

18 Lighting

Introduction

- 18.1 This chapter of the PEIR provides a preliminary assessment of the potential for obtrusive light arising from the OMSSD project during its construction and operational phases. This preliminary assessment has been undertaken by Designs for Lighting.
- 18.2 A detailed Lighting Impact Assessment of the OMSSD project will be undertaken in accordance with the Institution of Lighting Professionals (ILP) Professional Lighting Guide 04 - Guidance for Undertaking Environmental Lighting Impact Assessments (PLG04)⁵⁶⁹, and will be provided as a chapter within the OMSSD ES.
- 18.3 The Lighting Impact Assessment will provide a detailed assessment of the effects of artificial lighting at night resulting from the OMSSD, however, the purpose of this chapter is to present the Assessment Methodology and initial environmental information, including the likely effects of lighting associated with the OMSSD project.
- 18.4 Due to the nature of lighting and its potential effects within the landscape, this chapter overlaps with the Landscape Visual Impact Assessment (LVIA) chapter at chapter 17 of this PEIR. Similarly, the lighting chapter overlaps with the Terrestrial Ecology chapter at chapter 7, as the potential effects of lighting can have an impact on the suitability of ecological enhancement features and potentially sensitive ecological receptors.

Definition of the Study Area

- 18.5 The location of the existing Oikos Facility on the north bank of the River Thames means that it can be viewed across a wide area, including the south bank of the River Thames. Locally, the nearest residential areas lie adjacent to the south west boundary of the Oikos Facility, although there are views of the Oikos Facility from established residential areas to the north and north east across grazing land east of Haven Road.
- 18.6 The study area for lighting for the OMSSD project takes account of the study area for the LVIA (refer to Chapter 17 of this PEIR). The built elements of the OMSSD project will be located within the existing operational Oikos Facility and will comprise similar buildings and structures to those that already exist.
- 18.7 For the purposes of the lighting assessment the potential receptor groups that are considered to be sensitive to change resulting from the OMSSD project include:
- Customers of the Lobster Smack Pub (to the south west of the Oikos Facility);

⁵⁶⁹ ILP Professional Lighting Guide – PLG04, Guidance on Undertaking Environmental Lighting Impact Assessments (2013).

- Residents of Haven Quays (to the south west of the Oikos Facility);
- Users of the existing public footpath (CANV_8) which follows the sea wall to the Thames Estuary (to the south of the Oikos Facility);
- Residents of Thorney Bay Caravan Park (to the east of the Oikos Facility);
- Residents of properties on the southern edge of the built-up area of Canvey Island (to the north of the Oikos Facility);
- Users of footpaths on Benfleet Downs and Hadleigh Castle Country Park (on higher ground to the north of the Oikos Facility);
- Users of the livery at Sluice Farm (west of the Oikos Facility);
- Personnel working at IAA Vehicle Services (to the north and east of the Oikos Facility);
- Personnel working at the Calor import facility (to the east of the Oikos Facility); and
- Vessel operators (navigating the Thames Estuary to the south of the Oikos Facility).

18.8 Due to the Oikos Facility's location on the edge of the Thames, the lighting assessment considers a desktop study area of 8.0 kilometres radius from the OMSSD project site, to ensure landscape and visual impact assessment receptors on the south side of the Thames Estuary are assessed for potential effects of obtrusive light, along with human residential and ecological receptors. By extending the study area to 8.0km north of the OMSSD project site, the potential for glare from light sources visible from up to 8.0km can be suitably assessed. Refer to Figure 18.1: Study Area. This presents the desktop study area, from which residential and visual impact receptor locations are purposes of the baseline survey.

18.9 To the north, east and west of the OMSSD project site (shown approximately in Figure 18.1: Study Area) potentially sensitive receptors comprise of mostly human (amenity and safety). South of the OMSSD project site, the potentially sensitive receptors broadly comprise ecological and landscape.

Assessment Methodology

18.10 Within the National Policy Statement for Ports (NPSfP)⁵⁷⁰, the assessment of lighting impact is considered primarily within the section which discusses LVIA. Therefore, the approach and methodology of the lighting impact assessment has been informed by the potential for lighting proposed as part of the OMSSD project to have an impact on views and visual amenity during the site preparation, construction and operational stages of the project. This includes any light pollution effects on local amenity, rural tranquillity and nature conservation. Where significant effects are identified, appropriate mitigation measures are proposed to be employed to prevent or mitigate effects.

⁵⁷⁰ Department for Transport (DfT) (2012) National Policy Statement for Ports.

- 18.11 Although not of primary relevance as a policy document for the consideration of NSIPs, regard has also been given to national planning policy provided within the National Planning Policy Framework (NPPF) (February 2019)⁵⁷¹ as it sets out the Government's planning policies for England and how they are expected to be applied within the town and country planning context and provides a framework for local plans. The NPPF emphasises that planning policies and decisions should ensure that development is appropriate for its location taking into account the likely effects on health, living conditions and the natural environment that could arise. As such, decision makers should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation features.
- 18.12 The approach and methodology for the preliminary assessment is in accordance with best practice guidance from the ILP PLG 04 document 'Guidance on Undertaking Environmental Lighting Impact Assessments' (2013).
- 18.13 At the time of drafting this PEIR chapter, the global COVID-19 pandemic had prevented on-site survey work from being undertaken. However, this site survey information will be provided within the OMSSD Environmental Statement (ES), subject to national and local restrictions not being in place that would prevent this from being undertaken. For the purpose of this PEIR chapter, the assessment comprised a desktop study to establish the baseline lighting conditions and is informed by a lighting strategy for an existing development within the Oikos Facility. The desktop study was undertaken by suitably qualified and competent lighting professionals, holding either an Associate Member (AMILP) or Member (MILP) grade of membership with the ILP, and professionally registered with the Engineering Council, holding either Engineering Technician (EngTech), Incorporated Engineer (IEng) or Chartered Engineer (CEng) status on the Engineering Council register.

Data and Information Sources

- 18.14 This chapter is informed by the ILP obtrusive light criteria, for the Environmental Zone in which the OMSSD project site is located. This data, which forms the basis of this lighting impact assessment, is obtained from ILP GN01⁵⁷². The criteria provides a framework for determining the Environmental Zone in which the site is located, whilst also outlining maximum obtrusive light limitations for various components of obtrusive light, including: Upward Light Ratio (ULR), Vertical Illuminance onto residential windows (Lux), viewed source intensity (Candelas) and luminance of buildings (candelas per metre square).
- 18.15 To assist in the desktop-based baseline characterisation of the area in which the Oikos Facility is located, sky glow mapping produced by the Campaign for the Protection of Rural England (CPRE) has been used to review the quantities of upward light in the area, giving rise to sky glow. Figure 18.2 shows that the ambient light giving rise to sky glow in the environment surrounding the Oikos Facility is medium to high in terms of brightness.

⁵⁷¹ Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework.

⁵⁷² ILP Guidance Note 01/20 – Guidance notes for the reduction of obtrusive light. Published 2020.

- 18.16 The baseline survey (desktop and on-site for the OMSSD ES) helps to inform the appropriate Environmental Zone classification. Environmental Zone limits are defined by the Commission Internationale de l'Eclairage (CIE: 150: 2017)⁵⁷³. The purpose of the Environmental Zones is to limit the potential for obtrusive light to occur, relative to the district brightness of the area in which the lighting is to be implemented. Relevant Environmental Zone descriptions are presented in Table 18.1.
- 18.17 Once the relevant Environmental Zone is identified, Obtrusive Light Criteria for each corresponding Environmental Zone is provided by the Commission Internationale de l'Eclairage (CIE 150 table 2), presented in Table 18.2.

Table 18.1: Environmental Zone Criteria

Environmental Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, International Dark-Sky Association (IDA) dark sky places
E1	Natural	Intrinsically 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 – 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

Table 18.2 Environmental Zone Obtrusive Light Limits

Environmental Zone	Sky Glow (ULR) (Max %)	Light Trespass (into windows) E _v (lux)	
		Pre-Curfew	Post-Curfew
E0	0	0	0
E1	0	2	0 (1*)
E2	2.5	5	1
E3	5	10	2
E4	15	25	5

⁵⁷³ International Commission on Illumination, Technical Report, Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2nd Edition, CIE 150: 2017.

Environmental Zone	Sky Glow (ULR) (Max %)	Light Trespass (into windows)	
		E _v (lux)	
		Pre-Curfew	Post-Curfew
Notes:			
<ul style="list-style-type: none"> Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone. Rural zones under protected designations should use a higher standard of policy. Zone E0 must always be surrounded by an E1 Zone. Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas. SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective. Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula. Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK. 			

18.18 Luminous intensity criterion (for the purpose of minimising glare) is outlined in Table 18.3. This criterion is specifically relevant to proposed luminaires with the potential for the source to be visible to sensitive receptors.

18.19 ILP obtrusive light criteria updated in 2020⁵⁷⁴ provides a new methodology for assessing the maximum luminous intensity for individual observers. This is based on the size of the luminaire (or group of luminaires), the distance between the source and the receptor multiplied by a factor as given in Table 18.3.

Table 18.3: Luminous Intensity criterion (as per ILP GN01:2020)

Light Technical Parameter	Application Conditions	Luminaire Group (projected area A _p in m ²)					
		0 < A _p ≤ 0.002	0.002 < A _p ≤ 0.01	0.01 < A _p ≤ 0.03	0.03 < A _p ≤ 0.13	0.13 < A _p ≤ 0.50	A _p > 0.5
Maximum luminous intensity emitted by luminaire (I in cd)	E0						
	Pre-Curfew	0	0	0	0	0	0
	Post-Curfew	0	0	0	0	0	0
	E1						
	Pre-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
	Post-Curfew	0	0	0	0	0	0
	E2						
	Pre-Curfew	0.57 d	1.3 d	2.5 d	5.0 d	10 d	7,500
	Post-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	500
	E3						
Pre-Curfew	0.86 d	1.9 d	3.8 d	7.5 d	15 d	10,000	

⁵⁷⁴ ILP Guidance Note 01/20 – Guidance notes for the reduction of obtrusive light. Published 2020.

Light Technical Parameter	Application Conditions	Luminaire Group (projected area A_p in m^2)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
	Post-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1,000
	E4						
	Pre-Curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25,000
	Post-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
Aid to gauging A_p		2-5cm	5-10cm	10-20cm	20-40cm	40-80cm	>80cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Corresponding A_p representative area (m^2)		0.0008	0.004	0.016	0.063	0.251	>0.5
<p>Notes:</p> <ol style="list-style-type: none"> 1. d is the distance between the observer and the glare source in metres. 2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions. 3. A_p is the apparent surface of the light source seen from the observer position. 4. Upper limits for each zone shall be taken as those with column $A_p > 0.5$. 							

Determining Significance of Effects

Introduction

- 18.20 In order to determine the significance of likely effects, the sensitivity of receptors, the magnitude of change, and the significance of effect are considered, in line with criteria provided in Table 18.4, Table 18.5 and Table 18.6 respectively.
- 18.21 These criteria are considered together, in accordance with the matrix provided in Table 18.7.
- 18.22 Where relevant, mitigation measures to reduce the impact of adverse effects are also discussed, and the preliminary significance of any residual effects is identified.

Sensitivity of receptors

- 18.23 Criteria outlined in Table 18.4 determines the sensitivity criteria for potentially sensitive receptors to the OMSSD project.

Table 18.4: Criteria for Receptor Sensitivity

Sensitivity	Description of Criteria
High	<p>The environment is fragile, and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.</p> <p>Human (Amenity) – receptors which are sensitive to a change in lighting such that the quality of life would be affected (i.e. lighting is designated a statutory nuisance).</p> <p>Human (Safety) - receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers or workers).</p>

Sensitivity	Description of Criteria
	Ecological – where a change in the lighting affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.
Medium	The environment has a degree of adaptability and resilience and is likely to accommodate the changes caused by an impact, although there may still be some residual modification as a result. Human (Amenity) – receptors which are sensitive to a change in lighting however not such that the quality of life would be affected. Human (Safety) - receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers or workers). Ecological – where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt.
Low	The environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions. Human (Amenity) – receptors which would not noticeably be aware of a change in lighting (i.e. in areas of medium to high luminance). Human (Safety) - receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers or workers). Ecological – area with limited wildlife.
Negligible	Receptor has little or no night-time activity.

Magnitude of change

18.24 The magnitude of change criteria is defined in Table 18.5.

Table 18.5: Magnitude of Change Criteria

Magnitude of Change	Description of Criteria
High	A large change compared to the natural variations in background levels. A clear breach of limits and standards may occur. For example, levels of obtrusive light in the form of sky glow, light trespass or glare towards a receptor which exceeds the limits set within the ILP guidance for a higher Environmental Zone might classify as a high magnitude of change.
Medium	Change which is noticeable and may be a breach of limits and standards. In terms of the limits set in the ILP guidance this might equate to exceeding the limit but within the limits set for the next Environmental Zone.
Low	Change which, when compared to background levels, is only just noticeable.
Negligible	Change is not noticeable.

Significance criteria

18.25 Significance of effect criteria is defined in Table 18.6.

Table 18.6: Significance Criteria

Significance	Criteria
Major (beneficial)	Substantial reduction in obtrusive light at sensitive receptors and/or users of the OMSSD such that large scale improvements to visual amenity, human safety or health is delivered. Significantly improves ecological habitats.

Significance	Criteria
Moderate (beneficial)	Moderate reduction in obtrusive light at sensitive receptors and/or users of the OMSSD such that noticeable improvements to visual amenity, human safety or health are delivered. Improves ecological habitats.
Minor (beneficial)	Minor reduction in obtrusive light at sensitive receptors and/or users of the OMSSD such that perceptible improvements to visual amenity, human safety or health is delivered; perceptible improvement to ecological habitats.
Neutral / not significant	No appreciable effect on sensitive receptors. Effects are reversible.
Minor (adverse)	Minor increase in obtrusive light at sensitive receptors and/or users of the OMSSD such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Effects are reversible or temporary.
Moderate (adverse)	Moderate increase in obtrusive light at sensitive receptors and/or users of the OMSSD such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Requires monitoring and local remedial work. For example, lighting which is visible and causes nuisance to a sensitive receptor outside the OMSSD site.
Major (adverse)	Major increase in obtrusive light at sensitive receptors and/or users of the OMSSD such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Requires extensive remedial works. For example, a floodlighting installation which directs light into the eyes of oncoming motorists causing disability glare and potential reduction in visual performance leading to an increased risk of collision.

18.26 Impacts that are of moderate or major significance are taken to be significant in EIA terms.

Significance matrix

18.27 To determine the significance of the effect of lighting associated with the OMSSD project on sensitive receptors, the sensitivity of the receptor and the magnitude of change are combined within the matrix detailed in Table 18.7.

Table 18.7: Significance Matrix

		Sensitivity of receptor			
		High	Medium	Low	Negligible
Magnitude of Change	High	Major	Moderate to Major	Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor to Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Consultation

18.28 Consultation has been undertaken with the Landscape Consultant to Essex County Council to agree the approach to the lighting assessment and lighting strategy for the OMSSD

project. During the consultation, it was agreed that the lighting assessment would be conducted in accordance with the LVIA verified viewpoints (refer to Chapter 17 of this PEIR).

- 18.29 Consultation was also undertaken with Castle Point Borough Council’s Environmental Protection Officer to discuss the potential residential receptors sensitive to lighting associated with the OMSSD. In particular, the residents located within Haven Quays caravan park were discussed and it was agreed that light spill modelling would be provided in accordance with an overarching lighting strategy, to reduce the potential for obtrusive light to affect these receptors.
- 18.30 Consultation with other statutory consultees will continue as part of work on the OMSSD ES.

Table 18.8: Summary of consultation to date

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
ECC Landscape Consultant	2 nd October 2020	ECC landscape Consultant was happy with the proposed approach to align the lighting impact assessment and the LVIA.	Engineering design details still under development at time of drafting this chapter. Light spill diagram and lighting assessment to be developed for ES chapter.
CPBC Environmental Protection Officer	29 th October 2020	The approach to mitigating obtrusive light through a lighting strategy was agreed with the Environmental Protection Officer. It was agreed the Environmental Zone could be considered to be E3.	Lighting strategy and light spill modelling is under development to inform ES chapter whilst engineering details are being prepared.
TR030004 Scoping Opinion	May 2020	4.12.2 – The ES should provide a clear definition of what is considered a ‘distant location’ and justify why they would not be impacted by lighting from the Proposed Development.	For the purposes of the lighting assessment, viewpoints that are greater than 8.0km away are considered a ‘distant location’. A lighting strategy will be developed to ensure that all receptors (within and outside 8km radius) are unlikely to experience obtrusive light that exceeds obtrusive light criteria for the corresponding environmental zone).
TR030004 Scoping Opinion	May 2020	4.12.3 – The ES should clearly explain how brightness of existing light levels and sensitivity of nearby residential receptors have been applied in line with the relevant guidance and/or consultation.	The brightness of existing light levels was agreed with the CPBC Environmental Protection Officer in a meeting on 29 th October 2020 where the E3 Environmental Zone classification was discussed and agreed as acceptable. Guidance in the sensitivity criteria table (Table 18.4) has been used to determine the sensitivity of the receptor based on the descriptor. However, caution has been taken and residential

Consultee	Date	Summary of Response	How comments have been addressed in this Chapter
			receptors classified as having 'medium' sensitivity instead of 'low' sensitivity as the criterion indicates.
TR030004 Scoping Opinion	May 2020	4.12.4 – Any modelling used to support information in the ES should be explained and effort made to agree the approach with relevant consultation bodies.	Modelling software was discussed with the CPBC Environmental Protection Officer in a meeting on 29 th October 2020. Software proposed is considered industry standard.
TR030004 Scoping Opinion	May 2020	4.12.5 – Methodology and locations of baseline surveys should be agreed with relevant consultation bodies.	This was discussed and agreed in meetings with CPBC (29 th October 2020) and ECC (2 nd October 2020).
TR030004 Scoping Opinion	May 2020	4.12.6 – The lighting strategy is to be appropriately secured, and the approach is to be agreed with relevant consultation bodies.	The scope of the lighting strategy was discussed with both ECC and CPBC during a consultation meeting held 2 nd October 2020 and 29 th October 2020 respectively.

Implications of Legislation, Policy and Guidance

18.31 This section sets out the most relevant legislation, policy and guidance concerning lighting associated with the OMSSD project.

National Policy Statements for Ports, Department for Transport, January 2012 (NPSfP)⁵⁷⁵

18.32 Section 5.8 (Dust, odour, artificial light, smoke, steam and insect infestation) and Section 5.11 (Landscape and Visual impacts) of the NPSfP states that the applicant should assess the potential for artificial light to have a detrimental impact on amenity, as part of the ES.

18.33 Lighting should also form part of the landscape and visual assessment reported within the ES. It is a requirement for the landscape and visual assessment to include the visibility and conspicuousness of the project and potential impact on views and visual amenity. This should include any likely light pollution effects including on local amenity, rural tranquillity and nature conservation.

⁵⁷⁵ Department for Transport (2012) National Policy Statement for Ports

Castle Point Borough Council – New Castle Point Local Plan (2018-2033)

- 18.34 In October 2020 CPBC submitted its Local Plan to Government for examination
<https://www.castlepoint.gov.uk/local-plan-submission>
- 18.35 Once adopted, development within the boundary of CPBC must comply with the policies in the New Castle Point Local Plan, which sets out how development and growth requirements of Castle Point are to be met. This is achieved through compliance with Strategic and Local policies within the plan.
- 18.36 The most relevant policy with the CPBC Local Plan is Strategic Policy NE7, which states:

“Pollution Control

1. Development proposals should be designed to manage and reduce pollution through energy and water efficient design, the installation of sustainable drainage systems, and the delivery or enhancement of green infrastructure.

2. Development proposals should be located and designed in such a manner as to not cause a significant adverse effect upon the environment, the health of new and existing residents or surrounding residential amenity by reason of pollution to land, air or water, or as a result of any form of disturbance including, but not limited to, noise, light, odour, heat, dust and vibrations. ...”

Environmental Protection Act 1990⁵⁷⁶ / Clean Neighbourhoods and Environment Act 2005⁵⁷⁷

- 18.37 Since 2006, artificial light is incorporated as a potential statutory nuisance in the Environmental Protection Act 1990 (as amended by section 102 of the Clean Neighbourhoods and Environment Act 2005). Section 79(1) of the Environmental Protection Act 1990 (as amended) states:

“(fb) Artificial light emitted from premises so as to be prejudicial to health and nuisance constitutes a ‘Statutory Nuisance’and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 below or sections 80 and 80A below and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint”.

⁵⁷⁶ Environmental Protection Act 1990

⁵⁷⁷ Clean Neighbourhoods and Environment Act 2005

Overarching National Policy Statement for Energy (EN-1), Department of Energy and Climate Change, July 2011⁵⁷⁸

18.38 Section 5.6 of the Overarching NPS for Energy considers the potential for artificial light to have a detrimental impact on amenity within the section covering ‘Dust, odour, artificial light, smoke, steam and insect infestation’ as follows:

“The applicant should assess the potential for insect infestation and emissions of odour, dust, steam, smoke and artificial light to have a detrimental impact on amenity, as part of the Environmental Statement.

In particular, the assessment provided by the applicant should describe:

- *the type, quantity and timing of emissions;*
- *aspects of the development which may give rise to emissions;*
- *premises or locations that may be affected by the emissions;*
- *effects of the emission on identified premises or locations; and*
- *measures to be employed in preventing or mitigating the emissions.*

The applicant is advised to consult the relevant planning authority and, where appropriate, the EA about the scope and methodology of the assessment.”

National Planning Policy Framework: 2019⁵⁷⁹

18.39 Whilst the National Planning Policy Framework (NPPF) is not strictly applicable to Nationally Significant Infrastructure Projects, under the Planning Act 2008⁵⁸⁰, reference has been included for legislative context.

18.40 The NPPF sets out the government’s planning policies for England and how they are expected to be applied and provides a framework for local plans. With regards to light pollution, the NPPF was updated in November 2019 and states at paragraph 180 that the following elements are to be considered:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: ...

⁵⁷⁸ Department of Energy and Climate Change (2011) *Overarching National Policy Statement for Energy (EN-1)*

⁵⁷⁹ Ministry of Housing, Communities & Local Government (2019) *National Planning Policy Framework*

⁵⁸⁰ Planning Act 2008, c. 29. Available at: <https://www.legislation.gov.uk/ukpga/2008/29/contents> [Accessed: 11 Jan 2021]

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

British Standard: BS 5489 -1 :2020 – Lighting of Roads and Public Amenity Areas- Code of practice, British Standards Institute and British Standard: BS EN 12464 – 2:2014 – Lighting of work places (Part 2: Outdoor work places)⁵⁸¹

- 18.41 The above-mentioned British Standards are applicable to the artificial lighting of the OMSSD project to ensure that lighting is implemented in accordance with best practice, whilst achieving the minimum recommended performance requirements. The British Standards also help to ensure that lighting is appropriately designed and fit for the task for which artificial lighting is required.

ILP: Guidance for Undertaking Environmental Lighting Impact Assessments (PLG04: 2013)⁵⁸²

- 18.42 This industry standard guidance outlines good practice for undertaking assessments of the potential impact of artificial environmental lighting. The guidance outlines the procedures and considerations relevant to assessing potential environmental lighting impacts. PLG04:2013 is applicable to the OMSSD project as an assessment of the lighting is required to be undertaken in accordance with good practice.

ILP: Guidance Notes for the Reduction of Obtrusive Light (GN01/20)⁵⁸³

- 18.43 This guidance notes aim to reduce the potential for obtrusive light to occur, caused by poorly designed and installed exterior artificial lighting. The lighting strategy for the OMSSD project will be informed by the most relevant sections of GN01/20 (2020) to reduce the potential for obtrusive light from a wide range of exterior lighting applications.

Bat Conservation Trust and ILP: Bats and Artificial Lighting in the UK (GN08/18)⁵⁸⁴

- 18.44 This guidance in relation to the potential for artificial lighting to effect bats outlines key mitigation measures regarding the lighting performance. This guidance is considered and applied where the ecology assessment for a project highlights the potential for artificial light at night to impact bats.

⁵⁸¹ British Standard: BS 5489 -1 :2020 – Lighting of Roads and Public Amenity Areas- Code of practice, British Standards Institute and British Standard: BS EN 12464 – 2:2014 – Lighting of work places (Part 2: Outdoor work places)

⁵⁸² ILP: Guidance for Undertaking Environmental Lighting Impact Assessments (PLG04: 2013)

⁵⁸³ ILP: Guidance Notes for the Reduction of Obtrusive Light (GN01/20)

⁵⁸⁴ Bat Conservation Trust and ILP: Bats and Artificial Lighting in the UK (GN08/18)

Preliminary Description of the Existing Environment

Description of the Existing Environment

- 18.45 As an operational harbour facility, the current Oikos Facility operates 24 hours a day/seven days a week and 364 days per year. Vessels can arrive at either of the operational jetties at any time of the day or night. All areas of the operational terminal are lit, with security lighting around the boundary.
- 18.46 Existing lighting is designed to be energy efficient, low maintenance and to provide the appropriate level of lighting for each area according to operational, safety, security and navigational purposes.
- 18.47 Improvements to lighting across the Oikos Facility have been made in recent years through changes designed to only light the specific areas which require lighting, to the right light levels and only at the times in which the area requires light. The majority of task lighting is switched on as required, using sensor controls or adaptive lighting so that when no operatives are in a given area, lighting levels in that area are reduced. This strategy minimises light spill and obtrusive light by: (i) the use of suitable luminaires, (ii) minimising the installed electrical load, and (iii) limiting the time during which lighting is switched on. This Oikos facility-wide lighting strategy also minimises the lighting impact on the surrounding environment.
- 18.48 Navigational lighting is a key necessity for the marine elements of the Oikos Facility to assist with the safe navigation of vessels on the River Thames and by its nature must be visible for a long distance. Navigational lighting therefore remains operational at all times as specified by the Harbourmaster (the PLA).
- 18.49 As part of the preliminary lighting impact assessment, a desktop assessment of the OMSSD project site has been undertaken to ascertain likely existing artificial light levels. This allows changes in light levels as a result of the OMSSD project to be appropriately assessed and compared against the likely ambient light levels.
- 18.50 At the time of drafting this PEIR chapter, the global COVID-19 pandemic had prevented on-site survey work from being undertaken. However, this information will be provided within the OMSSD Environmental Statement (ES), subject to national and local restrictions not being in place that would prevent this from being undertaken.

Baseline conditions

- 18.51 Lighting throughout the OIKOS Facility is provided in accordance with *BS EN 124264-2:2014- Lighting of Outdoor Workplaces*. This ensures that lighting across the site is suitable for the safe operation of the facility. In terms of the light levels applied throughout, the lighting levels associated with the site are described as providing an ambient level of luminance typical of an E3 or E4 Environmental Zone (medium to high district brightness) when considered against the public levels of lighting within the wider study area.

- 18.52 At the time of drafting this chapter for the PEIR, a formal baseline survey was yet to be undertaken to quantify existing levels of light spill towards potentially sensitive residential and ecological receptors. However, a lighting strategy was developed for some areas of the site in 2015 with the aim of reducing the potential of obtrusive light from lighting required for tank inspection hatches, tank access stairways, pipe bunding, maintenance gantries and jetty access and it is unlikely for there to be existing high levels of obtrusive light associated with existing lighting on site due to the principles outlined within that lighting strategy. For context, the accompanying light spill diagram produced for the area around Jetty 2 in 2015 is provided at Figure 18.3. A similar diagram for the proposed OMSSD project will be included as part of the OMSSD ES.

Environmental Change without the OMSSD Project

- 18.53 This preliminary lighting assessment assesses the environmental change without the OMSSD project. In the absence of the OMSSD project, it is expected that the Oikos Facility would continue to operate with no material change in the current lighting levels.

Preliminary Consideration of Likely Impacts and Effects

- 18.54 This preliminary information and lighting assessment presents a realistic worst case scenario, based on the details provided in chapter 3 of this PEIR.
- 18.55 As a result of the exterior lighting (i.e. without mitigation) that will form part of the OMSSD project, there is potential for obtrusive light to occur due to poorly designed or installed lighting equipment. Where necessary, the lighting assessment will propose suitable mitigation measures that limit the potential impacts of lighting on sensitive receptors, as identified in this chapter.

Construction Phase

- 18.56 Glare from inappropriately orientated flood lighting associated with the construction phase has limited potential to affect river navigation during winter months, when flood lighting of construction operations is likely to be required for short durations after sunset. Measures within the lighting strategy will seek to minimise the significance of the effect of lighting on navigation.
- 18.57 It is likely that isolated instances of skyglow over the construction site would occur for short periods of time where tasks require specific lighting levels for safety. This would mainly occur between sunset and the end of the construction day. Certain works may run into the evening, however these tasks will be lit by localised flood lighting and task lighting as above.
- 18.58 Lighting required to support the construction phase of the OMSSD project has minimal potential to impact residential and ecological receptors through obtrusive light, as most of the site preparation and construction tasks are unlikely to take place during the hours of

darkness. Where some preparation and construction tasks could take place in the late afternoon or into the evening of winter months, lighting for limit periods may be necessary for safety and amenity purposes, depending on the tasks being undertaken. In this scenario all efforts will be made to minimise obtrusive light potential from construction lighting, through compliance with the key standards and guidance, such as: *BS EN 12464-2: 2014*⁵⁸⁵.

- 18.59 In the event that construction lighting is required for safety during some preparation and construction tasks, the luminaires will be focussed into the site to limit the possibility of obtrusive light occurring and use focused task lighting as required by the construction task being undertaken. Lighting in use within the construction phase will be required for the purposes of health and safety of the construction workforce, but all measures will be implemented through the lighting strategy to minimise its potential significance.
- 18.60 Given the low likelihood for lighting associated with the preparation and construction phase of the project to be required for extended periods after sunset in the winter, it is unlikely that lighting associated with this phase of the project would give rise to significant adverse effects. This is because the lighting strategy will ensure that such lighting is switched off when not required, and where lighting is required, it is suitably sited and orientated to reduce the potential for obtrusive light towards sensitive receptors.

Operational Phase

- 18.61 Lighting required to support the operational phase of the OMSSD project has the potential to impact residential and ecological receptors through glare and light spill (where mitigation measures are not incorporated into the design). This is most likely to occur from luminaires required for area lighting and task lighting, which in some instances are likely to be mounted at high level.
- 18.62 Although lighting is a necessary component of the OMSSD project, a lighting strategy is being developed that seeks to minimise the potential impacts by ensuring that the lighting system is deployed sensitively. It is likely that any new lighting will be characteristically similar to existing lighting in use across the operational Oikos Facility as any new lighting will serve a similar function to existing lighting. A principle of 'lighting off unless required' will be deployed within the lighting strategy to ensure that luminaires with the highest potential to give rise to obtrusive light are switched off when not required for site operational safety. Additionally, luminaires will be orientated to ensure that the main beam is focused towards the task area and where possible, away from sensitive receptors to reduce the potential of glare from luminaire source intensity towards sensitive receptors.
- 18.63 Due to compliance with the applicable British Standards for workplace lighting design⁵⁸⁶, the existing lighting levels associated with the operation of the Oikos Facility would be described as medium high brightness, this is based on the lighting levels outlined within the existing lighting strategy that exists for the Oikos Facility's Deep Water Jetty development. Sky glow

⁵⁸⁵ BS EN 12464-2: 2014: Light and lighting – Lighting of work places, Part 2: Outdoor work places.

⁵⁸⁶ BS EN 12464-2: 2014: Light and lighting – Lighting of work places, Part 2: Outdoor work places.

mapping within Figure 18.2 also provides evidence showing high levels of sky-glow over the site. The residential receptors near the site are considered to have a medium sensitivity to changes in lighting, based on the background levels of ambient luminance. Although, in accordance with Table 18.4, where receptors are located in areas where district brightness is medium to high, the receptor would be considered as 'low' in sensitivity. However, to ensure the development is minimally obtrusive towards residential receptors, their sensitivity is considered 'medium' as the sky glow mapping indicates that the sky glow in the area fluctuates between low and high, which would indicate that the district brightness varies accordingly, or that there is less upward light in some areas within the immediate surrounding environment. The Environmental Zone in which the Oikos Facility is located (E3) was agreed during consultation with the Environmental Protection Officer at Castle Point Borough Council.

- 18.64 At this stage, the resultant change that is likely as a result of the OMSSD project is unlikely to be noticeable to the receptor; therefore, considering all receptors, close by the OMSSD project site and up to 8.0km (radius) away from the application site, it is not thought to be such that the receptor's quality of life would be affected significantly due to the same British Standards applying to the proposed lighting. The lighting strategy for the OMSSD project will seek to ensure this by imposing limits in line with the Environmental Zone criteria within which the OMSSD project is located.

Human health

- 18.65 On the basis of the preliminary assessment undertaken, it is considered that there will be no significant adverse implications on human health as a result of lighting associated with the OMSSD project due to compliance of the required lighting system with relevant British Standards, Guidance Notes for the Reduction of Obtrusive Light and best practice in the use of control systems to ensure lighting is switched off or dimmed when it is not required to support the safety of a particular site operation.

Climate change

- 18.66 The lighting strategy will include the use of low energy luminaire technology and energy saving control systems to ensure lighting is switched off when it is not required and is therefore not considered to have any significant adverse climate change effects.

Inter-related effects

- 18.67 There are no foreseen inter-related effects of lighting associated with the OMSSD project.

Mitigation Measures

- 18.68 Within the lighting strategy, the following mitigation measures will be considered where necessary and practicable:

- Luminaire colour temperature will be sympathetic within the landscape to ensure lighting does not appear 'stark', this will be achieved through the use of warm white light sources with a maximum correlated colour temperature (CCT) of 3000 Kelvin (K);
- Luminaire peak beam when installed will not exceed 70° from the horizontal (refers to the main beam angle of the light emitted from the luminaire);
- In areas where operational safety and security allows, luminaires will be turned off when the illuminated areas are not in use;
- Minimising obtrusive light potential from construction lighting, through compliance with the key standards and guidance, such as: *BS EN 12464-2: 2014*; and
- Measures within the lighting strategy will seek to minimise the significance of the effect of lighting on navigation.

Limitations

- 18.69 EIA regulations require authors to state the limitations of the assessment that has been undertaken.
- 18.70 At the time of drafting, engineering design details were in progress and as such, the lighting strategy and light spill modelling is not finalised. Therefore, the outcomes within this report are based on professional judgement and prior knowledge of the characteristics of lighting deployed across the application site, which is informed by the same design standards that will apply to the OMSSD. To ensure the lighting strategy for the OMSSD minimises the potential for obtrusive light, the following lighting principles will apply to new lighting to be installed as part of the OMSSD project:
- Light is to be provided where needed, and to an appropriate level, ensuring that the site is not over lit, and that lighting is only provided where required.
 - Lighting is to be provided to an appropriate class for the Environmental Zone of the application site.
 - Luminaires are to be mounted close to the horizontal, with luminaire tilt avoided wherever possible.
 - Luminaire column height will be limited where possible, with lower height columns used where appropriate.
 - Luminaires are to be oriented away from sensitive receptors, with light directed into the boundaries of the application site.
 - Luminaires are to be switched off where operational safety and security allows.
- 18.71 Due to restrictions surrounding infection control because of the global COVID-19 pandemic, at the time of drafting, a physical baseline survey has not been completed. Baseline information presented within this chapter of the report is based on prior knowledge of the Oikos Facility's existing lighting strategy (implemented alongside the Deep Water Jetty development) and sky-glow mapping data, forming part of a comprehensive desktop study

undertaken by suitably qualified and competent lighting professionals, holding either an Associate Member (AMILP) or Member (MILP) grade of membership with the ILP, and professionally registered with the Engineering Council, holding either Engineering Technician (EngTech), Incorporated Engineer (IEng) or Chartered Engineer (CEng) status on the Engineering Council register.

Preliminary Conclusions on Residual Effects

Construction Phase

- 18.72 Where there is limited potential for some construction lighting to be required during the hours of darkness, which would require lighting for safety, the lighting strategy focuses on reducing the potential for construction lighting to be obtrusive in nature, by ensuring that construction lighting is focussed on the task, in accordance with BS EN 12464-2:2014. There is the potential for some short-term reversible residual effects from construction lighting, that has the potential to be of low magnitude, which would result in a minor significance for human (residential) receptors.

Operational Phase

- 18.73 Desktop research using satellite and street level imagery, along with pre-existing knowledge of the Oikos Facility and professional judgement regarding the existing environmental lighting conditions have informed this preliminary lighting assessment.
- 18.74 Considering the existing lit environment on site and background levels of public lighting immediately adjacent to the site, on Haven Road, the ambient luminance within the area is assessed as low to medium (E2 – E3). Therefore, the closest residential receptors to the site, situated within Haven Quays (south west of the OMSSD project site) and Thorney Bay Caravan Park to the east of the site currently experience some low to medium levels of light spill and potentially, glare.
- 18.75 To reduce the potential for obtrusive light to be generated by the OMSSD, a comprehensive lighting strategy is under development, which will propose a similar lit environment to the existing landside component of the Oikos deep water jetty project. Within the lighting strategy, best practice lighting design approaches and principles will be outlined, alongside recommended average light levels as per the relevant ILP Guidance and British Standards. The main aim and purpose of the lighting strategy will be to limit the potential for obtrusive light in the form of glare and light spill to impact the residents of Haven Quays and Thorney Bay Caravan park, as these residential receptors have the highest potential to be affected by poorly implemented lighting.
- 18.76 Lighting of the OMSSD project will follow a basic principle of control, ensuring that the lighting is switched off, or at least dimmed when the task area is not in use. This will help to minimise the duration of lighting for some tasks, such as high-level tank inspections. These measures will be coupled with suitable installation geometry to reduce the potential for obtrusive light to arise.

18.77 During the operational phase of the OMSSD, full implementation of the lighting strategy will help to ensure the additional lighting required to support safe operations will be characteristically similar in terms of the average levels of lighting when compared to existing task areas on the site. The additions of lighting are to be low in scale and directly comparable to similar examples of lighting in use on the site. Due to the approach proposed within the lighting strategy, and the principles of this lighting strategy outlined in this chapter, there are unlikely to be significant effects arising from lighting associated with the OMSSD, as the additional lighting will be utilised when required, will be appropriately installed to reduce the potential for glare and will be installed at a sufficient height so as to reduce the potential for light spill from high tilt angles. In terms of the potential for residual effects from lighting on nearby residential amenity, it is unlikely for the significance of residual effects of lighting to be greater than minor.