Manchester Town Hall lighting scheme for King George VI's coronation in 1937
Image: © Manchester Libraries
Foreword

Light has forever formed the basis of our work, home and social lives. Our relationship to light and how it has developed throughout history is strongly reflected in heritage sites.

An increasing number of our cultural and heritage organisations are investing in ‘once-in-a-lifetime’ restoration projects, however the role of lighting has not always been recognised from the outset. A holistic approach to lighting for heritage projects can create vibrant, prosperous, safe and inclusive places for those who live, work and play near them.

Successful lighting to our heritage buildings creates an opportunity to provide benefits in terms of social and economic value for a variety of stakeholders, from site owners to the local community. For example, it can enliven the urban environment for tourists and the local population, re-kindle the national interest in a forgotten landmark and even unlock new commercial opportunities for the site and its neighbours.

When working on two of the UK’s iconic Grade I listed heritage buildings; Alfred Waterhouse’s Manchester Town Hall and Walter Aubrey Thomas’s Royal Liver Building, it became apparent that there was limited guidance on how to sympathetically illuminate and restore the lighting of landmark sites. Our work on these two projects, supported by other heritage experience, inspired us to create our own guidance which addresses this shortfall.

The purpose of this brochure is to demonstrate that lighting goes beyond functional, task-based illumination. Lighting is a tool for placemaking, an opportunity to reinstate landmarks and an educational palette for observers. Lighting designers should re-think their title and responsibilities when working with heritage projects, instead becoming hybrid lighting designers, historians, product designers, advertisers, and wayfinding specialists to name a few.

Lauren Blow,
Senior Designer
Lighting
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The Lord Mayor’s staircase in Manchester Town Hall with two gas lights electrified in the late 1890s.

Image: © Arup
Heritage sites

Lighting design supports four key opportunities for heritage sites:

**Education**
- Showcase the technical lighting evolution
- Demonstrate historic workmanship
- Show how light once formed a space

**Economic**
- Resonate and showcase a landmark
- Place-make to increase footfall
- Create potential tenantable spaces

**Repurpose**
- Incorporate modern lighting requirements
- Preserve heritage luminaires
- Reveal architectural forms with light

**Sustainability**
- Adapt existing buildings
- Reduce energy consumption
- Improve safety and well-being of occupiers

“A listing protects everything within the building or structure including the services. The existing luminaires and the lighting intent forms part of the building’s history, archaeology, character and appearance.”

There are three forms of statutory protection for heritage sites within the United Kingdom:

**CONSERVATION AREAS**
- towns, city centres, suburbs or rural landscapes that have an architectural or historical importance.

**SCHEDULED MONUMENTS**
- archaeological sites and landscapes with national significance.

**LISTED BUILDINGS**
- a building or structure with special architectural or historic interest.
Archive imagery of Manchester Town Hall’s corridors in 1877, used by Arup as compelling evidence for the replication of the original luminaires.

Image: © Manchester Libraries
Guidance as we know it

Current guidance for lighting heritage sites comprises information on facade lighting, heritage luminaire significance, the planning process and sustainable building services. However, advice on the following key items is not well defined when working with lighting and heritage sites:

• Incorporation of modern design guides and standards.
• Understanding the current lighting conditions and how the proposed lighting conditions should honour the original design intentions.
• Coordination with the Heritage Consultant’s strategy and understanding their documents.
• Characterisation of the existing luminaires to determine heritage significance.
• Incorporation of modern lighting technologies into heritage luminaires and spaces.
• Specifying treatment to heritage luminaires and replica luminaires.
• Designing replica luminaires.
Common misconceptions with lighting heritage sites:

1. The building fabric cannot be penetrated with new luminaire mounting locations.
2. Design guides and standards must be fully complied with.
3. Modern, architectural luminaires cannot be installed within heritage spaces.
4. Gasoliers should be refurbished to incorporate electricity.
5. All lighting should appear to look like candlelight.
6. It is not possible to incorporate advanced digital technology into heritage luminaires.
7. Working on heritage projects requires a lengthy programme to gain planning approvals.
8. It is too difficult to add facade lighting to heritage fabric.
9. The heritage lights are a ‘nice to have’ and not essential.
History of light

When working with heritage sites, our understanding of the original lighting conditions needs to be enhanced. If appropriate, the lighting qualities can be mimicked to exhibit how we used to live to future generations and preserve the historic ambience of the scene.

“The discovery of portable light was a great achievement to civilisation - humans could hunt in the hours of darkness and have an advantage over our prey.”

“The word ‘curfew’ comes from the French phrase ‘couvre-feu’, which means “fire cover” This originates from the Medieval times to try and prevent fire spread.”

Albert Square, Manchester in 1878 demonstrating a different lighting layout and style to present day.
Image: © Manchester Libraries
The changing origins, colour hues and qualities of light sources throughout history are mapped below.

<table>
<thead>
<tr>
<th>TIME PERIOD</th>
<th>LIGHT SOURCE</th>
<th>QUALITIES</th>
<th>COLOUR TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4M YEARS AGO</td>
<td>SUN</td>
<td>The first light source for humans. Natural light source Originally worshipped Dynamic movement and colour temperature Excellent colour depiction Available to all for free</td>
<td>1800K – 6500K</td>
</tr>
<tr>
<td>1M YEARS AGO</td>
<td>FIRE</td>
<td>Discovered by a lightning strike. Humans could now see in the dark. Natural and man-made light source Provides warmth and light Dynamic movement and colour temperature Fixed or portable location Poor colour depiction Used in present day</td>
<td>1800K – 2700K</td>
</tr>
<tr>
<td>3000 YEARS AGO</td>
<td>OIL</td>
<td>Burning of fats and fish oils by the wealthy. Man-made light source Provides small amount of light Dynamic movement Warm colour temperature Poor colour depiction Originally a luxury light source Rarely used in present day</td>
<td>1800K – 2700K</td>
</tr>
<tr>
<td>14TH CENTURY</td>
<td>CANDLES</td>
<td>The first candles used in wealthy homes were made of beeswax and whale fat. Man-made light source Provides small amount of light Dynamic movement Warm colour temperature Poor colour depiction Originally a luxury light source Used in present day</td>
<td>1800K – 2700K</td>
</tr>
<tr>
<td>19TH CENTURY</td>
<td>GAS</td>
<td>Gas was the first advancement in lighting in hundreds of years. This was driven by factory owners during the industrial revolution to extend the working day. Man-made light source Little dynamic movement Warm colour temperature Poor colour depiction Originally a luxury light source Rarely used in present day</td>
<td>2200K</td>
</tr>
<tr>
<td>20TH CENTURY</td>
<td>ELECTRIC</td>
<td>Queen Victoria was a key influencer in introducing electric lighting to the UK during her reign. Man-made light source Provides varied light levels Little dynamic movement Dynamic colour temperature Fixed or portable location</td>
<td>Incandescent / Halogen: 3000K Sodium: 2200K Fluorescent: 3000-4000K Metal Halide: 5000K LED: 1800K – 6500K</td>
</tr>
</tbody>
</table>
Our framework

Our experience has lead us to develop a process which will inform a heritage lighting strategy, tailored to each individual project:

1. Survey
2. Research
3. Classification
4. Luminaire Restoration
5. Technical
6. Lighting Strategy

CONSERVATION PRINCIPLES, HISTORIC ENGLAND, 2018

1. Repair: Work beyond the scope of maintenance, to remedy defects caused by decay, damage or use, including minor adaption to achieve a sustainable outcome, but not involving restoration or alteration.
2. Restoration: To return a place to a known earlier state, on the basis of compelling evidence, without conjecture.
3. Alteration: Work intended to change the function or appearance of a place.
1 **Survey**
   - Benchmark the existing lighting scene to quantify visual characteristics such as shadow, brightness and contrast.
   - Determine the key viewpoints, approaches and journeys to the building or space.

2 **Research**
   - Invest time in research into the site history to form the basis of the lighting strategy and luminaire treatment.
   - Establish a time-line of events and modifications to the project including architectural intentions, social opinion, local and national events, luminaire modifications and light source developments.

3 **Classification**
   - Designate a classification to each of the existing luminaires for early validation that coordinates with the project-specific Heritage Management Plan\(^1\).
   - Define the principles of the lighting treatment for each luminaire classification.

4 **Luminaire Restoration**
   If no luminaires are classified as ‘heritage’, move to Step Five:
   - Create a lighting specification for each luminaire that connects to findings in Step Two: Research.
   - Remove a sample of luminaires for closer inspection to determine their construction, condition and materiality and confirm their age.

5 **Technical**
   - Determine the most suitable light source and qualities for each space by looking at the survey results in Step One: Survey and complete mock-ups.
   - Consider appropriate use of lighting technology, energy use and sustainability.
   - If suitable, incorporate other services within the luminaires such as location-based services, WiFi and CCTV equipment.

6 **Lighting Strategy**
   - Balance the lighting strategy between the conservation requirements and the modern lighting design guidance requirements.
   - Specify a lighting strategy for each type of space in accordance with Historic England’s Conservation Principles.
   - Complete mock-ups to determine the lit effect.

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\(^1\) A Heritage Management Plan details how the site will be maintained and preserved and its significance.
Case studies

Manchester Town Hall, Manchester

Project involvement: 2017
Completion date: 2024

Our recent collaboration with Manchester City Council on the seven-year restoration of one of Britain’s finest examples of neo-gothic architecture revealed a series of challenges, forgotten terminology and treasures. During the research phase of the framework, one of the discovered terms was ‘gloomth.’ Gloomth was originally coined by Horace Walpole, the great pioneer of Gothic culture, and was captured by Alfred Waterhouse in the Grade I Listed Manchester Town Hall. It represents the use of warm colours and gloom with dark shadows. Our lighting concept intended to retain the dark shadows, crevices and sunlit patches to enable the preservation of gloomth and Waterhouse’s original design intention.

The heritage luminaires required elements of replication and restoration. Replication was considered applicable if the luminaires were no longer in-situ but there was evidence of what was once there. Through research and archive evidence, existing heritage luminaires were confirmed and specified with appropriate levels of restoration.

By replicating and restoring the luminaire portfolio, we provided the following opportunities:

- Education for the public about past technologies by retaining the gas burners and documenting our research
- Reduced energy consumption with the incorporation of wireless control systems and location-based services into the lighting technology
- Allowing for safe-movement through improvement of the lighting levels and colour consistency around the building

“Alfred Waterhouse’s building was the first in Manchester to experiment with electric lamps. The lighting concept reflects on the past and present lighting scenarios and couples them with the project’s refurbishment aspirations.”

The lighting team was appointed to provide the services listed below in collaboration with an Arup multi-discipline design team:

1. Complete RIBA work stage design for the internal lighting, façade lighting and adjacent Albert Square public realm lighting.
2. Planning advice and documentation.
3. Heritage luminaire specification for >90 luminaires.
4. Replica luminaire design with nine different styles.
Lighting mock-up of one element of the lighting strategy to trial different colours on Manchester Town Hall facade.

Image: © Arup
Royal Liver Building, Liverpool

Project involvement: March 2019  
Completion date: November 2019

Owners of the Grade I Listed Royal Liver Building, situated on Liverpool’s UNESCO world heritage site, sought to breathe life into the area by investing in a new façade lighting scheme. By understanding the wider benefits to the community and city, the scheme aims to rediscover the majesty and form of this iconic building during the hours of darkness.

To create a hierarchy that defines how lighting should be applied and focused on the façade, we mapped the key journeys and viewpoints across Liverpool and aligned this with the visual prominence of the architectural elements.

Illumination of the clock towers and the famous Liver Birds were key to the lighting concept. Research revealed how fundamental these elements were to Liverpool’s maritime heritage and the city’s story. Highlighting these dominant elements became paramount; one of the main concept statements was the reinstatement of the original purpose of the clock towers into a 21st century digital format. By embedding digital control technology into the design solution, we have enabled a dynamic visitor experience to the Pier Head which honours the intentions of the iconic clock faces.

Through a sympathetic façade lighting scheme, we are able to reconnect the Royal Liver Building back to Liverpudlians and visitors and bring a revival to the waterfront by further promoting the area as a desirable nocturnal destination.

“Rediscovering the building through one of the first lighting experiences of its kind in the UK.”

Arup’s lighting team was appointed to provide the following services:

• Complete RIBA work stage design for the facade lighting and internal atrium
• Planning advice and document
• Content design for a regular façade lighting show

Clock tower lighting by Arup for the Royal Liver Building

Image: © Arup
Facade lighting installation for the Royal Liver Building.
Image: © Arup

“We were impressed with their considered approach to lighting a heritage building as well as their exciting concept. Arup’s lighting scheme will be one of the first of its kind in the UK, showcasing Liverpool’s spirit and hopefully setting a new trend in the approach to lighting heritage sites.”

Simon Hepple,
Director, CBRE

Lighting visualisation of the facade lighting strategy for the Royal Liver Building.
Image: © Arup
About Arup

Arup is a global firm of planners, designers, engineers and business consultants. We provide a diverse range of professional services to clients around the world, exerting a significant influence on the built environment. The firm is the creative force behind many of the world’s most innovative and sustainable building, transport and civil engineering projects and design technologies.

Established in 1946, Arup has over 14,000 employees based in 88 offices across 33 countries, working on up to 10,000 projects at one time. Its unique structure, with the firm held in trust on behalf of its employees, gives us complete independence.

Heritage at Arup

Our conservation-accredited team provides creative and technical services for heritage work across all disciplines. Through research, analysis, interpretation, design, stakeholder liaison and consent applications we enable development opportunities in historic sites while celebrating their unique significance.

Working with owners, occupants, funders, developers, local authorities and other key stakeholders, we deliver sensitive and innovative solutions for some of the world’s most beautiful places.
Lighting Design

Arup’s lighting designers create thoughtful, sustainable and award-winning concepts with light. Our designs are driven by a keen desire to understand the way people use places, and the unique cultural context. From sensitive historic interventions to engagement with the public via interactive light, we combine creativity with technical expertise to propose sympathetic solutions that enhance and preserve our heritage.

Some of the lighting heritage services include:

- Feasibility studies
- Heritage luminaire specification
- Complete RIBA work stage design
- Retrofit digital / technical solutions
- Facade lighting
- Content design
- Planning advice
- Branding
- Masterplanning
- Daylight analysis
- Wayfinding
- Environmental impact assessment
- Replica luminaire design
- Bespoke luminaire design
- Budget-setting
- Scope defining
- App development
- External lighting
- Exhibition lighting
We shape a better world

ACKNOWLEDGEMENTS
Case Studies
Manchester City Council
CBRE
Graphic Design
Visual Communications Team
Editors
Alex Wethered

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