



Resource & Environmental Consultants Ltd

**Lighting Assessment
Hillington Park Simplified Planning Zone, Glasgow**

**REC Report: 33817r2
Issued: 12th February 2014**





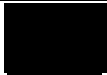

Prepared for: MEPC

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REPORT ISSUE

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Project number	33817	33817	

EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd has been instructed by Terence O'Rourke on behalf of MEPC to undertake a Lighting Assessment for a proposed Simplified Planning Zone at Hillington Park, Glasgow.

The proposals comprise the introduction of a Simplified Planning Zone to reduce planning control by removing the requirement for individual applications subject to compliance with defined parameters. Hillington Park is a highly successful Scottish business park providing offices and industrial units to let. At present Hillington Park has in the region of 432,000m² of employment land and has planning consent for approximately 53,000m² of additional employment land. The proposal at this stage in terms of development, is to increase the level of employment land at the park in the region of 10-15%, including a greater range of ancillary or complementary uses, such as small scale retail and improved leisure facilities.

Artificial lighting associated with any future development has the potential to cause impacts at sensitive receptors. An assessment was therefore undertaken to consider baseline conditions in the vicinity of the site and determine suitable parameters for inclusion within the Simplified Planning Zone.

A baseline lighting survey was undertaken to determine existing conditions in the vicinity of the proposed development site and classify the relevant environmental zones. Based on the assessment results and relevant guidance criteria, the following Simplified Planning Zone parameters were defined:

Lighting associated with any future development shall be designed to ensure:

- The maximum sky glow as an upward light ratio is less than 5.0%;
- Light trespass at the windows of all residential properties in the vicinity of the site is less than 10lux for pre-curfew periods(before 23:00) and 2lux post-curfew (between 23:00 - 07:00);
- Source intensity is less than 10kcd for pre-curfew periods (before 23:00) and 1.0kcd post-curfew (between 23:00 - 07:00);
- Building luminance is less than 10kcd/m² during pre-curfew periods (before 23:00); and,
- Glare rating on all highways is less than 45."

It is considered the design of any future development in accordance with the above parameters should control light impacts at sensitive locations to an acceptable level.

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1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd has been instructed by Terence O'Rourke on behalf of MEPC to undertake a Lighting Assessment for a proposed Simplified Planning Zone (SPZ) at Hillington Park, Glasgow.

Artificial lighting associated with any future development has the potential to cause impacts at sensitive receptors. An assessment was therefore undertaken to consider baseline conditions in the vicinity of the site and determine suitable parameters for inclusion within the SPZ.

1.2 Site Location and Context

The site is located at Hillington Park, Glasgow, at National Grid Reference (NGR): 251815, 665668. Reference should be made to Figure 1 for a location plan. It should be noted that the development is located within both Glasgow City Council's (GCC) and Renfrewshire Council's (RC) areas of jurisdiction.

The development site is adjacent to two significant sources of lighting, the M8 motorway and the Inverclyde Railway Line. Any future development may include lighting fixtures such as:

- Street lighting;
- Area lighting, including that for car parks; and,
- Pedestrian lighting.

These have the potential to cause increases in ambient lighting levels within the vicinity of the site. Baseline conditions have therefore been defined within this report and relevant parameters identified in order to ensure artificial lighting associated with any future development does not result in loss of amenity for local residents.

1.3 Limitations

This report has been produced in accordance with REC's standard terms of engagement. REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 LIGHTING BACKGROUND

2.1 Documents Consulted

The following legislation and guidance was used in this assessment:

- Controlling Light Pollution and Reducing Lighting Energy Consumption Guidance Note, Scottish Executive, 2007;
- Planning Advice Note 51, Planning, Environmental Protection and Regulation, Scottish Protective Development Department, 2006;
- Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Engineers, 2005;
- BS 5489-9:1996, Road Lighting - Part 9: Code of practice for lighting for urban centres and public amenity areas, British Standards Institute, 1996;
- Glare Evaluation System for Use within Outdoor Sports and Area Lighting, International Commission on Illumination, 1994; and,
- Environmental Protection Act, 1990.

2.2 Legislative Framework

The Public Health etc. Scotland Act (2008)¹ introduced artificial light pollution as a form of statutory nuisance as an amendment to the Environmental Protection Act (1990). This was included as follows:

"(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance;"

Although light is currently described as a statutory nuisance, no prescriptive limits or rules have been set for assessment. Guidance produced by the Scottish Executive, International Commission on Illumination (CIE), Institute of Lighting Engineers (ILE) and the Chartered Institute of Building Services Engineers (CISBE) have therefore been referred to whilst undertaking this assessment.

2.3 Scottish Planning Advice Note

The Scottish Government provides a range of advice on different subjects and in different forms, one of which is Planning Advice Notes (PAN). PAN51: Planning, Environmental Protection and Regulation² highlights the current legislation with regards light pollution in Scotland:

"There is no specific legislative control on light pollution, but the Scottish Executive are considering adding light pollution to the list of Statutory Nuisances under Part III of the Environmental Protection Act in 2007 when suitable legislative vehicle becomes available. This has been done for England and Wales, commencing April 2006. A new technical advice note is also being issued by Transport Scotland in 2006 identifying issues that planning authorities, developers, designers, road engineers and other relevant authorities should be aware of in lighting proposals. Lighting on motorways and trunk roads in Scotland is installed to ensure minimum spillage of light upward,

¹ Public Health etc. (Scotland) Act 2008, 2008.

² Planning Advice Note 51, Planning, Environmental Protection and Regulation, Scottish Protective Development Department, 2006.

and local work largely to the same principles. The installation of domestic scale lighting on existing buildings does not normally amount to development requiring planning permission since it would not materially affect the external appearance of the building. The extension of controls would place new burdens both on planning authorities and on businesses. Stricter controls do apply in conservation areas and for listed buildings. Planning permission is however required for lighting installations which are either free standing or amount to engineers operations."

2.4 Glasgow Planning Policy

The Glasgow City Plan 2³ was formally adopted in 2009 and provides a framework for development within Glasgow City Council's (GCC's) area of jurisdiction. A review of the City Plan indicated the following policies in relation to lighting that are relevant to this assessment:

"DES 6 - Public Realm and Lighting

Aim

[...] it is also aimed to ensure that the design of lighting schemes minimises light pollution, does not impact on amenity of neighbours and, in relation to architectural lighting installations, protects and enhances architectural and townscape quality.

[...]

Lighting

Lighting proposals should:

- Comply with the aims of the Lighting Strategy;
- Avoid light spillage or glare which would cause a hazard to road traffic or a nuisance to neighbours;
- Minimise opportunities for vandalism (any protective measures must not detract from visual amenity of building or surrounding area); and,
- Minimise light pollution and carbon footprint in their design operations."

This policy has been considered throughout this report by defining existing light levels at the site and defining suitable parameters to prevent adverse impacts from future development.

2.5 Renfrewshire Planning Policy

Renfrewshire Council's (RC's) new Local Development Plan (LDP) is in the process of being prepared and has been submitted to Scottish Government for examination. Review of the available documents regarding the proposed LDP indicated that there are no proposed policies relating to light pollution.

Until such time as the new LDP comes into force, the Renfrewshire Local Plan (LP)⁴ remains in place. The LP was adopted on the 7th March 2006 and is a document that guides

³ Glasgow City Plan 2, Glasgow City Council, 2009.

⁴ Renfrewshire Local Plan, Renfrewshire Council, 2006.

development and the use of land within Renfrewshire and sets out policies used to make decisions on planning applications. A review of the Renfrewshire LP also indicated no policies in regards light pollution.

3.0 METHODOLOGY

Any future development has the potential to cause the following impacts as a result of artificial lighting associated with the proposals:

- Light trespass at residential properties;
- Sky glow; and,
- Glare on the local road network.

Parameters for the SPZ have been defined to control the above impacts to acceptable levels. This included quantifying baseline lighting levels at the site and identifying the relevant criteria for each aspect as outlined in the following Sections.

3.1 Site Survey

3.1.1 Survey Conditions

A survey was undertaken around the proposed site in order to establish existing lighting levels in the absence of additional development. Light measurements were undertaken on the 3rd February 2014 between the hours of 21:55 and 00:50 to take results in both the pre-curfew period (before 23:00) and in the post-curfew period (between 23:00 – 07:00).

Weather conditions during the survey were overcast with low wind speeds.

Measurements were made using a Tecpel 536 digital light meter (S/N 101002025) at a position approximately 1.5m above ground level. The light meter meets CIE photopic spectral response with a maximum resolution of 0.01lux and the survey measurements were made using a resolution of 0.01lux.

3.1.2 Survey Locations

Lighting measurements were undertaken at twelve locations in order to determine baseline light levels in the vicinity of the site. It should be noted that there are no light sensitive receptors to the east of the site and the survey therefore concentrated on the residential properties to the north, south and west of the boundary. Survey locations are summarised in Table 1.

Table 1 Survey Locations

Survey Location		Orientation	NGR (m)	
			X	Y
S1	Penilee Terrace	North-east	251183	665119
S2	Linburn Road (over tracks)	North	251628	665070
S3	Linburn Road (before tracks)	North	251590	665040
S4	Linburn Road - centre	North	251800	664983
S5	Chirnside Road	North	252224	664913
S6	Chirnside Road (over tracks)	North	252711	664842

Survey Location		Orientation	NGR (m)	
			X	Y
S7	Chirnside Road (before tracks)	North	252682	664818
S8	Cockels Loan - West	South-east	250427	665974
S9	Morrison Crescent	South	251580	666315
S10	Cockels Loan - central	South-east	250733	666063
S11	Montgomery Road	East	249814	665585
S12	Montgomery Avenue	East	249837	665435

Reference should be made to Figure 2 for a graphical representation of monitoring locations and Appendix II of photographs from each of the survey positions.

3.2 Light Trespass and Sky Glow

Luminaires associated with any future development have the potential to cause light trespass into residential properties in the vicinity of the site and contribute to sky glow. The ILE⁵ has developed an Environmental Zone classification system for the categorisation of assessment locations. This is also detailed in the Scottish Executive Guidance Note⁶ and summarised in Table 2.

Table 2 Environmental Zone Classification

Category	Description	Examples
E1	Intrinsically dark landscapes	National Parks, Areas of Outstanding National Beauty, etc
E2	Low district brightness areas	Rural, small village, or relatively dark urban locations
E3	Medium district brightness	Small town centres or urban locations
E4	High district brightness areas	Town/city centres with high levels of night-time activity

For each Environmental Zone, obtrusive light limitations for exterior lighting installations have also been determined by the ILE⁷. These are summarised in Table 3.

⁵ Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Engineers, 2005.

⁶ Controlling Light Pollution and Reducing Lighting Energy Consumption Guidance Note, Scottish Executive, 2007.

⁷ Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Engineers, 2005.

Table 3 Obtrusive Light Limitations for Exterior Lighting Installations

Environmental Zone	Max Sky Glow ULR ^(a) (%)	Light Trespass (into Windows) E _v (lux) ^(b)		Source Intensity I (kcd)		Building Luminance Pre-curfew Average L ^(c) (cd/m ²)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	
E1	0.0	2	1 ^(d)	2.5	0	0
E2	2.5	5	1	7.5	0.5	5.0
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25

NOTE: (a) Upward light ratio of the installation - maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.

(b) Vertical Illuminance measured flat at the glazing at the centre of the window.

(c) Luminance.

(d) From public road lighting installations only.

The obtrusive light limitations shown in Table 3 have been used to define the relevant parameters for the SPZ.

3.3 Glare

Luminaires associated with any future development have the potential to cause glare at sensitive locations in the vicinity of the site. The CIE have produced Glare Rating Limits (GR_{max}) for a number of applications⁸. These are summarised in Table 4.

Table 4 Glare Rating Limits

Application	Risk	GR _{max}
Safety and security	Low risk	55
	Medium risk	50
	High risk	45
Movement and safety	Low risk	55
	Medium risk	50
	High risk	45
Work	Low risk	55
	Medium risk	50
	High risk	45

The GR_{max} values shown in Table 4 have been used to define the relevant parameters for the SPZ.

⁸ Glare Evaluation System for Use within Outdoor Sports and Area Lighting, International Commission on Illumination, 1994.

4.0 ASSESSMENT

The results of the site survey were utilised to define the relevant criteria for use within the SPZ, as summarised in the following Sections.

4.1 Survey Results

A baseline light survey was undertaken in the vicinity of the development site as previously described in Section 3.1. The results are shown in Table 5.

Table 5 Light Survey Results

ID	Location	Measured Illuminance (lux)	
		Pre-curfew	Post-curfew
S1	Penilee Terrace	0.7	0.4
S2	Linburn Road (over tracks)	3.0	3.5
S3	Linburn Road (before tracks)	94.5	80.5
S4	Linburn Road - centre	1.2	1.3
S5	Chirnside Road	0.8	0.9
S6	Chirnside Road (over tracks)	2.9	3.7
S7	Chirnside Road (before tracks)	4.2	4.0
S8	Cockels Loan - West	2.7	1.7
S9	Morrison Crescent	10.6	11.5
S10	Cockels Loan - central	1.7	19
S11	Montgomery Road	1.9	1.4
S12	Montgomery Avenue	24.5	27.1

Review of aerial photography and field notes made during the survey indicated the area to the north, south and west of the site is generally residential in nature with a number of artificial streetlight sources contributing to a relatively dark suburban environment.

During the lighting survey it became apparent that the two significant lighting sources, the M8 motorway and the Inverclyde Railway Line that flanked the proposed site had significantly more effect on sensitive locations than any current land use on Hillington Park.

As indicated in Table 5, the measured illuminance varied significantly between different survey locations. This was due to specific impacts associated with the motorway and railway lighting at a number of monitoring positions, particularly at S3 and S9, as shown in Photographs 3 and 9 in Appendix II. The residential properties to the west of the site, represented by S11 and S12, are not significantly affected by the motorway or railway line. However, due to the distance of the site to the nearest receptors it is likely residents will be influenced more by a number of local street lights, as seen in Photograph 12, than by any future development. This was shown by the relatively high measured illuminance at S12.

The survey results close to sensitive locations were generally low with lighting levels reducing significantly away from the relevant sources such as street lighting.

4.2 Environmental Zone Classification

Based on the results of the light survey and criteria shown in Table 2, the area surrounding the proposed development site is classified as Environmental Zone E3 - medium district brightness areas. This was because the majority of the monitoring results indicated illuminance of 10.0lux or below and the land use would be described as 'urban'.

4.3 Light Limitations

Table 6 provides the relevant light limitations for any future development based on the Environmental Zone classification outlined previously.

Table 6 Obtrusive Light Limitations for Exterior Lighting Installations

Environmental Zone	Max Sky Glow ULR ^(a) (%)	Light Trespass (into Windows) E _v (lux) ^(b)		Source Intensity I (kcd)		Building Luminance Pre-curfew Average L ^(c) (cd/m ²)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	
E3	5.0	10	2	10	1.0	10

A GR_{max} level of 45 should also be considered during the design of future lighting fixtures.

4.4 Simplified Planning Zone Parameters

Based on the assessment results and Scottish Executive guidance, the following parameters are proposed for inclusion for the SPZ:

"Lighting associated with any future development shall be designed to ensure:

- The maximum sky glow as an upward light ratio is less than 5.0%;
- Light trespass at the windows of all residential properties in the vicinity of the site is less than 10lux for pre-curfew periods(before 23:00) and 2lux post-curfew (between 23:00 - 07:00);
- Source intensity is less than 10kcd for pre-curfew periods (before 23:00) and 1.0kcd post-curfew (between 23:00 - 07:00);
- Building luminance is less than 10kcd/m² during pre-curfew periods (before 23:00); and,
- Glare rating on all highways is less than 45."

It is considered the design of any future development in accordance with the above parameters should control light impacts at sensitive locations to an acceptable level.

5.0 CONCLUSION

REC Ltd has been instructed by Terence O'Rourke on behalf of MEPC to undertake a Lighting Assessment in support of the proposed SPZ for Hillington Park, Glasgow.

Artificial lighting associated with any future development has the potential to cause impacts at sensitive receptors. An assessment was therefore undertaken to consider baseline conditions in the vicinity of the site and determine suitable Simplified Planning Zone parameters.

A baseline lighting survey was undertaken to determine existing conditions in the vicinity of the proposed development site. The results were utilised to classify the surrounding area as Environmental Zone E3 - medium district brightness.

During the lighting survey it became apparent that the two significant lighting sources, the M8 motorway and the Inverclyde Railway Line that flanked the proposed site had significantly more effect on sensitive locations than any existing land use at Hillington Park. However, due to the number of residential properties in the vicinity of the site, it should remain an aim for any development undertaken to ensure that lighting levels remain low.

Based on the Environmental Zone classification and relevant guidance criteria, the following SPZ parameters were defined:

Lighting associated with any future development shall be designed to ensure:

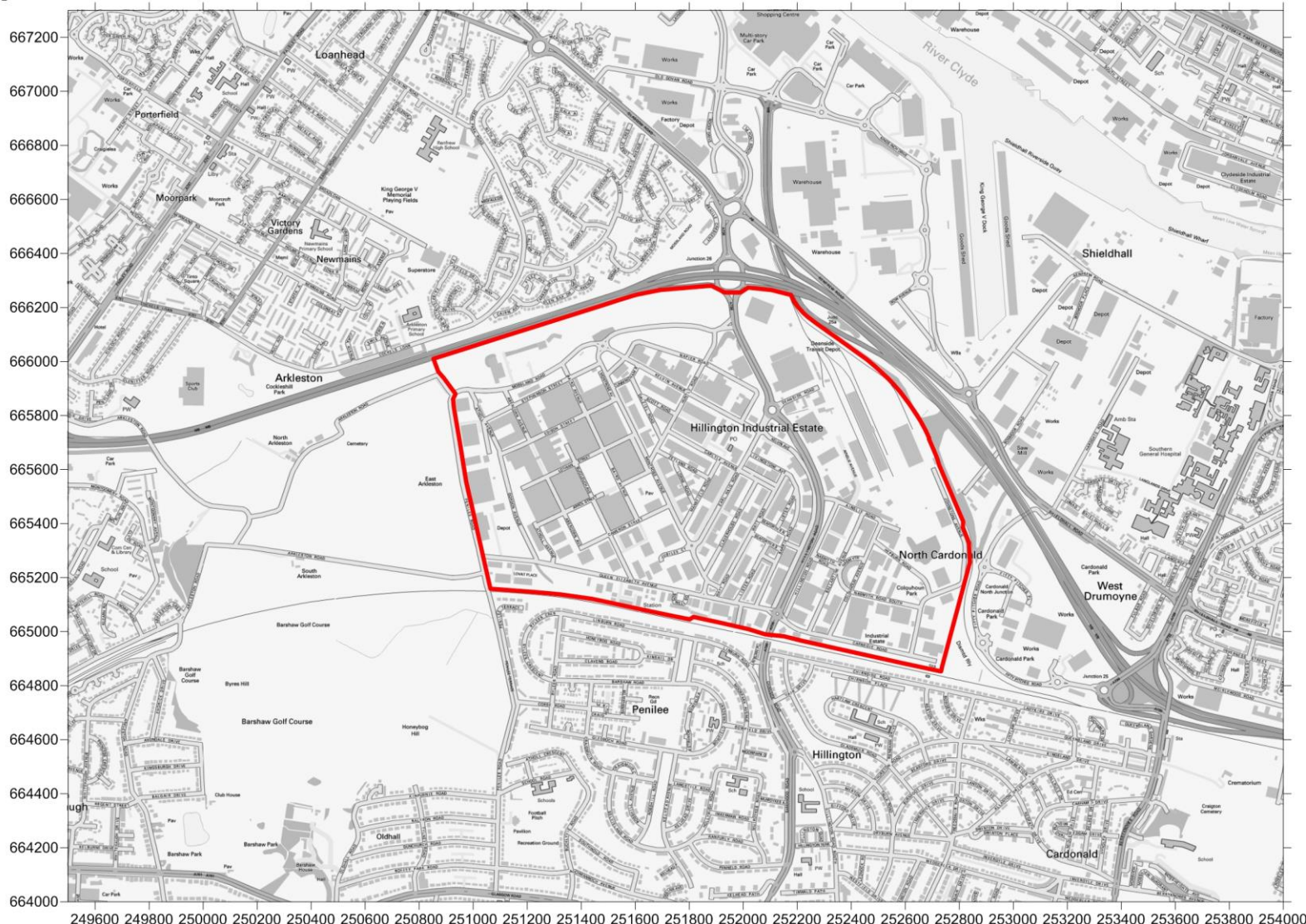
- The maximum sky glow as an upward light ratio is less than 5.0%;
- Light trespass at the windows of all residential properties in the vicinity of the site is less than 10lux for pre-curfew periods (before 23:00) and 2lux post-curfew (between 23:00 - 07:00);
- Source intensity is less than 10kcd for pre-curfew periods (before 23:00) and 1.0kcd post-curfew (between 23:00 - 07:00);
- Building luminance is less than 10kcd/m² during pre-curfew periods (before 23:00); and,
- Glare rating on all highways is less than 45."

It is considered the design of any future development in accordance with the above parameters should control light impacts at sensitive locations to an acceptable level.

6.0 ABBREVIATIONS

CIBSE	Chartered Institute of Building Services Engineers
CIE	International Commission on Illumination
E_m	Average maintained illuminance
E_{min}	Minimum Maintained Illuminance
E_v	Light trespass
GR_{max}	Glare rating limit
GCC	Glasgow City Council
ILE	Institute of Lighting Engineers
NGR	National Grid Reference
PAN	Planning Advice Note
RC	Renfrewshire Council
REC	Resource and Environmental Consultants
SPZ	Simplified Planning Zone
ULR	Upward Light Ratio

APPENDIX I FIGURES



Legend



Title
Figure 1 - Site Location Plan

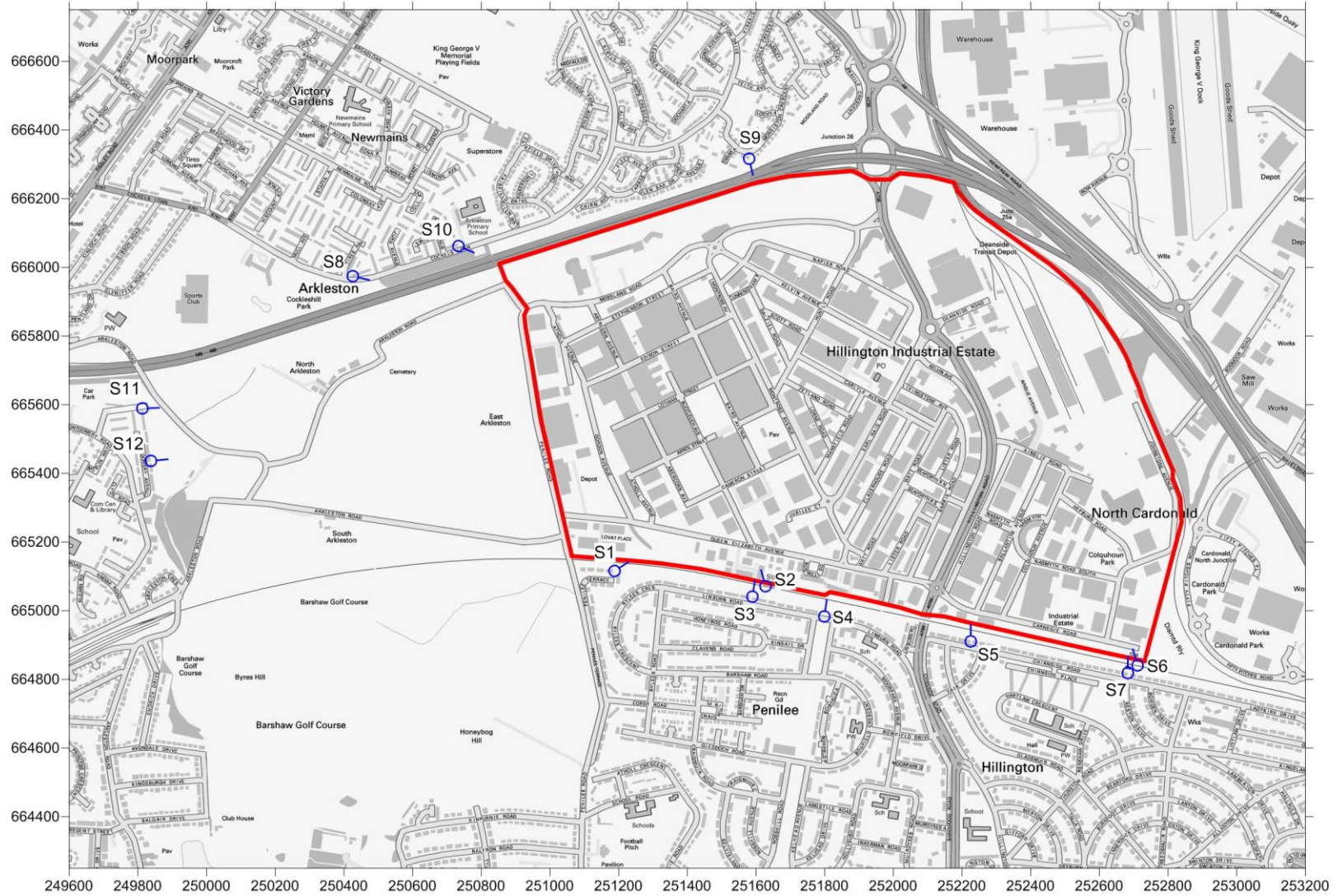
Project
Lighting Assessment
Hillington Park, Simplified Planning Zone,
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Client
MEPC

Contains Ordnance Survey Data
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Legend

-  Site Location
-  Survey Location

Title

Figure 2 - Survey Locations

Project

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APPENDIX II PHOTOGRAPHS



Photograph 1 Survey location 1



Photograph 2 Survey location 2



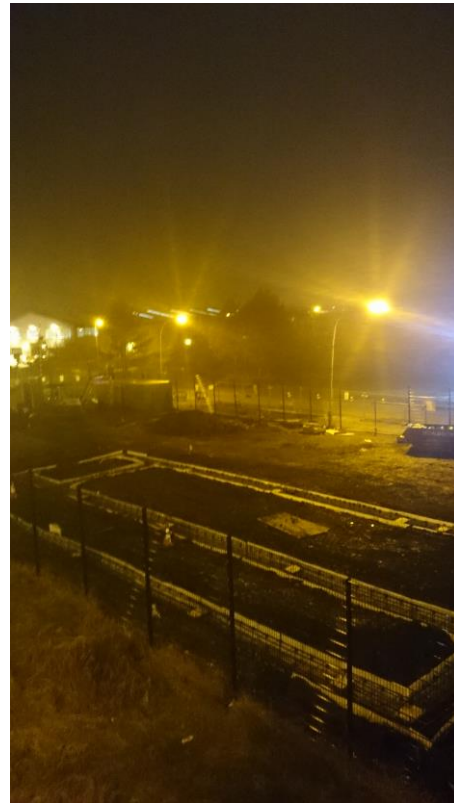
Photograph 3 Survey location 3



Photograph 4 Survey location 4



Photograph 5 Survey location 5



Photograph 6 Survey location 6



Photograph 7 Survey location 7



Photograph 8 Survey location 8



Photograph 9 Survey location 9



Photograph 10 Survey location 10



Photograph 11 Survey location 11



Photograph 12 Survey location 12