Intended for

SLR Consulting

Document type

Report

Date

March 2016

TINKER LANE SITE, NOTTINGHAMSHIRE SITE LIGHT SPILL ASSESSMENT

RAMBOLL

SITE LIGHT SPILL ASSESSMENT

Revision	**05**
Date	**31/03/2016**
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Checked by	**Vlad Sys**
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Description	**Proposed lighting design, light spill study**

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1. INTRODUCTION

Ramboll have been commissioned to model and assess the light levels and any spill beyond boundaries of the Tinker Lane exploratory wellsite.

We have detailed any assumptions made as well as lighting equipment used within our models below. These assumptions & equipment specifications have been made based on information provided to us by SLR in various emails and drawings.

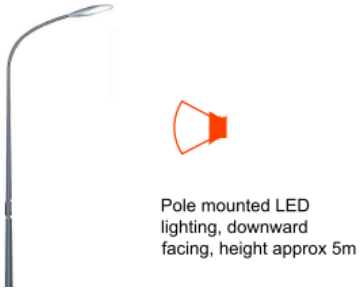
2. MODELING INPUTS & ASSUMPTIONS

Lighting Key Within Information Pack	Ramboll Modelling Input
	Thorn Petrelux 2x36W T8 Fluorescent Luminaire. Mounted where detailed on layouts and within drilling rig structure. These luminaires have been mounted within the drilling rig structure rising to the full height of 60m at approx. 7.5m centres. (Horizontally at an angle of 30 degrees) 
	Victor Titan VL39 250W Metal Halide Luminaire. Within and on drilling rig structure. Mounted as shown on Ramboll layout, surface, luminaire orientated 54 degrees below the horizontal 

Kingfisher 30W LED Aludra Luminaire. Mounted as indicated on layouts (perimeter of buildings / cabins). Angled 45 degrees below the horizontal.

Design Plan Post 2. 42W Fluorescent Bollard Luminaire. 0% upward light component.

2no. 250W Halogen "Floodlight" luminaires used per station. Angled 45 degrees below the horizontal.



Design Plan Talos Post Top Luminaire 39W (3240 lumens) As indicated on Layouts 5m columns.

Victor Titan VL39 Luminaire modelled as aviation light with output of 32 candela/300lm (180°).

3. RESULTS

We have produced a drawing indicating illumination levels on the ground plan within, and beyond the site hoarding. This drawing is included within the appendices of this report.
The drawing indicates, all luminaires being on, and in the positions denoted.
Due to the flexible nature of lighting used (mobile lighting) and controlled via presence therefore at any given time there are numerous scenarios of light scenes, we have made no further comment on the lighting

We have used five surfaces to determine the light spill from the site. The surfaces beyond the site are 60m tall, to match the height of the rig, run the length and width of the site, and are set 15m back from the hoarding line. The surface indicating upward light pollution is located 80m above ground level and is extended across to site boundaries.

The results are as follows;

Calculation Surface Description	Orientation	Average Lux	Min Lux	Max Lux
North Figure 1	Vertical	1.18	0.77	1.44
South Figure 2	Vertical	2.37	0.98	3.78
East Figure 3	Vertical	1.95	0.79	3.38
West Figure 4	Vertical	2.54	0.67	5.91
Top Figure 5	Horizontal	2.35	0.86	6

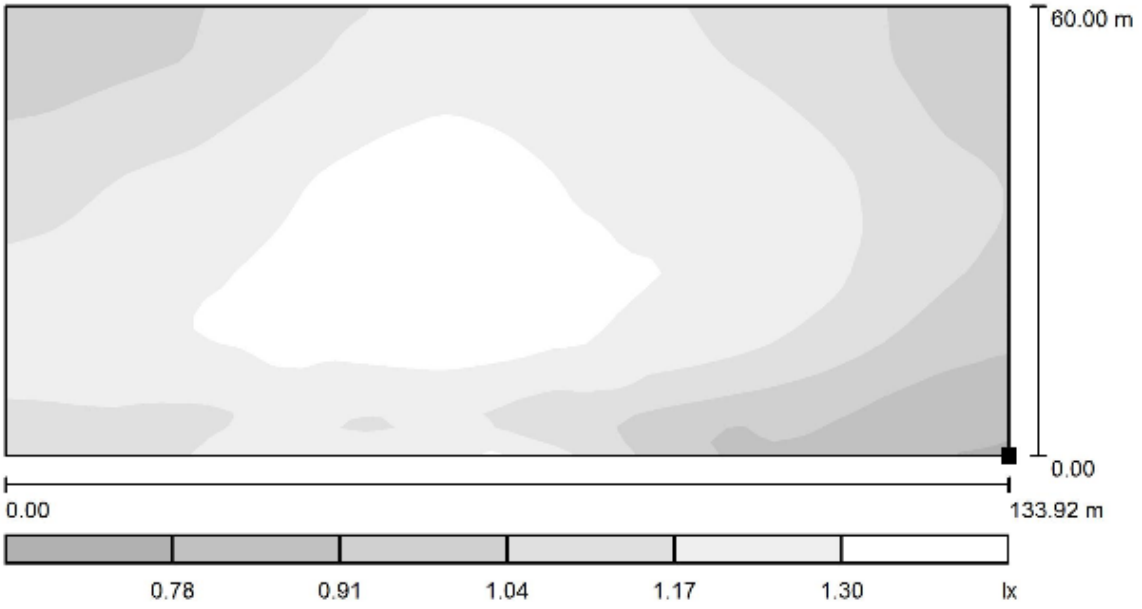


Figure 1 : North

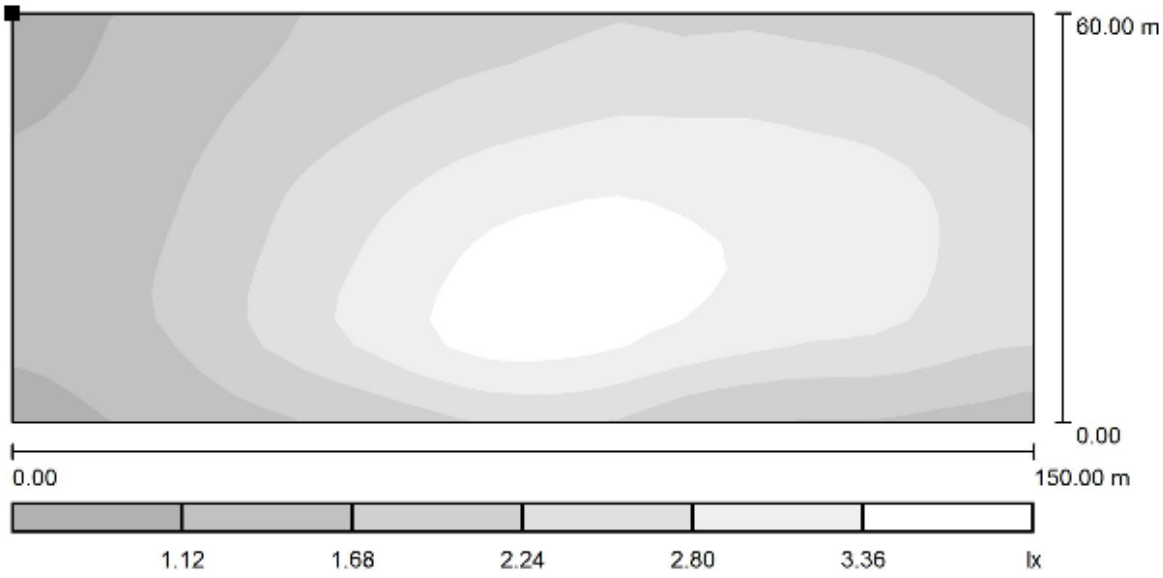


Figure 2 : South

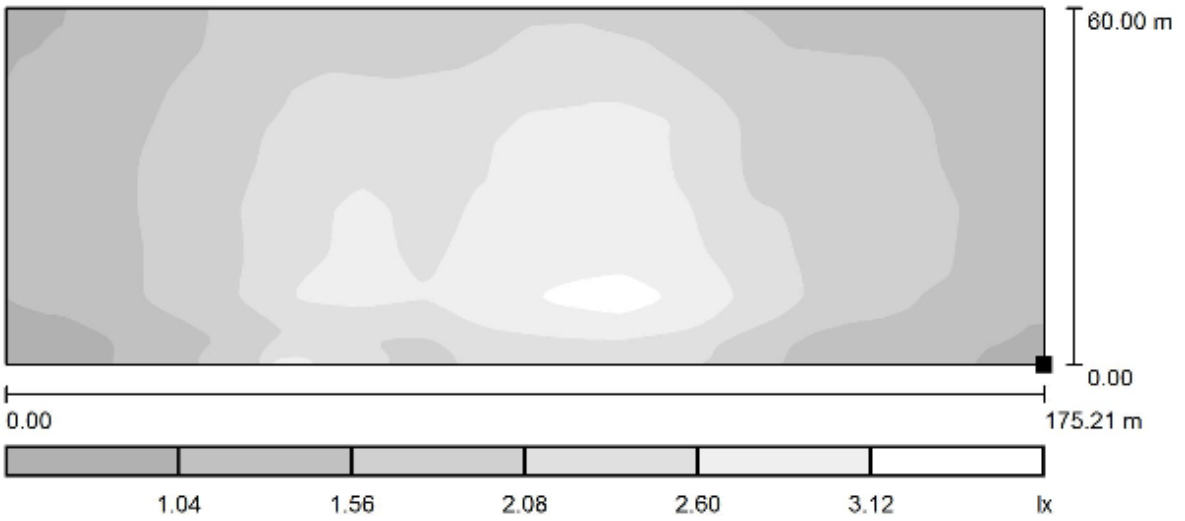


Figure 3 : East

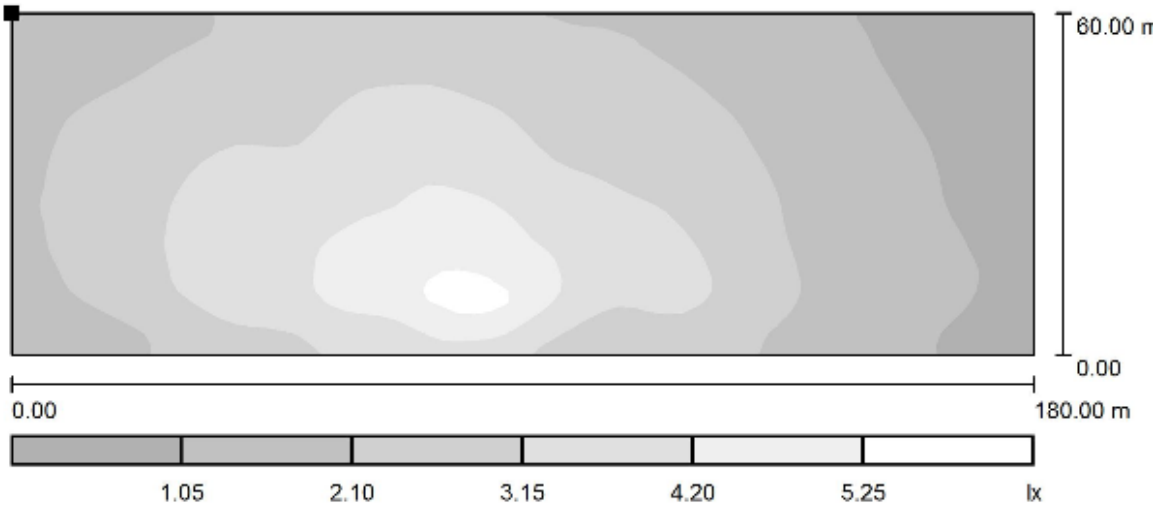


Figure 4 : West

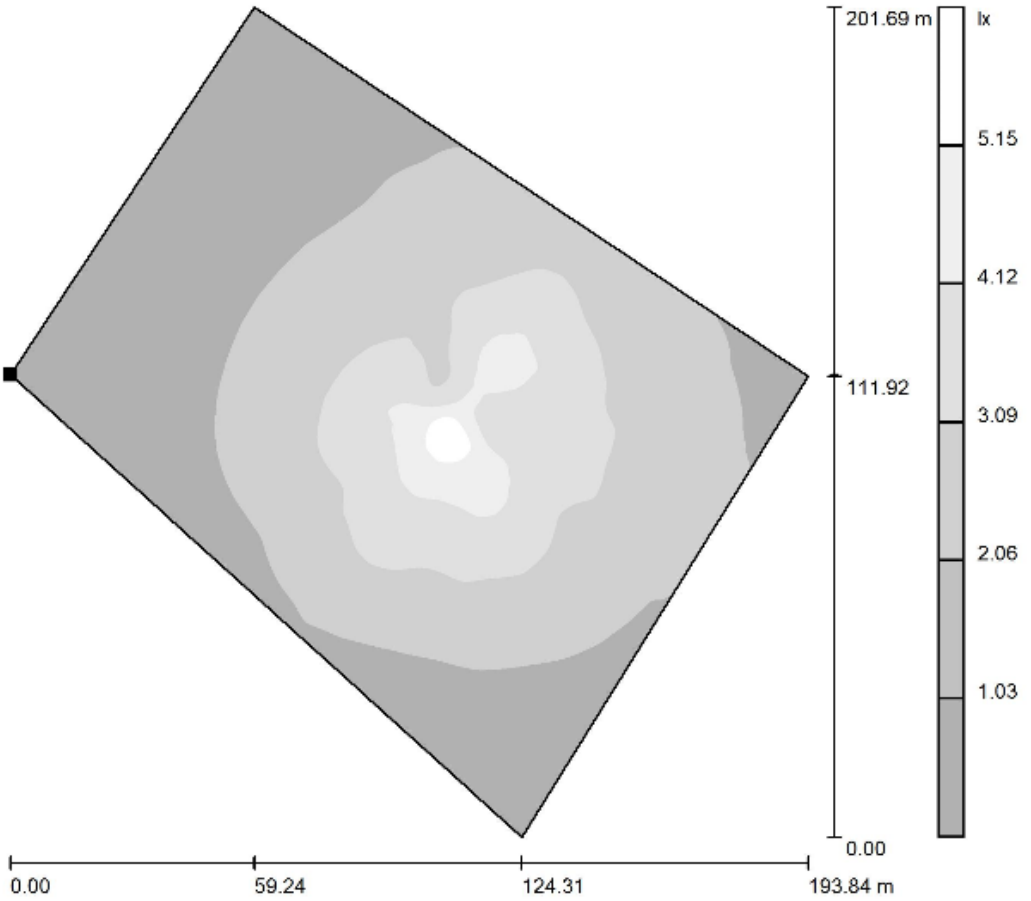


Figure 5: Top

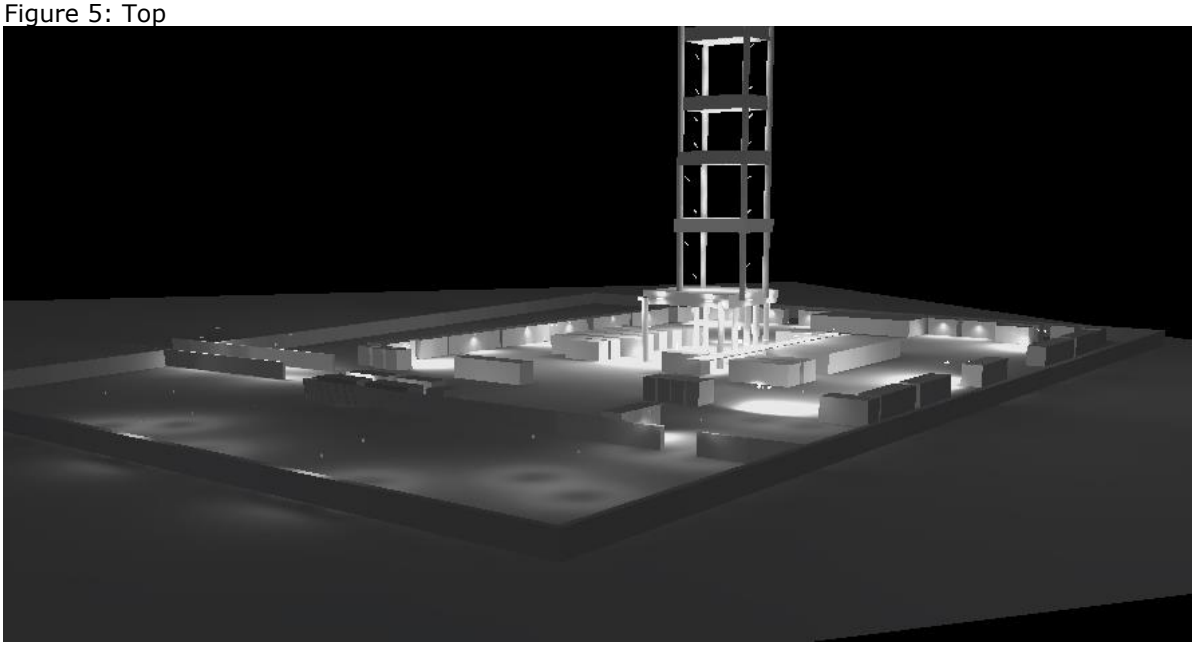


Figure 6 : Modelling Visualisation

4. ASSESSMENT CRITERIA

We have used several criteria to allow comparison of our modelled site plan against standard documents and guidance notes.
Below are extracts of the criteria and the documents from which they are obtained, as well as our assumptions on which apply.

Institute of Lighting Professionals: Guidance Notes for Reduction of Obtrusive Lighting GN01:2011

Table 1 – Environmental Zones

Zone	Surrounding	Lighting 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 activity

Table 2 – Obtrusive Light Limitations for Exterior Lighting Installations – General Observers

Environmental Zone	Sky Glow ULR [Max %] (1)	Light Intrusion (into Windows) E_v [lux] (2)		Luminaire Intensity I [candelas] (3)		Building Luminance Pre-curfew (4)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average, L [cd/m^2]
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2,500	0	0
E2	2.5	5	1	7,500	500	5
E3	5.0	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

5. CONCLUSION

Guidance Note GN01 classification E2 is our assumption on the requirements of the site.

From our model, the lux levels, as can be seen from the isoline plot, meet these requirements. This is mainly due to the 2.5m high site hoarding around the perimeter of the site. All values beyond the site are in most cases below the 5 lux requirement.

The exception to this is the west side of the site where there is a maximum illumination value of 5.9. This is mainly due to the proximity to the Victor Titan drilling rig lights mounted at 45 degrees.

The orientation of all luminaires has been detailed in above sections.

The aviation light with 32 candela output/ (modelled as 300 lm) has no impact on the overall assessment as detailed in the results outputs, due to the other luminaires, and the relatively low luminous intensity of this luminaire.

When all other luminaires are off, the aviation light may then be visible from distance, but even in this scenario, should have no impact in terms of light intrusion.

Light spill

The modelled vertical surfaces are measured at a distance of 15m from the hoarding, and even the west side is comparatively low value of lux.

The closest residential receptors are Jubilee and Beech Farms, which are both over 600m from the site boundary.

Over this distance illuminance values which are achieved within the model are not considered to cause any issue to local residents.

Sky Glow

In respect of sky glow the top surface gives values within an average below the 5 lux requirement except the location of the aviation light where the value maximum is 6 lux.

The angling & specification will also affect the sky glow percentage. Correct set up and positioning of the on site luminaires will affect this value significantly especially from the security PIR controlled luminaires and the mobile luminaires. This has been taken into account and the angling & specification of the exact luminaires are specified within the modeling inputs and assumptions' above.

Maximum value at a point is 6 lux, and the average over the surface (sky area) is 2.5 lux. GN01:2011 states values of 500 candela and 7500 candela, post and pre curfew respectively. In terms of conversion, the illuminance Ev in lux (lx) is equal to the luminous intensity Iv in candela (cd), divided by the square distance from the light source d^2 in square meters (m_2).

Therefore since our surface is 20m above our highest light source we have the following.

Curfew	Times	GN01:2011 value in CANDELA	GN01:2011 LUX @ 20m	Max Modelled Average Results LUX @ 20m
PRE	0700-2300 hrs	7500	17.5	2.35
POST	2300-0700 hrs	500	1.25	2.35

Sky Glow has been modelled in the above calculation surfaces. Average curfew levels are below that specified in Table 2 for pre curfew levels. Post curfew levels are exceeded when all luminaires are on at full intensity, but based on the distances of residential receptors to the site, illuminance values which are achieved within the model are not considered to cause any issue to local residents.

Summary

The requirement for 24 hour operations will be temporary (4 months)and the drill rig and the luminaires will be removed after 4 months. Having regard to the short term and temporary nature of the lighting and the degree of separation from residential receptors it is not considered that the predicted levels would have a significant impact on local residents.

APPENDIX 1
SITE ISOLINE ILLUMINATION LEVEL PLOT

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. THIS IS NOT AN INSTALLATION DRAWING, NOR A CO-ORDINATION DRAWING.

ISOLINES

- 0.5 LX
- 1.0 LX
- 2.0 LX
- 5.0 LX
- 10.0 LX
- 15.0 LX
- 25.0 LX
- 100.0 LX

Rev	Description	Date	By / Chk	App
A02	ISSUE FOR APPROVAL	09/12 2015	MB AC	VS
A01	ISSUE FOR APPROVAL	09/12 2015	MB AC	VS

APPROVAL

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ELECTRICAL SERVICES LIGHTING LUX PLOT

Project No:	Scale (@A1):	Drawn:	Date:
1620001432	1:500	MB	DEC 15

Drawing No: -RUK-XX-00-DR-E-250

Rev: A02

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