From:	Kieran Somers
To:	Wylfa Newydd; Kay Sully; KJ Johansson
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Subject:	Wylfa Newydd DCO Deadline 3 Submissions (Email 5 of 8) [NOT PROTECTIVELY MARKED]
Date:	17 December 2018 18:28:05
Attachments:	48 Off site Power Station Facilities - Building M3 Bat Survey Results.pdf 49 Local Noise Mitigation Strategy Update.pdf 46 Illustrative Lighting Spill Technical Note and Associate Appendices.pdf 47 Technical Note indicating how Horizon would meet committed noise levels.pdf

Good Evening

This is the fifth in a series of 8 e-mails for the Wylfa Newydd DCO Examination Deadline 3 deliverables.

The list below provides a complete list of all documents attached to this e-mail and we will also be delivering 2x USB pen drives containing all of our Deadline 3 submission to your offices at 10:00 tomorrow (Tuesday 18th December).

46 Illustrative Lighting Spill Technical Note and Associate Appendices.pdf
47 Technical Note indicating how Horizon would meet committed noise levels.pdf
48 Off site Power Station Facilities - Building M3 Bat Survey Results.pdf
49 Local Noise Mitigation Strategy Update.pdf

Kind Regards

Kieran Somers
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Pennaeth Cynllunio

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in England and Wales with company number 09641958) and Horizon Nuclear Power Services Limited (registered in England and Wales with company number 06812099) are all affiliates of Horizon Nuclear Power Limited and have the same registered office as that company. For further information about Horizon Nuclear Power Limited and its affiliates, please see our website at www.horizonnuclearpower.com.

HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

Illustrative Lighting Spill Technical Note and Associate Appendices

PINS Reference Number: EN010007

18 December 2018

Revision 1.0
Examination Deadline 3

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Horizon Internal DCRM Number: WN0902-RH-PAC-REP-00003

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Contents

Table of Figures

1 About this Note

1.1 Purpose and Applicability

This note supports Horizon Nuclear Power's Development Consent Order (DCO) application for a nuclear power station at Wylfa Newydd (the Project). The illustrative lighting spill modelling informs the shadow Habitats Regulations Assessment (sHRA). The modelling uses construction and operational project parameters to calculate the extent of the average 0.1 lux.

This report summarises the rationale, data inputs and assumptions used, provides the indicative lighting plans (appendix A and B) and resultant illustrative lighting spill (figure 1, 2 and 3).

In November 2018 there have been minor updates with further Project design information and redacted for DCO submission. The MOLF operational lighting spill with cranes (figure 2) has slightly changed in shape but the outputs remain within the bounding case used in the sHRA.

The modelled lighting configuration fit within the DCO lighting strategies, however, may not represent the final design.

1.2 Scope

This Note presents the indicative light spill for two scenarios based on current lighting strategies:

1. Construction of the marine works including the Marine Off-Loading Facility (MOLF), breakwaters and cooling water intake structure.
2. Operation of the Main site (Power station) and MOLF, specifically external lighting associated with the vehicle locks, inspection areas, outer perimeter fence and boundary lighting.

It is important to highlight that operation of the MOLF will mainly occur during the construction of the Power Station. Operation of the Power Station and MOLF are likely to overlap by a couple of years. Further in the future, the MOLF would also operate infrequently in exceptional circumstances (e.g. once every 10 years) to import replacement plant to the Power Station that could not be transported by road, sometimes called Abnormal Indivisible Loads.

The following have been excluded from the above mentioned two scenarios:

- The luminaires from the existing power station. This has been done on the basis that the current investigation is limited to the impact of the new lighting from the new development.
- The lighting during construction of the Main Power Station site as the focus is on the impact to the marine environment and Main Power Station construction lighting would have minimal marine light spill..

1.3 Basis of lighting

The indicative lay out of the Main site was taken from Drawing file "310QC85-391_Plot Plan Rev.0 DraftB_20170208". The indicative lay out of the marine works was taken from Drawing file "WN0907-HZCON-LAP-DRG-0025 – Standard".

The following standards would be applicable to the detailed design of the external lighting design:

- Health and Safety Executive – Lighting at work HSG38.
- BS EN 13201-2:2015 Road lighting Part 2: Performance requirements.
- BS EN 12464-2:2014 Light and lighting – Lighting of work places part 2: Outdoor work places.
- BS 5489-1:2013 Code of Practice for the design of road lighting Part 1 Lighting of roads and public amenity areas (where applicable).
- Institute of Lighting Professionals (ILP) – Guidance notes for the reduction of obtrusive light GN01 (2011 Edition).
- Institute of Lighting Professionals (ILP) – High masts for lighting and CCTV - Professional Lighting Guide (PLG) 07 (2013 edition).
- Building Regulations Approved Document L2B (with particular reference to metering and CIBSE TM39).
- Chartered Institute of Building Services Engineers (CIBSE) Lighting Guide 6:2016; Outdoor Environment.

2 Methodology

2.1 Software

Lighting Reality Pro software (version 1.8) has been adopted to calculate the illuminance contours (light spill). It is the latest version and conforms to all major international standards, such as EN13201:2015 and BS5489:2013 (www.lightingreality.com). This is one of the standard software packages used in industry to simulate lighting designs. Lighting Reality Pro is also used by around 97% of British municipalities.

A separate model was created in DIAlux (version 4.12) for the MOLF cranes as the Operational phase model already contained the Lighting Reality Pro maximum limit of 500 luminaires per model. DIAlux is one of the standard software packages used in British Industry to simulate lighting designs.

2.2 Assumptions

The principles and typical average Lux[1] values in the lighting strategy were translated into a variety of luminaires and an indicative lay out to enable light spill calculations. Typical heights of fittings were derived to achieve required average Lux values. The assumptions below were adopted.

<u>Construction Phase of MOLF</u>

- Mobile lighting towers areas: 100 Lux average.
- Site storage and rock preparation area: 20 Lux average.
- Grading plant at site storage: 120 Lux average.

[1] The lux is the unit of illuminance and luminous emittance, measuring luminous f lux per unit area. It is equal to one lumen per square metre. In photometry, this is used as a measure of the intensity, as perceived by the human eye, of light that hits or passes through a surface.

- Stockpile area at site storage: 80 Lux average.
- Bulk MOLF: 80 -150 Lux average.
- Cooling water intake structure area: 80 Lux average.
- Temporary cofferdam removal area: 100 Lux average.

Operational Phase of MOLF

- Loading and unloading at the MOLF, pedestrian passages: 50 Lux average.
- Regular vehicle traffic: 20 Lux average.
- General lighting: 20 Lux average.
- Cooling water intake structure: 50 Lux average.
- Tilt on the above fittings was limited to 5-8 degrees and used floodlights designed to minimise glare.
- There are three mobile harbour cranes on the MOLF with their own lights so that the operator can see into the holds of the ships. The tower cabin light is located about 20m above the quay ground level with an inclination of 0 degrees. Two other lights are at the boom tip with a maximum height of around 65m. The lights at the boom tip are fully floating, whereby they will always point to the floor, down the ropes regardless of the boom angle. The typical floodlight ratings have been confirmed by the crane manufacturer as being LED 458W. Details taken from Liebherr's 2012 LHM 280 Mobile Harbour Crane data sheet (10020138). During the peak construction of the Main Power Station Site, the MOLF would be operated 24 hours per day with ships arriving day and night.
- During the operation of the Main Site (Power Station), lighting at the MOLF and cooling water intake structure to be used infrequently, as and when required.

Operational Phase of Main Site

- Perimeter Fence:
    - Minimum of 6-10 Lux average.
    - Average to minimum uniformity of 5:1.
    - Average to minimum uniformity with single lamp failure 10:1.
    - Within a 10m sterile corridor.
    - LED fittings will be modelled centrally in the sterile corridor, mounted on 5m lighting columns; final lighting heights will depend on the height of the fences. Levels will be higher than the 6-10 Lux average to achieve visibility in the attack side of the fence.
- Roads:
    - Roads leading to the main site have been modelled as class P2 lighting classification.
    - Lighting is modelled using 4m lighting columns, LED type, zero tilt on the fitting.

The above assumptions were initially reviewed and deemed acceptable by Lead engineers for Security, the MOLF and Construction.

LLF-Lamp luminance factor was taken as 100% or 1 to indicate worst case output. In reality the luminance would deteriorate over time due to dust and other residues, including various environmental factors associated with sites situated close to the coast.

2.3 Exclusions

During construction of the MOLF, although the south west part (the RoRo) would be lit, it would be after the cofferdam is constructed. Therefore, from a perspective of impacts to the marine environment, lighting was not modelled in the south west part of the MOLF. Mobile activities (such as dredging) and activities behind the cofferdam are not included in the model as they would be largely bounded by the lighting of the breakwater

There will be mobile crawler cranes on the breakwater during construction of the MOLF. These will move along the breakwater placing armour units. It is likely that they will have a 50-60m boom pointing down to give to illuminate a 20m diameter to 75 -125 Lux average at water level. The lighting from these cranes has not been included in the models due to the transitional nature of the cranes. However, in comparison to the operational MOLF cranes, the implications of light spill from these crawler cranes are discussed in **Section 5**.

Light spills from ships in transit were excluded. Aids to navigation for the operational phase would include a set of leading marks with lights to guide vessels between the breakwaters and towards the bulk MOLF and Ro-Ro berths. In terms of the navigational lights at the MOLF and breakwaters, these are generally small 2W fittings with very low outputs and focussed towards a specific direction. They would not significantly contribute to the light spill and so are not included in the modelling.

The concrete batching plant area (behind the MOLF) is not included in the model. Its location is far enough away from the water's edge to have an impact.

The lighting within the car park next to the southern perimeter fence has not been included in the model as the road lighting would cause more spill.

2.4 Quality Checking

Quality checks have been performed in accordance with Royal HaskoningDHV's Management System; an integrated Quality, Health & Safety and Environmental (QHSE) Management System, which is certified to the ISO 9001:2015, OHSAS 18001:2007 and ISO 14001:2015 quality, health & safety, and environmental standards respectively. Quality reviews were undertaken after the models were created and outputs produced. The figures of the results in **Section 4** contain a record of the checks and approvals.

3 Modelled Luminaires

3.1 Construction of marine works

The following luminaires were used in the model for the construction of the marine works, taken from industry standard luminaires and may not be the exact units proposed during detailed design/construction:

- Mobile lighting towers areas: 305W LED floodlights mounted at 8m above floor ground level (FL800R-2-A4-CW-D700-305W).
- Site storage and rock preparation area: 305W LED floodlights mounted at 8m above floor ground level (FL800R-2-A4-CW-D700-305W).

- Grading plant at site storage: 305W LED floodlights mounted at 8m above floor ground level (FL800R-2-A4-CW-D700-305W).
- Stockpile area at site storage: 305W LED floodlights mounted at 8m above floor ground level (FL800R-2-A4-CW-D700-305W).
- Bulk MOLF: 458W LED floodlights mounted at 8m above floor ground level (FL800R-3-A3-CW-D700-458W).
- Cooling water intake structure area: 610W LED floodlights mounted at 12m above floor ground level (FL800R-4-A6-CW-D700-610W).
- Temporary cofferdam removal area: 305W floodlights mounted at 8m above floor ground level (FL800R-2-A4-CW-D700-305W).

Appendix A shows the configuration of the luminaires used in the model.

3.2 Operation of marine works and Main site

The following luminaires were used in the model for the operation of the marine works and main site, taken from industry standard luminaires:

- MOLF area LED floodlights mounted at 12m above floor ground level (FL800R-4-A6-CW-D700-610W).
- Cooling water intake structure area 610W LED floodlights mounted at 12m above floor ground level (FL800R-4-A6-CW-D700-610W).
- Perimeter lighting LED luminaires mounted at 5m above floor ground level, positioned centrally within sterile corridor.
- Incoming road network LED luminaires mounted at 4m above floor ground level (LUMA R6-LAMP 20-80 DS-CW 1 LED).
- Entrance parking area LED luminaires mounted at 10m above floor ground level (LUMA 1 R4-LAMP 20-80 DS-CW 1 LED).Three cranes with the following luminaires:
  - Tip of boom: 2 x LED floodlights at 65m above the floor ground level (Luminaire Manufacturer CU Phosco Lighting, type FL800R-3-A3-CW-D700-458W-458W).
  - Tower cabin: 1 x LED flood light at 20m above floor ground level (Luminaire Manufacturer CU Phosco Lighting, type FL800R-3-A3-CW-D700-458W-458W).

Appendix B shows the configuration of the luminaires used in the model.

4 Modelling Results

Figure 1 to **figure 3** illustrate the results of the modelling using illuminance contours ranging from 50 Lux to 0.05 Lux:

- **Figure 1**: illuminance contours during construction of the marine works.
- **Figure 2**: illuminance contours during operation of the MOLF and Main site.
- **Figure 3**: illuminance contours during operation of the Main site and MOLF without cranes.

5 Discussion

In reality the construction of the marine works is in sequences and so **figure 1** shows the accumulation of this. It can be seen that the average 0.1 Lux light spill from the construction of

the MOLF typically does not extend more than 50m over the water. For context purposes, a full moon on a clear night is about 0.1 Lux.

During operation of the MOLF (**figure 2**) the average 0.1 Lux extends no more than approximately 125m across the water. This is predominantly from the MOLF cranes and would only occur at three specific locations. Typically the average 0.1 Lux extends no more than 100m across the water when the cranes are not in use (**figure 3**).

During operation of the Main site the average 0.1 Lux spill from the perimeter is less than 50m and around 30m along the road leading to the Main site.

The light spill during the construction of the breakwaters could be further due to the transitional presence of crawler cranes placing armour units. As these cranes have a similar boom dimension as the MOLF cranes, it is likely that an average 0.1 Lux light spill would extend up to around 125m from the breakwaters.

It should be noted that the lighting design indicated on the sketches, is an illustrative lighting design compiled to provide an indication on the lighting spill. The light fittings are primarily floodlights, and as such are directional in nature. The aiming points of these floodlights have been selected to allow the suitable illumination of a large area, and this combined with the low proposed height of the light fittings, creates the tight grouping of the lux contour lines observed in the drawings. Additionally, the large scale of the drawings contributes to the apparent closeness of the contour lines. In order to achieve the above results, the following strategies apply:

- Limiting floodlights to heights as low as possible, whilst achieving the required levels and uniformities required in terms of design standards.
- Use of floodlighting luminaires that minimise glare, and provide suitable cut-off of spillage light.

6 Conclusions

The modelled illuminance contours have been produced based on the current lighting strategies and principles. The average 0.1 Lux light spill (a full moon on a clear night) generally stays within the harbour except during the construction of the western breakwater, which temporarily extends up to approximately125m. The average 0.1 Lux from the perimeter fence would not exceed 50m during operation of the Power Station. The indicative outputs are suitable to inform environmental assessment work.

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Figure 1: Indicative illuminance contours during construction of the marine works (NB lighting would occur in the south west part but would be behind the coffer dam)

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DO NOT SCALE

LIGHTING FITTINGS	
REV	SPECIFICATION
● A HIGH MAST	C U PHOSCO - FL800R - 2 - 33800 Lm - 305 W - 8 m (MOUNTING HEIGHT)
● B COLUMN	C U PHOSCO - FL800R - 4 - 67200 Lm - 610 W - 12 m (MOUNTING HEIGHT)
● C HIGH MAST	C U PHOSCO - FL800R - 3 - 50500 Lm - 458 W - 10 m (MOUNTING HEIGHT)

NOTES

1. THE PURPOSE OF THIS DRAWING IS TO SHOW ILLUMINANCE CONTOURS FROM THE FIXED LIGHTING. THE LIGHTING UNITS SELECTED ARE BASED UPON INDUSTRY STANDARD LUMINAIRES AND MAY NOT BE THE EXACT UNITS PROPOSED.
2. THE CONTROL PHILOSOPHY IS FOR THE LIGHTING TO BE ON DURING THE HOURS OF CONSTRUCTION.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE RELEVANT SECTIONS OF THE PLANNING REPORT AND DETAIL THE ENVISAGED HOURS OF OPERATION.
4. LLF-LAMP LUMINANCE FACTOR TAKEN AS 100% OR 1 TO INDICATE WORST CASE OUTPUT.
5. FINAL LIGHTING DESIGN WILL DEPEND ON FINAL CONSTRUCTION APPROACH , PROGRAMME, AND MARINE OFF LOADING FACILITY LAYOUT.

BASIS OF ILLUSTRATED LIGHTING IS BASED ON THE FOLLOWING:

- WBW-MOBILE CRANE TOWERS-100 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- SP-SITE STORAGE AND ROCK PREP AREA-20 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- SP-GRADING PLANT-120 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- SP-STOCKPILE AREA-80 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- BM-BULK MOLF-80-150 LUX-458W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-3-A3-CW-D700-458W).
- ITS-INTAKE STRUCTURE AREA-80 LUX-610W LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W).
- TCD-TEMPORARY COFFERDAM REMOVAL AREA-100 LUX- 305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).

EXCLUSIONS FROM MODEL:

- NAVIGATIONAL LIGHTS FOR APPROACH.
- TEMPORARY LIGHTING EXCLUDING MOBILE CRANES.

REFERENCE DOCUMENTS:

- "WYLFA JS3 MARINE CONSTRUCTION SEQUENCE LIGHTING"

ISOLUX LEGEND	
0.05 LUX	ISOLUX COLOUR KEY
0.1 LUX	ISOLUX COLOUR KEY
1.0 LUX	ISOLUX COLOUR KEY
5.0 LUX	ISOLUX COLOUR KEY
20 LUX	ISOLUX COLOUR KEY
50 LUX	ISOLUX COLOUR KEY

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B	22.11.18	ISSUED FOR REVIEW/COMMENT	MAA	IN	TS
A	07.07.17	ISSUED FOR REVIEW/COMMENT	JN	JN	SB

REVISIONS

CLIENT

HORIZON NUCLEAR POWER

PROJECT

WYLFA NEWYDD PROJECT

TITLE

INDICATIVE ILLUMINANCE CONTOURS DURING CONSTRUCTION OF THE MARINE WORKS

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Enhancing Society Together

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Figure 2: Indicative illuminance contours during operation of the MOLF and the Main site (Power Station).

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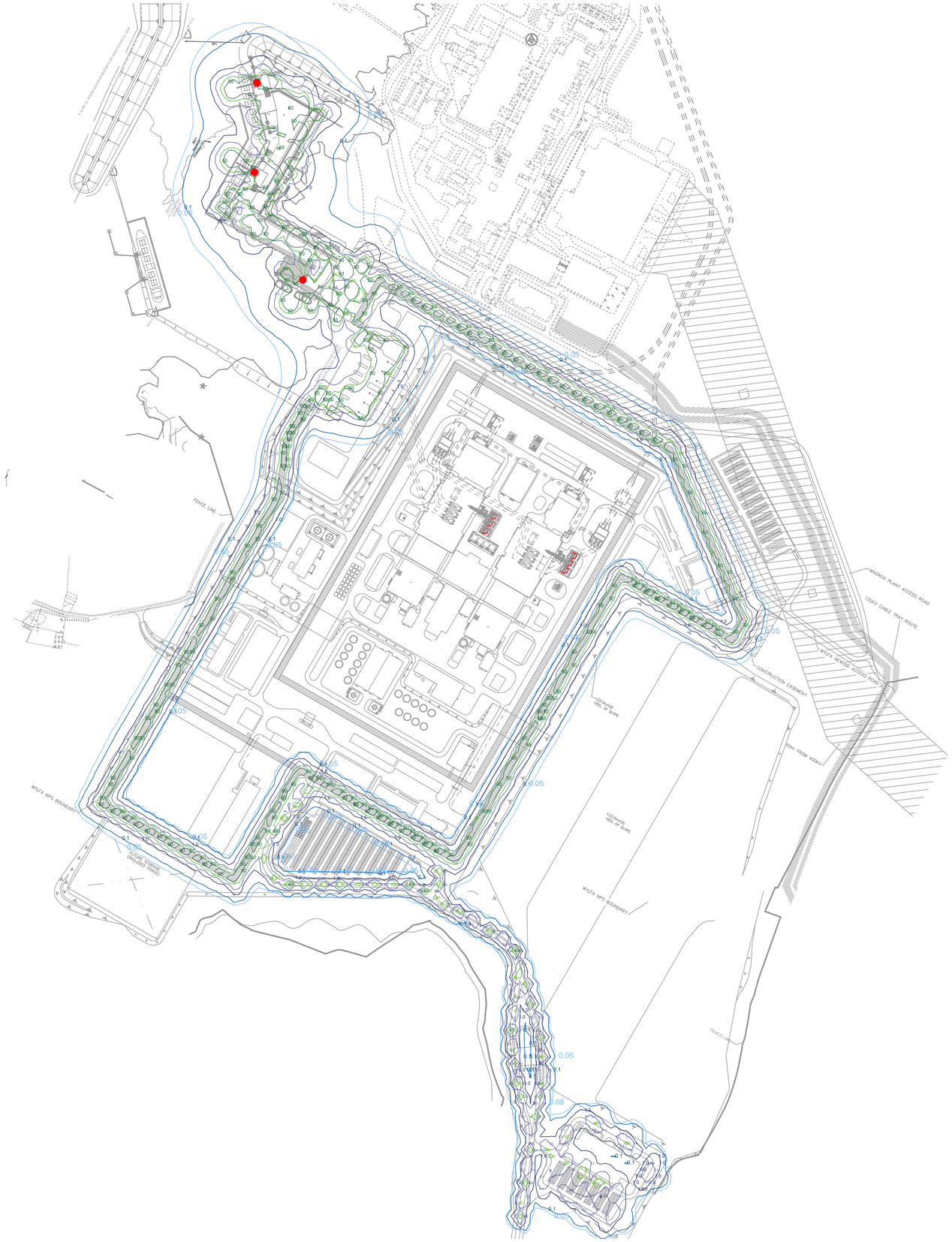

NOTES

1. THE PURPOSE OF THIS DRAWING IS TO SHOW ILLUMINANCE CONTOURS FROM THE FIXED LIGHTING. THE LIGHTING UNITS SELECTED ARE BASED UPON INDUSTRY STANDARD LUMINAIRES AND MAY NOT BE THE EXACT UNITS PROPOSED.
2. THE CONTROL PHILOSOPHY IS FOR THE LIGHTING TO BE ON DURING THE HOURS OF DARKNESS.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE RELEVANT SECTIONS OF THE PLANNING REPORT AND DETAIL THE ENVISAGED HOURS OF OPERATION.
4. LLF-LAMP LUMINANCE FACTOR TAKEN AS 100% OR 1 TO INDICATE WORST CASE OUTPUT.
5. FINAL LIGHTING DESIGN WILL DEPEND ON FINAL CONSTRUCTION APPROACH , CONSTRUCTION PROGRAMME, AND PORT LAYOUT.

BASIS OF ILLUSTRATED LIGHTING IS BASED ON THE FOLLOWING:
- INCOMING ROAD NETWORK-CLASS P2 LIGHTING CLASSIFICATION
- PERIMETER LIGHTING-MINIMUM 10 LUX, AVERAGE TO MINIMUM UNIFORMITY 5:1, AVERAGE TO MINIMUM UNIFORMITY WITH SINGLE LAMP FAILURE 10:1
- PEDESTRIAN PASSAGES, LOADING AND UNLOADING-50 LUX.
- REGULAR VEHICLE TRAFFIC WITHIN PORT AREA - 20 LUX
- GENERAL LIGHTING OG SHIPYARD AREA - 20 LUX
- ITS-INTAKE STRUCTURE AREA-80 LUX

LIGHTING INDICATED IS COMPOSED AS FOLLOWS:
- ITS-INTAKE STRUCTURE AREA-610W LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W).
- PERIMETER LIGHTING-LED LUMINAIRES MOUNTED AT 5M AFGL, POSITIONED CENTRALLY WITHIN STERILE CORRIDOR.
- INCOMING ROAD NETWORK-LED LUMINAIRES MOUNTED AT 4M AFGL (LUMA R6-LAMP 20-80 DS-CW 1 LED).
- ENTRANCE PARKING AREA-LED LUMINAIRES MOUNTED AT 10M AFGL (LUMA 1 R4-LAMP 20-80 DS-CW 1 LED).
- SHIPYARD AND PORT SIDE AREA-LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W Lamp 757P CW).

EXCLUSIONS FROM MODEL:
- NAVIGATIONAL LIGHTS FOR APPROACH.
- SECONDARY CAR PARK AREA.

REFERNCE DOUCMENTS:
- DOCUMENT WNO1-S3-FD-REP-00007 REV 0
- EXTERNAL LIGHTING STRATERGY – WYLFA NEWYDD NUCLEAR POWER PLANT

LEGEND

MOLF MOBILE CRANE TOWER LOCATION

ISOLUX LEGEND	
0.05 LUX	ISOLUX COLOUR KEY
0.1 LUX	ISOLUX COLOUR KEY
1.0 LUX	ISOLUX COLOUR KEY
5.0 LUX	ISOLUX COLOUR KEY
20 LUX	ISOLUX COLOUR KEY
50 LUX	ISOLUX COLOUR KEY

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A	07.07.17	ISSUED FOR REVIEW/COMMENT	JN	JN	SB

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CLIENT

HORIZON NUCLEAR POWER

PROJECT

WYLFA NEWYDD PROJECT

TITLE

INDICATIVE ILLUMINANCE CONTOURS DURING OPERATION OF THE MOLF AND THE MAIN SITE (POWER STATION)

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Enhancing Society Together

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Figure 3: Indicative illuminance contours during operation of the Main site (Power Station) and MOLF without cranes

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NOTES

1. THE PURPOSE OF THIS DRAWING IS TO SHOW ILLUMINANCE CONTOURS FROM THE FIXED LIGHTING. THE LIGHTING UNITS SELECTED ARE BASED UPON INDUSTRY STANDARD LUMINAIRES AND MAY NOT BE THE EXACT UNITS PROPOSED.
2. THE CONTROL PHILOSOPHY IS FOR THE LIGHTING TO BE ON DURING THE HOURS OF DARKNESS.
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4. LLF-LAMP LUMINANCE FACTOR TAKEN AS 100% OR 1 TO INDICATE WORST CASE OUTPUT.
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BASIS OF ILLUSTRATED LIGHTING IS BASED ON THE FOLLOWING:
- INCOMING ROAD NETWORK-CLASS P2 LIGHTING CLASSIFICATION
- PERIMETER LIGHTING-MINIMUM 10 LUX, AVERAGE TO MINIMUM UNIFORMITY 5:1, AVERAGE TO MINIMUM UNIFORMITY WITH SINGLE LAMP FAILURE 10:1
- PEDESTRIAN PASSAGES, LOADING AND UNLOADING-50 LUX.
- REGULAR VEHICLE TRAFFIC WITHIN PORT AREA - 20 LUX
- GENERAL LIGHTING OG SHIPYARD AREA - 20 LUX
- ITS-INTAKE STRUCTURE AREA-80 LUX

LIGHTING INDICATED IS COMPOSED AS FOLLOWS:
- ITS-INTAKE STRUCTURE AREA-610W LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W).
- PERIMETER LIGHTING-LED LUMINAIRES MOUNTED AT 5M AFGL, POSITIONED CENTRALLY WITHIN STERILE CORRIDOR.
- INCOMING ROAD NETWORK-LED LUMINAIRES MOUNTED AT 4M AFGL (LUMA R6-LAMP 20-80 DS-CW 1 LED).
- ENTRANCE PARKING AREA-LED LUMINAIRES MOUNTED AT 10M AFGL (LUMA 1 R4-LAMP 20-80 DS-CW 1 LED).
- SHIPYARD AND PORT SIDE AREA-LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W Lamp 757P CW).

EXCLUSIONS FROM MODEL:
- NAVIGATIONAL LIGHTS FOR APPROACH.
- SECONDARY CAR PARK AREA.

REFERNCE DOUCMENTS:
- DOCUMENT WNO1-S3-FD-REP-00007 REV 0
- EXTERNAL LIGHTING STRATERGY – WYLFA NEWYDD NUCLEAR POWER PLANT

ISOLUX LEGEND	
0.05 LUX	ISOLUX COLOUR KEY
0.1 LUX	ISOLUX COLOUR KEY
1.0 LUX	ISOLUX COLOUR KEY
5.0 LUX	ISOLUX COLOUR KEY
20 LUX	ISOLUX COLOUR KEY
50 LUX	ISOLUX COLOUR KEY

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PROJECT

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INDICATIVE ILLUMINANCE CONTOURS DURING OPERATION OF THE MOLF AND THE MAIN SITE WITHOUT CRANES (POWER STATION)

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APPENDIX A

DRG No. PB5660/E004

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AREA LIGHTING		
REV	LOCATION	AVERAGE LUX VALUE
	BREAK WATER	20 LUX
	ITS AREA	80 LUX
	BULK MOLF IN CONSTRUCTION MODE	80 - 150 LUX

LIGHTING FITTINGS	
REV	SPECIFICATION
● A HIGH MAST	C U PHOSCO - FL800R - 2 - 33800 Lm - 305 W - 8 m (MOUNTING HEIGHT)
● B COLUMN	C U PHOSCO - FL800R - 4 - 67200 Lm - 610 W - 12 m (MOUNTING HEIGHT)
● C HIGH MAST	C U PHOSCO - FL800R - 3 - 50500 Lm - 458 W - 10 m (MOUNTING HEIGHT)

NOTES

1. THE PURPOSE OF THIS DRAWING IS TO SHOW ILLUMINANCE CONTOURS FROM THE FIXED LIGHTING. THE LIGHTING UNITS SELECTED ARE BASED UPON INDUSTRY STANDARD LUMINAIRES AND MAY NOT BE THE EXACT UNITS PROPOSED.
2. THE CONTROL PHILOSOPHY IS FOR THE LIGHTING TO BE ON DURING THE HOURS OF CONSTRUCTION.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE RELEVANT SECTIONS OF THE PLANNING REPORT AND DETAIL THE ENVISAGED HOURS OF OPERATION.
4. LLF-LAMP LUMINANCE FACTOR TAKEN AS 100% OR 1 TO INDICATE WORST CASE OUTPUT.
5. FINAL LIGHTING DESIGN WILL DEPEND ON FINAL CONSTRUCTION APPROACH , PROGRAMME, AND MARINE OFF LOADING FACILITY LAYOUT.

BASIS OF ILLUSTRATED LIGHTING IS BASED ON THE FOLLOWING:

- WBW-MOBILE CRANE TOWERS-100 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- SP-SITE STORAGE AND ROCK PREP AREA-20 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- SP-GRADING PLANT-120 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- SP-STOCKPILE AREA-80 LUX-305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).
- BM-BULK MOLF-80-150 LUX-458W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-3-A3-CW-D700-458W).
- ITS-INTAKE STRUCTURE AREA-80 LUX-610W LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W).
- TCD-TEMPORARY COFFERDAM REMOVAL AREA-100 LUX- 305W LED FLOODLIGHTS MOUNTED AT 8M AFGL (FL800R-2-A4-CW-D700-305W).

EXCLUSIONS FROM MODEL:
- NAVIGATIONAL LIGHTS FOR APPROACH.
- TEMPORARY LIGHTING EXCLUDING MOBILE CRANES.

REFERENCE DOCUMENTS:
- "WYLFA JS3 MARINE CONSTRUCTION SEQUENCE LIGHTING"

REV	DATE	DESCRIPTION	BY	CHK	APP
B	22.11.18	ISSUED FOR REVIEW/COMMENT	MAA	IN	SB
A	07.07.17	ISSUED FOR REVIEW/COMMENT	JN	JN	SB

REVISIONS

CLIENT

HORIZON NUCLEAR POWER

PROJECT

WYLFA NEWYDD PROJECT

TITLE

ILLUSTRATIVE EXTERNAL LUMINAIRE CONFIGURATION DURING CONSTRUCTION OF THE MARINE WORKS

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Royal HaskoningDHV
Enhancing Society Together

DRAWN MAA	CHECKED IN	PASSED TS	
DATE 22.11.2018	CLIENT'S REF.		
SCALE AT A1 1:500	AUTOCAD REF. FILENAME		

DRAWING No. APPENDIX A

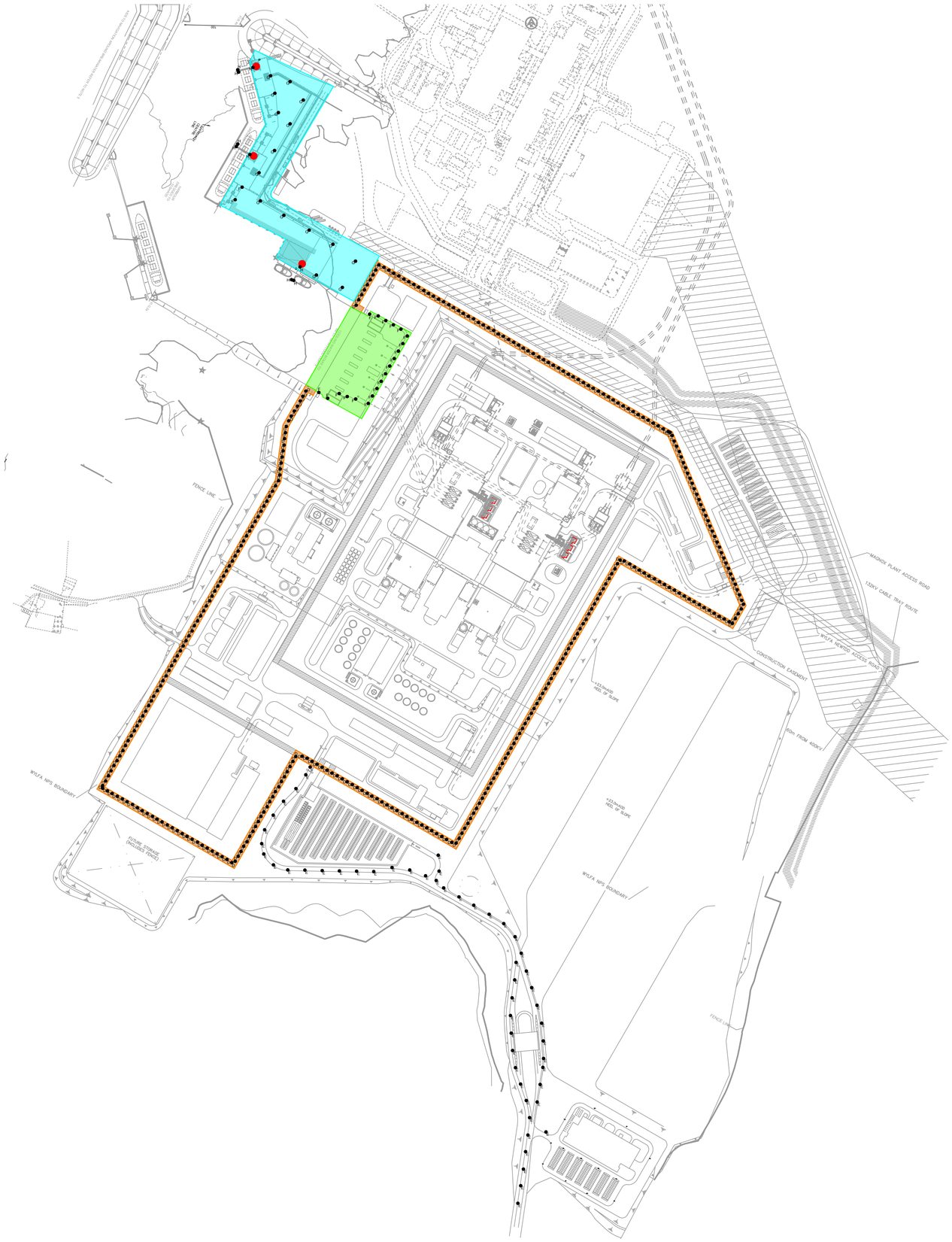
REVISION A

APPENDIX B

DRG No. PB5660/E003

DO NOT SCALE

LIGHTING FITTINGS	
REV	SPECIFICATION
●D COLUMN	PHILLIPS - LUMA 1 R4 - 10500 Lm - 70 W - 6 m (MOUNTING HEIGHT)
●E COLUMN	PHILLIPS - LUMA 1 R6 - 6400 Lm - 42 W - 4 m (MOUNTING HEIGHT)
●F COLUMN	C U PHOSCO - FL800R - 4 - 67200 Lm - 610 W - 12 m (MOUNTING HEIGHT)
●G HIGH MAST	C U PHOSCO - FL800R - 4 - 67200 Lm - 610 W - 12 m (MOUNTING HEIGHT)
●H HIGH MAST	C U PHOSCO - FL800R - 3 - 458 W - 65 m (MOUNTING HEIGHT) - 20 m MOUNTING HEIGHT AT CRANE TOWER LOCATION



NOTES

1. THE PURPOSE OF THIS DRAWING IS TO SHOW ILLUMINANCE CONTOURS FROM THE FIXED LIGHTING. THE LIGHTING UNITS SELECTED ARE BASED UPON INDUSTRY STANDARD LUMINAIRES AND MAY NOT BE THE EXACT UNITS PROPOSED.
2. THE CONTROL PHILOSOPHY IS FOR THE LIGHTING TO BE ON DURING THE HOURS OF DARKNESS.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE RELEVANT SECTIONS OF THE PLANNING REPORT AND DETAIL THE ENVISAGED HOURS OF OPERATION.
4. LLF-LAMP LUMINANCE FACTOR TAKEN AS 100% OR 1 TO INDICATE WORST CASE OUTPUT.
5. FINAL LIGHTING DESIGN WILL DEPEND ON FINAL CONSTRUCTION APPROACH , CONSTRUCTION PROGRAMME, AND PORT LAYOUT.

BASIS OF ILLUSTRATED LIGHTING IS BASED ON THE FOLLOWING:
- INCOMING ROAD NETWORK-CLASS P2 LIGHTING CLASSIFICATION
- PERIMETER LIGHTING-MINIMUM 10 LUX, AVERAGE TO MINIMUM UNIFORMITY 5:1, AVERAGE TO MINIMUM UNIFORMITY WITH SINGLE LAMP FAILURE 10:1
- PEDESTRIAN PASSAGES, LOADING AND UNLOADING-50 LUX.
- REGULAR VEHICLE TRAFFIC WITHIN PORT AREA - 20 LUX
- GENERAL LIGHTING OG SHIPYARD AREA - 20 LUX
- ITS-INTAKE STRUCTURE AREA-80 LUX

LIGHTING INDICATED IS COMPOSED AS FOLLOWS:
- ITS-INTAKE STRUCTURE AREA-610W LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W).
- PERIMETER LIGHTING-LED LUMIANIRES MOUNTED AT 5M AFGL, POSITIONED CENTRALLY WITHIN STERILE CORRIDOR.
- INCOMING ROAD NETWORK-LED LUMINAIRES MOUNTED AT 4M AFGL (LUMA R6-LAMP 20-80 DS-CW 1 LED).
- ENTRANCE PARKING AREA-LED LUMINAIRES MOUNTED AT 10M AFGL (LUMA 1 R4-LAMP 20-80 DS-CW 1 LED).
- SHIPYARD AND PORT SIDE AREA-LED FLOODLIGHTS MOUNTED AT 12M AFGL (FL800R-4-A6-CW-D700-610W Lamp 757P CW).

EXCLUSIONS FROM MODEL:
- NAVIGATIONAL LIGHTS FOR APPROACH.
- SECONDARY CAR PARK AREA.

REFERNCE DOUCMENTS:
- DOCUMENT WNO1-S3-FD-REP-00007 REV 0
- EXTERNAL LIGHTING STRATERGY – WYLFA NEWYDD NUCLEAR POWER PLANT

LEGEND

● MOLF MOBILE CRANE TOWER LOCATION

AREA LIGHTING		
REV	LOCATION	AVERAGE LUX VALUE
	PERIMETER LIGHTING	10 LUX
	ITS AREA	50 LUX
	MOLF	20 LUX (50LUX IN PEDESTRIAN PASSAGE)

REV	DATE	DESCRIPTION	BY	CHK	APP
B	22.11.18	ISSUED FOR REVIEW/COMMENT	MAA	IN	TS

REVISIONS

CLIENT

HORIZON NUCLEAR POWER

PROJECT

WYLFA NEWYDD PROJECT

TITLE

ILLUSTRATIVE EXTERNAL LUMINAIRE CONFIGURATION DURING OPERATION OF THE MOLF AND THE MAIN SITE (POWER STATION)

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Enhancing Society Together

DRAWN MAA	CHECKED IN	PASSED TS
DATE 22.11.18	CLIENT'S REF.	
SCALE AT A1 1:250	AUTOCAD REF. FILENAME	

DRAWING No. APPENDIX B

REVISION B