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TECHNICAL NOTE - LIGHTING

DATE: 01/04/2026

TO:	LPA ECOLOGIST
FROM:	ALEXANDER BROWN (DFL-UK)
SUBJECT:	EXISITING STREET LIGHTING

This document will give details of the modeled light levels of the existing lighting at Mitcheldean, as well as further context to explain that the current light levels are higher than those perceived to be acceptable to light sensitive species of Bats (in accordance with the guidance of the Institute Of Lighting Professionals (ILP) GN08:2023 guidance).

Whilst a light survey has been completed in an accurate format it does not give visuals or contextual explanation to explain that whilst the Application Site side of the area is dark (the open field to the east of the main road), it is protected by the existing vegetation which is currently illuminated by the existing street lighting, making it not a viable bat foraging path for light averse species.

The modeling process has used the lantern information provided by the local council. The maintenance factor has been calculated at 0.76, this means that the light level modeled includes the likely degradation of the light sources as opposed to the highest level of light which would have occurred at initial installation of the lighting.

The maximum illuminance at ground level is predicted to be 18.5 lux, increasing to 26.5 lux at 1.0 m above ground level, 32.6 lux at 1.5 m, and 40.9 lux at 2.0 m. Along the vertical plane adjacent to the vegetation (from ground level up to 5.0 m), illuminance reaches a maximum of 30.2 lux, with an average value of approximately 1.4 lux across the corridor.

These results indicate that the lower light levels recorded during the site survey are likely attributable to screening effects provided by on-site vegetation, which partially attenuates spill light from adjacent street lighting. However, notwithstanding this localised shielding, the influence of surrounding street lighting remains significant, and the corridor would, at best, be considered suboptimal for light-sensitive species.

Whilst dark patches are modeled along the vegetation, the peak light levels exhibited across multiple points greatly exceed the 0.2 lux horizontally or 0.4 lux vertically, advised within GN08:2023 (See Table 1).

LUMINAIRE INFORMATION

The following information was given by the local street maintenance team to inform us about the modeling process.

Luminaire information	
Example unit number	9
Height	6 mtrs
Manufacturer	Urbis Schreder
Family	Ampera Mini
Technical Details	16 LED 500Ma 5103 Optic
Estimated period of installation	18 years, 6 months

MODELING

The modeling was undertaken on Relux Desktop, an industry standard software used for light modeling, the Geolocation facility to ensure that the location of the columns and grids were realist to the location and gave an accurate impression of the real time environment.

The luminaires have not been modelled with rear spill shields, as this was not a advised by the Local Planning Authority (LPA) as items installed on or within the existing assets.

Due to the significant amount of light spill modelled, the application of these measures is unlikely to result in a significant alteration to the overall conclusion.

A maintenance factor of 0.76 was used to account for the likely loss (approximately 24%) of light functionality you would expect to see from a fitting installed and in use during the proposed period of time.

MODELING RESULTS

As shown in Figure 1, horizontal calculation grids (indicated by red lines) were modelled over areas of vegetation affected by the existing lighting, with a portion of the application site also included within the calculation boundary.

Figures 3,5,7 and 9 show the horizontal illuminance of the area shown in Figure 1 at ground level, 1 metre above ground level, 1.5 metre above ground level (height generally perceived to be the flight path of bats) and 2.5 metre above ground level. This does not include the vegetation itself as the vegetation changes its ability to block and reflect light through the year relative to its life cycle.

Figure 1: Horizontal grid location (extent of area calculated)

The horizontal light level (lux) of the area shown in Figure 1can be seen in Figures 2 to 9.

General		
Calculation algorithm used		Average indirect fraction
Height of evaluation surface		0.00 m
Height (phot.centre) [m]:		5.95 m
Maintenance factor		0.76
Total luminous flux		31990 lm
Total power		261 W
Total power per area (3275.12 m²)		0.08 W/m²
Illuminance		
Average illuminance	$\bar{E}_m$	1.9 lx
Minimum illuminance	E_{min}	0 lx
Maximum illuminance	E_{max}	18.5 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:332 (0)
Diversity U_d	E_{min}/E_{max}	1:3320 (0)

Figure 2: results at ground level

Figure 3: Corresponding numerical results for ground level output

General		
Calculation algorithm used		Average indirect fraction
Height of evaluation surface		1.00 m
Height (phot.centre) [m]:		5.95 m
Maintenance factor		0.76
Total luminous flux		31990 lm
Total power		261 W
Total power per area (3275.12 m²)		0.08 W/m²
Illuminance		
Average illuminance	$\bar{E}_m$	1.8 lx
Minimum illuminance	E_{min}	0 lx
Maximum illuminance	E_{max}	26.5 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:610 (0)
Diversity U_d	E_{min}/E_{max}	1:8820 (0)

Figure 4: results at 1 mtr above ground level

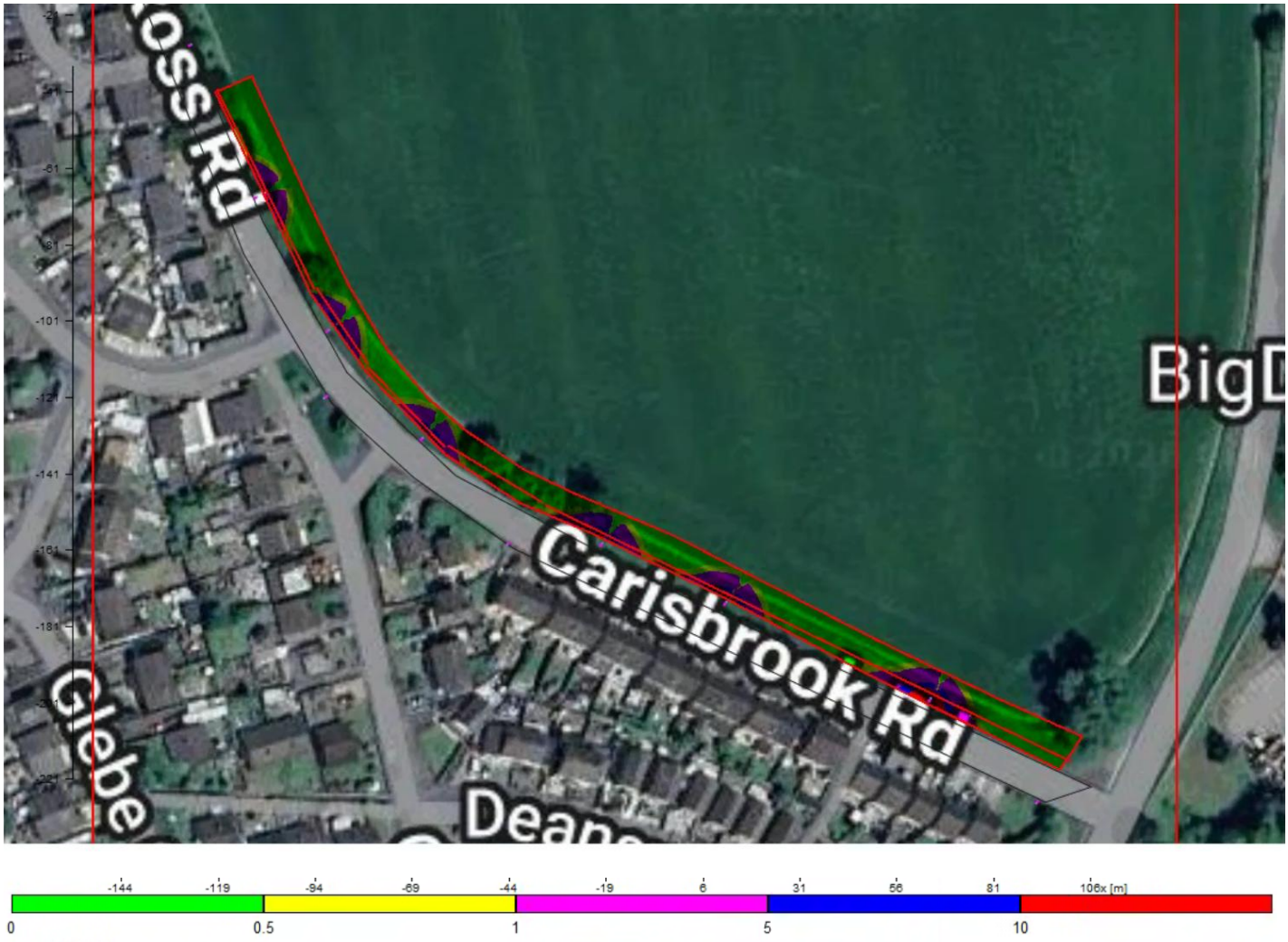

Figure 5: Corresponding numerical results 1 mtr above ground level output

General		
Calculation algorithm used		Average indirect fraction
Height of evaluation surface		1.50 m
Height (phot.centre) [m]:		5.95 m
Maintenance factor		0.76
Total luminous flux		31990 lm
Total power		261 W
Total power per area (3275.12 m²)		0.08 W/m²
Illuminance		
Average illuminance	$\bar{E}_m$	1.8 lx
Minimum illuminance	E_{min}	0 lx
Maximum illuminance	E_{max}	32.6 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:878 (0)
Diversity U_d	E_{min}/E_{max}	1:15800 (0)

Figure 6: results at 1.5 mtrs above ground level

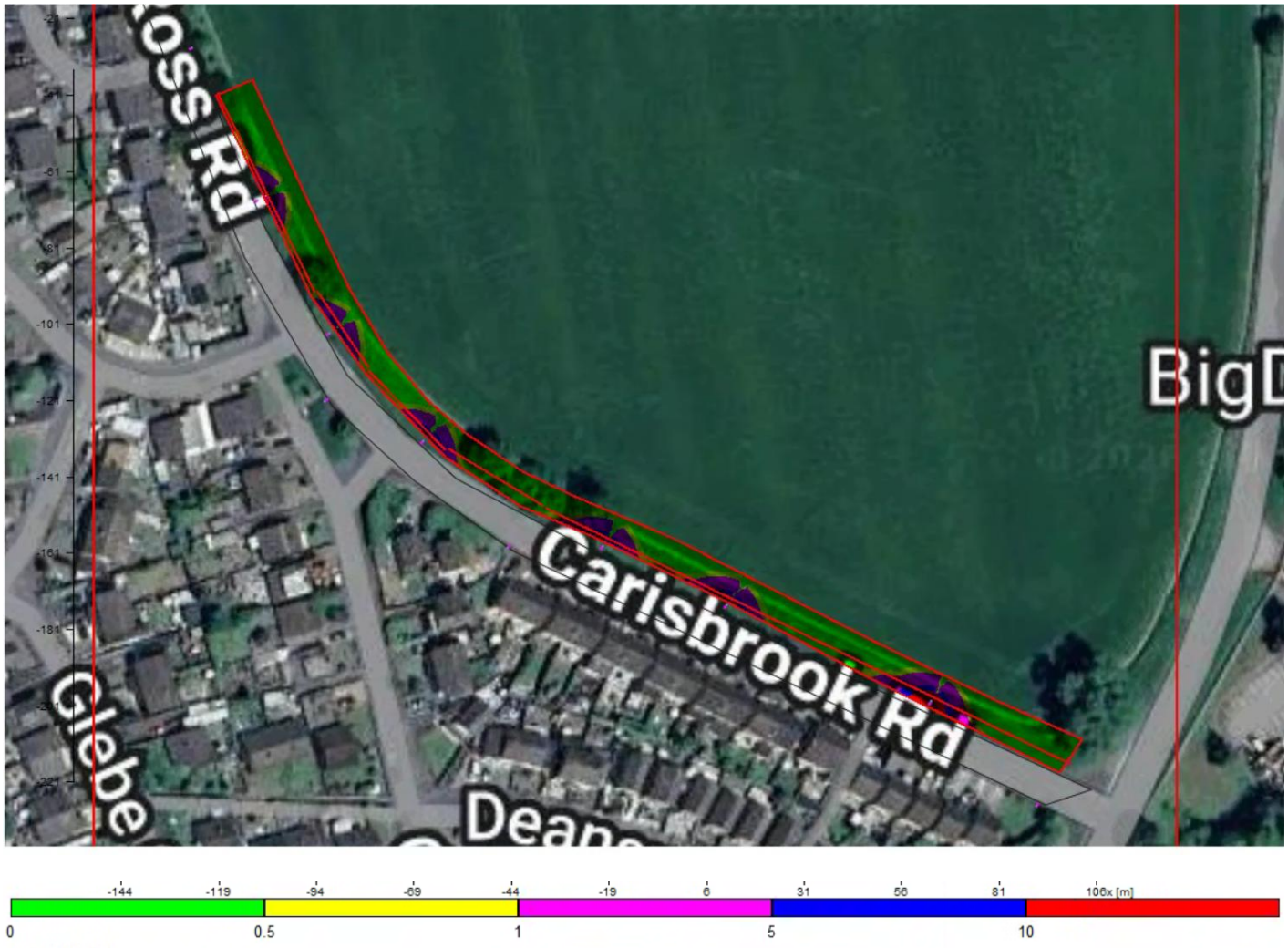

Figure 7: Corresponding numerical results 1.5 mtrs above ground level output

General		
Calculation algorithm used		Average indirect fraction
Height of evaluation surface		2.00 m
Height (phot.centre) [m]:		5.95 m
Maintenance factor		0.76
Total luminous flux		31990 lm
Total power		261 W
Total power per area (3275.12 m²)		0.08 W/m²
Illuminance		
Average illuminance	$\bar{E}_m$	1.8 lx
Minimum illuminance	E_{min}	0 lx
Maximum illuminance	E_{max}	40.9 lx
Uniformity U_o	$E_{min}/\bar{E}_m$	1:1300 (0)
Diversity U_d	E_{min}/E_{max}	1:30100 (0)

Figure 8: results at 2 mtrs above ground level

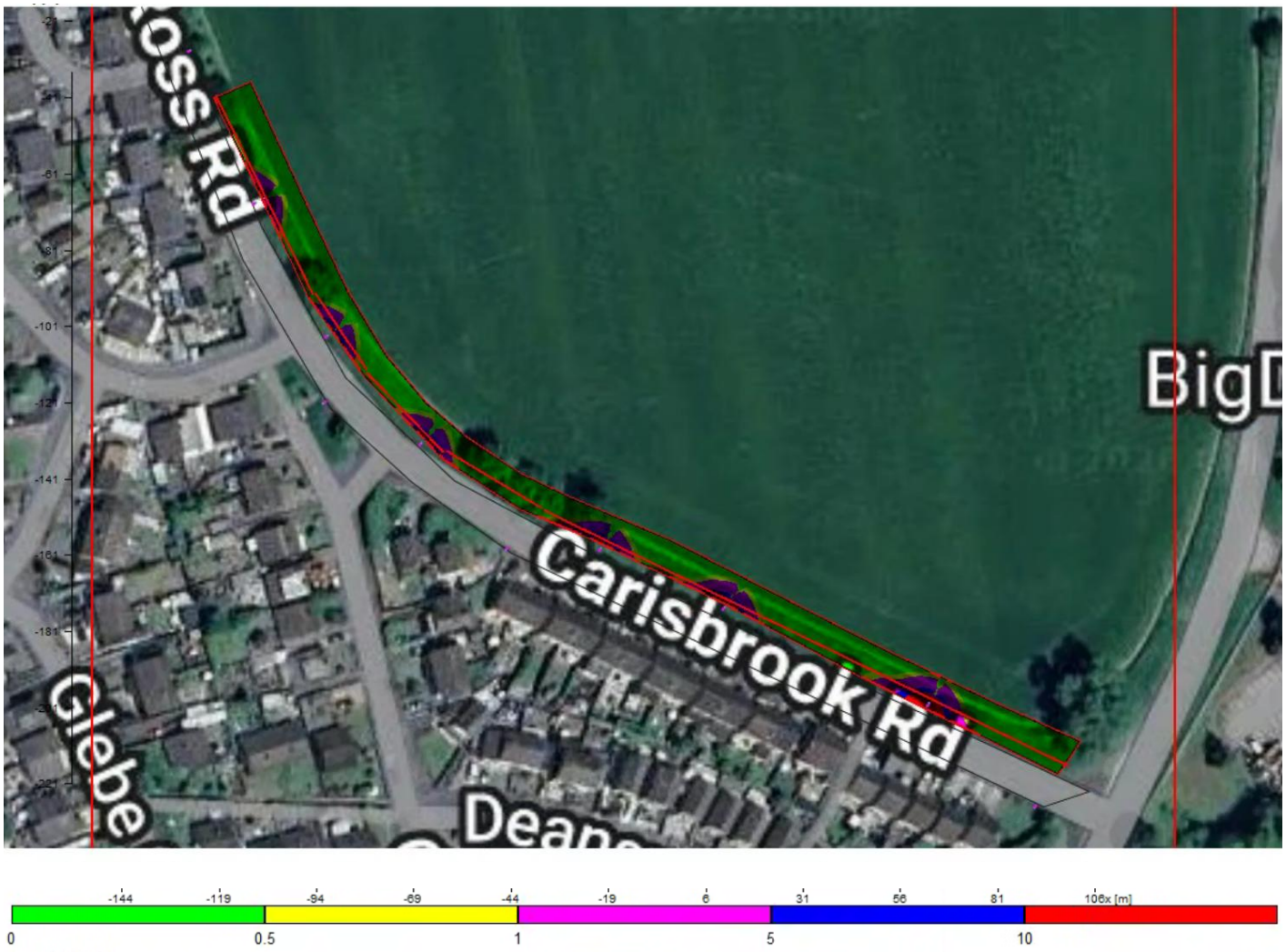

Figure 9: Corresponding numerical results 2mtrs above ground level output

As seen from the figures above there is a mix of light levels varying in intensity, however repeatedly breaking the potential for the vegetation or the surrounding to it be used by light sensitive bat species.

The Vertical lighting results offered a similar pattern of varying light levels, the results were taken across 5 different grids to account for the change in angle across the site, the grid locations can be seen in Figure 10, the location of the road indicated by the black outline and the grid locations indicated by the red line.

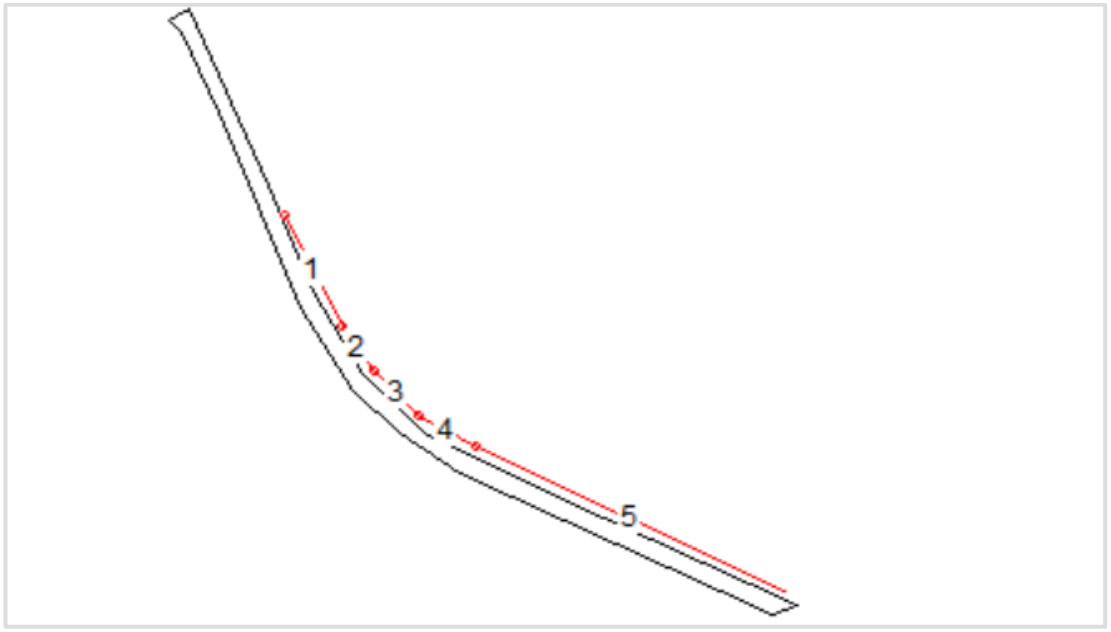

Figure 10 indication of vertical grids in relation to the road

The outcome of the vertical gids can be seen in Figure 11.

Vertical grid (1) (1)
Illuminance

No.	Measuring surface	Grid	$\bar{E}_m$	E_{min}	E_{max}	U_o	U_d
1.1	M 1.1	105 x 9	1 lx	0 lx	8.8 lx	0.04	0.00
1.2	M 1.2	44 x 9	1.9 lx	0.1 lx	6.6 lx	0.06	0.02
1.3	M 1.3	53 x 9	2 lx	0.2 lx	11.3 lx	0.11	0.02
1.4	M 1.4	53 x 9	0.3 lx	0.1 lx	1.3 lx	0.44	0.09
1.5	M 1.5	276 x 9	1.5 lx	0 lx	30.2 lx	0.01	0.00
Summary			**1.4 lx**	**0 lx**	**30.2 lx**	**0.01**	**0.00**

Figure 11: Summary of vertical grid results.

As demonstrated above, the vegetation does not meet the criteria set out within ILP GN08:2023 for the provision of a suitable habitat supporting bat foraging, commuting, roosting, or hibernation. In particular, the prevailing environmental conditions and site characteristics fall below the thresholds typically associated with functionally valuable or ecologically viable bat habitat. see table 1.

Grid type	GN08:2023 requirements	Maximum result	Pass/fail
Vertical grid at vegetation	0.40 lux maximum	30.2 lux	**Fail**
Ground level horizontal grid	0.20 lux maximum	18.5 lux	**Fail**
Horizontal grid 1 mtr above ground level	0.20 lux maximum	26.5 lux	**Fail**
Horizontal grid 1.5 mtr above ground level	0.20 lux maximum	32.6 lux	**Fail**
Horizontal grid 2 mtr above ground level	0.20 lux maximum	40.9 lux	**Fail**

Table 1: Grid outcomes of the existing lighting

Conclusion

The horizontal and vertical grid models presented in this Technical Note indicate that opportunities for mitigation are constrained by limited availability. Furthermore, the vegetation in question is illuminated to a level significantly exceeding industry guidance (GN08:2023) for protecting sensitive ecological receptors, suggesting that the area's vegetation may not be optimally utilised for light-averse bat species.

Whilst areas of vegetation exhibit localised zones of lower illuminance, the potential for these habitats to function as a continuous foraging or commuting corridor for light-sensitive bat species is, at best, suboptimal. This is due to the influence of existing artificial lighting, which introduces elevated light levels greatly exceeding the light levels deemed acceptable (GN08:2023 requirements) and spatial discontinuity, effectively fragmenting the corridor and reducing its suitability for light-averse species.

Whilst the Application Site does seek to develop a road cutting through the vegetation, based on the information above, the vegetation does not offer a viable foraging route in accordance with the guidance with GN08:2023 and as such will not negatively impact the area in discussion.

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Lilghting Impact and Planning