



MIDLANDS LIGHTING SOLUTIONS LTD

Warwickshire Golf Club - Proposed Range Lighting

LIGHTING IMPACT REPORT – MAY 2022

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Executive summary

Midlands Lighting Solutions Ltd have been instructed to evaluate the proposed lighting system for an improved golf range facility at The Warwickshire, the lighting is also required to enable the 'Toptracer' product, which is a state-of-the-art ball tracking system for golfers.

Physical site surveys have been carried out in conjunction with the appointed ecologists, hda, and only a single tree was identified as having the 'potential' for bat activity.

The increase in lighting at this specific tree is negligible, from 0.5 lux to 1.1 lux, which has stated as being within an acceptable maximum from the ecologist.

Other criteria of the evaluation process has been, additional impacts over and above the existing floodlighting system, unnecessary or wasted light spill, good design practices, and the employment of specific additional control measures.

The lighting has been designed specifically by the product supplier, Exled, which has been used for this evaluation, the use of any other product will mean the results and conclusions within this report are not relevant.

A similar number of lights will be installed across the width of the new range, which is greater than the existing footprint and therefore, will be more spread out, we believe the individual wattage of the lights will be significantly lower than the existing due to the use of LED technology.

In our opinion the proposed lighting will provide similar results to that of the existing due to the type of facility (golf range), the use of LED technology will provide more precise optical distribution of light compared to the existing traditional types, which can be controlled with additional accessories and the reduction in overall energy and carbon is positive for the overall environment.

We have suggested that a lighting professional should witness and evidence the setting up of the lighting including, aiming, installation of spill control measures and carrying out sample light tests to prove the scheme has been installed according to this proposal.



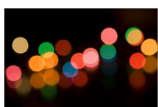
Designer Competence

The lighting calculations and technical assessment have been undertaken by me, Lee Burton, Managing Director of Midlands Lighting Solutions Ltd.

I have over 20 years' experience in the lighting and electrical industry, I am a fully qualified electrician (C&G2360) and hold an HNC in Electrical and Electronic Engineering (Edexcel), I have been a member of The Institution of Lighting Professionals (formerly The ILE) for most of the 20 years, I have been an active member regularly attending their Continuing Professional Development programme to ensure I am fully up to date with all advancements in technology, best practices and appraisal methods.

Between 2009 and 2015 I was part of the Midlands Regional Committee, when in 2014 I took the role of Chairman, organising the annual programme of relevant and technical papers for the membership amongst many other duties, which I myself have also given technical papers at The ILP and The Sports and Play Construction Association (SAPCA) events across the country regarding sports lighting systems and LED technology.

During my career, I have attended The ILP Exterior Lighting Module, which was a residential course spanning 4 (not consecutive) weeks and covered topics from lighting, electrical design fundamentals and environmental impacts, to other lighting disciplines such as Architectural and Tunnels, I also attended the South Bank University and the LET Diploma in Lighting, which was an in depth knowledge of the Physics of lighting and methods of implementation across the entire lighting portfolio, I have also undertaken many in house and CPD training modules from reputable manufacturers to demonstrate competence where necessary.



Introduction

The Warwickshire has developed into one of the leading leisure destinations within the region. Amongst other impressive facilities it hosts two championship standard 18-hole golf courses centred around a golf centre.

New investment is needed in the golf offer to enable the course to maintain and build upon its position as a leading course, capable of hosting leading competitions and providing the latest facilities to its members.

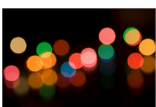
The main area in need of upgrading is the existing driving range, sited on the western side of the car park to the golf clubhouse. The driving range currently comprises of nine covered bays at the lower level, additional bays are situated adjacent which, are uncovered and open to the elements.

New innovative technology is now available and being used in other similar facilities for golf driving ranges, which is called 'Toptracer' this system has been installed within over 100 courses within the country and is increasingly becoming a standard expectation for leading golf venues such as The Warwickshire

This lighting impact report has been prepared to support proposals for a new improved range lighting system compared to the current system, this is required to not only ensure efficiencies are being obtained and only necessary lighting is being used but, it is also essential to enable the 'Toptracer' to function correctly and provide vital feedback on practice sessions, this also reduces the need for the more traditional high wattage lights.

Although the assessment will consider the recommendations from The Institution of Lighting Professionals (ILP) Guidance Note for The Reduction of Obtrusive Light 2020 (GN01), the situation is contradictory due to nature and necessity of projecting light in an upward direction and therefore it is a case that the need will be investigated and what can be done to mitigate the impact from anything outside the need for the light.

Our initial survey was carried out in conjunction with ecology professionals, hda and reference is made to their drawing as included in the relevant appendix.



Site Description

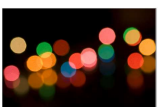
The site address is, The Warwickshire, Leek Wooton, Warwick CV35 7QT



Figure 1 - Location of Golf Range within the Overall Warwickshire Golf Club Site

Due to the type of facility, the site is located in open countryside, the existing range is at the south-western corner as shown in Fig.1.

Adjacent to the existing golf range is the golf centre building and a car park which is lit with artificial lighting already.



Environment

Although not entirely relevant for this type of proposed system, The Institution of Lighting Professionals has produced a comprehensive guidance document to assist with quantifying what would be deemed as acceptable maximum thresholds of artificial light through various types of analysis and calculation, therefore we have used this document (Guidance Note for the Reduction of Obtrusive Light GN01 2020) as our baseline reference.

Effects from Light Nuisance through windows on Residents

Light Intrusion (or spill light) is the term used for the consequential spilling of light beyond the boundary of the task area, or sports pitch in this case, being illuminated. The ILP Guidance Notes places a limit on the amount of vertical Illuminance which falls upon the centre of a dwelling window. The suggested maxima values quoted are relative to the amount of light measured as a baseline without the presence of the obtrusive light source.

Effects from Viewed Source Intensity on Residents and Sightseers

Table 4 of the ILP GN01 (extract found in this report Table 2) advises limits on luminaire intensity or viewed source intensity from luminaires to an observer. The greatest problems are usually encountered from poorly designed and inaccurately aimed floodlights, security lighting, or from lighting which is located too close to properties with poor optical control.

Effects from Upward Light (or Sky Glow)

Light emitted above the horizontal either directly from luminaires or indirectly as reflected light from surfaces such as the landscape or buildings, has the potential to cause sky glow. The ILP Guidance Notes place limits on the percentage of direct upward light emitted from the luminaires in their installed attitude, which is dependent upon the Environmental Zone in which the Application Site lies.

In specific circumstances such as the lighting of driving ranges or lighting a building façade from beneath, it is not possible to achieve the desired upward light or flux ratios therefore, measures must be implemented to reduce the impacts as much as reasonably practicable.

Indirect upward light is subject to material reflectance properties. It is not easily quantifiable but is unlikely to be as significant as direct upward light and is not an assessment criterion used in the ILP Guidance Notes.

Effects from Artificial Lighting on the natural environment

The effects of lighting on the natural environment can be difficult to quantify. For this assessment, the effects on bats are considered and the guidance in the document "Bats and Lighting in the UK" considered by minimising the intensity of light spill and also using a colour temperature which is deemed to be 'neutral' and not concentrating in the blue end of the spectrum.

The relevant criteria of upward light, light intrusion and viewed source intensity are assessed in accordance with the following criteria

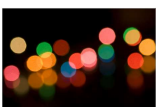
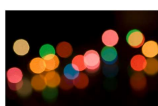


Table 2: Environmental zones			
Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural 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	Towns/City Centres with high levels of night-time activity

Table 1 - Table 2 of ILP GN01 Environmental Zones

Curfew is stated within the guidance notes as the time at which stricter requirements (for the control of obtrusive Light) will apply and in the absence of any stated time from the planning authority this is suggested as being 23:00, however in reality times of operation have been stated as until 22:00 Monday to Friday and 21:00 for weekends and the lights will only be used when necessary, predominantly during the winter months and not the summer.



Method of Appraisal

A day and night-time survey was carried out on the 31st of January, the daytime visit was a joint visit with a representative from hda Ecology to try and determine the areas where specific consideration was required, and a return visit was made after dark by us to measure the existing range floodlighting.

Fig 2 is an initial drawing provided by hda Ecology showing the areas of potential bat activity, please note that no evidence of bats was observed due to the time of year, this was based simply on the type of tree and whether there were characteristics of the tree which could house bats such as crevasses.

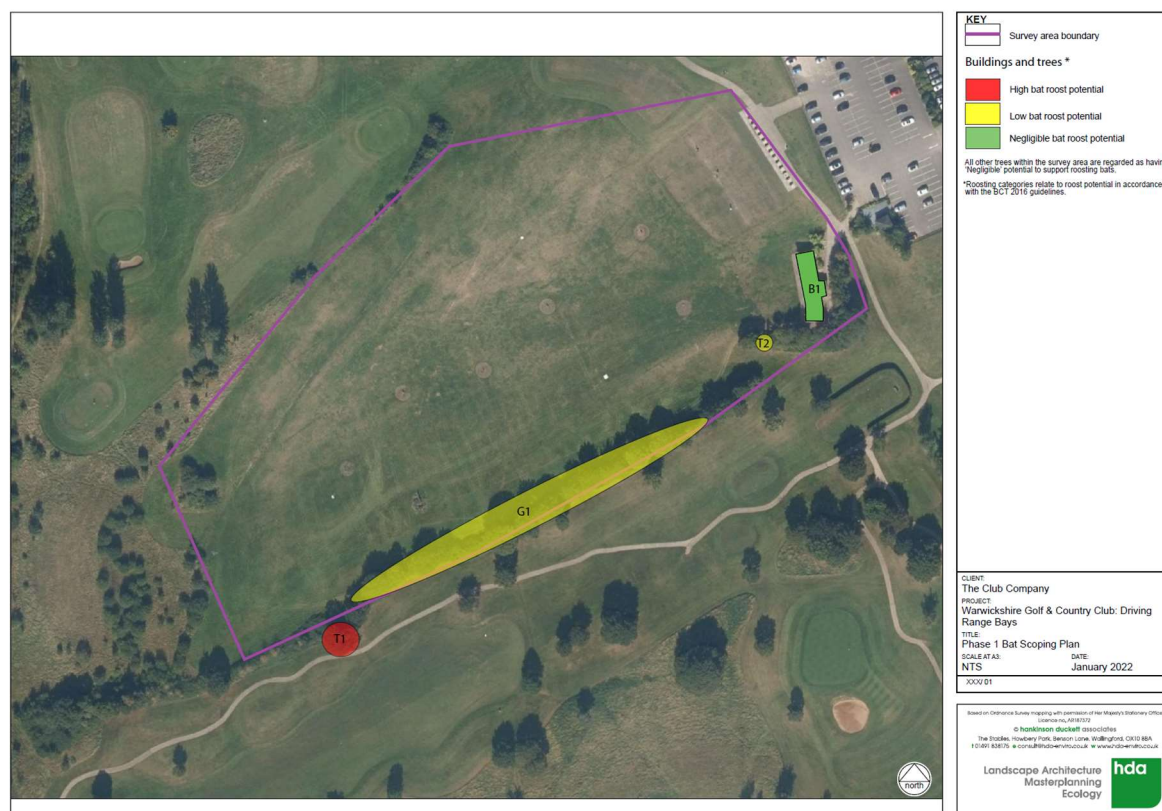


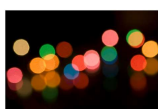
Figure 2 - hda Ecology drawing demonstrating potential for Bats across site

Please note that the golf range was in use at the time of our survey and caution was required when obtaining these results and only measurements that were felt necessary were recorded.

Regardless of the potential for bat activity, 4 actual measurements were taken along the tree line to the south as highlighted in Fig 2, then a visual survey was carried out across the site.

A lighting proposal has been provided by the preferred lighting supplier, Exled. They have also provided the necessary measurements files for us to independently verify and evaluate the effects of lighting outside of what is required for the 'Toptracer' system.

Firstly, the proposed lighting and relevant performance grids are set up in our own lighting software to ensure we have the correct set up as per the suppliers' calculations and in accordance with the 'Toptracer' requirements.



The lighting calculation software used is Philips CalcuLUX 7.9.0.0, the manufacturer has developed this software specifically for sports lighting installations and it provides the necessary capability to undertake obtrusive light calculations in full and independently by uploading others product data. The company (Philips Lighting) is ISO Approved, and the software is widely accepted and used throughout the industry in the UK and the world.

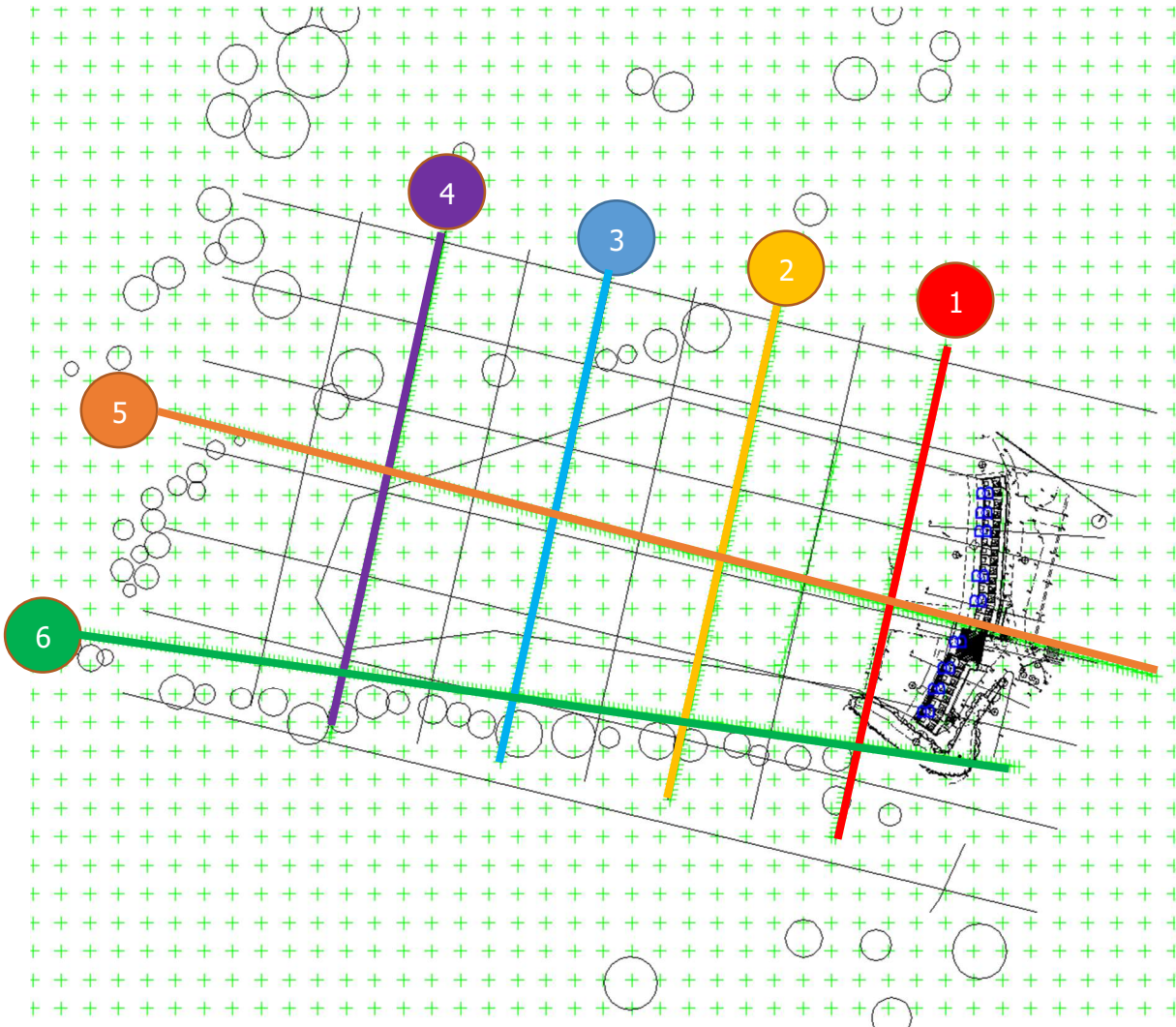
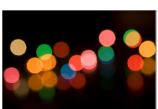


Figure 3 - Calculation grids used for appraisal

Once the lighting system has been modelled correctly, a series of grids have been created to evaluate the effects as noted:

1. Light distribution width & height at 30m from range (shown in Fig 6)
2. Light distribution width & height at 90m from range (See attached calculation)
3. Light distribution width & height at 150m from range (See attached calculation)
4. Light distribution width & height at 210m from range (See attached calculation)
5. Light distribution length & height through centre (See attached calculation)
6. Vertical light spill onto tree line to south of range (shown in Fig 7)



Proposed Floodlighting

The lighting design has been carried out by the preferred supplier, Exled and a copy of the calculation is appended to this report for information.

Based on the revised range layout consisting of a two storey and single storey bay combination, there will be 4 lights installed at 7.4m above the range floor for the 2 storey bays and 5 lights will be installed at 3.8m above the range floor for the single storey bays.



Figure 4 - Proposed layout and mounting height of lights

The Toptracer system requires a specific lighting performance to enable it to function as intended and the full system requirements are appended to this report for information.

With regards to the lighting element, it is suggested that a minimum 30 lux should be achieved over a vertical grid spanning the range width, 50m in front of the bays and up to a height of 30m as shown in Fig 5.

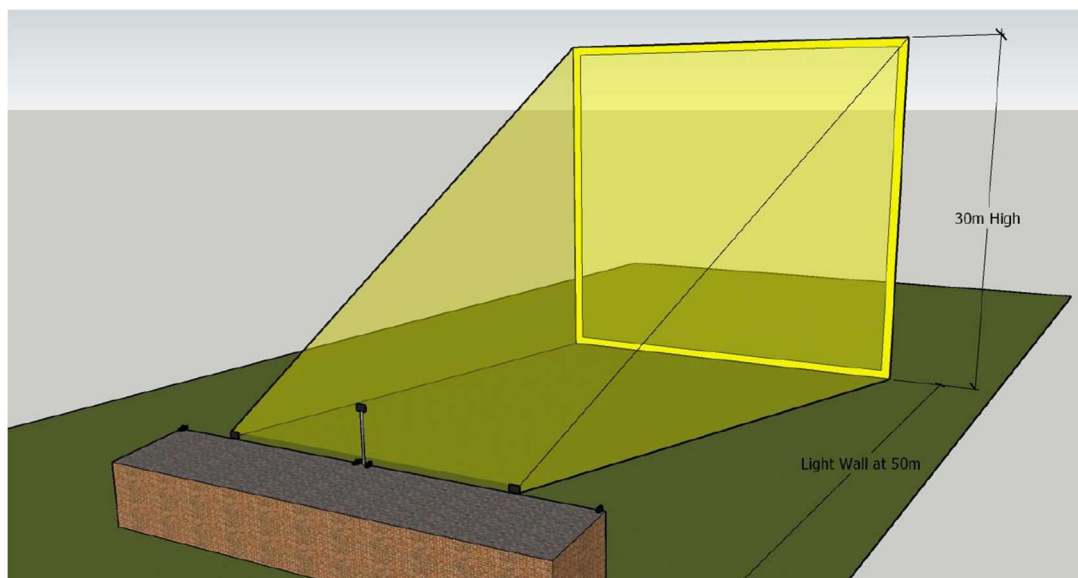


Figure 5 - Toptracer lighting requirement set up



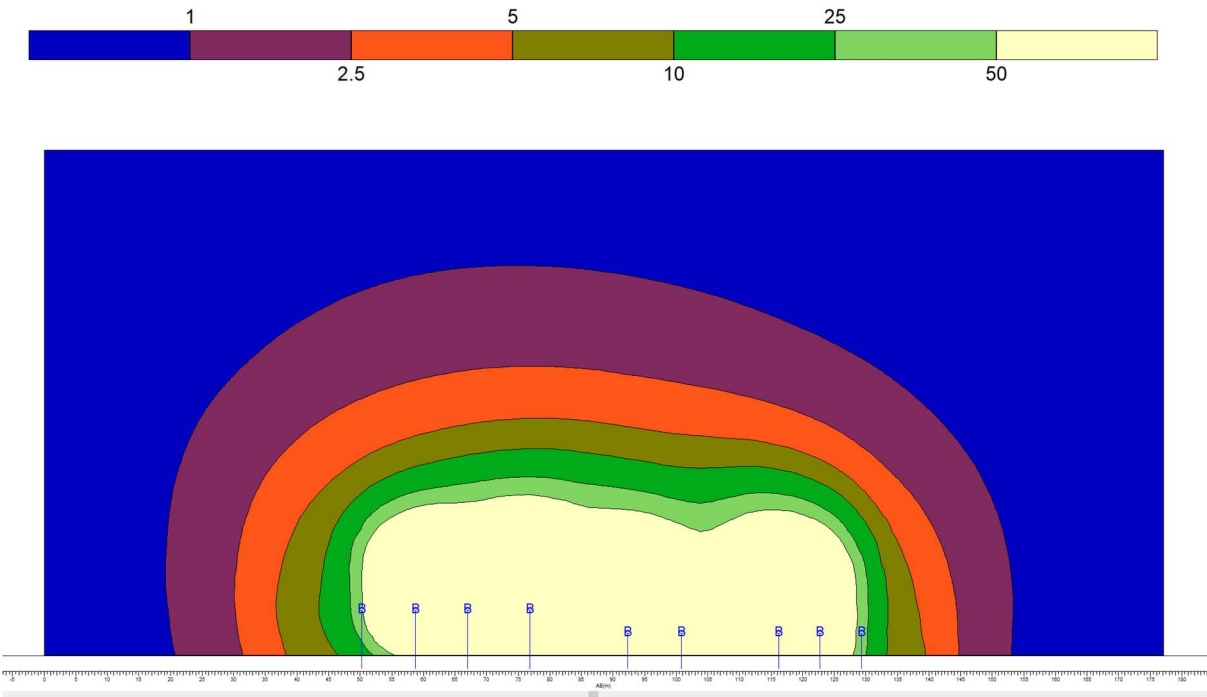


Figure 6 - Grid 1 Results

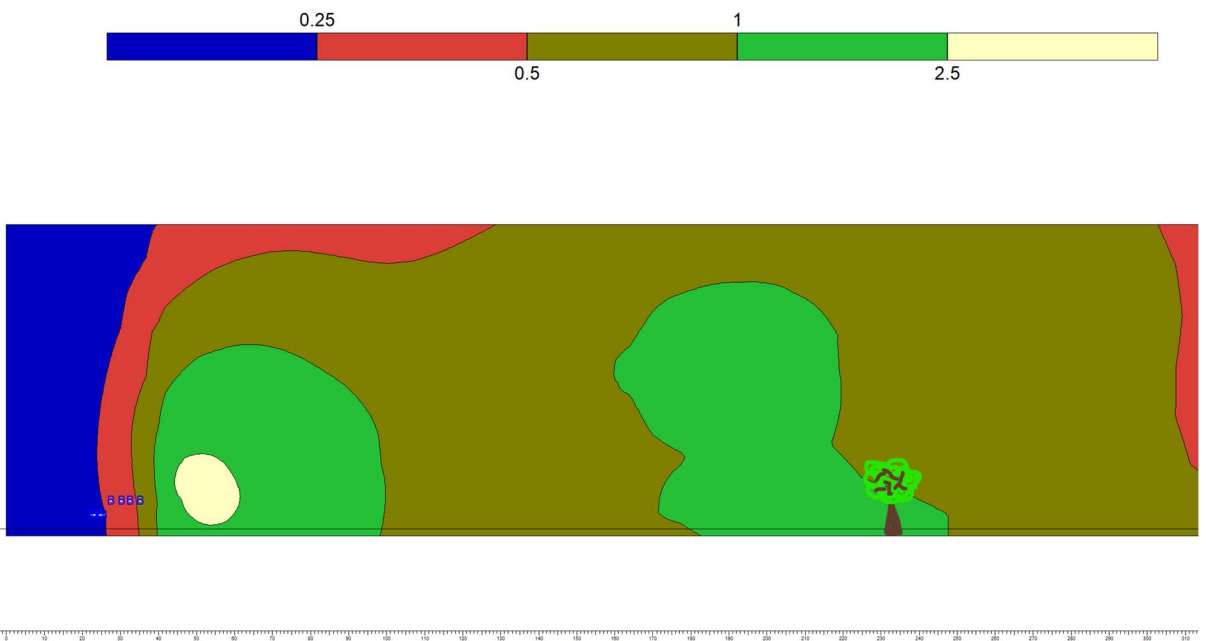


Figure 7 - Grid 6 results

The proposed floodlights, to suit the Toptracer system lighting requirements, is the Exled Galaxy TTX-US 300W with symmetrical beam, this is required to provide the upward required to track the golfers ball trajectory.

There are a number of versions and additions that are possible for the proposed light, it should be confirmed that a colour temperature of no more that 4000K should be used, all lights shall have the 'hood' fitted to reduce upward light where possible and 'barn doors' should be installed to reduce the amount of side spill as much as practicable.

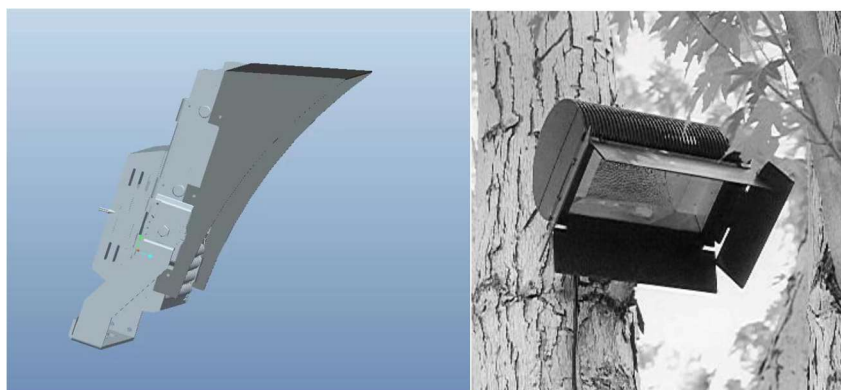
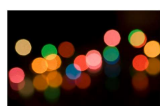


Figure 8 - Images demonstrating additional spill control measures



Residual Effects

Typically for this type of report, there is a specific dwelling or observer that the results can be evaluated against however, in this circumstance, the lighting has been evaluated against unnecessary or wasted light, best design practice and most importantly, known or suspected ecological impacts.

According to hda Ecologists initial report, there was only a single tree that had the potential to house bats although, this was not evidenced and the other areas of foliage around the range, had little or no potential and as there is already a similar lighting system in place and being used currently, the results for this specific tree are compared.

During our night-time survey, a single measurement was taken at the tree 1.5m above the ground level which was approximately 2m below the range surface due to the topography of the land as seen in Fig 7.



Figure 9 - Phone Camera picture taken from specific tree looking back to the existing range

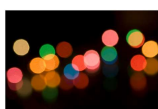
The measured result was 0.5 lux with the existing lighting on, it must be noted that the light closest to the tree line was not operating at the time of the survey as shown in Fig 8. So, the results may be slightly more.

According to our calculations, the new results for the same location will be 1.1 lux vertically when all lights are on, which demonstrates a reasonable increase in light at this sensitive location.



Figure 10 - Existing range lighting system failed light

Historically, there are many types of range lighting systems that are in use, these are end lighting systems, side lighting and berm lighting. With the advent of technology to provide instant feedback on performance within the majority of sports now, there are certain requirements to enable this technology to behave as intended and in this case, its lighting.



As noted, there is already an existing end lighting system in place, this consisted of 9 No. high wattage (probably in the region of 1000W each) floodlights, although the exact types and characteristics cannot be confirmed, it is our professional opinion the lights were at least 5000 kelvin colour temperature, and they were all concentrated within the width of the existing range bays footprint.

Due to the type of lighting system employed, it is unpractical to measure the full impact of the existing lighting to be able to compare this to the proposed and as the existing lighting has been installed and probably changed throughout its life for varying product types, we are unable to accurately model the lighting too.

When the new range is built the proposed lighting units are significantly lower wattage and spread about an increased width range.



Figure 11 - View from the range looking to the end



Figure 12 - View across the range and to the end

As can be seen the existing lighting is as expected for this type of system and according to our calculations, the proposed system will produce similar results.

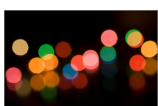
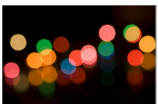




Figure 13 - View from behind the range across the existing lit car park

We strongly recommend that the installation is carried out with a lighting professional to demonstrate the correct use of additional accessories such as 'hoods' and 'barn doors' the accurate aiming of the floodlights should also be witnessed and documented to achieve the minimum performance whilst minimising any unnecessary light spill outside the application area and also the specific ecological locations as identified by hda ecologists.



Conclusion

The site is already being used as a golf range complete with high wattage floodlights installed above and directed to the end of the range, this intentionally directs light in an upwards direction to track the golfers ball trajectory and distance.

The club wish to improve the facilities and at the same time install the latest technology in ball flight tracking, which requires a specific lighting performance.

This report has been produced to demonstrate that all possible considerations have been made and that the employer (the Club Company) are acting in a responsible way by ensuring the proposed lighting system is fit for purpose but does not cause unnecessary additional impact to the environment.

Although the footprint of the proposed range will be larger, there will be the same number of light units (9) and the wattage will be significantly lower in our opinion.

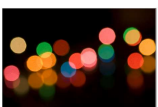
The appointed ecologists, hda, have undertaken a visual bat survey and identified a single tree with the 'potential' to house bats.

This has been the target of the attention with regards to lighting and although we will see an increase in lighting from 0.5 lux to 1.1 lux, this is a relatively low level of lighting which was deemed acceptable by the hda representative.

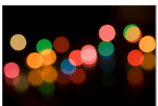
In our opinion and as observed at our night-time survey, the results will be comparable to the existing system due to the type of facility and purpose of the lighting system.

The preferred lighting supplier Exled has provided specific lighting data, which is unique to their product, we strongly suggest that this product is used to ensure that the results are as expected, the use of any other product will yield unknown results and this report will no longer be valid or relevant.

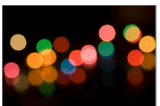
The maximum colour temperature of the lights should be 4000K and an independent lighting professional should witness and evidence the specific aiming and use of accessories to reduce unwanted wasted light such as 'hoods' or 'barn doors'.



Appendix 1 - Calculation Report



Appendix 2 – Reference Drawings



Appendix 3 - Product Data Sheets



Appendix 4 - Reference Guidance Notes

