

Wakehurst Conservation and Research Nursery

Condition 16: Glare Mitigation Plan

Condition 22: Lighting Design for Biodiversity

FINAL

Feb 2026

PERMISSION

REFERENCE: DM/25/2774

Condition 16

Prior to the commencement of any development above ground/slab level, a Glare Mitigation Plan shall have been submitted to and approved in writing by the local planning authority. The Plan shall set out details about how the proposal will minimise potential lighting glare adversely affecting neighbouring residential properties and how this will be managed in the long term. The development shall proceed in accordance with the approved details.

Reason: To protect the amenity of local residents and to accord with Policy DP26 of the Mid Sussex District Plan

Compliance Tracker: Condition 16 (Glare Mitigation)

Condition 16 Requirement	Document Section	Summary of Compliance	Evidence / Outcome
Minimise potential lighting glare affecting neighbours	Sections 2.2, 3.1 & 5.0	Use of directional LEDs, cowls, and automated blackout blinds.	Mitigation of light trespass and direct glare.
Manage lighting in the long term	Section 6.0	Controls integrated into the Building Management System (BMS).	Consistent, automated compliance with amenity policies.
Details of horticultural grow lighting	Section 3.0	High-specification blackout containment for Glasshouse 3.	Zero horizontal/vertical light bleed during sensitive hours.

External lighting specifications	Section 2.0 & Appendix B	Selection of low-glare luminaires with precise mounting heights.	Documented technical specifications.
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Compliance Tracker: Condition 22 (Lighting Design for Biodiversity)

Condition 22 Requirement	Document Section	Summary of Compliance	Evidence / Outcome
Identify features sensitive for bats	Section 4.2	Boundary treelines and hedgerows identified as dark corridors.	Lighting restricted in ecologically sensitive zones.
Demonstrate no disturbance to bat territory	Section 4.2 & Appendix B	Light spill contained to <1 lux at site boundaries.	Calculated Isolux contours in Appendix B.
Protect dark night skies (High Weald AONB)	Section 4.1	Use of "Dark Sky Friendly" 0% Upward Light Ratio (ULR) luminaires.	Elimination of sky glow and preservation of dark skies.
Technical specifications & Isolux drawings	Appendix B	Comprehensive point-by-point illuminance calculations provided.	Detailed lighting model results.
Residential amenity protection	Section 2.3, 3.1 & 5.0	Automated blinds and climate screens for glasshouse elements.	Verified protection of neighbouring properties.

1.0 Introduction

This plan identifies arrangements to mitigate potential lighting glare from the two elements of artificial lighting present at the Wakehurst Conservation and Research Nursery project which are:

1. General external lighting
2. Horticultural grow lighting

See **Appendix A** for a Site Plan with the Glasshouses numbered to align with references in this report.

2.0. General External Lighting Management & Mitigation Strategy

2.1. Compliance with Industry Guidance (BS EN 12464-2 & LG6)

The external lighting design for the Wakehurst Conservation and Research Nursery project has been engineered to align with, and slightly improve upon, standard industry benchmarks for external circulation in sensitive environments.

- **Standard Benchmark:** Under **BS EN 12464-2:2014** (Lighting of outdoor workplaces) and **CIBSE Lighting Guide 6 (LG6)**, the recommended average illuminance for low-risk external circulation or storage areas is typically **10 lx**.
- **Proposed Site Performance:** As evidenced by the provided calculation (*Kew Wakehurst LCRN External Lighting Calc*), the calculated average illuminance (Em) is **9.8 lx**. See lighting Calculations at **Appendix B**.
- **Mitigation Impact:** By targeting 9.8 lx, the design ensures the site meets safety requirements while strictly adhering to a "not to exceed" threshold relative to the 10 lx guidance. This deliberate choice minimizes unnecessary brightness on a sensitive site while maintaining essential operational safety.
- **Dark Skies:** All external luminaires are mounted horizontally to ensure a **0% Upward Light Ratio (ULR)**, eliminating direct light emission into the night sky.

2.2. Operational & Automated Controls

To ensure that external lighting is active only when strictly necessary, the system is governed by a robust, automated control hierarchy:

- **Photocell Control:** Sensors prevent activation during daylight hours, ensuring the system remains inactive regardless of the time if natural light is sufficient.
- **Automated Time Control:** Standard operation is strictly limited to the window of **07:00 to 19:00** since all lighting is extinguished by 19:00, the site is effectively "Dark" during the most sensitive post-curfew hours, this represents a voluntary

early 'curfew,' occurring four hours prior to the standard 23:00 industry benchmark. This ensures the site remains dark during the most sensitive night-time hours for local biodiversity.

- **Security & Emergency Override:** Outside of these hours, the site remains unlit. The system is under the control of onsite security, who will only manually override these settings for emergency response or critical safety requirements.

2.3. Summary of External Lighting Metrics

Metric	Site Specification	Industry Standard (LG6/BS EN)	Mitigation Impact
Avg. Illuminance (Em)	9.8 lx	10 lux	Compliant/Slight Reduction
Min. Illuminance (Emin)	0.1 lx	N/A	High contrast control
Total Power per Area	0.03 W/m ²	N/A	Minimal energy/light intensity
Control Logic	Photocell + Timer	Manual or Timer	Automated Night-sky Protection
Standard Operating Window	07:00 – 19:00	Dusk to Dawn	Elimination of Late-Night Glow

2.4. Conclusion

The design achieves an average illuminance of **9.8 lx**, which is a slight reduction from the standard **10 lx** recommended by **BS EN 12464-2** and **CIBSE LG6**. When combined with restricted operating hours (07:00–19:00) and photocell controls, this approach effectively eliminates the risk of light nuisance or significant ecological disruption on this sensitive site.

3.0 Horticultural Grow Lighting Management & Mitigation Strategy

3.1. Operational Controls (Glasshouses 1, 2, and 50% of 3)

To eliminate light nuisance during sensitive night-time hours, the following strict automated operational policy is in place:

- **Operational Hours:** Lighting in Glasshouses 1, 2, and the designated "Standard Growth" section of Glasshouse 3 is limited to **07:30 to 17:00** daily.
- **Mitigation Principle:** By restricting use to daylight or near-daylight hours, the "contrast ratio" between the internal lighting and the external environment is kept low. This prevents the "lighthouse effect" and ensures no high-intensity light is emitted during hours of darkness.

3.2. Engineered Controls for Research Zone (50% of Glasshouse 3)

For the research zone within Glasshouse 3, where specific biological research requires extended photoperiods, the following engineering control is utilised:

- **Total Containment System:** This section is equipped with high-density, automated **blackout blinds**, blinds are automatically drawn during hours of darkness.
- **Performance Specification:** The blackout blinds are specified to meet a light-transmission rating of **<1%** when closed. This ensures that even when internal lights are active during the night, the light is fully contained within the structure.
- **Mitigation Principle:** This system ensures that light spill is negligible and remains well below the threshold for environmental light nuisance or sky glow.

See Appendix A of this document for Glasshouse 3 plan and the location of the Blackout Blinds.

3.3. Glasshouse 4: Zero Lighting Status

- **Specification:** Glasshouse 4 is designated as a natural-light-only facility.
- **Lighting Status:** No artificial grow lighting is installed or proposed for Glasshouse 4.
- **Impact Assessment:** As this structure relies solely on natural solar irradiance, it poses **zero risk** of light spill or artificial light glare at any time of year.

3.4. Summary Table of Lighting Mitigation

Structure	Grow Lighting Installed	Operating Hours	Mitigation Measure
Glasshouse 1	Yes	07:30 – 17:00	Temporal Restriction
Glasshouse 2	Yes	07:30 – 17:00	Temporal Restriction
Glasshouse 3 (A)	Yes	07:30 – 17:00	Temporal Restriction
Glasshouse 3 (B)	Yes	Extended (Research)	Total Blackout Blinds (<1%)
Glasshouse 4	No	N/A	Natural Light Only

3.5. Mitigation Summary

We have adopted a proactive, three-pronged approach to light mitigation: **Temporal** (limiting hours), **Physical** (using Blackout blinds), and **Exclusionary** (omitting lights from Glasshouse 4). This strategy ensures that the development adheres to the highest standards of environmental stewardship and prevents any adverse impact on the local night-sky or neighbouring residential amenity.

4.0. Lighting Design for Biodiversity and Dark Skies (Condition 22)

4.1. Protection of the High Weald AONB Dark Skies The site is situated within the High Weald Area of Outstanding Natural Beauty (AONB), where the preservation of intrinsically dark night skies is a priority. To comply with Condition 22 and Policy DP16, the lighting scheme utilizes "Dark Sky Friendly" LED luminaires with a 0% Upward Light Ratio (ULR). By ensuring all light is directed downwards and localized to the necessary task areas, the design eliminates "sky glow" and preserves the rural character of the area.

4.2. Impact on Biodiversity and Bat Populations In coordination with the *Construction Environmental Management Plan (Biodiversity)* and **Policy DP38** (Biodiversity) of the Mid Sussex District Plan, this lighting scheme identifies the site boundaries, particularly the established treelines and hedgerows, as sensitive ecological features for foraging and commuting bats. To prevent disturbance:

- **Light Spill Control:** The technical calculations in Appendix B demonstrate that light spill is contained within the immediate building perimeter and well within the site boundary.
- **Spectral Control:** LED luminaires have been selected with a warm colour temperature (3000K or lower) to minimize the blue-light spectrum, which is known to be most disruptive to nocturnal species.
- **Directional Accuracy:** The use of internal baffles and precise mounting heights ensures that no direct light shines into the canopy of boundary trees, maintaining these as dark corridors for wildlife.

4.3. Horticultural Lighting Mitigation As detailed in Section 3.0, the potential impact of horticultural "grow lights" is mitigated through the installation of automated blackout blinds and climate screens. These measures ensure that high-intensity internal light does not escape horizontally or vertically, ensuring the facility remains dark to the external environment during sensitive nocturnal hours.

5.0. Overall Conclusion

5.1. The Wakehurst Conservation and Research Nursery lighting strategy has been designed as an integrated solution to satisfy the requirements of both **Condition 16** and **Condition 22**.

5.2. By employing precision-engineered LED luminaires, automated blackout systems for the glasshouses, and strict directional controls, the scheme successfully mitigates glare for neighbouring residents while protecting the ecological integrity of the site for local bat populations. The provided isolux drawings (Appendix B) verify that the development will not result in unacceptable light trespass or "sky glow," thereby preserving the dark skies of the High Weald AONB in accordance with the National Planning Policy Framework and local District Plan policies.

5.3. This Glare Mitigation Plan fully satisfies **Condition 16**, through the combination of automated photocell/timer overrides, high-specification blackout containment, and a 'natural-light-only' policy for Glasshouse 4, the facility will maintain a negligible lighting footprint. These controls are integrated into the site's permanent Building Management System (BMS) to ensure consistent, long-term compliance with the amenity requirements of Policy DP26.

6.0. Long-Term Maintenance and Restrictions

6.1. Maintenance and Management

As noted in Section 5.0, the lighting and blackout systems are integrated into the site's permanent Building Management System (BMS) to ensure long-term, automated compliance with the mitigation strategies. All luminaires and automated blinds will be subject to regular maintenance inspections to ensure they remain in full working order and correctly aligned.

6.2. Restriction on Future Lighting

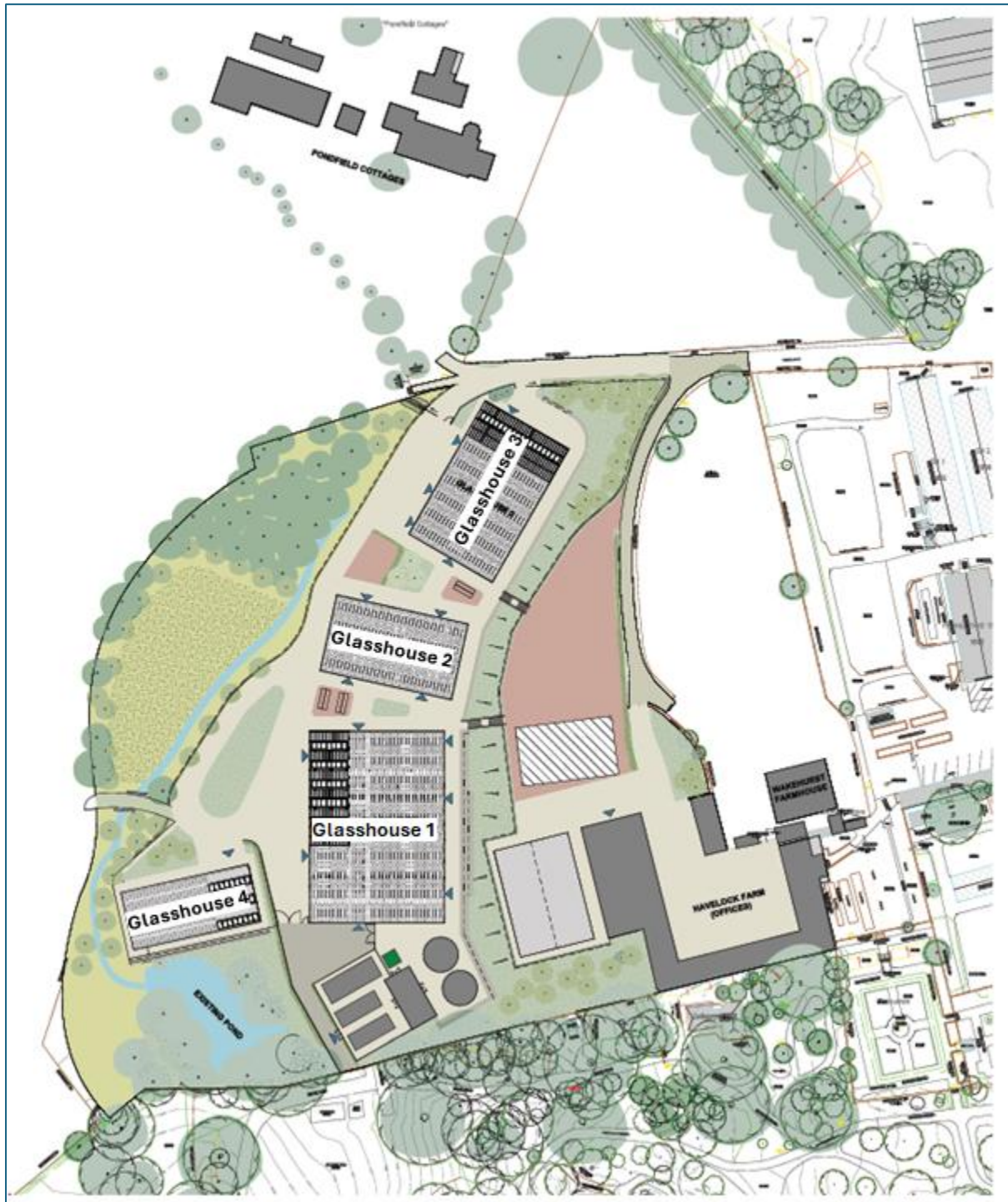
In accordance with the requirements of Condition 22, no additional external lighting shall be installed at the facility without the prior written consent of the Local Planning Authority. This ensures the ongoing protection of the High Weald AONB's dark skies and the identified ecological corridors for local bat populations.

Appendix A

- **Reference Site plan**
- **Glasshouse 3 Blackout Blind area**

Reference Site plan

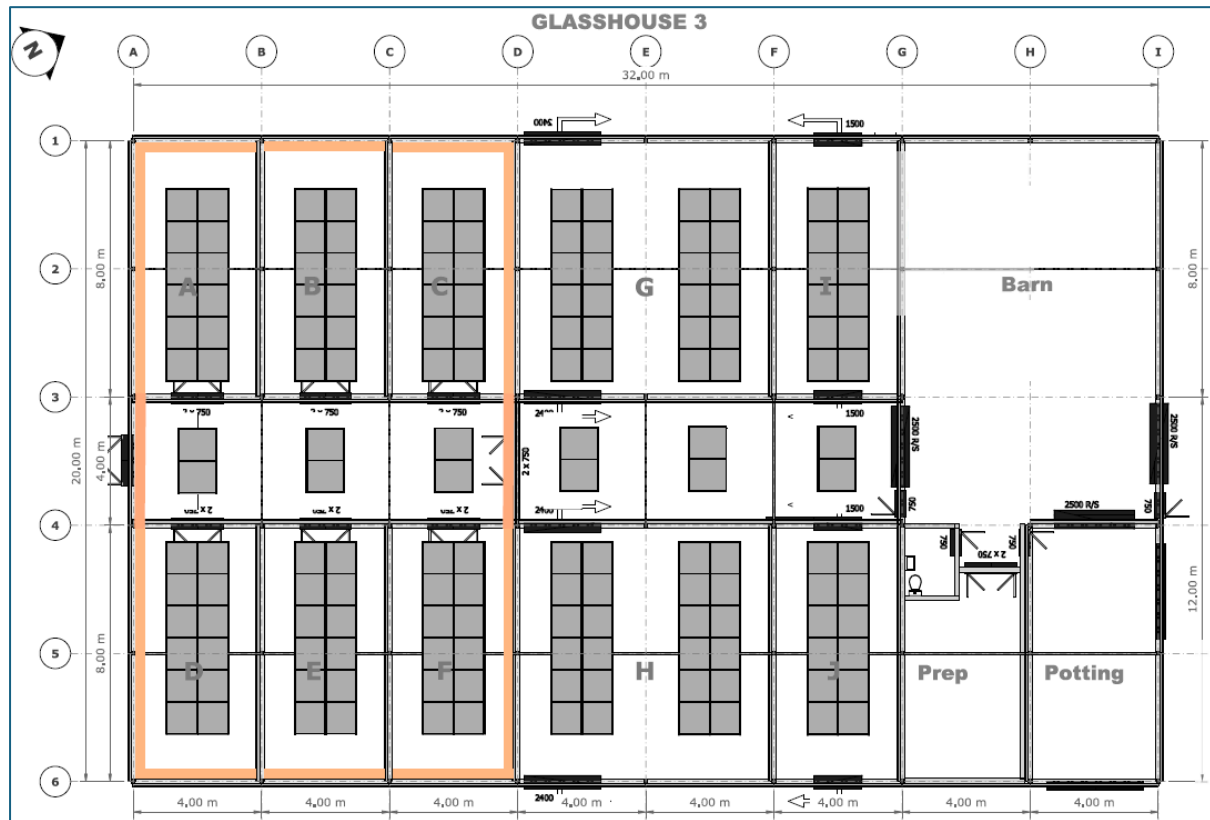
This site plan image below with glasshouse references added for clarity is taken from approved drawing A02 1002.



Glasshouse 3B Blackout Blind area

Glasshouse 3B blackout blind area is within the orange line on the drawing below.

Automatic blackout screens are provided to mitigate light bleed from the entire area including the roof.



Appendix B – Lighting Calculations

Installation : Wakehurst LCRN

Project number : 0104349

Customer : Kew

Processed by : Anna Mielcarek/ Jacky Wong

Date : 28.05.2025

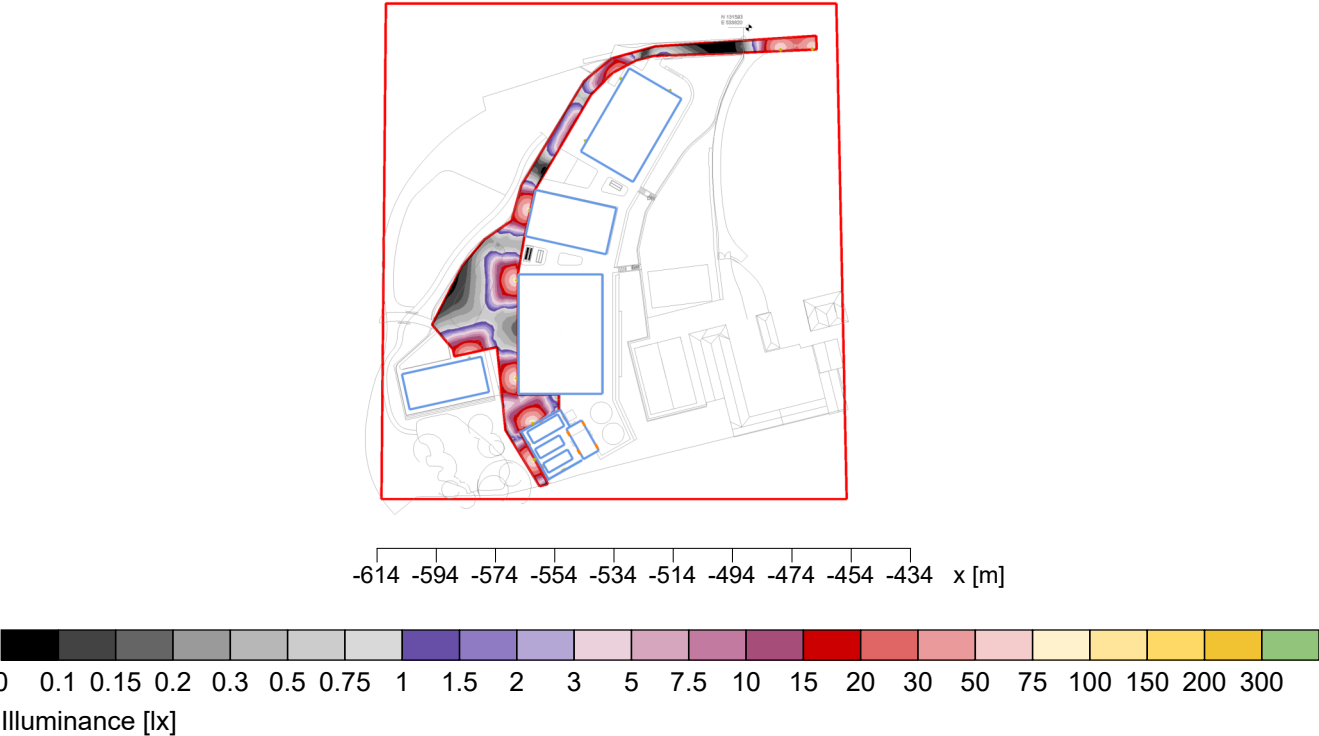
The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

1 Exterior 1

1.1 Summary, Exterior 1

1.1.1 Result overview, Measuring area 1



General	
Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux	93820 lm
Total power	718 W
Total power per area (25801.50 m²)	0.03 W/m²

Illuminance	
Average illuminance	$\bar{E}_m$ 9.8 lx
Minimum illuminance	E_{min} 0.1 lx
Maximum illuminance	E_{max} 80.7 lx
Uniformity U_o	$E_{min}/\bar{E}_m$ 1:168 (0.01)
Diversity U_d	E_{min}/E_{max} 1:1380 (0)

Type No. Make

		Thorlux Lighting	
1	11 x	Order No.	: ESM031A24
		Luminaire name	: Starbeam Plus
		Equipment	: 1 x 31 W / 4520 lm
3	9 x	Order No.	: ETP19773
		Luminaire name	: Thoroproof
		Equipment	: 1 x 30 W / 4900 lm