

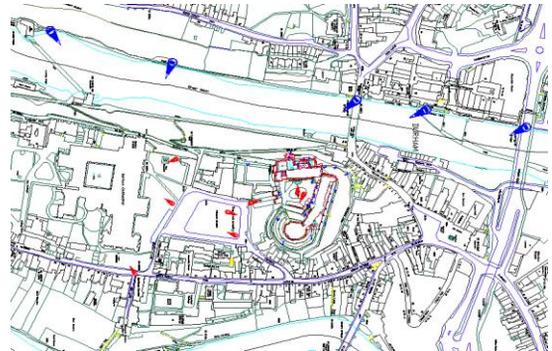
- Durham World Heritage Site
- Decorative Lighting Project

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- Director
- Stainton Lighting Design Services Ltd



- In 2009 a competition was organised by Durham County Council, Durham City Vision, Durham University, World Heritage Site Coordinating Committee in partnership with Institution of Lighting Professionals.
- The competition was to redesign the exterior floodlighting at Durham World Heritage Site.
- The existing floodlighting, installed in the 1960s, had reached the end of its serviceable life and the lamps and control gear were no longer energy-efficient. Therefore it needed replacing, using modern equipment.
- The scheme was split into 3 phases
- Phase 1 Durham Castle
- Phase 2 Durham Cathedral
- Phase 3 Other areas of interest centreing around the palace green area.

- The scheme had to have the following characteristics:
- In keeping with the status of the site
- Respectful to the varied use of both buildings
- Provide an alternative viewing experience to the daytime
- Fully controllable installation
- Sustainable
- Maintainable
- Low energy - we had to make minimum 30% energy savings from the existing scheme
- Vandal resistance
- Provide minimal disruption to the local ecology (bats)
- Designed and installed with archaeological considerations
- We were not permitted to directly mount any equipment on the fabric of the buildings
- No drilling was permitted into the stonework of the buildings



- Luminaire Characteristics
- Inefficient
- Difficult and costly to maintain
- Obsolete
- Castle
- 37 units being a mix of Projector floods ranging from 250 to 1500 watt discharge lighting
- Consuming 14.61 kW
- Cathedral
- 19 units being a mix of Projector floods ranging from 1000 to 1500 watt discharge lighting
- Consuming 24.68 kW



- This scheme could not have been delivered using conventional lighting as we needed the following characteristics:
- High level of optical control for control of light pollution
- Extremely high utilisation
- Highly accurate and stable colour temperature
- Energy savings
- Reduced revenue costs (maintenance)
- Variety of bespoke optical performance
- Fully controllable down to individual luminaires
- Interaction with events
- Use of wireless control to minimise impact on the fabric of the building
- Internet-based control interface
- Minimum 50,000 hour life
- Vandal resistance



A planning coordinator was involved in the evolution of the scheme, in order to design out as many of the planning conditions as possible.

The key planning constraints on the installation design were:

- The existing cable network was to be re-used wherever possible.
- Where clipped cable was replaced the fixing holes were reused.
- Lead P-Clips were to be used throughout - these had to be manufactured by the contractor.
- Any new cable power or control had to utilise existing cable routes.
- No new holes could be drilled into the existing fabric of the building.

All of the above conditions have been satisfactorily discharged, despite the considerable increase in luminaire numbers and the fact that we only re-used a small number of existing luminaire locations.

Given the historic nature of the building, the risk of finding buried artefacts of archaeological significance were real and, potentially, costly in terms of time and money.

To mitigate this, the design developed a number of approaches

- Utilisation of existing cable routes or previously disturbed ground
- depth of any buried cable or equipment limited to 300mm.
- All groundwork was undertaken early in the installation phase to minimise the impact on the programme of any archaeological finds.
- Any digging was subject to constant archaeological oversight in case articles of interest were found.
- Items discovered included
 - Pottery
 - Metal items
 - Animal remains
 - Human remains



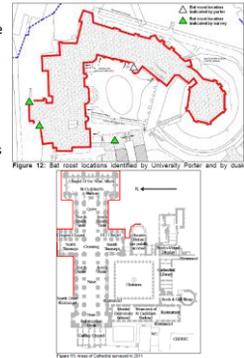
The design team was aware of diverse ecological issues within the vicinity of the site in particular the presence of bats, mostly the Common Pipistrelle species, foraging in the area.

A detailed bat survey was undertaken.

The lighting design took account of this information and the three areas where roosts are situated were specially evaluated.

This led to the decision not to illuminate these areas, which had minimal adverse effect on the scheme.

Early consultations with ecologists Barrett Environmental Ltd delivered a scheme which minimised the effect of the floodlighting on the ecology of the area – the final solution was commended for the consideration given to this issue.



Scheme Information			Dusk - Dawn				Dusk - 24.00 - 05.30 - Dawn			
Energy Cost	£ 0.12		Energy		Carbon Use		Energy		Carbon Use	
	Number of units	Actual Wattage	Hours/4100	Cost	Kg/CO2/KWH	Cost	Hours/2018	Cost	Kg/CO2/KWH	Cost
Castle										
Existing scheme	37	14609	59896.9	£ 7,187.63	32657.6					Not used
Proposed Scheme	107	6244	25600.4	£ 3,072.05	13958.1		12600.4	£ 1,512.05	6870.1	
% savings					57%					79%
Cathedral										
Existing scheme	19	24680	101188.0	£ 12,142.56	55170.7					Not used
Proposed Scheme	141	13050	53505.0	£ 6,420.60	29172.5		26334.9	£ 3,160.19	14358.6	
% savings					47%					74%
Whole Scheme										
Existing scheme	56	39289	161084.9	£ 19,330.19	87828.3					Not used
Proposed Scheme	248	19294	79105.4	£ 9,492.65	43130.6		38935.3	£ 4,672.24	21228.7	
% savings					51%					76%



• Finish

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