REDMOND
ANALYTICAL MANAGEMENT SERVICES
LIGHTING | ENERGY | DESIGN | SUPPORT

Lighting Design Report and Specifications for

Proposed Residential Development at Gordon Park

REV C

Client	Greenwalk Development Ltd.
Project number	21075
Designed by	Patrick Redmond *HDip Bus, EngTech AMILP, AMSLL, Tech IEI*
Date submitted	22nd October 2021

Redmond Analytical Management Services Ltd.
Rosewood House, Mount Seaton, Camolin, Enniscorthy, Co. Wexford. Y21 K8P3
Tel: 053 9383696 | Email: info@redmondams.ie | Web: www.redmondams.ie
Company registration number: 557316
Directors: P Redmond, M Redmond.

Document control: TD 07 Version: 1.0

REDMOND
ANALYTICAL MANAGEMENT SERVICES
LIGHTING | ENERGY | DESIGN | SUPPORT

Contents

Accompanying Documents

21075 Lighting class selection assessment Proposed Residential Development at Gordon Park.

21075 Product selection calculation Proposed Residential Development at Gordon Park.

21075 Product selection calculation report Proposed Residential Development at Gordon Park.

21075 Lighting level calculation full output Proposed Residential Development at Gordon Park REV C.

21075 Lighting level calculation report full output Proposed Residential Development at Gordon Park REV C.

21075 Lighting level calculation dimmed by 25% Proposed Residential Development at Gordon Park REV C.

21075 Lighting level calculation report dimmed by 25% Proposed Residential Development at Gordon Park REV C.

21075 Electrical calculations Proposed Residential Development at Gordon Park REV B.

21075 Energy consumption calculation Proposed Residential Development at Gordon Park REV B.

21075 Lighting layout drawing Proposed Residential Development at Gordon Park REV C.

21075 Lighting layout drawing Proposed Residential Development at Gordon Park REV C ~ PDF version.

REDMOND
ANALYTICAL MANAGEMENT SERVICES
LIGHTING | ENERGY | DESIGN | SUPPORT

1 General Information

The Safety, Health and Welfare at Work (Construction) Regulations 2013 clearly defines certain duties for Designers and for Project Supervisors, Design Stage. In order to meet these duties and to assist other designers and supervisors involved in this project to meet their duties we provide the following information. It must be noted that this information is based on our observations and there may be other risks that are beyond our knowledge on this project.

1.1 Client & Project

Project Name	Proposed Residential Development at Gordon Park REV C
Project Location	Dublin 24
Client	Greenwalk Development Ltd.
Contact	Rory Hickey

1.2 Our Design Role

We have completed a lighting design for the above project to comply with relevant EU Norms, National Standards, and best guidance documents as appropriate.

European lighting standards	*I.S. EN 13201-2:2015* *I.S. EN 13201-5:2015* *I.S. EN 12464-2:2007*
Code of practise	*BS 5489-1: 2020*
Professional guidance documents	*ILP PLG03 (2012)* *Technical Report 12. ILP (2007)*
Electrical standard	*I.S. 10101:2020*
Lantern standard	*EN 60598*
Column standard	*EN 40*
Column calculation method	*BD94/07*
Steelwork protection	*EN 1461*

The design has been completed based on the drawings provided to us.

Our design covers the physical area defined by the calculation grids marked in the lighting design booklet accompanying this report.

It is not possible to incorporate the blocking and shadowing effect of trees, or other obstructions into the lighting level calculations.

2 Safety

We are committed to safe working practises and have done all in our power to identify and 'design out' hazards. If there is any detail within this design that requires clarification or if you need further information, please contact us and we will endeavour to co-operate fully.

2.1 Particular Risks

Using Schedule 1 *Non-exhaustive List of Work Involving Particular Risks to the Safety, Health and Welfare of Persons at Work* as a template, we have identified the following risks that affect the design process:

None that we could identify.

2.2 Other Risks

In addition to the risks described in **2 Particular Risks** above, we have identified the following risks that affect the design process:

None that we could identify.

2.3 Construction and Risk Control

It is the contractor's responsibility to ensure that their method of work meets their duty of care and requirements under the Safety, Health and Welfare at Work (Construction) Regulations 2013 and any other national or local requirements.

2.4 Electrical Safety Tests

It is the electrical contractor's duty to calculate the appropriate fuse size for the electrical infrastructure.

It is the contractor's duty to ensure that all his electrical work meets relevant national and local standards. The contractor must ensure that all electrical safety testing is completed by a competent member of staff and that all test results are recorded and signed, and a copy given to the client and to us.

2.4.1 Electrical Standard

The *ETCI National Rules for Electrical Installations Fourth Edition, ET 101:2008* is to be replaced with *IS 10101:2020*. This replacement is to happen over a time frame to allow a smooth transition as follows:

1. 1st April 2020: New electrical installations may be designed and certified to the new standard.
2. 31st January 2021: This is the last day new electrical installations may be designed to the old standard. Such installations must be certified by 31st July 2022.
3. 1st February 2021: New electrical installations must be designed to the new standard.
4. 31st July 2022: This is the last day an installation may be pre-connection certified to the old standard. Such installations must have been designed by 31st January 2021.
5. 1st August 2022: Electrical installations must be certified to the new standard.

We design electrical infrastructure to comply with *I.S. 10101 :2020.*

2.5 Lighting Columns as a Hazard

Public lighting columns are defined in *BS 5489-1:2020 6.13* as a potential hazard to road users and defines minimal setbacks to the column face from the edge of the carriageway. In general, the edge of the carriageway is defined by the raised kerb in residential developments.

In this project we have located the columns at the back of the footpath or set back by at least 800mm from the kerb edge.

2.6 BS 5489-1:2020

In 2009, lighting designers in Ireland began reducing the design classification by one step when using white light. Effectively, to achieve *P2*, designing to *P3* with a source of colour rendering index (Ra) greater than 60.

This reduction of an entire step became discredited as it reduced the achieved lighting level excessively. In 2012, the *Institution of Lighting Professionals* published *PLG 03* which recommended the use of a weighting factor in line with the *Ra* of the light source, *S/P* ratios, when designing to *P* classifications. This guidance was included in *BS 5489-1 2013*, which was the code of practise that most Irish and UK based lighting designers adhered to.

On the 1st July 2020, *BS 5489-1:2020* was published, withdrawing the 2013 version. This revised document has stopped recommending the use of *S/P* ratios and instead has adjusted the lighting design selection process downwards by one whole step. Effectively going back to the 2009 method.

We believe that this will either lower lighting levels below that considered normal practise in Ireland or raise lighting levels, and at the same time increase energy consumption by as much as 40%.

We do not feel it is in our client's interest to follow the advice on selecting lighting classes given in *BS 5489-1:2020,* which is a code of practise rather than a standard. Therefore, we will continue to use the *S/P* ratio as detailed by *PLG 03*. Our lighting designs continue to meet or exceed the lighting levels recommended in *I.S. EN 13201-2:2015* and *S.R. CEN/TR 13201-1:2014*.

3 Lighting Design

Using *S.R. CEN/TR 13201-1:2014 Table 4* we have determined that designing the lighting in the residential section to comply with *I.S. EN 13201-2:2015 P4* is appropriate for this project given its size, location, and usage.

Each construction phase is self-contained.

There are two sections to the north of the development which will not be taken charge. The lighting in these areas are designed to comply with South Dublin County Council specifications, and the lighting will remain in the care of the management company.

3.1 Dimming

We have designed the lighting to dim by 25% from 00:00 to 06:00 in line with dimming profile *U14*.

3.2 Constant Lumen Output

The luminaires shall utilise constant lumen output.

3.3 Switching

The luminaires will be operated by PECUs switching at $35/18_{lux}$ levels.

3.4 Lighting Impact

We select the luminaire that uses the lowest energy consumption for the specific application. We utilise the most appropriate lumen package (lumen output and distribution optics) to ensure efficient lighting of the target area and to minimise light spill outside of

the area. Our energy consumption calculations are based on the requirements of *IS EN 13201-5:2015*.

We design using full cut off luminaires to ensure there is no direct upward light. We ensure that *threshold increment* is included in our calculations so that the luminaires are not a glare source.

We believe our lighting designs utilise the most energy efficient, sustainable luminaires currently available on the market and reflect practises laid out in relevant standards and in guidance notes from the professional bodies of which we are members, the Institution of Lighting Professionals and the Society of Light and Lighting.

3.5 Windows Over Carpark Wall

There are neighbouring upper floor windows close to the car park wall to the north of the development. We have added a vertical grid to assess the impact of the lighting. One point, not on the windows is slightly over 1_{LUX}, with the level dropping rapidly from that point. There will be no meaningful spill on these windows.

4 Lighting Performance

The lighting design has been carried out based on the performance of the selected luminaire. Any changes to the selected luminaire will make our design obsolete. This includes variation of specification of the luminaire by any member of the supply chain, including the OEM. Once this design has been approved by the local authority, any changes to the design will also require approval.

4.1 Maintenance Factor

The luminaire manufacturer's stated *lumen depreciation factor* is 0.9 at 100,000 hours at 25^{O} C for drive current selected. The *lamp survival factor* is 1. The mounting height, environmental zone and cleaning cycle derives a *luminaire maintenance factor* of 0.92 from *table C.1, BS 5489-1:2020*. This results in a *combined maintenance factor* of 0.83 which has been applied to the calculations.

4.2 S/P Ratio

We have used a product specific mesopic correction to factor visual efficacy under low level white light.

4.3 Luminaire Selection

We have selected a luminaire based on energy consumption, photometric performance, and general quality.

4.4 Luminaire Variation

While we endeavour to use the smallest number of luminaire variations on our projects, our primary aim is to comply with relevant European lighting standards while minimising energy consumption, minimising light pollution and light spill.

We achieve this by selecting an appropriate lumen package to suit the geometry of the area to be illuminated.

4.5 Design Luminaire

In this instance, we have selected a design based on the stated photometric performance and energy consumption of the Philips LumiStreet range.

5 Columns

We have used 6m columns throughout the project. The columns identified on the accompanying drawing as *PL 8, PL 9, PL 11, PL 12, PL 21* through *PL 24, PL 28,* and *PL 28* will be hinged as future access will be difficult for maintenance crews.

5.1 Trees and Landscaping

Trees and tall growth should be pruned back so that they do not cause shadowing. No trees or tall shrubs can be planted within 6m of the column.

6 Cable and Ducting

Ducting must be laid in accordance with the *National Rules for Electrical Installations I.S. 10101:2020*.

No cable joints are permitted. Cables can share ducts, but they must not be jointed in any manner.

No element of public lighting can stand on, or pass under, private property.

6.1 Midi Pillars

The project will require six midi pillars, two of which will remain in the care of the management company.

Midi pillars must be located in places that afford ease of identification and access for future maintenance crews. They must be located logically so as not to cause any risk to maintenance crews in the future.

6.2 Circuits

Midi pillar *MP 1* and *MP 2* will supply three circuits. Midi pillar *MP 3* will supply two circuits. The remaining pillars will supply a single circuit each.

7 Energy Consumption

The total energy consumption for this project will be 1,076 kW/h per annum, including dimming.

Appendix A Luminaire Quantities

Luminaire Quantities	
Quantity	**Item**
10	Philips BGP291 DW52 2.2klm in neutral white with 7 pin NEMA socket, DALI registered driver, and CLO. Programmed to dim by 25% from 00:00 to 06:00. Prewired to suit 6m column. Luminaire to comply with Appendix B attached. LumiStreet Gen2 Micro_BGP291_DW52_2200_10LED_5.2S_CLO_L90_740.ies PT U14
7	Philips BGP291 DM12 1.8klm in neutral white with 7 pin NEMA socket, DALI registered driver, and CLO. Programmed to dim by 25% from 00:00 to 06:00. Prewired to suit 6m column. Luminaire to comply with Appendix B attached. LumiStreet Gen2 Micro_BGP291_DM12_1800_10LED_5.2S_CLO_L90_740.ies PT U14
7	Philips BGP291 DN09 1.0klm in neutral white with 7 pin NEMA socket, DALI registered driver, and CLO. Programmed to dim by 25% from 00:00 to 06:00. Prewired to suit 6m column. Luminaire to comply with Appendix B attached. LumiStreet Gen2 Micro_BGP291_DN09_1000_6LED_5.2S_CLO_L90_740.ies PT U14
4	Philips BGP291 DRN1 0.8klm in neutral white with 7 pin NEMA socket, DALI registered driver, and CLO. Programmed to dim by 25% from 00:00 to 06:00. Prewired to suit 6m column. Luminaire to comply with Appendix B attached. LumiStreet Gen2 Micro_BGP291_DRN1_800_6LED_5.2S_CLO_L90_740.ies SE U14
1	Philips BGP291 DM10 1.6klm in neutral white with 7 pin NEMA socket, DALI registered driver, and CLO. Programmed to dim by 25% from 00:00 to 06:00. Prewired to suit 6m column. Luminaire to comply with Appendix B attached. LumiStreet Gen2 Micro_BGP291_DM10_1600_6LED_5.2S_CLO_L90_740.ies SE U14
1	Philips BGP291 DM10 3.0klm in neutral white with 7 pin NEMA socket, DALI registered driver, and CLO. Programmed to dim by 25% from 00:00 to 06:00. Prewired to suit 6m column. Luminaire to comply with Appendix B attached. LumiStreet Gen2 Micro_BGP291_DM10_3000_20LED_5.2S_CLO_L90_740.ies SE U14
20	6m column to comply with Appendix C attached.
10	6m hinged column to comply with Appendix C attached.
30	18/35 PECU.
30	Cut outs.
6	Midi pillar
19	Cable access chamber
940	Metres (approximately) 2 core 6mm^2 NYCY cable to link columns.
1180	Metres (approximately) Rigid duct to comply with Appendix D attached.
150	Metres (approximately) flexi duct to comply with Appendix D attached.

Appendix B Luminaire Specification

1 The luminaire shall be designed specifically to be used with LED light sources. It shall comply with all relevant EN standards and EC directives required by the CE *Community Marketing Directive*.

Product quality and standard measurements will be based on *IEC/PAS 62717* and *IEC/PAS 62722*.

Lantern shall comply with *EN 60598*.

2 The luminaire shall be supplied with surge protection of no less than 10kVa.

3 The light source shall be modular and replaceable on site. The module should be fixed in such a way as to maximise heat transfer from the LED chip and its respective board. The LED shall be a neutral white.

The lens assembly shall be protected by an appropriate material. The optic assembly will be protected to IP 66 as defined by *BS EN 60529*.

The lumen depreciation factor shall not exceed 10% at 100 000 hours at *ta* 25^0C

4 The driver shall be housed in a dedicated, separate chamber within the luminaire, the enclosure will be protected to a minimum of IP 65 as defined by *BS EN 60529*.

The driver shall be DALI registered and capable of communication and interaction with a CMS communication module should it be required in the future. Or shall be capable of being controlled by 1 to 10.

The manufacturer shall ensure that the driver is compatible with the LED array being used, that the driver complies with all appropriate regulation, standards, quality criteria and directives.

Drivers shall have over temperature protection and provide power factor correction of no less than 0.9.

5 The luminaire shall be constructed from die cast aluminium and powder coated in grey. All coloured components of the lantern shall be of the same colour code (RAL) and have the same visual appearance when viewed together.

6 The optic shall be protected to IP 66, the driver housing shall be protected to IP 66 as defined by *BS EN 60529*. The IP rating must be capable of being maintained throughout the design life of the luminaire.

7 The luminaire will be constructed in a robust manner and be suitable to use in the intended application and location. The luminaire shall have a minimum impact resistance of *IK08*.

8 A comprehensive written warranty covering lantern, driver and LED chip and module/array shall be provided. Warranty period shall be ten years as a minimum.
Details of how the local authority can access the warranty claim procedure should be supplied by the manufacturer in writing and signed by a director.

9 A signed declaration of conformity, along with certificates for ENC compliance and EMC Directive compliance shall be provided. The equipment will be fully compliant with RoHS requirements.

10 The weight and projected side area should be stated for the luminaire with all equipment and angle of installation considered in order to calculate column load for this installation.

11 Covers or openings on the lantern or the gear box required to be opened during the installation or maintenance of the light point must be captive when open.

12 All screws or fixtures required to be opened during installation or maintenance of the product must be protected against corrosion and seizure for the design life of the lantern.

ILP

13 LED failure fraction shall not be greater than 5% of the LEDs installed in the lantern over the design life of the lantern.

14 Correlated colour temperature shall not exceed four thousand Kelvin.

15 The luminaire shall provide thermal protection for all its components to ensure the lantern and its components operate within the stated temperature parameters through the design life of the lantern.

Ambient temperature related to lantern performance and tests will be in the range of -35°C to +55°C.

16 Electrical connection terminals shall be indelibly marked to indicate all wiring connections and use shrouded screws. Control equipment shall bear a clear circuit diagram in order to indicate all component connections in a concise manner.

Operating voltages shall be clearly marked within the enclosure.

17 Electrical terminals shall be capable of terminating three core 2.5mm^2 flexible cable.

18 Any link cables, connector blocks and plug & socket arrangements must be of a suitable IP rating for their location and application and comply with all standards or directives.

19 The complete luminaire including all component parts shall be guaranteed by the manufacturer for a minimum of ten years. Full written details of the warranty must be provided with the bid.

20 The luminaire shall be individually switched via PECU set to 35/18 lux switching. This PECU will be selected by the lantern manufacturer and be included in the lantern warranty, unless a NEMA socket is selected.

When a NEMA socket is used, it shall be a 7 pin unit and all communication cables shall be connected to the driver at the time of manufacturing.

21 The manufacturer shall provide the following information in accordance with the Lighting Industry Liaison Group's *A Guide to the Specification of LED Lighting Products*:

i. Rated input power, identifying the amount of energy consumed by the lantern, including its power supply in Watts.

ii. Rated luminous flux in lumens in absolute photometric values. Absolute photometry results in a LOR=1

iii. Lantern efficacy in lumens per Watt.

iv. Luminous intensity distribution.

v. Correlated colour temperature in Kelvin.

vi. Rated colour rendering index (CRI).

vii. Rated chromaticity co-ordinate values. Initial and maintained.

viii. Maintained luminous flux.

ix. Rated life in hours of the LED module and the associated rated lumen maintenance.

x. Failure fracture corresponding to the rated life of the LED module within the lantern.

xi. Ambient temperature for the lantern.

ILP

Appendix C Column & Bracket Specification

The column and bracket shall be designed to *EN 40* and in accordance with *BD 94/07*. They shall be of suitable size to bear the specified lantern and to achieve a nominal height to light source as called for by the lighting design.

The lighting column manufacturer shall be registered with and certified by either NSAI, British Standards Institute of Quality Assurance Services or Lloyds Register Quality Assurance Register for the design, manufacture, supply and verification of road lighting columns and brackets under their quality assessment schedule to ISO 9001.

The quality assurance certification shall relate to the specific lighting column material being proposed. The local authority reserves the right to request proof of certification from the proposed column manufacturer.

Aluminium columns can be considered for use, especially as they can be more environmentally favourable than steel columns.

Brackets will be manufactured from the same material as the column.

The column will comply with the following specifications:

1 The column shall be of functional design and suitable for the location and intended loading.

2 The column shall be protected against the ingress of moisture at the top and at the door entry.

3 Steel columns shall be galvanised to *BS EN 1461*.

4 Roots shall be protected with bitumen or other appropriate material. This protection should extend 100mm above ground level.

5 Doors shall be fitted in such a way as to minimise the risk of being pried off. Twin locks should be fitted. Column and door should have earth terminals of suitable mechanical type.

6 A suitable non-hygroscopic backboard will be fitted in line with the door and be large enough to take local authority approved termination units.

7 The space between the door and the backboard will be sufficient to enable the fitment of termination units as required by the County Council.

8 Each lantern shall be individually protected with a suitable fuse unit in the column base.

9 Neutral blocks, or looping-in blocks, shall be of an approved grooved bore 63A type, fully insulated and solidly mounted on the backboard.

10 Columns shall be wired with a minimum 2.5mm^2 PVC/PVC stranded copper cable.

11 All columns shall comply with *I.S. 10101:2020* regulations with regard to minimum door height.

12 Columns shall be installed so that their doors are aligned at 90^0 to the curb edge to enable maintenance personnel face towards oncoming traffic.

13 Close protection of street lighting lanterns to be provided by a 25A rated cut-out loaded with a 6A fuse incorporating a *cam lever* single pole disconnection. The cut-out will use a separate neutral and earth. The cut-out must provide ingress protection to *IP21* as defined by *EN 60529*. This fuse type is colloquially identified as conforming to *BS 88*.

14 The cut-out shall be constructed to conform to the requirements laid out in *BS 7654* For example: *MC040SLF 25A SLCO TYPE 1 (SNE)* by Lucy Zodion. Note that other cut-outs that meet this specification will be acceptable so long as they are an established and recognised, quality brand and do not have a negative impact on maintenance stock requirements of the local authority or their agents.

15 Where three phase supply is required, then separate link boxes will be installed in the column below the cut-out to allow for interconnecting. Link boxes must comply with the requirements

ILP

laid out in *BS 7657:2010*. Link boxes will be supplied for live 1, live 2, live 3, neutral and finally earth. The link box must provide ingress protection to *IP21* as defined by *EN 60529.*

16 All terminals shall be formed from solid brass and be electroplated for temperature rise stability. Terminals shall have a serrated bore to ensure good contact with all types of conductors. The incoming terminals shall have additional protection, provided by a red safety shield to guard against accidental contact with live metal.

17 All components required will be firmly fixed to the back board of the column in a tidy professional manner. All conductors will be stripped to the appropriate length to allow for connection. No exposed conductors shall be allowed.

18 The column shall be earthed from the incoming cable via a 6mm^2 PVC cable which will be connected to the column by a crimped lug.

Appendix D Ducting & Cable Specification

1 All cabling shall be laid underground in 110mm PVC-U pipe coloured red of high density to *IS 135 class B* with a wall thickness in the range 2.3-2.8mm or other pipe coloured red having a high resistance to impact.

Cable access chambers shall be provided at all road crossings with spare duct provided between chambers.

2 The minimum standard acceptable is *EN 50086-2-4* with a 750 Newton load rating for 5% deflection. A minimum cover of 600mm to the ducting shall be provided in grass margins and minimum cover of 750mm to the ducting shall be provided at road crossings.

3 The electrical cable should be at least:

$6mm^2$ NYCY type to *BS 6346:1989*, with colours brown, blue, and green-yellow.

4 Cable joints are not permitted. Cables shall be looped from column to column on each circuit. If faults develop on cables prior to commissioning, the section of cable involved shall be replaced.

5 A duct should be provided between the ESB section pillar and the Public Lighting Customer Service Pillar.

Appendix E Public Lighting Midi Pillar

Public lighting midi pillars must not be located within two metres of an ESBN service pillar.

1 All columns shall be supplied from a Public Lighting Customer Service Pillar, located adjacent to the ESB section pillar. Not more than eight columns may be supplied from any one circuit and not more than four circuits may be taken from any one Customer Service Pillar.

2 The pillar shall consist of a rectangular box of approximate dimensions above ground of 150mm deep, 250mm width, and 600mm high. The root section shall be 320mm long and turned out at the bottom for a distance of 50mm. This root section will be protected by bitumen or other suitable material.

3 The pillar shall be fitted with a recessed, lift-out, door with a weather strip all round. The door shall be fixed with an M8 triangular headed locking screw at the top onto a suitably tapped fixing plate and secured at the bottom by a fixed catch onto the weather strip.

4 The door shall be equipped with a suitable unobtrusive finger grip to facilitate easy removal of the door.

5 The minimum opening size shall be 220mm wide by 510mm high.

6 The pillar shell, door and extension plates shall be of 3mm thick mild steel. The pillar, when fabricated, shall be suitable for free standing or recessing into a wall.

7 A suitable non-hygroscopic backboard shall be fitted in each pillar which shall be easily removable.

8 A main earth terminal shall also be provided with an insulated earth lead to the door.

9 After fabrication the pillar shall be hot dipped galvanized both inside and outside in accordance with *BS EN 1461*.

10 The pillar shall have a smooth exterior finish and be free of all sharp and rough edges, both outside and inside.

ILP

Appendix F Public Lighting Midi Pillar Fit Out

1 All electrical components shall be securely mounted on the baseboard.

2 All outgoing circuits shall be individually fused by means of a 20A HRC fuse unit, capable of accommodating cable sizes up to 25mm^2. The fuse shall be rated 16kA minimum rupturing capacity and shall comply with *BS 1361*. The terminals of the fuse unit shall be of the grooved bore type. Unless appropriate calculations call for a different size fuse.

RCDs must not be used.

3 Where there is more than one outgoing circuit, a main fuse shall also be provided. The main fuse shall be rated 25A and shall otherwise be identical with individual circuit fuses.

4 The electrical contractor shall consult with the local ESB Networks office on ESB interface requirements at the Customer Service Pillar.

5 The installed pillar shall be embedded in concrete, *Class E, Clause 1502*, Specification for Road-works, published by the Department of the Environment.

6 The front of all Public Lighting Customer Service Pillars shall display a permanent rigid danger warning sign (black lettering on a yellow background), 100mm wide by 120mm deep, securely fixed, as per the local authority specification.

Appendix G Public Lighting Midi Pillar Earthing

1 All public lighting midi pillars shall be earthed, using an earth electrode and the supply neutralised. The electrode shall consist of a bare copper, or hot dipped galvanised steel rod/pipe of at least 16mm diameter, driven vertically into the soil for a length of at least 1,200mm. If difficulties arise in driving the vertical rod, due to underground services, a horizontal earth electrode may be installed as follows:

A straight length of at least 4.5m of either:

- 16mm diameter bare copper.
- 16mm diameter hot dipped galvanised steel rod.
- 25mm^2 cross-section bare copper.
- 25mm^2 cross-section hot dipped galvanised steel rod.

This should be buried in the soil to a depth of at least 500mm. The earthing lead shall exit the pillar through the services cable entry opening.

2 The connection at the earth electrode shall be accessible for inspection and shall be protected against corrosion by a suitable waterproof tape. The connection shall be enclosed in a galvanised steel box, with an inspection cover. After inspection, the connection shall be buried underground.

3 A main earth terminal shall be mounted on the pillar baseboard, with the following connections:

- 10mm^2 PVC cable from the earth terminal on the pillar, with a crimped lug connection to the pillar,
- 10mm^2 PVC cable from the earth electrode,
- 10mm^2 PVC cable from the neutral link.

4 A main earth terminal shall be mounted on the baseboard in each lighting column, with the following connections:

- 6mm^2 PVC cable from the earth terminal to the column, with a crimped lug connection to the column,
- 2.5mm^2 PVC cable from the lantern earth terminal.

5 The outer sheath of the incoming and/or outgoing service cable shall be connected to the main earth terminal, in the case of both the lighting column and the public lighting customer service pillar.

6 Earth continuity cables shall be coloured yellow/green, in accordance with *I.S. 10101:2020* wiring rules. In the case of NYCY cables, appropriate yellow/green sleeving shall be used.

REDMOND
ANALYTICAL MANAGEMENT SERVICES
LIGHTING | ENERGY | DESIGN | SUPPORT

P Classification Selection

Project Name Proposed Residential Development at Gordon Park
Project Number 21075
From Table 4 - Parameters for the selection of lighting class P CEN/TR 13201-1:2014

Parameter	Options	Description	Weighting Value V_w [a]	Designer Selection
Travel speed	Low	v ≤ 40km/h	1	1
	Very low (walking speed)	Very low, walking speed	0	
Use intensity	Busy		1	
	Normal		0	0
	Quiet		-1	
Traffic composition	Pedestrians, cyclists and motorised traffic		2	
	Pedestrians and motorised traffic		1	1
	Pedestrians and cyclists only		1	
	Pedestrians only		0	
	Cyclists only		0	
Parked vehicles	Present		1	
	Not present		0	0
Ambient luminosity	High	Shopping windows, advertisement expressions, sports fields, station areas, storage areas	1	
	Moderate	Normal situation	0	0
	Low		-1	
Facial recognition	Necessary		Additional requirements[b]	
	Not necessary		No additional requierments	

[a] The values stated in the column are an example. Any adaption of the method or more appropriate weighting values can be used instead, on the national level.

[b] Specific guidelines on use of facial recognition parameter are defined at national level for each country.

Number of lighting classes	6
Weighting value V_w	2
Lighting class selected	4

Redmond Analytical Management Services Ltd.
www.redmondams.ie | info@redmondams.ie | 086 2356356

DATE:	**22 October 2021**
DESIGNER:	**Patrick Redmond**
PROJECT No:	**21075**
PROJECT NAME:	**Proposed Residential Development at Gordon Park REV C**

Lighting designed to comply with I.S. EN 13201-2:2015 P4 due to the nature of the development. Energy consumption assessed in accordance with I.S. EN 13201-5:2015.

A product specific S/P ratio has been applied to the calculation to factor visual efficacy under low level white light, in line with guidance offered by PLG 03 (ILP '12).

LMF 0.92 x LDF 0.9 x LSF 1 = MF 0.83 at 100,000 hours at 25 degree ambient. Photometry measured at minimum 15 degree ambient.

Luminaire A = 13W. Luminaire B = 11W. Luminaire C = 6W. Luminaire D = 5W. Luminaire E = 10W. Luminaire F = 17W. Connected load, averaged for CLO.

Lighting Level ~ Full Output

PREPARED BY: Patrick Redmond MILP, AMSLL, IEng, Tech IEI
Redmond Analytical Management Services Ltd.
M~ 086 2356356
O~ 053 9383696
patrick@redmondams.ie
Rosewood House, Mount Seaton, Camolin,
Enniscorthy, Co. Wexford. Y21 K8P3
www.redmondams.ie
Document control: TD 01 Version: 1.0

DATE: 22 October 2021 DESIGNER: Patrick Redmond

PROJECT No: 21075 PROJECT NAME: Proposed Residential Development at Gordon Park REV C

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	Phase 1	705379.58	728724.91	165.85	147.83	1.49	1.49
2	Phase 2	705379.90	728787.09	165.85	164.98	1.49	1.50
3	Management Zone	705412.62	728874.47	43.20	71.01	1.49	1.48
4	Vertical Assessment	705435.39	728937.45	9.00	3.00	1.00	1.00

Luminaires

Luminaire A Data

Supplier	Philips
Type	BGP291 DW52
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	2.20
File Name	LumiStreet Gen2 Micro_BGP291_DW52_220 0_10LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	639 6, 45 2, 0.0
Lamp S/P Ratio	1 61
No. in Project	10

Luminaire B Data

Supplier	Philips
Type	BGP291 DM12
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	1.80
File Name	LumiStreet Gen2 Micro_BGP291_DM12_180 0_10LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	742 0, 45 4, 0 0
Lamp S/P Ratio	1 61
No. in Project	7

Luminaire C Data

Supplier	Philips
Type	BGP291 DN09
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	1.00
File Name	LumiStreet Gen2 Micro_BGP291_DN09_1000 _6LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	986.5, 116.6, 0.0
Lamp S/P Ratio	1.61
No. in Project	7

Luminaire D Data

Supplier	Philips
Type	BGP291 DRN1
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	0.80
File Name	LumiStreet Gen2 Micro_BGP291_DRN1_800 _6LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0 83
Imax70,80,90(cd/klm)	431 4, 23 6, 0.0
Lamp S/P Ratio	1 61
No. in Project	4

Luminaires

Luminaire E Data

Supplier	Philips
Type	BGP291 DM10
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	1.60
File Name	LumiStreet Gen2 Micro_BGP291_DM10_1600_6LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0 83
Imax70,80,90(cd/klm)	534 0, 55 4, 0 0
Lamp S/P Ratio	1 61
No. in Project	1

Luminaire F Data

Supplier	Philips
Type	BGP291 DM10
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	3.00
File Name	LumiStreet Gen2 Micro_BGP291_DM10_3000_20LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	534 0, 55 4, 0 0
Lamp S/P Ratio	1 61
No. in Project	1

Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
PL 1	A	705400.80	728823.25	6.00	243.00	0.00	0.00	0.40			
PL 2	A	705426.18	728803.24	6.00	220.00	0.00	0.00	0.40			
PL 3	A	705446.01	728775.18	6.00	214.00	0.00	0.00	0.40			
PL 4	A	705471.08	728771.08	6.00	116.00	0.00	0.00	0.40			
PL 5	A	705503.26	728783.86	6.00	124.00	0.00	0.00	0.40			
PL 6	B	705450.42	728745.68	6.00	199.00	0.00	0.00	0.40			
PL 7	F	705395.64	728836.79	6.00	348.00	0.00	0.00	0.40			
PL 8	C	705390.35	728837.98	6.00	348.00	0.00	0.00	0.40			
PL 9	C	705395.35	728860.67	6.00	344.00	0.00	0.00	0.40			
PL 10	D	705449.46	728732.85	6.00	116.00	0.00	0.00	0.40			
PL 11	D	705524.46	728791.10	6.00	237.00	0.00	0.00	0.40			
PL 12	D	705532.47	728772.10	6.00	199.00	0.00	0.00	0.40			
PL 13	A	705500.08	728816.25	6.00	206.00	0.00	0.00	0.40			
PL 14	A	705480.09	728844.77	6.00	217.00	0.00	0.00	0.40			
PL 15	A	705461.09	728865.83	6.00	221.00	0.00	0.00	0.40			
PL 16	A	705435.93	728883.56	6.00	351.00	0.00	0.00	0.40			
PL 17	B	705441.20	728911.30	6.00	349.00	0.00	0.00	0.40			
PL 18	B	705458.13	728898.95	6.00	134.00	0.00	0.00	0.40			
PL 19	A	705455.58	728911.81	6.00	70.00	0.00	0.00	0.40			
PL 20	B	705415.84	728868.02	6.00	98.00	0.00	0.00	0.40			
PL 21	C	705403.22	728896.07	6.00	345.00	0.00	0.00	0.40			
PL 22	C	705407.27	728926.12	6.00	345.00	0.00	0.00	0.40			
PL 23	D	705422.45	728935.38	6.00	164.00	0.00	0.00	0.40			
PL 24	C	705423.73	728919.28	6.00	71.00	0.00	0.00	0.40			
PL 25	B	705497.72	728847.89	6.00	136.00	0.00	0.00	0.40			
PL 26	E	705512.04	728861.23	6.00	133.00	0.00	0.00	0.40			
ML 27	C	705425.93	728887.92	6.00	172.00	0.00	0.00	0.40			
ML 28	C	705429.07	728908.74	6.00	172.00	0.00	0.00	0.40			
ML 29	B	705429.28	728938.50	6.00	246.00	0.00	0.00	0.40			
ML 30	B	705442.88	728918.84	6.00	74.00	0.00	0.00	0.40			

Horizontal Illuminance (lux)

Phase 1

Results

Eav	4.01
Emin	1.07
Emax	16.93
Emin/Emax	0.06
Emin/Eav	0.27

Horizontal Illuminance (lux)

Phase 2

Results

Eav	4.16
Emin	1.26
Emax	11.98
Emin/Emax	0.10
Emin/Eav	0.30

Horizontal Illuminance (lux)

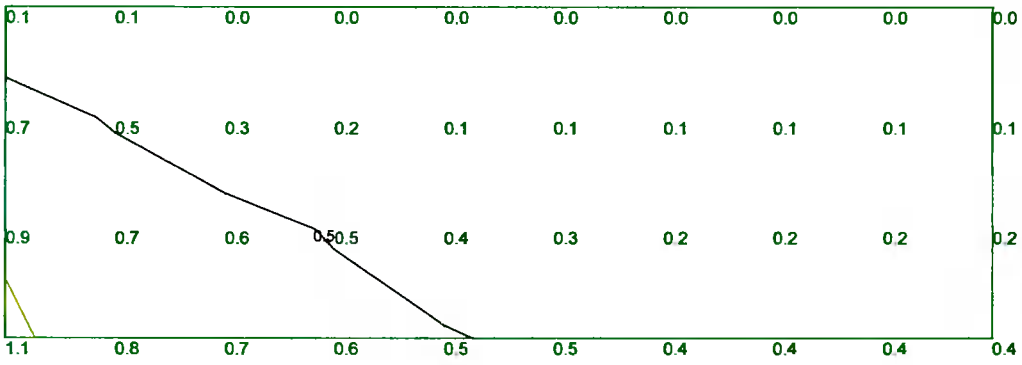
Management Zone

Results

Eav	5.10
Emin	1.29
Emax	13.91
Emin/Emax	0.09
Emin/Eav	0.25

Illuminance (lux)

Vertical Assessment



Results

Eav	0.31
Emin	0.02
Emax	1.06
Emin/Emax	0.02
Emin/Eav	0.07

DATE:	**22 October 2021**
DESIGNER:	**Patrick Redmond**
PROJECT No:	**21075**
PROJECT NAME:	**Proposed Residential Development at Gordon Park REV C**

Lighting designed to comply with I.S. EN 13201-2:2015 P4, prior to dimming by 25%, due to the nature of the development. Energy consumption assessed in accordance with I.S. EN 13201-5:2015.

A product specific S/P ratio has been applied to the calculation to factor visual efficacy under low level white light, in line with guidance offered by PLG 03 (ILP '12).

LMF 0.92 x LDF 0.9 x LSF 1 = MF 0.83 at 100,000 hours at 25 degree ambient. Photometry measured at minimum 15 degree ambient.

Luminaire A = 10W. Luminaire B = 8W. Luminaire C = 5W. Luminaire D = 4W. Luminaire E = 8W. Luminaire F = 13W. Dimmed load, averaged for CLO.

Lighting Level ~ Dimmed By 25%

PREPARED BY: Patrick Redmond MILP, AMSLL, IEng, Tech IEI
Redmond Analytical Management Services Ltd.
M~ 086 2356356
O~ 053 9383696
patrick@redmondams.ie
Rosewood House, Mount Seaton, Camolin,
Enniscorthy, Co. Wexford. Y21 K8P3
www.redmondams.ie

Document control: TD 01 Version: 1.0

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	Phase 1	705379.58	728724.91	165.85	147.83	1.49	1.49
2	Phase 2	705379.90	728787.09	165.85	164.98	1.49	1.50
3	Management Zone	705412.62	728874.47	43.20	71.01	1.49	1.48
4	Vertical Assessment	705435.39	728937.45	9.00	3.00	1.00	1.00

Luminaires

Luminaire A Data

Supplier	Philips
Type	BGP291 DW52
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	2.20
File Name	LumiStreet Gen2 Micro_BGP291_DW52_2200_10LED_5 2S_CLO_L90_740.ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	639 6, 45.2, 0.0
Lamp S/P Ratio	1 61
No. in Project	10

Luminaire B Data

Supplier	Philips
Type	BGP291 DM12
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	1 80
File Name	LumiStreet Gen2 Micro_BGP291_DM12_1800_10LED_5 2S_CLO_L90_740.ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	742 0, 45 4, 0 0
Lamp S/P Ratio	1 61
No. in Project	7

Luminaire C Data

Supplier	Philips
Type	BGP291 DN09
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	1.00
File Name	LumiStreet Gen2 Micro_BGP291_DN09_1000_6LED_5 2S_CLO_L90_740.ies
Maintenance Factor	0 83
Imax70,80,90(cd/klm)	986 5, 116 6, 0.0
Lamp S/P Ratio	1 61
No. in Project	7

Luminaire D Data

Supplier	Philips
Type	BGP291 DRN1
Lamp(s)	LED-HB 5 2S 740
Lamp Flux (klm)	0 80
File Name	LumiStreet Gen2 Micro_BGP291_DRN1_800_6LED_5 2S_CLO_L90_740 ies
Maintenance Factor	0 83
Imax70,80,90(cd/klm)	431 4, 23 6, 0.0
Lamp S/P Ratio	1 61
No. in Project	4

Luminaires

Luminaire E Data

Supplier	Philips
Type	BGP291 DM10
Lamp(s)	LED-HB 5.2S 740
Lamp Flux (klm)	1.60
File Name	LumiStreet Gen2 Micro_BGP291_DM10_1600_6LED_5.2S_CLO_L90_740.ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	534.0, 55.4, 0.0
Lamp S/P Ratio	1.61
No. in Project	1

Luminaire F Data

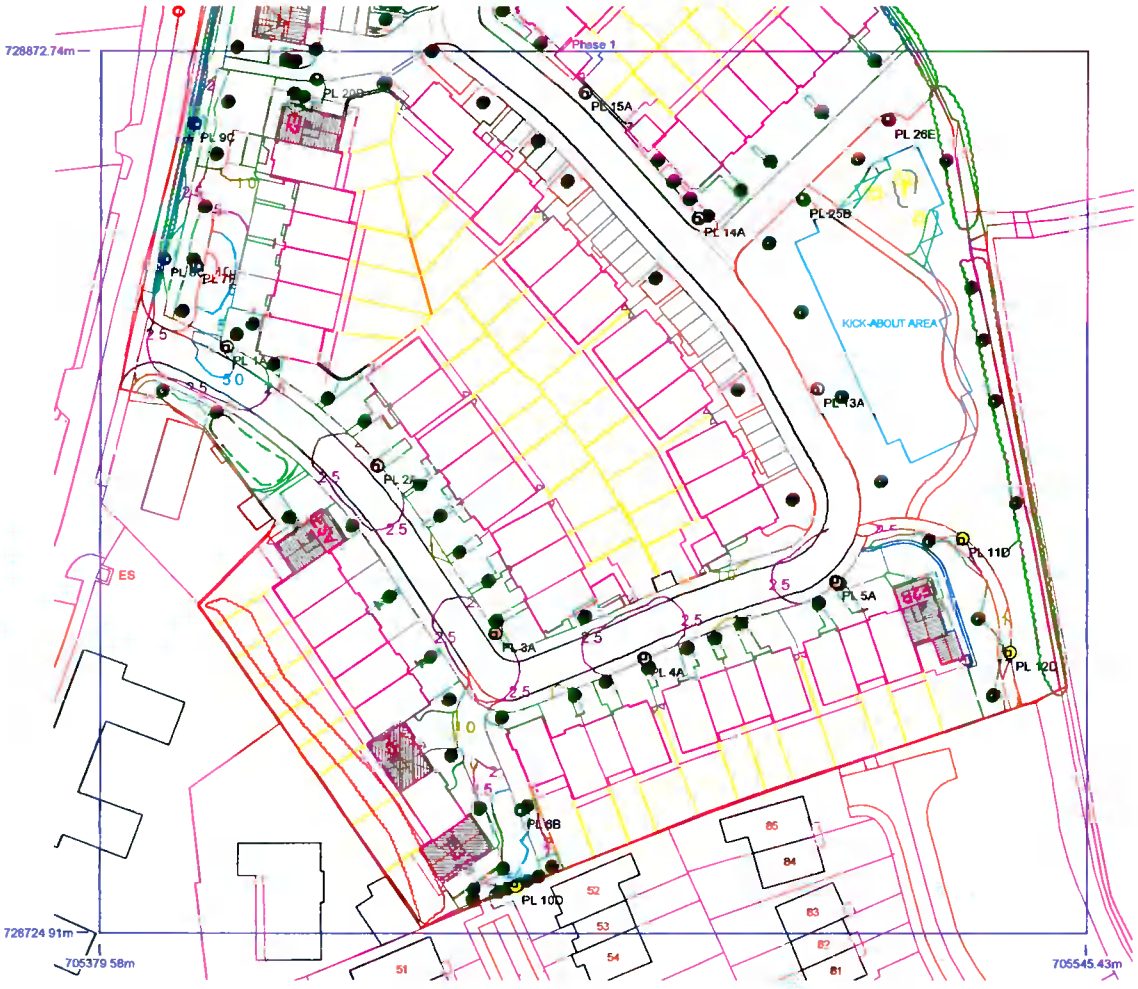
Supplier	Philips
Type	BGP291 DM10
Lamp(s)	LED-HB 5.2S 740
Lamp Flux (klm)	3.00
File Name	LumiStreet Gen2 Micro_BGP291_DM10_3000_20LED_5.2S_CLO_L90_740.ies
Maintenance Factor	0.83
Imax70,80,90(cd/klm)	534.0, 55.4, 0.0
Lamp S/P Ratio	1.61
No. in Project	1

Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Dimmed to	Target X	Target Y	Target Z
PL 1	A	705400.80	728823.25	6.00	243.00	0.00	0.00	0.40	75%			
PL 2	A	705426.18	728803.24	6.00	220.00	0.00	0.00	0.40	75%			
PL 3	A	705446.01	728775.18	6.00	214.00	0.00	0.00	0.40	75%			
PL 4	A	705471.08	728771.08	6.00	116.00	0.00	0.00	0.40	75%			
PL 5	A	705503.26	728783.86	6.00	124.00	0.00	0.00	0.40	75%			
PL 6	B	705450.42	728745.68	6.00	199.00	0.00	0.00	0.40	75%			
PL 7	F	705395.64	728836.79	6.00	348.00	0.00	0.00	0.40	75%			
PL 8	C	705390.35	728837.98	6.00	348.00	0.00	0.00	0.40	75%			
PL 9	C	705395.35	728860.67	6.00	344.00	0.00	0.00	0.40	75%			
PL 10	D	705449.46	728732.85	6.00	116.00	0.00	0.00	0.40	75%			
PL 11	D	705524.46	728791.10	6.00	237.00	0.00	0.00	0.40	75%			
PL 12	D	705532.47	728772.10	6.00	199.00	0.00	0.00	0.40	75%			
PL 13	A	705500.08	728816.25	6.00	206.00	0.00	0.00	0.40	75%			
PL 14	A	705480.09	728844.77	6.00	217.00	0.00	0.00	0.40	75%			
PL 15	A	705461.09	728865.83	6.00	221.00	0.00	0.00	0.40	75%			
PL 16	A	705435.93	728883.56	6.00	351.00	0.00	0.00	0.40	75%			
PL 17	B	705441.20	728911.30	6.00	349.00	0.00	0.00	0.40	75%			
PL 18	B	705458.13	728898.95	6.00	134.00	0.00	0.00	0.40	75%			
PL 19	A	705455.58	728911.81	6.00	70.00	0.00	0.00	0.40	75%			
PL 20	B	705415.84	728868.02	6.00	98.00	0.00	0.00	0.40	75%			
PL 21	C	705403.22	728896.07	6.00	345.00	0.00	0.00	0.40	75%			
PL 22	C	705407.27	728926.12	6.00	345.00	0.00	0.00	0.40	75%			
PL 23	D	705422.45	728935.38	6.00	164.00	0.00	0.00	0.40	75%			
PL 24	C	705423.73	728919.28	6.00	71.00	0.00	0.00	0.40	75%			
PL 25	B	705497.72	728847.89	6.00	136.00	0.00	0.00	0.40	75%			
PL 26	E	705512.04	728861.23	6.00	133.00	0.00	0.00	0.40	75%			
ML 27	C	705425.93	728887.92	6.00	172.00	0.00	0.00	0.40	75%			
ML 28	C	705429.07	728908.74	6.00	172.00	0.00	0.00	0.40	75%			
ML 29	B	705429.28	728938.50	6.00	246.00	0.00	0.00	0.40	75%			
ML 30	B	705442.88	728918.84	6.00	74.00	0.00	0.00	0.40	75%			

Horizontal Illuminance (lux)

Phase 1



Results

Eav	3.01
Emin	0.80
Emax	12.70
Emin/Emax	0.06
Emin/Eav	0.27

Horizontal Illuminance (lux)

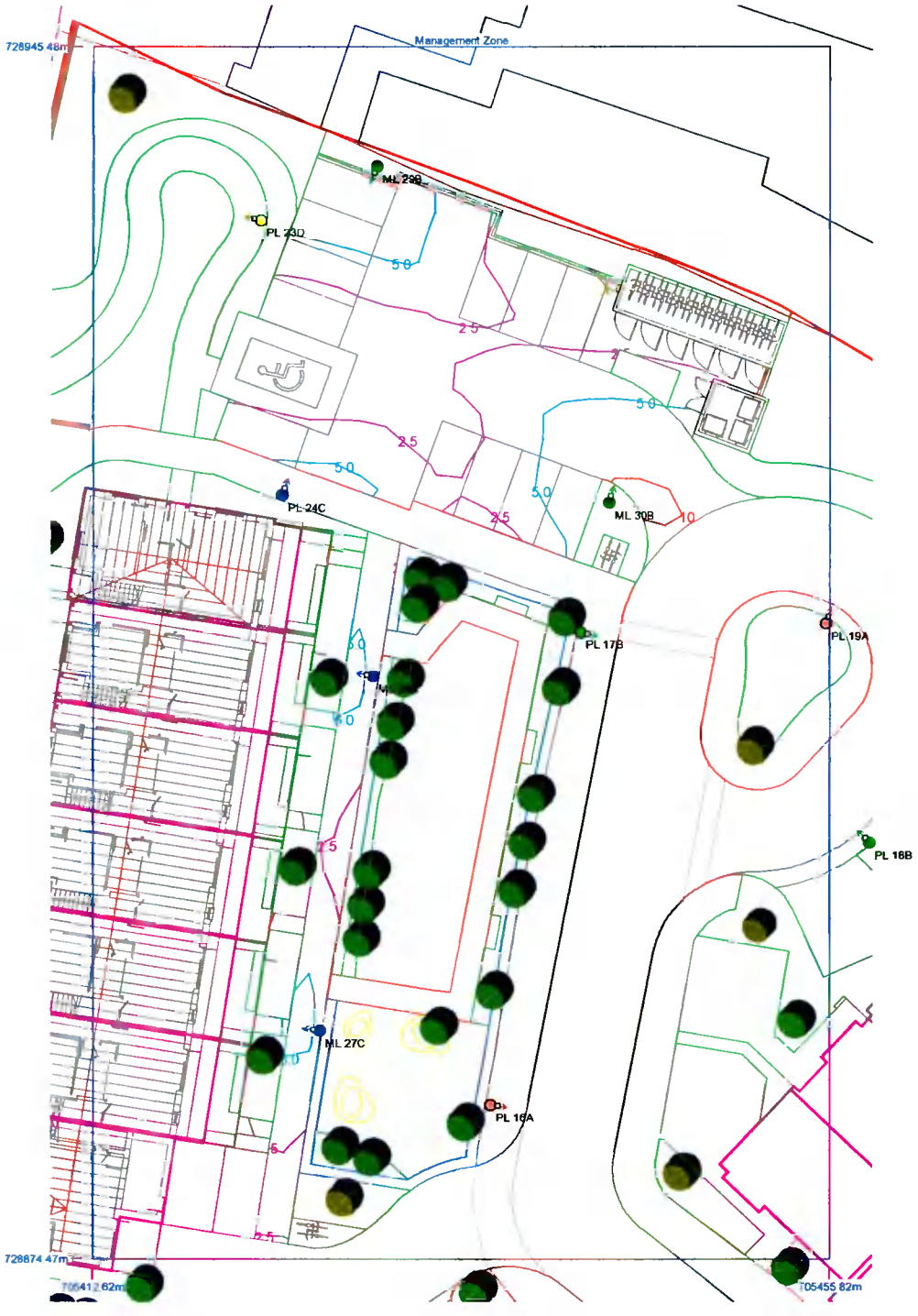
Phase 2

Results

Eav	3.12
Emin	0.94
Emax	8.99
Emin/Emax	0.10
Emin/Eav	0.30

Horizontal Illuminance (lux)

Management Zone

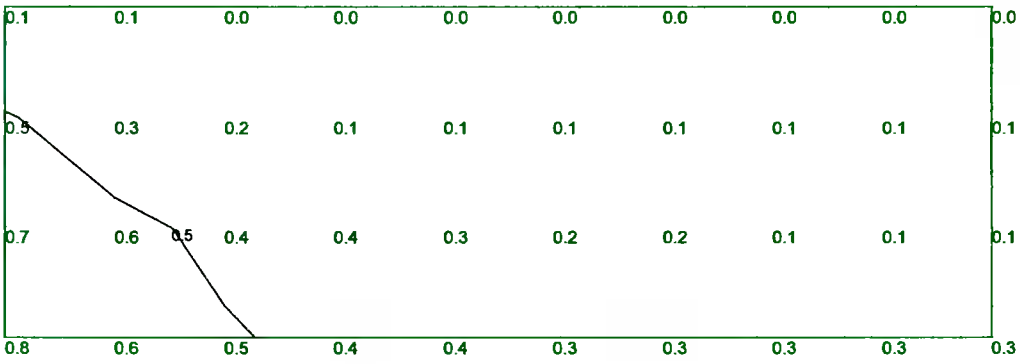


Results

Eav	3.83
Emin	0.97
Emax	10.43
Emin/Emax	0.09
Emin/Eav	0.25

Illuminance (lux)

Vertical Assessment



Results

Eav	0.23
Emin	0.02
Emax	0.79
Emin/Emax	0.02
Emin/Eav	0.07

REDMOND
ANALYTICAL MANAGEMENT SERVICES
LIGHTING | ENERGY | DESIGN | SUPPORT

Cable Calculations

Project Name Proposed Residential Development at Gordon Park REV B
Project Number 21075

Midi Pillar Number 1							
Circuit	Tabulated Voltage drop (cable)	Total columns on circuit	Total luminaire Current (I_D)	Total circuit length	kVA for pillar	Voltage drop	Voltage drop percentage
1	7.3	2	0.08	66		0.04	0.02%
2	7.3	6	0.34	220	0.14	0.55	0.24%
3	7.3	4	0.18	146		0.19	0.08%
Circuit	Z_E	Conductor Resistance Ω/km	Z_S	Circuit Impedance Ohm	Fault Current Amp	Circuit Fuse (I_N) Amp	Cable size
1	0.35	3.08	0.41	0.8	304.0	10	6mm^2
2	0.35	3.08	1.36	1.7	134.9	10	6mm^2
3	0.35	3.08	0.90	1.2	184.1	10	6mm^2

Note that circuit length includes an extra 10m per column to allow for turns, access and other potential issues.
It is the duty of the electrical contractor to undertake appropriate electrical safety tests and to certify the electrical installation.

The voltage drop on each circuit is below the allowed maximum.
The minimum sized cable permissible under I.S. 10101:2020 is 6mm SQ.
It is the duty of the electrical contractor to calculate the appropriate fuse size.

Approximate Total Cable (m) = 940

Midi Pillar Number 2							
Circuit	Tabulated Voltage drop (cable)	Total columns on circuit	Total luminaire Current (I_D)	Total circuit length	kVA for pillar	Voltage drop	Voltage drop percentage
1	7.3	2	0.11	72	0.07	0.06	0.03%
2	7.3	2	0.13	62		0.06	0.03%
3	7.3	1	0.07	35		0.02	0.01%
Circuit	Z_E	Conductor Resistance Ω/km	Z_S	Circuit Impedance Ohm	Fault Current Amp	Circuit Fuse (I_N) Amp	Cable size
1	0.35	3.08	0.44	0.8	289.8	10	6mm^2
2	0.35	3.08	0.38	0.7	314.2	10	6mm^2
3	0.35	3.08	0.22	0.6	406.6	10	6mm^2

Note that circuit length includes an extra 10m per column to allow for turns, access and other potential issues.
It is the duty of the electrical contractor to undertake appropriate electrical safety tests and to certify the electrical installation.

Midi Pillar Number 3							
Circuit	Tabulated Voltage drop (cable)	Total columns on circuit	Total luminaire Current (I_D)	Total circuit length	kVA for pillar	Voltage drop	Voltage drop percentage
1	7.3	5	0.17	177	0.07	0.22	0.10%
2	7.3	2	0.12	64		0.06	0.02%
Circuit	Z_E	Conductor Resistance Ω/km	Z_S	Circuit Impedance Ohm	Fault Current Amp	Circuit Fuse (I_N) Amp	Cable size
1	0.35	3.08	1.09	1.4	159.7	10	6mm^2
2	0.35	3.08	0.39	0.7	309.0	10	6mm^2

Note that circuit length includes an extra 10m per column to allow for turns, access and other potential issues.
It is the duty of the electrical contractor to undertake appropriate electrical safety tests and to certify the electrical installation.

Midi Pillar Number 4							
Circuit	Tabulated Voltage drop (cable)	Total columns on circuit	Total luminaire Current (I_D)	Total circuit length	kVA for pillar	Voltage drop	Voltage drop percentage
1	7.3	2	0.12	51	0.03	0.04	0.02%
Circuit	Z_E	Conductor Resistance Ω/km	Z_S	Circuit Impedance Ohm	Fault Current Amp	Circuit Fuse (I_N) Amp	Cable size
1	0.35	3.08	0.31	0.7	346.3	10	6mm^2

Note that circuit length includes an extra 10m per column to allow for turns, access and other potential issues.
It is the duty of the electrical contractor to undertake appropriate electrical safety tests and to certify the electrical installation.

Private Midi Pillar Number 5							
Circuit	Tabulated Voltage drop (cable)	Total columns on circuit	Total luminaire Current (I_D)	Total circuit length	kVA for pillar	Voltage drop	Voltage drop percentage
1	7.3	2	0.06	48	0.01	0.02	0.01%
Circuit	Z_E	Conductor Resistance Ω/km	Z_S	Circuit Impedance Ohm	Fault Current Amp	Circuit Fuse (I_N) Amp	Cable size
1	0.35	3.08	0.30	0.6	356.2	10	6mm^2

Note that circuit length includes an extra 10m per column to allow for turns, access and other potential issues.
It is the duty of the electrical contractor to undertake appropriate electrical safety tests and to certify the electrical installation.

Private Midi Pillar Number 6							
Circuit	Tabulated Voltage drop (cable)	Total columns on circuit	Total luminaire Current (I_D)	Total circuit length	kVA for pillar	Voltage drop	Voltage drop percentage
1	7.3	2	0.11	89	0.03	0.07	0.03%
Circuit	Z_E	Conductor Resistance Ω/km	Z_S	Circuit Impedance Ohm	Fault Current Amp	Circuit Fuse (I_N) Amp	Cable size
1	0.35	3.08	0.55	0.9	256.1	10	6mm^2

Note that circuit length includes an extra 10m per column to allow for turns, access and other potential issues.
It is the duty of the electrical contractor to undertake appropriate electrical safety tests and to certify the electrical installation.

REDMOND
ANALYTICAL MANAGEMENT SERVICES
LIGHTING | ENERGY | DESIGN | SUPPORT

Energy consumption

Project Name Proposed Residential Development at Gordon Park REV B
Project Number 21075
Dimming Profile U14

Proposed Installation							
Lantern	Connected Load ~ W	Quantity	Burn Hours Annum	kW/h per Annum	Cost per kW/h	Annual Cost	
2.2 klm luminaire	13	10	2350	306	€ 0.158	€48.27	FP
	10	10	1710	167	€ 0.158	€26.34	Dim
1.8 klm luminaire	11	7	2350	181	€ 0.158	€28.59	FP
	8	7	1710	99	€ 0.158	€15.60	Dim
1.0 klm luminaire	6	7	2350	99	€ 0.158	€15.59	FP
	5	7	1710	54	€ 0.158	€8.51	Dim
0.8 klm luminaire	5	4	2350	47	€ 0.158	€7.43	FP
	4	4	1710	26	€ 0.158	€4.05	Dim
1.6 klm luminaire	10	1	2350	24	€ 0.158	€3.71	FP
	8	1	1710	13	€ 0.158	€2.03	Dim
3.0 klm luminaire	17	1	2350	40	€ 0.158	€6.31	FP
	13	1	1710	22	€ 0.158	€3.44	Dim

Total Annual Energy Cost €169.88

Total Annual Energy Consumption (kW/h) 1075.22