

17.0 LIGHTING

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APPENDIX

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17.1 INTRODUCTION

17.1.1 This chapter has been prepared by Brookbanks Consulting Ltd to present the findings of an assessment of the likely effects of lighting arising from the Proposed Development of Land at Bankside (Phase 2), Banbury.

17.1.2 The assessment considers the potential effects of both the construction and operational phases and identifies both the risks and associated mitigation requirements.

17.2 ASSESSMENT METHODOLOGY

Assessment approach

17.2.1 Assessment of the potential impacts associated with light on the Proposed Development during and after the construction phase and identification of mitigation measures required to resolve any potential negative impact. This will include the residential impact of lighting from the development and mixed-use environmental impact of light installed for other purposes.

17.2.2 The main factors that generally influence the design of lighting schemes include:

- The general nature of the surrounding area;
- The topography of the areas illuminated;
- The presence or absence of structures to effectively block the spill light beyond the boundaries of the complex; and
- The ability to design the systems with integral shielding devices.

- 17.2.3 Spill light and glare analysis are key environmental issues. Spill light is the amount of illumination added to the environment and glare is the discomfort of visions experienced when the image is excessively bright compared to the source's background.
- 17.2.4 The approach to the lighting assessment involves the consideration of areas that have a view of the proposals and shall consider the impact of light and glare into the surrounding areas.
- 17.2.5 In designing a suitable lighting solution for The Site, a number of key specification issues have to be considered. These include the assumed illuminance levels required and the environmental zone category for the site.
- 17.2.6 To establish the appropriate environmental zone for the site, reference was made to the ILP Guidance Notes for the Reduction of Obtrusive Light 2011. This document categorises the environment into five zones, ranging from National Parks to City Centres. This site, in this instance, falls into Zone E2, being a rural location.
- 17.2.7 The table below shows an example of the typical lighting levels for various situations by way of comparison with the lighting expected to be proposed in the Site application.
- 17.2.8 This table is provided to demonstrate the lighting impacts of introducing the Site development onto the currently unlit site. Table 17.1 outlines the difference in lux levels for the different categories of site use; a judgment is therefore made on the proximity of these different site uses to the nearby receptors to establish both a magnitude and significance of impact.

Table 17.01 – Lux Levels

Light Source	Horizontal Lux
Full Moon	0.3 to 0.5
Street Lights - Footpath	3 to 10
Street Lights – Residential Area	5 to 15
Street Lights – Local Centre	20 to 40
Sunny Day	80,000 to 120,000

Significance criteria

17.2.9 The assessment of likely impacts as a result of the Proposed Development has taken into account both the construction and operational phases. The significance level attributed to each impact has been assessed based on the magnitude of change due to the Proposed Development, 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.

17.2.10 The criteria used to determine the significance of any change in baseline lighting levels have been defined qualitatively using professional judgement and best practice guidance (as identified in section 13.2). The criteria used to assess the magnitude and significance of the effects of artificial lighting has been derived from the ILP Guidance Notes for the Reduction of Obtrusive Light 2011. Reference has been made to the Environmental Zone Criteria for light trespass into windows (measured in lux) as defined as:

- E1: Intrinsically Dark – National Parks, Areas of Outstanding Natural Beauty etc.

- E2: Low District Brightness – Village or relatively dark outer suburban locations
- E3: Medium District Brightness – Small town centres or suburban locations
- E4: High District Brightness – Town/city centres with high levels of night time activity

17.2.11 In the instance of The Site, judgement has derived that the current site conditions fall within category E2: Low District Brightness.

17.2.12 Additionally, judgement has determined that The Site development once completed will change from category E2 to E3: Medium District Brightness. The category change derives from acknowledging the present day and unlit Greenfield site will change to a permanently lit residential settlement with a new access albeit with strong landscaped screening.

17.2.13 In the absence of stator guidance, the ILP Guidance Notes for the Reduction of Obtrusive Light 2011, referred to above, have been used as suitable criteria against which to assess the effects of artificial lighting. The guidance levels for light trespass into windows have been used as the principal criteria for assessing the likely impacts associated with The Site. 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 dependent on the type and distance from the light source. To-date there are also no set criteria to quantify the potential effects on ecological and landscape receptors.

17.2.14 Therefore, in addition to the criteria provided in the ILP Guidance Notes for the Reduction of Obtrusive Light 2011, the impact magnitude and significance and duration of the impacts have been evaluated using a Brookbanks Consulting defined assessment scale outlined below:

Impact Magnitude

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

- High: significant deterioration/improvement in local conditions or circumstances;
- Medium: readily apparent change in conditions or circumstances;
- Low: perceptible change in conditions or circumstances; and
- Negligible: no discernible change in conditions or circumstances.

Impact Significance

17.2.16 The overall significance of an effect has been determined by measuring the magnitude of the residual effect against:

- The number of receptors affected, which will determine 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

17.2.17 The significance of any effects has been measured using the seven-point scale outlined in Table 17.2.

Table 17.02 – Significance of Effects

Significance	Definition
Major Beneficial	Major decrease in the level of sky glow, light spill and glare onto 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 ILP guidance levels.
Moderate Beneficial	Moderate decrease in the level of sky glow, light spill and glare onto surrounding areas and illuminance levels at the windows of residential properties, resulting in a moderate improvement in the current baseline conditions and is within the recommended ILP guidance levels.
Minor Beneficial	Minor decrease in the level of sky glow, light spill and glare onto surrounding areas and illuminance levels at the windows of residential properties, resulting in a perceptible improvement in baseline conditions and is within the recommended ILP guidance levels.
Negligible	Negligible or barely perceptible change in the level of sky glow, light spill and 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 Adverse	Minor increase in the level of sky glow, light spill and glare onto 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 ILP guidance levels but where current uses could still be maintained.
Moderate Adverse	Moderate increase in the level of sky glow, light spill and glare onto 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 ILP guidance levels.
Major Adverse	Major increase in the level of sky glow, light spill and glare onto 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 ILP guidance levels.

Impact duration

17.2.18 In determining the overall significance of an effect, judgement has been made between temporary and permanent effects based on the following timescale derived by Brookbanks Consulting:

- Short Term: the effects from lighting would be temporary and of short duration and would not last more than two to five years from the commencement of the works;
- Medium Term: the effects from lighting would be temporary and of medium duration and would not last more than five to fifteen years from the commencement of the works; and
- Long Term: the effects from the lighting would be of a long period of time (fifteen years or more) and may include permanent effects.

17.2.19 The timescales nominated are a judged framework for assessing the duration of an impact. Both the construction and operational effects defined later in this chapter contain one of these defined timescales to notify the reader of the expected duration of the effect.

17.3 RELEVANT POLICY

17.3.1 Environmental Protection Act: The Environmental Protection Act 1990 (Section 102 of the Clean Neighbourhoods and Environment Act (CENA): 2005, gives local authorities the power to consider obtrusive artificial light as a Statutory Nuisance. The Act makes ‘exterior light emitted from premises so as to be prejudicial to health or a nuisance’ a criminal offence.

- 17.3.2 ILP Guidance Notes for the Reduction of Obtrusive Light 2011: The Institute of Lighting Professionals has proposed lighting guidance and criteria for lighting impact assessments 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 against which limits for obtrusive light are defined.
- 17.3.3 DEFRA Lighting in the Countryside: Towards Good Practice 2001: This guidance provides advice on good lighting types and installations for street, sports and security lighting. It describes how to avoid light obtrusion of the night sky, glare hazards to drivers and nuisance to neighbours.
- 17.3.4 Construction Industry Research and Information Association: Good practice guidance documents prepared by the Construction Industry Research and Information Association (CIRIA) note that lighting on construction sites is typically required for onsite security and health and safety requirements during the night-time period and is temporary and short-term in nature.
- 17.3.5 CIE 150: Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations: This guide sets out guidelines for assessing the environmental impacts of outdoor lighting and gives recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels.
- 17.3.6 CIE 126: Guidelines for Minimising Sky Glow: The report gives general guidance for lighting designers and also policy makers about the ways the interference by sky glow of astronomical observations can be reduced or even avoided. The report gives guidance for the design of lighting installations and lighting equipment.

17.3.7 CIE 136: Guide to the Lighting of Urban Areas: The purpose of this publication is to supplement the recommendations for the lighting of public thoroughfares within urban areas. This guide includes the justification for the lighting of these public thoroughfares and methods of lighting specific areas such as cycle tracks, pedestrian areas and malls, residential and other non-arterial routes, alleys and lanes.

17.3.8 BS EN 12464 Part 2: Lighting of Workplaces, Outdoor Workplaces: This British Standard focuses on the recommendations for outdoor work places that are used at night and advice on limiting the effects of light obstruction within the environment.

17.3.9 BS EN 13201 Road Lighting Part 2: Performance Requirements 2003: This standard defines lighting classes for road lighting according to photometric requirements and aiming at the visual needs of road users.

17.3.10 BS 5489 Part 1 2003 provides recommendations on the general principles, aesthetic and technical aspects of road lighting and advises on statutory provisions, operation and maintenance of lighting. The standard provides recommendations for the design of lighting for all types of highways and public thoroughfares, including those specifically for pedestrians and cyclists, and for pedestrian subways and bridges. It also provides recommendations for the design of lighting in urban centres and public amenity areas.

Light Impact (England) Regulations

17.3.11 The Clean Neighbourhoods and Environment Act 2005 (Sections 101-103) is the only UK legislation in existence which applies some statutory regulation over the environmental impact of light pollution and nuisance glare. This act extended the statutory monitoring and enforcement duties of the District Council as the local

environmental health authority to include monitoring and enforcement of nuisance glare. The Act requires the environmental health authority to complete periodic assessment to identify “artificial light emitted from premises [where]... prejudicial to health or a nuisance”.

17.3.12 The above Act makes a number of exemptions to statutory enforcement powers against nuisance glare in respect to premises where increased levels of lighting are essential for public safety or security. Examples cited in the act include bus stations and associated facilities and public service vehicle operating centres. Street lighting modifications, associated with the site, proposed to roads around the site are certainly exempt from enforcement.

17.3.13 The development proposal has been assessed in the context of the 2005 Act, to demonstrate the sensitivity of design and the low level of impact anticipated.

17.4 BASELINE CONDITIONS

17.4.1 The Proposed Development land is currently undeveloped and therefore unlit, resulting in an area that is largely unaffected by light spillage.

17.4.2 The only present-day effects anticipated are from:

- Headlights from vehicles surrounding the site
- General and security lighting from residential properties surrounding the site
- General street light spillage from the adjacent roads

17.5 POTENTIAL EFFECTS

Construction Stage: short to medium term

17.5.1 The assessment of the effects of lighting during construction has been based on outline judgements regarding the project proposal. The principal lighting impacts which are often associated with construction sites and would be relevant at the Site location are as follows:

- Temporary floodlighting particularly during the winter months;
- Temporary security lighting;
- Lights at height associated with construction structures;
- Lights in the contractors compound and car parking areas;
- Light spill and glare towards surrounding residential receptors areas predominantly to the south west and south east of the site; and
- Glare from illuminated advertisements.

17.5.2 Construction impacts are temporary in their nature. However, prior to mitigation the impact magnitude would be medium with a significance impact range between moderate and major adverse.

17.5.3 Effect of light spill, glare and sky glow from construction lighting upon the local residential properties.

17.5.4 Given the close proximity of some residential properties to the Site, it has been judged that the sensitivity of these properties to construction lighting is high as topographically The Site is situated on higher ground which increases the impact of

light spill and glare. Prior to mitigation the magnitude of change is expected to be medium with an impact range of moderate to major adverse significance.

Operational Phase

17.5.5 Effect on light spill, glare and sky glow from operational lighting upon the existing residential properties.

17.5.6 A detailed lighting design will be prepared for the development by specialist lighting contractors, this is, however, not available at this time and is anticipated to be drawn up at later detailed design stages in consultation with the Council (as a likely condition of development). It is expected that the lighting to be installed on the site will be predominantly street lighting along distributor and residential roads, including the access points. Other lighting expected will include car park lighting, security lighting and any lighting of recreational facilities e.g. NEAPs and LEAPs. Dedicated pedestrian and cycle ways may require lighting.

17.5.7 Any car park lighting and street lighting should be designed to comply the guidance contained within BS5489-1:2003 and BS13201-2:2003, with the appropriate level for the proposed use of each road taken into account. Average illuminance levels range from 3.5 lux for residential roads in a low crime area, to 10 lux where night time use is likely to be high, particularly those associated with local amenities.

17.5.8 The following potentially significant lighting impacts from the operational phase of the Proposed Development are listed below:

- light spill and glare from the installation of street lighting on distributor and residential roads across the site;
- light spill from windows in the development;

- fugitive upwards lighting from street lighting (will add to sky glow in the surrounding area);
- temporary and intermittent glare from the headlamps of vehicle using the site and potential glare and light spill from security lighting; and

17.5.9 Prior to mitigation the impacts from particularly light spill and glare should be considered to be of up to moderate impact, due to the very low levels of existing lighting on the site. Prior to mitigation the impacts from vehicle lights and on sky glow in the surrounding area should be considered to be minor to moderate adverse impacts.

17.6 MITIGATION MEASURES

Construction Stage: short to medium term

17.6.1 Effect of light spill, glare and sky glow from construction lighting upon the existing residential properties

17.6.2 A Construction Environmental Management Plan (CEMP) will be prepared and agreed in advance of commencement of the construction activities. The CEMP is likely to identify the location of the material storage areas, construction compound, temporary parking bays, highway works and temporary security/health and safety lighting throughout the construction programme to ensure that the siting of such features considers any potential surrounding sensitive receptors and that any disturbance impact from lighting is reduced to a minimum.

17.6.3 In order to reduce the impacts of lighting during the construction phase on sensitive receptors, the following best practice measures have been recommended by the ILP,

CIRIA and Health and Safety Executive (HSE) and should be implemented as part of the CEMP:

- 17.6.4 A named individual for the public to contact should there be any complaints related to temporary lighting installations;
- 17.6.5 Specified working hours, uses of lighting, the location of temporary floodlights and construction compound should be agreed in advance. The CEMP should indicate the proposed location of the construction compound for each phase of construction. The proposed location of the compound and storage areas should take into consideration the location of sensitive receptors and should respect the proximity to nearby sensitive receptors;
- 17.6.6 Lighting should to be switched off when not required unless specifically needed for construction activities or for security and/or health and safety requirements;
- 17.6.7 Glare caused by poorly directed security and floodlighting will be minimised by ensuring that light fittings are horizontally mounted and directed away from the boundaries of the Site. Temporary lighting fixtures should be installed and designed to provide full cut-off or should be directionally shielded to ensure that artificial light is controlled and substantially confined to the defined area intended to be illuminated;
- 17.6.8 The use of appropriate hoarding (if deemed necessary) will contain surface level illumination on the boundaries of the construction areas (the retained walls will do likewise);
- 17.6.9 Light spill will be minimised by avoiding poorly sited lights on the boundary of the Site or in particularly sensitive areas of the Site. In particular, lighting will be located

and directed so that it does not cause unnecessary intrusion to adjacent residential properties; and

17.6.10 Contribution to sky glow will be minimised by the use of modern floodlights with appropriate tilt angles and shields to avoid upward light loss.

17.6.11 In terms of Health and Safety requirements during the construction phases, the following measures will be implemented:

17.6.12 Any temporary detours of vehicles or pedestrians (e.g. any temporary footpath diversions) around then construction site should be clearly visible at all times;

17.6.13 Construction area fences located near existing roadways or walkways should be appropriately lit to assist in defining the limits of the construction area for motorists and pedestrians;

17.6.14 Temporary walkways, roads and parking areas should be illuminated to the same intensity in accordance with current guidance stipulated in the ILE Guidance Notes of the Reduction of Obtrusive Light (2005); and

17.6.15 Should hoarding be required during the construction phases, care should be taken to avoid these casting shadows on surrounding and adjacent footpaths and roads which may otherwise compromise safety.

17.6.16 Should any illuminated advertising be installed to advertise the development during construction the signage should be carefully illuminated in order to minimise glare, and follow best practice guidelines in ILP Technical Report 5, Brightness of Illuminated Advertisements (2011).

Operational Phase

17.6.17 Effect on light spill, glare and sky glow from operational lighting upon the existing residential properties.

17.6.18 The future detailed lighting design will be designed to use current best practice and technology, and will be agreed with Council as part of a later Reserved Matters application. Additionally the proposals for the development include a comprehensive landscaping strategy that will further reduce the impacts of any lighting installed by providing screening.

17.6.19 It is important to note that the land uses proposed (predominantly residential) are typically lit with a lighting specification unlikely to trigger nuisance complaints.

17.6.20 The impacts of the external lighting will be minimised by the installation of lighting to the minimum specification required to provide a safe night time environment for residents and others using on site facilities. Therefore lighting will be designed to comply with the minimum illuminance levels given within the appropriate guidance.

17.6.21 Sky glow is limited in the areas surrounding the site, however, it is visible to the south and south east in the direction of the wider urban area.

17.6.22 All lamps used for external lighting should be high pressure sodium lamps of the same colour temperature. The whiter light emitted by high pressure sodium lamps provide superior colour rendering to the more orange low pressure sodium lamps, and additionally reduce impacts on the night time scene (due to their poor performance low pressure sodium lights have now been phased out for new development or lighting upgrades). Additionally care should be taken to minimise glare from any luminaires

installed, by ensuring the correct luminaire is selected and installed correctly, in lines with the following recommendations within ILE Guidance Notes for the Reduction of Obtrusive Light (2005) – this could be secured by condition as part of a detailed lighting design to be agreed by the Council:

- Where practicable, switch off lights when not required for safety, security or enhancement of the night-time scene (this could be achieved through automatic timer in appropriate locations);
- The lighting design prepared at the detailed design stage should utilise low light pollution flat glass luminaires throughout to ensure adherence with Environmental Zone E2 requirements;
- Low level bollard lights could be proposed as a subtle alternative to taller columns along the
 - footpaths and cycle routes;
 - Avoid "over-lighting" by reference to appropriate standards;
 - To keep glare to a minimum, ensure that the main beam angle of all lights directed towards any potential observer is kept below 70 degrees. It should be noted that the higher the mounting height, the lower can be the main beam angle;
 - Wherever possible use floodlights with asymmetric beams that permit the front glazing to be kept at or near parallel to the surface being lit;
 - For road lighting, light near to and above the horizontal should be minimised.
 - For the new traffic signals on Romsey Road, light filters and glare guards can be installed to remove any light pollution to the wider area outside of the motorists in the immediate vicinity to the features.

17.6.23 The impact of glare from vehicle headlamps using the site will be minimised by the layout of the site through careful masterplanning, and therefore limiting roads directly

facing any existing nearby residential properties. Landscaping of the site will serve to further reduce the impact of vehicle headlights.

17.7 RESIDUAL EFFECTS

Construction stage

17.7.1 Effect of light spill, glare and sky glow from construction lighting upon the existing residential properties.

17.7.2 The construction works will be temporary in nature and many of the potential impacts would be minimised by application of the mitigation measures above. Overall there would be a minor to moderate adverse residual impact, primarily due to the installation of lighting on areas that are currently unlit, impacting of the night time environment, particularly with respect to residential properties, roads and public rights-of-way overlooking the site.

17.7.3 Mitigation to best available technology can be delivered as part of a CEMP for the site during construction.

Operational Phase

17.7.4 Effect on light spill, glare and sky glow from operational lighting upon the existing residential properties.

17.7.5 After mitigation it is considered that there will be overall a minor adverse effect from the lighting of the proposed scheme on residential receptors and road users. The use of

well located, modern light fittings, will minimise glare, light spill and reduce sky glow contributions to the existing sky glow above Banbury.

17.7.6 Vehicles, cyclists and pedestrians will not be adversely impacted following mitigation, as glare will be minimised through design, and lighting levels will be sufficient to provide safe transport routes. Lighting across the site will be compliant with British Standards, providing a safer (but less obtrusive in terms of glare) night time environment than many of the surrounding areas.

17.7.7 Levels of illuminance at the windows of residential receptors are unlikely to be increased by the proposals due to the mitigation measures put into place.

Summary of effects

17.7.8 An assessment of the external lit environment on and in the immediate vicinity of the Proposed Development has been considered.

17.7.9 During the construction phase, the principal lighting impacts are likely to be associated with the requirement for temporary lighting to illuminate temporary car parking areas, the contractor's compound and work areas. In order to mitigate temporary impacts on surrounding sensitive receptors the lighting requirements at the site will be managed as part the CEMP. 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 and Council requirements. 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 and security 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 phase will be short term and temporary in nature and considered to be of minor significance as a worse case.

17.7.10 During the operational phase, the likely impacts include the introduction of artificial light sources as part of The Site which will result in changes to the current baseline conditions in the built development part of the site.

17.7.11 The effects on sensitive receptors will be mitigated through the implementation of a stringent lighting design, which will include the use of low light pollution fittings which retain light spill within the built development area, minimising the loss of light to the night sky and glare discomfort to on-site or neighbouring receptors. In addition to the above, landscape treatment and the orientation of buildings etc. will provide additional screening from proposed lighting on the site. Overall, the residual effect on sensitive receptors during the development's operation is considered to be of minor significance.

17.7.12 Following the implementation of appropriate mitigation, the Proposed Development will comply with the relevant policies, legislative requirements and best practice guidance in relation to external lighting and minimising light pollution. The lighting design for the Proposed Development (to be prepared at later design stages) will provide the minimum amount of lighting necessary to provide a safe and secure environment for users of the site, and will minimise potential impacts on local amenity (including adjacent residential properties), the visibility of the night sky, and the safety of road users (both existing and future) to ensure that the potential effects on surrounding sensitive receptors from light spill, glare and sky glow are minimal and of an acceptable level.

17.8 CUMULATIVE EFFECTS

17.8.1 It is anticipated that regulatory lighting controls will ensure the Proposed Development and other development sites achieve the baseline standards in relation to lighting, and as such, no cumulative impacts are anticipated.