

Westmill Service Station Electric Vehicle Charging Equipment Scheme External Lighting Impact Assessment

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1.0 SITE DETAILS

1.1 LOCATION

Westmill Service Station is an existing petrol station located in Hitchin. The proposal is for the installation of Electric Vehicle Charging Equipment located to the eastern side of the service station. This is to include new dedicated bays, a charging unit, localised column lighting, and all associated landscaping and infrastructure works.

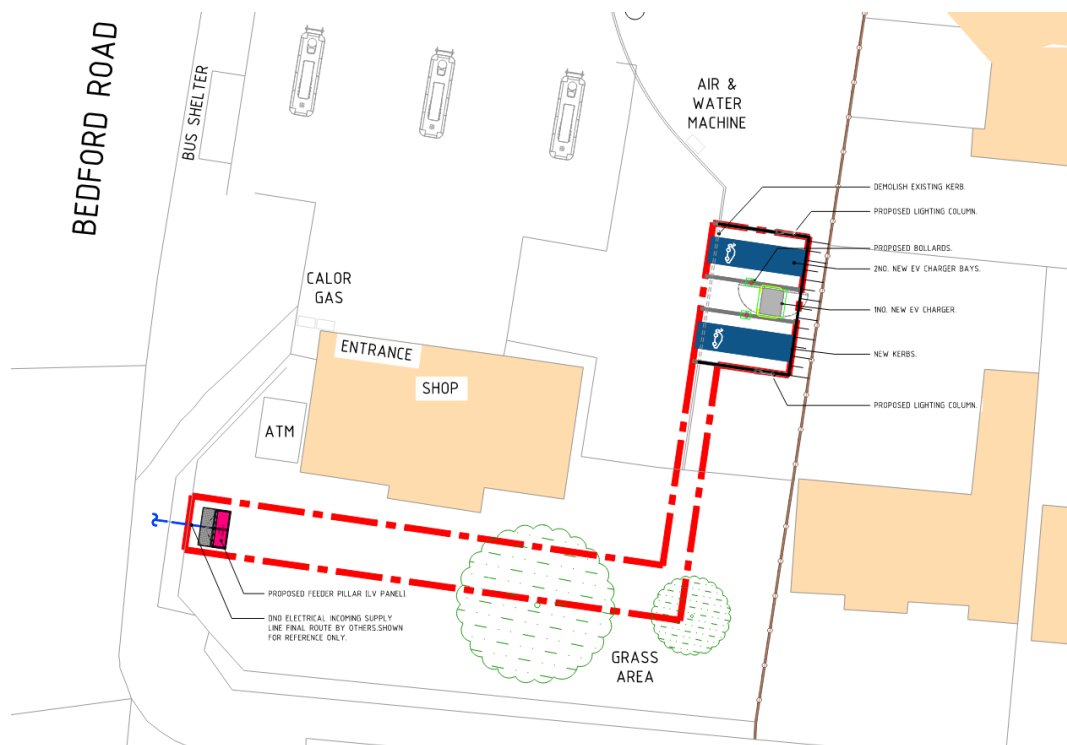


Figure 1.1.1 – Image showing the location of the proposed Electric Vehicle Charging Scheme

The service station is in a generally suburban area with adjacent properties, domestic or commercial. Of these, the properties most likely to be affected by the proposed works are positioned along Deacons Way and King Georges Close, which back on to the proposed Electric Vehicle Charging Equipment Scheme. As such, the external lighting scheme for the site has been designed in accordance with national standards and regulations. Section 3.0 of this report reviews the effect that the preselected column lighting has on these properties, and discusses the affect of obtrusive light.

This report reviews the impact on the existing neighbouring dwellings, of introducing new column lighting to the Service Station as part of the proposed Electric Vehicle Charging Equipment Scheme. The report details how the proposed external lighting scheme has a limited impact on the existing neighbouring dwellings, and that mitigation methods to reduce light spill may need to be considered as far as practically possible.

1.2 DEVELOPMENT TYPE

Westmill Service Station is an existing petrol station located on Bedford Road in Hitchin. The site is in a medium district brightness area. There are a few neighbouring properties, however the area has minimal external lighting other than street lighting.

1.3 ENVIRONMENTAL TYPE

Due to the location of the service station, it has been classed as an Environmental Zone E3 as defined within the Institution of Lighting Professionals (ILP) guidance notes for the Reduction of Obtrusive Light. The guidance document defines an Environmental Zone E3 as "medium district brightness", such as small town centres or suburban locations.

The service station and proposed Electric Vehicle Charging Equipment is in close proximity to existing neighbouring dwellings. Therefore, light spill to the existing neighbouring dwellings is the critical element of this scheme.

2.0 DESIGN STANDARDS AND GUIDELINES

2.1 BRITISH STANDARDS

BS EN 12464 – Light and Lighting

This standard details the requirements of external lighting and refers to the reduction of obtrusive light. It forms the basis of the CIBSE lighting guides and the ILP lighting guides. The standard defines the different environmental zones and details the lighting requirements for each.

2.2 CIBSE LIGHTING GUIDELINES

CIBSE Lighting Guide 6 – The Outdoor Environment

LG6 is a CIBSE lighting guide which relates generally to external lighting. The guide details the recommended lux levels and uniformity for various scenarios and areas (for example, car parks, pathways, etc.)

CIBSE SLL Code for Lighting

The SLL Code for Lighting is a covering guidance document which summaries the specific lighting guides and provides broader detail of the requirements for external lighting.

2.3 ILP GUIDELINES

ILP Guidance Notes for the Reduction of Obtrusive Light

The ILP guidance for the reduction of obtrusive light is one of the most common documents referred to when reviewing the impact of external lighting to the surrounding environment. The document details strict parameters for which external lighting must comply. The parameters are determined by the location of the development.

2.4 DESIGN CRITERIA

The Service station is located within a suburban location, which falls into the environmental zone E3. Environmental Zone E3 is defined in the ILP Guidance notes for the reduction of obtrusive light as a “medium district brightness” area, such as small town centres or suburban locations. Definitions for all Environmental Zones can be found within Table 2.4.1 below, taken from the ILP guidance documentation.

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

Table 2.4.1 – Extract from ILP Guidance Notes for the Reduction of Obtrusive Light

The proposed preselected lighting scheme has been retrospectively calculated in accordance with the standards detailed in section 2.0.

The column lighting will each be controlled via an integrated photocell arrangement.

ILP Guidance Note for the Reduction of Obtrusive Light outlines maximum values of vertical illuminance on properties. For an environmental zone of E3, as mentioned in section 1.3, this is 10.0 lux pre-curfew and 2.0 lux maximum post-curfew. Definitions for all Environmental Zones can be found within Table 2.4.2 below, taken from the ILP guidance documentation.

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on properties.						
Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E _v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

Table 2.4.2 – Extract from ILP Guidance Notes for the Reduction of Obtrusive Light

3.0 LIGHTING DESIGN

3.1 SELECTED LUMINAIRES

Luminaires have been preselected as part of the Electric Vehicle Charging Equipment Scheme, to help provide the correct light levels and uniformity across the electric vehicle charging equipment and associated bays, whilst minimising the overall spill of light to the existing neighbouring dwellings. The preselected luminaires generally have directional diffusers and LED light sources, to help control the light distribution and reduce the overall glare from the fitting. The luminaires also have 0% upward light ration to further reduce spill.

The columns modelled within the lighting calculation are 3m, based on the information provided to Delta Green, and positioned to direct light across the electric vehicle charging bays. Mounted with an angle of 15°.



Figure 3.1.1 – preselected luminaire used within the lighting calculation – Philips ClearWay Gen2 DM50, 38.8W, 4730 lm, 4000K LED colour temperature, Colour Rendering Index 70

3.2 LIGHTING CALCULATIONS

The proposed external lighting scheme has been calculated using software called DIALux, developed by DIAL GmbH. The software allows the user to model the geometry of the site and neighbouring properties to represent the site, and then import photometric data for the light fittings to accurately assess the impact of lighting.

Photometric data is produced and issued by the manufacturer by means of an eulumdat file. The file contains all of the photometric data pertaining to the fitting including output levels, colour temperature, and light distribution. The data is then calculated in the context of the geometric modelling to determine the impact of lighting.

Once the model has been set up, and luminaires have been added, the user can analyse the effect that these different luminaires have with regards the level and uniformity of light on a given surface.

The calculation model for Westmill Service Station demonstrates that the maximum lux reading on the vertical face of any neighbouring property is 1.43 lux. All other readings fall below this value, as such demonstrating compliance with the ILP post-curfew lux limits for this environment type.

The results against each of the calculations surfaces (vertical faces of neighbouring properties is detailed in figure 3.2.1 below. Note the maximum permitted value is 2.0lux.

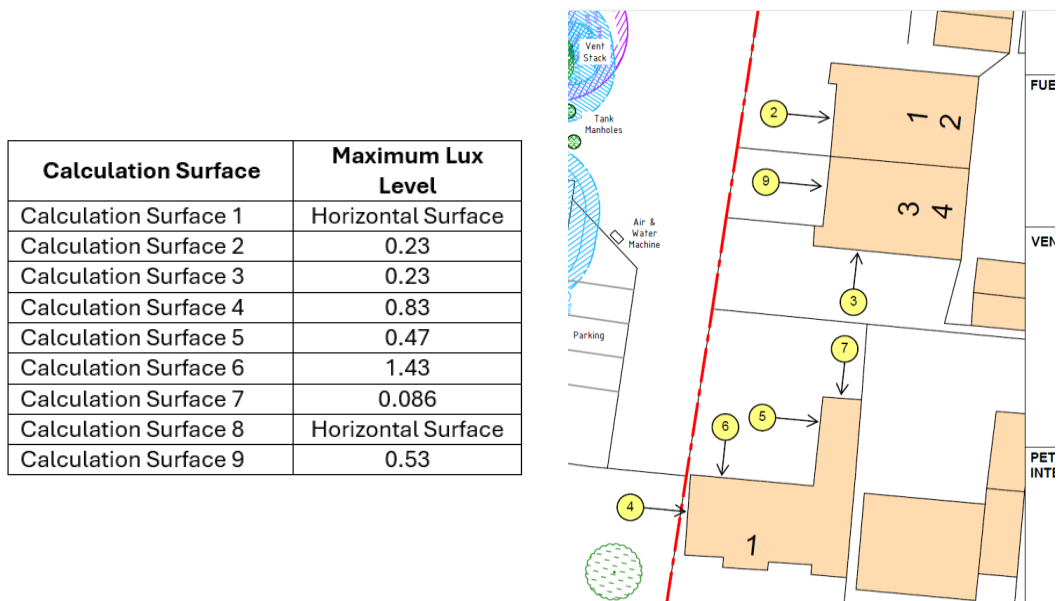


Figure 3.2.1 – Image showing the calculation surfaces

*The proposed preselected external column lighting model has been constructed for the purpose of expressing lux levels only and does not accurately reflect the visual appearance of the Service Station or the neighbouring gardens.

3.3 LIGHTING DRAWINGS

Images have been included in this section which accompanied the calculation, which shows light distribution across the electric vehicle charging equipment and bays, the neighbouring gardens and dwellings, the existing fence line, and the proposed preselected external lighting layout of luminaires at the Service Station.

Figure 3.3.1 details the general layout of the lighting model.



Figure 3.3.1 – General layout of the lighting model

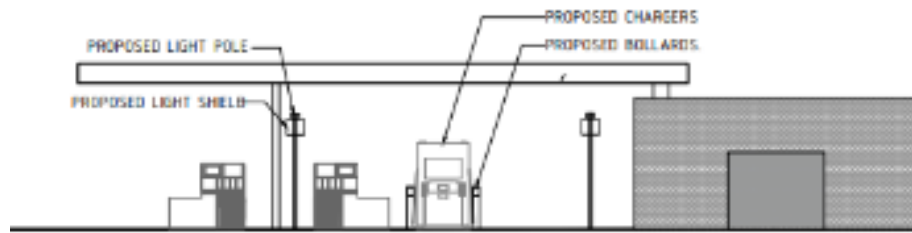


Figure 3.3.2 – Section drawing of the proposed lighting and charging equipment

Figure 3.3.2 details the luminaire positions. The type of luminaire can be cross-referenced with the luminaire selection detailed in section 3.1.

Figure 3.3.3 below is a false colour rendering representation of the light levels from the calculated lighting, which demonstrate the lux levels across the space.

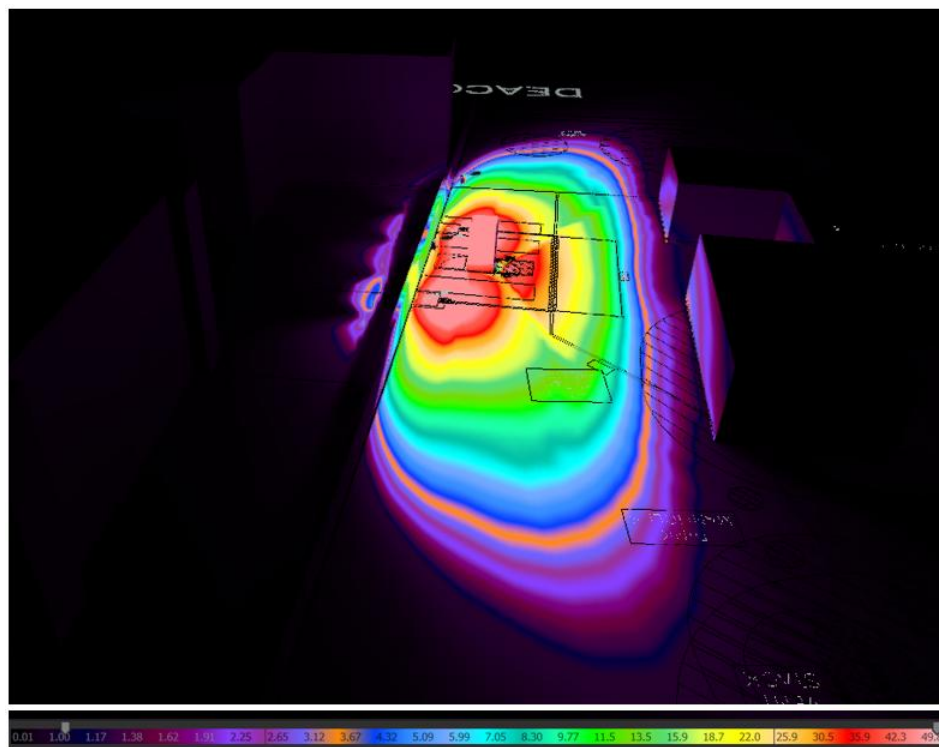


Figure 3.3.3 – False Colour Rendering of Lighting Calculations

3.4 LIGHTING CONTROLS

Lighting controls can be used to help further reduce the impact of lighting on the surrounding environment.

Lighting controls can ensure that lighting is used correctly for the intended purpose and is not used unnecessarily or excessively.

The preselected column lighting will each be controlled via an integrated photocell arrangement.

The system shall also be provided with manual override such that lighting can be turned on or off as required outside of normal operation.

Photocells are also known as 'dawn to dusk' sensors. Briefly described as the following; At dusk, as the natural light level decreases, the sensors prompt the lights to activate, ensuring areas remain illuminated throughout the night. At dawn, as the natural light levels increase, the sensors automatically switch the lights off. Thus, conserving energy and reducing unnecessary light exposure during daylight.

It is noted that the electric vehicle charging station is likely to operate beyond post curfew hours, as defined by the ILP guidance notes, however the calculated values do not exceed the maximum permitted levels and as such does not pose a risk of unreasonable obtrusive light.

4.0 MITIGATION OF LIGHT SPILL

4.1 MITIGATION METHODS

A number of mitigation methods have been considered with a view of further mitigating the risk of light spill to neighbouring properties. This includes reducing the height of the lighting columns, adjusting the position and angle of the lights to minimise spill, and introduce light shields (baffles) to further block lighting and prevent the risk of glare.

The columns were originally installed at a height of 4m. Compared with the adjoining fence, this was considered too high leading to unwanted spill into the neighbouring gardens. As such, the columns will be reduced to 3m. The calculation model is based on the revised height of 3m and demonstrates that light spill is significantly reduced and provides a scheme that is compliant with ILP guidance on the reduction of obtrusive light.

The heads of the light fittings have been carefully positioned to minimise back-spill from the heads which has also be done in conjunction with the light shields / baffles. The results in a tight line of light, well controlled and designed (and installed) to target the EV charging area only.

5.0 SUMMARY

In summary, the preselected column lighting will have a limited affect the surrounding area. The domestic properties that are immediately adjacent to the proposed Electric Vehicle Charging scheme will have a minimum level of light spill into rear gardens with a very low level of reflectance on the vertical faces.

The scheme has been designed in the way deemed most appropriate to help reduce the level of spill to the surrounding buildings whilst incorporating preselected parameters with regards to luminaire selection and column height.

The lighting has been modelled to show the extent at which the level of light reaches onto the existing neighbouring gardens and dwellings. The results show that the existing fence line is critical in mitigating some light spill into the neighbouring gardens and onto the neighbouring dwellings, and additional measures have incorporated to further mitigate the spill.

Luminaires have been preselected to ensure that suitable light levels are achieved across the electric vehicle charging equipment.

The angle and orientation of the luminaires, is critical in providing a scheme that is compliant with ILP guidance on the reduction of obtrusive light. With additional consideration required for the introduction of luminaire baffles.

This report supports a retrospective planning application, and therefore the lights and mitigation measures suggested in this report have been installed. Baffles have been installed as close to the light source as reasonably practicable. As set out in this report, the lighting as installed is compliant with ILP guidance on the reduction of obtrusive light and does not result in an unacceptable level of lighting spill to existing neighbouring gardens and onto the neighbouring dwellings.