



OUTLINE LIGHTING STRATEGY: 7.3

DECARBONISATION

Cory Decarbonisation Project

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QUALITY CONTROL

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1. INTRODUCTION

1.1. PROJECT BACKGROUND

1.1.1. WSP has been instructed by Cory Environmental Holdings Limited (hereafter referred to as the Applicant) to prepare an **Outline Lighting Strategy (Document Reference 7.3)**, for the Cory Decarbonisation Project to be located at Norman Road, Belvedere in the London Borough of Bexley (LBB) (National Grid Reference/NGR 549572, 180512). The following figures are available in the Environmental Statement (ES):

- **Figure 1-1: Site Boundary Location Plan (Volume 2) of the ES (Document Reference 6.2);** and
- **Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2) of the ES (Document Reference 6.2).**

1.1.2. The Applicant intends to construct and operate the Proposed Scheme to be linked with the River Thames. It comprises of the following key components, which are described below, and further detail is provided within Chapter 2: Site and Proposed Scheme Description (Volume 1):

- The Carbon Capture Facility (including its associated Supporting Plant and Ancillary Infrastructure): the construction of infrastructure to capture a minimum of 95% of carbon dioxide (CO₂) emissions from Riverside 1 and 95% of CO₂ emissions from Riverside 2 once operational, which is equivalent to approximately 1.3Mt CO₂ per year. The capture rate is the annual average. The Carbon Capture Facility will be one of the largest carbon capture projects in the UK.
- The Proposed Jetty: a new and dedicated export structure within the River Thames as required to export the CO₂ captured as part of the Carbon Capture Facility.
- The Mitigation and Enhancement Area: land identified as part of the **Landscape, Biodiversity, Access and Recreation Delivery Strategy (Document Reference 7.9)** to provide improved access to open land, habitat mitigation, compensation and enhancement (including forming part of the drainage system and Biodiversity Net Gain delivery proposed for the Proposed Scheme) and planting. The Mitigation and Enhancement Area provides the opportunity to improve access to outdoor space and to extend the area managed as the Crossness Local Nature Reserve (LNR);
- Temporary Construction Compounds: areas to be used during the construction phases for activities including, but not limited to office space, warehouses, workshops, open air storage and car parking, as shown on the **Works Plans (Document Reference 2.3)**. These include the core Temporary Construction Compound, the western Temporary Construction Compound and the Proposed Jetty Temporary Construction Compound.

- Utilities Connections and Site Access Works: The undergrounding of utilities required for the Proposed Scheme in Norman Road and the creation of new, or the improvement of existing, access points to the Carbon Capture Facility from Norman Road.

1.1.3. Together, the Carbon Capture Facility the Proposed Jetty, the mitigation and Enhancement Area, the Temporary Construction Compounds and the Utilities Connections Site and Access Works are referred to as the 'Proposed Scheme'. The land upon which the Proposed Scheme is to be located is referred to as the 'Site' and the edge of this land referred to as the 'Site Boundary'. The Site Boundary represents the Order Limits for the Proposed Scheme as shown on the **Works Plants (Document Reference 2.3)**

1.2. BRIEF AND OBJECTIVES

- 1.2.1. An assessment of the potential effects associated with lighting of the Proposed Scheme is presented in **Chapter 7: Terrestrial Biodiversity (Volume 1)**, **Chapter 8: Marine Biodiversity (Volume 1)** and **Chapter 10: Townscape and Visual (Volume 1) of the Environmental Statement (Document Reference 6.1)**.
- 1.2.2. This Outline Lighting Strategy seeks to ensure that external lighting for the Proposed Scheme is designed to deliver a safe working environment in all relevant areas of both the Carbon Capture Facility and the Proposed Jetty during night-time whilst avoiding unnecessary light pollution and minimising visual impact on nearby and distant receptors and as such the lighting shall be designed and controlled so that sky glow and light pollution, glare, and over lighting during periods of no and or limited operational site activity are avoided.
- 1.2.3. Key objectives for external lighting of the Proposed Scheme are to deliver the principles of the Bat Conservation Trust/Institute of Lighting Professionals Guidance Note 08/18 – 1 and to be compliant with applicable lighting standards and guidance, in particular, BS EN 12464-2:2014, Light and Lighting, Lighting of Workplaces – Outdoor Work Places.
- 1.2.4. Through detailed design, a detailed Lighting Strategy will be developed to be in substantial accordance with this outline Strategy, as secured through by DCO Requirement. Within the next stages of the project ~~we~~the Applicant will consider how this initial external lighting evaluation ~~we will work~~should be developed, working alongside the Landscape Architect, to achieve the landscape lighting vision and as detailed in ~~LaBards~~LaBARDS.
- 1.2.5. As part of the project going forward and within the next phase of works, the team will work with the Landscape Architect to achieve the landscape lighting vision.

2. LIGHTING DESIGN

2.1. PRINCIPLES OF LIGHTING DESIGN

- 2.1.1. The following principles will be followed in the lighting design for the Proposed Scheme, with the detailed strategy setting out more detail of how these principles have been delivered by the final lighting design.

2.2. TERRESTRIAL ENVIRONMENT

- 2.2.1. Pole top luminaires will be proposed to the new internal roads, car parking and turning areas, on 6m poles, whereas the Jetty areas have been provided with a combination of 6m pole top luminaires and bollard type lighting.
- 2.2.2. All lighting will comply with the obtrusive light requirements set out in BS 12464-2:2014.
- 2.2.3. The closest residential development is approximately 1km distant, to the southeast. The Crossness Local Nature Reserve lies within and adjacent to the Site Boundary.
- 2.2.4. All necessary external lighting will be provided by means of column/pole top LED lights units designed with appropriate deflectors, including extreme backlight deflectors, compliant with IDA Dark Sky Compliant Certification and positioned to achieve the necessary illumination levels whilst minimising light spill and glare,
- 2.2.5. The lighting will be shielded to avoid light spill on habitats on the surrounding site, (notably the Crossness Local Nature Reserve) which are used by commuting animals at night and to decrease the potential displacement effect on light sensitive fauna such as Bats and, Barn Owls and water voles. Dark corridors will be identified in the final Strategy to minimise disturbance to these sensitive ecological features.
- 2.2.6. Lighting levels would be kept to a minimum necessary for security and safety and designed (where practicable) to avoid light spillage beyond the Site. This would include control of operation phase lighting to focus it on the Carbon Capture Facility, the Proposed Jetty and Ancillary Infrastructure and to maintain dark corridors around designated sites and key habitats.
- 2.2.6.2.2.7. The lighting will be controlled by photocells for automatic switching depending on ambient light levels with programmable time controls, in order to reduce light pollution at night-time.
- 2.2.7.2.2.8. No lighting is proposed in the Mitigation and Enhancement Area and no lighting (additional to that already on Norman Road) is proposed within the Utilities Corridor and Site Access Works on Norman Road.
- 2.2.8.2.2.9. The detailed strategy will explain how new lighting proposals will dovetail with the existing lighting at Riverside 1 and Riverside 2 and on Norman Road. It will ensure that there is no intensification of light to receptors and unnecessary duplication of lighting furniture.

2.3. MARINE ENVIRONMENT

- 2.3.1. The Proposed Jetty will be lit with a combination of pole top luminaries and bollard type lighting. The Proposed Jetty lighting will be designed to be co-ordinated and complement the existing Middleton Jetty to minimise impacts to marine ecology.
- 2.3.2. The lighting will be developed to reduce impact upon the marine environment. Where practicable:
- Lighting will be positioned carefully, and measures implemented to minimise light spillage into the marine environment.
 - The lighting will have high directionality and employ controls to: reduce light levels when not required (unless for safety and navigation); determine suitable light intensity; (i.e. where minimum requirements) and utilise a tailorable spectrum.
 - Screening (for example, cowling) will be provided in intertidal area to lessen light spillage.

2.4. LIGHTING DESIGN CRITERIA

- 2.4.1. Minimum measure illuminance levels for specific areas (based on the applicable tables from BS EN 12424-2: 2014) where it is known that lighting is required that will be achieved are given in the table 2-1 below. The detailed lighting strategy will include illuminance levels for any task specific lighting that may be required above and beyond this.

Table 2-1 – Terrestrial Environment -BS EN 12464-2:2014 Table 5.1

Type of Area, Task or Activity	Average Illuminance (LX)	Uniformity (Uo)
Regular vehicle traffic (max 40km/h)	20	0.40
Medium traffic e.g. parking areas of department stores, office buildings, plants, sports and multi-purpose building complexes	20	0.25
Walkways exclusively for pedestrians	5	0.25

Table 2-2 – Marine Environment - BS EN 12464-2:2014 Table 5.4

Type of Area, Task or Activity	Average Illuminance (LX)	Uniformity (Uo)
Cargo handling, loading, and unloading	30	0.25

2.5. COLOUR TEMPERATURE

- 2.5.1. LED sources are generally available in three distinct colour temperature ranges: warm white (3000k); neutral white (4000k); and cool white (5000k or above). It is proposed that a warm white option (3000K) is used for functional external lighting. This range reduces many of the disadvantages of very cool sources, whilst offering the benefits of a white light source to the interaction between different user groups. It is also more beneficial to wildlife as this has less impact on the natural behaviours and activities of nocturnal animals.
- 2.5.2. A white light source will also have the added advantage of being least at risk of being confused with signals for waterways, in particular within the Proposed Jetty area.

2.6. LIGHTING CONTROL

- 2.6.1. Terrestrial external lighting will be controlled by a combination of both photocells and time switches so that lighting is kept to a minimum and only switched on when required for operations.
- 2.6.2. During low light periods in the year, all external lighting around the Carbon Capture facility will be switched on during operational periods when staff are on site to provide a safe lighting level for vehicle and personnel movements, shift change, and other outdoor activities, such as regular maintenance.
- 2.6.3. The photocells will ensure that the lights will only come on when it is getting dark outside. The photocell and time switches will be able to be overridden from an appropriate staffed area such as a control room, so that all lights can be switched manually as required for operational purposes.
- 2.6.4. In the marine environment the Proposed Jetty area will be controlled via with a combination of photocell and hard wired/switched lighting from the control room, to allow for flexibility in operational requirements.
- 2.6.5. All necessary jetty signal lighting and emergency rescue lighting will be provided in accordance with regulatory requirements.

3. LIGHTING MODELLING

3.1. INTRODUCTION

- 3.1.1. The Applicant has undertaken indicative modelling of the lighting contours and spill that would arise when the principles, criteria and colour temperature set out in section 2 are followed, to demonstrate that these principles are achievable in practice.
- 3.1.2. This is based on the:
- Indicative plant layout provided in the **Indicative Equipment Layout Drawing (Document Reference 2.5)**.
 - Luminaires set out in table 3-1 being used, which comply with these principles, criteria, and colour temperature requirements.
- 3.1.3. These luminaires are just example of the lighting types that could be used – the final equipment to be used will be developed in detailed design. Furthermore, the indicative plant layout is also not secured – it just shows one way in which the parameters in the Works Plans could be built out.

Table 3-1 – Luminaires

Area	Luminaire Type Used in Calculation
Carbon Capture Facility Access Points	Manufacturer - Holophane Lighting – illustrated in Figure 3-1 Luminaire Type - D-Series 2 - 6m pole mounted luminaire 1 x 34w LED, 3000k with extreme backlight cut-off accessory Compliant with IDA Dark Sky Certificate
Carbon Capture Facility Car Park and Internal Roads	Manufacturer - Holophane Lighting Luminaire Type - D-Series 2 - 6m pole mounted luminaire 1 x 34w LED, 3000k with extreme backlight cut-off accessory Compliant with IDA Dark Sky Certificate
Proposed Jetty/Access Trestle	Manufacturer - Holophane Lighting - illustrated in Figure 3-3 Luminaire Type - D-Series 2 - 10m pole mounted luminaire 1 x 34w LED, 3000k with extreme backlight cut-off accessory Compliant with IDA Dark Sky Certificate
Marine Loading and associated Dolphins	Manufacturer - Thorn Lighting Luminaire Type - Urba Bollard – Pathway Distribution 1 x 11w LED. 3000k Compliant with IDA Dark Sky Certificate

Figure 3-1 – Holophane Lighting, D-Series 2 Luminaire



Figure 3-2 – Luminaire Distribution

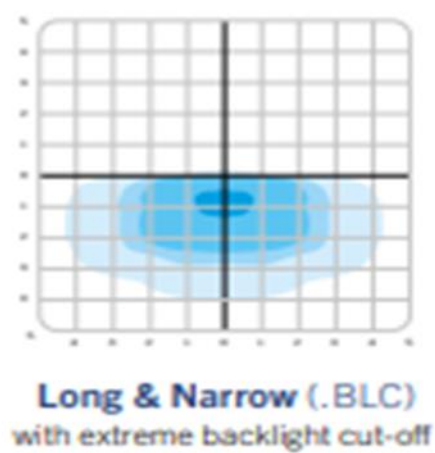
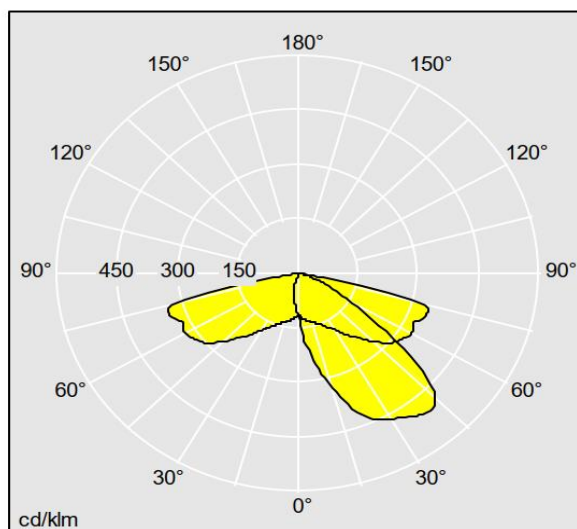


Figure 3-3 – Thorlux Lighting, Passway Bollard



Figure 3-4 – Luminaire Distribution



4. LIGHTING CALCULATION RESULTS

4.1. CONTOUR COLOUR PLANS

- 4.1.1. The following pages contains the Isolux (lux levels) contour plans indicating the design lux (lighting levels) on the new internal roads and associated car parks, and Proposed Jetty area. The contour plans will also show where any light spill will affect the surrounding environment.

Figure 4-1 – Indicative Site Layout Calculated Lux Levels

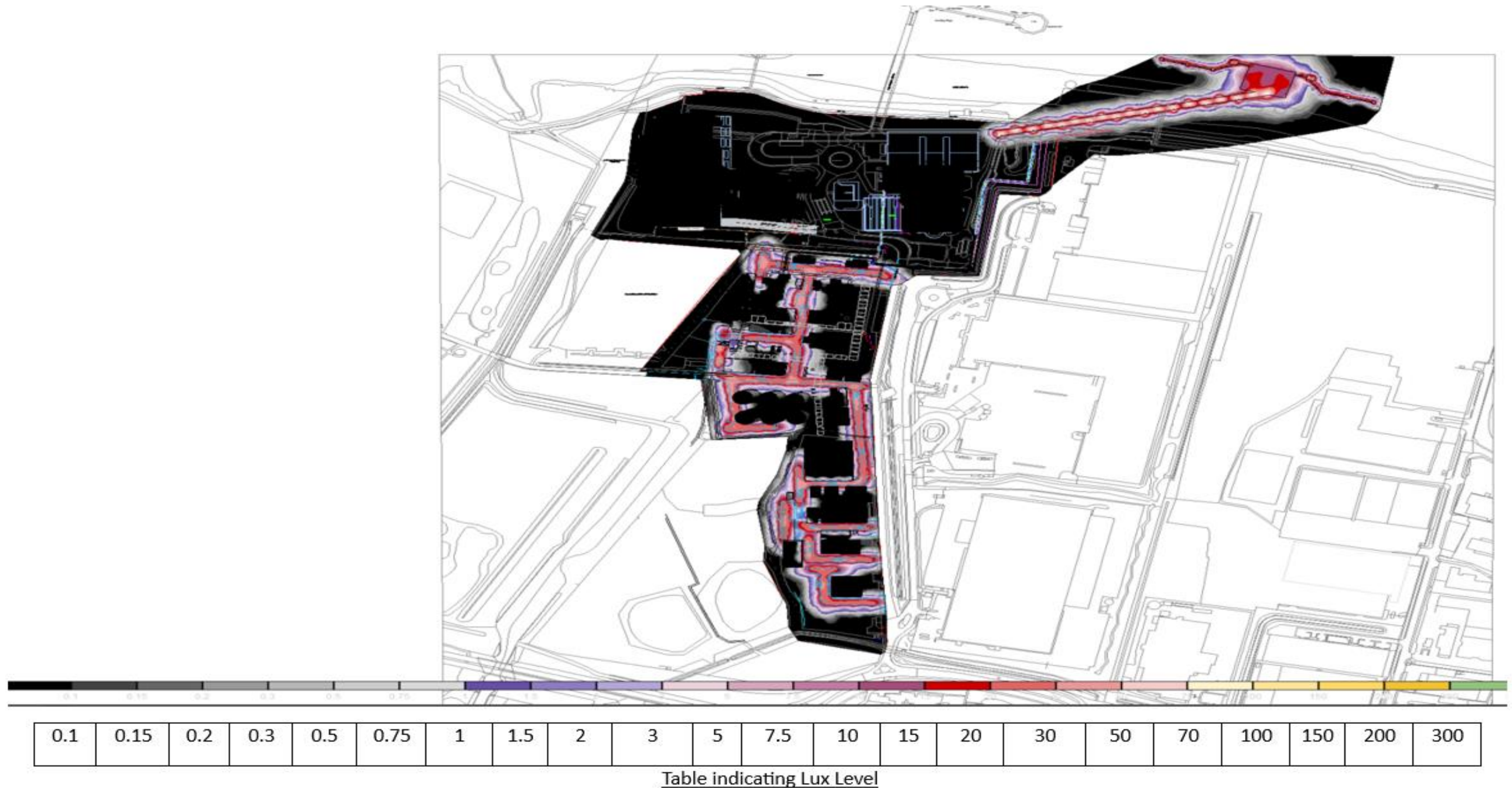


Figure 4-2 – Southern End of Site Lux Levels

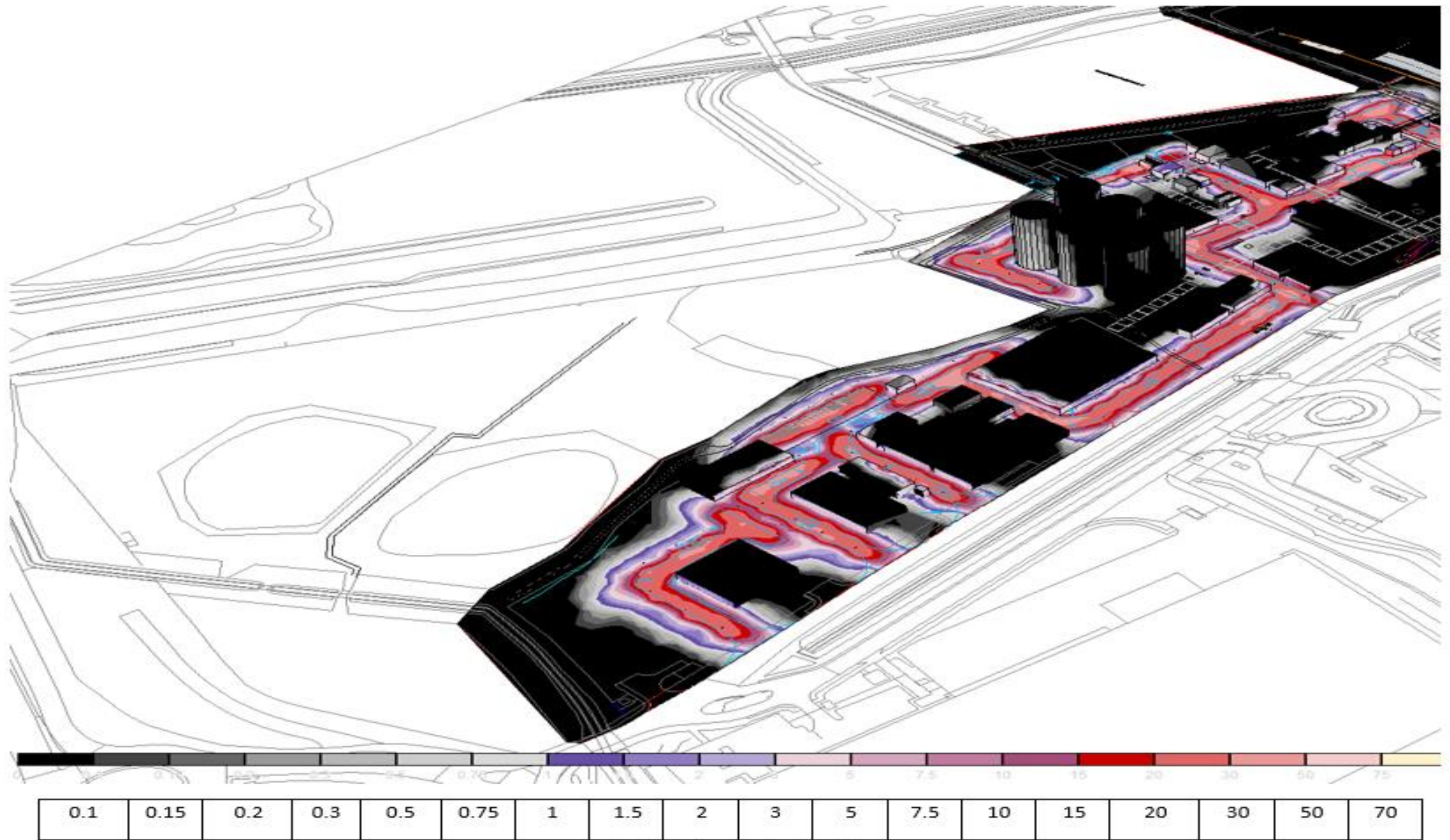


Table indicating Lux Level

Figure 4-3 – Middle Part of Site Lux Levels

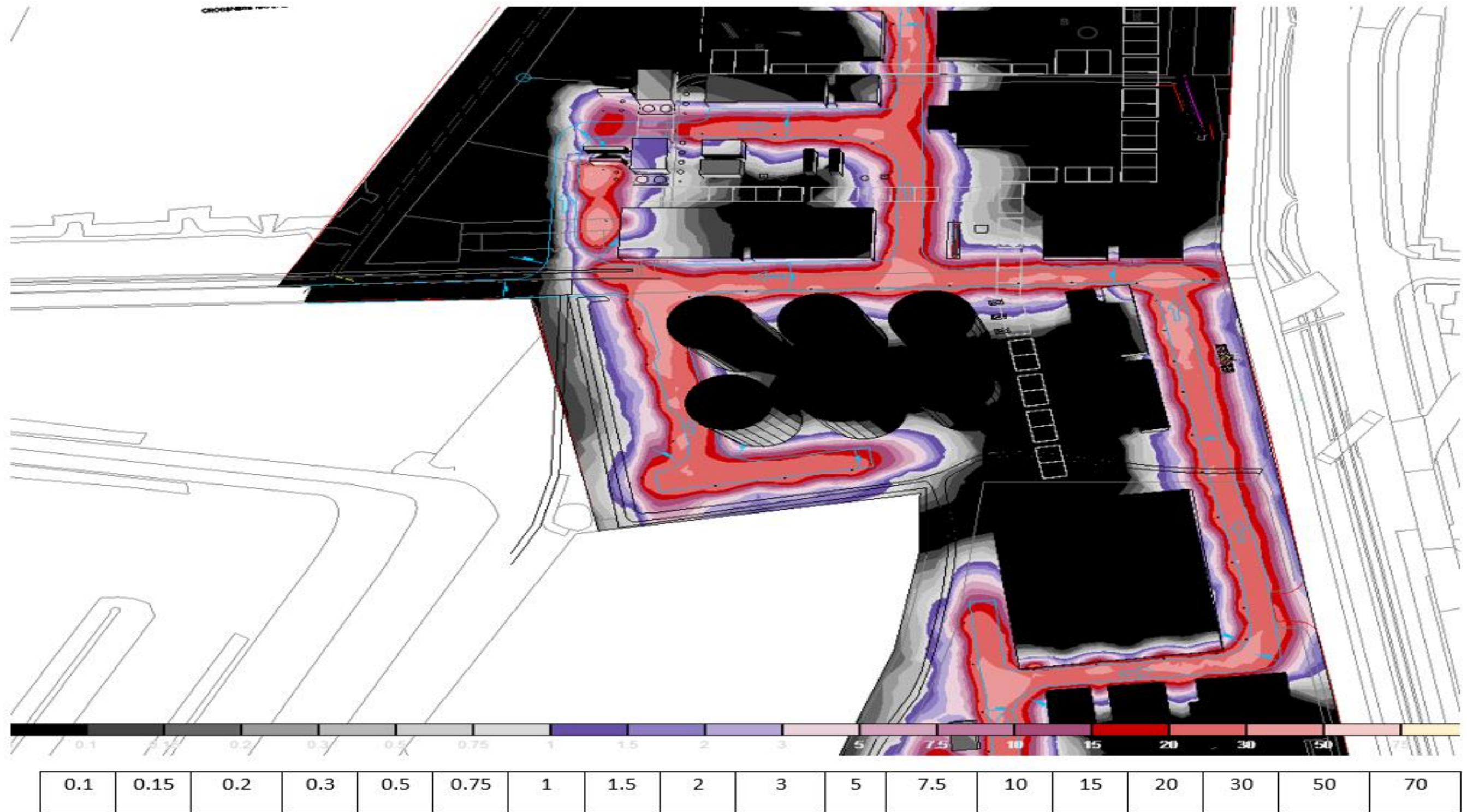


Table indicating Lux Level

Figure 4-4 – North End of Site Area Lux Levels

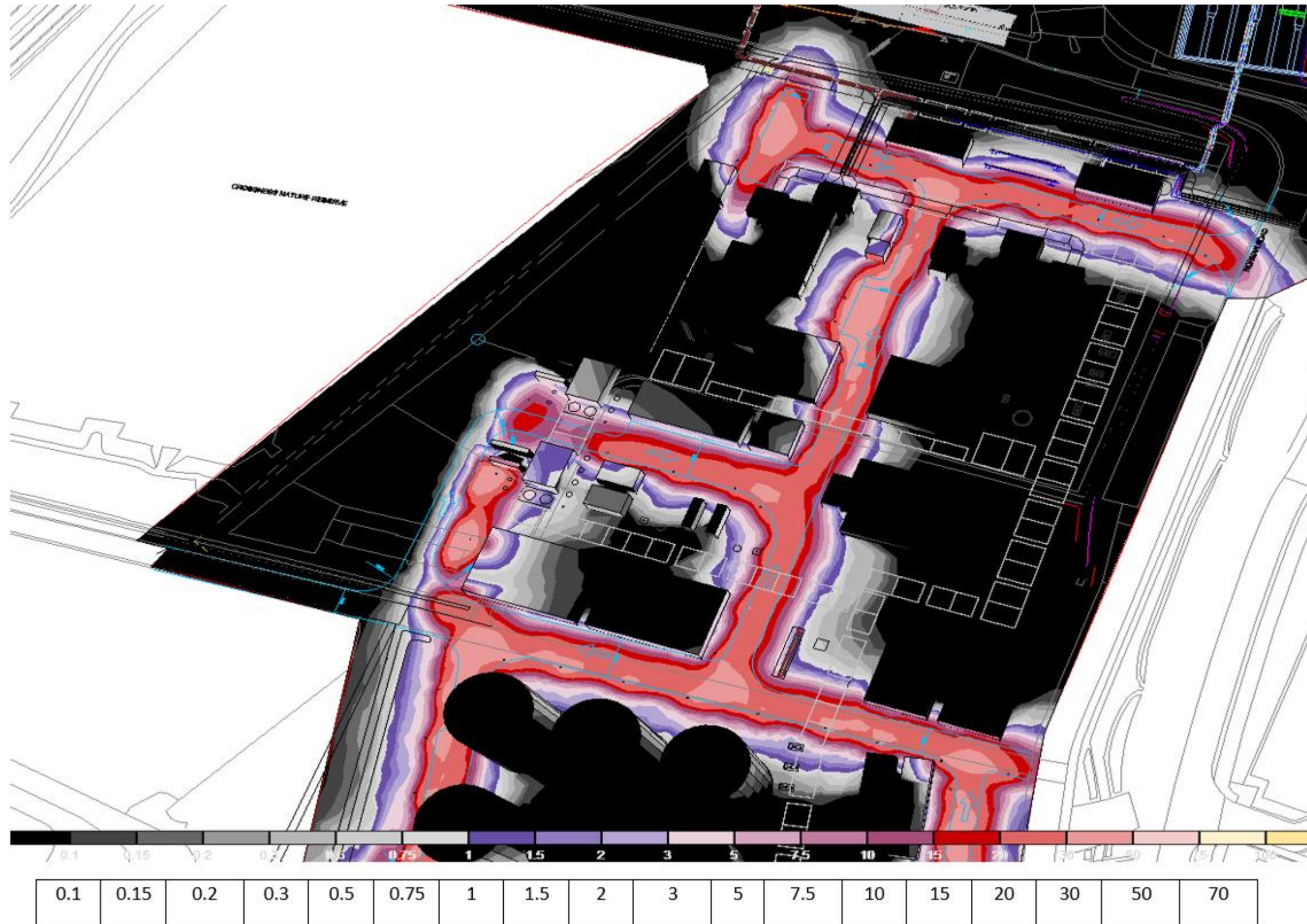
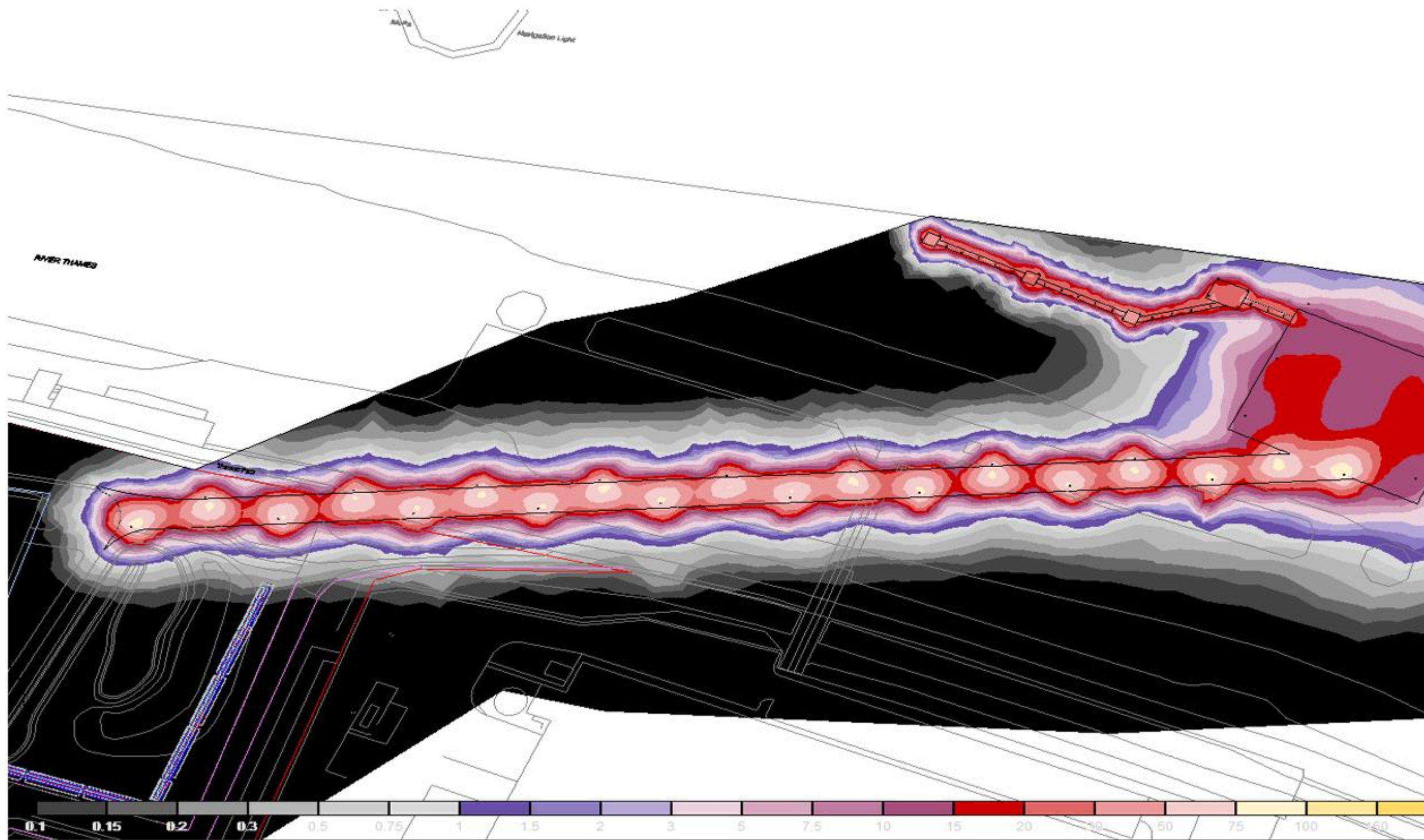


Table indicating Lux Level

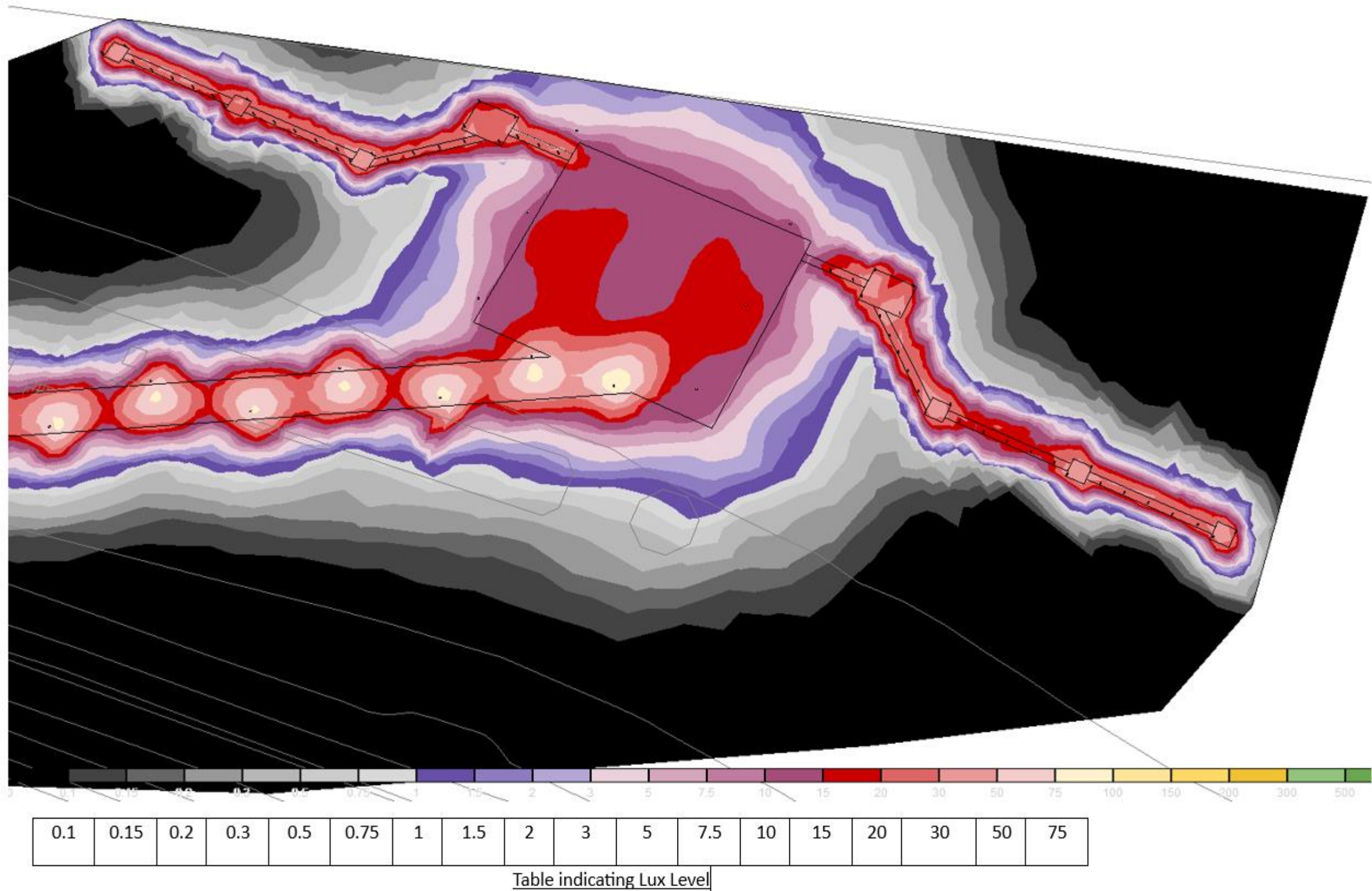
Figure 4-5 – Marine Area Lux Levels



0.1	0.15	0.2	0.3	0.5	0.75	1	1.5	2	3	5	7.5	10	15	20	30	50	75
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Table indicating Lux Level

Figure 4-6 – Marine Loading Area





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