

# **Lighting Mitigation Strategy**

## **Cambushinnie 400kV Substation**



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## **1. INTRODUCTION**

### **1.1 Project Background**

This project, alongside several other major electricity transmission network upgrades planned in the north of Scotland, is part of a Great Britain wide programme of works that are required to meet UK and Scottish Government energy targets. In order to support this and the transition to a low carbon energy network, a new 400kV substation at Braco West (to be known as Cambushinnie) is required to connect to the existing 275kV Braco West substation and the Beauly – Denny overhead line.

### **1.2 Purpose of the Plan**

This plan outlines the strategy that will inform the detailed lighting design to ensure that the lighting at the new substation does not adversely impact on the local environment or neighbouring properties.

## **2. PROJECT DESCRIPTION**

### **2.1 Project Summary**

A new 400kV outdoor AIS substation at Cambushinnie is proposed to support the upgrade of the Beauly-Denny OHL to 400kV double circuit.

The existing 275/33kV Braco West substation will connect to the new 400kV substation via approximately 500 m of 33kV underground cable. The existing two 275/33kV Super Grid Transformers (SGTs) and 275kV switchgear will be removed from the existing substation and the 33kV cable from the new substation will be routed into the vacated connections on the continuing grid supply point within the 275kV substation control building.

The proposed Cambushinnie substation will be the final substation on the Beauly-Denny 400kV circuit before transfer to Scottish Power.

The OHL tie in works from the new Cambushinnie 400kV substation to the existing Beauly – Denny OHL will be undertaken by others and consent applied for separately through the submission of a Section 37 application to the Energy consents Unit (ECU).

### **2.2 Project Location**

The proposed 400kV Cambushinnie substation is located close to Braco in Perth and Kinross. The proposed location is in close proximity to the existing 275kV Braco West substation.

Both sites are currently accessed off the B8033 near Braco.

The project is currently in design stage. This document sets out the strategy for lighting during the construction and operation of the substation. This strategy will be used to inform the planning application.

### 3. RELEVANT LEGISLATION

The relevant legislation, policy and guidance in relation to obtrusive light to take into consideration for this Lighting Strategy are listed below:

- National Planning Framework 4, Adopted February 2023
- Scottish Executive Controlling Light Pollution and Reducing Energy Consumption, March 2007
- Institution of Lighting Professionals Guidance Note 01/21 The Reduction of Obtrusive Light, January 2021
- Bat Conservation Trust Guidance Note 08/18 Bats and artificial lighting in the UK, September 2018

### 4. LIGHT SENSITIVE RECEPTORS

#### 4.1 Environmental Zones

The Institution of Lighting Professionals (ILP) has established Environmental Zones for exterior lighting based on the external ambient lighting levels in the area. Table 2-1 describes the Environmental Zones as per ILP GN 01/21 – The Reduction of Obtrusive Light.

Table 2-1 ILP Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ≈15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

\*SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA).

The project location currently lies within zone E2: Rural.

#### 4.2 Receptors

The following potential light receptors have been identified below:

- The existing substation.

- Users of the adjacent public road (B8033).
- Surrounding residential receptors including Bentick, Tamano, Calzieveg and Knoxfauld Farm
- Tamano farm camping and glamping facility.
- Ecology within the local area. (Note ecological surveys are ongoing and have not identified any specific receptors, however it is likely that the surrounding area in general will be used by nocturnal species such as bats and badgers.)

## 5. DESIGN PRINCIPLES

SSEN Transmission have provided a design lighting requirement in their internal design guidance document.

This guidance requires the following:

*“Complete floodlighting scheme to achieve a maintained average of 6 lux illumination throughout the HV compound and transformer enclosures. The maintained minimum point illumination shall be 2.5 lux. All floodlights to be accessible for maintenance without circuit outages. Floodlights to be controlled by weatherproof outdoor switch(es), mounted at suitable personnel access position.*

*Lights with passive infrared detectors to be provided to illuminate the access gates and doors to assist personnel entering the site during the hours of darkness.”*

## 6. OBTRUSIVE LIGHT MITIGATION STRATEGY

### 6.1 Construction

Construction lighting will be in accordance with the Construction Environment Management Plan (CEMP) prepared by the Principal Contractor. Where possible works will be carried out during daylight hours to minimise the risk of disturbing protected or notable nocturnal species. When required lighting will be directional task oriented and will only be used in active working areas. Particular care will be taken to minimise lighting of woodland edges to minimise adverse effects on nocturnal wildlife. Lighting will be controlled via time clocks to ensure that lights are not accidentally left on, out with working hours.

No lighting will be provided on the haul road, low level lighting will be provided in all footpath areas to ensure safe access to and from the work site. Lighting will be required in compound and welfare areas during operational hours of darkness for safety and security. Lighting will be directional to minimise spill to the surrounding environment.

### 6.2 Operation

The proposed substation equipment would not be illuminated at night during normal operation. Floodlights would be installed but would only be used in the event of a fault during the hours of darkness; during the overrun of planned works; or when activated as security lighting for night-time access. The access track would not be lit under normal operation

LED luminaires are proposed for lighting of the development. Compared to older traditional high pressure sodium lanterns that have been used for street lighting in the past, the output of LEDs can be define their angle of light output via the optic setting chosen. In using a LED luminaire, the light output can be focused onto the areas required to be illuminated. A suitable optic setting of the luminaire will be utilised to narrow the distribution of light from the luminaire onto the carriageway.

As defined in the Bat Conservation Trust's (BCT) Guidance Note 08/18, LEDs typically feature no ultraviolet (UV) content, UV is known to adversely impact upon the behaviour on airborne insects and bats.

No preferred colour temperature has been specified and therefore 4000K (neutral white) is proposed for this development.

Lighting will be designed to the required specification with care taken not to over light the substation. Lighting will be angled towards the substation and away from the site boundary.

Lighting shall be sensor controlled to prevent areas that are not in use from being lit unnecessarily.

## **7. CONCLUSION**

The Site is connected to the wider landscape by habitats, such as woodland blocks, that are likely to be used by bats for commuting and other nocturnal species. Directional task lighting will be important for minimising potential disruption. No other sensitive receptors are close enough to the site to warrant specific mitigation, other than the best design practice outlined in this strategy.

The use of LEDs directed within the substation compound together with the use of presence sensors will ensure that the substation is only lit when required for maintenance or repair work. This will also ensure that lighting does not spill into the adjacent areas surrounding the substation.

The proposed average light level of 6 lux will prevent any adverse impacts on the E2 – Rural environmental zone of the existing areas.

No lighting will be provided on the haul road, maintaining locally dark roadways.

The implementation of the proposed design parameters and mitigation measures within sections 5 and 6 of this strategy will prevent any obtrusive light from the new development affecting the surrounding environment and light sensitive receptors.