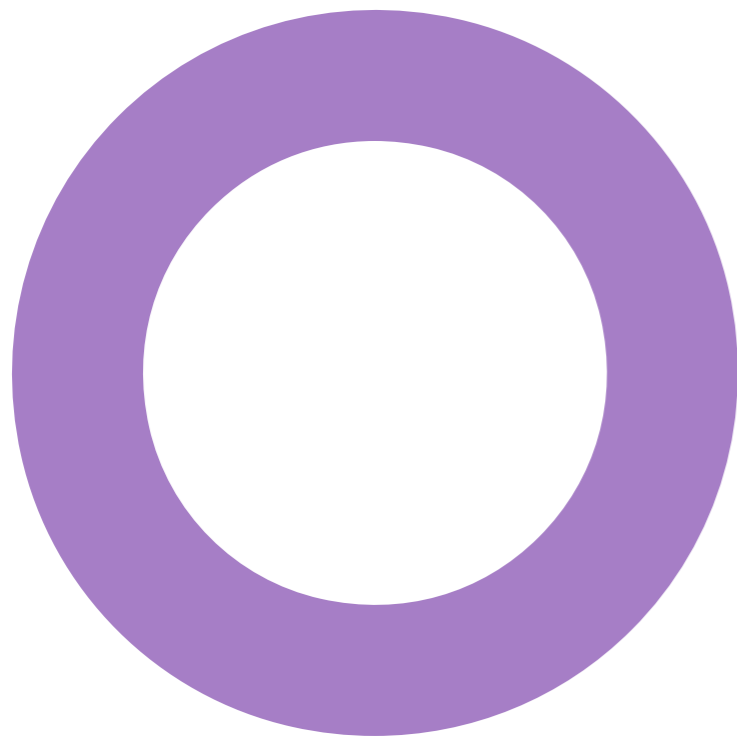


Proposed Great Wolf Lodge. Great Lakes UK Limited.

16-16472
EXTERNAL LIGHTING BASELINE SURVEY
NOVEMBER 2019

DOC-16-16472-20191024-SMK-GREAT WOLF-BLS-04



Audit sheet.

Rev	Date	Description	Prepared	Verified
01	17/09/2019	First issue	SMK	BA
02	24/10/2019	Client comments incorporated	SMK	BA
03	31/10/2019	Client comments incorporated	SMK	BA
04	04/11/2019	Final review	SMK	BA

This report is provided for the stated purposes and for the sole use of Great Wolf Resorts. It will be confidential to the Client and the client's professional advisers. Hoare Lea accepts responsibility to the Client alone that the report has been prepared with the skill, care and diligence of a competent designer, but accepts no responsibility whatsoever to any parties other than the Client. Any such parties rely upon the report at their own risk. Neither the whole nor any part of the report nor reference to it may be included in any published document, circular or statement nor published in any way without Hoare Lea's written approval of the form and content in which it may appear.

Contents.

Audit sheet	2
Introduction	3
1.0 Proposed Development Summary	4
2.0 Environmental Zones	5
3.0 Survey	6
4.0 Sky Glow - Site and wider area	48
5.0 Environmental Zone classification	50
6.0 Glossary	51

Introduction.

This survey reviews the artificial lighting currently installed on the Proposed Development Site area and adjacent surrounding areas.

Comment is made regarding the resulting lighting levels found, with regard to current standards and guidelines, where relevant. Receptors are assessed with regard to their present individual lighting conditions to enable a future assessment to be made of the potential impact the Proposed Development may have.

Chesterton is a village and civil parish on Gagle Brook, a tributary of the Langford Brook in north Oxfordshire. The village is about 1 1/2 miles (2.4 km) southwest of the market town of Bicester. The 2011 Census recorded the parish population as 850.

The Site is bounded by M40/A4095 to the north, the A4095 to the east, Green Lane to the south and an unlit section of the M40 to the west. Outside the boundaries of the red-line, Bicester Hotel Golf and Spa and a small industrial unit are to the south. The nearest residential properties are in the south east and a small commercial development lies to the far south.

The survey was carried out on 16th July 2019. A walk around was carried out during the day to assess Site conditions, access and safety. The measurements were taken in the night between 10pm and 1am. Weather conditions while taking the readings were clear and dry. The moon was visible in the sky, although there was a partial lunar eclipse. The following measurements were taken on the 16th July 2019:

- Measurements taken with a calibrated hand-held Minolta T-10a light meter. Serial Number: 20013532. Calibration certificate: 118583/ABU. (Copy available on request).
- Measurements taken at least 1 hour post sunset and at stabilised levels of darkness.
- Horizontal meter readings taken at ground level.
- Vertical light meter readings taken at 1.5m.
- Bridge readings heights & positions as noted in comments.

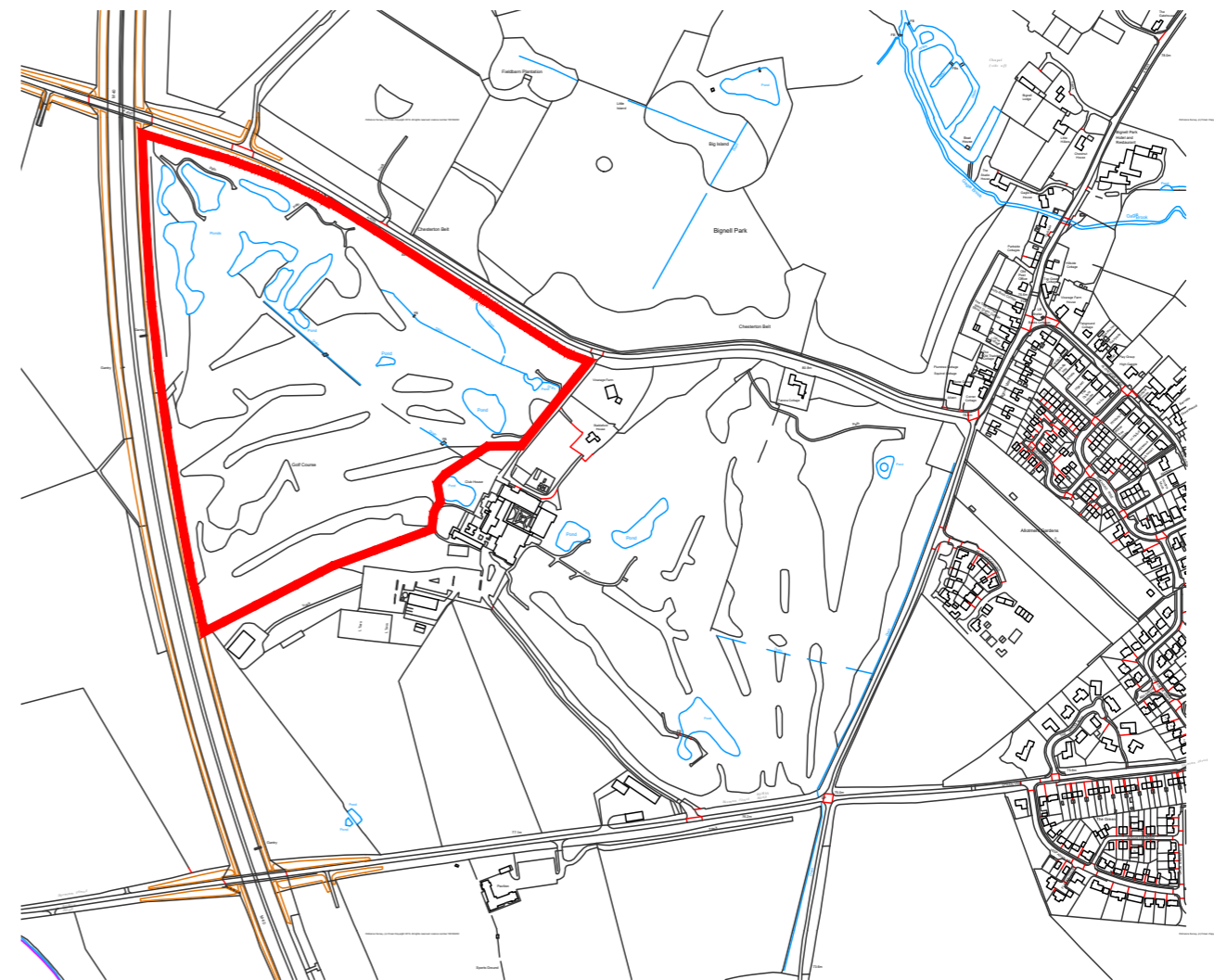


Figure 1.1. Overview of existing Site.

1.0 Proposed development summary.

Shown below is an aerial view of the Proposed Development Site & surrounding area. The proposal is to add a hotel & leisure facilities.



Figure 1.2. Aerial view of Site.

2.0 Environmental zones.

Tables 1 & 2 are taken from: Guidance Notes for the Reduction of Obtrusive Light (GN01:2011), (CIE150). These define areas in terms of usage and light levels. They provide guidance on the levels of light typically found and acceptable levels of light trespass.

Notes to Table 2:

Where:

ULR (Upward Waste Light Ratio) = Maximum permitted percentage of luminaire flux that goes directly into the sky.

EV = Vertical Illuminance in Lux - measured flat on the glazing at the centre of the window.

I = Light intensity in Candelas

L = Luminance cd/m²

Curfew = The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by the local planning authority. If not otherwise stated - 23.00hrs is suggested.

* Permitted only from Public road lighting installations

1 - Upward Light Ratio – Some lighting schemes will require the deliberate and careful use of upward light, e.g. ground recessed luminaires, ground mounted floodlights, festive lighting, to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.

2 - Light Intrusion (into Windows) – These values are suggested maxima and need to take account of existing light intrusion at the point of measurement. In the case of road lighting on public highways where building façades are adjacent to the lit highway, these levels may not be obtainable. In such cases where a specific complaint has been received, the Highway Authority should endeavour to reduce the light intrusion into the window down to the post curfew value by fitting a shield, replacing the luminaire, or by varying the lighting level.

3 - Luminaire Intensity – This applies to each luminaire in the potentially obtrusive direction, outside of the area being lit. The figures given are for general guidance only and for some sports lighting applications with limited mounting heights, may be difficult to achieve.

4 - Building Luminance – This should be limited to avoid over lighting, and related to the general district brightness. In this reference building luminance is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but used to light an adjacent area.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

Environmental Zone	Sky Glow ULR (Max%) ¹	Light Intrusion (Into Windows) Ev (Lux) ²		Luminaire Intensity I (candelas) ³		Building Luminance Pre-curfew ⁴
		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*)	2,500	0	0
E2	2.5	5	1	7,500	500	5
E3	5.0	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

3.0 Survey.

The table adjacent provides a reference for light levels experienced in a variety of internal & external settings. The values are typical averages that would be measured. The information can be used when assessing the magnitude of impact in later appendices.

Table 3. Example lux levels for reference				
Lighting conditions	Lux level		Lighting conditions	Lux level
British summer sunshine	50,000		Typical side road lighting	5
Overcast sky	5,000		Minimum security lighting	2
Well-lit office	500		Twilight	1
Minimum for easy reading	300		Clear full moon	0.25 to <1
Passageway or outside working area	50		Typical moonlight/cloudy sky	0.1
Good main road lighting	5-20		Typical starlight	0.001
Sunset	10		Poor starlight	0.0001
Source: IPCCTV specialists use-IP Ltd. Referenced in ILP Guidance note 08/18 "Bats and artificial lighting in the UK.				

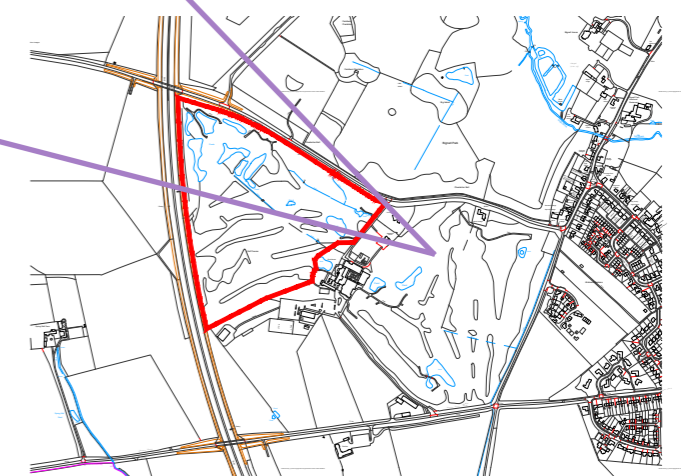
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of entrance to Bicester Hotel Golf & Spa.



View near of entrance to Bicester Hotel Golf & Spa.



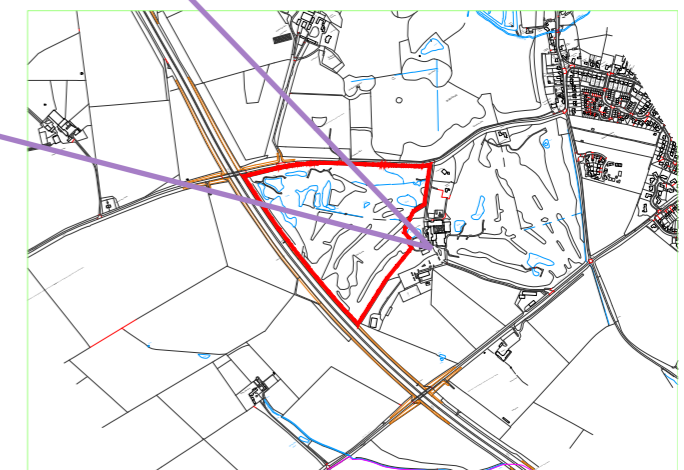
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View near of entrance to Bicester Hotel Golf & Spa.



View near of entrance to Bicester Hotel Golf & Spa.



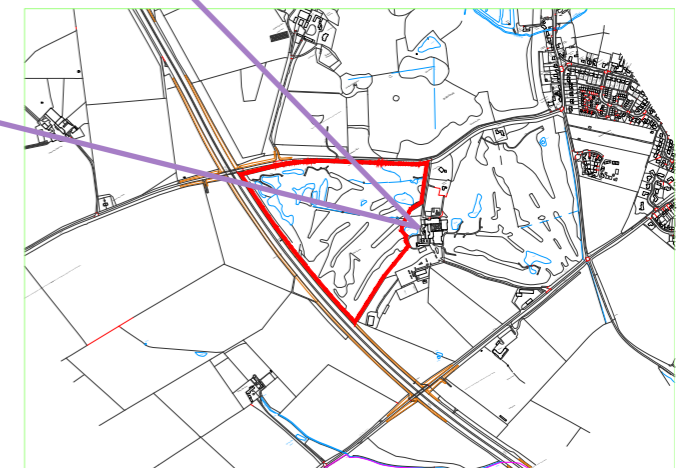
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of patio area at Bicester Hotel Golf & Spa.



View from patio area at Bicester Hotel Golf & Spa.



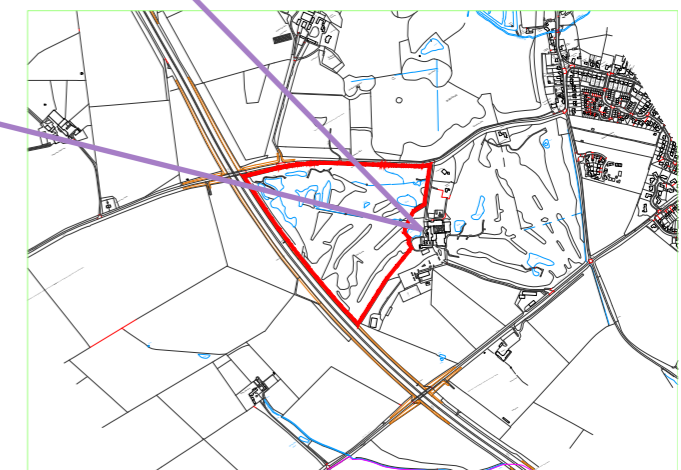
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of roof terrace area at Bicester Hotel Golf & Spa.



View near patio area at Bicester Hotel Golf & Spa.



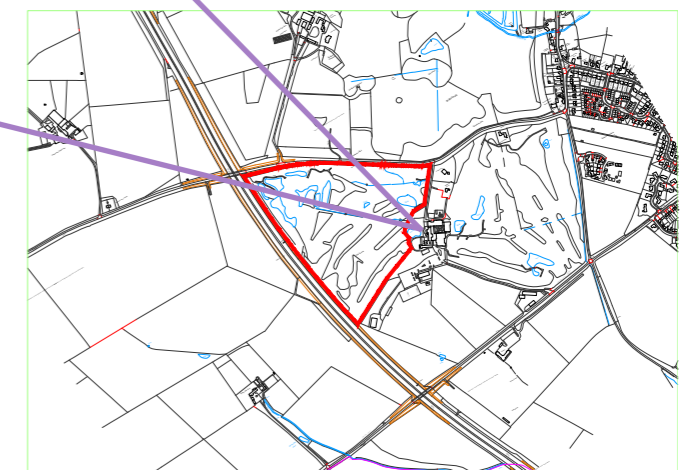
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of roof terrace area at Bicester Hotel Golf & Spa.



View of roof terrace area at Bicester Hotel Golf & Spa.



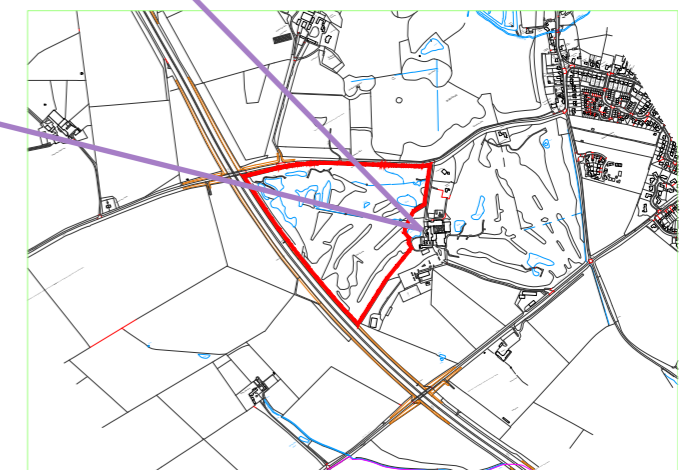
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from roof terrace area at Bicester Hotel Golf & Spa.



View from roof terrace area at Bicester Hotel Golf & Spa.



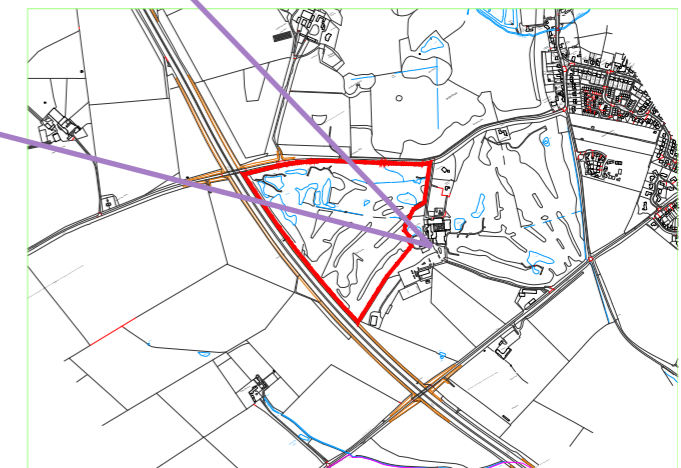
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of walkways near rooms Bicester Hotel Golf & Spa.



View of walkways near rooms Bicester Hotel Golf & Spa.



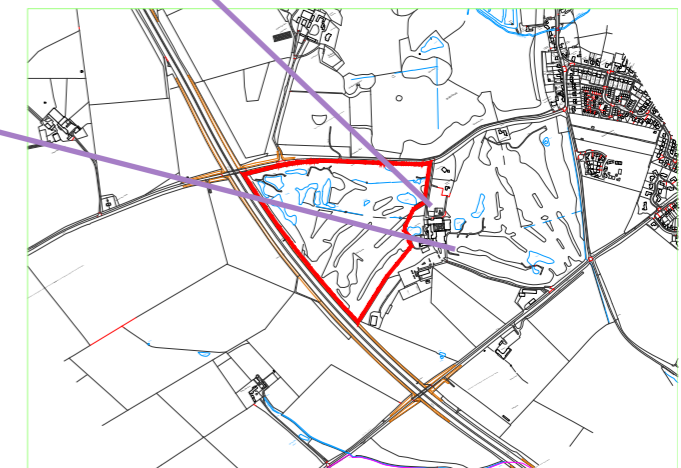
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from golf course Bicester Hotel Golf & Spa.



View of service yard Bicester Hotel Golf & Spa.



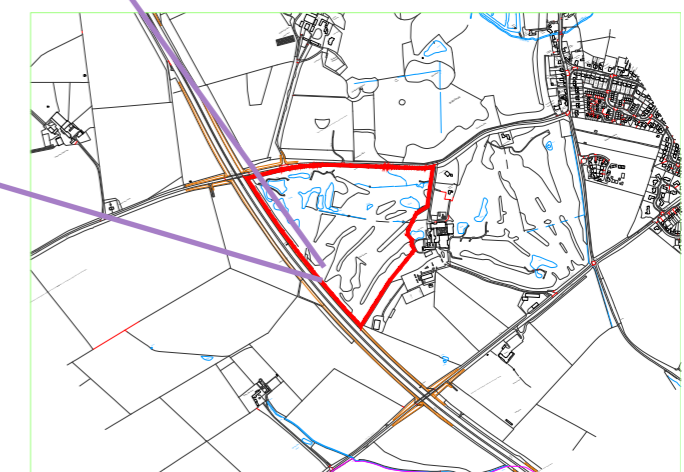
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of M40, off golf course Bicester Hotel Golf & Spa.



View of golf course Bicester Hotel Golf & Spa.



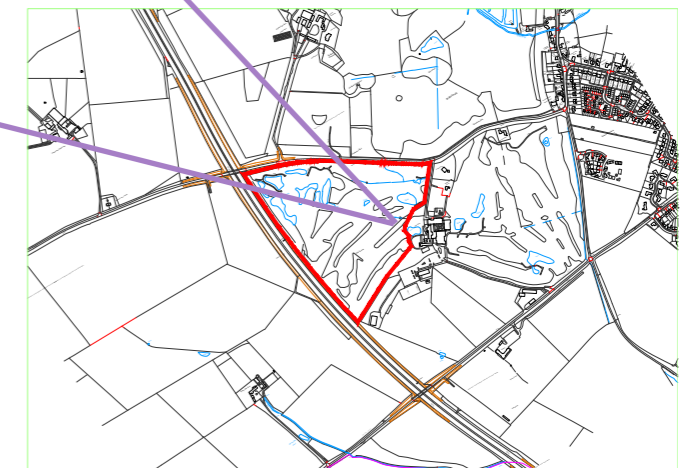
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of club house from golf course Bicester Hotel Golf & Spa.



View of club house from golf course Bicester Hotel Golf & Spa.



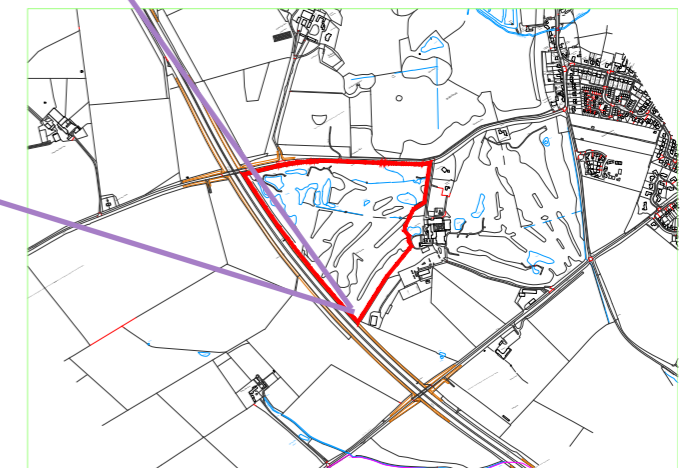
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of M40 near service area of Bicester Hotel Golf & Spa.



View of service area Bicester Hotel Golf & Spa.



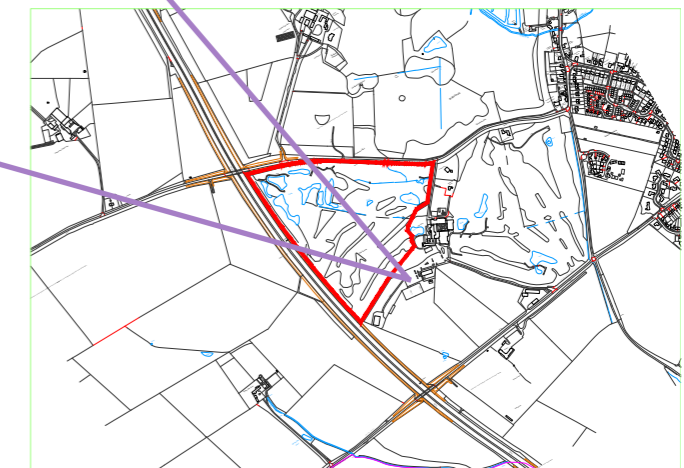
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of car park near tennis courts Bicester Hotel Golf & Spa.



View of car park fitting near tennis courts Bicester Hotel Golf & Spa.



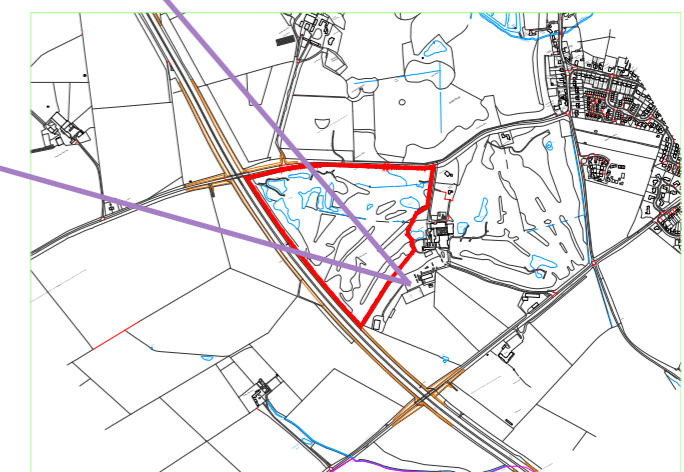
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of car park near tennis courts Bicester Hotel Golf & Spa.



View of car park near tennis courts Bicester Hotel Golf & Spa.



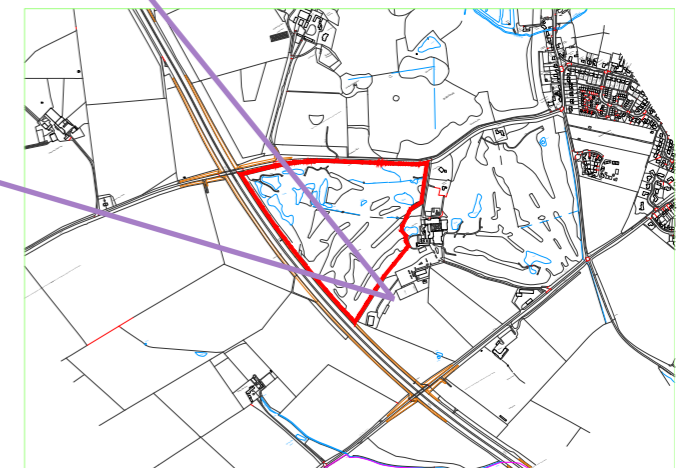
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of tennis courts Bicester Hotel Golf & Spa.



View of tennis courts Bicester Hotel Golf & Spa.



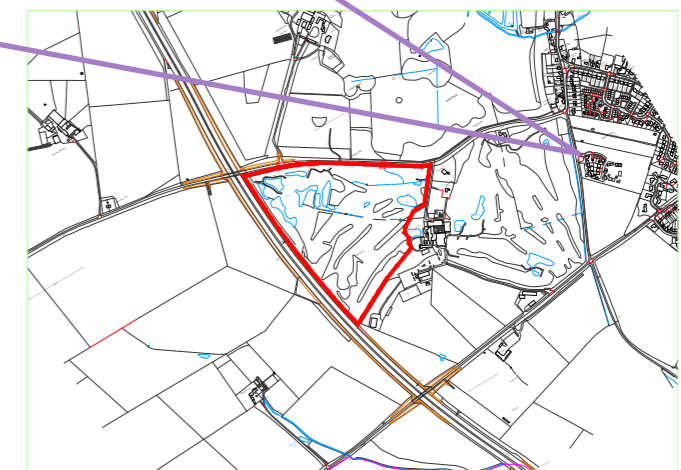
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of houses at Penrose Gardens.



View of houses at Penrose Gardens.



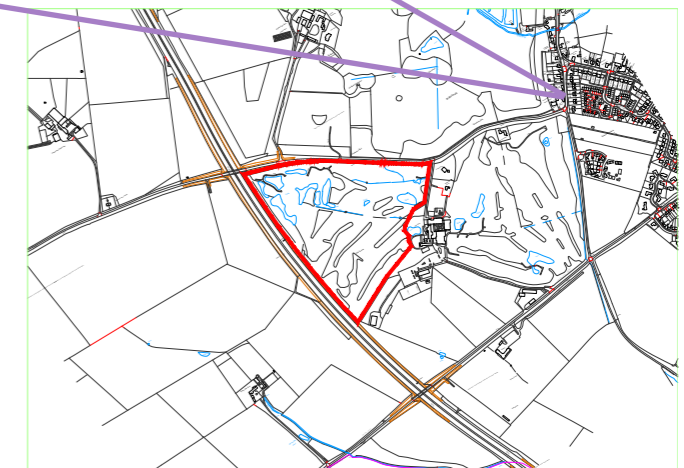
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View along A4095 - Chesterton.



View along A4095 - Chesterton.



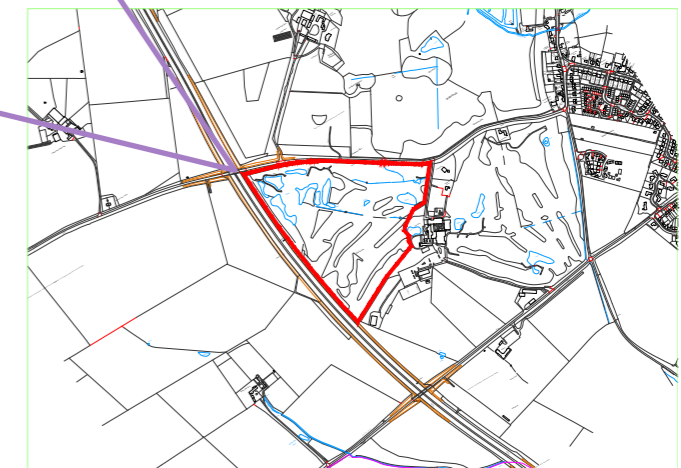
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from A4095 over M40 to Bicester Hotel Golf & Spa.



View from A4095 over M40 to Bicester Hotel Golf & Spa.



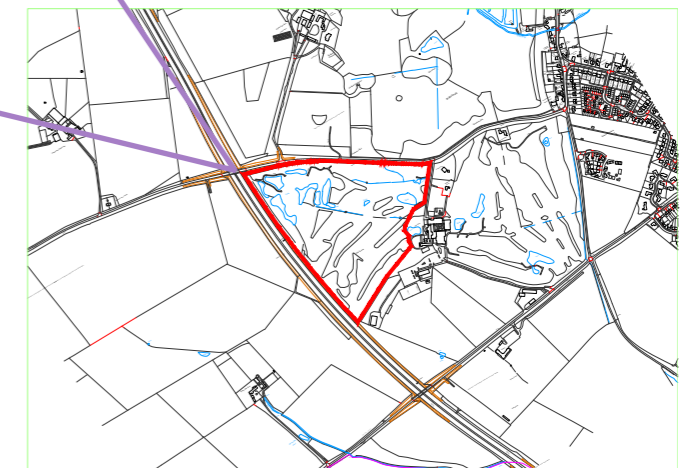
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from A4095 over M40 to fields west of application Site.



View from A4095 along M40 looking south east.



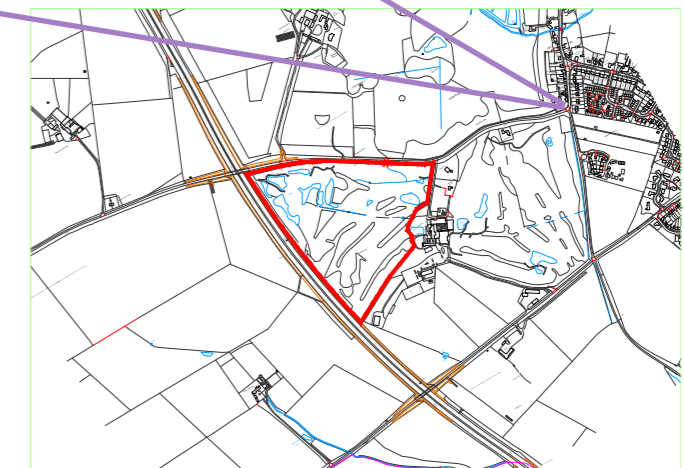
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View along A4095 - Chesterton.



View along A4095 - Chesterton.



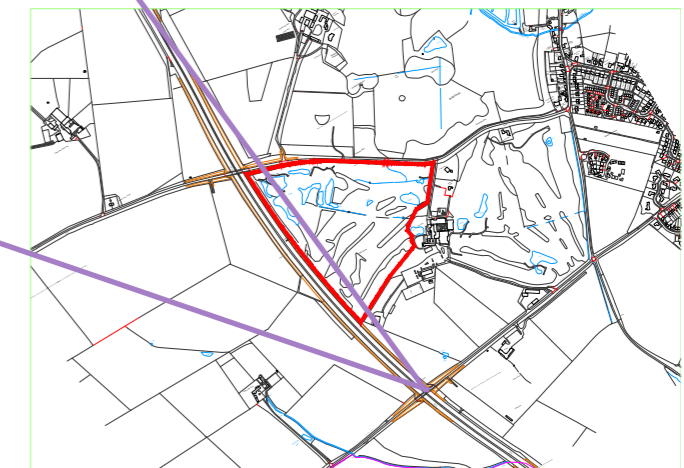
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from bridge on Green Lane over M40 looking north east.



View from bridge on Green Lane over M40 looking south east.



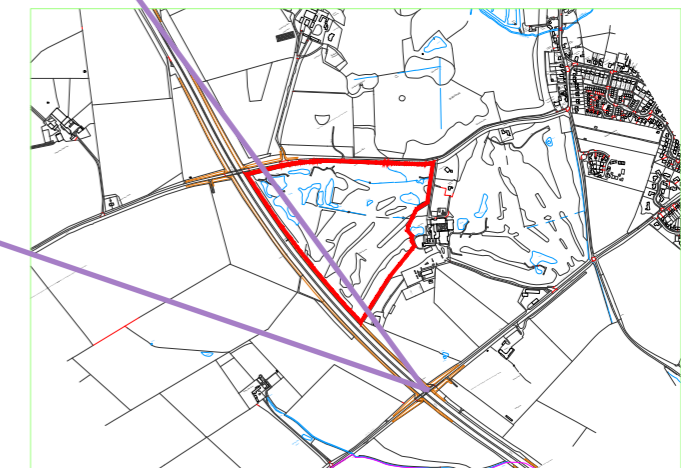
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from bridge on Green Lane over M40 looking towards Bicester Hotel Golf & Spa.



View from bridge on Green Lane over M40 looking towards Bicester Hotel Golf & Spa.



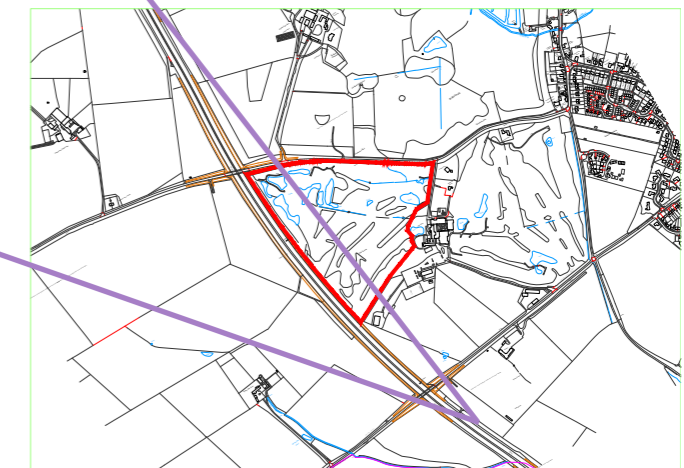
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from footpath adjacent to M40, south east of Green lane, looking north east.



View from footpath adjacent to M40, south east of Green lane, looking north east.



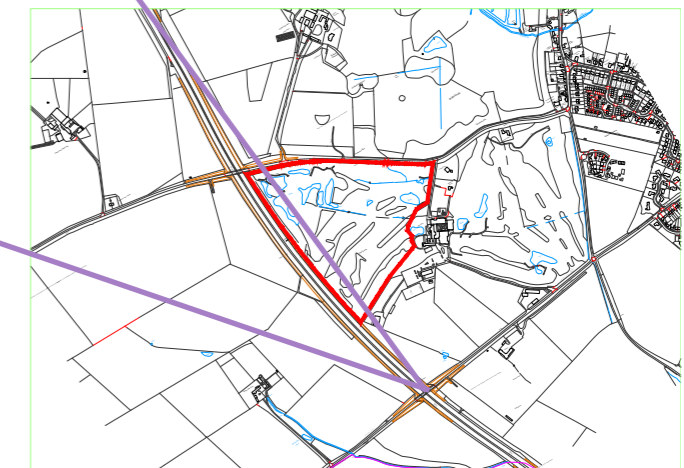
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View from bridge on Green Lane over M40 looking south east, note footpath on right of photo.



View from bridge on Green Lane over M40 looking towards Bicester Sports Association.



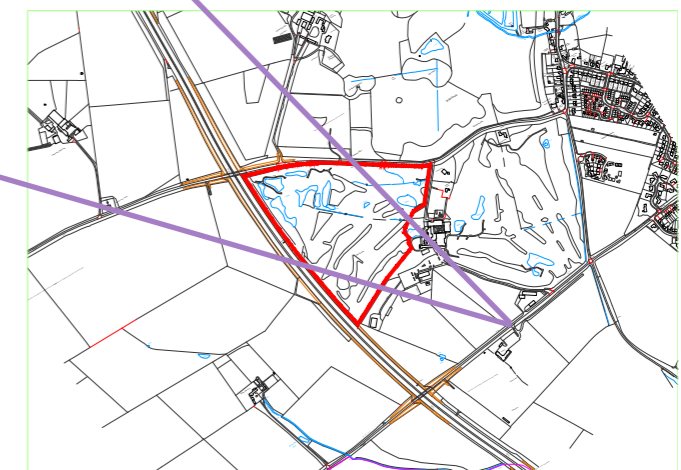
3.0 Survey.

Daytime Site photographs showing Site context & the variety of luminaires.

View of Bicester Sports Association from Green lane.



View of Bicester Sports Association from Green lane.



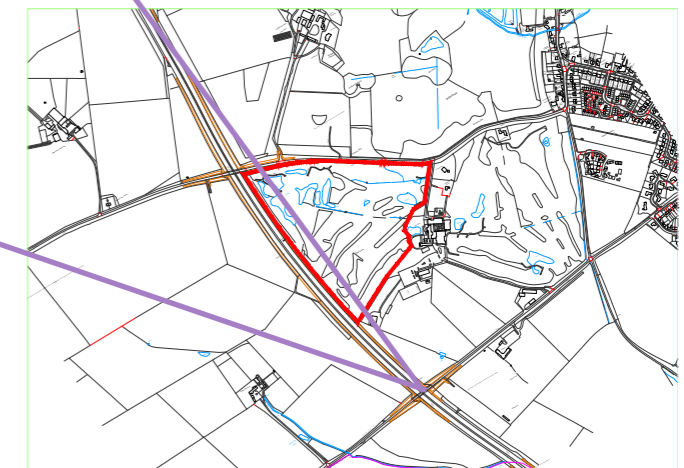
3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View from bridge on Green Lane over M40 looking south.



View from bridge on Green Lane over M40 looking south. Photo taken during lunar eclipse.



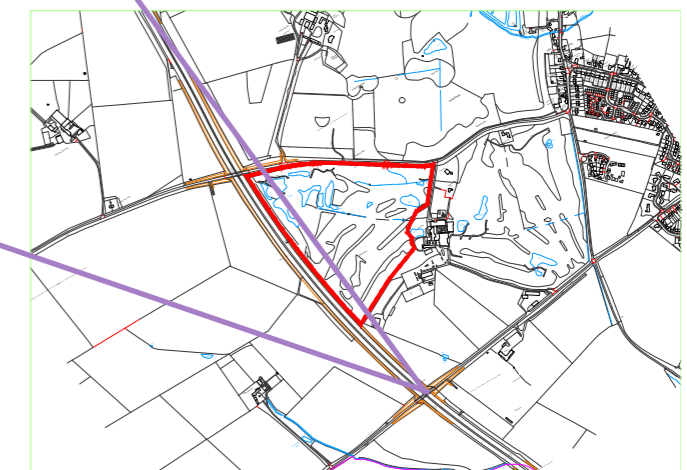
3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View from bridge on Green Lane over M40 looking north west.



View from bridge on Green Lane over M40 looking north west.



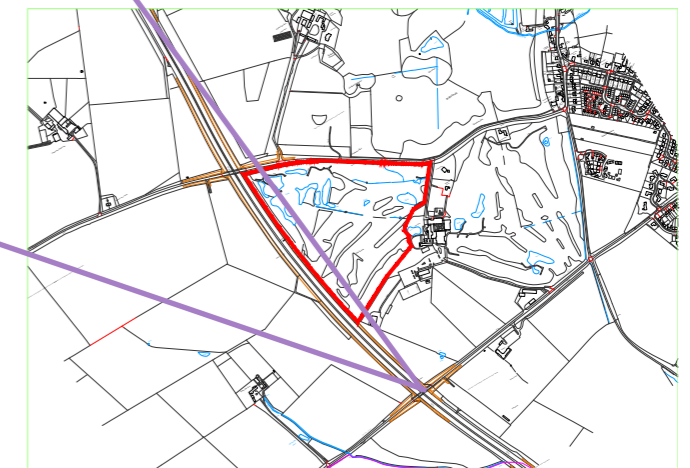
3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View from bridge on Green Lane over M40 looking north east towards tennis courts at hotel.



View from bridge on Green Lane over M40 looking south east.



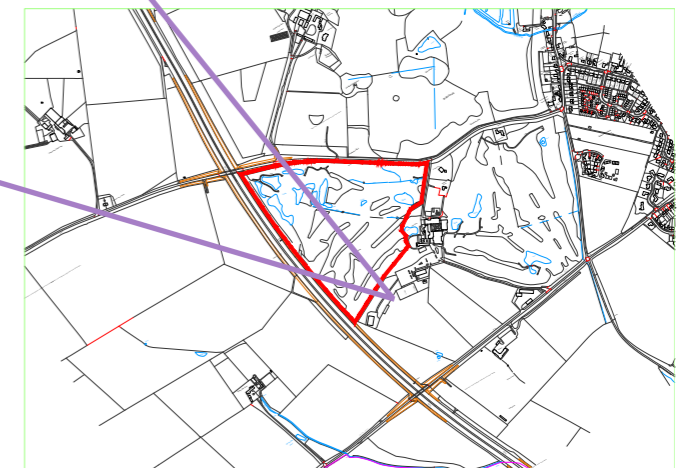
3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View of tennis courts Bicester Hotel Golf & Spa.



View of tennis courts Bicester Hotel Golf & Spa.



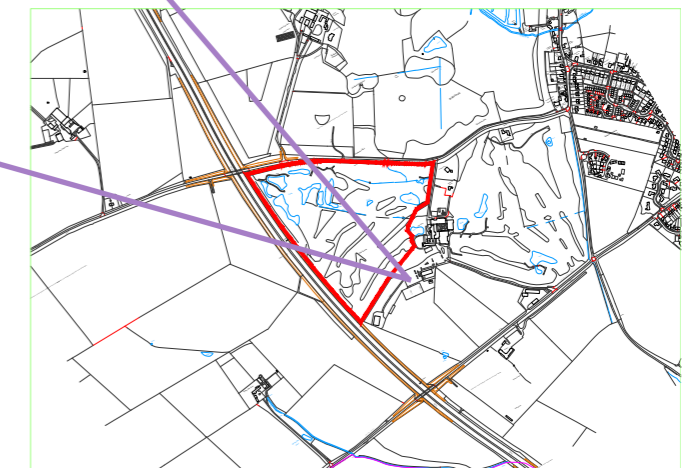
3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View of car park near tennis courts Bicester Hotel Golf & Spa.



View of car park near tennis courts Bicester Hotel Golf & Spa.



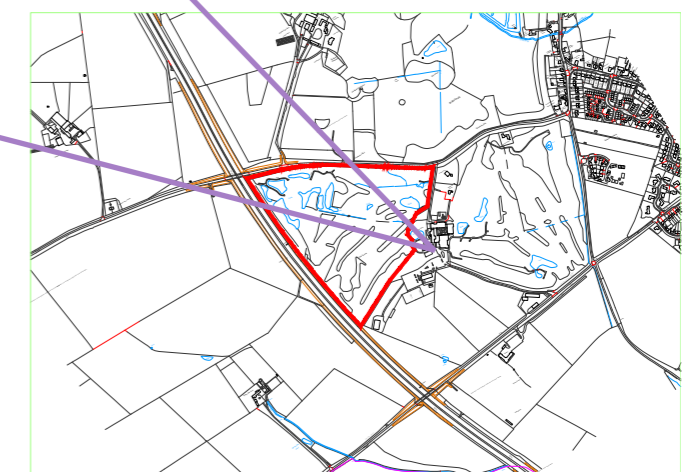
3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View near entrance to Bicester Hotel Golf & Spa.



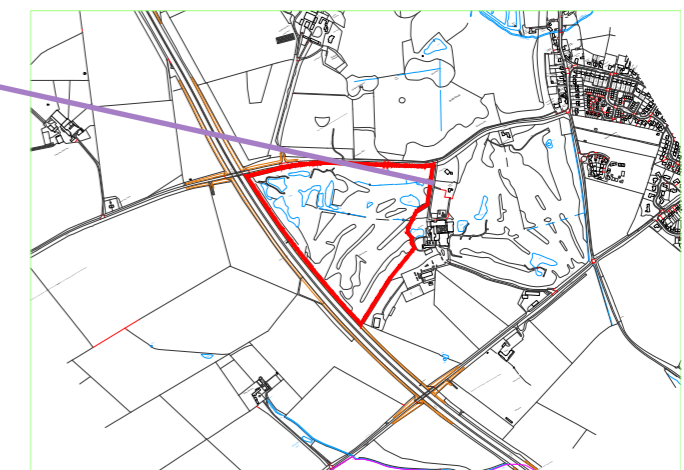
View near entrance to Bicester Hotel Golf & Spa.



3.0 Survey.

Night time Site photographs showing Site context & the variety of luminaires.

View of Stableford House on access lane to Bicester Hotel Golf & Spa.



3.0 Survey.

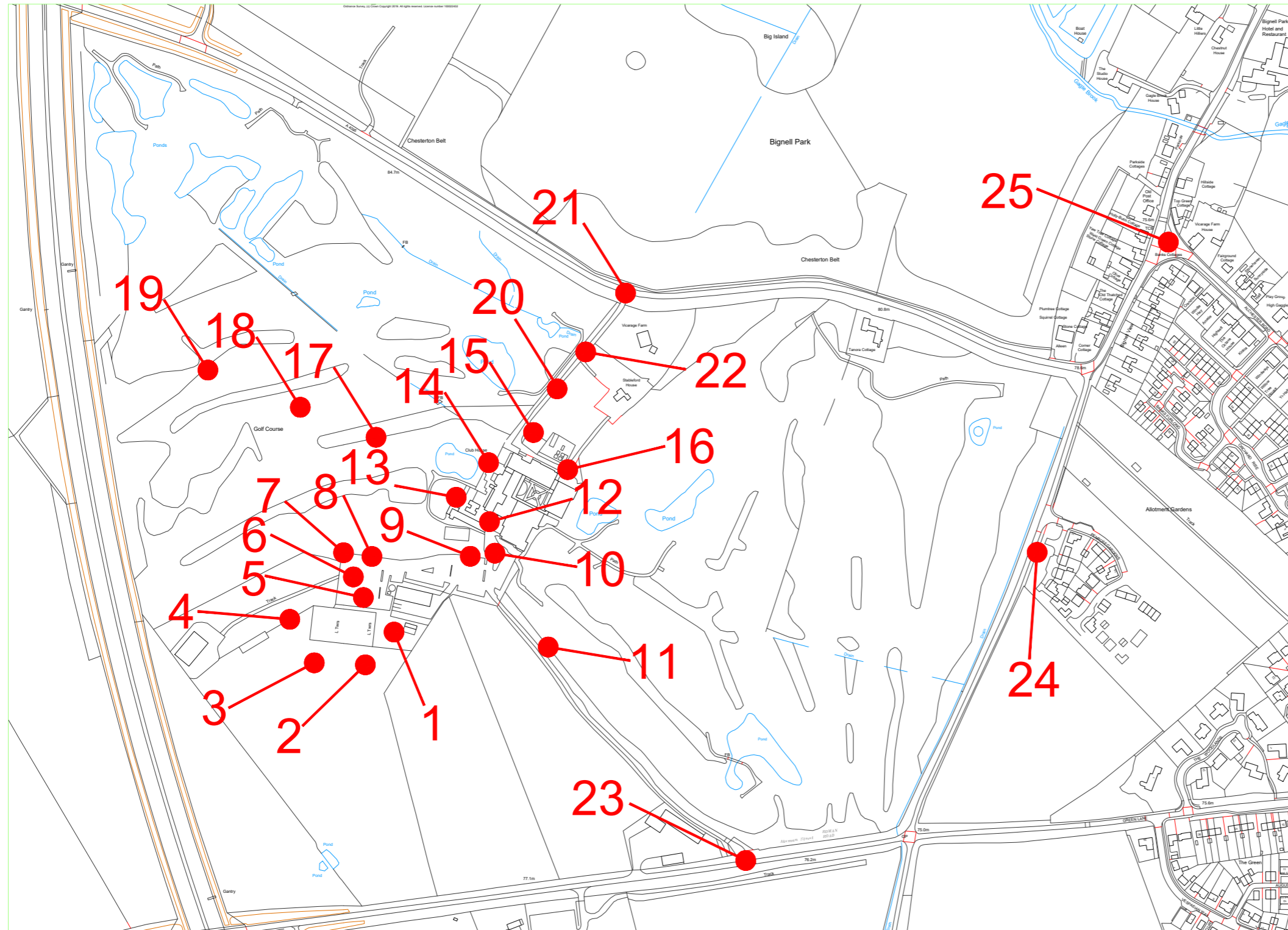


Figure 2.1 Image taken from CAD plans supplied - Showing survey points.

3.0 Survey.

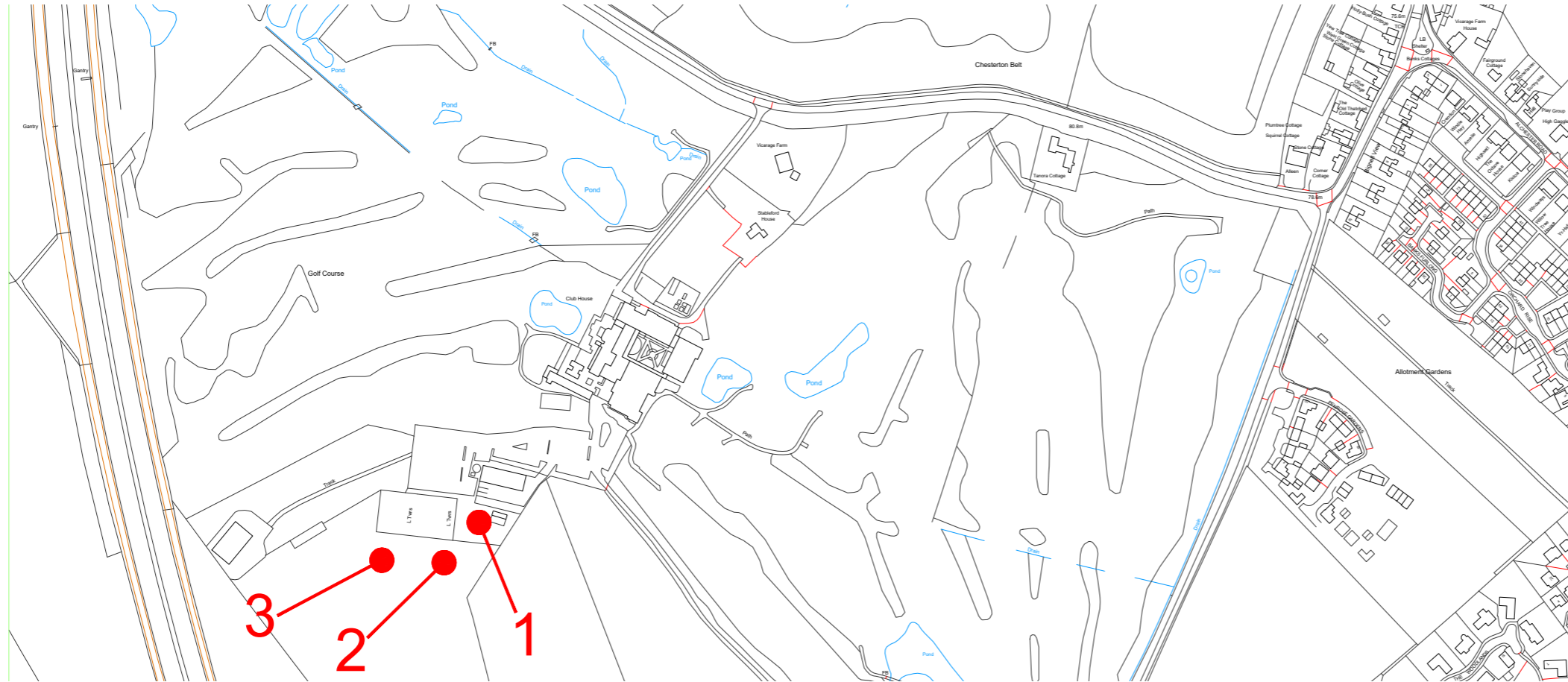


Figure 2.2 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
1	Eastern side of tennis courts.	23.57	49.00	West	E4	12m columns, Metal Halide, white light.
2	South eastern side of tennis courts.	27.70	61.40	West	E4	12m columns, Metal Halide, white light.
3	South western side of tennis courts.	31.70	43.30	East	E4	12m columns, Metal Halide, white light.

3.0 Survey.

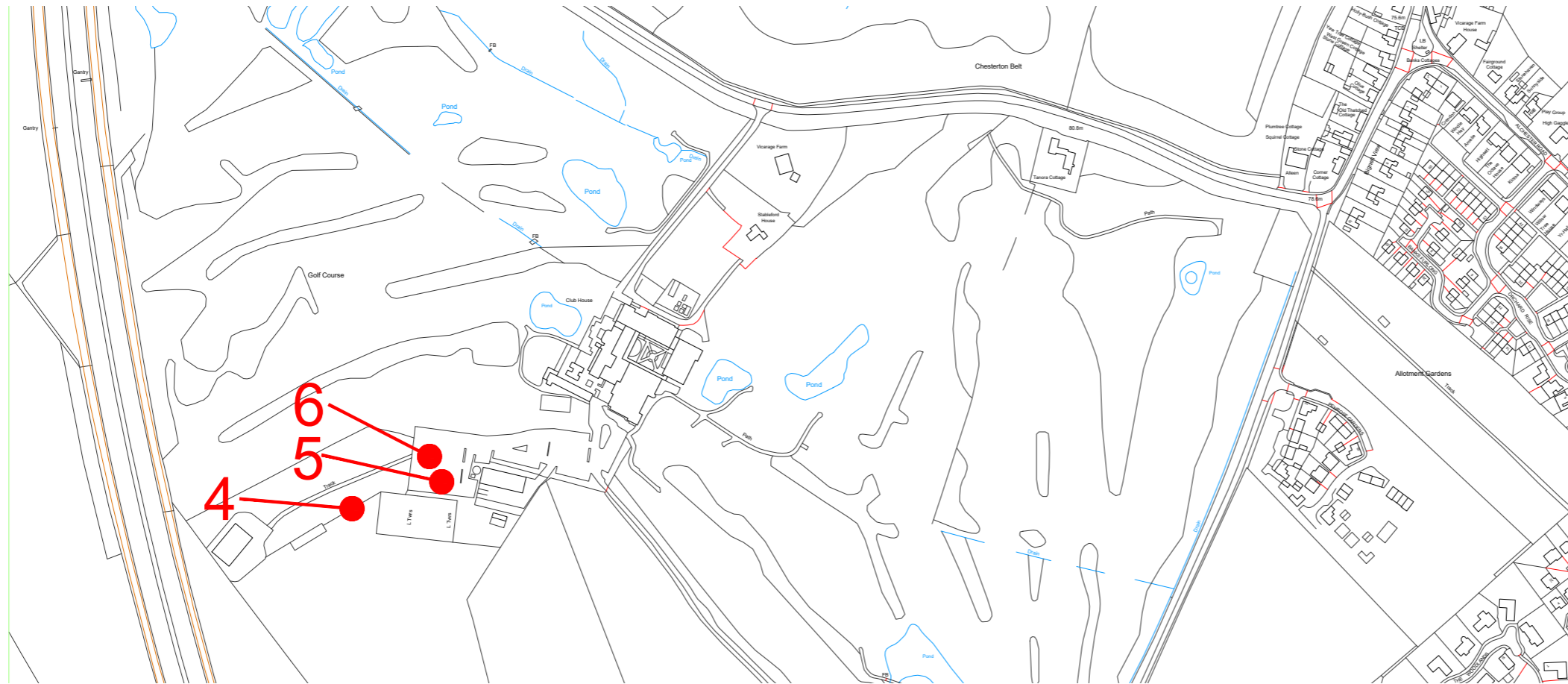


Figure 2.3 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
4	Western side of tennis courts.	8.37	34.40	East	E3	12m columns, Metal Halide, white light.
5	Northern side of tennis courts.	40.70	54.60	West	E4	12m columns, Metal Halide, white light.
6	Tennis car park (southern).	58.40	84.50	North	E4	6m columns, Metal Halide, white light. Tennis court lighting in operation.

3.0 Survey.

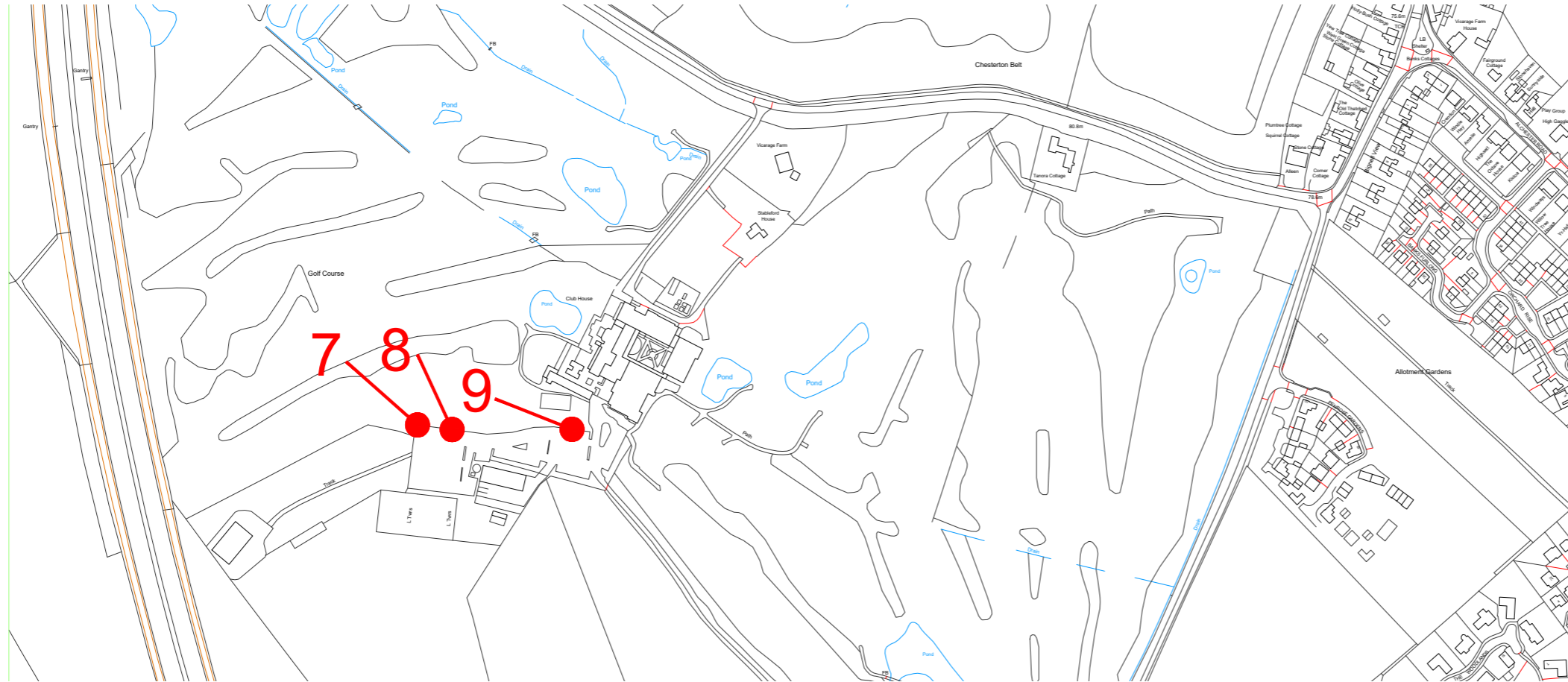


Figure 2.4 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
7	Tennis car park (middle).	20.94	17.72	East	E4	6m columns, Metal Halide, white light. Tennis court lighting in operation.
8	Tennis car park (northern).	6.74	18.54	South	E3	6m columns, Metal Halide, white light. Tennis court lighting in operation.
9	Main car park.	37.40	40.30	South	E4	6m columns, Metal Halide, white light.

3.0 Survey.

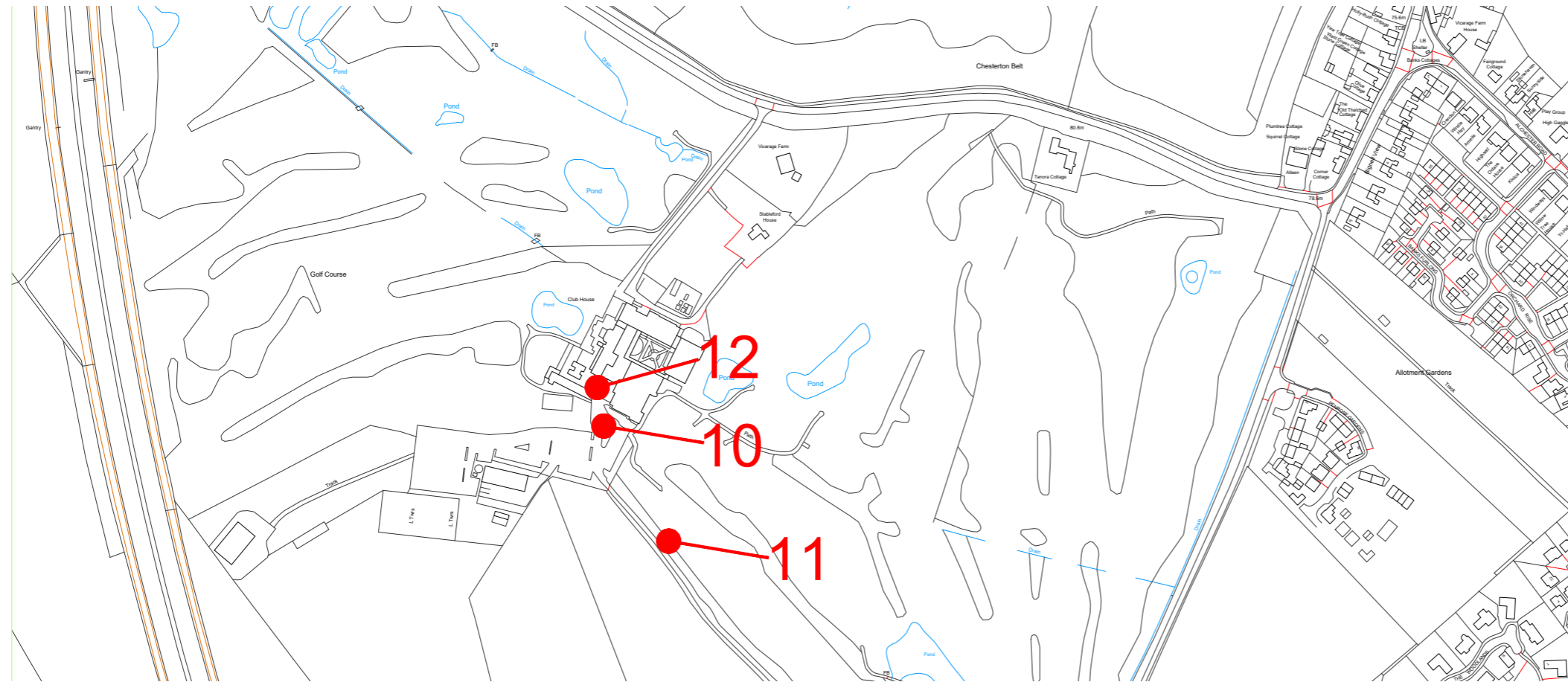


Figure 2.5 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
10	Main car park.	26.90	34.80	North	E4	6m columns, Metal Halide, white light.
11	In-between feature lit trees.	0.07	1.98	North	E2	Single LED to uplight every other tree.
12	Near Accessible bays and children's small playground.	6.51	4.65	South	E3	Wall mounted luminaires.

3.0 Survey.

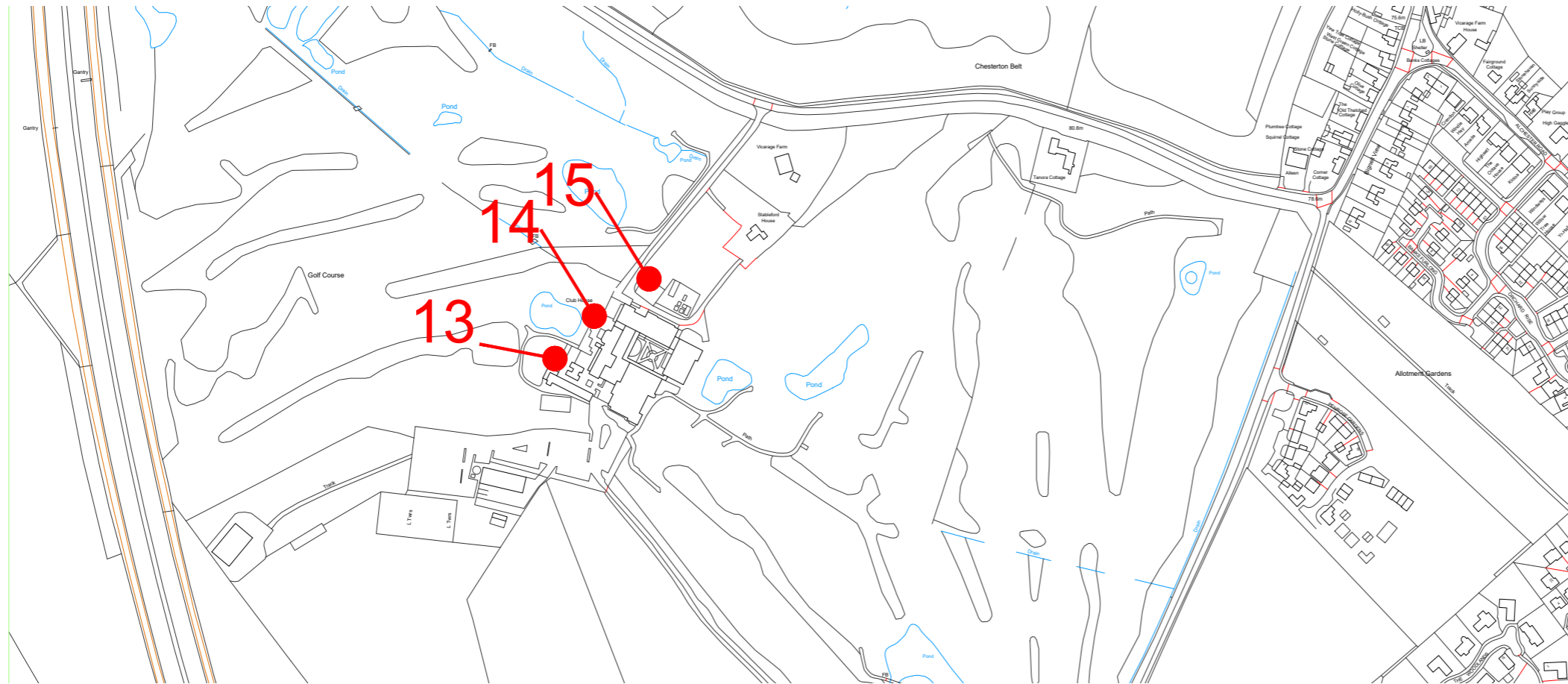


Figure 2.6 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
13	Near steps to roof terrace.	17.97	30.06	South	E4	Wall mounted luminaires plus column mounted roof terrace lighting.
14	Near rear entrance and steps to roof terrace bar on right looking towards building.	6.48	9.08	South	E3	Wall mounted luminaires plus column mounted roof terrace lighting.
15	Rear service yard.	1.60	18.00	East	E2	Wall mounted luminaires.

3.0 Survey.

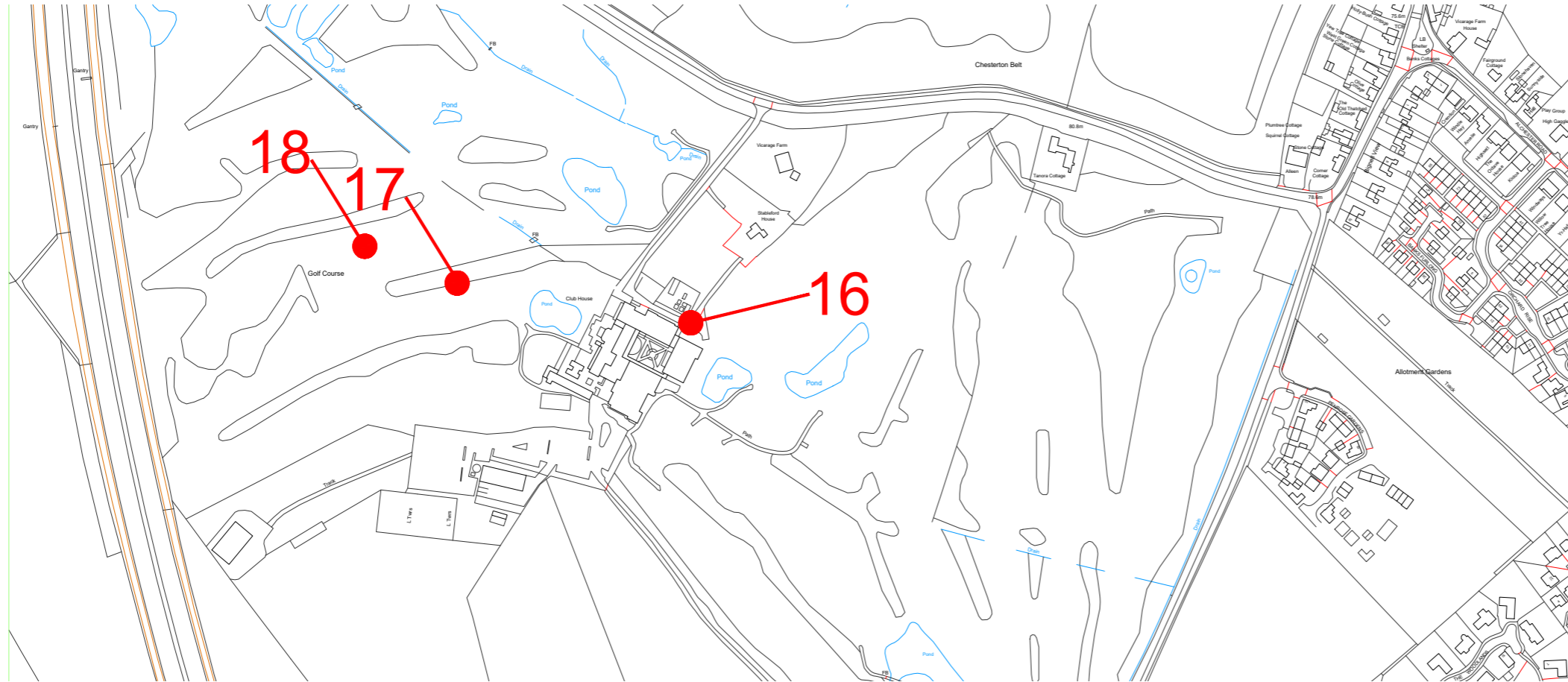


Figure 2.7 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
16	Near square arch.	1.09	2.16	West	E2	Wall & ceiling mounted luminaires.
17	On golf course approx 120 m out	0.02	0.11	East	E1	No nearby artificial light sources.
18	200 m away from golf club.	0.01	0.04	East	E1	No nearby artificial light sources.

3.0 Survey.

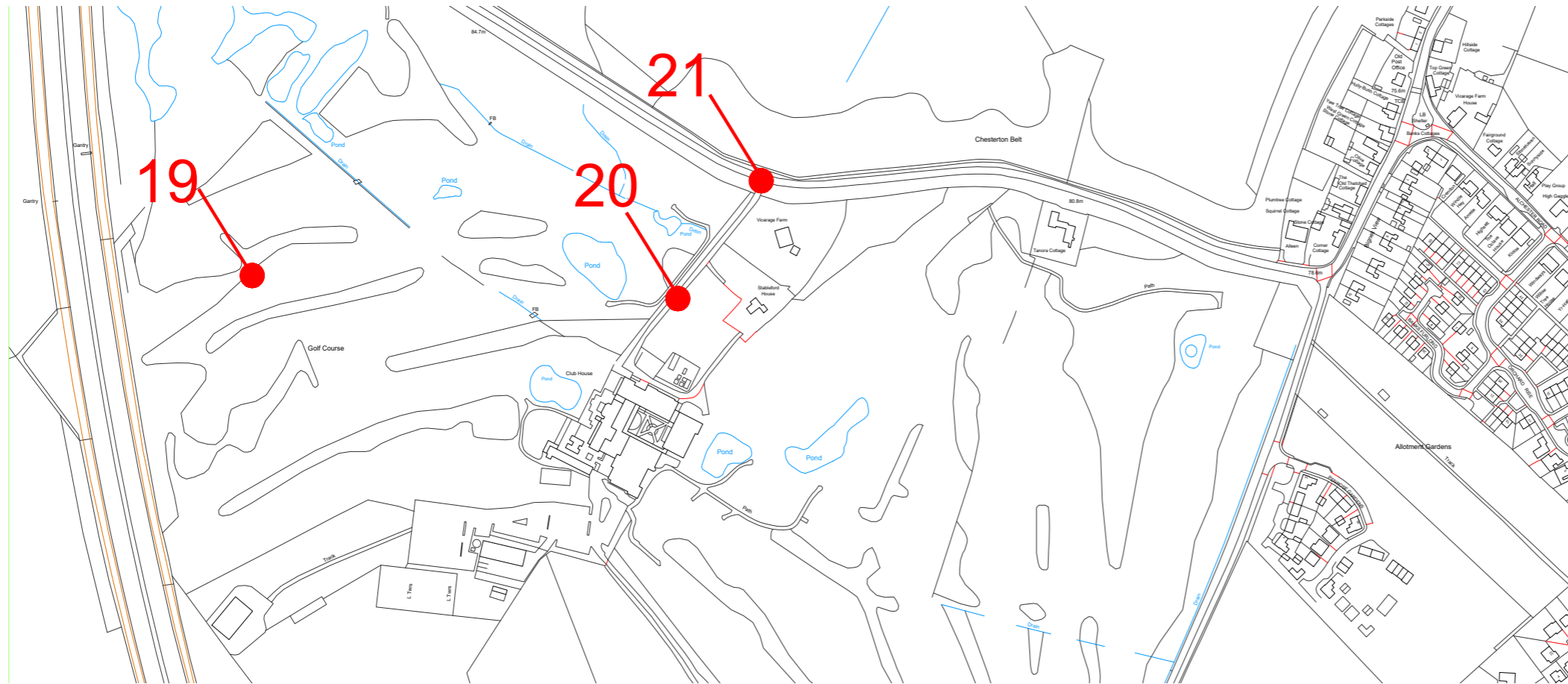


Figure 2.8 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
19	300 m away from golf club.	0.01	0.00	North	E1	No nearby artificial light sources.
20	Rear of service yard - along access lane.	0.07	0.48	South	E1	Minimal spill light from service yard.
21	Junction of Stableford Lane and A4095.	0.00	0.01	East	E1	No nearby artificial light sources.

3.0 Survey.

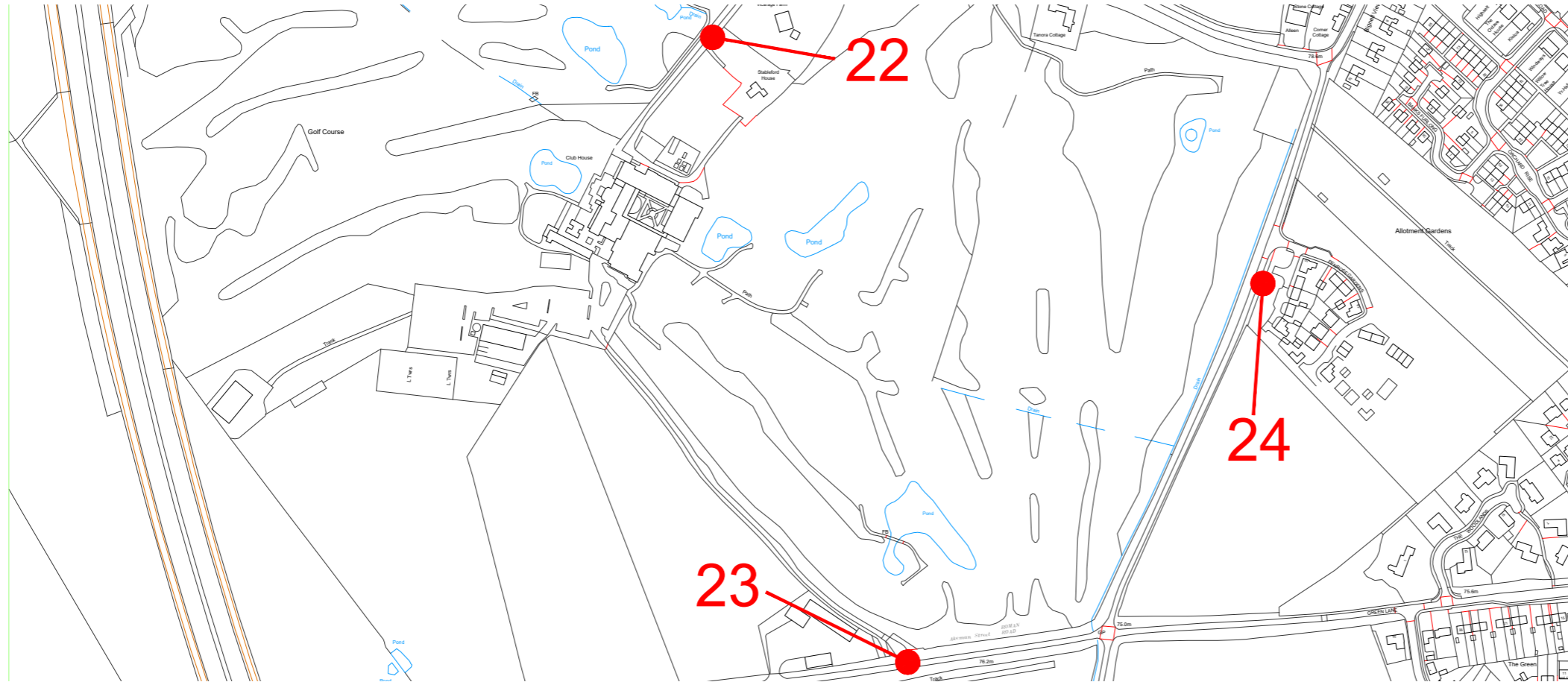


Figure 2.9 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
22	Outside Stableford House.	0.09	0.76	East	E1	Wall mounted luminaires.
23	Hotel main entrance.	15.00	28.51	East	E4	Feature lit wall
24	Penrose Gardens entrance.	1.06	0.92	West	E2	6m columns LED

3.0 Survey.

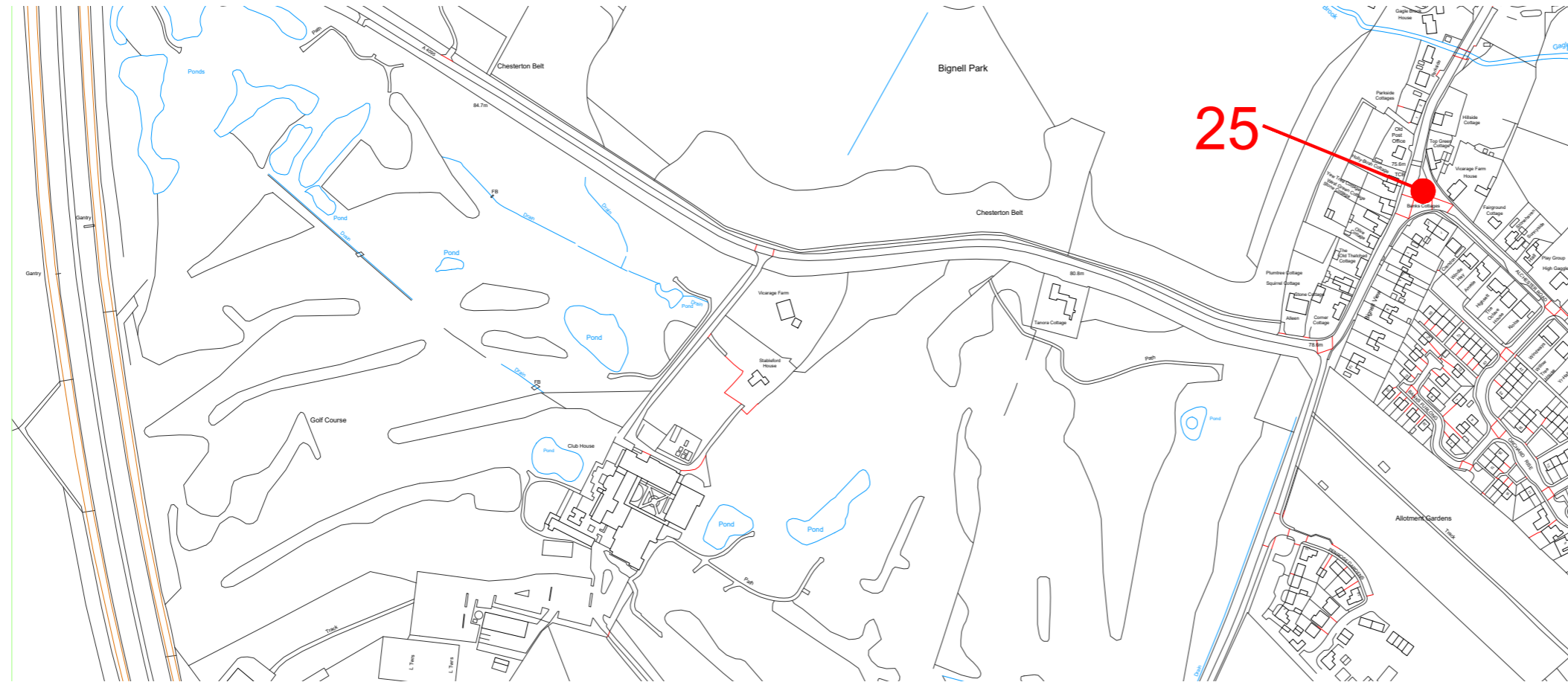


Figure 2.10 Image taken from CAD plans supplied - Showing survey points.

Survey Location	Location Name	Peak Illuminance Measurement (Lux) Horizontal at ground level	Peak Illuminance Measurement (Lux) Vertical at 1.5m	Peak Illuminance Measurement - Direction	Representative Environmental Zone	Comments
25	Chesterton village near phone box.	0.55	1.17	West	E1	Pole mounted luminaires

4.0 Sky Glow - Site and wider area.

Figure 3 below, CPRE – Great Britain's light pollution and dark skies gives a broad brush indication of the upwards light (sky glow) experienced for the year 2015 for the Proposed Development Site and further surrounding locations.

Map showing local geography of the Site to be viewed in conjunction with Figure 4.

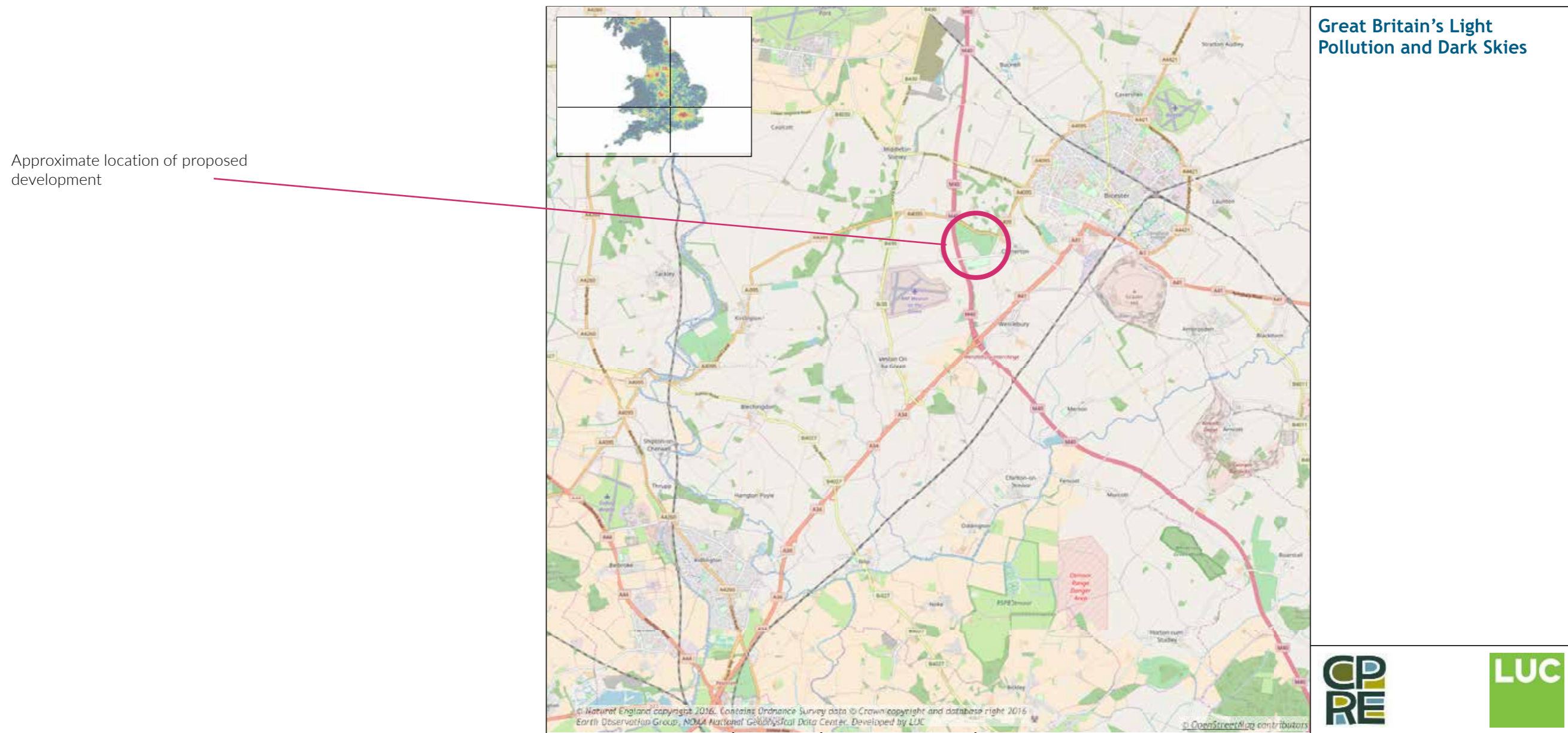


Figure 3.

4.0 Sky Glow - Site and wider area.

Figure 4 below, CPRE – Great Britain’s light pollution and dark skies gives a broad brush indication of the upwards light (sky glow) experienced for the year 2015 for the Proposed Development Site and further surrounding locations.

- Shades of blue show the ‘darkest’ levels of sky glow
- Shades of red ‘brightest’ levels of sky glow

Satellite measurements range from 0 (being a dark sky) to 255 (being a saturated bright sky at night – city centre). The development is situated in the fifth/sixth brightest band for sky glow.

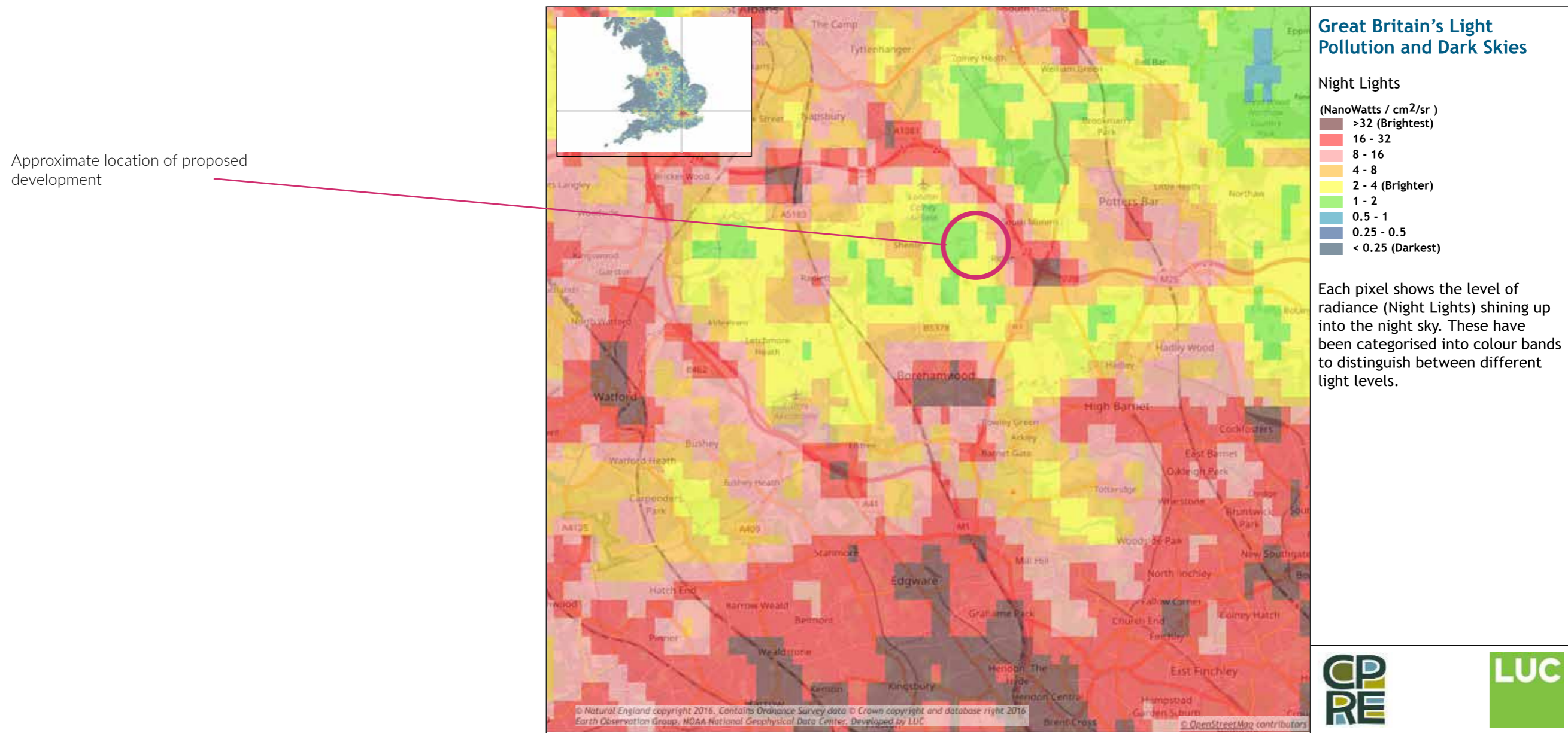


Figure 4.

5.0 Site and environmental zone classification.

To assess the Site we refer to the ILP guidance notes for the reduction of obtrusive light (2011) and CIE150.

In Figure 5 (adjacent map) areas would be classified as:

Green

- **E1 Natural, Intrinsically dark, National Parks, Areas of Outstanding Natural Beauty etc.**

The areas immediately surrounding the Site would be classified as E1. Examples of artificial lighting are restricted to domestic properties and few small scale commercial sites.

Cyan

- **E1 Natural, Intrinsically dark, National Parks, Areas of Outstanding Natural Beauty etc./E2 Rural, Low district brightness, Village or relatively dark outer suburban locations.**

The area within the red-line boundary is predominately undeveloped. There are elements of spill light from the neighbouring developments (Bicester Hotel Golf & Spa). These are more evident from vertical measurements facing those locations. Horizontally at ground level the spill light fades to natural levels within 30 to 40m. The vegetation along the A4095 and Green Lane provide a barrier to light exiting the Site. The combination classification for this area (E1/E2) is based upon predominately natural light levels being recorded, tempered by the fact that artificial light sources are often apparent within visual range.

Blue

- **E2 Rural, Low district brightness, Village or relatively dark outer suburban locations.**

The Bicester Hotel Golf & Spa building is lit utilising what appear to be metal halide light sources (white light) typically mounted. However some fittings are column mounted on the roof terrace. Several of the light fittings have high aiming angles which gives human receptors a near full view of the light source, this does create a source of glare against a dark sky. The access road from Green Lane is lit at the entrance with ground mounted uplights, the trees along the access road are also uplit to provide guidance rather than a road lighting standard of illumination.

Magenta

- **E3 Suburban, Medium district brightness, Small town centres or suburban locations.**

The car park is lit utilising what appear to be metal halide light sources (white light) on 6m columns. Several of the light fittings have high aiming angles which gives human receptors a near full view of the light source, this does create a source of glare against a dark sky. The levels of illumination are suitable for a car park with high levels of night time activity.

Orange

- **E4 Urban, High district brightness, Town/city centres with high levels of night-time activity.**

Around the tennis courts the light levels recorded were typical of an E4 environment. Although these are localised to the area, the tennis court lighting is evident from the bridge over the M40 along Green Lane.

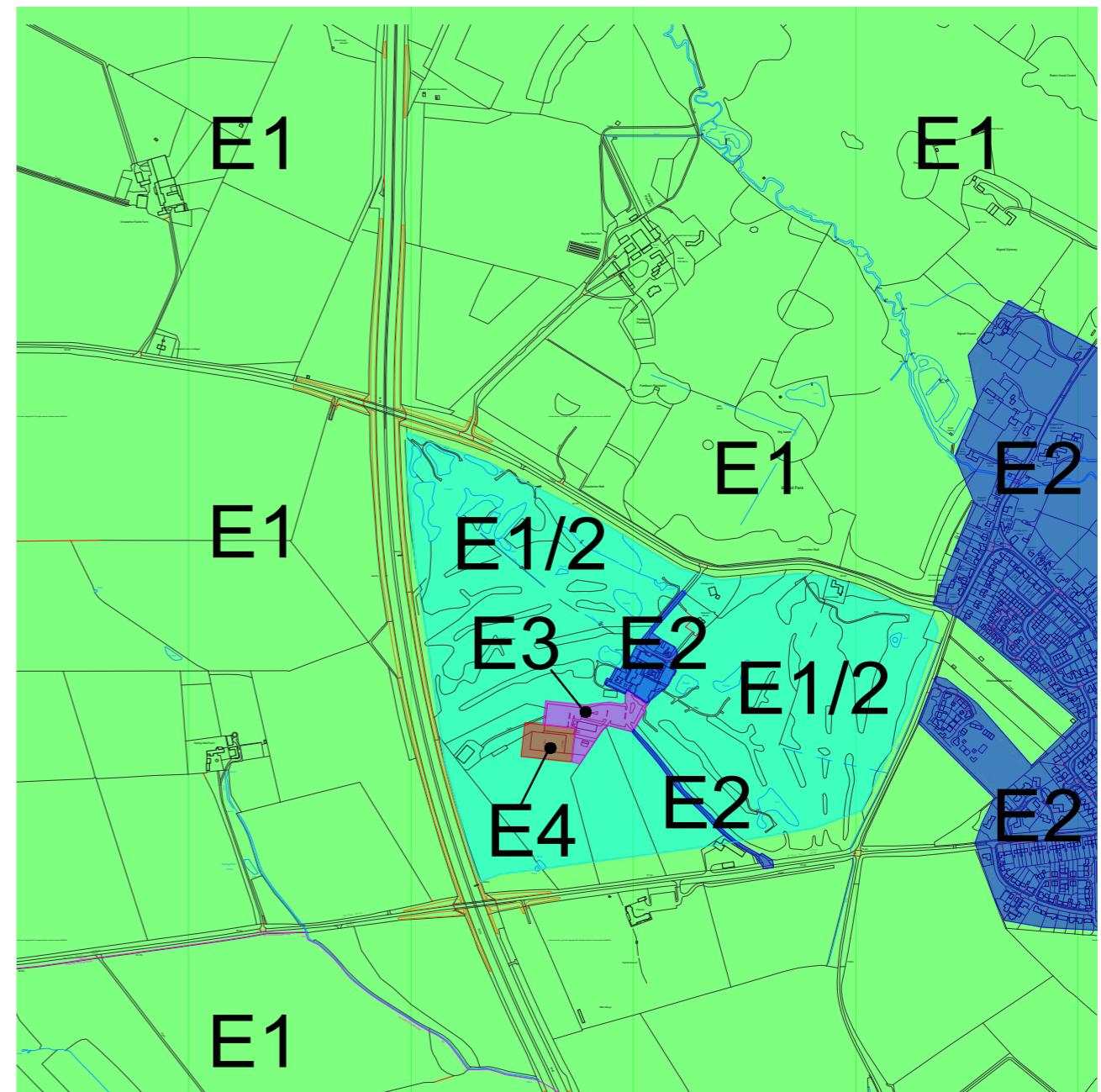


Figure 5. Map showing environmental lighting zones. Note hatched areas beyond zone of influence.

6.0 Glossary of terms.

- AONB, Areas of Outstanding Natural Beauty
- BCT, Bat Conservation Trust
- Candela, (cd) is the base unit of luminous intensity in the International System of Units (SI); that is, luminous power per unit solid angle emitted by a point light source in a particular direction.
- CIE, Commission Internationale de l'Eclairage (International Commission on Illumination)
- Direct Sky glow: the direct upward spill of light into the sky, which can cause a glowing effect and is often seen above cities when viewed from a dark area.
- Glare: (viewed source intensity) the uncomfortable brightness of the light source against a dark background which results in dazzling the observer, which may cause nuisance to residents and a hazard to road users.
- IDA, International Dark-Sky Association
- Illuminance, is calculated as the density of lumen's per unit area and is expressed using lux (lumen's/square meter). Illuminance can be measured using a light meter.
- ILP, Institution of Lighting Professionals.
- Light trespass/intrusion (vertical and horizontal): the spilling of light beyond the boundary of a property, which may cause nuisance to others.
- Lumen, a measure of the quantity of light, referred to as luminous flux or just flux, emitted by a light source. For example, a 60-watt incandescent bulb provides about 840 lumen's.
- Luminance is a photometric measure of the luminous intensity per unit area of light travelling in a given direction. It describes the amount of light that passes through, is emitted or reflected from a particular area, In basic terms it would often be referred to as the "brightness" of an object typically when viewed against a dark background. This can be measured using a light meter but is more often calculated.
- Lux, is the SI derived unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre.
- Maintenance factor, usually a percentage is allowed for in lighting calculations to allow for the effects of time on fittings and their surroundings. Light sources, drop in output, fittings and surroundings become dirtier, several factors combine to reduce the amount of light available. A typical maintenance factor would be 70% this would ensure an installation was still meeting required light levels in for example 3 years. For this report a factor of 100% (unity) has been used, that is a day one, worst case scenario.
- Receptors, ecological, human, heritage, natural. These define positions around a Site which may be impacted. Different receptors have various degrees of tolerance to increased light levels. For example an additional 10 lux in an already highly lit area (E4) could be described as negligible, whereas 0.5 lux to an ecological receptor in an intrinsically dark area (E1) could be described as major/adverse.
- Spill light, the unwanted spillage of light onto adjacent areas and may affect sensitive receptors, particularly residential properties and ecological sites.
- ULR, Upward Light Ratio. Expressed as a percentage of upward light compared to downward light.
- UNESCO, United Nations Educational, Scientific and Cultural Organization



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