

IMMINGHAM EASTERN RO-RO TERMINAL



Lighting Plan

Document 2.8

APFP Regulations 2009 – Regulation 5(2)(o)

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PROJECT IERRT LANDSIDE CONCEPT LIGHTING DESIGN STAGE SUMMARY REPORT

Project no. 4021009

Prepared for:
Associated British Ports

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1. Introduction

1.1 Background

A DCO application for the proposed scheme was accepted for examination by the Planning Inspectorate on 6 March 2023. The proposed scheme is currently in examination which started on 25 July 2023 and is due to close on 25 January 2024. This report has been produced to update the proposed Landside structure lighting plan.

This report provides details of the concept level lighting design undertaken and the assumptions made in undertaking the design.

1.2 Scope of Works

The project objective is to further develop the proposed landside concept lighting design to meet the design parameters detailed within this document.

2. Concept Design

2.1 Electrical Services

2.2 Design Standards

The project design has been prepared in line with the following standards and regulations:

- CIBSE Publications
- BS 7671 Requirements for Electrical Installations
- The CIBSE Lighting Guide. LG06: The Exterior Environment
- The Docks Regulations and Guidance 1988: 'Regulation 6 – Lighting'
- HSG38 – HSE – Lighting at Work
- GN01-ILP Guidance Note 1 – the reduction of obtrusive light – 2021 v2
- The Building Regulations
- Energy Conservation Act

All components and systems within the scope of this Section of the works must comply with all statutory Acts of Parliament and any relevant British or European standards.

Materials, components and systems not manufactured in the UK or Europe shall be of a standard which ensures its compliance with all relevant British and European standards. Any such material, component or system which is utilised shall be affixed with the CE or new UKCA mark to indicate that certain European Directives or UK requirements, relevant to that product have been complied with.

Prior to works commencing on site, confirmation will be required of the above by direct measurement at the incoming supply point and for inclusion of these values in the design documents as part of the project. It is anticipated that this would be carried out as part of the investigations at detailed design stage.

Existing columns or electrical distribution switchgear in poor condition will be replaced and redundant cabling and associated markings on distribution boards will be removed from site as required.

All work shall be carried out by an approved NICEIC and / or ECA Electrical Contractor

2.3 Lighting Design Criteria

The concept design proposal is that a high mast system of lighting will be utilised to provide ambient and working illumination, having regard to environmental impact and minimising energy consumption by use of a dimming regime to further reduce lighting levels at pre-determined times. All lighting will be LED type and use a light source that emits zero UV light and reduced blue white output, rather than other commonly used light sources, to further mitigate environmental disruption.

The lighting scheme will be operated by photocells that turn the lighting on at dusk and switches them off again at dawn. There will also be a requirement for a lighting control system to switch the lighting between general and operation mode. It is recommended that luminaires with reduced energy consumption characteristics will be supplied.

Site lighting will use light types and methods to provide adequate colour rendition without degrading security protection visibility or creating safety concerns. The light source will have a warm white appearance of approximately 4000 K or greater, but further dialogue is required to consider the colour temperature of any existing lighting distribution.

Lighting levels, uniformity, colour rendering and temperature shall be as follows:

- Lux levels: 20 lux average 5 lux minimum
- Uniformity: 0.25
- Colour Rendering: Ra 20 (note: a higher level will be achieved with LED lighting)
- Colour Temperature: 4000K minimum

Required lux levels are currently specified from the Health and Safety Guidance Note 38 – Lighting at Work 1997, complying with the requirements for a Lorry Park (document extract below):

Activity	Typical locations/ types of work	Average illuminance (lux) 1x	Minimum measured illuminance (lux) 1x
Movement of people, machines and vehicles ^(a)	Lorry park, corridors, circulation routes	20	5

This therefore defining 20 lux average with 5 lux minimum (i.e. 0.25 Uniformity). The extract below from the more recent BS EN 14264 pt 2 concurs with these specified levels.

Table 5.14 — Shipyards and docks

Ref. no.	Type of area, task or activity	\bar{E}_m lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.14.1	General lighting of shipyard area, storage areas for prefabricated goods.	20	0,25	55	40	
5.14.2	Short-term handling of large units	20	0,25	55	20	

All lighting columns will adopt a loop in / loop out termination method comprising a Tofco type cut-out that will be suitable to terminate SWA 3-core cable (up to 25 mm²). The cut-outs will also be suitable for use with BS 88 type fuses. A maintenance, refurbishment and replacement regime of systems and components will be provided to meet the required design life.

The present lighting scheme mode of operation and control will be investigated to consider parallel mode of operation.

Variable lighting levels may be adopted following discussion at detailed design stage.

2.4 Environmental Criteria

The existing installation at the Port of Immingham consists of the following:

- Supply Voltage: 230 V & 400 V
- Phase: SP&N; 3 Wire & TP&N; 4 Wire + CPC
- Supply Frequency (f): 50 Hz
- Ambient Temp: -5 °C to 35 °C
- Humidity: Normal
- Presence of Water: High with high saline levels
- Impact: Moderate
- Ventilation: Natural
- Fire Risk: Normal

2.5 Below Ground Services and Electrical Distribution

All distribution boards and panels will be SP&N / TP&N and any surface mounted or underground / buried cable will be Cu/XLPE/SWA/LSF type multicore cables with a minimum cross-sectional area of 16 mm². Cabling supplying lighting circuits will be single-phase and consideration shall be given to colour coding for ease of identification.

All additional duct work that is required will be installed at the appropriate depth, unless there is already sufficient spare ducting capacity. Note that all control cables must be run in a separate duct from power cables.

The following ducting will be used:

- 150 mm diameter for all LV electrical service and lighting cables;

Cable duct buried under carriageways finished concrete will consist of ducts having a minimum cover of 750 mm and will be protected by concrete surround or similar as directed and agreed with the Client's Engineer. The ducts will typically be twin-walled high-density polypropylene with smooth bore of 150 mm in internal diameter to BS EN 50086-2-4, marked accordingly and terminate in an underground draw-in chamber.

When buried in land / soft soil, service ducts will typically be twin-walled high-density polypropylene with smooth bore of 150 mm in internal diameter to BS EN 50086-2-4. A minimum cover of 450 mm will be provided.

Consideration should be given to a new dedicated electrical distribution board fed from the existing primary distribution supply. Allowance must be made for co-ordination with the current

provider to establish the supply arrangement and capacity details before work commences. Distribution will typically comprise a 400V distribution panel complete with moulded case circuit breakers to feed any / all sub distribution boards as required by the prospective demand.

Service voltage will be 400/230 Volt at 50 Hz and all equipment housings and enclosures will be constructed from materials that are resistant to the effects of weather (outdoor marine applications).

Generally, the concept will include but will not be limited to:

- Replacement of external luminaires and existing columns.
- Identification and removal of redundant equipment and cabling.
- Supply and installation of all electrical cabling associated with the new lighting scheme.
- Supply and installation of the new equipment associated with the lighting control system.
- Inspection, testing and commissioning of the complete installation.
- The complete electrical installation will include all cables, glands, fixings, terminations, numbers, supports, tray work, bracketry, cable installation, labelling, junction boxes, local isolators and all equipment necessary to complete the installation in accordance with the specification.

2.6 Protective Earthing and Protective Equipotential Bonding

The installation will form an equipotential zone in the site to provide fault protection by bonding all extraneous and exposed conductive parts to the main earth terminal in accordance with BS 7430 and BS 7671. Where appropriate, it will be linked to the existing network to ensure the earth potential is common across the full installation.

All high masts will come complete with lightning protection rod on top of the mast.

2.7 Testing and Commissioning

Testing and commissioning of the electrical installation work will be in accordance with the relevant British Standards and on completion of the installation, commissioning of all items of plant and equipment will be carried out to demonstrate the complete installation is operating correctly and in accordance with any project Specification or site standards. As a minimum, testing will be carried as per the relevant applicable British standards and specifications in accordance with BS 7671.

2.8 Assumptions and Exclusions

There is specific guidance in BS 7671 which relates to electrical installations near water. Further review of this will be required during detailed design stage.

Further discussion will be required with regard to site standards relating to preferred power distribution equipment and lighting manufacturers to minimize the need for additional training or spares.

3. Network Rail Glare, Light Pollution and Column / Mast Collapse Assessment

The whole lighting design will be undertaken in accordance with the recommendations given in the GN01-ILP Guidance Note 1 – the reduction of obtrusive light, document.

This document sets out targets and limits for the reduction of obtrusive light, be that excessive glare, spill light away from the area being lit and upward light which would contribute to 'sky glow'.

In order to set the target levels, a suitable environmental zone needs to be selected based upon the location and use of the site in question. Table 2 below, extracted from the GN01-ILP document demonstrates the environmental zone options.

Table 2: Environmental zones

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

For this, site the environmental zone has been assessed to be E3.

3.1 Upward Light Ratio (ULR)

Table 6 below, extracted from the GN01-ILP document, demonstrates maximum values of upward light; for zone E3 this is 5%.

Table 6 (CIE 150 table 5): Maximum values of upward light ratio (ULR) of luminaires

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

Referring to the lux plot calculation in Appendix A, the calculated ULR is 0.4%, therefore passing by a significant margin.

3.2 Limitation of the effects on transport systems

Guidance from GN01-ILP will be followed to assess potential glare to vehicle drivers from road lighting.

This uses Maximum values of Threshold Increment and viewing direction in the path of travel. Threshold Increment (TI) is the measure of disability glare expressed as the percentage increase in contrast required between an object and its background for it to be seen equally well with a source of glare present. Note: Higher values of TI correspond to greater disability glare, the reduction in visibility caused by intense light sources in the field of view.

Table 5 below, extracted from the GN01-ILP document demonstrates the maximum values of threshold increment and viewing direction.

Table 5 (CIE 150; table 4): Maximum values of Threshold Increment and viewing direction in the path of travel

Light technical parameter	Road classification ¹			
	No road lighting	M6 / M5	M4 / M3	M2 / M1
Veiling luminance ² (L_v)	0.037 cd/m ²	0.23 cd/m ²	0.40 cd/m ²	0.84 cd/m ²
Threshold Increment	15% based on adaption luminance of 0.1 cd/m ²	15% based on adaption luminance of 1.0 cd/m ²	15% based on adaption luminance of 2.0 cd/m ²	15% based on adaption luminance of 5 cd/m ²

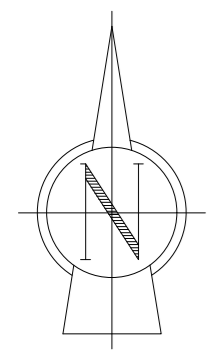
Within the calculation, simulated viewing points have been placed along the rail tracks at a 3m spacing at a height of 1.5m above ground level. The extract below of the calculation demonstrates a 'pass' in all simulations.

3.3 Lighting Column and Mast Collapse

The lighting has been designed so that in the event of a lighting column or mast collapse the infrastructure will not fall within 4m of a Network Rail-owned track. This design requirement shall be adhered to throughout the subsequent design phase.

APPENDIX

Appendix A: Lighting Lux Plot Calculation (4021009-SIL-ZZ-02-DR-E-63010-P02)



- FLOODLIGHTING EQUIPMENT:**
- 30m masts each carrying the following Challenger 1**
 - M1..... 3 x AL6202_10752SH (H)
 - 2 x AL6201_10752SH (T)
 - M2..... 5 x AL6202_10752SH (H)
 - M3..... 4 x AL6202_10752SH (H)
 - 2 x AL6201_10752SH (T)
 - M4..... 5 x AL6202_10752SH (H)
 - 1 x AL6201_10752SH (T)
 - M5..... 3 x AL6202_10752SH (H)
 - M7..... 4 x AL6202_10752SH (H)
 - M8..... 1 x AL6202_10752SH (H)
 - 2 x AL6302_05752SH (K)
 - M9..... 2 x AL6202_10752SH (H)
 - 2 x AL6302_05752SH (K)
 - M10..... 3 x AL6302_05752SH (G)
 - M18..... 2 x AL6302_05752SH (G)
 - 1 x AL6302_05752SH (K)
 - M19-M23..... 2 x AL6302_05752SH (G)
 - 2 x AL6302_05752SH (K)
 - M24..... 1 x AL6302_05752SH (G)
 - 1 x AL6302_05752SH (K)
 - M25..... 2 x AL6302_05752SH (G)
 - M26, M27..... 4 x AL6302_05752SH (G)
- 47 x 8m masts each carrying the following S-Lums**
- A..... 1 x AL1002_55W_4K
 - Single
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°
- 3 x 8m masts each carrying the following S-Lums**
- A1..... 1 x AL1002_55W_4K
 - Single
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +10°
- 25 x 8m masts each carrying the following S-Lums**
- B..... 1 x AL1002_55W_4K
 - Single
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°
- 6 x 8m masts each carrying the following S-Lums**
- D..... 1 x AL1009_55W_4K
 - Single
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°
 - Custom Mounted
- 19 x 8m masts each carrying the following S-Lums**
- L..... 1 x AL1003_135W_4K
 - Single
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +10°
- 4 x 8m masts each carrying the following S-Lums**
- M..... 1 x AL1002_55W_4K
 - Twin
 - Back to Back
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°
- 14 x 6m Building mounted S-Lums**
- N..... 1 x AL1003_55W_4K
 - Single
 - Lantern +0°
- 7 x 8m masts each carrying the following S-Lums**
- Q..... 1 x AL1002_55W_4K
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°
 - 1 x AL1003_55W_4K
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +15°
- 8 x 8m masts each carrying the following S-Lums**
- R..... 2 x AL1003_55W_4K
 - Twin
 - Back to Back
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°
- 1 x 6m masts each carrying the following S-Lums**
- S..... 1 x AL1003_55W_4K
 - Single
 - Bracket Projection 0.5M
 - Bracket: +0° / Spigot: +0° / Lantern +0°

- HORIZONTAL ILLUMINANCE LEVELS - SPECIFIED**
- Average Horizontal Illuminance (E_{av}): 20 Lux
 - Minimum Horizontal Illuminance (E_{min}): 5 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.25
- HORIZONTAL ILLUMINANCE LEVELS - CALCULATED**
- Bridge**
 - Average Horizontal Illuminance (E_{av}): 21 Lux
 - Minimum Horizontal Illuminance (E_{min}): 7 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.32
 - Central Trailer Park**
 - Average Horizontal Illuminance (E_{av}): 23 Lux
 - Minimum Horizontal Illuminance (E_{min}): 8 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.26
 - Central Trailer Park Staff Parking**
 - Average Horizontal Illuminance (E_{av}): 20 Lux
 - Minimum Horizontal Illuminance (E_{min}): 5 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.25
 - Marshall Yard - Road**
 - Average Horizontal Illuminance (E_{av}): 25 Lux
 - Minimum Horizontal Illuminance (E_{min}): 7 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.28
 - Marshall Yard - Main Area**
 - Average Horizontal Illuminance (E_{av}): 24 Lux
 - Minimum Horizontal Illuminance (E_{min}): 8 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.33
 - North Trailer Park**
 - Average Horizontal Illuminance (E_{av}): 20 Lux
 - Minimum Horizontal Illuminance (E_{min}): 6 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.30
 - North Trailer Park Road 2**
 - Average Horizontal Illuminance (E_{av}): 22 Lux
 - Minimum Horizontal Illuminance (E_{min}): 6 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.27
 - South Trailer Park**
 - Average Horizontal Illuminance (E_{av}): 25 Lux
 - Minimum Horizontal Illuminance (E_{min}): 7 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.28
 - South Trailer Park Road 1**
 - Average Horizontal Illuminance (E_{av}): 24 Lux
 - Minimum Horizontal Illuminance (E_{min}): 7 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.29
 - South Trailer Park Road 2**
 - Average Horizontal Illuminance (E_{av}): 19 Lux
 - Minimum Horizontal Illuminance (E_{min}): 8 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.27
 - Western Trailer Park Area**
 - Average Horizontal Illuminance (E_{av}): 20 Lux
 - Minimum Horizontal Illuminance (E_{min}): 8 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.26
 - Robinson Road**
 - Average Horizontal Illuminance (E_{av}): 20 Lux
 - Minimum Horizontal Illuminance (E_{min}): 9 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.45
 - Area 01**
 - Average Horizontal Illuminance (E_{av}): 20 Lux
 - Minimum Horizontal Illuminance (E_{min}): 9 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.30
 - Area 02**
 - Average Horizontal Illuminance (E_{av}): 22 Lux
 - Minimum Horizontal Illuminance (E_{min}): 8 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.37
 - Area 03**
 - Average Horizontal Illuminance (E_{av}): 28 Lux
 - Minimum Horizontal Illuminance (E_{min}): 11 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.39
 - New Area**
 - Average Horizontal Illuminance (E_{av}): 21 Lux
 - Minimum Horizontal Illuminance (E_{min}): 7 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.33
 - New Car Park**
 - Average Horizontal Illuminance (E_{av}): 21 Lux
 - Minimum Horizontal Illuminance (E_{min}): 8 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.37
 - New Road**
 - Average Horizontal Illuminance (E_{av}): 28 Lux
 - Minimum Horizontal Illuminance (E_{min}): 9 Lux
 - Uniformity Ratio (E_{av} / E_{min}): 0.32

OBSTRUCTIVE LIGHT COMPLIANCE REPORT

CIE 150:2017, 63-Medium Glare Index, Pre-Curlew
 Filename: L5407593_9_ABP_Humber Project Sugar
 04/09/2023 07:36:28

Threshold Increment (TI)
 Maximum Allowable Value: 15 %

Calculations Tested (32):

Calculation Label	Adaptation Luminance	Test Results
Threshold Increment_East_Track 1	10	PASS
Threshold Increment_East_Track 2	10	PASS
Threshold Increment_West_Track 2	10	PASS
Threshold Increment_West_Track 1	10	PASS
Threshold Increment_East_Track 3	10	PASS
Threshold Increment_East_Track 4	10	PASS
Threshold Increment_East_Track 5	10	PASS
Threshold Increment_East_Track 6	10	PASS
Threshold Increment_East_Track 7	10	PASS
Threshold Increment_West_Track 8	10	PASS
Threshold Increment_West_Track 9	10	PASS
Threshold Increment_East_Track 9	10	PASS
Threshold Increment_East_Track 10	10	PASS
Threshold Increment_West_Track 10	10	PASS
Threshold Increment_East_Track 12	10	PASS
Threshold Increment_West_Track 13	10	PASS
Threshold Increment_West_Track 14	10	PASS
Threshold Increment_East_Track 15	10	PASS
Threshold Increment_East_Track 17	10	PASS
Threshold Increment_West_Track 18	10	PASS
Threshold Increment_East_Track 19	10	PASS
Threshold Increment_West_Track 20	10	PASS
Threshold Increment_East_Track 21	10	PASS
Threshold Increment_West_Track 22	10	PASS
Threshold Increment_West_Track 26	10	PASS
Threshold Increment_East_Track 25	10	PASS
Threshold Increment_East_Track 23	10	PASS
Threshold Increment_West_Track 24	10	PASS
Threshold Increment_East_Track 27	10	PASS
Threshold Increment_West_Track 28	10	PASS
Threshold Increment_East_Track 29	10	PASS
Threshold Increment_West_Track 30	10	PASS

Upward Light Ratio (ULR)
 Maximum Allowable Value: 0.0 %

Calculated ULR 0.4 %
Test Results: PASS

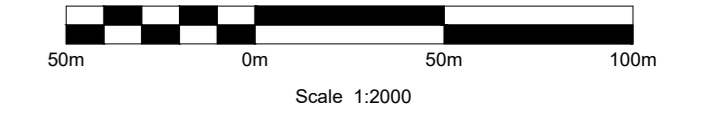
Note: The limits, including the height and depth of the Works, shown in the drawing are not to be taken as limiting the obligations of the contractor under Contract.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION:
 IN ADDITION TO THE HAZARDS OR RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, THE FOLLOWING SIGNIFICANT RESIDUAL RISKS SHOULD BE NOTED. FURTHER DETAILS ARE INCLUDED IN THE CDM DESIGN RISK MANAGEMENT REGISTER.

CONSTRUCTION:

MAINTENANCE, CLEANING AND OPERATION:

DECOMMISSIONING OR DEMOLITION:



Scale 1:2000

PO2	CM	BO	BL	MS	25/09/23	FOR CLIENT APPROVAL
PO1	CM	BO	BL	MS	22/09/23	FOR CLIENT REVIEW AND ACCEPTANCE

Rev	Drawn	Check	Rev'd	Appr'd	Date	Description

Designed by: **SIL** Date: **22/09/23**

Status: **SS** Suitable for Client Review and Acceptance

RIBA Stage: **NA** Classification: **Public**

Client: **ABP**



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Project: **PROJECT SUGAR**

Design Services: **DESIGN SERVICES**

Drawing title: **EXTERNAL LIGHTING LUX PLOT**

Drawing scale: 1:2000 Sheet size: A0

Drawing no. 4021009-SIL-ZZ-02-DR-E-63010 Revision: P02



IERRT

Marine Concept Lighting Design Stage Summary Report

P02

19th September 2023

Associated British Ports



Project IERRT

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Document No.: B2429400/P02
Revision: P02
Date: 19th September 2023
Client Name: ABP
Project Manager: Claire Nicolson
Author: Brian Manson
File Name: B2429400-E001-ABP Lighting Summary_Report_P02.docx

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Document History and Status

Revision	Date	Description	By	Review	Approved
P01	Nov 22	Client Review	VY	RH	GP
P02	Sep 23	Final	VY	MG	DR

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Appendix(es)

Appendix A Concept Lighting Layout

1. Introduction

1.1 Background

Jacobs have been commissioned to undertake a concept lighting design study to look at the potential provision of lighting for new roll on, roll off (ro-ro) berths at the Port of Immingham that includes a landside terminal area for a combination of container units, HGV and trailer units. This report details the Marine lighting elements of the project only.

This report provides details of the concept level lighting design undertaken and the assumptions made in undertaking the design.

A DCO application for the proposed scheme was accepted for examination by the Planning Inspectorate on the 6th of March 2023. The proposed scheme is currently in examination which started on 25 July 2023 and is due to close on 25 January 2024.

1.2 Scope

Review of existing external lighting strategy and prepare a new lighting concept design for the marine. Information review: undertake review of information available through Jacobs records, ABP records and other publicly available information sources and identify gaps in the information.

2. Concept Design

2.1 Electrical Services

2.1.1 Design Parameters

The existing installation at the Port of Immingham consists of the following:

- Supply Voltage: 230 V & 400 V
- Phase: SP&N; 3 Wire & TP&N; 4 Wire + CPC • Supply Frequency (f): 50 Hz
- Ambient Temp: -5° C to 35° C
- Humidity: Normal • Presence of Water: High with high saline levels
- Impact: Moderate • Ventilation: Natural
- Fire Risk: Normal

Prior to works commencing on site, confirmation will be required of the above by direct measurement at the incoming supply point and for inclusion of these values in the design documents as part of the project. It is anticipated that this would be carried out as part of the investigations at detailed design stage.

It is assumed that if any existing columns or electrical distribution switchgear are in poor condition they will be replaced and redundant cabling and associated markings on distribution boards will be removed from site as required.

It is expected and will be specified that the work shall be carried out by an approved NICEIC and / or ECA Electrical Contractor.

The concept project design will include technical references consulted in preparation of this document to include, but not limited to:

- The Building Regulations, 1972
- Energy Conservation Act, 1981
- CIBSE Publications
- BS 7671 IET Wiring Regulations
- CE Directive on Machinery 89/392 EEG-98/37
- Low Voltage Directive EEG-72/23 EEG-93/68
- EEG and EMC Directive 89/336 – 93/68 EEG
- The CIBSE Lighting Guide: 'The Outdoor Environment'
- The Docks Regulations and Guidance 1988: 'Regulation 6 – Lighting'
- HSG38 – HSE – Lighting at work
- BS EN 12464-2 Light and lighting. Lighting of workplaces – Outdoor work places
- COP 25 – Docks Regulations and Guidance 1988 + A:

All components and systems within the scope of this Section of the works must comply with all statutory acts of Parliament and any relevant British or European standards.

Materials, components and systems not manufactured in the UK or Europe shall be of a standard which ensures its compliance with all relevant British and European standards. Any such material, component or system which is utilized shall be affixed with the CE or new UKCA mark to indicate that certain European Directives or UK requirements, relevant to that product have been complied with.

2.1.2 Concept Design

All distribution boards and panels will be SP&N/TP&N and any surface mounted or underground / buried cable will be Cu/XLPE/SWA/LSZH type multi core cables with a minimum cross-sectional area of 16 mm². Cabling supplying lighting circuits will be single phase and consideration shall be given to colour coding for ease of identification.

All additional duct work that is required will be installed at the appropriate depth, unless there is already sufficient spare ducting capacity. Note that all control cables must be run in a separate duct from power cables.

The following ducting will be used:

- 150 mm diameter for all LV electrical service and lighting cables;

Cable duct buried under carriageways finished concrete will consist of ducts having a minimum cover of 750 mm and will be protected by concrete surround or similar as directed and agreed with the Client's Engineer. The ducts will typically be twin walled high-density polypropylene with smooth bore of 150 mm in internal diameter to BS EN 50086-2-4, marked accordingly and terminate in an underground draw-in chamber.

When buried in land /soft soil service ducts will typically be twin walled high-density polypropylene with smooth bore of 100 mm in internal diameter to BS EN 50086-2-4. A minimum cover of 450 mm will be provided.

Consideration should be given to a new dedicated electrical distribution board fed from the existing primary distribution supply. Allowance must be made for co-ordination with the current provider to establish the supply arrangement and capacity details before work commences. Distribution will typically comprise a 400V distribution panel complete with moulded case circuit breakers to feed any / all sub distribution boards as required by the prospective demand.

Service voltage will be 400/230 Volt at 50 Hz and all equipment housings and enclosures will be constructed from materials that are resistant to the effects of weather (outdoor marine applications).

Generally, the concept will include but not be limited to:

- Supply and installation of all electrical cabling associated with the new lighting scheme.
- Supply and installation of the new equipment associated with the lighting control system.
- Inspection, testing and commissioning of the complete installation.
- The complete electrical installation will include all cables, glands, fixings, terminations, numbers, supports, tray work, bracketry, cable installation, labelling, junction boxes, local isolators and all equipment necessary to complete the installation in accordance with the specification.

2.1.2.1 Lighting

The concept design proposal is that lighting will be utilised to provide ambient and working illumination, having regard to environmental impact and minimising energy consumption by use of a dimming regime to further reduce lighting levels at pre-determined times. All lighting will be LED type and use a light source that emits zero UV light and reduced blue white output, rather than other commonly used light sources, to further mitigate environmental disruption.

The lighting scheme will be operated by photocells that turn the lighting on at dusk and switches them off again at dawn. There will also be a requirement for a lighting control system to switch the lighting between general and operation mode. It is recommended that luminaires with reduced energy consumption characteristics will be supplied.

Marine lighting will use light types and methods to provide adequate colour rendition without degrading security protection visibility or creating safety concerns. The light source will have a cool white appearance of approximately 4000 K, but further dialogue is required to consider the colour temperature of any existing lighting distribution.

In addition to following HSE – Lighting at work (HSG38) guidance, the illumination levels for the new site lighting system will comply with the requirements of BS EN 12464- Light and lighting. Lighting of workplaces – Outdoor work places documentation. All luminaires will operate at 230V AC and have an ingress protection rating not less than IP65 and luminaires will use electronic control.

Design criteria:

- Lux levels: 20 lux average 5 lux minimum
- Uniformity: 0.25
- Colour Rendering: Ra 20 (note: a higher level will be achieved with LED lighting)
- Colour Temperature: 4000K minimum

The extract below from BS EN 12464-2 forms the basis of the above specified levels.

Table 5.14 — Shipyards and docks

Ref. no.	Type of area, task or activity	\bar{E}_m lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.14.1	General lighting of shipyard area, storage areas for prefabricated goods.	20	0,25	55	40	
5.14.2	Short-term handling of large units	20	0,25	55	20	

Figure 1. Lighting Requirements for Shipyards and Docks

All lighting columns will adopt a loop in / loop out termination method comprising a Tofco type cut-out that will be suitable to terminate SWA 3 core cable (up to 25 mm²). The cut-outs will also be suitable for use with BS88 type fuses. A maintenance, refurbishment and replacement regime of systems and components will be provided to meet the required design life.

2.1.2.2 Protective Earthing and Protective Equipotential Bonding

The installation will form an equipotential zone in the site to provide fault protection, by bonding all extraneous and exposed conductive parts to the main earth terminal in accordance with BS 7430, BS 7671. Where appropriate it will be linked to the existing network to ensure the earth potential is common across the full installation.

2.1.3 Testing & Commissioning

Testing and commissioning of the electrical installation work will be in accordance with the relevant British Standards and on completion of the installation, commissioning of all items of plant and equipment will be carried out to demonstrate the complete installation is operating correctly and in accordance with any project Specification or site standards. As a minimum testing will be carried as per the relevant applicable British standards and specifications in accordance with BS7671.

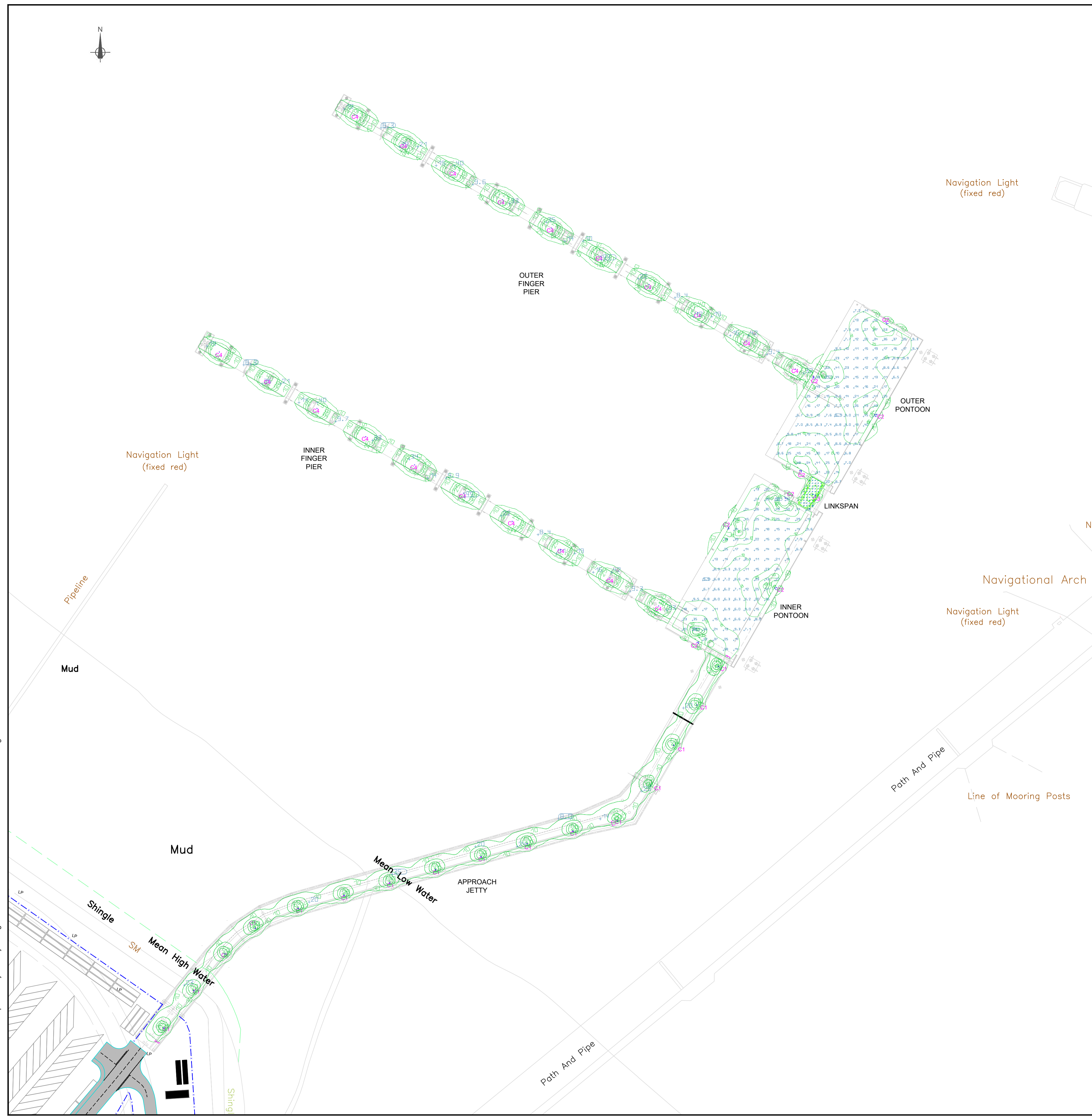
2.1.4 Assumptions and Exclusions

With regards to electrical installations near water there is a specific guidance in BS7671 and further review of this with regards the proposed site will be required.

Further discussion will be required with regard to site standards relating to preferred power distribution equipment or lighting manufacturers to minimise the need for additional training or spares.

This concept design has not taken into consideration of external lighting influences from neighbouring properties.

Appendix A Concept Lighting Layout



- FLOODLIGHTING EQUIPMENT**
- Approach Jetty
16X6m masts each carrying the following S-Lum
C1...
1x AL61001_55_4K
Single
Custom Mounted
 - Pontoon (inner and outer)
8x8m masts each carrying the following Vago
C2...
3x AL61101v2_17-2AW734K
Triple
Custom Mounted
 - Linkspan
1x6m masts each carrying the following S-Lum
C3...
1x AL61002_55_4K
Single
Bracket Projection 1m
Custom Mounted
 - Finger Pier (inner and outer)
20x6m masts each carrying the following S-Lum
C4...
2x AL61002_30_4K
Twin
Double Stud Bracket
Custom Mounted

HORIZONTAL ILLUMINANCE LEVELS - SPECIFIED
Average Horizontal Illuminance (E.av): 20 Lux
Minimum Horizontal Illuminance (E.min): 5 Lux
Uniformity Ratio (E.av/E.min): 0.25

HORIZONTAL ILLUMINANCE LEVELS - CALCULATED
Approach Jetty
Average Horizontal Illuminance (E.av): 20.5 Lux
Minimum Horizontal Illuminance (E.min): 5.13 Lux
Uniformity Ratio (E.av/E.min): 0.25

Outer Pontoon
Average Horizontal Illuminance (E.av): 20.4 Lux
Minimum Horizontal Illuminance (E.min): 5.28 Lux
Uniformity Ratio (E.av/E.min): 0.26

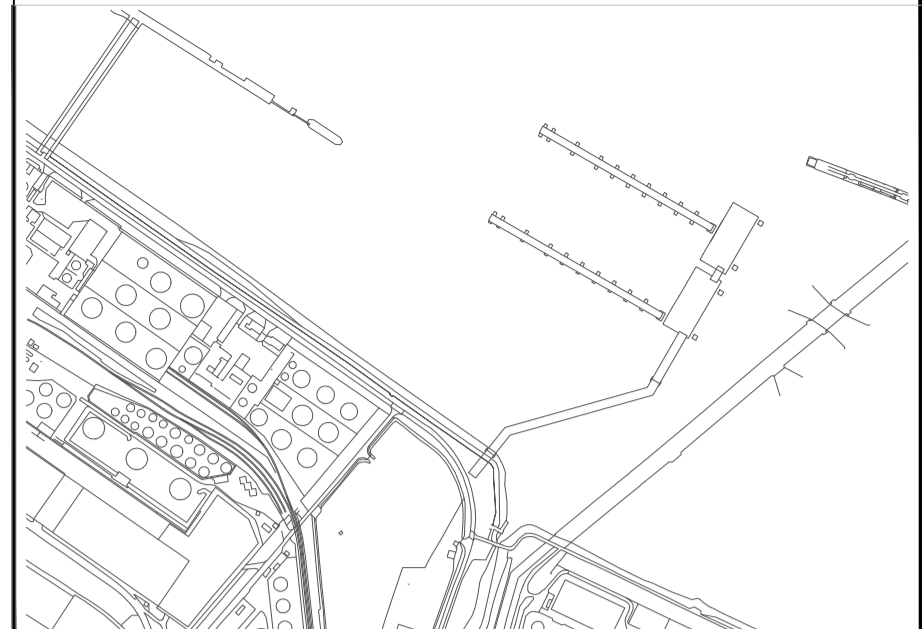
Inner Pontoon
Average Horizontal Illuminance (E.av): 20.1 Lux
Minimum Horizontal Illuminance (E.min): 5.51 Lux
Uniformity Ratio (E.av/E.min): 0.27

Linkspan
Average Horizontal Illuminance (E.av): 37.6 Lux
Minimum Horizontal Illuminance (E.min): 13.4 Lux
Uniformity Ratio (E.av/E.min): 0.36

Outer Finger Pier
Average Horizontal Illuminance (E.av): 23.4 Lux
Minimum Horizontal Illuminance (E.min): 8.2 Lux
Uniformity Ratio (E.av/E.min): 0.35

Inner Finger Pier
Average Horizontal Illuminance (E.av): 23.2 Lux
Minimum Horizontal Illuminance (E.min): 8.23 Lux
Uniformity Ratio (E.av/E.min): 0.35

Key Plan



General Notes

- All dimensions in metres unless noted otherwise
- All levels to Ordnance Datum unless noted otherwise
- Contractor shall verify lighting design meets specified criteria, it is the contractor's responsibility to ensure the lighting installation meets the design intent.
- Project scope covers the Approach Jetty, Inner Pontoon, Outer Pontoon, Linkspan, Outer Finger Pier, Inner Finger Pier, and associated restraint dolphins. Calculation and layout of this area to the allowance of the DCO.

P03	2023-09-19	For Comment	CMcG	VY	MG	CN
P02	2023-02	For Comment	BHW	RH	RH	CN
Rev	Rev. Date	Purpose of revision	Orig	Check	Rev	Appr

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Client
ABP ASSOCIATED BRITISH PORTS

Project
IMMINGHAM EASTERN RO-RO-TERMINAL

Drawing title
Lighting Project: ABP Humber, IERTT External Lighting.

Drawing status	For Comment	Suitability	S3
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Scale	1:1000
Jacobs No.	B2429400
Client No.	4021009

Drawing number
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