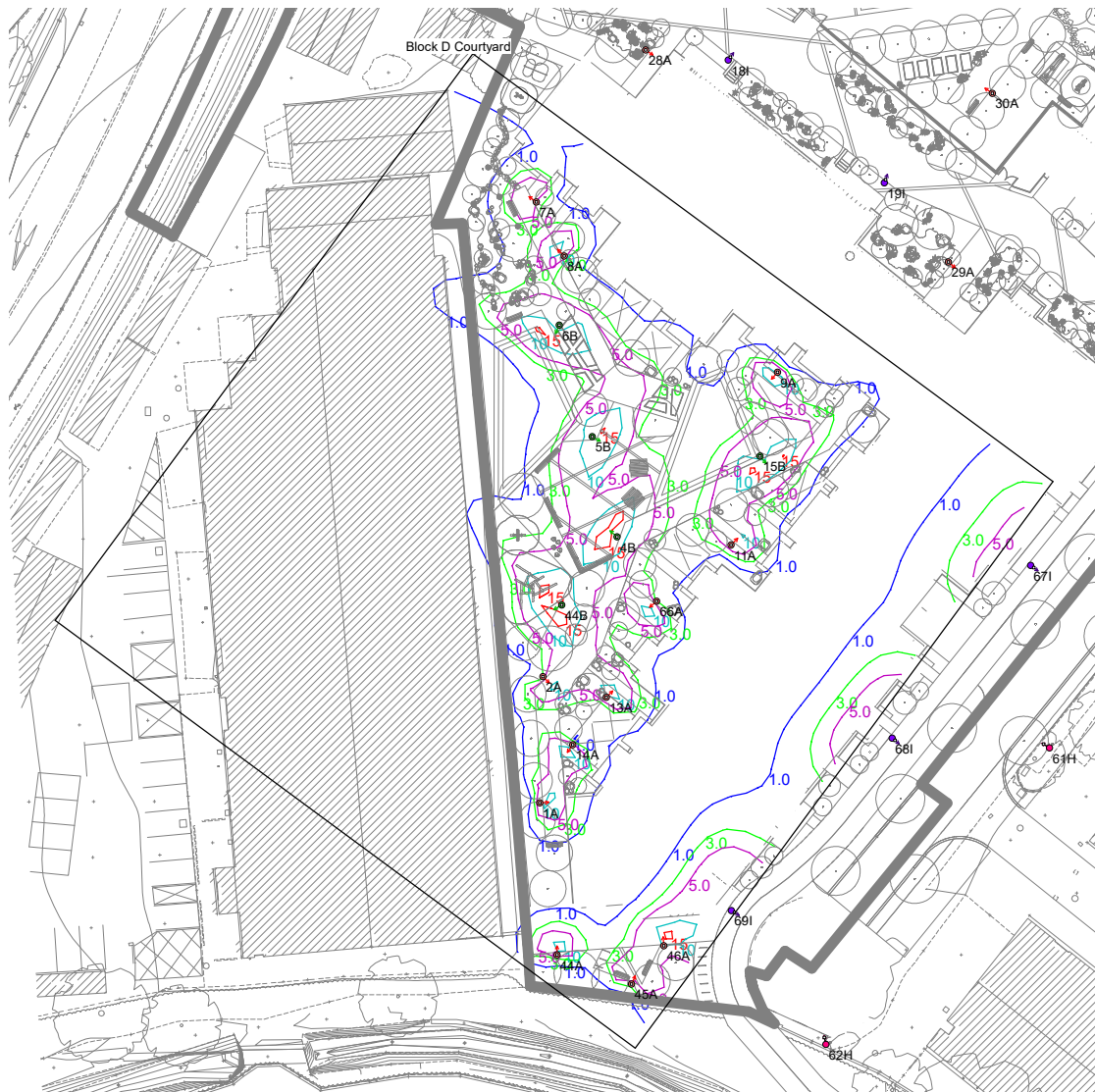


Results

Eav	6.08
Emin	1.25
Emax	21.09
Emin/Emax	0.06
Emin/Eav	0.21

Horizontal Illuminance (lux)

Block D Courtyard

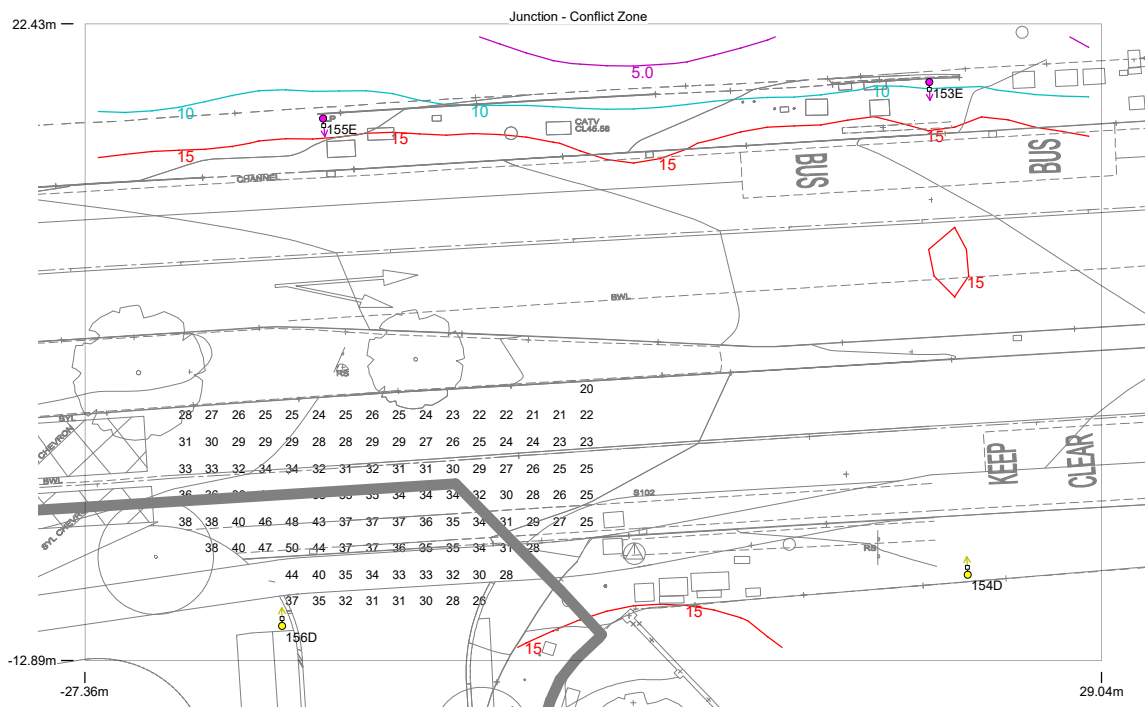


Results

Eav	6.37
Emin	1.26
Emax	18.46
Emin/Emax	0.07
Emin/Eav	0.20

Horizontal Illuminance (lux)

Junction - Conflict Zone

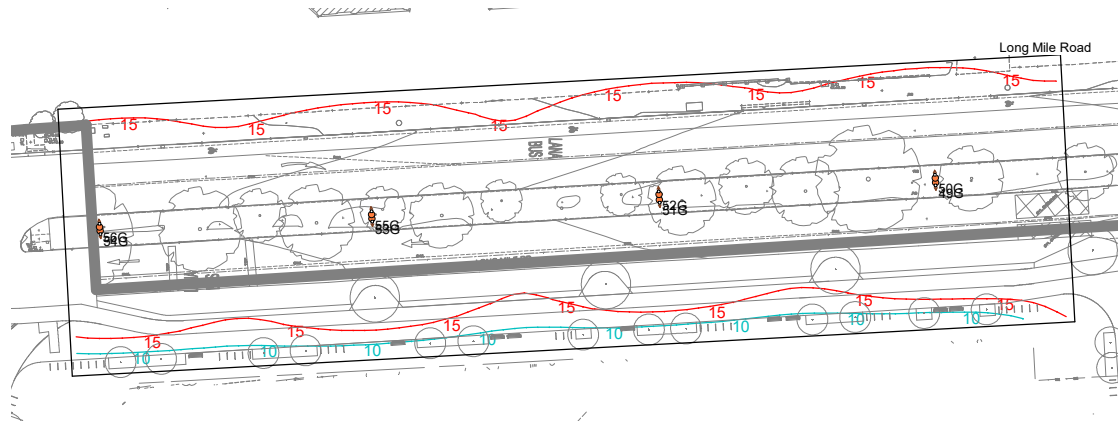


Results

Eav	31.52
Emin	20.38
Emax	49.58
Emin/Emax	0.41
Emin/Eav	0.65

Horizontal Illuminance (lux)

Long Mile Road

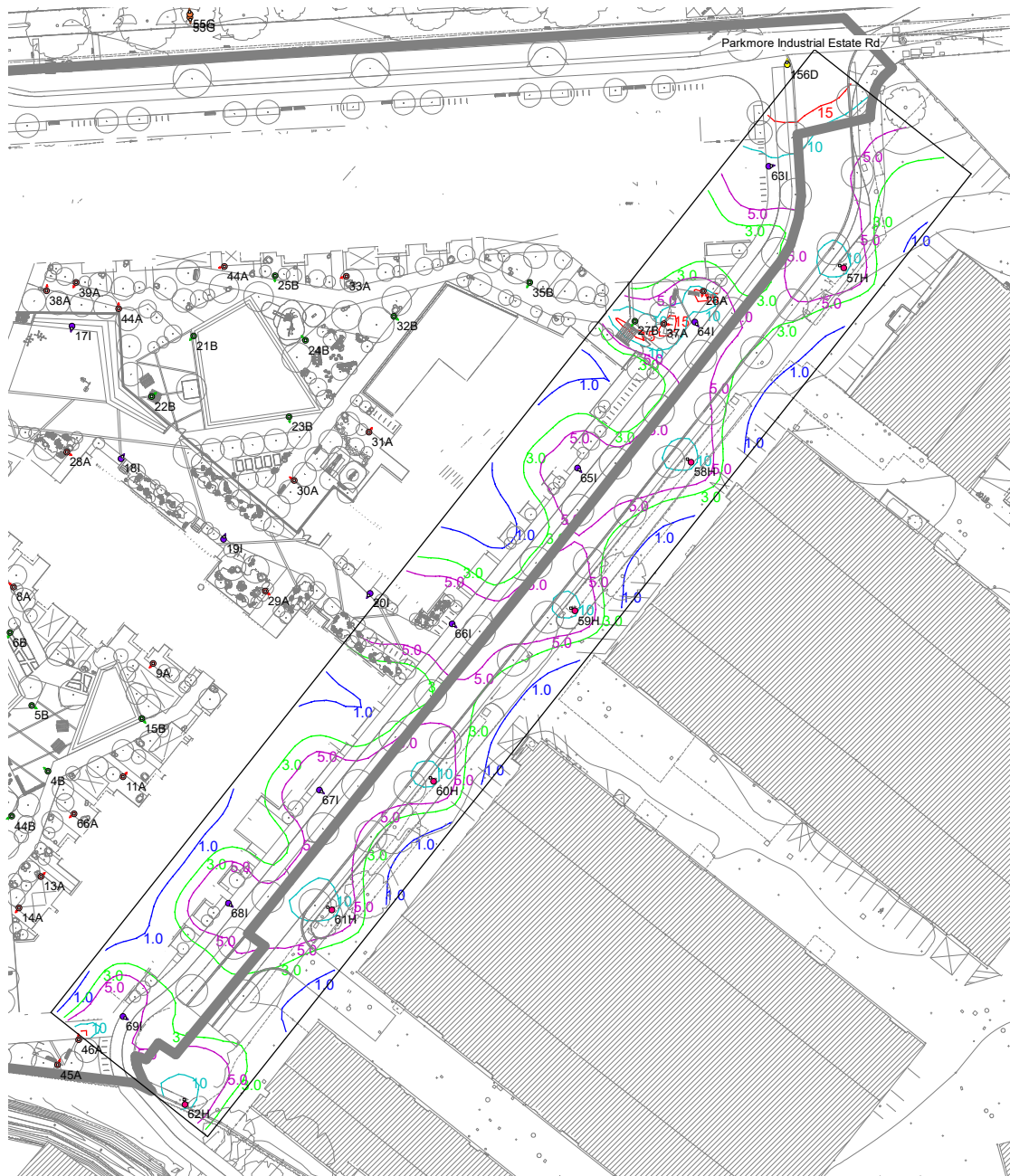


Results

Eav	23.14
Emin	8.77
Emax	40.37
Emin/Emax	0.22
Emin/Eav	0.38

Horizontal Illuminance (lux)

Parkmore Industrial Estate Rd



Results

Eav	5.71
Emin	1.12
Emax	27.46
Emin/Emax	0.04
Emin/Eav	0.20



Engineering Design Consultants

www.edcengineers.com