

Project: P186-894 Revision G/1 Hinckley DZ3

Date : 08.06.2023

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External Lighting Report

This report has been produced in support for planning. The Lighting design complies with GN01 -ILP – The reduction of Obtrusive light-2021 for E2 zone

The external design performed, complies with the CPW specification -220192-CPW-ZZ-XX-RP-E-EXT01-P01 - Hinckley Park DZ3 - External Lighting Report based on EN-12464-2-2014 for E2 zone.

For compliance with GN01-2021 calculations were performed for illuminance, glare and luminous intensity using Relux and Visual. The Guidance refers to below elements for compliance:

1. **Sky glow**- the brightening of the night sky
2. **Glare** the uncomfortable brightness of a light source when viewed against a darker background
3. **Light spill** the spilling of light beyond the boundary of the area being lit and Light intrusion ('Nuisance')

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Sky Glow

The project requires E2 environmental zone compliance, and we produced a BREEAM report based on the Upward Light Output Ratio as below which shows compliance:

According to the ILP guidance below are the 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

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Sky Glow

BREEAM P186-894 - HINCKLEY DZ3 UNITS 1 2 & 3

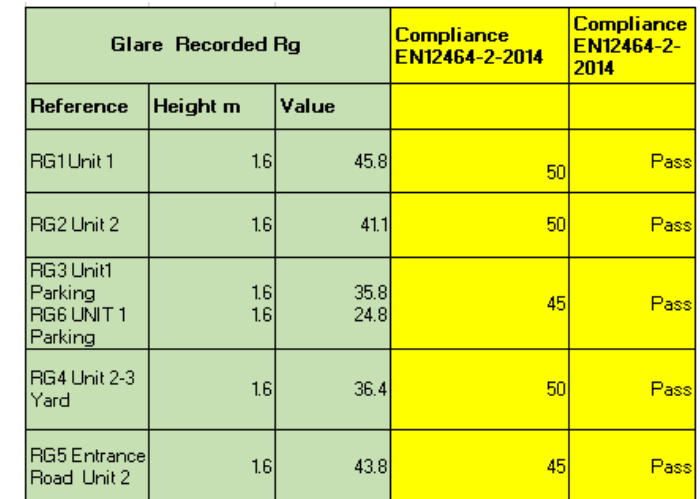
Total Lumens		
1,854,956	Installation ULR	Complies with environmental zones
Total Upward Lumens	0.02%	E2 & E3 & E4
415.69		

CATALOGUE	ITEM REF	QUANTITY	LUMENS	POWER (W)	LLM/TcW	TOTAL LUMENS	TILT (°)	ULOR (%)	TOTAL UPWARD LUMENS
DSX2.2.LA364.FW.C9	AW8	8	40,787	328	124	326,296	-	0	0
DSX2.2.LA364.FW.C6.CL7	AW7 BLS 70	7	40,787	328	124	285,509	-	0	0
DSX2.2.LA364.FW.C6	A1-10	1	40,787	328	124	40,787	-	0	0
DSX1.2.LA304.FW.C6	B1-10	7	30,330	286	106	212,310	-	0	0
DSX0.1.LA114.FW.C6	CW8	2	11,644	88	132	23,288	-	0	0
DSX0.1.LA084.FW.C6	CW8(2)	1	8,023	64	125	8,023	-	0	0
DSX0.1.LA114.AY.C6	C1-8	1	11,322	88	129	11,322	-	0	0
DSX1.2.LA304.AY.C6	D1-8	2	29,463	286	103	58,926	-	0	0
DSX0.1.LA084.AY.C6	D1-6	3	7,802	64	122	23,406	-	0	0
DSX0.1.LA084.AY.C6	E1-8	2	7,802	64	122	15,604	-	0	0
DWL.1.LA034.NR.C6.W018	EW-4	15	2,544	18	141	38,160	-	0	0
DSX1.2.LA224.FW.C6	FW-8	7	24,252	200	121	169,764	-	0	0
DBD.1.LA014.DO.AY.H100.C6.W009	F	4	932	9	104	3,728	-	2.7	100.66
DSX1.2.LA224.SY.C6	G1-8	5	25,179	200	126	125,895	-	0	0
DWL.1.LA044.AY.C6.W025	HW-4	19	3,779	25	151	71,801	-	0	0
DBD.1.LA014.DO.AY.H100.C6.W009	I	2	932	9	104	1,864	-	2.7	50.33
DSX2.2.LA364.FW.C6.CL7	AW7-70	6	40,787	328	124	244,722	-	0	0
DSX1.2.LA304.FW.C6.CL7	B1-10-70	3	30,330	286	106	90,990	-	0	0
DSX2.2.LA364.FW.C6.CL7	A1-Y-70	1	40,787	328	124	40,787	-	0	0
DEW.LA024.CGL.NR.C6	NW	4	2,451	23	106	9,804	-	2.7	264.71
VMX.2.LA054.V1.F4L2.PT1.C7.W036	J1-8	10	5,197	36	144	51,970	-	0	0

Required LLM/TcW: 70
Permissible ULR %: E0: 0% E1: 0% E2: up to 2.5% E3: up to 5% E4: up to 15%

Glare

Below the positions for the RG observer and the maximum levels recorded that shows compliance with the standard for the task performed.



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Light Spill - the spilling of light beyond the boundary of the area being lit and Light intrusion ('Nuisance')

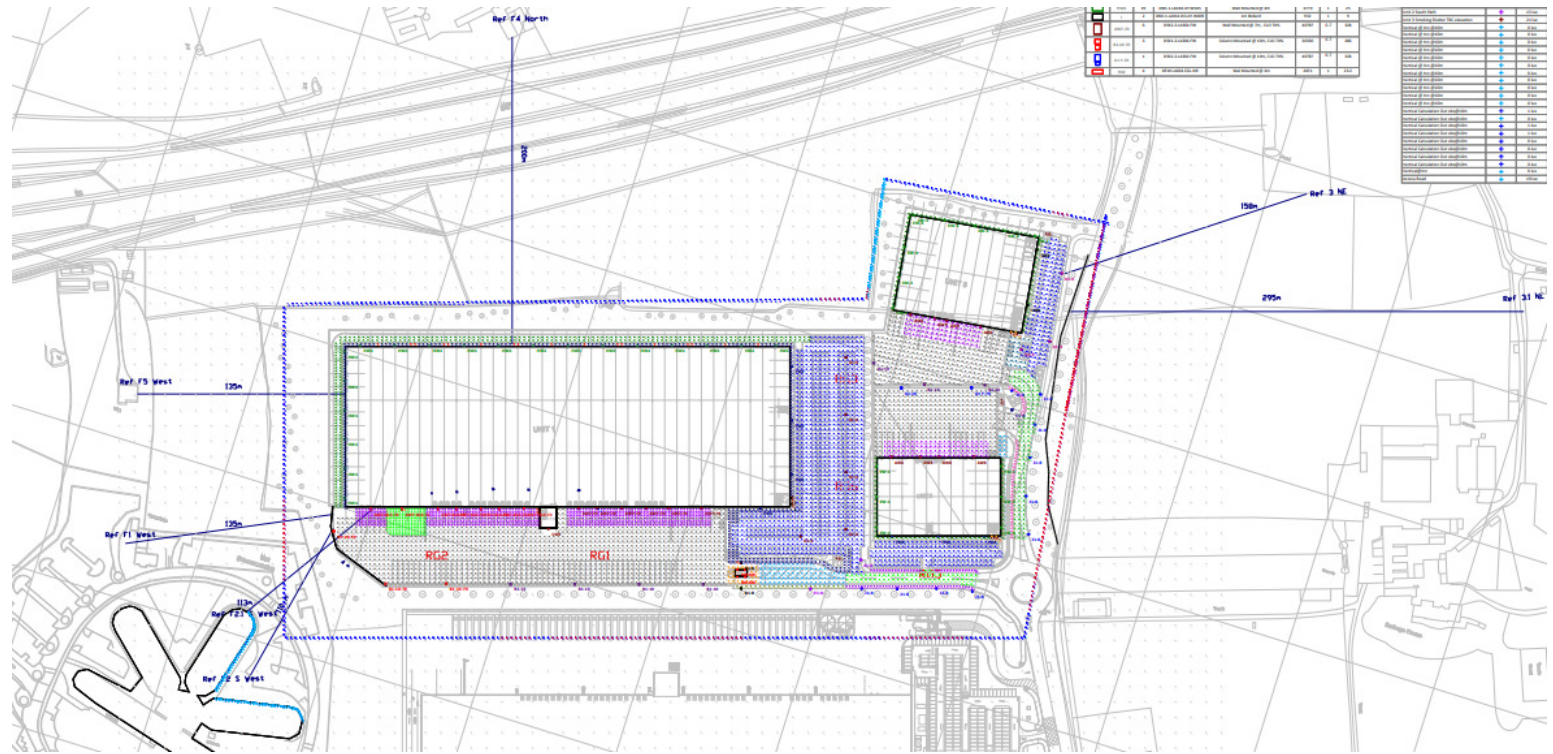
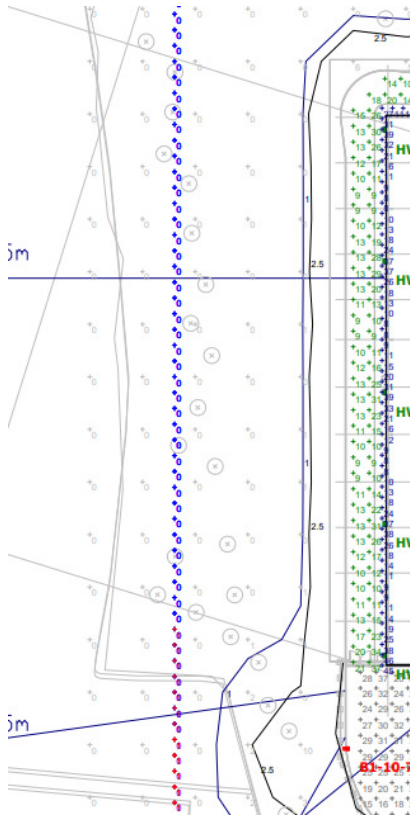
To prove compliance with the spill we looked at 3 elements :

- Spill beyond boundary on the horizontal
- Spill beyond boundary on the vertical
- Luminous intensity for the observer positions as mapped on below to comply with the levels for GN01-Table 4.

Environmental Zone	Application conditions	Luminaire group (projected area AP in m2)					
		0<AP ≤0.002	0.002<AP ≤0.01	0.01<AP ≤0.03	0.03<AP ≤0.13	0.13<AP ≤0.50	AP>0.5
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	2500
	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	7500
	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	10000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1000
E4	Pre-curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2500

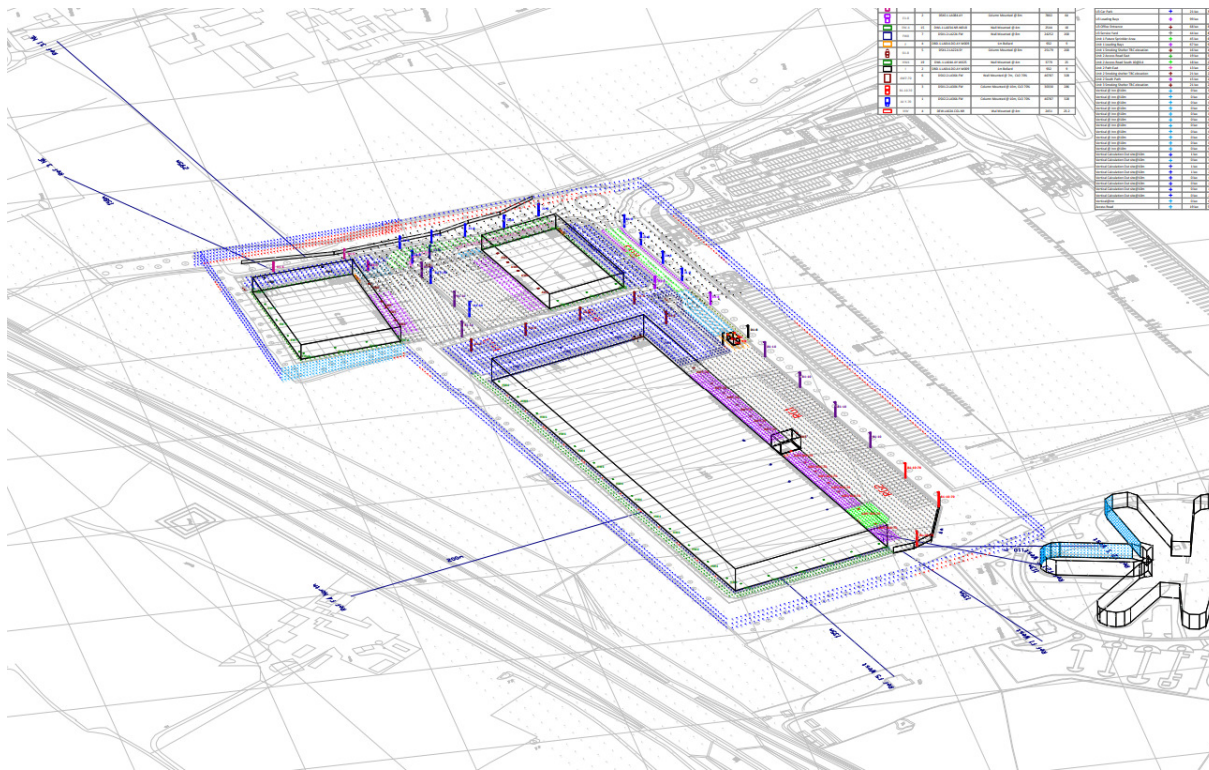
Light Spill - the spilling of light beyond the boundary of the area being lit and Light intrusion ('Nuisance')

- Spill beyond boundary on the horizontal plane . The main document calculations are attached to this report.



Light Spill - the spilling of light beyond the boundary of the area being lit and Light intrusion ('Nuisance')

- Spill beyond boundary on the vertical plane
- Spill on vertical at adjacent properties it is 0 (Vertical @ Inn).



Statistics					
Description	Symbol	Avg	Max	Min	Min/Avg
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	1 lux	3 lux	0 lux	0.00
Vertical Calculation Out site@10m	+	0 lux	1 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	1 lux	3 lux	0 lux	0.00
Vertical Calculation Out site@10m	+	1 lux	2 lux	0 lux	0.00
Vertical Calculation Out site@10m	+	0 lux	1 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	2 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	1 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	2 lux	0 lux	N/A
Vertical@Inn	+	0 lux	0 lux	0 lux	N/A
Access Road	+	19 lux	57 lux	11 lux	0.58

Environmental Zone	Sky Glow ULR (Max %)	Maximum values of vertical illuminance on neighbouring premises EV (lux)	
		Pre-curfew	Post-curfew
E0	0	n/a	n/a
E1	0	2	<0.1 (1 Road)
E2	2.5	5	1
E3	5	10	2
E4	5	25	5

Light Spill - the spilling of light beyond the boundary of the area being lit and Light intrusion ('Nuisance')

- Luminous intensity for observers :

The observer positions as mapped comply with the levels for GN01-Table 4 for 500 cd.

Calculations were performed in Relux for the observers with below values calculated according to the geometric mean of the luminaires and the distance to the observer:

Environmental Zone Table 4	Application conditions	Luminaire group (projected area AP in m2)					
		0<AP ≤0.002	0.002<AP ≤0.01	0.01<AP ≤0.03	0.03<AP ≤0.13	0.13<AP ≤0.50	Ap>0.5
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	2500
	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	7500
	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	10000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1000
E4	Pre-curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2500

Luminous Intensity Points Candela cd											
Observer	Height m	Post curfew cd Max recorded	Distance	Compliance E2 curfew cd	Compliance E2 post curfew	Observer	Height m	Post curfew cd Max recorded	Distance	Compliance E2	Compliance E2 post curfew
REF1 West	1.5	350	135	500	Pass	REF1 West	4	230	135	500	Pass
REF 2 SW	1.5	420	110	500	Pass	REF 2 SW	4	340	110	500	Pass
REF 2 SW	0.5	340	110	500	Pass	REF 2.1 SW	4	340	113	500	Pass
REF 2.1 SW	0.5	490	113	500	Pass	REF 3 NE	4	300	158	500	Pass
REF 2.1 SW	1.5	450	113	500	Pass	REF 3.1 NE	4	170	295	500	Pass
REF 3 NE	1.5	420	158	500	Pass	REF 4 North	4	170	200	500	Pass
REF 3.1 NE	1.5	280	295	500	Pass	REF 5 West	4	250	135	500	Pass
REF 4 North	1.5	250	200	500	Pass						
REF 5 West	1.5	410	135	500	Pass						

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Light Spill - the spilling of light beyond the boundary of the area being lit and Light intrusion ('Nuisance')

To prevent any spill and to fully comply for the post-curfew levels for luminous intensity we propose :

Unit 2 – luminaire A1-Y to be CLO 70%

Unit 1 Luminaire B1-10, AW7BLS, AW7 to be CLO 70%.

Further control will apply by using timeclock and photocell as advised.

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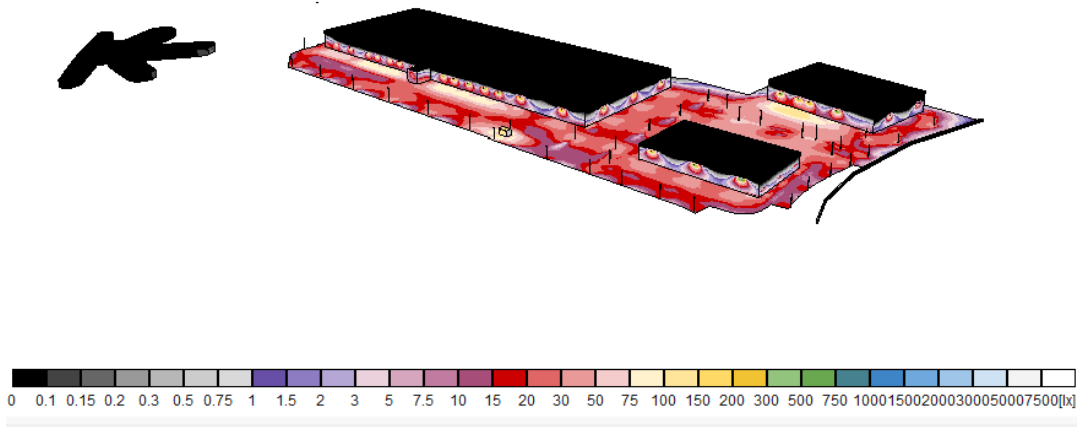
Illuminance levels

Schedule							
Symbol	Label	Quantity	Catalog Number	Description	Lumens Per Lamp	Light Loss Factor	Wattage
	J1-8	10	VMX.2.IA054.V1.F4L2.W036	Column Mounted @ 8m 0° Tilt	5197	1	36
	AW8	8	DSX2.2.IA364.FW	Wall Mounted @ 8m	40787	1	328
	AW7-BLS-70	7	DSX2.2.IA364.FW.BLS	Wall Mounted @ 7m, with Back Light Shield, CLO 70%	31845	0.7	328
	A1-10	1	DSX2.2.IA364.FW	Column Mounted @ 10m	40787	1	328
	B1-10	7	DSX1.2.IA304.FW	Column Mounted @ 10m	30330	1	286
	CW8	2	DSX0.1.IA114.FW	Wall Mounted @ 8m	11644	1	88
	CW8	1	DSX0.1.IA084.FW	Wall Mounted @ 8m	8023	1	64
	C1-8	1	DSX0.1.IA114.AY	Column Mounted @ 8m	11322	1	88
	D1-8	2	DSX1.2.IA304.AY	Column Mounted @ 8m	29463	1	286
	D1-6	3	DSX0.1.IA084.AY	Column Mounted @ 6m	7802	1	64
	E1-8	2	DSX0.1.IA084.AY	Column Mounted @ 8m	7802	1	64
	EW-4	15	DWL.1.IA034.NR.W018	Wall Mounted @ 4m	2544	1	18
	FW8	7	DSX1.2.IA224.FW	Wall Mounted @ 8m	24252	1	200
	F	4	DBD.1.IA014.DO.AY.W009	1m Bollard	932	1	9
	G1-8	5	DSX1.2.IA224.SY	Column Mounted @ 8m	25179	1	200
	HW4	19	DWL.1.IA044.AY.W025	Wall Mounted @ 4m	3779	1	25
	I	2	DBD.1.IA014.DO.AY.W009	1m Bollard	932	1	9
	AW7-70	6	DSX2.2.IA364.FW	Wall Mounted @ 7m, CLO 70%	40787	0.7	328
	B1-10-70	3	DSX1.2.IA304.FW	Column Mounted @ 10m, CLO 70%	30330	0.7	286
	A1 Y-70	1	DSX2.2.IA364.FW	Column Mounted @ 10m, CLO 70%	40787	0.7	328
	NW	4	DEW.IA024.CGLNR	Wal Mounted @ 4m	2451	1	23.2

Description	Statistics				
	Symbol	Avg	Max	Min	Min/Avg
Building Perimeter	+	31 lux	51 lux	15 lux	0.48
Horizontal spill	±	0 lux	40 lux	0 lux	N/A
Pathway	+	28 lux	87 lux	10 lux	0.36
Pedestrian Area	+	20 lux	26 lux	10 lux	0.50
Pedestrian Perimeter Areas	+	21 lux	75 lux	7 lux	0.33
U1 Car Park	+	24 lux	45 lux	10 lux	0.42
U1 Gatehouse	+	79 lux	106 lux	44 lux	0.56
U1 Office Entrance	+	65 lux	68 lux	60 lux	0.92
U1 Perimeter Road	+	12 lux	28 lux	6 lux	0.50
U1 Service Yard	+	30 lux	88 lux	12 lux	0.40
U2 Car Park	+	27 lux	42 lux	14 lux	0.52
U2 Cycle Store	+	20 lux	29 lux	15 lux	0.75
U2 Loading Bays	+	82 lux	118 lux	38 lux	0.46
U2 Office Entrance	+	85 lux	87 lux	84 lux	0.99
U2 Service Yard	+	40 lux	93 lux	19 lux	0.48
U3 Building Perimeter	+	22 lux	53 lux	7 lux	0.32
U3 Car Park	+	21 lux	39 lux	10 lux	0.48
U3 Loading Bays	+	99 lux	137 lux	64 lux	0.65
U3 Office Entrance	+	68 lux	87 lux	55 lux	0.81
U3 Service Yard	+	44 lux	86 lux	20 lux	0.45
Unit 1 Future Sprinkler Area	+	45 lux	68 lux	29 lux	0.64
Unit 1 Loading Bays	+	67 lux	96 lux	27 lux	0.40
Unit 1 Smoking Shelter TBC elevation	+	16 lux	16 lux	15 lux	0.94
Unit 2 Access Road East	+	19 lux	35 lux	8 lux	0.42
Unit 2 Access Road South 10@0.4	+	18 lux	25 lux	11 lux	0.61
Unit 2 Path East	+	13 lux	29 lux	7 lux	0.54
Unit 2 Smoking shelter TBC elevation	+	21 lux	22 lux	19 lux	0.90
Unit 2 South Path	+	15 lux	23 lux	10 lux	0.67
Unit 3 Smoking Shelter TBC elevation	+	21 lux	22 lux	20 lux	0.95
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical @ Inn @10m	+	0 lux	0 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	1 lux	3 lux	0 lux	0.00
Vertical Calculation Out site@10m	+	0 lux	1 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	1 lux	3 lux	0 lux	0.00
Vertical Calculation Out site@10m	+	1 lux	2 lux	0 lux	0.00
Vertical Calculation Out site@10m	+	0 lux	1 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	2 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	1 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	2 lux	0 lux	N/A
Vertical Calculation Out site@10m	+	0 lux	2 lux	0 lux	N/A
Vertical@Inn	+	0 lux	0 lux	0 lux	N/A
Access Road	+	19 lux	57 lux	11 lux	0.58

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Illuminance levels



Luminance levels

