

14.0 LIGHTING

- 14.1 This Chapter provides an assessment of the potential effects on sensitive receptors arising as a result of the temporary and permanent installation of artificial lighting on the Proposed Development Site (hereafter referred to as the Site).
- 14.2 The lighting assessment includes a review of the relevant legislation and planning policy guidance relating to artificial lighting and a description of the baseline lighting conditions both on and in the immediate vicinity of the Application Site. The assessment includes an evaluation of the significance and nature of existing lighting on and in the vicinity of the Site in terms of light nuisance spill, source intensity (glare) and sky glow and the effects of future lighting that will be required to illuminate the temporary scheme. Full details of the lighting specification for the scheme (site compound areas etc) will be produced. Light nuisance (spill) and source intensity (glare) values have been measured and the assessment is based on these results.
- 14.3 The assessment considers the potential temporary lighting effects during construction, operation and decommissioning in relation to surrounding sensitive receptors including local residents and road users. Where likely significant effects have been identified in relation to potential temporary and permanent light spill, source intensity (glare) and sky glow, during the construction and operational phases, mitigation measures have been proposed with the resulting residual effect identified.
- 14.4 Consideration is given to the potential ecological effects and the potential effects on the night-time scene in Chapter 7 Ecology and Biodiversity and Chapter 8 Effects on Visual Amenity respectively.

Legislation, Policy and Guidance

Legislative Framework

- 14.5 The *Clean Neighbourhoods and Environment Act (CNEA) 2005* gives Local Authorities additional powers to deal with artificial lighting by classifying artificial light emitted from defined premises as a statutory nuisance (from April 2006).
- 14.6 The CNEA 2005 amends section 79 of the *Environmental Protection Act 1990* to extend the statutory nuisance regime to include light spill and glare (emitted from defined premises) stating the following:

“(fb) artificial light emitted from premises so as to be prejudicial to health or a nuisance”.

14.7 Guidance produced on Sections 101 to 103 of the CNEA 2005 by DEFRA in April 2006 extends the duty on local authorities to ensure their areas are checked periodically for existing and potential sources of statutory nuisances including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or recur, local authorities must issue an abatement notice (in accordance with section 80(2) of the Environmental Protection Act 1990), requiring that the nuisance cease or be abated within a set timescale.

14.8 However, the defence of “best practical means” is afforded to land uses including facilities and other defined premises where high levels of light are required for safety reasons. It is expected that the following sources will generate the most complaints to local authorities:

- Domestic security lights;
- Commercial security lights;
- Healthy living and sports facilities e.g. floodlit sports facilities;
- Domestic decorative lighting;
- Exterior lighting of buildings and decorative lighting of landscapes; and
- Laser shows / sky beams / light art.

14.9 With regard to potential artificial light nuisance associated with domestic/commercial security lighting, the *CNEA 2005* states a number of control measures should be used, including the application of the minimum level of illumination necessary to light the property, special optics or double asymmetric luminaries and adjusting timers to the minimum.

Planning Policy

National Planning Policy

14.10 ***Planning Policy Statement (PPS) 23***: The UK Government, through PPS23 Planning and Pollution Control, permits Local Planning Authorities (LPAs) to take account of the possible polluting impact of lighting in preparing local development documents. Support for combating light pollution was planned to be strengthened with a new annex on light pollution and a requirement for LPAs to have policies covering acceptable types of

lighting. Whilst a draft has been completed, it is understood that the Government will not be taking it forward at this time. Should it be released in the future the annex would be subject to full public consultation.

Regional Planning Policy & Local Planning Policy

- 14.11 There are no specific policies noted in the North Yorkshire County Council (NYCC) Core Regional Policies relating to light nuisance/pollution and the effects from the introduction of artificial light sources as part of new development proposals. However that actions and decisions associated with development and the use of land should actively encourage the conservation and, where appropriate, the enhancement of the character, distinctiveness, and sense of place of settlements and landscapes throughout the region. Opportunities for creating a high quality environment should be sought, based on a shared vision that places emphasis on good design, innovation, sustainability and achieving a high quality of life.

International Guidance

- 14.12 ***Commission Internationale De L'Eclairage (CIE 150 (2003) - International Commission on Illumination) (2003) Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations:*** The purpose of this guide is to help formulate guidelines for assessing the environmental impacts of outdoor lighting and to give recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. As the obtrusive effects of outdoor lighting are best controlled initially by appropriate design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations. This Guide refers to the potentially adverse effects of outdoor lighting on both natural and man-made environments for people in most aspects of daily life, from residents, sightseers, transport users to environmentalists and astronomers.
- 14.13 ***CIE 126 (1997) Guidelines for Minimising Sky Glow:*** This guide gives general guidance for lighting designers and policy makers on the reduction of sky glow. The report gives recommendations about maximum permissible values for lighting installations. These values must be regarded as limiting values. Lighting designers should do all possible to meet the lowest specifications for the design. Other uses of the open air areas at night will usually result in less stringent sky-glow requirements. Practical implementation of the general guidance is left to National Regulations.

National Guidance

- 14.14 ***Institution of Lighting Engineers (2005) Guidance Notes for the Reduction of Obtrusive Light:*** The Institution of Lighting Engineers (ILE) has proposed lighting guidance and criteria for local authorities with a recommendation that they are incorporated at the Local Plan level. The guidance defines various forms of light pollution and describes a series of environmental zones (similar to the CIE 150 (2003) Environmental zones set out in **Table 14.1**). The ILE Guidance Notes provide suitable criteria against which the effects of artificial lighting can be assessed, however as the CIE 150 (2003) guidance holds a higher standing, the CIE 150 (2003) guidance is used in this assessment.
- 14.15 ***DEFRA (2001) Lighting in the Countryside: Towards Good Practice:*** The Office of the Deputy Prime Minister (ODPM – now Department for Communities and Local Government) in conjunction with the Countryside Commission published 'Lighting in the Countryside: Towards Good Practice' in July 1997, and a revised issue in 2001. The guidance was developed to *'provide practical advice on the prevention and control of lighting impacts through appropriate action by all those involved with lighting in the countryside'*. Its objective is *'to identify good practice in the planning and design of lighting in rural areas; and advise on how it can be achieved, using case study examples'* (ODPM, 2001). The guide aims to provide an overview and common understanding of all aspects of good lighting practice stating that close co-operation and participation is required for all those involved in planning, designing and installing lighting schemes. The guidance provides valuable information on lighting best practice and the standard methodology outlined in this guidance document has been followed as part of this assessment.

Assessment Methodology and Significance Criteria*Scope of the Assessment*

- 14.16 A lighting impact assessment has been prepared to assess the following:
- Assess the existing baseline lighting conditions on the Site and in the immediate surroundings;
 - Assess the potential lighting impacts during the construction, operational and decommissioning phases, in relation to sensitive receptors (see Table 14.2) including local residents and road users (including motorists, cyclists and pedestrians). Consideration is given to the potential ecological effects and the

potential effects on the night-time scene in Chapter 7 Ecology and Biodiversity and Chapter 8 Effects on Visual Amenity respectively; and

- Provide outline mitigation measures to reduce potential light spill, glare and sky glow from future external sources of lighting.

Extent of the Study Area

14.17 The study area comprises of the proposed Pipeline Development from Ebberston to Hurrell Lane at Thornton le-Dale as well as the location of sensitive receptors near existing sources of artificial light. As part of the Environmental Impact Assessment (EIA) for the proposed Pipeline Development from Ebberston to Hurrell Lane at Thornton le-Dale, a lighting impact assessment has been undertaken. The extent of the study area for the baseline lighting survey has been determined to identify the baseline lighting levels within and along the boundaries of the Site, as well as in the area within the immediate vicinity of it. The study area also takes account of views toward the Site from residents in and around the vicinity of the proposed site: these include the villages of Thornton Le-Dale Village, Wilton and Allertson to ensure that any statutory nuisance issues from lighting associated with the temporary scheme towards identified receptors are effectively mitigated. Consideration of visual impact at night is given in Chapter 8 Effects on Visual Amenity.

Consultation

14.18 The Environment Department North Yorkshire County Council (NYCC) was consulted on the scope of the assessment and key issues relating to potential lighting impacts arising during operation of the temporary scheme.

Table 14.1: Lighting Consultation Response

Consultee	Summary of Response
North Yorkshire County Council (NYCC)– Environment Department	No response received.

14.19 The submission of the planning application to North Yorkshire County Council (NYCC), the following information will be required to fully assess the visual impact of the development:

- **Lighting calculations results in the form of isolux plots for the whole site**

- **Photometric details of all the proposed luminaires**
- **Calculations showing the light spillage to the surrounding areas."**

Method of Baseline Data Collation

14.20 The approach and methodology used to assess the baseline lighting conditions on and in the immediate vicinity of the Site involves a desk top study (including consultations with North Yorkshire County Council) and a baseline lighting survey undertaken on and in the immediate vicinity of the Application Site:

Desk Study

14.21 A desk top study has been undertaken to identify relevant legislation, planning policy, good practice guidance, local designations and relevant planning policy in relation to lighting following the CIE 126 (1997) and CIE 150 (2003) guidance, whilst consideration is also given to the standard methodology outlined in *Lighting in the Countryside: Towards Good Practice*, DEFRA, 2001.

Baseline Lighting Survey

14.22 On the 18th November 2009 a day-time site survey was undertaken. A night-time site visit and survey was undertaken on 17th November 2009 under wet conditions where readings and measurements were taken from 19:30 to 23:00hrs to establish the existing ambient lighting conditions (illuminance only) both on the Site and in the immediate area. The moon was not in view during the survey and it is, therefore, considered that moonlight could not have had an influence on the survey results.

14.23 Readings of luminance (source intensity) were taken in the vicinity of the Site and in the surrounding area. Sensitive receptors in proximity to the Site were identified as part of the desk based study and confirmed through the day time and night-time walkover of the Site and surrounding area.

14.24 It was not considered necessary to take readings of illuminance (glare) due to the absence of lighting on the Site and in the surrounding area, as well as the screening afforded by the conifer plantation. Sensitive receptors in close proximity to the Site were identified as part of the desk based assessment and confirmed through the day time walkover of the Site and surrounding area.

- 14.25 Illuminance was recorded using Minolta T-10 illuminance meter (body serial number 35721003 & cell unit 54711007)
- 14.26 Luminance readings were made using a Minolta LS110 luminance meter serial number 37844004
- 14.27 Photographs were taken using a Panasonic Lumix DMC TZ1 Digital Camera with a night-time landscape exposure setting.
- 14.28 In order to benchmark the existing lighting levels, readings were taken on and in the immediate vicinity of the Site. Readings of luminance and illuminance were recorded at a total of 11 monitoring locations (A to K). At each of the monitoring locations, lighting levels were taken and recorded from northerly, southerly, easterly and westerly directions.
- 14.29 Monitoring locations were selected to be representative of the Site and the wider area. The monitoring locations are described in **Table 14.2**.

Table 14.2: Description of Monitoring Locations

Location	Description
A	Located on Broadmires Lane west of the site.
B	Located on Westgate west of the site.
C	Located on Westgate (at end of houses) west of the site.
D	Located on Harrowcliff Lane (halfway down) west of the site.
E	Located on A170 halfway between Thornton Le Dale and Wilton north of the site.
F	Located at junction of Cawcliff Lane and Cliff Lane north of the site.
G	Located end of houses Cliff Lane to the north of the site.
H	Located at junction of Allerston Lane and Penniston Lane east of the site
I	Located Main Street, Allerston east of the site
J	Located A170 High Street Ebberston east of the site
K	Located at Hurrell Lane at New Ings Lane (at proposed Gas Processing Facility)

- 14.30 The baseline lighting levels on and surrounding the Site are described with reference to the Environmental Zone Criteria for light nuisance (spill/source intensity) into windows (measured in lux) as outlined in CIE 150 (2003).
- 14.31 In accordance with current CIE guidance and the ILE Guidance Notes for the Reduction of Obtrusive Light (2005) and in relation to the assessment, the following definitions are used in describing lighting effects:
- **Sky glow:** the 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.
 - **Light spill:** the unwanted spillage of light onto adjacent areas and may affect (or cause nuisance to) sensitive receptors, particularly residential properties and natural habitats.
 - **Glare:** 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.

Significance Criteria

- 14.32 The assessment of potential impacts, as a result of the temporary and permanent scheme, has taken into account both the construction, operational and decommissioning phases. The significance level attributed to each impact has been assessed based on the magnitude of change due to the temporary scheme, and the sensitivity of the affected receptor/receiving environment to change. Magnitude of change and the sensitivity of the affected receptor/receiving environment are both assessed on a scale of high, medium, low and negligible.
- 14.33 The criteria used to determine the 'significance' of any temporary change in baseline lighting levels have been defined qualitatively, with reference to the lighting design required for operational, health and safety purposes, and using professional judgement and best practice guidance identified above, enabling the temporary future lighting levels to be benchmarked against the appropriate CIBSE guide and a comparison to be made with the existing baseline lighting levels recorded.
- 14.34 The lighting assessment has followed the methodology outlined in CIE 126 (1997) and CIE 150 (2003) guidance, whilst consideration is also given to '*Lighting in the Countryside: Towards Good Practice*', Defra, 1997. The criteria used to assess the magnitude and significance of the effects of installed lighting have been derived from

CIE 150 (2003), with consideration also given to the Institution of Lighting Engineers (ILE) Guidance Notes for the Reduction of Obtrusive Light (ILE, 2005). Here reference has been made to the Environmental Zone Criteria for light nuisance into windows (measured in lux and cd/m²) as defined as;

- **E1:** Intrinsically Dark Landscapes - "National Parks", Areas of Outstanding Natural Beauty (AONB) or other dark landscapes;
- **E2:** Low District Brightness Areas – rural, small village or relatively dark urban locations;
- **E3:** Medium District Brightness Areas - small town centres or urban locations; and
- **E4:** High District Brightness Areas – town/city centre with high levels of night-time activity.

14.35 The CIE guidance (2003) propose that where a district classification falls between two zones that the more rigorous environmental zone standards are applied in the design of the lighting e.g. an E2 Environmental Zone would be selected in preference to an E3 Environmental Zone. The CIE (2003) guidelines and threshold values for the environmental zones are outlined in **Table 14.3**.

Table 14.3: Obtrusive Light Limitations for Exterior Lighting Installations (CIE 150, 2003)

Environmental zone	Sky glow UWLR [Max. %]	Light into windows EV		Source intensity I [cd] **		Building Luminance*** L[cd/m ²] Av. before curfew
		Before curfew	After curfew	Before curfew	After curfew	
E1	0	2	1*	2,500	0	0
E2	5	5	1	7,500	500	5
E3	15	10	2	10,000	1,000	10
E4	25	25	5	25,000	2,500	25

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

EV = Vertical Illuminance in Lux

I = Light intensity in Candelas

* Acceptable from public road lighting installations only (otherwise 0 lux applies)

** Source intensity - This applies to each source in the potentially obtrusive direction, outside the area being lit. The figures given are for general guidance only and on some medium to large lighting applications with limited mounting heights they may be difficult to achieve. The choice of correct lanterns will reduce this to a minimum.

*** Building luminance - This will be limited to avoid over lighting, and relate to the general district brightness.

14.36 It is proposed that the CIE 150 (2003) international guidance, referred to above, will be used, in order to provide suitable assessment criteria against which to assess the potential temporary effects of artificial lighting. The guidance levels for light nuisance into windows have been used as the principle criteria for assessing the potential

impacts associated with the temporary scheme. However, given the subjective nature of sky glow and glare, it is difficult to quantify the potential impacts due to a number of variables including the fact that sky glow is measured as a percentage change and glare from a light source is dependant on the type and distance from the light source.

14.37 Therefore, in addition to the criteria provided in CIE 150 (2003) and in the ILE Guidance Notes (2005), the impact magnitude and significance and duration of the impacts will be evaluated using the assessment scale outlined below.

Impact Magnitude

14.38 The magnitude of any effects has been determined using the following four point scale:

- High adverse/beneficial effects - significant deterioration/improvement in local conditions or circumstances;
- Medium adverse/beneficial effects - readily apparent change in conditions or circumstances;
- Low adverse/beneficial effects - perceptible change in conditions or circumstances; and
- Negligible adverse/beneficial effects - no discernable change in conditions or circumstances.

Impact Significance

14.39 The overall significance of an effect will be determined by measuring the magnitude of the residual effect against:

- The number of receptors affected, which will consider the scale of an effect, whether it is local, regional or national;
- The duration of the effect;
- The type and sensitivity of the receptor affected; and
- The type of effect.

14.40 The significance of any effects will be measured using the following four point scale derived by WSP Environmental outlined in **Table 14.4** below:

Table 14.4: Significance Criteria used in the Assessment

Significance	Definition
Major Positive	Major decrease in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at the windows of residential properties, resulting in a noticeable or major improvement in baseline conditions and is well within the recommended CIE guidance levels.
Moderate Positive	Moderate decrease in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at the windows of residential properties, resulting in a moderate improvement in the current baseline conditions and recommended CIE guidance levels.
Minor Positive	Minor decrease in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at the windows of residential properties, resulting in a perceptible improvement in baseline conditions and is within the recommended CIE guidance levels.
Negligible	Negligible or barely perceptible change in the level of sky glow, nuisance (light spill) and source intensity (glare) onto surrounding areas and illuminance levels at the windows of residential properties and would cause a negligible or barely discernible change to current baseline conditions.
Minor Negative	Minor increase in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at the windows of residential properties, would cause a minor perceptible change in baseline conditions which are slightly above recommended CIE guidance levels but where current uses could still be maintained.
Moderate Negative	Moderate increase in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at the windows of residential properties, and would result in a noticeable effect on baseline conditions moderately in excess of the recommended CIE guidance levels.
Major Negative	Major increase in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at the windows of residential properties, and would result in a major effect on baseline conditions significantly in excess of the recommended CIE guidance levels.

Notes to Table:

- Baseline conditions above refer to the conditions recorded on and in the immediate vicinity of the application site during the baseline lighting survey undertaken in November 2009.
- These classifications have been applied indicatively based on the baseline lighting conditions recorded at the site and available information and guidance levels contained in CIE 150 (2003) and the ILE Guidance Notes for the Reduction of Obtrusive Light (ILE, 2005).

Impact Duration

14.41 The overall significance of an effect will distinguish between temporary and permanent effects based on the following WSP timescale:

- Short Term – the effects from lighting would be of short duration and would not last more than 2 to 5 years from the commencement of the works;

- Medium Term – the effects from the lighting would take 5 to 15 years to be mitigated; and
- Long Term – the effects from the lighting would be reasonably mitigated over a long period of time (15 years or more) and includes permanent effects.

Baseline Conditions

Existing Site Conditions and the Surrounding Environment

- 14.42 The proposed Site comprises gas production at the existing Ebberston Wellsite and the construction of two pipelines in parallel carrying wet gas and condensate respectively from the Wellsite, plus a fibre optic cable, to a Gas Processing Facility on land off Hurrell Lane, Thornton-le-Dale, a distance of approximately 8.6 km. There is no lighting at the proposed site of the Gas Processing Facility at Hurrell Lane nor within 1000m of it. Some sky glow was noticeable in the direction of urban centres such as Thornton-Le-Dale, Wilton and Allerston.
- 14.43 The closest light source comes from the houses located at Cliff Lane, Thornton-le-Dale approximately 1000m from the Site to the north. **Table 14.5** demonstrates that the area is in an E1 Environmental Zone (an “intrinsically dark landscape”) under current CIE 150 guidance (CIE, 2003).
- 14.44 There is intermittent lighting emanating from the headlamps of passing cars on Hurrell Lane adjacent the site and the A170 to the east, but due to the location there are no other significant permanent or temporary light sources are present.

Sensitive Receptors

- 14.45 The following potentially sensitive receptors have been identified:
- Residential dwellings located to the north, south, east and west of the site at Thornton-le-Dale, Wilton and Allerston Villages (Receptors A-K are specifically assessed);
 - Residential dwellings located 1000m to the north of the site (Receptors J-K are specifically assessed);
 - Potential for increased sky glow, source intensity(glare) and nuisance(light spill) affecting the current night-time scene (refer to Chapter 8 Landscape and Visual Effects);

- The potential effects of artificial lighting on ecological species sensitive to changes in ambient lighting levels (refer to Chapter 7 Ecology and Biodiversity); and
- The potential effects on existing and future road users utilising the site and surrounding road network including safety of motorists, cyclists and pedestrians sensitive to changes in ambient lighting levels and the effects from glare and light spill.

Baseline Lighting Conditions on the Proposed Development Site

14.46 This section describes the results of the baseline lighting survey undertaken on the 17th and 18th November 2009. This includes information relating to the baseline lighting conditions on and surrounding the site and provides site specific data on levels of illumination.

14.47 In order to benchmark the existing levels of lighting on and in the immediate vicinity of the Application Site readings of illuminance were recorded at a total of 11 monitoring locations (A to K). The location of the monitoring positions on the Site and in the surrounding area is described in Table 14.2 above. The illuminance levels and description of the recorded lighting on the application site and in the immediate area are shown in Table 14.5 below.

14.48 Such readings enable the baseline lighting conditions on the Site and in the immediate area to be benchmarked with reference to the CIE 150 (2003) Environmental Zone Criteria for light nuisance into windows (measured in lux) (CIE, 2003).

14.49 Further technical information relating to the selected monitoring locations noted on and surrounding the Site during the baseline lighting survey are detailed overleaf in Table 14.5.

Future Baseline

14.50 It is anticipated that should the development proposals not take place at the Site, it is predicted that the baseline lighting conditions described above would not change. Overall, should the Site remain undeveloped in the future, it would remain categorised as an E1 Environmental Zone, in accordance with criteria outlined in CIE 150 (2003).

Assessment of Impacts, Mitigation and Residual Effects

14.51 Assessment of the effects of lighting during the construction, operational and decommissioning phases has been assessed against the baseline lighting conditions outlined in Table 14.5 below. For the purposes of the impact assessment, construction and decommissioning have been considered together as it is assumed that the decommissioning requirement will be the same as those for construction.

Table 14.5: Baseline lighting conditions recorded on the Application Site and in the surrounding areas and details of the CIE Environmental Zone Criteria

Location	Luminance L[cd/m ²]				Luminance L[cd/m ²] at Processing Plant	CIE Zone Criteria	Baseline Survey Comments
	Facing North	Facing East	Facing South	Facing West			
A	0.69	0.00	0.63	0.00	0.00	E1	Monitoring location A is located on Broadmires lane to the most western part of the Site. There are no lights on Broadmires lane. The maximum luminance recorded at this location was 0.69 L[cd/m ²] facing north. The location is characteristic of an E1 Environmental Zone which is "an intrinsically dark landscape".
B	1.07	0.00	0.00	0.00	0.01	E1	Monitoring location B is located on Westgate the west part of the Site The maximum luminance recorded at this location was 0.69 L[cd/m ²] facing north. The location is characteristic of an E1 Environmental Zone which is "an intrinsically dark landscape".
C	0	2900	0.00	2900	0.00	E2	Monitoring location C is located on Westgate (at start of houses) west part of the Site. The maximum luminance recorded at this location was 2900 L[cd/m ²] facing east and west at existing lighting columns. The location is characteristic of an E2 Environmental Zone which is "an intrinsically dark landscape".
D	0.00	0.00	0.00	0.00	0.00	E1	Monitoring location D is located on Harrow Cliff Lane western part of the Site. The maximum luminance recorded at this location was 0.00 L[cd/m ²] no lighting in or round this vicinity. The location is characteristic of an E1 Environmental Zone which is "an intrinsically dark landscape".
E	0.00	0.00	0.00	0.00	0.00	E2	Monitoring location E is located on A170 northern part of the Site. The maximum luminance recorded at this location was 0.00 L[cd/m ²] no lighting in or round this vicinity. The location is characteristic of an E2 Environmental Zone which is "an intrinsically dark landscape".

Location	Luminance L[cd/m ²]				Luminance L[cd/m ²] at Processing Plant	CIE Zone Criteria	Baseline Survey Comments
	Facing North	Facing East	Facing South	Facing West			
F	4307	0.00	0.00	0.00	0.00	E2	Monitoring location F is located to the north of the Site Cawcliff Lane and Cliff Lane. The maximum luminance recorded at this location was 4307 L[cd/m ²] existing street lighting in this vicinity. The location is characteristic of an E2 Environmental Zone which is “an intrinsically dark landscape”.
G	1	0.7	1.17	325	0	E2	Monitoring location G is located in the woodland to the north of the Site. The maximum luminance recorded at this location was 325 L[cd/m ²] existing street lighting in this vicinity. The location is characteristic of an E2 Environmental Zone which is “an intrinsically dark landscape”.
H	2310	0.00	0.00	0.00	0.00	E2	Monitoring location H is located to the east of the Site. The maximum luminance recorded at this location was 2310 L[cd/m ²] existing street lighting in this vicinity. The location is characteristic of an E2 Environmental Zone which is “an intrinsically dark landscape”.
I	2179	0.00	1.57	0.00	0.00	E2	Monitoring location I is located in the woodland to the north of the Site. The maximum luminance recorded at this location was 2179 L[cd/m ²] existing street lighting in this vicinity. The location is characteristic of an E2 Environmental Zone which is “an intrinsically dark landscape”.
J	0.00	0.00	0.00	1354	0.00	E2	Monitoring location J is located to the north east of the Site. The maximum luminance recorded at this location was 1354 L[cd/m ²] existing street lighting in this vicinity. The location is characteristic of an E2 Environmental Zone which is “an intrinsically dark landscape”.

Location	Luminance L[cd/m ²]				Luminance L[cd/m ²] at Processing Plant	CIE Zone Criteria	Baseline Survey Comments
	Facing North	Facing East	Facing South	Facing West			
K	0.00	0.00	0.00	0.00	0.00	E1	Monitoring location K located at proposed processing plant The maximum luminance recorded at this location was 0.0 L[cd/m ²]. The location is characteristic of an E1 Environmental Zone which is "an intrinsically dark landscape". There is no lighting in around this vicinity.

Construction and Decommissioning

14.52 It is anticipated that the main construction works at the Site will be associated with the clearance of the existing scrub and trees and with the construction of the new Gas Processing Facility. During the construction and decommissioning phases, temporary direct and indirect impacts may arise over the duration of the construction and decommissioning programme as a result of the installation of temporary lighting for health and safety purposes associated with the following stages:

- Clearance of the existing scrub and trees and ground preparation;
- Installation of temporary site plant including new light sources associated with on-site temporary port-a-cabins and storage areas;
- Construction and decommissioning of proposed Gas Processing Facility and associated structures; and
- Restoration of the Site following completion of the drilling activities.

14.53 Good practice guidance documents prepared by The Construction Industry Research and Information Association (CIRIA) notes that lighting on construction sites is typically required as part of on-site health and safety requirements. However, it also notes that potential effects towards surrounding receptors will need to be minimised through the controlled application of lighting in accordance with current best practice standards.

14.54 It is anticipated that the key potential areas to be illuminated temporarily during the construction and decommissioning phases of the temporary scheme will include the following:

- Floodlighting associated with the installation of the pipeline and site compound area, which will be typically required for health and safety purposes, in order to deter the potential for crime and incidents during the night time period. The construction phase may be lit by the required operational phase lighting which may be installed early in the site set up process and removed last during decommissioning;
- The potential for fugitive light nuisance (spill) and source intensity (glare) from internal lighting associated with the temporary port-a-cabin units and storage area; and
- Lights at height (fixed to the gas processing plant) associated with the installation and decommissioning of any lighting associated with the installation of the gas pipeline.

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- 14.55 Effects from artificial lighting are likely to result in nuisance (spill), source intensity (glare) and sky glow, if poorly controlled. However, lighting provided during the construction and decommissioning phases will be located well away from residential receptors and will be temporary in nature.
- 14.56 Potential disturbance from lights associated with plant and construction vehicles are considered unlikely since they will be restricted, except in an emergency, to the proposed working hours as stated in Chapter 4 (there should be no requirement for 24hr operational construction lighting).
- 14.57 The key lighting impacts are considered to be as follows:
- 14.58 Impact: Light spill and source intensity (glare) associated with temporary floodlighting associated with the work areas affecting residential receptors. Although under normal operations floodlighting is not required.
- 14.59 The nearest residential properties to the proposed site are to the north (Hurrell Lane in Thornton-Le-Dale Village) are not considered likely to be significantly affected by nuisance issues (light spill or source intensity (glare)) associated with temporary lighting during the construction and decommissioning phases due to their distance from site (1000m) and the fact that the topography and, in particular, the coniferous plantation trees provide year round screening. The visual impact associated with glare and sky glow is more likely to cause an impact and is considered in Chapter 8 Effects on Visual Amenity. Therefore, the temporary presence of construction and decommissioning lighting will have a **negligible** impact on residential properties in terms of light nuisance issues, prior to the implementation of mitigation measures.
- 14.60 **Mitigation:** A Lighting Management Plan (LMP) will be prepared and agreed with North Yorkshire County Council in advance of any construction, operation and decommissioning activities or preparatory work. The LMP will specify the location of any temporary lighting throughout the planned programme (including any additional lighting that may be required only for the construction and decommissioning phase) to ensure that the siting of such features considers the surrounding sensitive receptors and ensures that any impact is reduced to a minimum. This will ensure that the unlikely effects on residential receptors in Thornton-Le-Dale, Wilton and Allerston village is minimised further.

14.61 In order to reduce further any lighting impacts during all phases, the following best practice measures as recommended by CIE, the ILE, CIRIA and Health and Safety Executive (HSE) will be implemented as part of the LMP proposed:

- Specified working hours, uses of lighting, and the location of temporary floodlights will be agreed with North Yorkshire County Council. The proposed location of lighting will take into consideration the location of sensitive receptors;
- Lighting to be adaptable lighting and switched off when not required unless specifically needed for construction, operation and decommissioning activities or for health and safety requirements;
- Source intensity (Glare) caused by poorly directed flood lighting will be minimised by ensuring that light fittings comply with the specification that have been highlighted and when they are installed they are horizontally mounted and directed into the centre of the Site and by good design and installation, meeting CIE 150 (2003) and the CIBSE lighting level requirements. Given the ecological and visual sensitivities on and surrounding the Site (refer to Chapters 7 and 8 respectively), temporary lighting fixtures will be installed and designed to provide full cut-off or will be directionally shielded as required post-installation to ensure that artificial light is controlled and substantially confined to the object(s) intended to be illuminated;
- Light nuisance (spill) will be minimised by avoiding poorly sited lights on the boundary of the Site. In particular, lighting will be located and directed so that it does not cause unnecessary distraction to adjacent road users on Hurrell Lane or the A170;
- Contributions to sky glow will be minimised by the use of modern lighting designed to comply with CIE 126 (1997) with appropriate tilt angles and shields to avoid upward light loss.

14.62 Further information on the mitigation for the operational phase, which will also be encompassed within the LMP, are described in the Operation section below.

14.63 **Residual Effects:** The potential nuisance effects of temporary construction/decommissioning lighting installed will be mitigated by the incorporation of the necessary good practice lighting requirements outlined above as part of the LMP and by the topography and intervening trees. The sensitivity of such residential properties to light nuisance during construction/decommissioning is negligible (due to the distances involved, the screening and the site lighting not being in use at these stages) and the

magnitude of change, following mitigation, is low. Therefore, there is likely to be a **negligible** effect on such residential properties from temporary installed lighting during construction and decommissioning.

14.64 **Impact:** The potential effects on the road users utilising the surrounding road network including safety of motorists, cyclists and pedestrians sensitive to changes in ambient lighting levels and the affects from glare and light spill.

14.65 Given the Site's location close to Hurrell Lane, the temporary effects of source intensity (glare) from the construction lighting could affect road users in the surrounding area. Although this could be minimised if the right type of lighting equipment is selected and is installed correctly. The sensitivity of existing road users to such temporary lighting is considered to be medium and the magnitude of change, prior to mitigation, is considered to be moderate. Therefore, there is likely to be a direct, temporary, short-term effect on such road users of **moderate negative** significance, prior to the implementation of appropriate mitigation measures.

14.66 **Mitigation:** To reduce lighting impacts during the construction phase on road users utilising the surrounding road network, the best practice measures recommended above will be implemented. In addition to this, the following mitigation will also be implemented:

- The construction areas adjacent to walkways or roadways should be well lit and clearly defined at all times to ensure the safety of motorists and pedestrians;
- Any temporary detours of vehicles or pedestrians around a construction site should be clearly visible at all times;
- Construction area fences located near existing roadways or walkways should be well lit to assist in defining the limits of construction for motorists and pedestrians;
- Temporary walkways, roads and parking areas should be illuminated to the same intensity in accordance with CIBSE guidance; and
- Should hoarding be required during the construction phase, care should be taken to avoid this resulting in the casting of shadows on surrounding footpaths and roads.

14.67 **Residual Effects:** To minimise the effects of light nuisance (spill) and glare from installed lighting in the site compound on adjacent road users, the lighting requirements for the site will be included as part of the LMP and will be in accordance with the

14.71 It is anticipated that impacts from artificial lighting could arise as a result of the following:

- type and specification of the lighting equipment used;
- the location and mounting height of luminaires, and
- The intensity of the light source.

14.72 Therefore, prior to mitigation, the following potential impacts associated with lighting implemented during the operational phase of the development are anticipated on the identified sensitive receptors:

14.73 **Impact:** Potential effect of glare and light spill upon residential properties.

14.74 The installation of lighting on the Site has the potential to result in source intensity (glare) and nuisance light spill which could result in a direct nuisance and disturbance to residential receptors. However, the nearest residential receptors are those properties in Cawcliff Lane approximately 1200m to the north of the Site. The sensitivity of the residential properties to the potential nuisance impacts of lighting is considered to be low due to their distance (1200m) from the site and screening from trees (but taking into account that the process plant lighting on the highest parts of the processing plant would not be totally visible above the height of the trees) and the magnitude of change to these nearest receptors in Cawcliff Lane or any of the points that were measured, prior to mitigation, is considered to be low. Therefore, there is likely to be a direct, temporary, short-term nuisance effect on such residential properties of minor negative significance, prior to the implementation of mitigation measures.

14.75 **Mitigation:** Primary mitigation would be put in place through the sensitive nature of the lighting design. The assumption built into any proposed model should include that all lighting equipment is mounted horizontally and will be designed with a 0 degree tilt. All Asymmetric beam luminaires that would be installed vertically should be fitted with suitable shields and cowls which would form part of the LMP to prevent light spill into surrounding areas for lighting ground level work areas on the drilling sites.

14.76 All rail or building mounted fluorescent luminaires would be fitted with a top cowl to prevent light spill above the horizontal. This measure is designed to prevent light pollution and minimise the upward loss of light.

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- 14.77 Particular attention should be applied to the frequency and use of the processing plant. It is essential that appropriate luminaires are utilised and aimed specifically for the task being carried out i.e. zero degree tilt, to minimise the impact on the surrounding night time landscape.
- 14.78 There should be no need for high level lights although if required would be blanked off or removed as the applicant recognises the need to not over light the Site.
- 14.79 Secondary mitigation would take the form of screening. Although the security fencing is anticipated to be see-through chain link fencing, screening will be provided by the soil bund, water tanks and compound blocks, as well as the coniferous screening which will provide year-round screening of all surface illumination.
- 14.80 An inspection and survey of the operational lighting would be commissioned as part of the LMP to analyse the proposed process plant lighting once constructed and suggest improvements where applicable (particularly to the visible upper parts which may result in nuisance glare). Particular attention would be paid to critical points on local roads and at dwellings. Where a light is noticeable from remote locations it would be screened or its position altered as far as is practicable (taking into account the operational lighting requirements) to mitigate any visual impact.
- 14.81 Light spill should not extend a significant distance beyond the site boundary. Due to the distance to properties in Thornton-Le-Dale, Wilton and Allerston Villages these properties should not be significantly affected by light spill if the new lighting is installed correctly.
- 14.82 Moorland Energy would maintain contact with local residents in order to address any ongoing concerns or comments that residents may have as part of the LMP.

Residual Effects

Light Spill / Light Trespass

- 14.83 Provided that the above measures are implemented the light spill will not extend a significant distance into the surrounding woodland and will not affect sensitive residential properties (i.e. light nuisance into the nearest residential windows from the lighting associated with the Site post-curfew will be 0 lux which conforms to the E1 Environmental Zone standard (CIE, 2003)). There is likely to be a direct, temporary,

short-term (only 5 to 6 weeks) residual effect in terms of light nuisance of **negligible** significance, following the implementation of the mitigation measures.

Source Intensity (Glare)

14.84 The Source Intensity results for the 11 identified residential receptors conform to the E1 and E2 Environmental Zone standard (CIE, 2003) and are as follows:

Sky Glow

14.85 Light fittings will be designed to allow minimal upward light loss calculated at 0.15 upward light ratio (UWLR), not quite conforming to the E1 Environmental Zone standard for sky glow of 0 UWLR, CIE 126, (1997) however this is not considered significant and is in accordance with best available technology.

14.86 **Impact:** Potential effect of Source Intensity (glare) and nuisance (light spill) upon existing and future road users, cyclists and pedestrians on and adjacent to the Site.

14.87 Poorly controlled and designed installations have the potential to cause unnecessary distraction and glare towards both existing and future road users, together with an uncomfortable brightness towards cyclists and pedestrians. Proposed lighting on the Site may result in increased glare towards these receptors (compared to the existing baseline levels). As such, cyclists, pedestrians and road users utilising the publicly accessible land and footpaths, as well as A170 and Hurrell Lane, may experience increased levels of *Source Intensity* (glare) (compared to the current baseline levels).

14.88 The location of the Gas Processing Facility would be set approximately 1200m from Hurrell Lane. The sensitivity of existing and future road users to such lighting is considered to be low and the magnitude of change (taking into account the 4 to 5 week duration), prior to mitigation, is considered to be low as the site access and Hurrell Lane are currently unlit. Therefore, there is likely to be a direct, temporary, short-term effect on such road users of **minor negative** significance, prior to the implementation of mitigation measures.

14.89 **Mitigation:** To ensure the effects on existing and future road users is minimised, the mitigation measures stated previously (including the adoption of an LMP) will help mitigate any negative effects.

14.90 Light Nuisance (spill) will not extend a significant distance from the site boundary due to the screening afforded by the soil bunds, equipment, compound area and coniferous trees and therefore intrusive light nuisance towards adjacent roads and road users will be negligible and will not cause a significant visual nuisance.

14.91 **Residual Effects:** As part of the Environmental Impact Assessment (EIA) for the proposed Pipeline Development from Ebberston to Hurrell Lane at Thornton le-Dale, a lighting impact assessment has been undertaken that will ensure that any new light that would be installed will be minimised. This would be achieved through the application of the lighting design (as described previously) and the screening afforded by the soil bunds, equipment, compound area and coniferous trees. Overall, the sensitivity of existing and future road users to such lighting is considered to be low and the magnitude of change, following mitigation, is considered to be low to negligible. Therefore, there is likely to be a direct, temporary, short-term (only 5 to 6 weeks) effect on such road users of **negligible to minor negative** significance.

Monitoring

14.92 It is anticipated that as part of the LMP, during the construction, operation and decommissioning phases inspection and monitoring of the temporary lighting installations would be undertaken to ensure correct tilting angles and direction of lighting is being achieved, and appropriate modifications made, where necessary, should undue light spill or source intensity (glare) be identified. This monitoring procedure will ensure that during the time the Site is occupied the levels of lighting in the required areas on-site are maintained in accordance with current best practice standards, whilst ensuring that potential impacts associated with the introduction of temporary artificial light sources on identified receptors is controlled and minimised where practicable.

14.93 Such an inspection and maintenance programme for the installed lighting will be agreed in advance with the on-site facilities management and will be delivered by the LMP.

Limitations and Assumptions

14.94 CIE 150 (2003) referred to above, has been used, in order to provide suitable assessment criteria against which to assess the effects of artificial lighting. The guidance levels for light nuisance into windows have been used as the principle criteria for assessing the impacts associated with the temporary scheme. Consideration has also

been given to the ILE Guidance Notes (ILE, 2005), although these are broadly in line with the CIE guidance notes.

- 14.95 The assumption built into the proposed model should include that all lighting equipment is mounted horizontally and should be designed with a 0 degree tilt angle. All Asymmetric beam luminaires that would be installed vertically should be fitted with suitable shields and cowls which would form part of the LMP to prevent light spill into surrounding areas for lighting ground level work areas on the proposed site.
- 14.96 During the construction, operation and decommissioning phases, it has been assumed that in order to manage and minimise the potential effects from temporary lighting, the mitigation measures proposed in this chapter will be incorporated into an LMP for the Site and also into the adopted lighting design to ensure that the predictions set out are achieved. The incorporation of such best practice measures for on-site lighting will ensure that the temporary effects of such temporary lighting is controlled and minimised.
- 14.97 This will ensure that the appropriate levels of lighting are provided to ensure on-site safety in the night period during the occupation of the temporary scheme and that potential impact on identified sensitive receptors both on and surrounding the Site are effectively mitigated.

Cumulative Impacts

- 14.98 Due to the temporary nature of the scheme (5 to 6 weeks of operation) and the location of the Gas Processing Facility at Hurrell Lane, it is unlikely that any other developments will take place at the same time and so cumulative lighting impacts are considered to be negligible.

Summary

- 14.99 An assessment of the artificial lighting environment on and in the immediate vicinity of the Site was undertaken as part of the baseline lighting survey. Readings of illuminance (light spill) were recorded at key monitoring locations to illustrate the current night time scene on and adjacent to the site.
- 14.100 The Site recorded ambient lighting levels considered typical of an E1 Environmental Zone, in accordance with criteria outlined in CIE 150 (2003).

14.101 During the construction, operation and decommissioning phases, the principal lighting impacts are likely to be associated with the need for temporary lighting associated with the temporary illumination of the site area and work areas. In order to mitigate such temporary impacts on surrounding sensitive receptors the lighting requirements at the Site during the construction, operation and decommissioning phase will be managed as part the LMP. Installed lighting will involve the use of well located, modern light fittings which are directionally controlled and will be in accordance with current best practice standards (taking into account the necessary illuminance for health and safety purposes as set out in the CIBSE guidance) and County Planning Authority requirements. Light nuisance (spill) will not extend a significant distance from the site boundary due to the screening afforded by the soil bunds, equipment, compound area and coniferous trees and will conform to an E1 Environmental Zone (CIE 150 2003). Levels of glare experienced by the nearest sensitive receptors are negligible and also comply with an E1 Environmental Zone (CIE 150, 2003). Sky glow requirements marginally do not comply although given the lighting requirements this is not considered significant and is in accordance with best available technology.

14.102 The temporary lighting will be specific to those areas of the Site that require illumination during the night-time period to ensure both on-site safety while ensuring that the effects of light spill, glare and sky glow towards sensitive receptors are effectively mitigated. Overall, the residual effect on sensitive receptors during the construction, operation and decommissioning phases will be short term and temporary in nature and considered to be of negligible significance in terms of light nuisance.

14.103 Following the implementation of appropriate mitigation outlined above, the temporary scheme will meet the relevant design standards and environmental policies in relation to external lighting and light pollution, taking into account best available technology. In order to comply with the relevant planning guidance and policy at a national, regional and local level in relation to lighting, the temporary scheme must use the minimum amount of lighting necessary to provide a safe and secure environment for users of the Site, without negatively affecting the local amenity, the visibility of the night sky, ecological flora and fauna sensitive to changes in ambient lighting levels and the safety of road users. It is anticipated that the adoption of the mitigation described in accordance with current best practice guidance, will ensure that the potential effects on surrounding sensitive receptors from light spill, glare and sky glow are negligible.