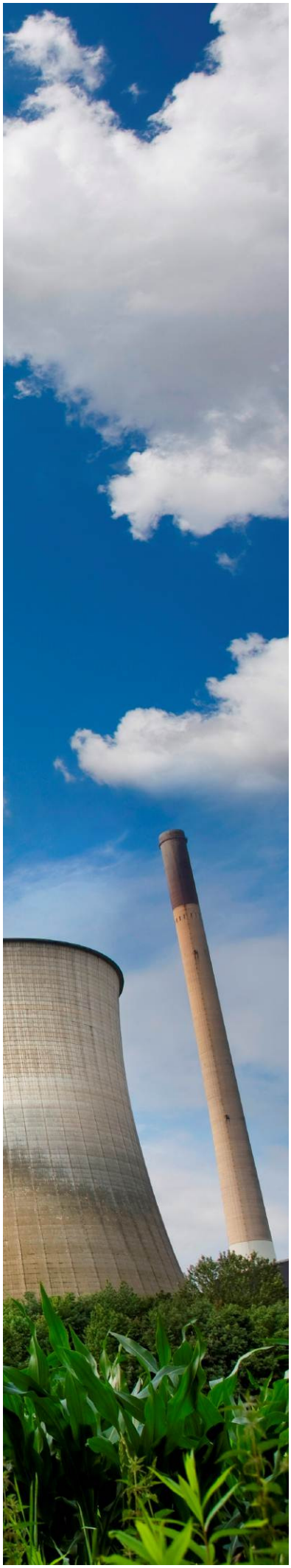
REC
Resource & Environmental Consultants Ltd

Lighting Assessment
Milton Park Local Development Order

REC Report: 33071p1r2
Issued: 28th September 2012

On Behalf of Vale of White Horse District Council and MEPC



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REPORT ISSUE

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EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd has been instructed by Terence O'Rourke on behalf of Vale of White Horse District Council and MEPC to undertake a Lighting Assessment for Milton Park, Oxford. The Milton Park Local Development Order is a partnership between Vale of White Horse District Council as the local planning authority, and MEPC Milton Park as the landowner. Terence O'Rourke Ltd has been instructed by MEPC to help coordinate the Local Development Order process.

The purpose of the Milton Park Local Development Order is to enable a vibrant business area, promoting employment-generating uses at the business park, to maximise the success of the Science Vale UK Enterprise Zone and give greater confidence to business to invest in Milton Park. It is being prepared in accordance with the Town and Country Planning (Development Management Procedure) (England) Order (2010).

The Milton Park Local Development Order will simplify planning control to give greater flexibility for businesses to develop new premises and facilities or adapt existing premises, whilst maintaining a successful and diverse mix of employment generating uses. Development will only be permitted where the local authority is satisfied that it is in accordance with the permitted uses and development parameters set out in the Order. Development proposals not in accordance with the provisions of the Order will be determined by a planning application.

The Local Development Order has been designed to be effective for a period of 15 years to reflect the typical timescale of business leases and give greater certainty for potential investors.

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 Local Development Order.

A baseline lighting survey was undertaken to determine existing conditions in the vicinity of the proposed development site and classify the relevant environmental zone. Based on the assessment results and relevant guidance criteria, the following parameters were defined for inclusion within the Local Development Order:

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

- The maximum sky glow as upward light ratio is less than 2.5%;
- Light trespass at the windows of all residential properties in the vicinity of the site is less than 5lux for pre-curfew periods and 1lux post-curfew;
- Source intensity is less than 7.5kcd for pre-curfew periods and 0.5kcd post-curfew;
- Building luminance is less than 5kcd/m^2 during pre-curfew periods; 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 MEPC Milton Park to undertake a Lighting Assessment for Milton Park, Oxford. The Milton Park Local Development Order (LDO) is a partnership between Vale of White Horse District Council as the local planning authority, and MEPC Milton Park as the landowner. Terence O'Rourke Ltd has been instructed by MEPC to help coordinate the LDO process.

The purpose of the Milton Park LDO is to enable a vibrant business area, promoting employment-generating uses at the business park, to maximise the success of the Science Vale UK Enterprise Zone and give greater confidence to business to invest in Milton Park. It is being prepared in accordance with the Town and Country Planning (Development Management Procedure) (England) Order (2010).

The Milton Park LDO will simplify planning control to give greater flexibility for businesses to develop new premises and facilities or adapt existing premises, whilst maintaining a successful and diverse mix of employment generating uses. Development will only be permitted where the local authority is satisfied that it is in accordance with the permitted uses and development parameters set out in the Order. Development proposals not in accordance with the provisions of the Order will be determined by a planning application.

The LDO has been designed to be effective for a period of 15 years to reflect the typical timescale of business leases and give greater certainty for potential investors.

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 LDO.

1.2 Site Location and Context

Milton Park is located to the north-west of Didcot, at National Grid Reference (NGR): 449140, 191760. Reference should be made to Figure 1 for a map of the site and surrounding area.

Any future development may include lighting fixtures. These may include:

- 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:

- 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

Light pollution was introduced within the Clean Neighbourhoods and Environment Act (2005) as a form of statutory nuisance under the Environmental Protection Act (1990), which was amended to include the following nuisance definition:

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

Although light was described as a statutory nuisance, no prescriptive limits or rules have been set for assessment. Guidance produced by the 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 National Planning Policy

The National Planning Policy Framework (NPPF)[1] was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including lighting. The document includes the following considerations which are relevant to this assessment:

> "To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account."
>
> "By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

The implications of the NPPF have been considered throughout this assessment.

[1] National Planning Policy Framework, Department for Communities and Local Government, 2012.

2.4 Local Planning Policy

Local Planning Authorities, including VoWHDC are able to designate specific policies on the control of light from proposed developments. VoWHDC Local Plan[2] was formally adopted in 2006 and provides a framework for development within the district. A number of policies contained within the Local Plan have been saved in accordance with the Planning and Compulsory Purchase Act (2004) until such time that they are superseded by the Core Strategy. As such, the policies contained within the Local Plan provide the current basis for the determination of planning applications within VoWHDC's area of jurisdiction.

A review of the Local Plan indicated the following policies in relation to lighting that are relevant to this assessment:

> "Policy DC10
>
> Development will not be permitted if it would unacceptably harm the amenities of neighbouring properties and the wider environment in terms of:
>
> i) Loss of privacy, daylight or sunlight;
> ii) Dominance or visual intrusion;
> iii) Noise or vibration;
> iv) Smell, dust, heat, gases or other emissions;
> v) Pollution, contamination or the use of or storage of hazardous substances; and,
> vi) External lighting."
>
> "Policy DC20
>
> Application for planning permission, or for consent for the display of advertisements, which involve external lighting will be permitted provided that:
>
> i) There will be no adverse effect on the character of the area or the amenity of neighbouring properties;
> ii) The lighting proposed is the minimum necessary to undertake the task for which is it required;
> iii) The potential light pollution from glare and spillage is minimised; and,
> iv) There will not be a hazard to highway safety.
>
> Where permission or consent is granted for external lighting conditions may be imposed requiring a light spillage test prior to its first use and, where necessary, the fitting of devices to reduce glare and spillage and/or restrict the hours during which the lighting may be used."

These policies have 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] Vale of White Horse District Council Local Plan 2011, Vale of White Horse District Council, 2006.

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

3.1 Site Survey

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 26th July 2012 between the hours of 23:30 and 23:40 in the post-curfew period (between 23:00 – 07:00).

Weather conditions during the survey consisted of clear sky 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.

3.1.1 Survey Locations

Lighting measurements were undertaken at six 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, south or west of the site and the survey therefore concentrated on the residential properties off Pembroke Lane to the north of the boundary. Survey locations are summarised in Table 1.

Table 1 Survey Locations

Survey Location		Orientation	NGR (m)	
			X	Y
S1	Pembroke Lane - western end	West	448766	192016
S2	3 Pembroke Lane	South-east	448730	192025
S3	3 Pembroke Lane	East	448730	192025
S4	15 Pembroke Lane	East	448668	192038
S5	15 Pembroke Lane	West	448668	192038
S6	Pembroke Lane - centre	East	448614	192035

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 ILE has developed an Environmental Zone classification system for the categorisation of assessment locations[3]. This is 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 ILE[4]. These are summarised in Table 3.

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 LDO.

[3] Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Engineers, 2005.
[4] Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Engineers, 2005.

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 applications[5]. 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 LDO.

[5] 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 LDO, 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)
S1	Pembroke Lane - western end	0.1
S2	3 Pembroke Lane	15.4
S3	3 Pembroke Lane	0.4
S4	15 Pembroke Lane	56.4
S5	15 Pembroke Lane	1.0
S6	Pembroke Lane - centre	0.4

As indicated in Table 5, the measured illuminance varied significantly between different survey locations. This was due to specific impacts associated with the street lighting at each monitoring position, particularly S4 as shown in Photograph 4 in Appendix II. However, the results were generally low with lighting levels reducing significantly away from the relevant sources.

Review of aerial photography and field notes made during the survey indicated the area to the north of the site is generally rural in nature with few artificial light sources contributing to a relatively dark baseline environment.

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 E2 - low district brightness areas. This was because the majority of the monitoring results indicated illuminance of 1.0lux or below and the land use would be described as 'rural' or 'small village'.

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	
E2	2.5	5	1	7.5	0.5	5.0

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

4.4 Local Development Order Parameters

Based on the assessment results and ILE[6] and CIE guidance[7], the following parameters are proposed for inclusion within the LDO:

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

- The maximum sky glow as upward light ratio is less than 2.5%;
- Light trespass at the windows of all residential properties in the vicinity of the site is less than 5lux for pre-curfew periods and 1lux post-curfew;
- Source intensity is less than 7.5kcd for pre-curfew periods and 0.5kcd post-curfew;
- Building luminance is less than 5kcd/m^2 during pre-curfew periods; 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 Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Engineers, 2005.
7 Glare Evaluation System for Use within Outdoor Sports and Area Lighting, International Commission on Illumination, 1994.

5.0 CONCLUSION

REC Ltd has been instructed by Terence O'Rourke on behalf of VoWHDC and MEPC to undertake a Lighting Assessment in support of the proposed LDO for Milton Park, Didcot, Oxfordshire.

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 LDO.

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 E2 - low district brightness areas.

Based on the Environmental Zone classification and relevant guidance criteria, the following parameters were defined for inclusion within the LDO:

> "Lighting associated with any future development shall be designed to ensure:
>
> - The maximum sky glow as upward light ratio is less than 2.5%;
> - Light trespass at the windows of all residential properties in the vicinity of the site is less than 5lux for pre-curfew periods and 1lux post-curfew;
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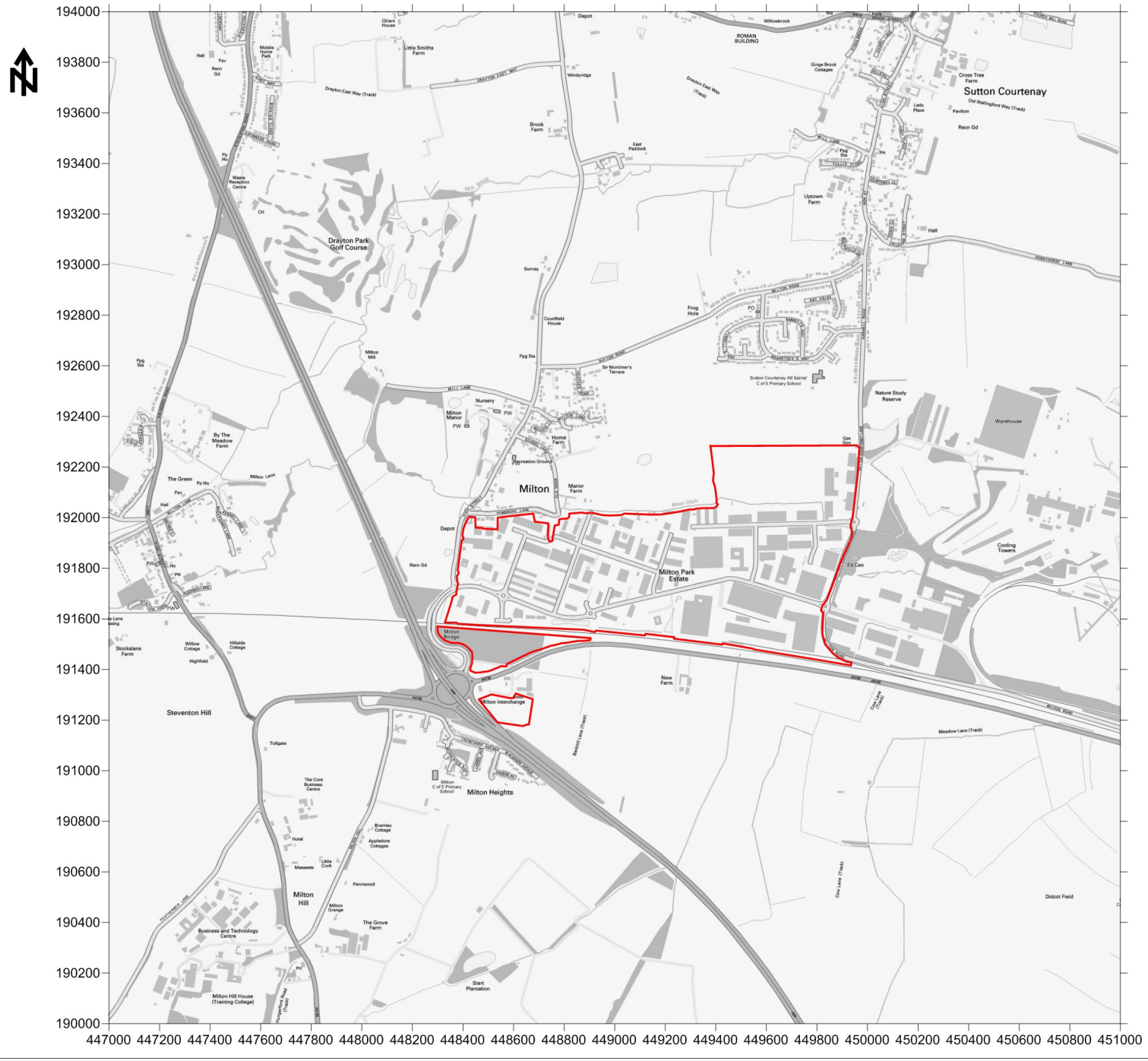
> - Glare rating on all highways is less than 45."

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
ILE	Institute of Lighting Engineers
LDO	Local Development Order
NGR	National Grid Reference
NPPF	National Planning Policy Framework
REC	Resource and Environmental Consultants
ULR	Upward Light Ratio
VoWHDC	Vale of White Horse District Council

APPENDIX I FIGURES



Legend

Site Boundary

Title

Figure 1 - Site Location Plan

Project

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Client

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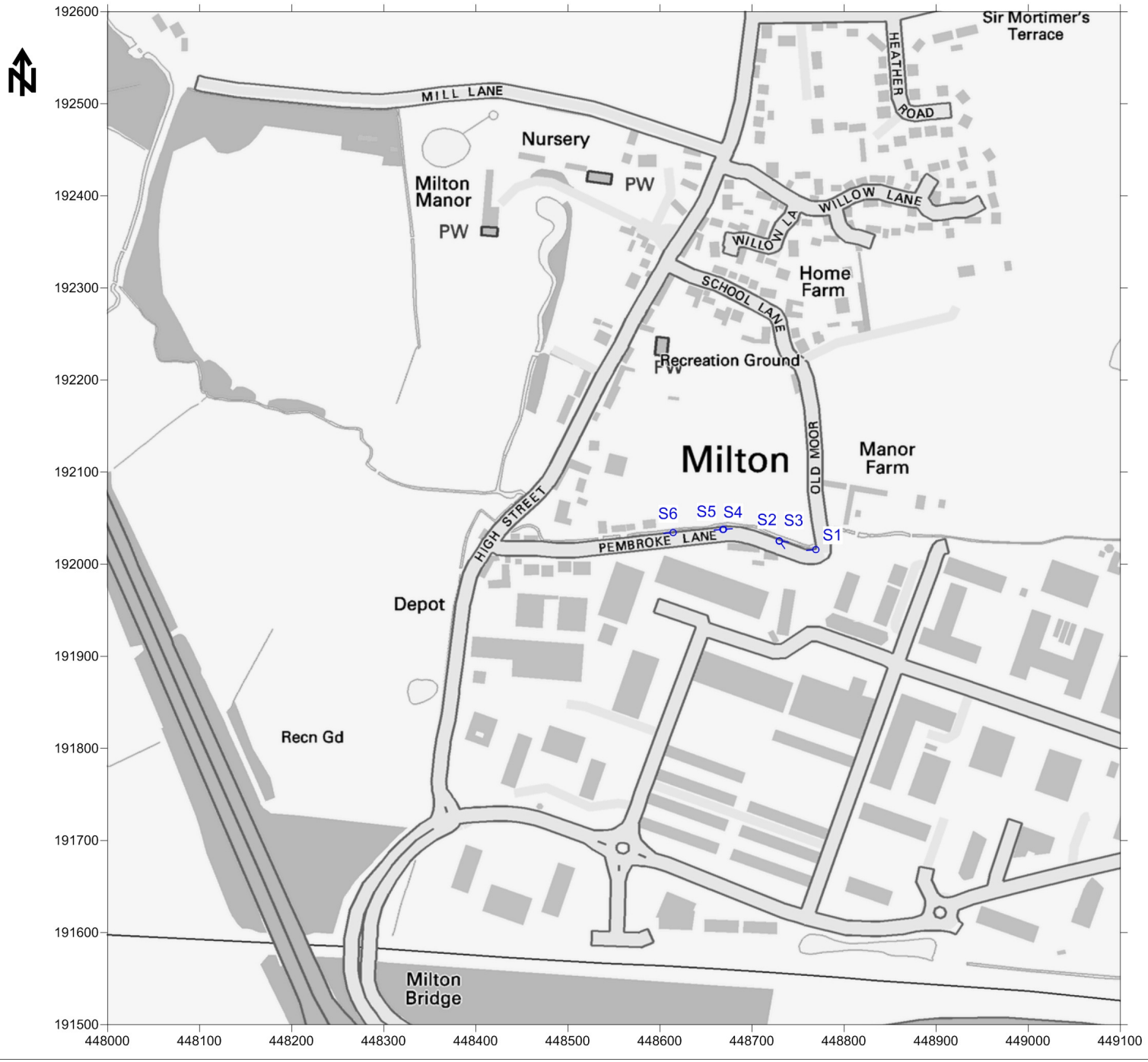

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Survey Location

Title

Figure 2 - Survey Locations

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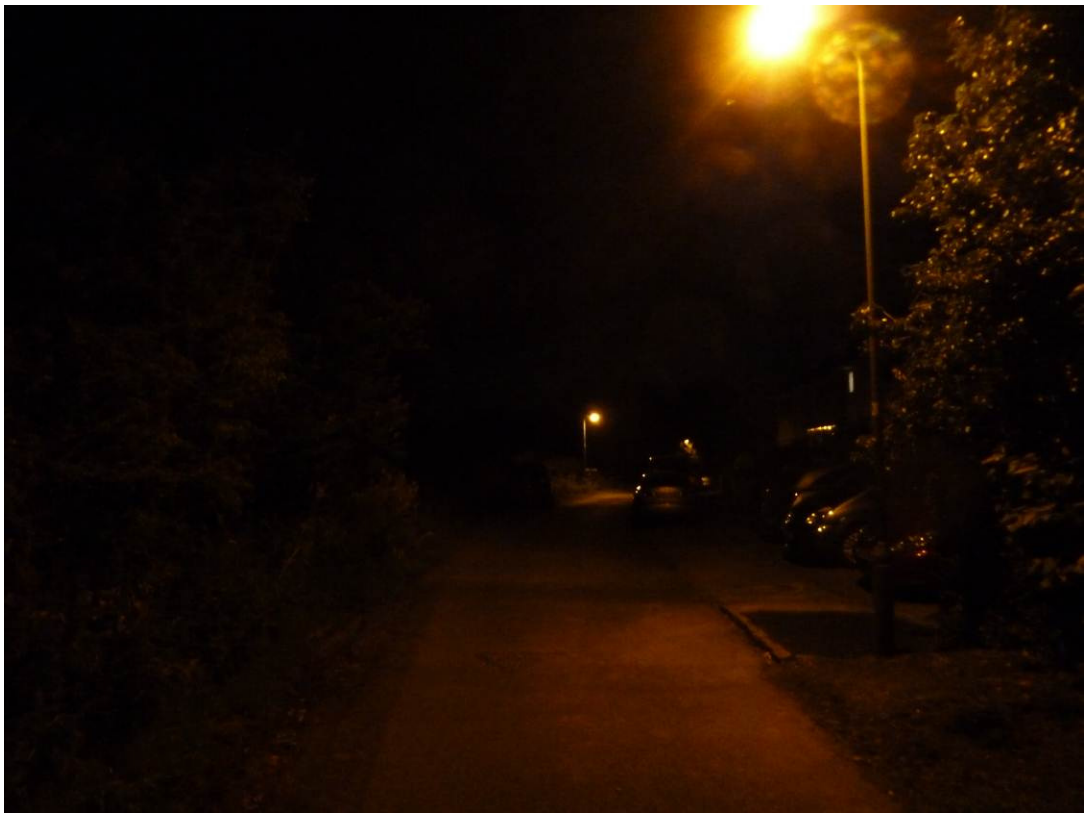
APPENDIX II PHOTOGRAPHS

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