



## Kintore Hydrogen Plant

### Lighting Principles Statement

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<https://www.kintorehydrogen.co.uk/>

Kintore Hydrogen Limited  
4th Floor  
80 Victoria Street  
London  
SW1E 5JL

## Qualifications

Prepared by: Millie Potter

Contributors: Erin Banks

Checked by: Erin Banks, Tom Dearing

This document has been prepared by Millie Potter BSc (Hons), MSc, a practitioner member of the Institute of Environmental Management and Assessment, who has 2 years' experience.

It has been checked by Tom Dearing, a Chartered Environmentalist and full Member of the Institute of Environmental Management and Assessment, who has 14 years' experience of environmental impact assessment.

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# 1 Introduction

## 1.1 General

1.1.1 This document is a statement of lighting strategy principles to be adopted for Kintore Hydrogen Plant (the proposed development). It accompanies the planning application in principle and the Environmental Impact Assessment Report (EIAR) made by Kintore Hydrogen Ltd (Kintore Hydrogen or 'the applicant'). The proposed development is described in Volume 2, Chapter 2: Project Description of the EIAR.

1.1.2 The purpose of this document is to provide an initial statement of lighting design principles and an outline of the lighting strategy to be followed during subsequent detailed design of the proposed development. It is anticipated that lighting details, in line with the overall principles and strategy set out in this document, would be subject to approval post-consent.

## 1.2 Goals of a lighting strategy

1.2.1 The goal of the lighting strategy for the proposed development is to provide the necessary lighting for safe working and site security during construction and operation while minimising light spillage any impacts on sensitive human and ecological receptors.

1.2.2 This document aims to:

- identify the relevant policy, guidance and lighting standards;
- describe the existing ambient lighting conditions at the application site;
- establish the types and general locations of lighting required to operate a safe, secure and energy efficient development;
- identify the light-sensitive receptors which could be affected by artificial lighting required; and
- establish the strategy and design objectives for external lighting, to be followed in subsequent design and approval stages, to minimise adverse effects.

## 1.3 Implementation of the lighting strategy

1.3.1 The framework and principles established in this document will be inform a final Lighting Strategy which will be adopted by the applicant. The adopted Lighting Strategy will be prepared during the detailed design stage (post consent) to reflect more detailed design information, and will include modelling to show illuminance levels (as lux contour lines).

1.3.2 The approval of the Lighting Strategy is expected to be secured through an appropriately worded planning condition as part of the planning consent.

## 1.4 The proposed development

1.4.1 Kintore Hydrogen Ltd proposes to develop a hydrogen production plant on land next to Kintore Substation in Aberdeenshire. The hydrogen plant would be a facility for the production of hydrogen from water by electrolysis using primarily renewable energy.

1.4.2 The land within the application boundary can be divided into five parts:

- the main electrolysis plant site including temporary construction access and permanent access road;
- the electrical connection from Kintore Substation to the electrolysis plant;
- the underground hydrogen pipeline to a connection and blending point for export into National Gas's existing National Transmission System (NTS), referred to as the 'above-ground installation' (AGI) for the hydrogen export connection;
- the water abstraction and discharge point, pumping and potential water treatment station, and underground water pipelines to and from the River Don; and
- the riparian and other habitat creation and enhancement area on the east bank of the River Don.

1.4.3 Further information about the proposed development is provided in Volume 2, Chapter 2: Project Description of the EIAR.

1.4.4 The focus of this document is on the main electrolysis plant. Minimal lighting is expected to be required for the gas connection above-ground installation and the water pumping station and potential treatment works, but these are also included insofar as relevant. No lighting during operation would be required for the underground electricity cable route or pipeline routes for water and hydrogen.

## 2 Planning Policy and Guidance

### 2.1 National planning policy

#### National Planning Framework 4 (NPF4)

- 2.1.1 At a national level, the need to consider the potential effects of artificial lighting is embodied in several policies of the National Planning Framework 4 (NPF4)<sup>1</sup> and should be considered within the planning process to reduce the potential effects on local amenity and nature conservation.
- 2.1.2 Policy 3: Biodiversity states that “any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design.”
- 2.1.3 Policy 11: Energy states that “in addition, project design and mitigation will demonstrate how the following impacts are addressed: i. impacts on communities and individual dwellings, including residential amenity... ix. Biodiversity including impacts on birds...”
- 2.1.4 Policy 14: Design, Quality and Place states that development proposals will be supported where they are consistent with the six qualities of successful places. Included within this list is “pleasant: supporting attractive natural and built spaces”, where “protection from the elements to create attractive and welcoming surroundings, including provision for shade and shelter, mitigating against noise, air, light pollution and undesirable features...” is included within the criteria for a pleasant space.
- 2.1.5 Finally, Policy 26: Business and Industry states that “development proposals for business and industry will take into account: ...i. impact on surrounding residential amenity; sensitive uses and the natural and historic environment”.

### 2.2 Local planning policy

#### Aberdeenshire Local Development Plan 2023

- 2.2.1 The Aberdeenshire Local Development Plan 2023<sup>2</sup> will direct decision-making on all land-use planning issues and planning applications in Aberdeenshire up to 2031. In terms of artificial lighting, Policy E1: Natural Heritage states that “development must seek to avoid any unacceptable detrimental impact on protected species.” A Species Protection Plan, detailing appropriate avoidance and mitigation measures, may be required. Furthermore, development proposals will only be accepted “when a baseline ecological survey has been carried out and when the development has been designed to avoid impacts where possible”. Developments will not be allowed if it is not designed

to minimise any adverse impact on the site’s environmental quality, ecological status, or viability.

- 2.2.2 Policy P1: Layout, Siting and Design states that the Council will “only approve development designs that demonstrate the six qualities of successful places, which are:... safe and pleasant, encouraging both activity and privacy, providing security and protecting amenity”.
- 2.2.3 Finally, Policy P4: Hazardous and Potentially Polluting Developments and Contaminated Land states that “we will refuse development, even infill development, if there is a risk that it could ... create a significant nuisance”. Heavy industrial uses is an example of a development that could create a nuisance. In any circumstance where development of this kind is, on balance, considered acceptable by the appropriate authorities, satisfactory steps must be taken to mitigate any residual negative development impacts.

### 2.3 Guidance and standards

#### Planning Advice Note (PAN) 51: Planning, Environmental Protection and Regulation

- 2.3.1 PAN 51<sup>3</sup> supports the existing national policy on the role of the planning system in relation to the environmental protection regimes. In terms of light, Pan 51 states that: “There are no specific legislative controls on light pollution, but the Scottish Executive are considering adding artificial light pollution to the list of Statutory Nuisances under Part III of the Environmental Protection Act in 2007 when a suitable legislative vehicle becomes available.”
- 2.3.2 The Scottish Government has added artificial light nuisance to the list of Statutory Nuisances under Part III of the Environmental Protection Act 1990, as introduced by the Public Health etc. (Scotland) Act 2008, bringing legislation in line with the situation in England and Wales. This act included an amendment to Section 79 (statutory nuisances and inspections) of the Environmental Protection Act 1990 (c.43) to include the following with regard to artificial light nuisance: “(fba) artificial light emitted from— (i) premises; (ii) any stationary object, so as to be prejudicial to health or a nuisance;”
- 2.3.3 Aberdeenshire Council publishes some guidance on light pollution from an environmental health perspective on its website<sup>4</sup>. The council states that careful planning, installation and use of lighting will prevent most of the common issues that can arise. The following actions to prevent light becoming a nuisance are recommended:

- only use the amount of lighting you need
- position lights so you only need to use the minimum number of lights
- dim or switch off lights when they are not required
- use lights that switch off automatically when natural light is available or when they are not required, for example, using motion detectors
- use baffles, shields and louvres to reduce obtrusive light
- angle your lights downwards or use light fittings that reduce light shining upwards
- check that security lights do not produce excessive glare which could affect drivers or neighbours
- consider using security lights that are activated by movement, but check that they are only triggered by humans and not animals

### The Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light

2.3.4 The ILP's Guidance Note GN01/21 for the 'Reduction of Obtrusive Light'<sup>5</sup> provides the basis for determining the existing ambient lighting levels in an area and defining whether an installation will be obtrusive to the environment and neighbouring properties. The Environmental Zones for exterior lighting are provided in Table 3.1.

Furthermore, the guidance note assists in quantifying and providing acceptable maximum limitations for light spill, light intrusion, sky glow and glare from exterior lighting installations.

### BS EN 12464-2

2.3.5 BS EN 12464-2:2014<sup>6</sup> provides guidance for lighting outdoor workplaces, i.e. applicable to the exterior lighting for equipment and working areas accessed by staff for Kintore Hydrogen Plant. The framework for lighting design and the criteria it provides can be used for both construction site and operational exterior lighting.

### 3 Existing Conditions and Sensitive Receptors

#### 3.1 Existing lighting conditions

3.1.1 There are limited sources of night time lighting in the area surrounding the proposed development. Private roads and highways are generally not currently lit. There are scattered residential properties and farms plus Kintore Substation, a battery storage facility and rural light industry in the area. The town of Kintore is approximately 2 km from the main electrolysis plant site. Therefore, the existing site is considered to fall primarily within Environmental Zone E2 with some of the more sparsely occupied areas along the pipeline routes being in Environmental Zone E1, according to Table 3.1.

Table 3.1: Lighting environment 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

Source: Institute of Lighting Professionals Guidance Note GN01/21 The Reduction of Obtrusive Light<sup>7</sup>

#### 3.2 Sensitive receptors

3.2.1 Sensitive receptors on and surrounding the proposed development are presented in Table 3.2. Further details are provided in the EIAR, particularly the ecology, heritage and landscape and visual impact chapters.

Table 3.2: Sensitive receptors

Receptor	Description
Human receptors with views of the site	Human receptors with views to the site could, without appropriate design, experience glare or increased sky glow from the proposed development.

Receptor	Description
Ecology (habitats and protected species)	Chapter 8: Ecology and Biodiversity of the EIAR sets out the sensitive ecological receptors that were scoped into the assessment of effects. A variety of terrestrial habitats were scoped in, and sensitive species scoped in include bats, otters, badgers, reptiles, birds and fish. Light intrusion from the proposed development could, without appropriate design and mitigation, affect these sensitive habitats and species.
Motorists, cyclists and pedestrians	The roads in the immediate vicinity of the proposed development are not currently lit. Users of the existing roads could experience light 'patches' from the proposed development.
Heritage	Chapter 7: Archaeology and Cultural Heritage details the heritage assets scoped into the assessment of effects. The settings of these assets have the potential to be impacted by artificial lighting from the proposed development without appropriate design and mitigation.



## 4 Lighting Requirements and Outline Lighting Design Principles

### 4.1 Construction lighting requirements

4.1.1 Temporary construction lighting is likely to be required at worksites during hours of low light or darkness within the construction working hours.

4.1.2 This is expected to comprise a mixture of temporary fixed and mobile task lighting providing:

- street lighting for the main construction access road to the electrolysis plant and temporary access points and haul roads within the overall development boundary;
- lighting over entrances and exits to and from temporary construction office and welfare buildings;
- lighting at points where vehicles will be required to stop;
- security fence and entrance gate lighting; and
- task lighting for specific areas of work or from mobile plant.

### 4.2 Operational lighting requirements

4.2.1 Kintore Hydrogen Plant may be operational at any time, 24 hours a day. Lighting would therefore be required at times during the hours of darkness to fulfil health and safety requirements. It is also expected to be a Control of Major Accident Hazards (COMAH) site which will require security to prevent unauthorised access, in which security lighting will play a role.

4.2.2 The majority of lighting will be restricted to the main electrolysis plant site and its access road. The water and hydrogen pipeline corridor and underground electrical connection would not be lit during operation.

4.2.3 Lighting at the electrolysis plant site would be required for the following activities and/or areas:

- street lighting for new internal access roads;
- lighting over entrances and exits to and from buildings (both vehicular and pedestrian);
- lighting at points where vehicles will be required to stop;
- security fence and entrance gate lighting;
- wayfinding lights along internal pathways;
- task lighting for external plant that is accessed to be operated, monitored or maintained by staff; and

- possibly, lighting of the enclosed ground flare exhaust stack, although at no more than 30 m, this is not a tall exhaust stack structure that would require aviation safety lighting.

4.2.4 Lighting required at the above-ground installation, pumping station and potential water treatment works would be lesser, as these would not require staff to be present during normal operation, but will be accessed on occasion for inspection and maintenance. Lighting would be required for the following activities and/or areas:

- lighting over entrances and exits to and from buildings (both vehicular and pedestrian);
- wayfinding lights along internal pathways; and
- task lighting for external equipment that is accessed to be operated, monitored or maintained by staff when present.

### 4.3 Outline lighting design principles

#### Construction

4.3.1 Construction lighting will follow the overall design principles set out below, insofar as applicable to the area and nature of works.

4.3.2 As construction lighting will be temporary and typically only fixed for the duration of works in a particular area, or provided by mobile plant, a single lighting design for the construction stage is not proposed to be approved as a separate pre-commencement requirement. It is proposed that the Principal Contractor will develop construction lighting designs as part of the Method Statements for each aspect of works, controlled by the adopted Construction Environmental Management Plan.

#### Operation

4.3.3 Design principles in relation to external artificial lighting for operation are as follows:

- Lighting will be appropriate to the local context and will mitigate lighting impacts upon identified habitats, neighbouring occupiers and the wider landscape:
  - Intelligently designed low-glare fully shielded fittings pointing downwards will be used to reduce light spill into adjacent habitats;
  - The height and design of lighting columns will be considered to avoid light spill where possible;
  - Lighting elements will be consistent in terms of materials, finish and colours and contribute to the appearance of the proposed development;
  - Motion sensors or user controls for lighting of specific equipment will be used to ensure lighting is only used when needed; and



- Blue light emissions will be mitigated by using low colour temperature lighting.
- The Bats and Lighting guidance<sup>8</sup> will be followed when choosing lighting for the site to avoid negative effects on bats, which includes:
  - all luminaires should lack UV elements when manufactured;
  - metal halide, compact fluorescent sources should not be used;
  - LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
  - a warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component.
- Lighting will provide illumination for the safe operation of the various activities proposed to be carried out, including access and wayfinding:
  - Subject to meeting the operational and safety requirements, lighting will be designed to reduce the brightness and spread of light during operation;
  - The lighting design will provide adequate lighting levels to enable the safe operation of all facilities on-site and support vehicular, pedestrian and cyclist movements;
  - Ease and safe maintenance will be considered as part of selection of light fittings and luminaires;
  - The illuminance level will be as low as guidelines and the safety of operation allow; and
  - The lighting design will deliver robust and efficient lighting which creates a safe environment for staff.
- Further recommendations:
  - The final lighting design will be developed to meet the appropriate ILP Environment Zone (as set out in Table 3.1 above);
  - Retained habitats within and around the boundary of the main electrolysis plant site would not be directly lit; and
  - Any adjacent lighting would be directed to avoid light spill onto retained habitats.

## References

<sup>1</sup> Scottish Government (2023). National Planning Framework 4, <https://www.gov.scot/publications/national-planning-framework-4/documents/>, accessed 07/08/24.

<sup>2</sup> Aberdeenshire Council (2023). Aberdeenshire Local Development Plan, <https://online.aberdeenshire.gov.uk/ldpmedia/LDP2021/AberdeenshireLocalDevelopmentPlan2023IntroductionAndPolicies.pdf>, accessed 07/08/24.

<sup>3</sup> Scottish Government (2006). Planning Advice Note 51: planning, environmental protection and regulation, <https://www.gov.scot/publications/planning-advice-note-pan-51-revised-2006-planning-environmental-protection/>, accessed 07/08/24.

<sup>4</sup> Aberdeenshire Council (n.d.). Light pollution, <https://www.aberdeenshire.gov.uk/environment/environmental-health/light-pollution/>, accessed 07/08/24.

<sup>5</sup> The Institute of Lighting Professionals (2021). Guidance Note GN01/21. The Reduction of Obtrusive Light, <https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021/>, accessed 07/08/24.

<sup>6</sup> BSI (British Standards Institution) (2014). BS EN 12464-2:2014 Light and lighting. Lighting of work places. Outdoor work places, available at: <https://standardsdevelopment.bsigroup.com/projects/2013-00890#/section>, accessed 04/06/24.

<sup>7</sup> The Institute of Lighting Professionals (2021). Guidance Note GN01/21. The Reduction of Obtrusive Light, <https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021/>, accessed 07/08/24.

<sup>8</sup> Bat Conservation Trust and Institute of Lighting Professionals (2023). Bats and Artificial Lighting at Night, <https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/>, accessed 02/08/24.