

Ingle Wood

External Lighting Report

Date: 06/03/18

Reference: ING-HYD-00-XX-RP-ME-0001



Ingle Wood

External Lighting Report

Revision: P06
Issue Date: 06/03/18

INTRODUCTION

Hydrock Consultants has been appointed by Stride Treglown to provide planning stage advisory services in relation to the design and construction of the proposed Ingle Wood development in Paignton.

Purpose of Report

The following design statement is provided for planning purposes to describe the proposal for the new external lighting scheme for the proposed development, with the specific intention of expressing methods for the reduction of obtrusive light.

The proposal will be a guide to ensure the future external lighting scheme is as unobtrusive as possible, complies with guidelines for the reduction of light pollution and to satisfy the local planners and the local community.

The external lighting scheme will be designed to create a safe external environment by providing artificial lighting in the hours of darkness, whilst ensuring the lighting does not affect the neighbouring buildings. Also of vital importance is the visual impact perspective upon the Area of Outstanding Natural Beauty. In addition, the proposed development falls within a Greater Horseshoe Bat sustenance zone and has been recognised as a Cirl Bunting breeding and potential wintering area. This report focuses on the street lighting required for the development and satisfying the strict lighting parameters necessary for the area and ecology.

Development Details

The land is currently a vacant Greenfield site located south of Paignton and adjacent to an Area of Outstanding Natural Beauty. To the south, the site is bordered by the villages of Waddleton and Galmpton.

The scheme proposes to build up to 400 residential dwellings, a 2 form entry primary school and a public house to the north of the site.



Figure 1: Proposed masterplan of the Ingle Wood development.

Ingle Wood

External Lighting Report

Revision: P06
Issue Date: 06/03/18

BASELINE LIGHT SURVEY

Site Location

The Ingle Wood site is located on the western edge of Paignton as indicated in the Figure 2. The land is currently being used for agricultural purposes and is bounded almost entirely by hedgerows along Brixham Road and between land parcels.

The north of the marked site has received planning permission for further business and housing developments.

Site Study

The survey was undertaken on Tuesday 6th December 2016 between 5:00 pm and 9:00 pm. The weather was dry and the sky was clouded. The moon was not visible and the very thin layer of fog covered the area analysed. Because of this the illumination levels measurement can fluctuate.

The proposal of the survey has been to review any existing artificial lighting on site, the illumination of the adjacent roads and the street and external lighting of the nearby villages / residential suburbs. The data collected will serve to determine the lighting strategy for the proposed development. A good understanding of the future nature of the site, the surrounding areas and any potential sensitive areas is needed to determine the right external lighting solutions.

The measurements have been taken using a handheld lux meter. All the measurements were taken at approximately 1.5 m above the ground.

Site description

As the site is currently being used for agricultural use, it has no existing artificial lighting. The lighting available on site is from adjacent street lighting. The study focused on the following areas which are also indicated in Figure 2:

	Receptors	Use	Note
1	Brixham Road	Road	West
2	Inglewood	Site	-
3	White Rock	Residential & Business	North
4	Waddleton Road	Road	East
5	Waddleton	Village	South West
6	Stoke Road	Road	South
7	Galampton (Langdon Road)	Residential	South West
8	Residential Area	Residential	East

Table 1: Areas assessed around the Ingle Wood development.

Desk Study

Guidance Notes for the reduction of Obstructive Light GN01:2011 classifies environmental zones into five categories, Table 2 describes these below:

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically	National Parks, Areas of Outstanding Natural Beauty
E2	Rural	Low District Brightness	Small Town centres or suburban locations
E3	Suburban	Medium District Brightness	Small Town centres or suburb locations
E4	Urban	High District Brightness	Town/City centres with high levels of night-time activity

Table 2: Environmental Lighting Categories.

The lighting limitations for each environmental zone are described in Table 3, extracted from the same document.

Zone	Sky Glow ULR [Max %]	Light Intrusion (into windows) E _v [lux]		Luminaire intensity I [candelas]		Building Luminance (pre-curfew)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L [cd/m ²]
E0	0	0	0	0	0	0
E1	0	2	0(1*)	2500	0	0
E2	2.5	5	1	7500	500	5
E3	5.0	10	2	10000	1000	10
E4	15	25	5	25000	2500	25

Table 3: Obtrusive Light Limitations for Exterior Lighting Installations – General Observers.

ULR – Upward Light Ratio of the installation; E_v – Vertical illuminance in lux; I – Light intensity in candelas; L – Luminance in candelas per square meter. *permitted only from public road lighting installations.

Following the survey the site has been assessed as being Environmental Zone E2 – Rural, all the other receptors are described in the next section.



Figure 2: Areas analysed in baseline light survey.

Ingle Wood

External Lighting Report

Revision: P06
Issue Date: 06/03/18

Site Study

All measurements have been captured in drawing ING-HYD-00-GF-DR-E-8000, shown in Appendix A. Each area analysed is detailed below:

Brixham Road

- Lux levels: Maximum lighting levels measured are above 73 [lx];
- Lamp type: mixture of SON & metal halide;
- Representative Environment Zone: E3.

Inglewood [Site]

- Lux levels: Maximum lighting levels measured are above 18 [lx];
- Lamp type: No existing luminaires;
- Representative Environment Zone: E2.

White Rock 1

- Lux levels: Maximum lighting levels measured are above 20 [lx];
- Lamp type: mixture of metal halide, SON & LED;
- Representative Environment Zone: E3.

Waddleton Road

- Lux levels: 0 [lx];
- Lamp type: No street lighting;
- Representative Environment Zone: E3.

Waddleton

- Lux levels: 0 [lx];
- Lamp type: No street lighting;
- Representative Environment Zone: E2.

Stoke Road

- Lux levels: Maximum lighting levels measured are above 43 [lx];
- Lamp type: mixture of SON & metal halide;
- Representative Environment Zone: E3.

Residential Area

- Lux levels: Maximum lighting levels measured are above 37 [lx];
- Lamp type: mixture of SON & metal halide;
- Representative Environment Zone: E3.



Figure 3: Brixham Road



Figure 4: White Rock 1 Development.



Figure 5: View alongside Brixham Road.



Figure 6: View from Inglewood looking onto Brixham Road.



Figure 7: Inglewood

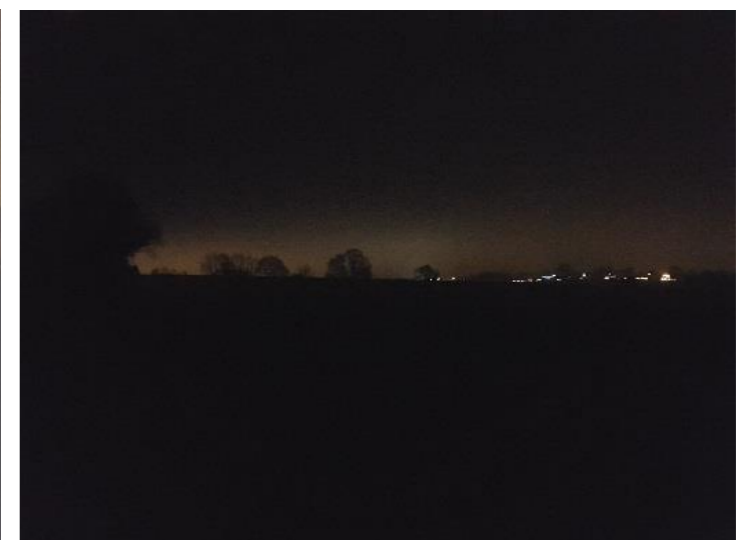


Figure 8: Waddleton Road.

Ingle Wood

External Lighting Report

Revision: P06
Issue Date: 06/03/18



Figure 9: Waddleton



Figure 10: Stoke Road



Figure 11: Residential Area.



Figure 12: Stoke Road



Figure 13: Residential Area



Figure 14: Day View from East Cornworthy Hill



Figure 15: Night View from East Cornworthy Hill

Site Survey Conclusion

- The site existing lighting levels have been recorded and the most important surroundings areas have been identified.
- Around 100 meters inland from Brixham Road the illumination levels reduce to zero lux.
- The site and the areas analysed have been categorised according to the environmental indices mentioned above.
- Based on the client's information the potential bat sensitive areas have been identified.
- The new development will inevitably change the existing lighting levels of the areas analysed but careful lighting design considerations can keep the light pollution below the levels specific to each Environmental Zone of each area mentioned.

Ingle Wood

External Lighting Report

Revision: P06
Issue Date: 06/03/18

CODES OF PRACTICE / PLANNING STATEMENT

The external lighting scheme will be designed in accordance with the following guidance documents:

- ILE Guidance Notes for the Reduction of Obtrusive Light GN01:2011;
- CIBSE Lighting Guide 6 (LG6) – Outdoor Environment.
- CIBSE Lighting Guide 9 (LG9) – Lighting for Communal Residential Buildings;
- CIBSE SLL Code for Lighting 2012;
- BS 5489-1:2013 – Code of Practice for Design of Road Lighting;
- CEN/TR 13201-1: Road Lighting – Part 1: Selection of Lighting Classes;
- CIE – Guidelines for minimising Sky Glow;
- Royal Commission on Environmental Pollution – Artificial Light in the Environment.

The ILE Guide for the Reduction of Obtrusive Light is the primary document used by most local councils and planning departments to categorise the provision of external lighting. External lighting shall be compliant to Dark Sky requirements and to Lighting Environmental Zone CIE E21.

Local Planning Policy

The local policies are summarised in various documents produced by Torbay Council. Section 5.3.3 of the Strategic Delivery Areas – a policy framework for Neighbourhood Plans details the following policies:

- Policy NC1, Biodiversity and Geodiversity: The Local Plan seeks to conserve and enhance Torbay's biodiversity and geodiversity, through the protection and improvement of the terrestrial and marine environments and fauna and flora.

Developments should not result in the loss or deterioration of irreplaceable habitats or wildlife corridors. Where development in sensitive locations cannot be located elsewhere, the biodiversity and geodiversity of areas will be conserved and enhanced through planning conditions or obligations.

- Policy SDP3, Paignton North and Western Area: Development in these locations should provide resilience to the effects of climate change, particularly through the provision of green infrastructure, and adhere to planning guidance on Greater Horseshoe

Bats within the South Hams SAC, as well as other species such as cirr buntings, in accordance with Policy NC1.

Legislation & Guidance for Lighting Effects on Bats

In the United Kingdom, all bats are protected by law. The following documents form the legislative framework for the protection of bats:

- The Wildlife and Countryside Act 1981
- The Conservation of Habitats and Species Regulations (2010)

According to the above mentioned documents, it is illegal to:

- Intentionally or recklessly disturb a bat while it is occupying a structure of place of shelter or protection;
- Intentionally or recklessly obstruct access to a structure or place used by a bat for protection or shelter.

The Bat Conservation Trust has published documents that offer guidance on artificial lighting for new or existing developments around bat sensitive areas. Landscape and Urban Design for Bats & Biodiversity make the following recommendations:

- No bat roost should be directly illuminated;
- The type of lamp specified does not have an adverse impact on bats foraging and commuting patterns;
- The height of the lighting columns should be as low as possible;
- The light should be as low as guidelines permit;
- The lighting operational times should provide switch off intervals;
- Road and trackways in areas important for bat foraging and commuting areas should provide stretches left unlit to avoid isolations of bat colonies.

Environmental Impact Assessment Scope of Opinion

The EIA Scope of Opinion has been produced by Torbay Council and provides guidance on the lighting design for the Ingle Wood development:

- Lighting assessments and subsequent sensitive lighting design will be required in situations where Greater Horseshoe Bats are known to be present on site (or on adjacent land where they could be affected) and using specific features to roost, commute or forage and

existing ambient light levels will increase as a result of new artificial lighting being introduced as a part of the proposed development. Lighting design should also look to avoid further light pollution in to the night sky especially when viewed from the AONB.

- The site is located within the sustenance zone for Greater Horseshoe Bats and previous surveys have identified the use of the site by foraging Greater Horseshoe Bats. Adequate information must be submitted to demonstrate that all land proposed for mitigation for Greater Horseshoe Bats will be subject to minimal artificial light spill no greater than 0.5 lux.
- The site is within an area where cirr bunting breeding activity has been recorded and is a potential wintering area.

CATEGORY OF SYSTEM & LIGHTING LEVELS

A baseline light survey was undertaken on Thursday 1st December 2016 between 5pm and 9pm. Following this survey, the site of the scheme has been classified as a Category E2 Environmental Zone.

A Category E2 Environmental Zone is defined in the ILE guides as 'village or relatively dark outer suburban locations. BS EN 12464 Part 2 expands the E2 Environmental Zone to include the following definition 'low district brightness areas, such as industrial or residential rural areas'. This site would comply with both the definitions provided for a category E2 scheme.

Lighting levels

Lighting levels and uniformity have been calculated using the assessment tables in CEN/TR 13201-1: Road Lighting - Part 1: Selection of Lighting Classes. The following assumptions have been made in order to classify the road types:

- The typical speed of motor vehicles will be between 5mph and 20mph.
- Motorised traffic, pedestrians, cyclists and slow moving vehicles will all be allowed to use the road.
- No geometric measures have been put in place for traffic calming.
- The area does not have a higher than normal crime risk.
- Facial recognition is unnecessary in the area.

- The difficulty of navigational tasks are normal.
- There is a normal flow of pedestrian traffic.

Table 4 describes the classifications for the road types proposed. The ME lighting classes recommend illuminance levels for roads where the predominant users are motorised vehicles and the speed of the user is moderate to fast. The S lighting classes recommend illuminance levels for minor roads, where traffic speed and density are lower, and the predominant users are pedestrians, slow moving vehicles, or cyclists, for example in residential areas.

Road type	Classification	Minimum maintained illuminance	Uniformity of illuminance
Local distributor road	ME4	15 [lx]	0.4
Major access road	S3	7.5 [lx]	0.4
Minor Access Road	S4	1 [lx]	N/A*
Home zones	S5	0.6 [lx]	N/A*

Table 4: Road types and classifications.

*A standard uniformity is not required for this classification, however it is recommended that the average lux level is 5 lux (S4) and 3 lux (S5).

Ingle Wood

External Lighting Report

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PROPOSED EXTERNAL LIGHTING STRATEGY

The site has been modelled with a mixture of low height, directional column luminaires and 1 metre tall bollards to provide sufficient illuminance on roads whilst also being sensitive to the bats and Area of Outstanding Natural Beauty. Where possible, luminaires will be positioned to face away from the Area of Outstanding Natural Beauty. A maintenance factor of 0.8 has been used in these calculations.

To integrate the site into the nearby residential areas, warm white LEDs which have a colour temperature of 3000K have been chosen for the site. The lighting model does not take into account the vegetation of the site.

Where possible, residents should be educated about the flora and fauna in their local area and encouraged to install low lumen security lighting to reduce the lux levels falling on nearby hedges. Modelling has also been undertaken to predict the light spill from internal luminaires, the exercise has proved that the distance between dwellings and hedges is sufficient enough to not further increase the illuminance on hedges.

Local Distributor Road – Brixham Road

The majority of Brixham Road is currently lit with a mixture of SON and metal halide column luminaires. The road layout will be modified to include roundabout access to the development. The roundabout will be lit with 6m column luminaires to provide the higher lux levels and illumination spread across the roundabout to provide high visibility for motorists and cyclists.

Major Access Roads

A major access road runs through the site in a figure eight, as shown in Figure 16. These roads have been modelled with 4m high column luminaires to provide the higher lux levels and uniformity required for this area.

Minor Access Roads

A few minor access roads branch from the main major access road and have a lower illuminance requirement. Minor access roads within the centre of the site have been modelled with 3m high column luminaires. Minor access roads towards the exterior of the site, which could be seen more easily from the Area of Outstanding Natural Beauty, have been modelled with 1m high bollard luminaires to reduce night time light pollution.

Home Zones and Shared Surfaces

There are various home zones and shared surfaces located within the development. These zones are designed as

shared surfaces for motorised vehicles, cyclists and pedestrians with a maximum speed to 10mph. These areas have been modelled with 1m high bollards.

Lighting Control

The external lighting controls as a minimum will consist of photocell and time clock arrangements. Passive Infrared Sensors (PIR) are recommended for this development as both an energy saving feature and a strategy to reduce light spill on bat sensitive areas. A dimming profile would also be recommended, typically luminaires are either dimmed or every second luminaire is switched off past a designated curfew time. This reduces the overall light pollution of the development.

Please see Appendix B for detailed isoline drawings of the proposed external lighting strategy.

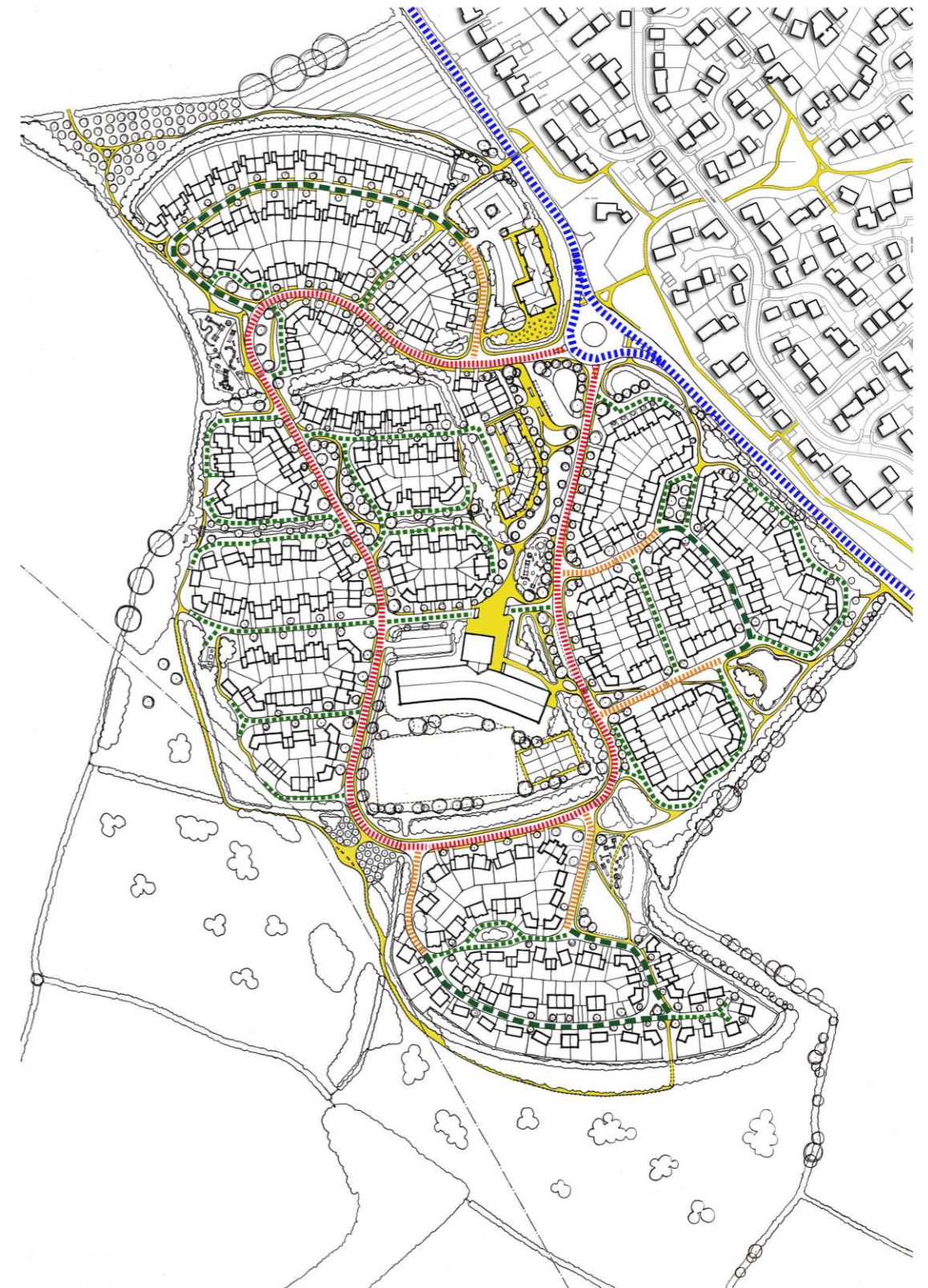


Figure 16: The street hierarchy proposed for the Inglewood development.

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SPECIAL MEASURES UNDERTAKEN TO PROTECT BATS



Figure 17: Plan showing areas of bat mitigation.

Unlit areas to provide bat corridors

Certain stretches of the road have been left unlit to provide corridors for the existing bats to migrate through the site. These stretches follow the original hedge lines, providing areas of <0.5 lux for bats to travel through. These areas are shown by the blue areas on Figure 17 and detailed isoline drawings of these areas are shown in Appendix C.

Reduction of light to hedges

Three home zones and one minor access road lie adjacent to hedges which are used by commuting bats. Extensive modelling has been undertaken in these areas to provide illuminance on the roadway whilst making sure that the hedges are not over illuminated.

These hedges are represented by the orange areas on Figure 17 with Figures 18 to 21 showing the vertical lux levels which fall upon the hedges in question. The south eastern hedge reaches a maximum of 0.24 lux, the western hedge reaches a maximum of 0.48 lux and the central hedge reaches a maximum of 0.32 lux. The south western hedge reaches a maximum value of 0.51 lux adjacent to the junction with the major access road, but all other calculation points are below 0.5 lux.

Some of these roads stretches do not reach the recommended illuminance levels in CEN/TR 13201-1: Road Lighting – Part 1: Selection of Lighting Classes due to these measures.

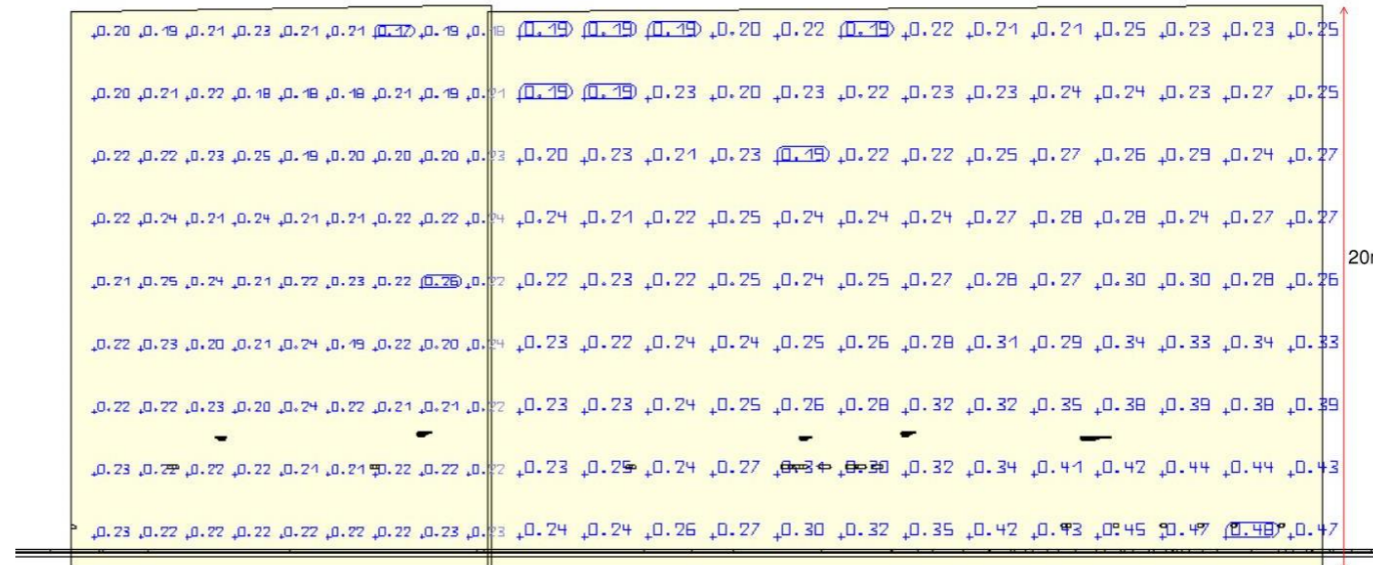


Figure 18: Vertical lux levels falling on the western hedge.

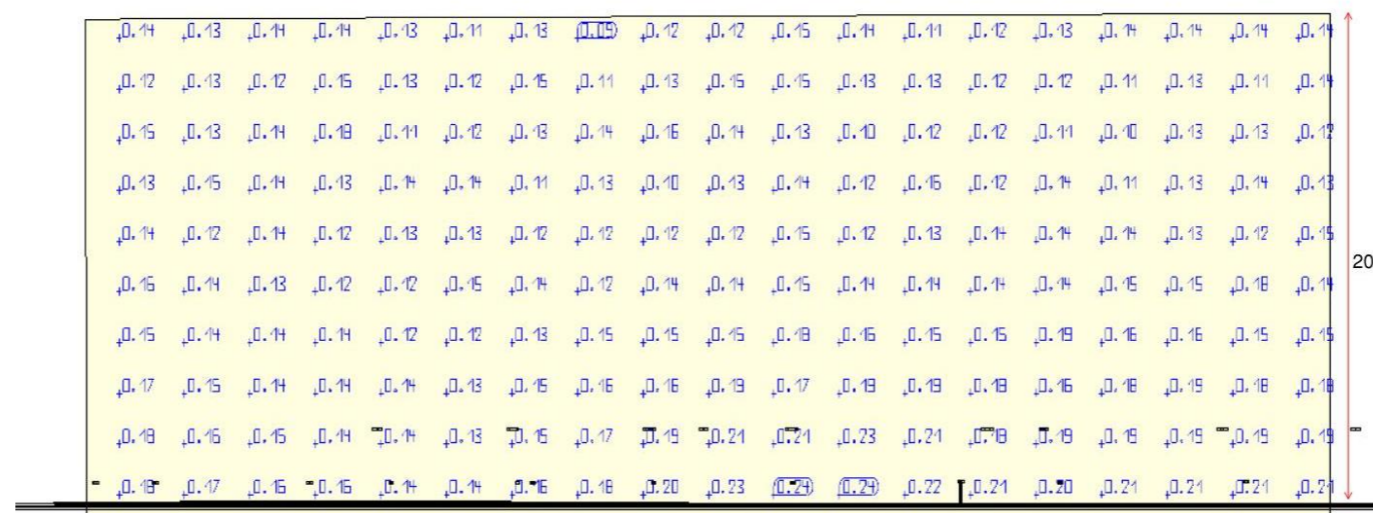


Figure 19: Vertical lux levels falling on the south eastern hedge.

Ingle Wood

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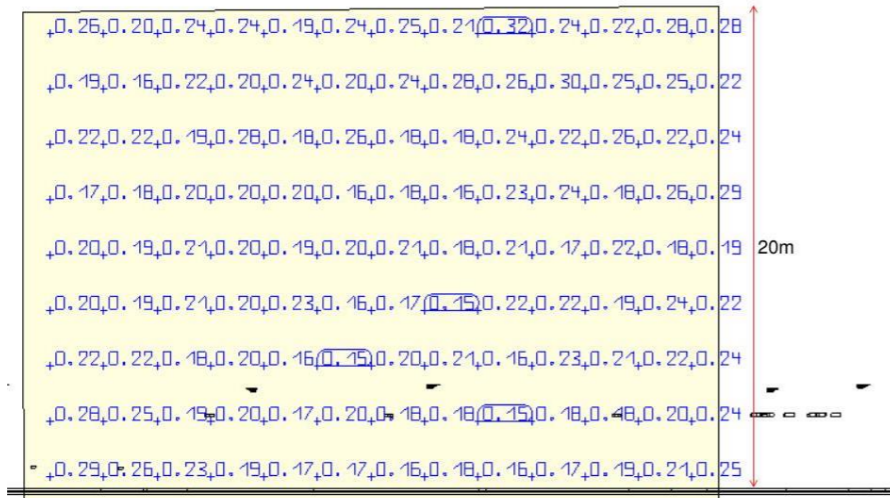


Figure 20: Vertical lux levels falling on the central hedge

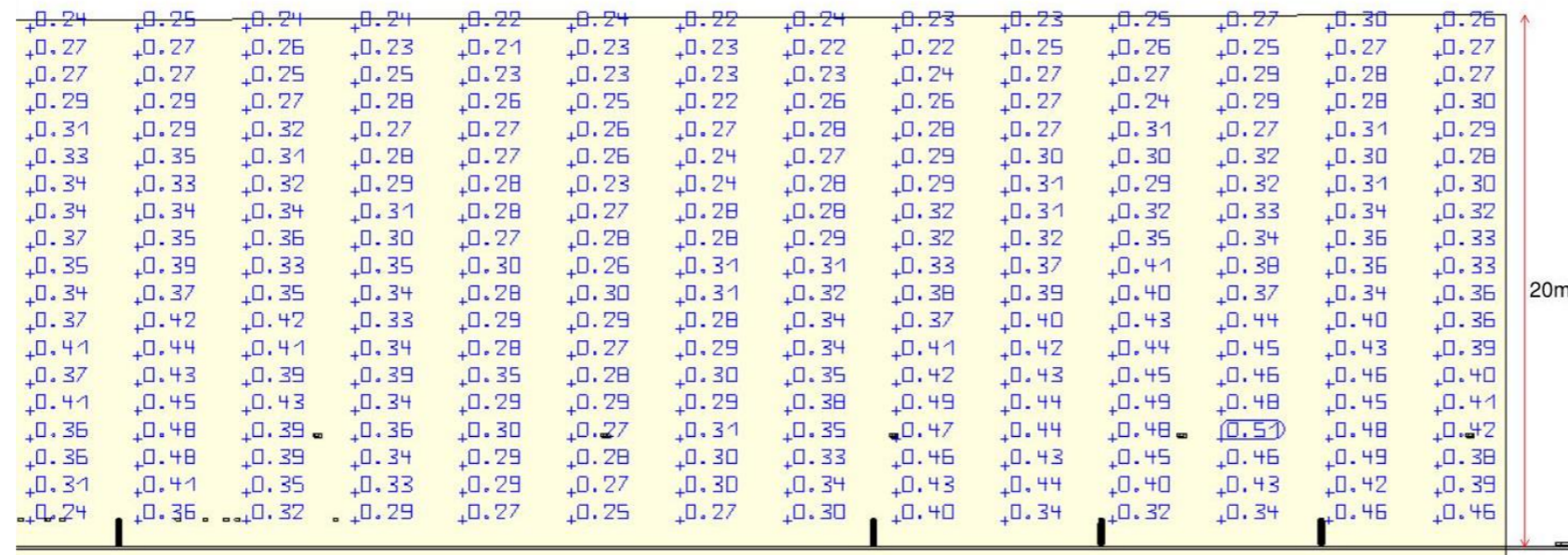


Figure 21: Vertical lux levels falling on the south western hedge.

CONCLUSION

The above methods of lighting and control are proven methods for reducing light spill over the site boundary onto neighbouring areas and also to reduce sky glow from upward light distribution.

The purpose of the lighting scheme is ultimately to provide a safe and secure environment for the residents and also to minimise or eliminate any negative impact on the existing environment and ensure that the new development blends into the surrounding area.

The proposed scheme will be developed in conjunction with Stride Treglown, Nicholas Pearson Associates and any recommendations from the planning committee.

APPENDIX A: BASELINE SURVEY RESULTS



NOTE A: SKY GLOW BY THE WHITE ROCK 1 AREA



NOTE B: SKY GLOW EXAMPLE FROM THE RESIDENTIAL AREA AND WHITE ROCK 1



NOTE C



NOTE D: VIEW OF THE SKY GLOW PRODUCED BY THE EAST SIDE OF THE DEVELOPMENT



NOTE E: PANORAMIC VIEW OF THE SITE FROM THE WADDETON ROAD



NOTE F: VIEW OF THE BRIXHAM ROAD



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LEGEND:

- X.X [lx] EXTRAPOLATED VALUES
- X.X [lx] MEASUREMENTS - LOCATION & ILLUMINATION VALUES

P01	09/12/16	Preliminary	AD	ES
Rev	Date	Description	By	Ckd

Architect:
STRIDE TREGLOWN



Client:
STRIDE TREGLOWN

Project Title:
INGLE WOOD PAIGHTON

Drawing Title:
EXTERNAL LIGHTING BASELINE SURVEY

Drawing Status:
PRELIMINARY

Hydrock Job No:
C-05959

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Drawing Number:				Revision:
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 - B 3m high column luminaire
 - C 1m high symmetric bollard
 - D 1m high asymmetric bollard
 - E 6m high column luminaire
 - F 1m high asymmetric bollard
 - 0.5 lux
 - 1 lux
 - 2 lux
 - 5 lux
 - 10 lux
 - 20 lux
 - 50 lux
 - Bat corridor areas
 - Commuting bat hedges

P07	06/03/18	Planning	HJ	ES
P06	18/10/17	Planning	HJ	ES
P05	03/10/17	Planning	HJ	ES
P04	16/06/17	Preliminary	HJ	ES
P03	08/05/17	Preliminary	HJ	ES
P02	03/05/17	Preliminary	HJ	ES
P01	21/04/17	Preliminary	HJ	ES

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Project Title:
**INGLE WOOD
PAIGNTON**

Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
SITE WIDE**

Drawing Status:
PLANNING













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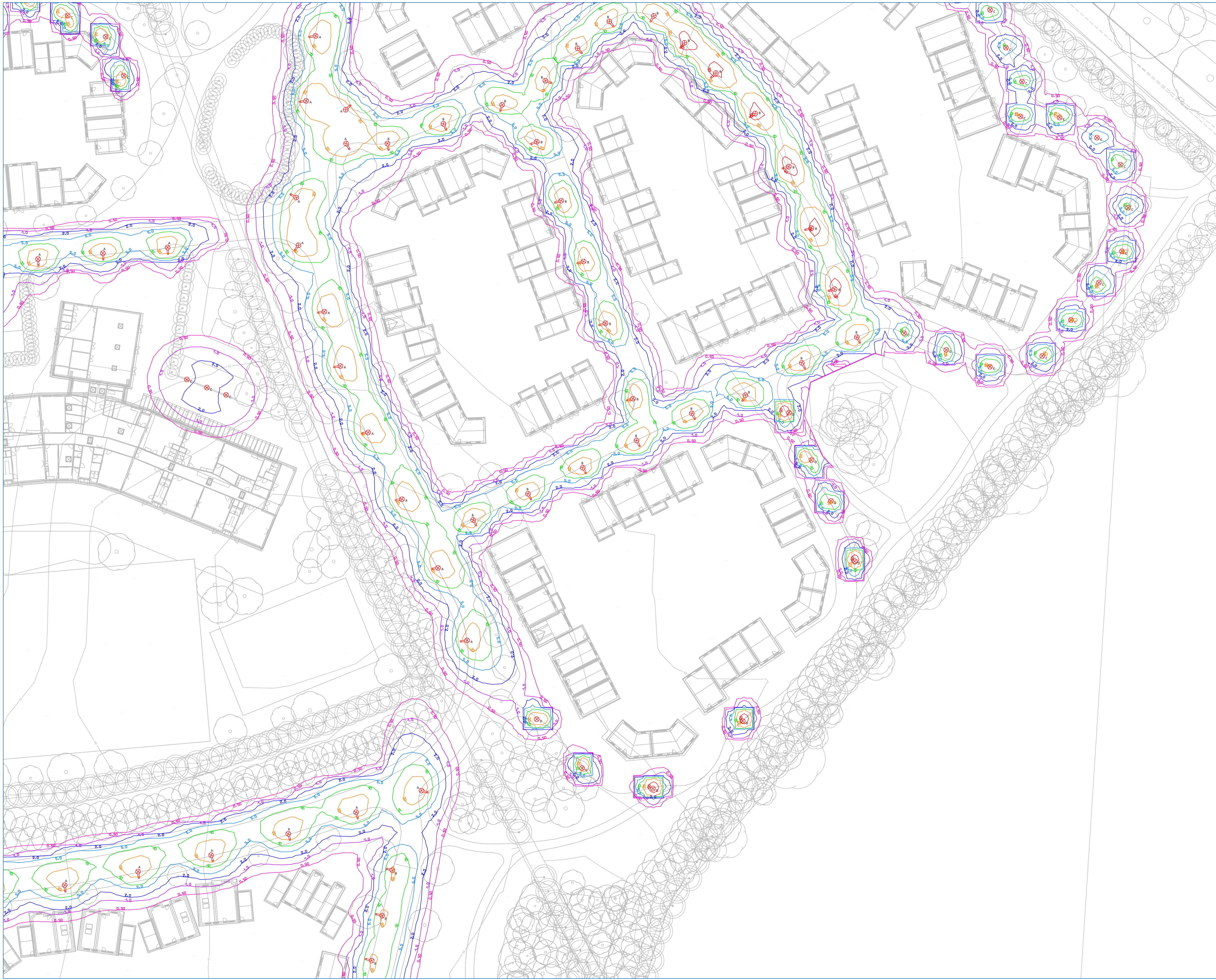
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EXTERNAL LIGHTING
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SOUTH**

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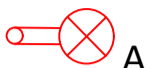












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 -  1.0 1 lux
 -  2.0 2 lux
 -  5.0 5 lux
 -  10 10 lux
 -  20 20 lux
 -  50 50 lux

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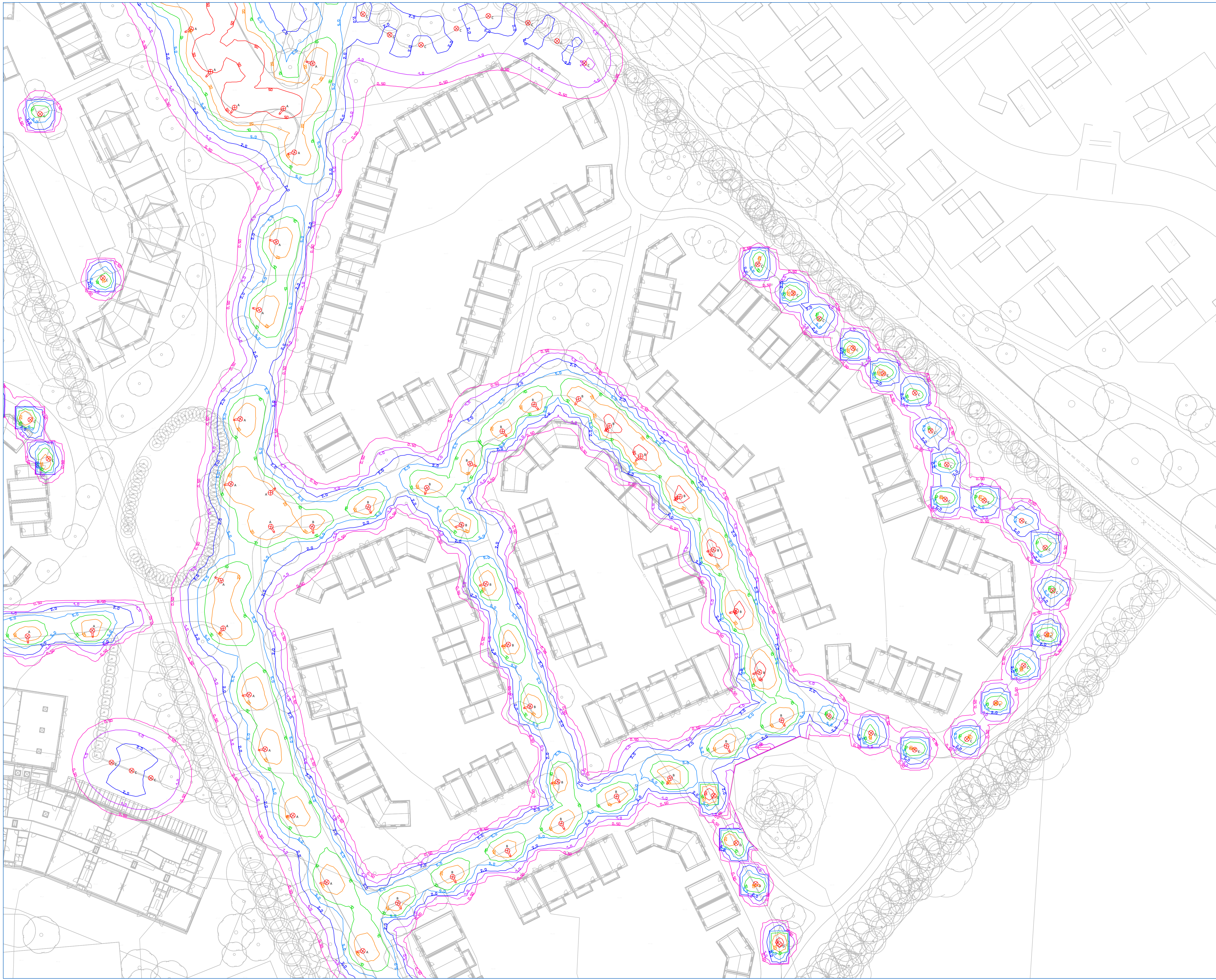
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STRIDE TREGLOWN

Project Title:
**INGLE WOOD
PAIGNTON**

Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
EAST 2**

Drawing Status:
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P05	03/10/17	Planning	HJ	ES
P04	16/06/17	Preliminary	HJ	ES
P03	08/05/17	Preliminary	HJ	ES
P02	03/05/17	Preliminary	HJ	ES
P01	21/04/17	Preliminary	HJ	ES

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Project Title:
INGLE WOOD
PAIGNTON

Drawing Title:
ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
EAST 1

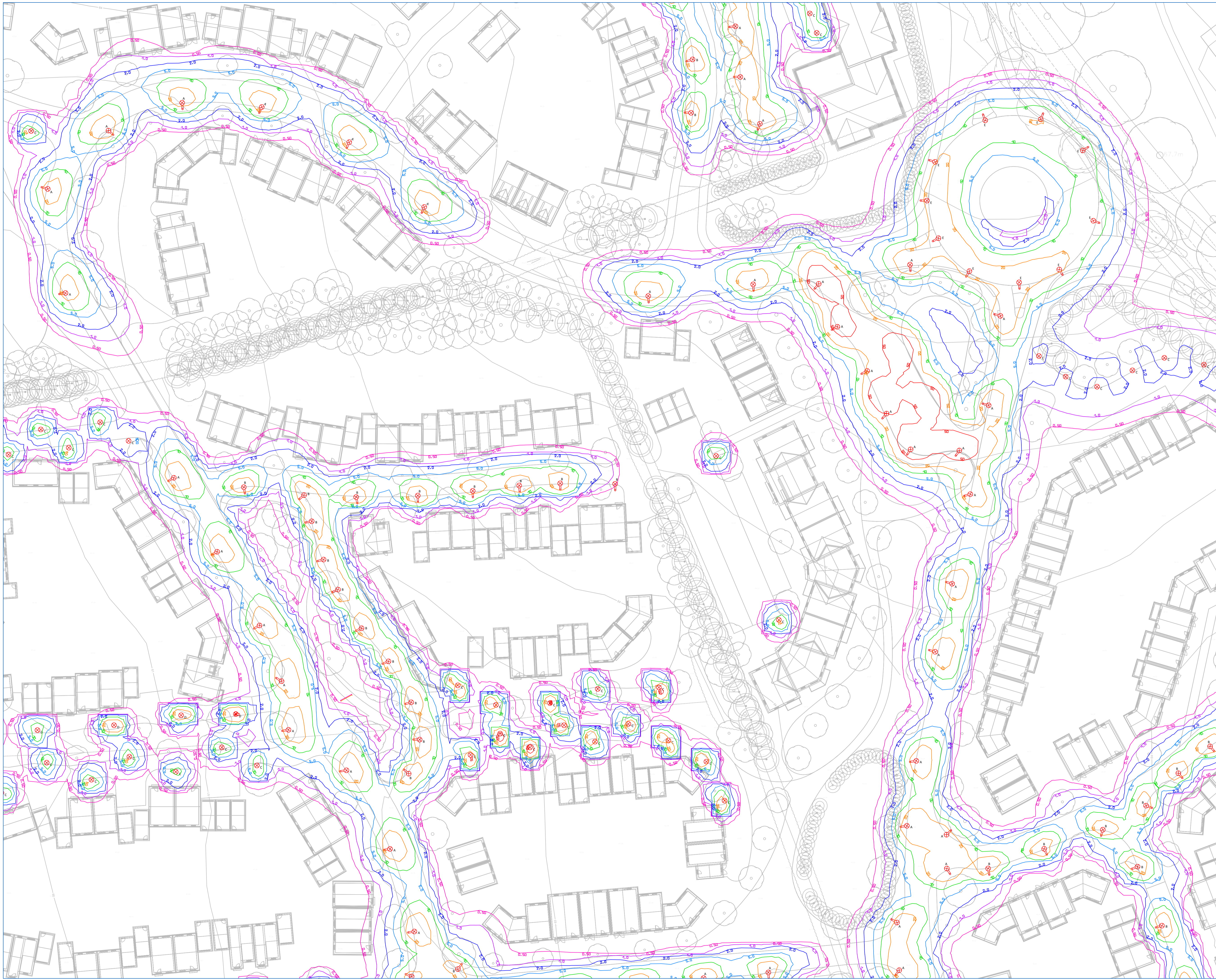
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Hydrock Job No:
C-05959

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HJ	ES	1:400	APR 2017	06/03/18

Drawing Number:
ING-HYD-00-GF-DR-E-9003

Revision:
P07



NOTES:

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- Legend:**
- A 4m high column luminaire
 - B 3m high column luminaire
 - C 1m high symmetric bollard
 - D 1m high asymmetric bollard
 - E 6m high column luminaire
 - F 1m high asymmetric bollard
 - 0.50 0.5 lux
 - 1.0 1 lux
 - 2.0 2 lux
 - 5.0 5 lux
 - 10 10 lux
 - 20 20 lux
 - 50 50 lux

P07	06/03/18	Planning	HJ	ES
P06	18/10/17	Planning	HJ	ES
P05	03/10/17	Planning	HJ	ES
P04	16/06/17	Preliminary	HJ	ES
P03	08/05/17	Preliminary	HJ	ES
P02	03/05/17	Preliminary	HJ	ES
P01	21/04/17	Preliminary	HJ	ES

Rev	Date	Description	By	Ckd

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**INGLE WOOD
PAIGNTON**

Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
CENTRAL**

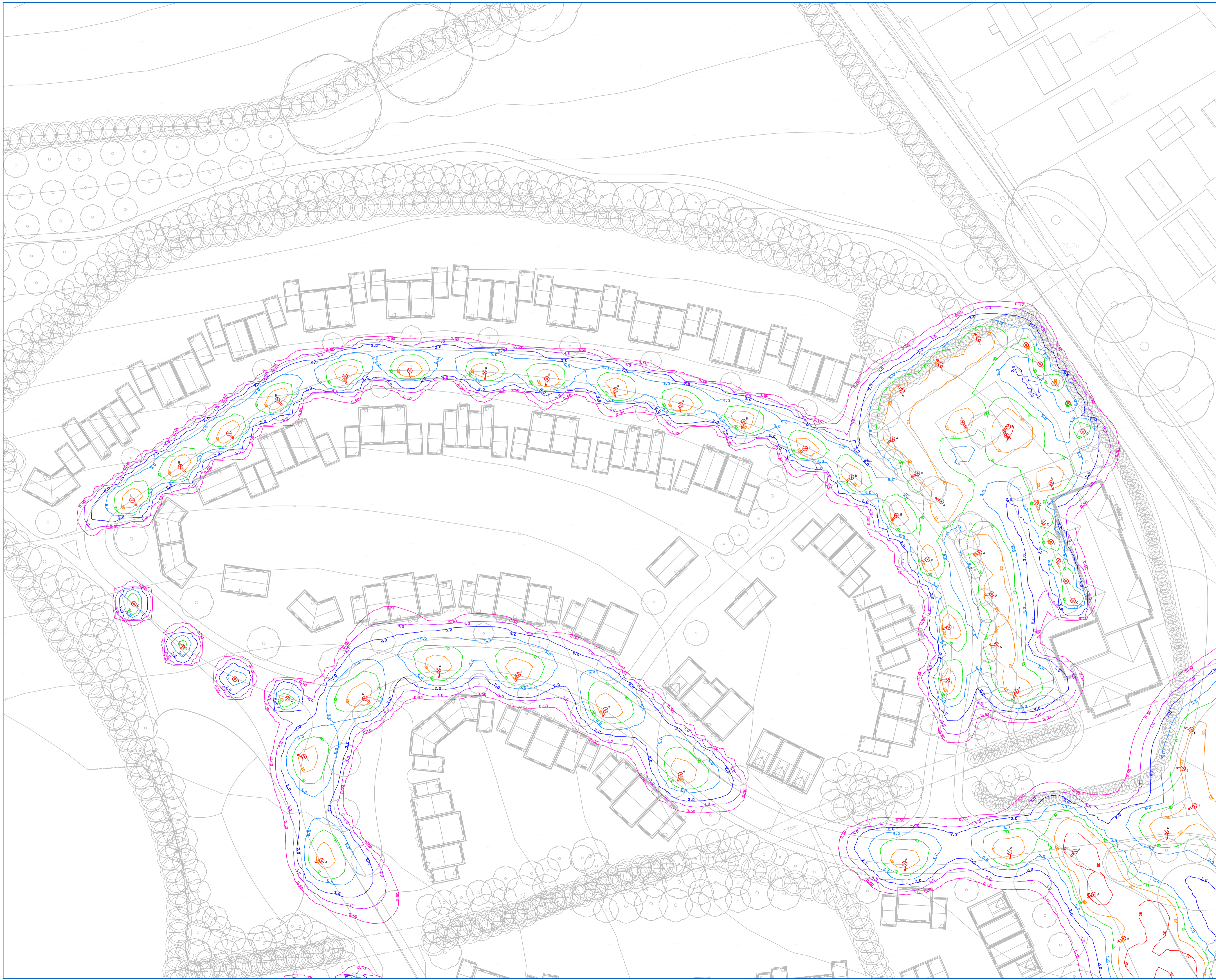
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Hydrock Job No:
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HJ	ES	1:400	APR 2017	06/03/18

Drawing Number:
ING-HYD-00-GF-DR-E-9004

Revision:
P07



- NOTES:**
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 - E 6m high column luminaire
 - F 1m high asymmetric bollard
 - 0.5 lux
 - 1 lux
 - 2 lux
 - 5 lux
 - 10 lux
 - 20 lux
 - 50 lux

P07	06/03/18	Planning	HJ	ES
P06	18/10/17	Planning	HJ	ES
P05	03/10/17	Planning	HJ	ES
P04	16/06/17	Preliminary	HJ	ES
P03	08/05/17	Preliminary	HJ	ES
P02	03/05/17	Preliminary	HJ	ES
P01	21/04/17	Preliminary	HJ	ES
Rev	Date	Description	By	Ckd

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Project Title:
**INGLE WOOD
PAIGNTON**

Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
NORTH**

Drawing Status:
PLANNING

Hydrock Job No:
C-05959

Drawn:	Checked:	Scale @ A3:	Date:	Issue Date:
HJ	ES	1:400	APR 2017	06/03/18
Drawing Number:				Revision:
ING-HYD-00-GF-DR-E-9005				P07



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Legend:

	A	4m high column luminaire
	B	3m high column luminaire
	C	1m high symmetric bollard
	D	1m high asymmetric bollard
	E	6m high column luminaire
	F	1m high asymmetric bollard
	0.50	0.5 lux
	1.0	1 lux
	2.0	2 lux
	5.0	5 lux
	10	10 lux
	20	20 lux
	50	50 lux

Rev	Date	Description	By	Ckd
P07	06/03/18	Planning	HJ	ES
P06	18/10/17	Planning	HJ	ES
P05	03/10/17	Planning	HJ	ES
P04	16/06/17	Preliminary	HJ	ES
P03	08/05/17	Preliminary	HJ	ES
P02	03/05/17	Preliminary	HJ	ES
P01	21/04/17	Preliminary	HJ	ES

Architect:
STRIDE TREGLOWN



Client:
STRIDE TREGLOWN

Project Title:
INGLE WOOD PAIGNTON

Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
WEST 1**

Drawing Status:
PLANNING

Hydrock Job No:
C-05959

Drawn	Checked	Scale	Date	Issue Date
HJ	ES	1:400	APR 2017	06/03/18
Drawing Number:	ING-HYD-00-GF-DR-E-9006			Revision:
				P07



NOTES:

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 - 5.0 5 lux
 - 10 10 lux
 - 20 20 lux
 - 50 50 lux

P07	06/03/18	Planning	HJ	ES
P06	18/10/17	Planning	HJ	ES
P05	03/10/17	Planning	HJ	ES
P04	16/06/17	Preliminary	HJ	ES
P03	08/05/17	Preliminary	HJ	ES
P02	03/05/17	Preliminary	HJ	ES
P01	21/04/17	Preliminary	HJ	ES
Rev	Date	Description	By	Ckd

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Project Title:
**INGLE WOOD
PAIGNTON**

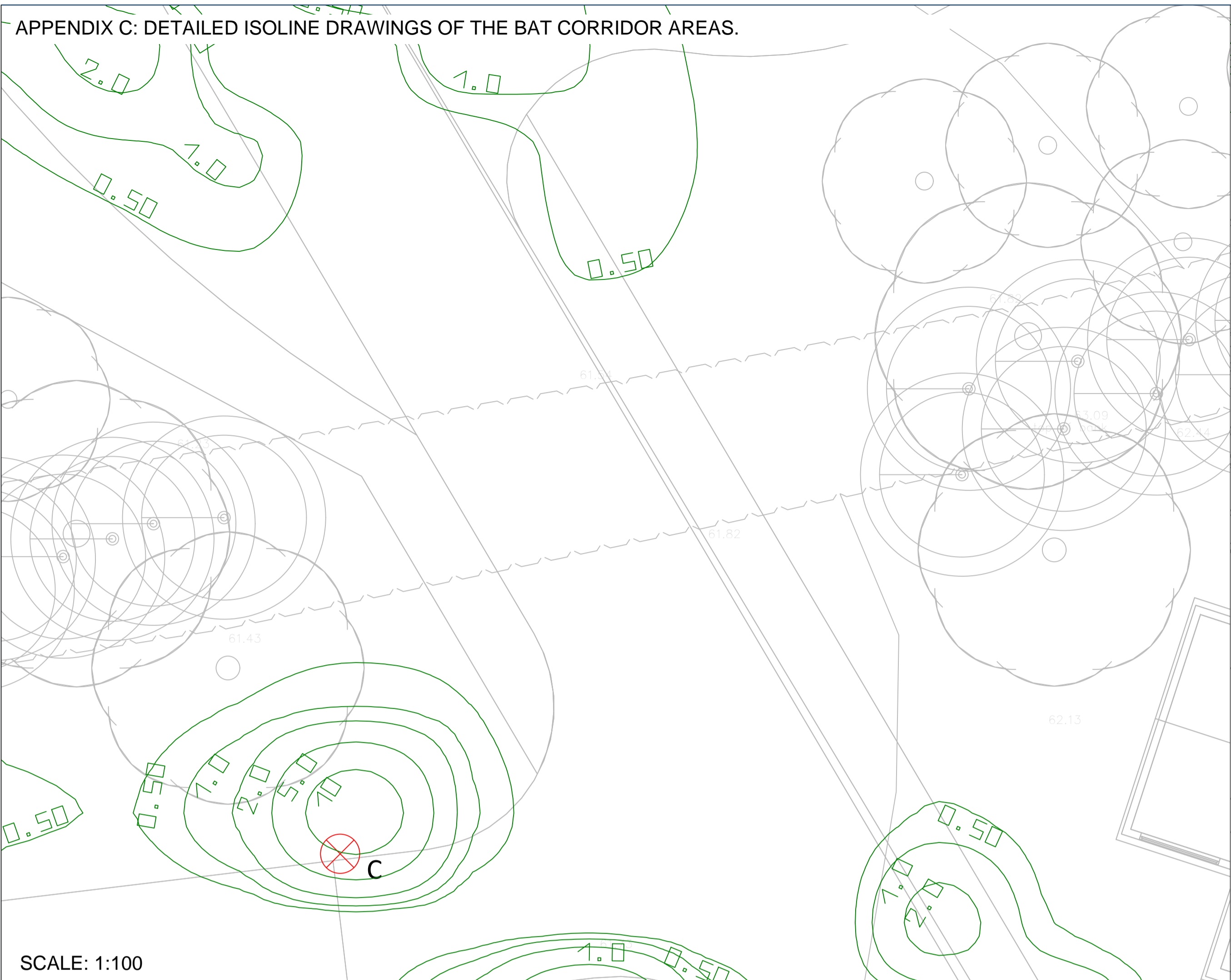
Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
WEST 2**

Drawing Status:
PLANNING

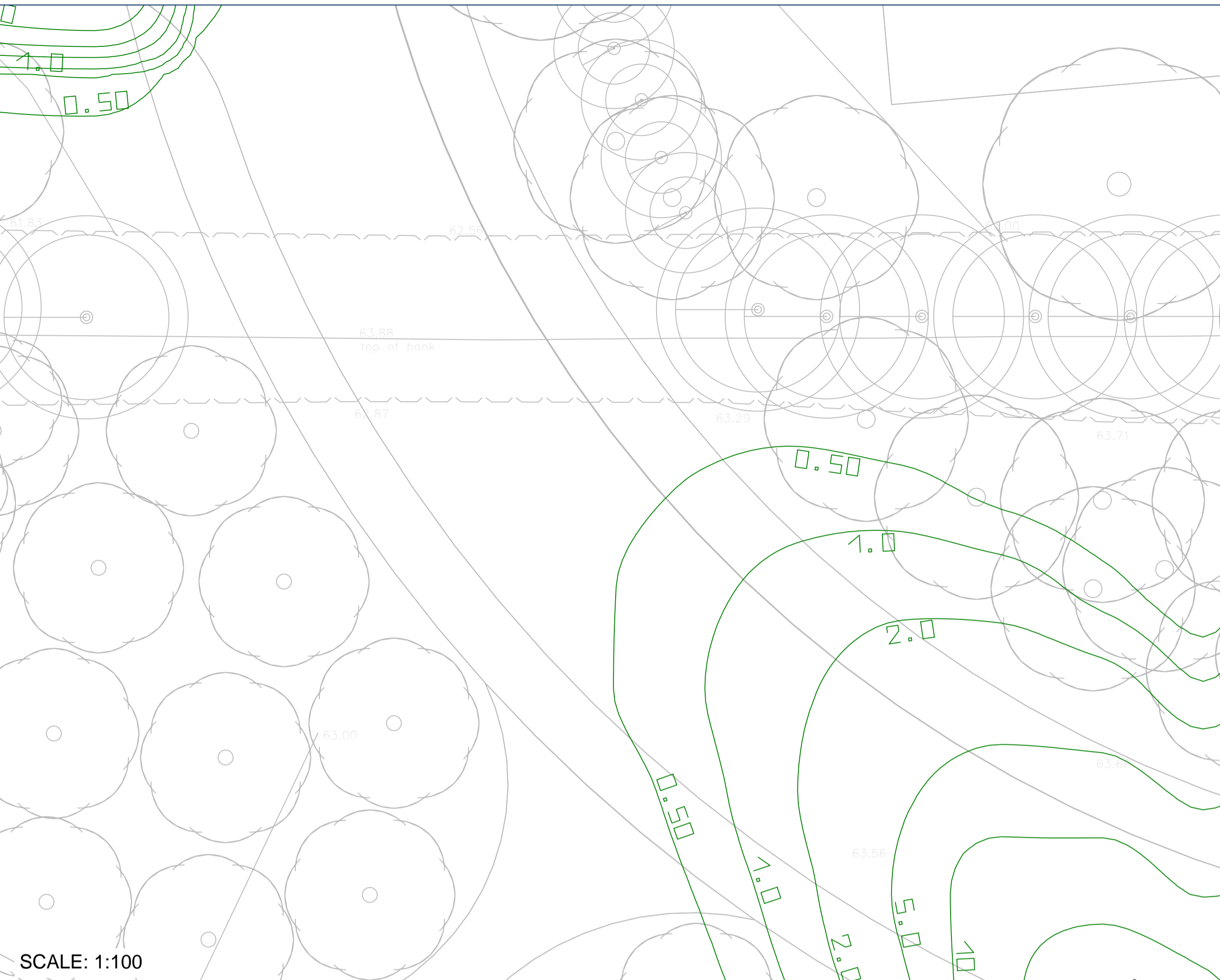
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Drawing Number:				Revision:
ING-HYD-00-GF-DR-E-9007				P07

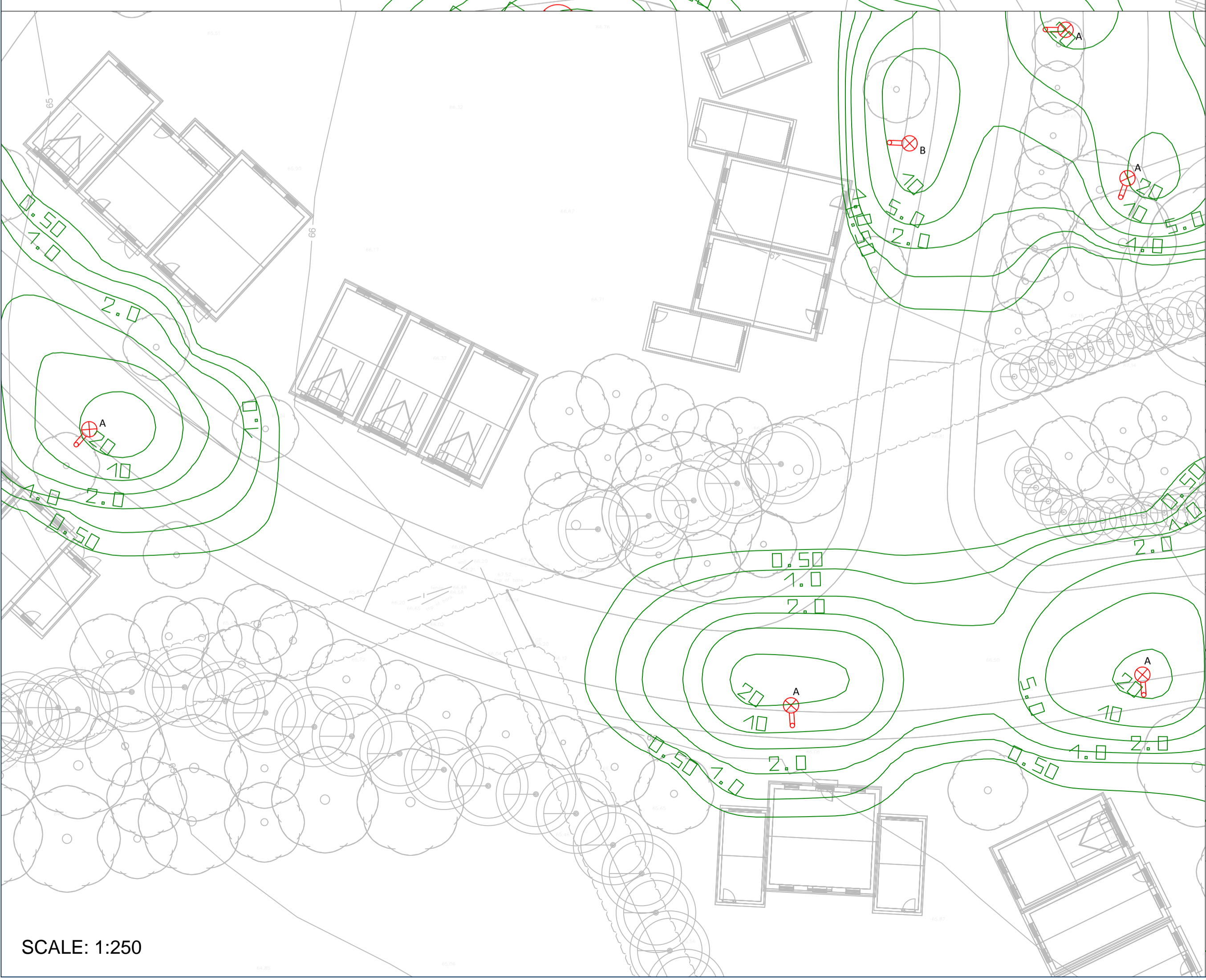
APPENDIX C: DETAILED ISOLINE DRAWINGS OF THE BAT CORRIDOR AREAS.



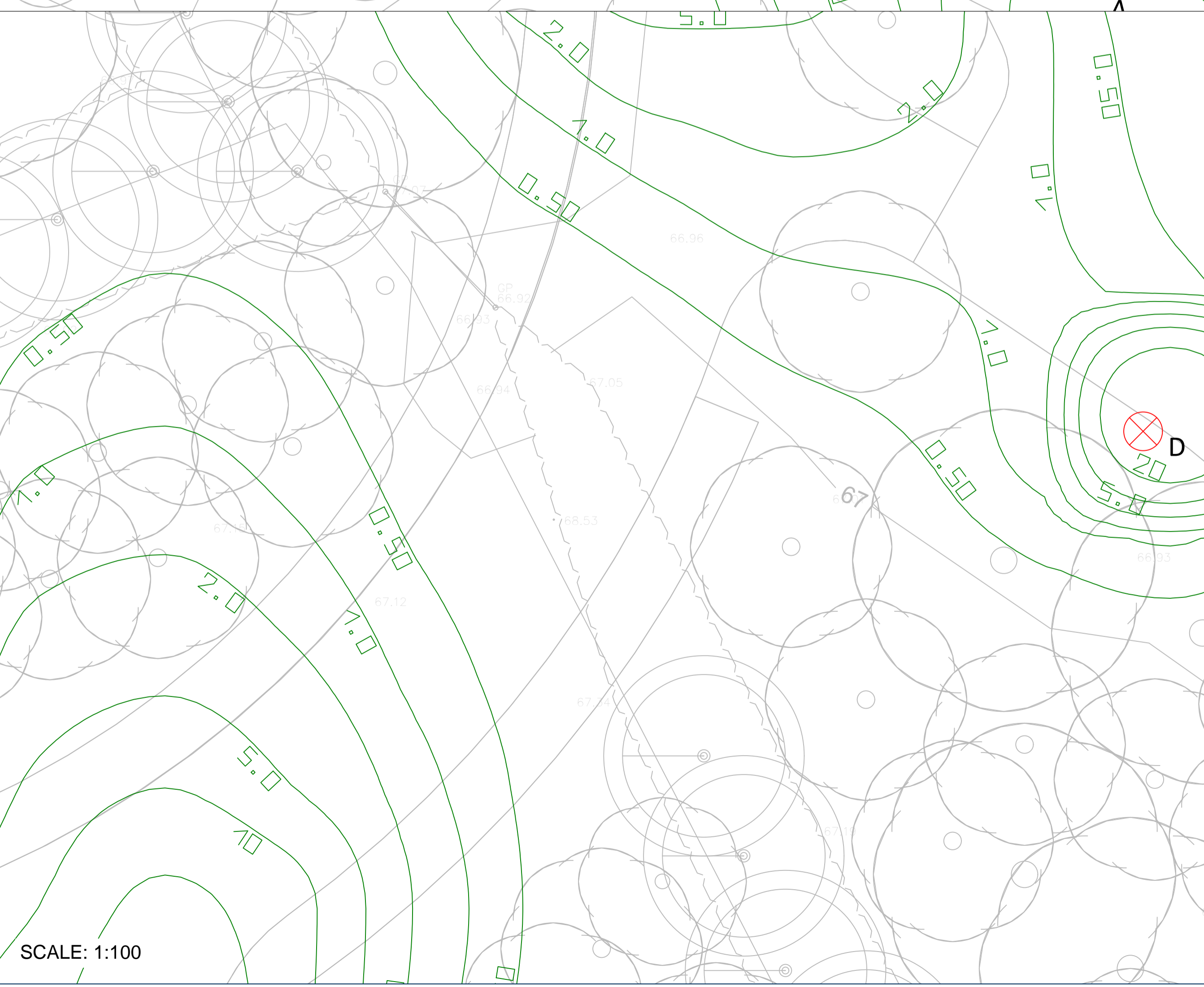
SCALE: 1:100



SCALE: 1:100



SCALE: 1:250



SCALE: 1:100

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 - F 1m high asymmetric bollard

P05	06/03/18	Planning	HJ	ES
P04	18/10/17	Planning	HJ	ES
P03	03/10/17	Planning	HJ	ES
P02	16/06/17	Preliminary	HJ	ES
P01	03/05/17	Preliminary	HJ	ES
Rev	Date	Description	By	Ckd

Architect:
STRIDE TREGLOWN



Client:
STRIDE TREGLOWN





Project Title:
**INGLE WOOD
PAIGNTON**

Drawing Title:
**ELECTRICAL SERVICES
EXTERNAL LIGHTING
ISOLINE DRAWING
BAT CORRIDOR AREAS**

Drawing Status:
PLANNING

Hydrock Job No:
C-05959

Drawn:	Checked:	Scale @ A3:	Date:	Issue Date:
HJ	ES	As indicated	MAY 2017	06/03/18
Drawing Number:				Revision:
ING-HYD-00-GF-DR-E-9008				P05

Reference	Manufacturer	Model	Lamp	Description	Image
A, E	Thorn	R2L2	LED 3089 lm 28W	A small size LED road lighting lantern with 12 LEDs driven at 700mA with Wide Road optic. Class I electrical, IP66, IK08. Ra ≥ 70. Correlated colour temperature – 3000 K	
B	Thorn	CQ 12L35-740	LED 1728 lm 15W	A small size LED road lighting lantern with 12 LEDs driven at 350mA with Wide Street optic. Class I electrical, IP66, IK08. Ra ≥ 70. Correlated colour temperature – 3000 K	
C	Abacus	AL1000	1000 lm 20W	High performance bollards with excellent light distribution, extensively tested for vandal resistance. Ra ≥ 70. Correlated colour temperature – 3000K	
D	Thorn	Adelie Bollard	LED 792 lm 11W	An elegant vandal resistant asymmetric slim bollard with high performance optic. IP66 Electrical Class I. Ra ≥ 70. Correlated colour temperature – 3000K	
F	Thorn	Tea Bollard	LED 751 lm 16W	Decorative steel bollard with clear diffuser and symmetrical light distribution. An optimised ULOR of 0 and asymmetric optic which reduce obtrusive light and glare. Correlated colour temperature – 3000K.	