

## External Lighting Assessment

Tees Valley Energy Recovery Facility  
Grangetown Prairie, Dorman Point  
Prepared on behalf of Viridor Tees Valley Limited  
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# **TEES VALLEY ENERGY RECOVERY FACILITY, GRANGETOWN PRAIRIE, DORMAN POINT EXTERNAL LIGHTING ASSESSMENT**

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# 1. EXECUTIVE SUMMARY

## 1.1 Background

Tees Valley Authorities, Durham County Council and Newcastle City Council (the Councils) have joined together to create an opportunity for a contractor to design, build, finance and operate a new ERF to be located in the Tees Valley on a mandated site owned by the South Tees Development Corporation (STDC). Redcar & Cleveland Borough Council (RCBC), as the local planning authority, granted outline planning permission for the construction of an ERF and associated development at the site under reference R/2019/0767/OOM on 24 July 2020. Viridor is applying for reserved matters approval for the details of an ERF pursuant to this outline permission. The outline permission application referred to an ERF with a capacity of approximately 450,000 tonnes of residual waste per year.

## 1.2 Objectives and Scope

The overall objective of the scheme has been to minimise the lighting impact, whilst maintaining health and safety considerations, both in terms of its location and the ecological interest of the area.

As part of the design development, the following considerations have been identified as key drivers for the external lighting systems:-

- Energy Efficiency
- Light Pollution
- Light Spill
- Security
- Aesthetics

The lighting design for the Tees Valley ERF has been provided to ensure the following criteria is met:

- Provide a level of lighting on site that meets the requirements set out within the relevant British Standards;
- Provide safe conditions across the site;
- Reduce any adverse impact of the installation on neighbouring areas; and
- Reduce any adverse impact on the local environment.

## 1.3 Outcomes

To provide an energy efficient solution, we have proposed that all external luminaires are of an LED type. This shall reduce energy consumption and maintenance intervals. The colour temperature of the LEDs proposed is 3000k to reduce the blue light component and reduce the environmental impact.

Lighting for the task areas (as defined by the Society of Light and Lighting) detailed below has been designed in accordance with BS EN 13201-1 and taking into account BS EN 12464-2 requirements. The Institution of Lighting Professionals (ILP) 'Guidance Note for The Reduction of Obtrusive Light' has also been observed.

The luminaires have been selected with an output curve which directs the lighting to the roadway surface to prevent light spill. Dependent on location the columns at 6m or 8m high to or wall mounted at 6 or 8m high to achieve the lighting levels required on the task area.

The external lighting layout is designed to comply with the requirements of ILP guidance note 1 for the reduction of obtrusive light and the SLL guide to limiting obtrusive light. The design is based on the requirements for an E4 environmental zone.

## 2. SITE DESCRIPTION

The site is currently brownfield and lies within the south west corner of the STDC regeneration area within the Grangetown Prairie zone. The extent of the ERF outline permission (R/2019/0767/OOM) covers around 10 ha of land that is roughly rectangular in shape. The site is situated between John Boyle Road to the west, Tees Dock Road to the east, the A66 to the south and the railway line to the north. Further to this, Dorman Point Way is a newly constructed road that lies to the south of the proposed ERF site. The site subject to the reserved matters application sits within the area of the outline permission and covers an area of 8.87 ha, at 10m above Ordnance Datum.

The ERF site is a previously developed industrial site that was formerly used for the production of iron and steel (occupied by Eston Iron Works and Cleveland Steel Works). Following the closure of the steel works and cessation of industrial activities, the building complex was cleared in the 1980's and the site is now vacant.

## 3. ASSESSMENT

### 3.1 Lighting Level Criteria

Lighting has been provided to Roads, Walkways, Loading and Unloading areas and for the lighting level on the horizontal plane, the guidance within BS EN 13201-1 and BS EN 12464-2:2014 has been used.

Table 5.1 — General requirements for areas and for cleaning at outdoor work places

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	$U_o$ -	$R_{GL}$ -	$R_a$ -	Specific requirements
5.1.1	Walkways exclusively for pedestrians	5	0,25	50	20	
5.1.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	0,40	50	20	
5.1.3	Regular vehicle traffic (max. 40 km/h)	20	0,40	45	20	At shipyards and in docks, $R_{GL}$ may be 50
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0,40	50	20	
5.1.5	Cleaning and servicing	50	0,25	50	20	All relevant surfaces

Fig 1 – Table excerpt from BS EN 12464-2:2014

**Table 5.9 — Parking areas**

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	$U_o$ -	$R_{GL}$ -	$R_a$ -	Specific requirements
5.9.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0,25	55	20	
5.9.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0,25	50	20	
5.9.3	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	0,25	50	20	

Fig 2 – Table excerpt from BS EN 12464-2:2014

The highlighted sections are the targeted lighting levels which have been accounted for in the proposed lighting scheme.

### 3.1.1 Luminaires

- Luminaire Type

The type of fittings that we will use for this purpose, are pole mounted LED light source on columns and wall mounted LED luminaires. Dependant on location, the columns are either 6m or 8m high to achieve the lighting levels required on the task area. The same occurs for wall mounted luminaires which are either mounted at 6m or 8m depending on task area. The luminaires have been selected with an output curve which directs the lighting to the roadway surface to prevent light spill.

Type A	Type B	Type C
DW WINDSOR KIRIUM PRO 1 5686 LUMENS	DW WINDSOR KIRIUM PRO 1 7394 LUMENS	DW WINDSOR KIRIUM PRO 2 11264 LUMENS
		

Type D	Type E
DW WINDSOR SABRE 18502 LUMENS	DW WINDSOR KIRIUM WALL 3947 LUMENS
	



### 3.2 Lighting pollution

#### 3.2.1 Lighting pollution and proposed vertical calculation surfaces

To safeguard and enhance the night-time environment it is necessary to control obtrusive light (also known as light pollution), which can present physiological and ecological problems to surroundings and people.

We have applied the limits and guidance within (ILP) 'Guidance Notes for The Reduction of Obtrusive Light' (extract below).

We have, for the purposes of this assessment, assumed an E4 zone (urban area) is applicable. The limit on illuminance for the E4 zone on a vertical plane is no greater than 25 Lux (see Fig 4). There is no reason to include a curfew allowance and therefore normal pre-curfew limits to the boundary of the development have been used.

**Table 2 The zoning system of the Commission Internationale de l'Eclairage (2003)**

Zone	Zone description and examples of such zones
E1	Areas with intrinsically dark landscapes: national parks, areas of outstanding natural beauty (where roads are usually unlit)
E2	Areas of 'low district brightness': outer urban and rural residential areas (where roads are lit to residential road standard)
E3	Areas of 'middle district brightness': generally urban residential areas (where roads are lit to traffic route standard)
<b>E4</b>	<b>Areas of 'high district brightness': generally urban areas with mixed recreational and commercial land use with high night-time activity</b>

Fig 3 – Table excerpt from CIBSE Guide for limiting Obtrusive light

**Table 3 Lighting recommendations for avoiding obtrusive light for area lighting (Institute of Lighting Professionals, 2011)**

Environmental zone	Maximum upward light ratio (%)	Maximum illuminance on windows (lx)	Maximum luminaire luminous intensity (cd)
E0	0.0	0	0
E1	0.0	2	2500
E2	2.5	5	7500
E3	5.0	10	10 000
<b>E4</b>	<b>15.0</b>	<b>25</b>	<b>25 000</b>

Fig 4 – Table excerpt from CIBSE Guide for limiting Obtrusive light

### 3.2.2 Proposed vertical calculations

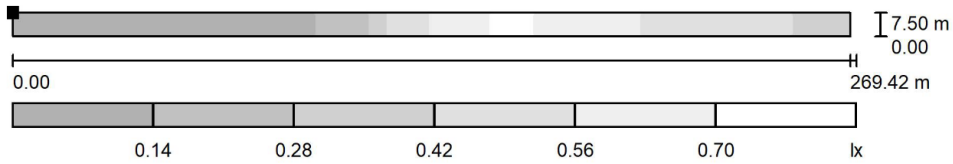
To test the impact of the obtrusive light levels, we have used 4No. vertical calculation surfaces as shown in the figure below.



Surface Designation	Height (m)	Width (m)
North Vertical Surface	7.5	270
South Vertical Surface	7.5	250
East Vertical Surface	7.5	300
West Vertical Surface	7.5	337

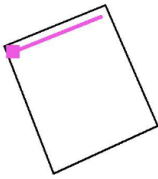
## 4. RESULTS

### 4.1.1 North Vertical Surface



Scale 1 : 1927

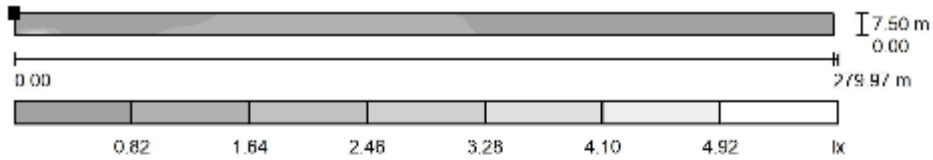
Position of surface in external scene:  
Marked point:  
(127.905 m, 416.022 m, 9.134 m)



Grid: 64 x 2 Points

$E_{av}$ [lx]	$E_{min}$ [lx]	$E_{max}$ [lx]	$u0$	$E_{min} / E_{max}$
0.35	0.04	0.72	0.108	0.052

### 4.1.2 South Vertical Surface



Scale 1 : 2002

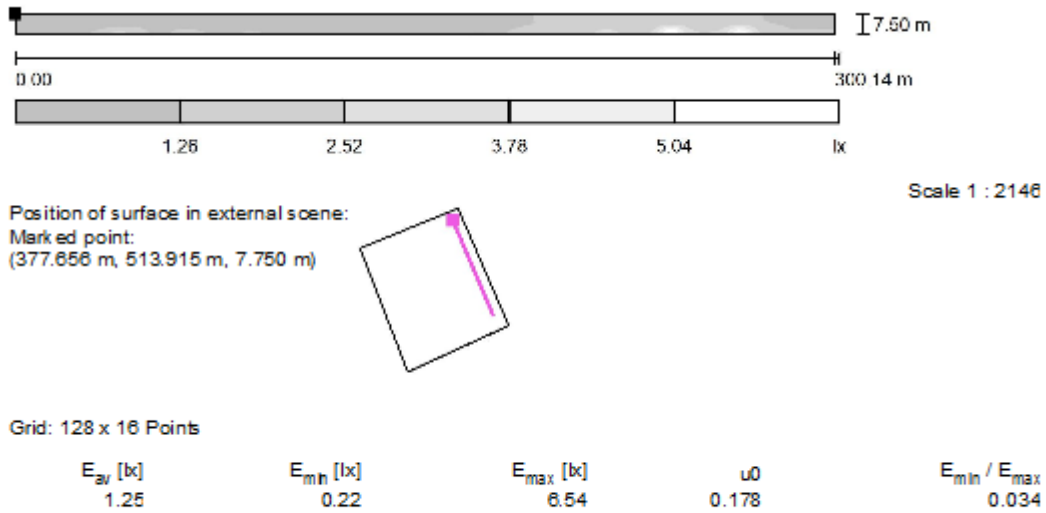
Position of surface in external scene:  
Marked point:  
(510.854 m, 209.207 m, 8.808 m)



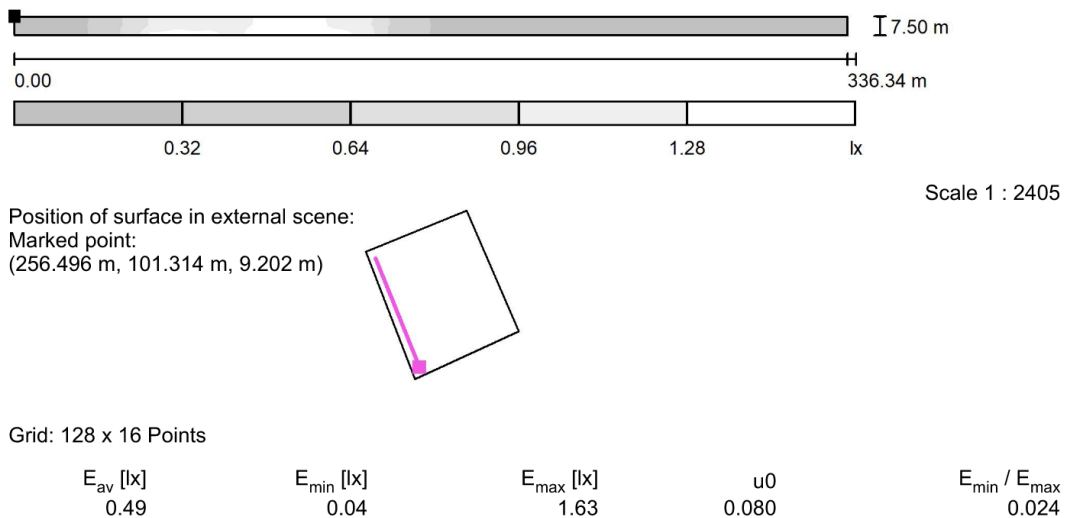
Grid: 128 x 8 Points

$E_{av}$ [lx]	$E_{min}$ [lx]	$E_{max}$ [lx]	$u0$	$E_{min} / E_{max}$
0.66	0.13	4.24	0.199	0.031

### 4.1.3 East Vertical Surface 3



### 4.1.4 West Vertical Surface



### 4.1.5 Summary of Results

The results summary calculations show that no one vertical luminance plane is above 1.5lx average and well below the ILP guidance of 25 lux for this plane. Further to this, the maximum lux values are also below the required figure, with the maximum found on the eastern boundary calculated at 6.56lx.

The results of the horizontal light spill are shown within the isolines drawing in Appendix 1. The isoline drawing shows the lux levels achieved across the whole site and shows the drop in lighting levels at the site boundary down to 0.2lux.

The upward light ratio is calculated as 0.0%.

These low light levels have been achieved by ensuring the areas are not over lit, and utilising quality luminaires with controlled light “throw”. All columns have been orientated so as to minimise light spill on the adjacent and nearby boundaries.

## 5. CONCLUSION

The light spill on all vertical surfaces is minimal, and as stated above, will be reduced further by the addition of the proposed landscaping.

No lighting controls have been implemented in the lighting model, and these are not considered necessary. However, for operational purposes, the operator could utilise photocells, dusk to dawn sensors, as well as time clocks which will further control the light as appropriate.

Luminaires may also be dimmed at certain times to meet any site requirements. .

The luminaires selected have no upward light component therefore meeting the requirement of Dark Sky’s guidance set out by the IPL.

**APPENDIX 1**  
**EXTERNAL LIGHTING DRAWING WITH ISOLINES (LUX LEVELS)**



- Notes
- DO NOT SCALE FROM THIS DRAWING.
  - ALL DIMENSIONS ARE MILLIMETRES U.N.O.
  - ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
  - THE EXTERNAL LIGHTING LAYOUT IS DESIGNED TO COMPLY WITH THE REQUIREMENTS OF ILP GUIDANCE NOTE 1 FOR THE REDUCTION OF OBTRUSIVE LIGHT AND THE SLL GUIDE TO LIMITING OBTRUSIVE LIGHT. THE DESIGN IS BASED ON THE REQUIREMENTS FOR AN E4 ENVIRONMENTAL ZONE.



LUX LEVEL KEY

Color	Lux Level
Blue	0.2 lx
Purple	0.5 lx
Light Blue	1.0 lx
Cyan	5.0 lx
Green	10.0 lx
Yellow-Green	15.0 lx
Yellow	20.0 lx
Orange	30.0 lx
Red-Orange	40.0 lx
Red	50.0 lx

LUMINAIRE SCHEDULE



REF A  
DW WINDSOR  
KIRILUM PRO 1 LAMP 6M POST MOUNTED LED LUMINAIRE WITH FULL CUTOFF 4K C/W PHOTOCELL 5686 LUMENS



REF B  
DW WINDSOR  
KIRILUM PRO 1 LAMP 6M POST MOUNTED LED LUMINAIRE WITH FULL CUTOFF 4K C/W PHOTOCELL 7394 LUMENS



REF C  
DW WINDSOR  
KIRILUM PRO 2 LAMP 8M POST MOUNTED LED LUMINAIRE WITH FULL CUTOFF 4K C/W PHOTOCELL 11264 LUMENS



REF D  
DW WINDSOR  
SARKIS WALL MOUNT AT 8M LED LUMINAIRE WITH C2 OPTIC 4K C/W PHOTOCELL 18502 LUMENS



REF E  
DW WINDSOR  
KIRILUM WALL 4K LED ARRAY AT 6M CLEAR-WIDE OPTIC, LUMINAIRE C/W PHOTOCELL 3947 LUMENS

Rev	Description	Date	App
P03	FOR PLANNING	03/05/2023	HS TM
P02	FOR PLANNING	28/09/2022	HS RH
P01	FOR PLANNING	25/06/2021	DS SP
		2021	DN

FOR PLANNING

TEES VALLEY ERF



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LIGHTING LUX LEVELS SITE LAYOUT

Project No:	Scale (B/A):	Drawn:	Date:
1620010534	NTS	HS	MAY 21
Drawing No:	Rev:		
RAM_00_00_DR_E_00210	P03		