11.0 NIGHT LIGHT

11.1 INTRODUCTION

Given the short daylight hours in winter and the need for this facility to operate around the clock and be safe for staff and visitors that have cause to use the site at night, a level of artificial lighting is necessarily required. The combined effect of numerous lighting systems over an intensively used area or a large brightly lit site in an otherwise dark area is the generation of light pollution. In other words, in addition to the site itself light can spill onto adjacent areas or be visible from off-site areas and cause nuisance to local residents or disturb wildlife and especially roosting birds. It is the latter that is of greatest concern in the context of this site as the development lies close to an internationally recognised protection area for birds (see ES *Section 9* for details).

It is necessary, therefore to understand the level of light pollution that exists now and compare this to the light spill associated with the minimum level of lighting necessary to make the redeveloped site safe and workable during periods of diminished natural light. In particular it is important to understand if the new lighting will have a negative impact on the adjacent foreshore that would not have occurred under the current or consented lighting arrangements.

11.2 ASSESMENT METHODOLOGY

A site survey of the existing installation was carried out on Thursday January 27th 2005 during the hours of 14:00pm and 20:00pm, in order that both a daytime and night time assessment could be made. No significant changes to the lighting arrangements at the site have been made since this time and the results of that survey are still considered to be relevant. The survey of the existing lighting equipment was carried out detailing luminaire and lamp type, mounting height and site location. In addition, 13 camera positions were defined in and around the site and a series of images in 360° rotations were recorded at each location. This provided a record of the whole site, identifying views of the site from outside the boundary and the surrounding area from within. The same process was carried out by night, with the addition of horizontal illuminance readings being taken, at predefined locations, inside and outside the site boundary. This was carried out using a Minolta T1 digital illuminance metre, compliant with BS667: 2005, capable of measurement in the range 0.01 – 100,000 lux.

In addition to the site survey, assessment of the surrounding properties, roads and railways were carried out in order to establish the location of residential properties, sightlines and proximity of the surrounding roads and railways in order to establish the context for the proposed development site.

11.3 BASELINE CONDITIONS

The current site has a number of existing luminaire (light fittings) and lamp types, ranging from column mounted street lanterns to wall mounted floodlights. However, the site is not entirely illuminated, as the lighting tends to be concentrated in and around existing buildings, storage yards and security lodges. The existing lighting consists of mostly High Pressure Sodium (SON) and Metal Halide (HQI) lamp types but also includes some Tungsten Halogen (TH) and Low Pressure Sodium (SOX). As mentioned the site is not entirely lit and therefore large areas remain in darkness after hours and are not suitable as a safe working environment. In addition most lighting tends to be badly aimed and does not have necessary louvres or baffles and, as a consequence produces Light Pollution[1] in the forms of Direct Upward Light, Spill Light & Light Trespass. Another associated problem is that of glare caused by the visibility of the light source (lamp) itself due to the location, aiming positions, optic type and the fact that baffles and louvres are not fitted. It is clear that the lighting has evolved over many years without any concise strategy, resulting in a poor ad-hoc lighting installation. In addition, not all areas of the site are lit, therefore large areas of darkness remain, giving rise to concerns over safety for pedestrians, site workers and vehicle movement. From the measurements recorded on site, the maximum illuminance level is 151 lux and the minimum 0.32. It should be noted that the high level (151 lux) is located directly beneath wall mounted HQI floodlights, adjacent to existing buildings (*see Figure 11.3.1 below*) and the low value (0.32 lux) is located in open ground away from direct illumination and is therefore indicative of the general ambient illuminance levels within the area. The average illuminance level, taken from the point measurements within the site boundary, is 23.3 lux, but again this is not a good guide for the site in general as some areas are well lit, such as the container storage yard (37.74 lux average) whereas the cylinder storage area, on the north side of the central green space, is not lit (with an average illuminance of only 0.4 lux).

Figure 11.3.1 - Highly illuminated area of the site by day and night

Figure 11.3.2 - Industrial park located on south west corner of the site, by day and night.

The surrounding areas adjacent to the site boundary consist of an industrial park in the south west with a high concentration of industrial units, offices and factories. Lighting in these areas consists of Low Pressure Sodium (SOX) street lanterns on 6m columns with a 2m-swan neck bracket. All roads are illuminated to an average illuminance of approximately 7.7 lux. The individual properties generally employ exterior floodlighting, mainly for security, utilising High Pressure Sodium (SON) floodlights.

The River Mersey is located approximately 200m to the south of the site, with the addition of a large industrial complex (PDM Ltd – animal rendering plant) on the south east corner of the site which produces glue and other products from animal carcases. This site is well illuminated with both SOX street lanterns and SON floodlights.

[1] The Institution of Lighting Engineers "Guidance Notes for the Reduction of Light Pollution". 2000

Figure 11.3.3 - Carcass rendering plant (PDM Ltd), by day and night

In the distance, towards the south east, the Runcorn-Widnes Bridge is highly visible due to the high concentration of decorative white flood and festoon lighting.

Figure 11.3.4 - Distant view of Runcorn-Widnes Bridge

On the northern border of the site is the main Liverpool - Warrington railway, running east – west, which is currently not illuminated. The railway is adjacent to the site boundary, parallel to the main container storage yard which is currently floodlit to approximately 37.74 lux average, from twin mounted High Pressure Sodium (SON) floodlights on 10 metre columns. The track and yard are separated by a continuous row of conifer trees approximately 9m high, running the complete length of the yard, approximately 500m long. This provides an effective barrier, helping to reduce spill light onto the tracks from the floodlighting and at the same time shields the view for the oncoming trains.

Figure 11.3.5 - Floodlit container storage yard and high-level conifers, by day and night.

Beyond the railway, running parallel is the A561, which is illuminated to a high level using Low Pressure Sodium (SOX) lanterns mounted at high level. It was not possible to carry out any measurements upon the carriageway due to safety, but it can be assumed that it had been lit to the old British Standard *BS 5489 Part 2: 1987 Road Lighting, Code of Practice for Lighting of Traffic Routes.* This standard was replaced following a major revision of the road lighting standards in 2003. It is likely that the illuminance on the road will be in the range 12 – 20 lux average. It should also be noted that the road is elevated above ground level, varying in height along the carriage way, but is at a maximum at the east end of the road, with the junction of the A557.

Likewise, the A557, which runs north-south from the Runcorn-Widnes Bridge into Widnes, on the eastern side of the site is also fully illuminated to the same specification as the A561 and is also elevated above ground level. Intersecting the A557 and A561 on the eastern side of the site is an elevated railway viaduct, shown below in *Figure 11.3.6*. This is not illuminated, but does form a visual barrier to the site.

Figure 11.3.6 - Elevated railway viaduct

11.4 ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

The proposed development for the High Bay Regional Distribution Centre involves the complete demolition of the current buildings and surface structures on the site and thus will, in effect, remove the existing lighting layout. This gives the developer the opportunity to design and implement a new holistic lighting strategy for the site. The general approach to lighting for the site will be for necessary operational lighting and is not intended to showcase the buildings. In other words, the primary aims of the lighting system will be to ensure that roadways, pedestrian areas and service yard areas where nightime activity may take place are sufficiently illuminated to provide a safe working environment. There will be a need for an additional level of security lighting around the site, but it is not intended that there will be upcast spotlighting or showcase lighting of the buildings to make them visibly prominent at night.

Typical types of light fittings and lighting levels for the proposed High Bay Regional Distribution Centre are as follows:

- Staff car park - average illuminance 30 lux, 12m high Abacus columns (orion) / 2 x 400w SONP - T lantern.

- Site entrance - average illuminance 50 lux, 8m high Abacus road lantern columns (trivium) / 150w SONP – Road lantern.

- Loading bays – average illuminance 50 lux, 8m high mounted floodlights, (themis) / 250w SONP – T

The design of the lighting scheme for the High Bay Regional Distribution Centre is shown on *Drawing 11.4.1*.

Detailed modelling of the light levels that could be associated with the new development has not been undertaken as the proposed design, provided by Abacus for the development does not differ markedly from that proposed for the INNOVIS Rail Freight Park in that the lighting is for illuminating operational areas and not for 'showcasing' the buildings. There was detailed modelling undertaken for the previously approved proposals, which included allowance for security lighting of customs bonded storage yards. Furthermore the approved INNOVIS scheme was based on 7 different buildings, each with a different occupier, and rail related loading and off-loading adjacent to these buildings. The current proposals effectively comprise one very large building and one smaller building with one occupier in each. The rest of the site is dedicated to service yards, parking and associated infrastructure. Bearing this in mind the new proposals are likely to have more efficient lighting layouts than the previously approved proposals and there are fewer activities that require dedicated lighting solutions. As such, it has been assumed for the purposes of the ES that the predicted impacts of the new proposals would be less than those of the previous approved scheme and thus the modelling carried out for that is a useful comparator for the worst case light pollution levels that could be expected.

For the sake of completeness a discussion of the detailed modelling of the previously approved scheme is presented below.

The previous scheme consisted of column mounted Thorn Lemnis luminaires with 250w SON lamps mounted in single and twin head arrangements on 10m high columns. In addition, wall mounted Thorn Areaflood luminaire with 250w SON lamps were to be mounted at 10m on the façade of the buildings in order to illuminate service yards. The design was modelled in a lighting design software package, AGI32, in order to determine the resulting illuminance levels and distribution around the site.

The results of the modelling showed that the average illuminance over the whole of the site would be 28.27 lux with a minimum of 0 lux and a maximum of 156 lux. It was noted that these results could be considered to be a worst case scenario since no maintenance factor was applied to the calculations. In addition, the software calculated the Upward Waste Light Ratio (UWLR), the percentage of direct light emitted above the horizontal, upwards into the sky. The result was 0.015 (1.5%), which was considered to be very low. The Institute of Lighting Engineers *"Guidance Notes for the Reduction of Light Pollution"* define four categories of Environmental Zones with maximum limits set for each, in terms of UWLR %. Category E3: Medium district brightness, sets a maximum limit of 5%; therefore the proposed installation was well within these limits.

Light pollution comes in various forms, but the biggest contributor towards "Sky-Glow" is reflected light as opposed to direct light. Therefore, various calculations were made in order to establish the approximate amount of reflected light, per metre squared, for the whole of the INNOVIS Rail Freight Park site. The result was 2.83 lumens per square metre, which was again considered to be a very low figure. However, light pollution is not limited to direct/reflected upwards light. Light spill and light trespass are equally problematic as they may cause nuisance for occupants of neighbouring properties. Spill light can be defined as light which spills over the site boundary into adjacent properties, whilst light trespass is defined as spill light which enters the windows of neighbouring properties. However, due to the location of the site and the fact that no residential properties are located close to the site boundary, these potential problems are not considered to be relevant considerations for the proposed redevelopment of this site.

The main difference between the lighting scheme for the High Bay Regional Distribution Centre and that of the previous rail freight park development is the location of floodlights in the car park in the south western area of the site, in the location currently occupied by the Reclamation Mound. This means that there will be flood lighting in an area that is currently unlit and in relatively close proximity to the Mersey Estuary. The implications of this are discussed below.

Potential Impacts on Wildlife

Previously, there has been no clear strategy for lighting at the AHC site and consequently lighting has been added in an uncontrolled and rather *ad hoc* fashion with much of the site being effectively unlit at night. The site lies in a predominantly industrial area but consideration still needs to be paid to the potential impacts that the proposed lighting scheme will have on wildlife in the area (when compared to the existing scenario). As described above, the new lighting scheme is expected to provide a number of benefits in terms of efficiency, particularly the reduction in upward spillage of light, as well as some reduction in lateral light spillage but it will introduce light sources closer to the river foreshore.

The foreshore immediately south of the proposed car-parking area (former reclamation mound)and thus nearest to it is also adjacent to the Hale Bank industrial area which has been established for some time and is lit at night. This means that this area is already affected by light pollution and if it is used by birds they are likely to have acclimatised to this phenomenon in this stretch of the foreshore. A similar argument can be applied to the foreshore immediately adjacent to the PDM facility which is an industrial night light source between the new development and the foreshore. This means that the only area of foreshore close to the new car-parking area but which does not presently have light sources directly affecting it is the area immediately south of the HEDCO landfill (Hutchison's Hill). This, however, is a large heavily vegetated and unlit landform between the proposed car-parking area and the foreshore and will provide a substantial and effective barrier to light spill and direct lighting of that section of the foreshore. As such the introduction of new lighting of a previously unlit area should not have a significant impact on the foreshore or wider Ramsar designated area.

11.5 SUMMARY AND CONCLUSIONS

The proposed lighting design increases the number of luminaires and resulting illuminance levels around the site, whilst utilising a more efficient and controlled light distribution. Upward Wasted Light will be reduced. The location of the site, away from residential properties and the nature of the surrounding industrial areas mean that light trespass will not be an issue. The proposed redevelopment of the site together with the new lighting installation will help enhance and improve the quality of the site whilst providing a safe working environment, in-line with current guidance and codes of practice.

The introduction of higher efficiency lighting and the resultant reduction in upward and lateral light spill will be of importance to the ornithology of the Mersey Estuary, located approximately 100m south of the site. Spillage of light is an important factor in relation to the potential disturbance of over-wintering or breeding birds and therefore the proposed improvements to lighting efficiency should have a positive effect, by reducing any previous impacts arising from the current site lighting. Although new lighting will be introduced in a currently unlit area of the site (the Mound, which is the proposed location of a car park) this area is screened from the Estuary to the south/ south east by the HEDCO site (which is unlit). To the south west there are existing industrial areas that are illuminated. Overall, it is considered that there will be no detrimental effect from the proposed lighting arrangement and that it is likely to result in a moderate improvement with regard to potential impacts on wildlife.