

The West Midlands Rail Freight Interchange Order 201X
Technical Appendix 12.8 - Lighting Strategy and Impact Assessment
Regulation 5(2)(a)
Vanguardia - January 2018



West Midlands
Interchange

Four Ashes Ltd

The West Midlands Rail Freight Interchange Order 201x

TECHNICAL APPENDIX 12.8: LIGHTING STRATEGY AND LIGHTING IMPACT ASSESSMENT

Document 6.2

Regulation 5(2)(a)

January 2018

Vanguardia Ltd

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EXECUTIVE SUMMARY

1. This Lighting Strategy and Lighting Impact Assessment has been prepared on behalf of Four Ashes Limited ('the Applicant' or 'FAL'). It presents and assesses the potential lighting impacts of the West Midlands Interchange ('WMI') proposals on sensitive receptors and identifies mitigation to minimise light pollution in all its forms within the context of planning policy.
2. The development proposed by this application is for a new Strategic Rail Freight Interchange ('SRFI'). The proposals for the SRFI constitute a Nationally Significant Infrastructure Project ('NSIP') under the criteria provided by the Planning Act 2008 ('the Act').
3. This Lighting Strategy and Lighting Impact Assessment accompanies an application made to the Secretary of State, via the Planning Inspectorate, for a Development Consent Order ('DCO') under the Act for the development of a new SRFI (which includes warehousing) (together, 'the Proposed Development') at land located at Four Ashes, Staffordshire.
4. The Site is located approximately 10km north of Wolverhampton and lies immediately west of Junction 12 of the M6. The Site lies within the administrative boundary of South Staffordshire District Council ('SSDC') and comprises approximately 297 hectares ('ha') of land.
5. The Proposed Development comprises:
 - An intermodal freight terminal with direct connections to the West Coast Main Line, capable of accommodating up to 10 trains per day and trains of up to 775m long, including container storage, Heavy Goods Vehicle ('HGV') parking, rail control building and staff facilities;

- Up to 743,200 square metres (gross internal area) of rail served warehousing and ancillary service buildings;
 - New road infrastructure and works to the existing road infrastructure;
 - Demolition and alterations to existing structures and earthworks to create development plots and landscape zones;
 - Reconfiguring and burying of electricity pylons and cables; and
 - Strategic landscaping and open space, including alterations to public rights of way and the creation of new ecological enhancement areas and publicly accessible open areas.
- 6 The Proposed Development would include external lighting that has the potential to give rise to adverse impacts and should be considered in the context of the existing conditions in the surrounding area, which contains many sources of light.
- 7 Closer residential receptors would be likely to experience a moderate adverse impact in terms of light presence (visibility of lighting, including lit surfaces) and a slight or moderate increase in local sky glow. All other lighting impacts on non-ecological receptors would likely be minor adverse or negligible.
- 8 The Lighting Strategy and Lighting Impact Assessment requires that lighting designers work closely with ecologists in order to mitigate ecological impacts to the point where they can be regarded as negligible or non-existent.
- 9 The external lighting would comply with all national and local policy requirements as well as relevant guidance.

1. INTRODUCTION

- 1.1.1 This Lighting Strategy and Lighting Impact Assessment has been prepared on behalf of Four Ashes Limited ('the Applicant' or 'FAL'). It presents and assesses the potential lighting impacts of the West Midlands Interchange ('WMI') proposals on sensitive receptors and identifies mitigation to minimise light pollution in all its forms within the context of planning policy. The document provides information on the potential night time effects of the Proposed Development and is supplementary to Chapter 12 (Landscape and Visual) of the Environmental Statement (ES).
- 1.1.2 The Site, as indicated by the Order of Limits Plan [Document 2.4], is located approximately 10km north of Wolverhampton and lies immediately west of Junction 12 of the M6. The Site lies within the administrative boundary of South Staffordshire District Council ('SSDC') and comprises approximately 297 hectares ('ha') of land.
- 1.1.3 The Proposed Development comprises:
- An intermodal freight terminal with direct connections to the West Coast Main Line, capable of accommodating up to 10 trains per day and trains of up to 775m long, including container storage, Heavy Goods Vehicle ('HGV') parking, rail control building and staff facilities;
 - Up to 743,200 square metres (gross internal area) of rail served warehousing and ancillary service buildings;
 - New road infrastructure and works to the existing road infrastructure;
 - Demolition and alterations to existing structures and earthworks to create development plots and landscape zones;

- Reconfiguring and burying of electricity pylons and cables; and
- Strategic landscaping and open space, including alterations to public rights of way and the creation of new ecological enhancement areas and publicly accessible open areas.

1.1.4 Strategic landscaping and open space, including alterations to public rights of way and the creation of new ecological enhancement areas and publicly accessible open areas. This report first sets out the legislation, policy and guidance context within which proposed external lighting can be considered (section 2). It then describes the types of light pollution and their mitigation, setting the scene for considering the potential impacts of external lighting (section 3). This is followed by an assessment of the existing conditions after dark (the baseline conditions – section 4); the proposed Lighting Strategy (section 5; also see below); the impact assessment methodology and its results (section 6); and the conclusion (section 7).

1.1.5 External lighting will be provided wherever it is necessary to create a safe and secure environment for staff and other users after dark. This includes roads, footways and cycleways; service yards; the immediate perimeter of buildings; and the rail terminal (both general lighting for circulation of HGVs and train operation and localised lighting for loading/unloading tasks). This is a significant change to the existing night time environment within the SRFI Site and therefore it has the potential to affect sensitive receptors such as nearby residents, night time views from darker locations and local ecology.

1.1.6 An assessment of the potential effects of lighting on sensitive receptors is given in section 6 of this document. In order to do this, a Lighting Strategy for the Proposed Development has been prepared and is also included in this report (see section 5).

1.1.7 The Lighting Strategy has been developed for two reasons. Firstly, it specifies sufficient detail concerning the external lighting associated with the Proposed Development to enable potential lighting impacts to be robustly assessed for the Impact Assessment in this document. Secondly, it acts as a statement concerning the constraints that need to be applied to the future design of all external lighting associated with the Proposed Development (embedded mitigation) to ensure that the predicted impacts are not exceeded.

2. LEGISLATION, POLICY AND GUIDANCE

2.1.1 The lighting and night time assessment has been undertaken within the context of relevant legislation, planning policies and guidance documents.

2.2 LEGISLATION

Clean Neighbourhoods and Environment Act (2005)¹

2.2.1 The Clean Neighbourhoods and Environment Act (2005) (“CNEA”) gives Local Authorities powers to deal with artificial lighting by classifying artificial light emitted from defined premises as a statutory nuisance (from April 2006).

2.2.2 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 “artificial light emitted from premises so as to be prejudicial to health or a nuisance”².

2.2.3 Guidance produced on Sections 101 to 103 of the CNEA by Department for Environment Food & Rural Affairs (DEFRA) in April 2006³ made clear that the duty on local authorities to ensure their areas are checked periodically for existing and potential sources of statutory nuisances now includes situations where a nuisance arises from the use of artificial lighting.

¹ Clean Neighbourhoods and Environment Act 2005 (“CNEA”)

² *ibid.* Section 102 (2).

³ DEFRA (2006) Statutory Nuisance from Insects and Artificial Light – Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005

- 2.2.4 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.
- 2.2.5 CNEA introduces an exemption in respect of lighting for railway premises⁴; however, its provisions remain applicable to all other lighting on the SRFI Site.

2.3 NATIONAL PLANNING POLICY

National Policy Statement for National Networks (2014)⁵

- 2.3.1 The National Policy Statement for National Networks (2014) (“NPS”) recognises that light pollution associated with strategic rail freight interchanges can have direct impacts on health (paragraph 4.79) but that such impacts can be mitigated by means of appropriate measures (paragraph 4.86).
- 2.3.2 Chapter 5 of the NPS covers a range of potential harmful emissions from the construction and operation of a strategic rail freight interchange, including emissions from artificial lighting (paragraphs 5.81 to 5.89). In particular, paragraph 5.87 and 5.89 state:

“5.87 The Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions of ... artificial light. This includes the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

“5.89 The Secretary of State should ensure the applicant has provided sufficient information to

⁴ CNEA Section 102 (4).

⁵ Department for Transport (December 2014) National Policy Statement for National Networks

show that any necessary mitigation will be put into place. In particular, the Secretary of State should consider whether to require the applicant to abide by a scheme of management and mitigation concerning emissions of odour, dust, steam, smoke, artificial light from the development to reduce any loss to amenity which might arise during the construction and operation of the development. A construction management plan may help codify mitigation.”

National Planning Policy Framework (2012)⁶

2.3.3 The National Planning Policy Framework (2012) (“NPPF”) provides the policy framework for planning and pollution control and new development in England. The purpose of the planning system is to contribute to the achievement of sustainable development. It emphasises the need for sustainable development, one dimension of which is environmental, and includes protecting and enhancing the natural environment and minimising pollution (paragraphs 6 and 7).

2.3.4 Specifically, in relation to light pollution paragraph 125 states:

‘By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.’

2.3.5 This policy encourages limitation of impacts, on both humans and ecology, by good design. Its premise is that the potential effects caused by external lighting should not normally be a reason for

⁶ Department for Communities and Local Government (March 2012) National Planning Policy Framework

refusal; instead the design should be refined so as to minimise these effects.

National Planning Practice Guidance, 2014⁷

- 2.3.6 The National Planning Practice Guidance provides guidance on how to consider light within the planning system. It recognises that artificial light provides valuable benefits to society, including through extending opportunities for employment, and can be essential to a new development. Equally, artificial light is not always necessary and has the potential to become what is termed 'light pollution' or 'obtrusive light'. It can be a source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or detract from enjoyment of the night sky.

2.4 LOCAL PLANNING POLICY

South Staffordshire Core Strategy Development Plan Document (2012)⁸

- 2.4.1 The South Staffordshire Core Strategy Development Plan Document (2012) sets out the long-term vision for communities, objectives and policies to guide the future development of the District. It sets out how much development will take place locally and how it will be delivered.
- 2.4.2 The sole reference to impacts from artificial lighting in the South Staffordshire Core Strategy occurs in Policy EQ9: Protecting Residential Amenity, which states:

⁷ Department for Communities and Local Government (March 2014) National Planning Practice Guidance Light Pollution, ID 31. Available at <https://www.gov.uk/guidance/light-pollution>

⁸ South Staffordshire Council (Adopted 11th December 2012) A Local Plan for South Staffordshire: Core Strategy Development Plan Document

“All development proposals should take into account the amenity of any nearby residents, particularly with regard to privacy, security, noise and disturbance, pollution (including light pollution), odours and daylight.”

2.5 GUIDANCE

Institution of Lighting Professionals Guidance Notes (2011)⁹

- 2.5.1 Professional design guidance is given in ‘Guidance Notes for the Reduction of Obtrusive Light’ (hereafter referred to as the ‘ILP Guidance Notes’). The guidance is intended to be used in the planning context and can be applied through planning conditions.
- 2.5.2 It sets out best practice for lighting design and control of obtrusive light (light pollution), defines environmental zone categories based on their capacity to absorb lighting effects, and gives guidance on the limitation of obtrusive light in terms of sky glow, glare and light trespass for each category. It therefore aligns with the NPS objective to minimise detrimental impacts (as set out in 3.3.1 above) and echoes the approach set out in the NPPF that impacts can and should be controlled by appropriate design rather than being grounds for refusal. The guidance is framed around what is reasonably achievable with modern lighting equipment and careful design.
- 2.5.3 ILP Guidance Notes recommends that the immediate environment is classified systematically as shown in Table 1.

⁹ Institution of Lighting Professionals (2011) GN01: Guidance Notes for the Reduction of Obtrusive Light. Available at <https://www.theilp.org.uk/documents/obtrusive-light/>

Table 1: ILP Guidance Notes Environmental Zones

ZONE	SURROUNDING	LIGHT 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 activities

2.5.4 ILP Guidance Notes then make recommendations for limiting obtrusive light (light pollution) appropriately according to the environmental zone in which the lighting would be situated. The stringency depends on the capacity to absorb lighting effects, with Zone E0 requiring the tightest level of control and Zone E4 the lowest.

3. LIGHT POLLUTION, IMPACTS AND MITIGATION

3.1 GENERAL

3.1.1 Light pollution is a generic term for all the adverse impacts that artificial lighting can have after dark. It takes a number of forms and this section of the report describes the different forms that light pollution can take and explains how they can be mitigated as much as possible.

3.1.2 Light pollution impacts can be placed under five headings as shown in Table 2:

Table 2: Light pollution impacts

CATEGORY	TYPE OF IMPACT
Nuisance	(1) excessive illumination falling on bedroom windows (2) glare causing visual disability or discomfort
Loss of amenity	(3) light spill onto property/gardens, changing their character after dark
Visual	(4) light presence – light sources and other lit elements appearing in dark views (5) local sky glow appearing over new lit development (6) general brightening of the night sky, reducing visibility of stars and affecting astronomical observation
Hazard	(7) glare causing visual disability (8) light sources affecting visibility and interpretation of signals, runway lights, etc.
Disturbance (ecology)	(9) light spill onto dark habitat, reducing its ecological value (esp. in relation to bats) (10) UV light emission, affecting airborne invertebrates

3.1.3 In section 5 of this report a Lighting Strategy has been set out for the Proposed Development. The Strategy is designed to ensure that the best lighting design principles are employed on the Proposed Development and this is taken into account in the explanations that follow.

3.2 NUISANCE

(1) Excessive illumination falling on bedroom windows

3.2.1 The ILP Guidance Notes recommends limits to the illuminance (lighting level, measured in lux) reaching bedroom windows. This is to prevent an occupant's sleep patterns from being adversely affected. The limits vary according to the environmental zone of the existing location and have been set to encourage appropriate lighting design.

3.2.2 In practice these limits can be comfortably met in virtually every circumstance and the Lighting Strategy will ensure this is the case for the Proposed Development.

(2) Glare causing visual disability or discomfort

3.2.3 The ILP Guidance Notes recommends limits to the intensity of any light source that can be seen by an observer outside the lit development. This is to prevent a source of light dazzling an observer to the extent that it significantly affects their ability to see properly or it causes discomfort. As before, the limits vary according to the environmental zone of the existing location and have been set to encourage appropriate lighting design.

3.2.4 Again, these limits can be comfortably met in virtually every circumstance and the Lighting Strategy will ensure this is the case for the Proposed Development.

3.3 LOSS OF AMENITY

(3) Light spill onto property/gardens, changing their character after dark

- 3.3.1 Light spill into the curtilage of a residential property can affect its character after dark, as can light spill onto the property itself. This can be considered as a loss of amenity for the resident, as their immediate night time environment has been altered and there is no easy way for them to remedy it.
- 3.3.2 Careful design, in conjunction with landscaping and planting, can readily ensure that this impact is prevented and that the illumination falling within any residential property curtilage will, to all intents and purposes, be zero. This is incorporated into the Lighting Strategy.

3.4 VISUAL

(4) Light presence – light sources and other lit elements appearing in dark views

- 3.4.1 This impact refers to what an observer would see of the development in a night time view. It is the night time equivalent of the daytime visual impact. Night time elements that are potentially visible are light sources and any surface which is being illuminated, whether it be the target surface (such as a service yard) or a surface that is receiving light incidentally (such as a building façade).
- 3.4.2 This type of impact is not measurable and therefore there is no guidance on any limiting values. The magnitude of the impact is a matter of judgement, taking into account the existing night time view. The magnitude is lessened for those views where an observer is subject to direct illumination from, say, a nearby street light, or where light spill from a nearby light source illuminates the

foreground. This is because the observer's vision can no longer be fully dark adapted, resulting in lowered visual sensitivity to the new light presence in the field of view.

- 3.4.3 Mitigation is achieved by placing light sources out of sight of sensitive receptors where possible; minimising illumination falling onto vertical surfaces (such as building facades); and taking advantage of screening provided by mounding, planting, and the development buildings themselves. This is in line with the Lighting Strategy.

(5) Local sky glow appearing over new lit development

- 3.4.4 This impact refers to what an observer would notice in the sky above the development in a night time view. The effect is most pronounced on misty or hazy nights, where light is scattered by particles of water or dust suspended in the atmosphere, or when there is a reasonably low cloud base to act as a reflector for any upward light.
- 3.4.5 Mitigation is achieved by complying with the recommended limits in the ILP Guidance Notes for upward light emission. The limits vary according to the environmental zone of the existing location and have been set to encourage appropriate lighting design. The Lighting Strategy will ensure that these limits are met for the Proposed Development.
- 3.4.6 However, while this controls the performance of the lighting units themselves by setting limits to how much light they emit above the horizontal plane, it cannot control how much is reflected back up from illuminated surfaces, nor how much emitted light is scattered into the atmosphere on its way down to the target surface. These two factors are what give rise to potential local sky glow over new lit development. To mitigate it as much as possible, lighting must be accurately targeted and kept to a minimum, and this design principle is incorporated into the Lighting Strategy.

3.4.7 As for light presence (4), the magnitude of the impact is a matter of judgement, taking into account the existing night time view. Again, the magnitude is lessened for those views where an observer is subject to direct illumination from, say, a nearby street light, or where light spill from a nearby light source illuminates the foreground, because the observer's vision is not fully dark adapted.

(6) General brightening of the night sky, reducing visibility of stars and affecting astronomical observation

3.4.8 Clear views of the night sky are adversely affected by stray light that rises through the atmosphere and is scattered back towards the observer. It can affect views by the naked eye, with binoculars and with telescopes, reducing contrast and obscuring fainter stars. Even on the clearest nights some scattering can occur.

3.4.9 Stray light from major conurbations can have a significant effect over distances of tens of kilometres and therefore it is the remoter locations that will afford the best observations of the night sky.

3.4.10 It is not likely that any one development will make a noticeable difference to the clarity of night sky views from remoter locations in the surrounding area. This is especially true given the prevalence of existing lit development.

3.4.11 Nevertheless, the ILP Guidance Notes gives recommendations for limiting upward light emission from new lighting installations and compliance with these will prevent new development from contributing to this widespread problem. This has been incorporated into the Lighting Strategy.

3.5 HAZARD

(7) Glare causing visual disability

- 3.5.1 For roads, railways and navigable waterways, very bright sources of light can cause glare, disabling adequate vision and creating a safety hazard. Such glare is easily avoidable by designing in compliance with the ILP Guidance Notes and, where necessary, complying with additional requirements stipulated by highway, rail and navigation authorities, as described in the Lighting Strategy.

(8) Light sources affecting visibility and interpretation of signals, runway lights, etc.

- 3.5.2 The colours or patterns of lights can cause confusion to rail drivers and aircraft pilots at night. With careful design, in consultation with the responsible authorities, this can be completely avoided. This is incorporated into the Lighting Strategy.

3.6 DISTURBANCE

(9) Light spill onto dark habitat, reducing its ecological value (esp. in relation to bats)

- 3.6.1 Similar to impact type (3), light spill onto dark habitat changes its character to the extent that it may affect light sensitive nocturnal fauna. This is especially true of bats and airborne insects.
- 3.6.2 This impact is mitigated by careful design, in collaboration with ecologists, as described in the Lighting Strategy, to ensure any light spill levels are sufficiently curtailed and, if possible, completely eliminated.

(10) UV light emission, affecting airborne invertebrates

- 3.6.3** Some light sources in widespread use emit significant amounts of UV light. Airborne invertebrates are particularly attracted to this, upsetting local insect populations and altering bat feeding patterns. With the availability of LED light sources, it is now feasible to avoid using UV-emitting sources close to ecologically sensitive areas, thus preventing any adverse effects. This is incorporated into the Lighting Strategy.

4. BASELINE CONDITIONS

- 4.1.1 The SRFI Site and surrounding area was visited in May 2017 to ascertain the baseline conditions after dark. The weather was clear with some cloud cover. Photographs documenting night time views are given in section 8 of this document. Further information concerning the type and extent of lighting on the road network in the area was gathered from Google Street View.
- 4.1.2 Although the surrounding area is largely rural in character, it nevertheless contains many sources of light, some of which is poorly controlled and is giving rise to significant, if localised, light pollution. The overall prevailing night time environment can be categorised as Environmental Zone E2 “Rural” from the ILP Guidance Notes. The SRFI Site itself is largely unlit.
- 4.1.3 The most significant existing sources of light are listed below in Table 3. Four Ashes Park (Bericote Properties) is included as it was under construction at the time of writing, with Phase 1 completed in summer 2017.

Table 3: Existing sources of light

TYPE	LOCATION OF SOURCE	LIGHTING DESCRIPTION
Commercial, industrial and other non-residential areas	Four Ashes industrial estates and business parks	Mixture of street and floodlighting, some of it poorly controlled; red aviation warning light on Veolia Energy Recovery Facility (ERF) stack
	Four Ashes Park, Bericote Properties (Phase 1 recently completed, detailed planning permission for up to four B2/B8 units)	Significant amount of floodlighting, stated to be designed for Environmental Zone E3 (i.e. appropriate for small town centres or suburban locations). Details given in Bericote Properties Ltd External Lighting Statement ¹⁰
	Premises in Gailey, including Gailey Service Station, Watling Street Police Station, Staffordshire CC Highways Depot, Spread Eagle Pub and Dobbies Garden Centre	Mixture of lighting types, including some poorly controlled floodlighting
	Food packing and farming premises off Church Lane, Hatherton	Floodlighting, some of it poorly controlled
Major highways	A449 Stafford Road	Lit continuously throughout its length (high pressure sodium)
	M6 motorway	Lit southward from Calf Heath (high pressure sodium)
	A5 Watling Street	Lit at junction with A449 and eastward from South Cannock (high pressure sodium)
	M6 motorway/M6 Toll interchange	Fully lit (high pressure sodium).

¹⁰ Tate Consulting on behalf of Bericote Properties Ltd (March 2016) Four Ashes: Land off Gravelly Way, Four Ashes. South Staffs – External Lighting Statement

TYPE	LOCATION OF SOURCE	LIGHTING DESCRIPTION
	M54 motorway	Lit eastward from junction at i54 Business Park, including A449 and A460 junctions and M6 interchange (high and low pressure sodium)
Conurbations	Cannock	Street and other lighting (mainly high and low pressure sodium)
	Wolverhampton-Willenhall-Walsall-Bloxwich	Street and other lighting (mainly high and low pressure sodium)
Smaller settlements	Croft Lane	Street lighting
	Penkridge	Street and other lighting
	Shareshill	Street lighting
	Featherstone	Street lighting; floodlighting associated with HMP Featherstone
	Coven	Street lighting
	Brewood	Street lighting

- 4.1.4 For this preliminary assessment, sensitive receptors have been identified and the existing night time conditions they experience have been determined, as given in Table 4. (Details on the nature of the sensitivity for each type of receptor are given in Table 5, section 6.)

Table 4: Receptors and baseline conditions

TYPE OF RECEPTOR	RECEPTORS	BASELINE CONDITIONS
(A) Residential properties within 100m of new lit development	Gailey Wharf, buildings and moorings	Views are largely dark but local sky glow is visible in southward views and Croft Lane street lighting can be glimpsed.
	Croft Lane	Some dark views might be glimpsed from certain properties and in certain directions but this is tempered by the presence of street lighting on Croft Lane and local sky glow in southward views.
	Avenue Cottages and Old Pool House	Views are largely dark but local sky glow is visible in southward views.
(B) Residential properties more than 100m away from new lit development	Properties along A5	Although the A5 is largely unlit, there are sporadic lit locations such as the Gailey Service Station, and the region around the A5/A449 junction is well lit (roads, Police Compound, Staffordshire CC Highways Depot, Spread Eagle pub, Dobbies Garden Centre).
	Properties along A449, including Coven	Views towards the SRFI Site are dominated by existing street lighting along the A449.
	Properties along Straight Mile	Views towards the SRFI Site mostly take in the street lighting which is present along Straight Mile through Calf Heath.
	Properties along Station Drive	Views towards the Rail Terminal within the SRFI Site contain A449 street lighting on the left hand side and Four Ashes Park and the new Bericote Properties development on the right hand side. Station Drive itself is lit.

TYPE OF RECEPTOR	RECEPTORS	BASELINE CONDITIONS
	Properties in Calf Heath (including Stable Lane), Shareshill and Brewood	Perimeter properties with unobstructed views towards the SRFI Site currently see some local sky glow near the horizon from existing lit development, and the Veolia stack aviation warning light is also visible. All other properties have views that are screened by buildings and/or are dominated by local street lighting.
(C) Night time views from dark non-residential areas	Shoal Hill Common	Existing lit development is clearly visible, including the Veolia stack aviation warning light, and significant lighting and local sky glow can be seen towards the horizon. Shoal Hill Common is not frequented after dark.
(D) Transport)	Roads, railways, airports, navigation	There are no existing adverse lighting conditions.
(E) Night sky views	Dark rural locations well away from all lighting (including street lights)	On a clear night reasonable quality views of the overhead night sky are obtainable. However, the quality diminishes towards the horizon due to sky glow.
(F) Light-sensitive ecology within and very close to the SRFI Site	Calf Heath Reservoir, Canal (dark stretches), wooded locations within the SRFI Site	Habitats for light-sensitive species currently experience negligible light spill.

5. LIGHTING STRATEGY

5.1 INTRODUCTION

- 5.1.1 This Lighting Strategy has been developed for two reasons. Firstly, it specifies sufficient detail concerning the external lighting associated with the Proposed Development to enable potential lighting impacts to be robustly assessed (see section 6). Secondly, it acts as a statement concerning the constraints that need to be applied to the future design of all external lighting associated with the Proposed Development to ensure that the predicted impacts are not exceeded.

5.2 GENERAL PRINCIPLES

- 5.2.1 External lighting will be provided wherever it is necessary to provide a safe and secure environment for staff and other users after dark. This includes roads, footways and cycleways; service yards; the immediate perimeter of buildings; and the rail terminal (both general lighting for circulation of HGVs and train operation and localised lighting for loading/unloading tasks). 'Secured by Design' principles will be adopted and emphasis will be placed on achieving good uniformity of light distribution.
- 5.2.2 All external lighting will be designed to minimise light pollution and optimise energy use. Lighting will comply with the ILP Guidance Notes recommendations for Environmental Zone E2 and, where possible, will meet the stricter recommendations for Environmental Zone E1.
- 5.2.3 Luminaires (lighting units or fittings) will be of the directional type that emit all their light below the horizontal. They will be mounted at as low a height as practicable and will be arranged to direct as much of their emitted light as possible to hard surfacing and task

areas, while avoiding spill light onto adjacent green areas where there might be unwanted ecological effects.

- 5.2.4 Illumination levels will be set as low as practicable while complying with safety and security recommendations. Spill of light onto building facades and outside of the target area for illumination will be minimised through careful design, specification and positioning of lighting equipment.
- 5.2.5 At the outer edges of the Proposed Development lighting units will, as far as practicable, be positioned so that they are out of view of receptors such as nearby residential properties and rural settlements further afield. Mounding, fencing and planting to be provided as part of the Proposed Development will assist in minimising visual and noise impacts.
- 5.2.6 The lighting design will ensure that there will be negligible upwards emitted light, very well controlled light spill and no glare.

5.3 SPECIAL MEASURES CLOSE TO ECOLOGICALLY SENSITIVE AREAS

- 5.3.1 There are a number of ecological areas that will potentially be particularly sensitive to lighting impacts. Where lighting is to be sited close to such areas, there is the potential for such impacts to be significant unless targeted and special measures are employed. This is particularly true for retained wooded areas within the SRFI Site, ecological corridors, and the points where such corridors intersect with roads.
- 5.3.2 The special measures given below will each assist in mitigating impacts and will be incorporated as necessary into the detailed design. The development of detailed designs will take place in conjunction with an ecologist and such designs will be subject to the approval of Staffordshire County Council's (SCC) Ecologist.

General parameters

- 5.3.3 All lighting sited close to ecologically sensitive areas will be designed to prevent adverse effects on those areas using measures such as are set out in this section. In particular, where bats are likely to be present the guidance issued from time to time by the Bat Conservation Trust in conjunction with the Institution of Lighting Professionals will be followed¹¹.
- 5.3.4 Light sources will be LED with no UV content. Colour temperature will be warm white (3000K) LED wherever possible as this has low blue light content, helping to prevent adverse effects on airborne insect and bat populations.
- 5.3.5 Additional mitigation to be employed will include one or more of the following: reduced lighting levels; lowest practical mounting height; luminaires with sharp light cut-off; cowls/ shields/ louvres/ hoods to block unwanted light; additional screening in the form of dense hedgerow planting and fencing.
- 5.3.6 Paragraphs 5.3.7-5.3.12 give specific information regarding lighting for the bat hop overs that will be created where ecology corridors intersect with roads. These locations are defined in Figure 5.3 in the Framework Ecological Mitigation and Management Plan¹².

Lighting at bat hop over on adoptable A5/A449 Link Road

- 5.3.7 A specific ecological constraint has been identified on the proposed adoptable A5/A449 Link Road, and agreement in principle has been reached on an acceptable lighting solution with SCC. The constraint will occur where an ecological corridor crosses the road close to the canal. A bat hop over will be created using planting and landscaping, extending over a stretch of road at least 50 metres in

¹¹ Current document: Bat Conservation Trust/ILE (May 2009) Bats and Lighting in the UK. Available at <https://www.theilp.org.uk/documents/bats-and-lighting-in-the-uk/>

¹² Document 6.2, Technical Appendix 10.4

length. This will necessitate a lighting solution that facilitates the hop over's use by bats and avoids adverse impacts. Discussions with SCC have confirmed that an adoptable lighting solution is achievable that will satisfy the County's requirements in all respects.

5.3.8 The agreed solution includes reducing the lighting level locally and installing shorter columns within the bat hop over area¹³. Lighting design parameters are as follows:

- Lighting class P3, 7.5 lux. (note: formerly known as lighting class S3)
- Column mounting height 6 metres (this is the lowest acceptable to SCC)
- Lighting units mounted horizontally, thus preventing any upward light emission
- Lighting units from the Holophane V-Max LED range, which have very sharp light cut off.

5.3.9 For context, SCC have determined that the rest of the Link Road should be lit using columns not exceeding 10 metres in height. The lighting class should be M4, 0.75 candelas per square metre (cd/m^2), which is approximately equivalent to 10 lux, while roundabouts should be lit to lighting class C3, 15 lux.

¹³ Details given in an email sent by SCC's Principal Lighting Engineer, 24 January 2018 14:26

Lighting at bat hop overs on non-adoptable internal roads

- 5.3.10 The lighting design parameters agreed with SCC for the adoptable A5/A449 Link Road (see paragraphs 5.3.6-5.3.8) will form the starting point for similar locations on non-adoptable internal roads, with column heights and/or lighting levels reduced further wherever possible.

Lighting at bat hop overs on Vicarage Road and Straight Mile

- 5.3.11 Vicarage Road is currently unlit in the vicinity of the bat hop over and will remain so.
- 5.3.12 Straight Mile currently has very limited lighting in the vicinity of the bat hop over. This lighting only serves the residential properties that will be demolished as part of the Proposed Development. Consequently, Straight Mile will become unlit at this point.

5.4 RAIL TERMINAL

- 5.4.1 Trafficked areas will be lit as described below for internal roads, service yards and lorry parks.
- 5.4.2 During the operation of the Initial Rail Terminal (reach stacker operation), lighting of the container area will be in accordance with BS EN 12464 'Light and lighting – Lighting of work places – Part 2: Outdoor work places'¹⁴. It will be provided from 18 metre height columns and the target average illuminance will be 50 lux.
- 5.4.3 During the operation of the Expanded Rail Terminal (gantry crane operation), the underside of the gantry cranes will carry down-lighting units to illuminate the working area immediately below the crane. The remainder of the area will be lit from perimeter lighting columns not exceeding 18 metres in height. The lighting will be in

¹⁴ BSI Standards Publication (2014) BS EN 12464-2:2014 Light and lighting — Lighting of work places. Part 2: Outdoor work places

accordance with BS EN 12464 'Light and lighting – Lighting of work places – Part 2: Outdoor work places' and the target average illuminance will generally be 20 lux for trafficked areas, rising locally to 50 lux in the vicinity of load/unloading operations.

5.5 ROADS WITHIN THE SRFI SITE

5.5.1 All roads within the SRFI Site will be lit using standalone lighting columns with a typical mounting height of eight to ten metres. Lighting will comply with the recommendations given in BS 5489-1 'Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas'¹⁵. Additionally, adoptable roads will comply with local highway authority requirements (see paragraph 5.3.9 regarding the adoptable A5/A449 Link Road).

5.6 SERVICE YARDS

5.6.1 Lighting for service yards will be provided from column mounted luminaires around the perimeter of the yard and directed towards the building. Maximum column height will be 18 metres. Additional luminaires will be located over loading bays/lorry dock areas and aimed downwards.

5.6.2 Lighting will comply with the recommendations given in BS EN 12464 'Light and lighting – Lighting of work places – Part 2: Outdoor work places' and the target average illuminance will be 20 lux.

5.7 LORRY PARKS AND CAR PARKS

5.7.1 Lorry parks and car parks will be lit by luminaires mounted on standalone lighting columns. Maximum column height will be 15 metres. The lighting will comply with the recommendations given

¹⁵ BSI Standards Publication (2013) BS 5489-1:2013 Code of practice for the design of road lighting. Part 1: Lighting of roads and public amenity areas

in BS EN 12464 'Light and lighting – Lighting of work places – Part 2: Outdoor work places'. The target average illuminance will be 20 lux for lorry parks and 10 lux for car parks.

5.8 LIGHTING NEAR TRANSPORT

- 5.8.1 Where lighting will be sited in the vicinity of roads, railways or navigable waterways, care will be taken to avoid creating a hazard through glare from a light source and the possibility of signals being misinterpreted due to distracting lights. Detailed lighting proposals will be subject to consultation with and approval by the appropriate transport authorities.

6. POTENTIAL LIGHTING IMPACTS

6.1.1 This section describes the potential lighting impacts from the Proposed Development with the following embedded mitigation having been implemented:

- the Lighting Strategy (section 5)
- the Green Infrastructure Plan¹⁶ (mounding and planting)
- the principles given in the illustrative Landscape and Green Infrastructure Strategy¹⁷ (planting).

6.1.2 Table 5 shows the relevance of the different types of lighting impact (as described in section 3) to each type of receptor.

Table 5: Receptor types and lighting impacts

TYPE OF RECEPTOR	POTENTIAL LIGHTING IMPACTS
(A) Residential properties within 100m of new lit development	(1) Nuisance: excessive illumination falling on bedroom windows (2) Nuisance: glare causing visual disability or discomfort (3) Loss of amenity: light spill onto property/gardens, changing their character after dark (4) Visual: light presence – light sources and other lit elements appearing in dark views (5) Visual: local sky glow appearing over new lit development
(B) Residential properties more than 100m away from new lit development	(4) Visual: light presence – light sources and other lit elements appearing in dark views (5) Visual: local sky glow appearing over new lit development

¹⁶ Document 2.7, Green Infrastructure Parameter Plans

¹⁷ Document 6.2, Figure 12.11 Landscape and Green Infrastructure – Illustrative Plan

TYPE OF RECEPTOR	POTENTIAL LIGHTING IMPACTS
(C) Night time views from dark non-residential areas	(4) Visual: light presence – light sources and other lit elements appearing in dark views (5) Visual: local sky glow appearing over new lit development
(D) Transport)	(7) Hazard: glare causing visual disability (8) Hazard: light sources affecting visibility and interpretation of signals, runway lights, etc.
(E) Night sky views	(6) Visual: general brightening of the night sky, reducing visibility of stars and affecting astronomical observation
(F) Light-sensitive ecology within and very close to the SRFI Site	(9) Disturbance: light spill onto dark habitat, reducing its ecological value (esp. in relation to bats) (10) Disturbance: UV light emission, affecting airborne invertebrates

6.1.3 To assess the significance of lighting effects, it is necessary first to determine the sensitivity of receptors using Table 6. The likely impact on light-sensitive ecology (receptor type F) is dealt with in Chapter 10 (Ecology and Nature Conservation).

Table 6: Receptor sensitivity to lighting effects

SENSITIVITY OF RECEPTOR	EXAMPLES OF RECEPTOR
High	Rural and dark landscapes. Views over significant water bodies and large unlit spaces. SPAs, Ramsar sites, SACs, SSSIs and SINCs. Astronomical observatories.
Medium	Views with existing lighting visible in the middle distance or beyond. Larger villages. Conservation areas. Railways, major roads, aerodromes and navigable waterways.
Low	Urban and suburban environments. Commercial and industrial property.

6.1.4 The magnitude of a lighting impact is assessed as a change from the baseline condition, taking into account the relative scale of the

new effect. Table 7 sets out the criteria for assessing the magnitude of impact, which is generally adverse. Beneficial impacts, if any, are rated using a similar scale.

Table 7: Determining Lighting Impact Magnitude

MAGNITUDE	CRITERIA FOR ASSESSING IMPACTS
Large	The light pollution associated with the Proposed Development is considerably greater than the baseline situation, thus fundamentally changing the character of the nightscape (visual impacts) or exceeding ILP Guidance Note recommendations (nuisance, loss of amenity and hazard impacts).
Moderate	The light pollution associated with the Proposed Development is of a similar magnitude to the baseline situation, thus noticeably adding to it, but not fundamentally changing the character of the nightscape (visual impacts) or exceeding ILP Guidance Note recommendations (nuisance, loss of amenity and hazard impacts).
Slight	The light pollution associated with the Proposed Development is discernible but its magnitude and type is not noticeably different from the baseline condition.
Negligible	The light pollution associated with the Proposed Development is barely distinguishable, approximating to a 'no change' situation.

6.1.5 The significance of a lighting effect is determined by the interaction of sensitivity and magnitude. The effect significance matrix is set out in Table 8. For the purposes of this assessment, a significant effect would be any effect greater than moderate adverse.

6.1.6

Table 8: Significance of Effect Matrix

MAGNI- TUDE	SENSITIVITY		
	High	Medium	Low
Large	Major	Major [†] Moderate [‡]	Moderate [†] Minor [‡]
Moderate	Major [†] Moderate [‡]	Moderate [†] Minor [‡]	Minor
Slight	Moderate [†] Minor [‡]	Minor	Negligible
Negligible	Negligible	Negligible	Negligible
[†] for nuisance, loss of amenity, hazard and disturbance effects (i.e. all except 4, 5 and 6) [‡] for visual effects (i.e. 4, 5 and 6)			

6.1.7 Table 9 sets out the assessment of potential lighting impacts from operation of the Proposed Development. Construction impacts would generally be no greater than operational impacts and in many cases they will be less. Similarly, Phase 1 Operation impacts are expected to be the same as or less than for Phase 2 Operation. Therefore, Table 9 reports the potential impacts arising from Phase 2 Operation only.

Table 9: Potential lighting impacts (Phase 2 Operation)

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Gailey Wharf, buildings and moorings (A)	High	50m +	Moderate	Moderate Adverse	<p>There will be no nuisance (1, 2) and loss of amenity (3) impacts.</p> <p>The upper parts of the closest units will be visible, illuminated to a low level by stray light reflected from lower surfaces. Mounding and planting will screen the lower parts of the units and the active areas. Some lighting units might be glimpsed, including lighting on the A5-A449 link road. It is concluded that the impact of light presence (4) will be moderate.</p> <p>There will be a slight increase in local sky glow (5) in the direction of the Proposed Development, rising to moderate on misty and hazy nights.</p>

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Croft Lane residential properties (A)	High	50m +	Moderate	Moderate Adverse	<p>There will be no nuisance (1, 2) and loss of amenity (3) impacts.</p> <p>Views of lit development will be partially screened by existing vegetation and proposed mounding and planting. The upper parts of the closest units, illuminated to a low level by stray light reflected from lower surfaces, will be visible in some views. Some lighting units might be glimpsed by certain receptors, including lighting on the A5-A449 link road, but existing street lighting on Croft Lane will reduce its significance. It is concluded that the impact of light presence (4) will be moderate.</p> <p>There will be a slight increase in local sky glow (5) in the direction of the Proposed Development, rising to moderate on misty and hazy nights.</p>

RECEPTOR	SENSI-TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI-TUDE OF CHANGE	SIGNIFI-CANCE OF IMPACT	DESCRIPTION
Avenue Cottages and Old Pool House (A)	High	50m	Moderate	Moderate Adverse	<p>There will be no nuisance (1, 2) and loss of amenity (3) impacts.</p> <p>There will be views of the upper parts of the nearest units, which will be illuminated to a low level by stray light reflected from lower surfaces. Mounding and planting, together with careful lighting design, will largely prevent visibility of lighting units. It is concluded there will be a moderate increase in light presence (4).</p> <p>There will be a slight increase in local sky glow (5) in the direction of the Proposed Development, rising to moderate on misty and hazy nights.</p>

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Properties along A5 (B)	High	150m +	Moderate	Moderate Adverse	<p>There will be no nuisance (1, 2) and loss of amenity (3) impacts.</p> <p>Views of lit development will be curtailed to some extent by existing vegetation and proposed mounding and planting. The upper parts of the closest units will be visible in some views, illuminated to a low level by stray light reflected from lower surfaces. It is possible that some lighting units will be glimpsed by certain receptors. Taking into account that existing light sources can be seen in many views, it is concluded that the impact of light presence (4) due to the Proposed Development will be moderate.</p> <p>There will be a slight increase in local sky glow (5) in the direction of the Proposed Development, rising to moderate on misty and hazy nights.</p>

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Properties along A449, including Coven (B)	High	100m +	Slight	Minor Adverse	<p>The A449 will present a lit barrier in all views of the development. Beyond that, the upper parts of the closest units will be visible, illuminated to a low level by stray light reflected from lower surfaces. Mounding and planting will prevent views of the lower parts of the units and the active areas and, to a large extent, new lighting units. It is concluded that the increase in light presence (4) will be slight.</p> <p>There will be a very slight increase in local sky glow (5) in the direction of the Proposed Development, rising to slight on misty and hazy nights.</p>
Properties along Straight Mile (B)	High	150m +	Slight	Minor Adverse	<p>Mounding and planting will limit views of the lighting on the Proposed Development. It is concluded that the increase in light presence (4) will be slight.</p> <p>There will be a very slight increase in local sky glow (5) in the direction of the Proposed Development, rising to slight on misty and hazy nights.</p>

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Properties along Station Drive (B)	High	150m +	Moderate	Moderate Adverse	<p>Although mounding and planting will help to restrict views of the lit Rail Terminal to the north, some illumination will be visible in the middle distance. Taking into account the existing night time conditions in views looking north it is concluded that the increase in light presence (4) will be moderate.</p> <p>The increase in local sky glow (5) in the direction of the Proposed Development will be slight.</p>
Properties in Calf Heath (including Stable Lane), Shareshill and Brewood with existing dark views towards the SRFI Site (B)	High	400m – 3km	Slight	Minor Adverse	<p>The uppermost parts of some units may be distantly glimpsed, however existing vegetation and new landscaping will eliminate most of the lit development from view. Taking into account distance, it is concluded that the impact of light presence (4) will be slight.</p> <p>There will be at most a slight increase in local sky glow (5) in the direction of the Proposed Development under misty or hazy conditions.</p>

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Shoal Hill Common (C)	High	3.8km	Slight	Minor Adverse	<p>The uppermost parts of many units will be seen in the middle distance of the extensive views obtainable from the exposed parts of this location. Some lighting units may also be observable. Existing vegetation and new landscaping will prevent the most significant parts of lit development from being seen, however. Taking into account the context, where many significant sources of light can be seen in the middle distance right out to the horizon, the impact of light presence (4) will be slight.</p> <p>There will be at most a slight increase in local sky glow (5) in views in the direction of the Proposed Development under misty or hazy conditions.</p> <p>There will be no hazard (7, 8) impacts for transport receptors.</p>
Roads, railways, airports, navigation (D)	Medium	—	Negligible	Negligible	<p>The adverse impact of lighting from the Proposed Development will be insignificant in comparison to the existing situation, where several major conurbations and lit highways are present in the wider landscape.</p>
Views of the night sky from dark rural locations (E)	—	—	—	Negligible	<p>The adverse impact of lighting from the Proposed Development will be insignificant in comparison to the existing situation, where several major conurbations and lit highways are present in the wider landscape.</p>

RECEPTOR	SENSI- TIVITY	DISTANCE TO NEAREST LIGHTING	MAGNI- TUDE OF CHANGE	SIGNIFI- CANCE OF IMPACT	DESCRIPTION
Light-sensitive ecology within and very close to the SRFI Site (F)	—	—	—	—	See Chapter 10 (Ecology and Nature Conservation)

7. CONCLUSION

- 7.1.1 The Proposed Development will include external lighting that has the potential to give rise to adverse impacts. This should be considered in the context of the existing conditions in the surrounding area, which contains many sources of light.
- 7.1.2 A Lighting Strategy and Lighting Impact Assessment has been set out, enabling assessment of potential lighting impacts on sensitive receptors. The Strategy will minimise light pollution in all its forms through a number of measures, such as minimising mounting heights while using directional luminaires that emit all their light downward towards hard surfacing.
- 7.1.3 The assessment has found that there will be no nuisance and loss of amenity impacts for any receptor. The closer residential receptors are likely to experience a moderate adverse impact in terms of light presence (visibility of lighting, including lit surfaces) and a slight or moderate increase in local sky glow. All other lighting impacts on non-ecological receptors are likely to be minor adverse or negligible.
- 7.1.4 Regarding impacts on ecologically sensitive locations, the Lighting Strategy requires that lighting designers should work closely with ecologists in order to mitigate such impacts to the point where they can be regarded as negligible or non-existent (further details are given in Chapter 10, Ecology and Nature Conservation).
- 7.1.5 In conclusion, this Lighting Strategy and Lighting Impact Assessment addresses the requirements of Chapter 5 of the NPS in relation to light pollution. It demonstrates that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact from emissions of artificial light (NPS paragraph 5.87), including impacts on local amenity, intrinsically dark landscapes and nature conservation. Furthermore, it complies with NPPF policy

and the South Staffordshire Core Strategy, as well as all relevant industry guidance.

8. FIGURES

The following figures contain night time photographs looking towards the SRFI Site. Figure 1 shows the locations of the views. These are wide angle views with a span of about 140 degrees¹⁸. All photographs have been processed identically, with the aim of simulating what would be seen by a human observer with eyesight that is dark adapted. They are best viewed on screen rather than in print.

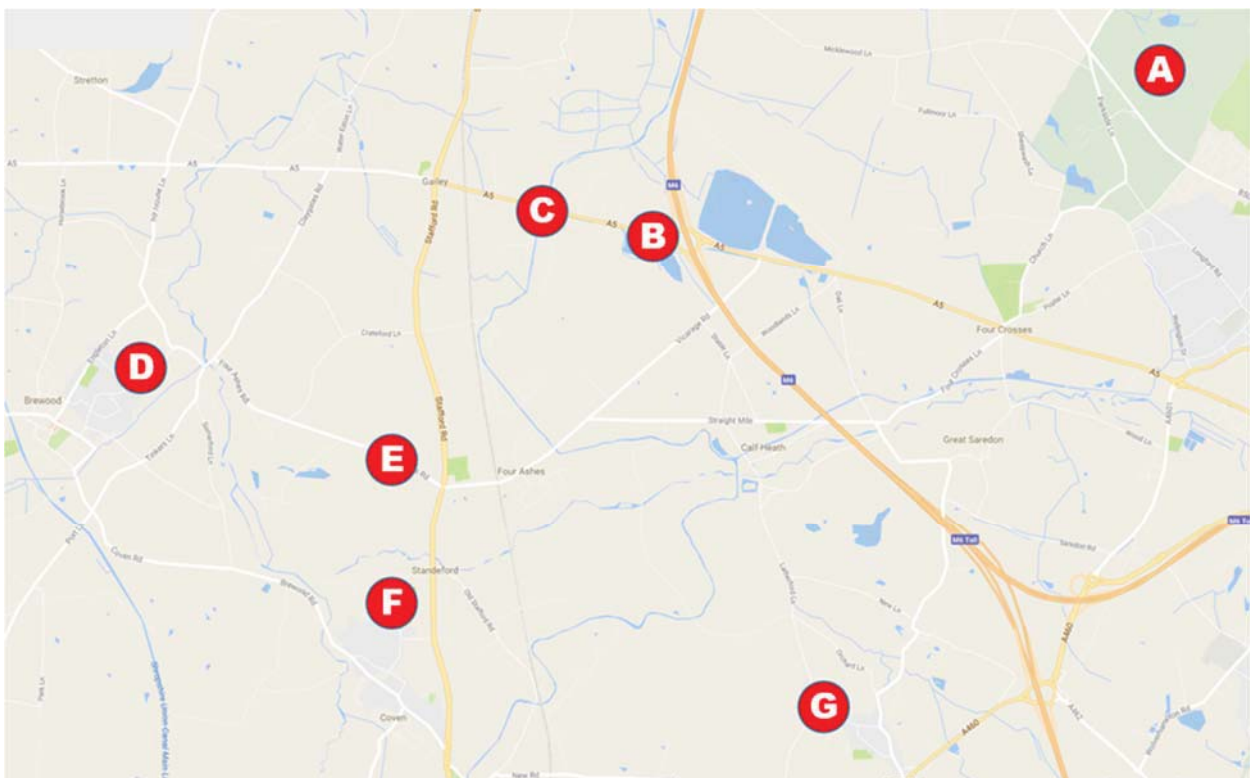


Figure 1 *Map of night time view locations.*

¹⁸ Taking lens: full frame 7.5 mm fisheye on MFT sensor size (equivalent to 15 mm on 36x24mm sensor size). Geometric adjustments: converted to cylindrical projection and cropped equally top and bottom to 4:1 aspect ratio.



Figure 2 Location A (dusk). View from the viewpoint on Shoal Hill Common.

White lights at centre belong to Four Ashes industrial areas and lit development on Church Lane, Hatherton. The Veolia stack red aviation warning light is prominent at centre. Orange sky glow left of centre is due to motorway lighting and the Wolverhampton conurbation. Other lighting belongs to A449 and other settlements and development.

Since this photograph was taken, further lit development has taken place at Four Ashes Park, immediately to the right of the Veolia stack, which is likely to increase the number of light sources in that portion of the view.



Figure 3 Location B. View across Calf Heath Reservoir.

Artificial light is received by reflection from clouds and sky glow. Although not clear in this photograph, the Veolia stack red aviation warning light is visible towards the centre.



Figure 4 Location C. View from A5 overbridge at Gailey Wharf.

Artificial light is received by reflection from clouds and sky glow. There are a few small light sources associated with buildings at Gailey Wharf itself, while for safety the moorings have low output illuminated bollards which can just be made out in this photograph.

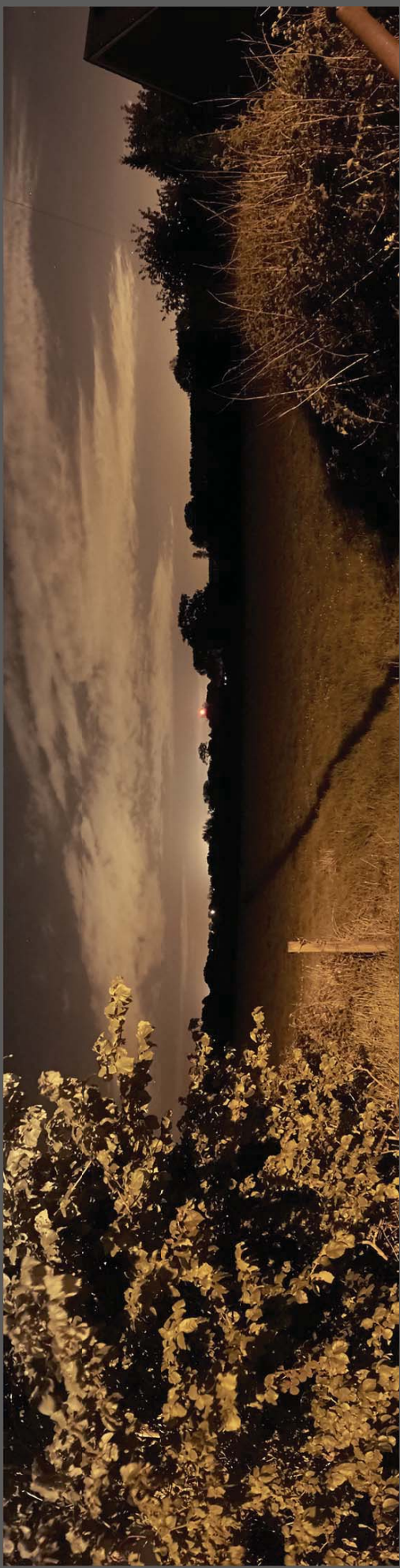


Figure 5 Location D. View from Four Ashes Road at the eastern edge of Brewwood.

Foreground illumination is due to street lighting on Four Ashes Road, making other lighting less visible. Local sky glow over Four Ashes industrial areas can be seen in the centre and the Veolia stack red aviation warning light is prominent.

Since this photograph was taken, further lit development has taken place at Four Ashes Park, immediately to the left of the Veolia stack, which is likely to increase the local sky glow in that direction.



Figure 6 Location E. View from Four Ashes Road immediately west of its junction with A449.

This clearly shows that any views towards the Site from the far side of the A449 are already dominated by the A449 road lighting itself. The Veolia stack red aviation warning light is visible right of centre.



Figure 7 Location F. View from School Lane, Coven.

Views towards the Site are dominated by the A449 road lighting itself. The Veolia stack red aviation warning light is visible towards the left.

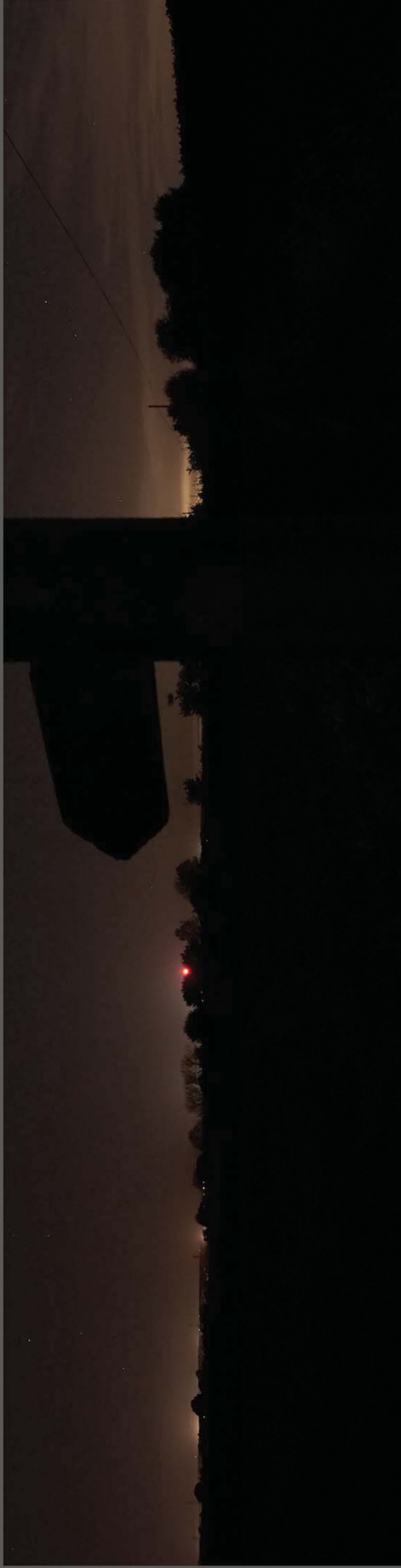


Figure 8 Location G. View from junction of Church Road, Featherstone Lane and Latherton Lane, Shareshill.

There are several sky glow hotspots in this view, including most noticeably sky glow over the Cannock conurbation right of centre. The Veolia stack red aviation warning light is visible left of centre.

Since this photograph was taken, further lit development has taken place at Four Ashes Park, immediately beyond the Veolia stack, which is likely to increase the local sky glow in that direction.