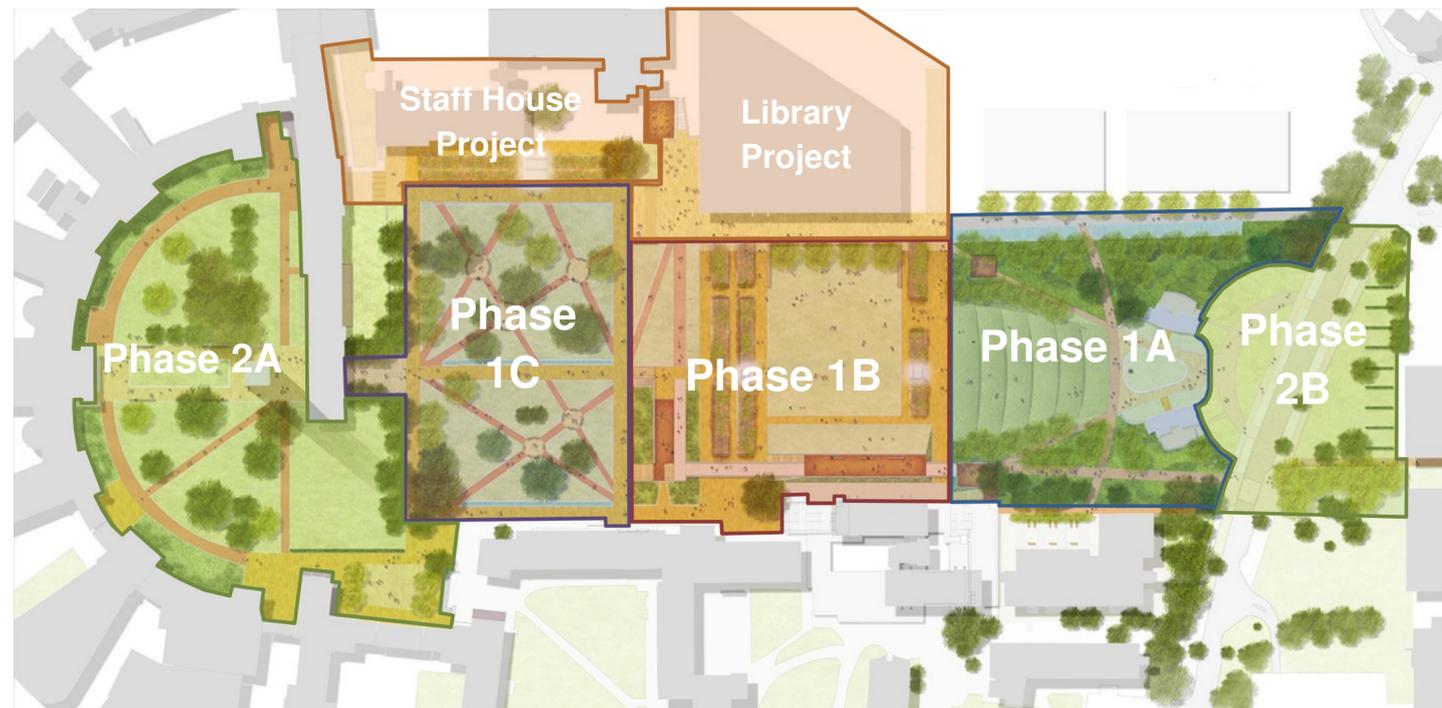


11 Phasing



12 Lighting

Lighting will play a key role in the success of the Green Heart redevelopment. The various public spaces will be used a great deal after dark, and in particular during the busy winter months. It is therefore critical that the area is well illuminated in relation to its context, not only to meet the requirements of safety and security of the students, staff and visitors but also to provide a character that is appropriate to the landscape. This section of the Design and Access Statement aims to briefly summarise the lighting intent.



12.1 Themes

The strategic design for the lighting of the site is based on three key themes:

Safety + Security

The primary role of the lighting is to keep people safe and secure. Lighting standards have therefore been selected to harmonise with the University's requirements and to provide both horizontal and vertical illuminance that is appropriate to a landscaped area with busy footfall. Warm white light sources with a broad spectrum will be used to ensure good recognition and the accurate rendering of colours.

Movement + Encounter

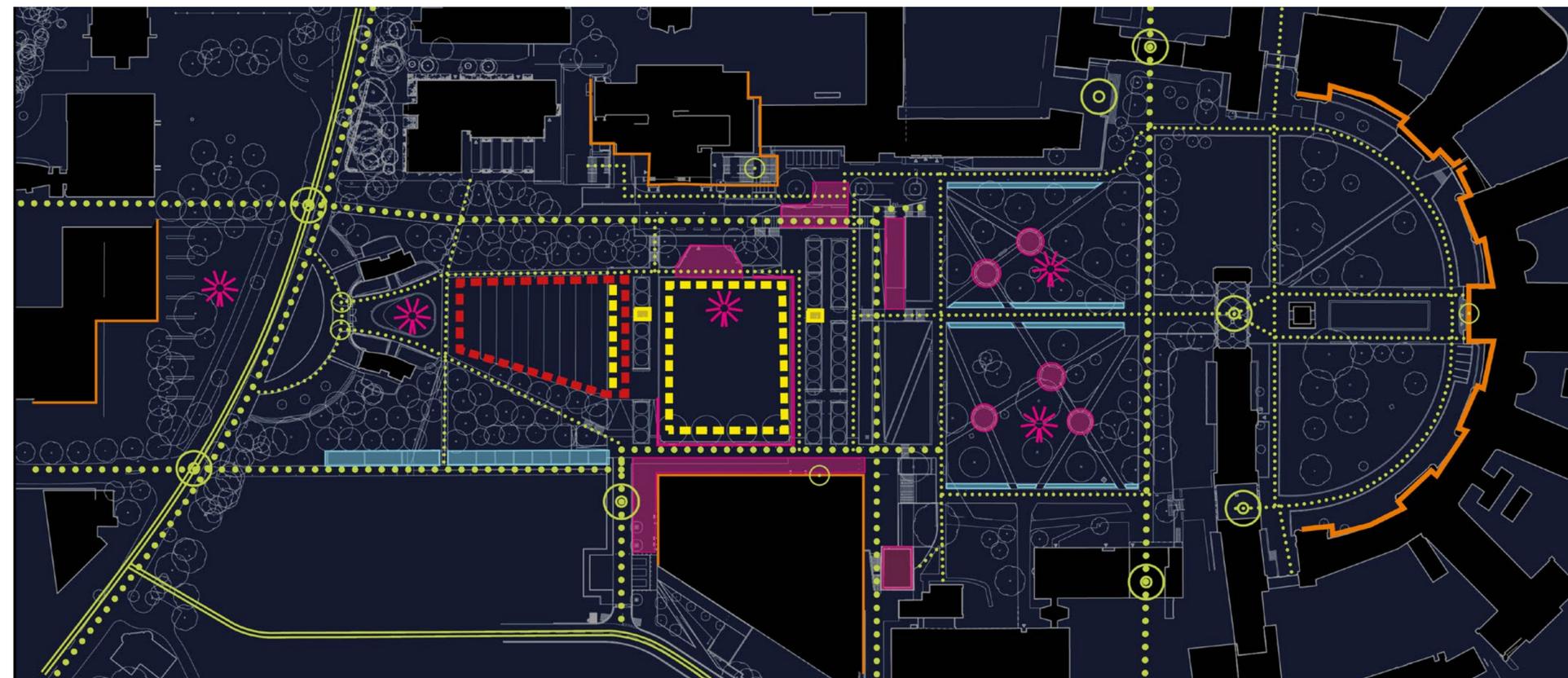
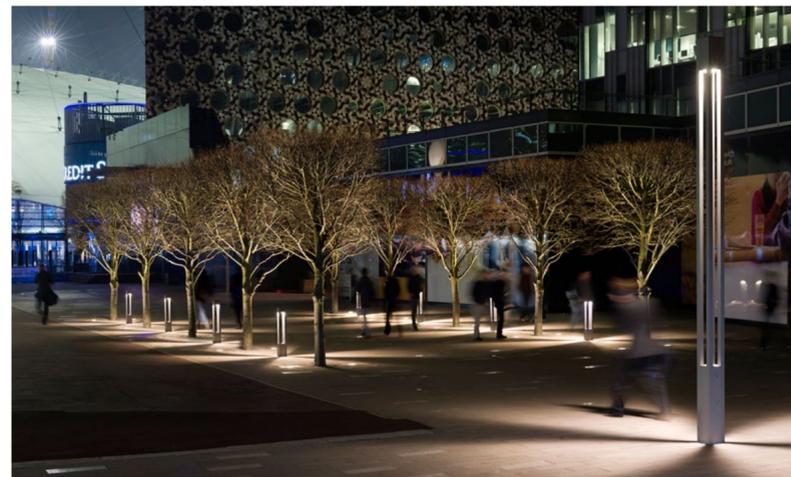
The lighting has been designed to both support aims of the overall landscape concept in supporting movement and promoting interaction between people using the site. This is to be achieved by clearly illuminating the routes to respect their hierarchy and then highlighting key junctions and meeting spaces. The lighting has also been designed to meet the general requirements for accessibility for all.

Movement + Encounter

The lighting has been designed to both support aims of the overall landscape concept in supporting movement and promoting interaction between people using the site. This is to be achieved by clearly illuminating the routes to respect their hierarchy and then highlighting key junctions and meeting spaces. The lighting has also been designed to meet the general requirements for accessibility for all.

Sustainability + Flexibility

The need for light for both safety and security and social interaction needs to be balanced against potential adverse environmental impacts including energy use, light pollution and damage to local ecologies. The lighting design has taken a progressive approach by avoiding over-lighting and retaining natural darkness in areas where appropriate. The use of low energy light sources (LEDs) and area control (dimming) will assist in managing energy. Flexibility is required to support a programme of events after dark.



<ul style="list-style-type: none"> — Vehicular Route ●●●● Primary Pedestrian Route ⋯⋯⋯ Secondary Pedestrian Route — Primary Landmark — Secondary Landmark ■ Outdoor Social/Study Space ■ Informal Teaching & Event Space ■ Event & Performance Space ■ Amphitheatre ■ Water Feature ○ Major Gateway ● Minor Gateway ✱ Public Art 	<p>Route</p>	<p>Landmark</p>	<p>Landscape</p>	<p>Water</p>
	<p>Space</p>	<p>Gateway</p>	<p>Art</p>	

12.2 Quality of Light

The quality of light has been carefully selected as follows:

Intensity

The intensity of the lighting has been graded to reduce strong contrasts that will create problems with the perception of the lit environment. Brightly lit areas can create dark adjacencies. The use of broad spectrum white light sources with fittings placed to provide good uniformity to key routes and spaces allows good adaptation of the eye through the use of carefully controlled levels of light.

Colour

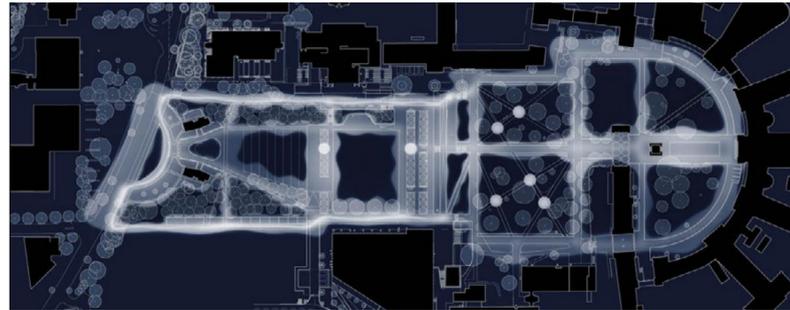
The colour temperature of the light will be warm for all routes (3000°K) and generally cool for landscaped elements such as trees, planting and water (4000°K). Colour rendering of the light sources will be good to accurately reveal colours of materials, skin tones, etc. (<Ra80).

Texture

The discrete lighting of key landscape features such as mature trees and planting, water features, etc., introduce texture and colour into the visual scene on a seasonal basis adding interest and reinforcing the landscape design.

Scale

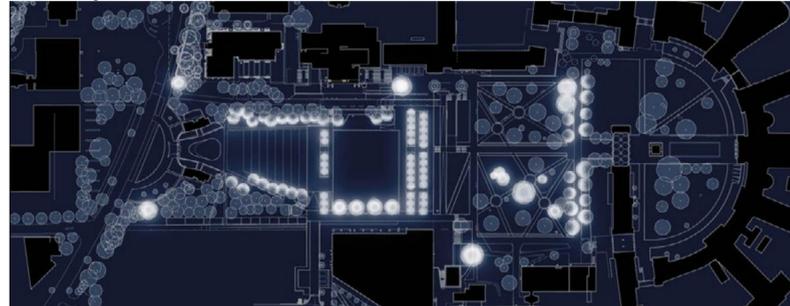
The light fittings and intensity of light have been designed to create a human scale to the area after dark. The edges of the area are lit more brightly and with higher light columns allowing the central area to be lit to a lower level such that key views and vistas are retained after dark.



Intensity diagram



Colour diagram



Texture diagram



Scale section



12.3 Areas

The following is a description of the lighting design by area. The phasing of the lighting will be related to that of the landscape design and implementation.

Chancellor's Court

This area provides for a simple landscape lighting approach within the tradition of the illumination of a major park or garden. Illumination is provided to the secondary routes to the perimeter of the space from post-top mounted lanterns providing a human scale. These will provide safe and secure lighting with good vertical illuminance to aid recognition. Whilst the pathways across the landscaped central space are not directly lit to help reduce clutter concealed lighting from benches at the nodal points combined with the feature lighting of key tree groups will contribute to the perception of safety and aid legibility. It will also encourage such spaces to be continued to be used after dark for interaction.

A scheme for the illumination of the main facades and clock tower would greatly benefit the area in terms of providing a lit backdrop to the activity of the Chancellor's Court and to help reinforce the main vista through the landscape when seen after dark. Such a project would form part of a separate, future project.

The key elements of the lighting to this area are:

- 4m high post-top mounted lanterns using warm white LED (3000K) to provide general area lighting to the footpath.
- Adjustable in-ground luminaires using cool white light (4000K) to uplight trees to provide natural colour and texture.
- Surface mounted linear luminaires using warm white light (3000K) to be concealed to underside of curved benches to wash floor.

The secondary routes are to be lit to provide an average maintained illuminance of 4 lux with a uniformity of 0.25 to meet class P4 as defined by BSEN13201/BS5489.

University Square

As per Chancellor's Court this area provides for a simple landscape lighting approach within the tradition of the illumination of a major park or garden. Illumination is provided to the secondary routes to the perimeter of the space from post-top mounted lanterns providing a human scale. These will provide safe and secure lighting with good vertical illuminance to aid recognition. Whilst the pathways across the landscaped central space are not directly lit to help reduce clutter concealed lighting from benches at the nodal points combined with the feature lighting of key tree groups will contribute to the perception of safety and aid legibility. It will also encourage such spaces to be continued to be used after dark for interaction.

The key elements of the lighting to this area are:

- 4m high post-top mounted lanterns using warm white LED (3000K) to provide general area lighting to the footpath.
- Adjustable in-ground luminaires using cool white light (4000K) to uplight trees to provide natural colour and texture.
- Surface mounted linear luminaires using warm white light (3000K) to be concealed to underside of curved benches to wash floor.

The primary route that bounds the north of Chancellor's Court / south of University Square is to be lit to provide an average maintained illuminance of 8.6 lux with a uniformity of 0.25 to meet class P2 as defined by BSEN13201/BS5489.

All secondary routes are to be lit to provide an average maintained illuminance of 4 lux with a uniformity of 0.25 to meet class P4 as defined by BSEN13201/BS5489.

Important note: Whilst the centre of the square will be illuminated through feature lighting to the trees and benches the garden is not lit to a definable standard.



Circular benches



Primary pedestrian



Uplight to trees



Facade lighting

Library Square

This area will be illuminated to provide a safe and secure heart to the scheme whilst at the same time preserving the tradition of illumination associated with a grassed university square. Whilst the hard landscaped area to the perimeter of the square will be illuminated to three sides by a combination of sources the north side continues the idea of retaining a clutter free environment as an extension to the amphitheatre. This approach aims to create a strong and dramatic character that employs the contrast between light and darkness to create an area which not only promotes movement around the central lawn but also encourages interaction to take place.

The main lit elements for this area are:

- 10m high adjustable column mounted spotlights using warm white light (3000K) to provide general area lighting to the hard landscaped route to the west of the square adjacent to the library.
- Surface mounted linear luminaires using warm white light (3000K) to be concealed to underside of benches to wash route.
- Surface mounted linear luminaires using warm white light (3000K) to be concealed to edge of lawn to define the pathway to the south and east of the square.
- Adjustable in-ground luminaires using cool white light (4000K) to uplight trees adjacent to pavilions using cool white light (4000K) to create visual boundary to space.
- Adjustable in-ground luminaires using cool white light (4000K) to uplight feature trees to lawn provide natural colour and texture.

The routes to the western and eastern perimeter of the lawn are to be lit to provide an average maintained illuminance of 8.6 lux with a uniformity of 0.25 as defined by BSEN13201/BS5489.

Important note: Whilst illuminated by spill and feature lighting and benefitting the highlighting of vertical features such as trees and the pavilion the northern area and southern pathway to the Library Square is not lit to a definable standard.

Cafe'

The alfresco seating area to the café to the east of the Library Square is to be illuminated to create a safe and secure but informal ambience.

The key elements of the lighting scheme for this area are as follows:

- Surface mounted wash lights using warm white LED (3000K) to provide general area lighting to alfresco eating area.
- In-ground linear luminaire using warm white LED (3000K) to uplight vertical surfaces either side of café to create a lit boundary to the space.

The alfresco eating area is to be lit to provide an average maintained illuminance of 8.6 lux with a uniformity of 0.25 to meet class P2 as defined by BSEN13201/BS5489. Pavilions

The glass pavilions are simply illuminated to become glowing features after dark. When contrasted with the landscape lighting they will become important lit objects within the landscape that will promote interaction.

The key elements of the lighting scheme for these structures are as follows:

- Surface mounted linear luminaires using warm white light (3000K) to be integrated into the edge of the vertical supporting glass fins to provide ambient and feature illumination.
- Surface mounted linear luminaires using warm white light (3000K) to be concealed to underside of linear benches to wash floor.

Bridge

The illumination of the main bridge deck is to provide safe lighting to the route whilst not compromising the views into the landscape. The underside of the bridge is to be uplit and the general area below it directly illuminated to help create a safe environment whilst revealing the form of the structure.

The key elements of the lighting scheme for this structure is as follows:

- Recessed wash-light module using warm white LED (3000K) to be integrated into handrail to wash deck of bridge to create a safe level of illumination.
- In-ground adjustable luminaire using warm white LED (3000K) to uplight underside of bridge deck to help reduce shadowing effect.

The bridge deck is to be lit to provide an average maintained illuminance of 30 lux with a uniformity of 0.5 as defined by BSEN13201/BS5489.



Trees canopy



Pavilions



Bridge



Underseat lighting



Pavilions



Bridge

Steps

All steps are to be directly illuminated from lighting integrated into the handrails to support safety.

The key lighting element is as follows:

- Recessed wash-light module using warm white LED (3000K) to be integrated into handrail to illuminate flights to create a safe level of illumination.

The steps are to be lit to provide an average maintained illuminance of 30 lux with a uniformity of 0.5 as defined by BSEN13201/BS5489.

Ramp

The main ramp to the southern threshold of the bridge and raised terrace is to be illuminated in two sections. The upper section is to be directly illuminated from lighting integrated into the handrail to support safety. The lower section is to be illuminated from low level lighting that marks the route,

The key lighting elements are as follows:

- Recessed wash-light module using warm white LED (3000K) to be integrated into handrail to illuminate flights to create a safe level of illumination.
- Surface mounted luminaire using warm white LED (3000K) to create wash to path to help define the route.

The upper ramp is to be lit to provide an average maintained illuminance of 30 lux with a uniformity of 0.5 as defined by BSEN13201/BS5489.

Important note: Whilst the lower section of the ramp is defined by low level illumination it does not meet a definable standard.

Raised Terrace

This area is illuminated from reflected light that help illuminate the main vertical surface including the feature shields and which then reflects light onto the terrace.

The key lighting elements are as follows:

- In-ground linear washlight using warm white LED (3000K) to uplight main wall surface and reflect light onto terrace.

Archaeology Terrace

This area is illuminated from low level lighting from the perimeter of the terrace, this help provides definition and legibility to the terrace.

The key lighting elements are as follows:

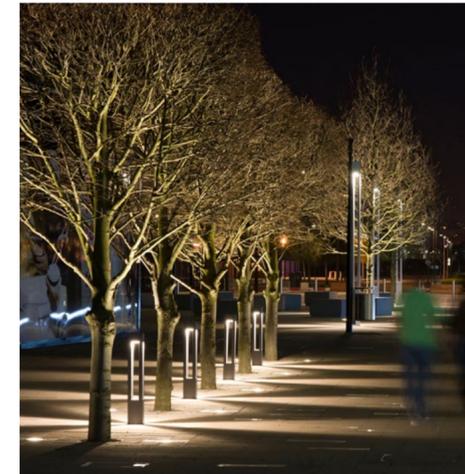
- Recessed washlight using warm white LED (3000K) to create a wash to the terrace to help define the terrace.

Muirhead Service Yard

This area is to be simply and safely illuminated in a manner that compliments the main area. Good visibility is to be maintained within the car parking area with feature lighting to the central tree and adjacent benches to help create a positive ambience.

The key lighting elements for this area are:

- 4m high post-top mounted lanterns using warm white LED (3000K) to provide general area lighting to the footpath.
- Surface mounted linear luminaires using warm white light (3000K) to be concealed to underside of benches to wash paved surface local to seating area.
- Surface mounted wash lights using warm white LED (3000K) to provide general area lighting to service area.
- Adjustable in-ground luminaires using cool white light (4000K) to uplight tree to provide natural colour and texture.



Lighting standards



Handrail



Handrail

Amphitheatre

The amphitheatre is a key open area where there is a desire to leave the landscape clutter free. Whilst the grassed area is therefore not directly illuminated spill light from the illumination of the secondary routes to the perimeter and the feature uplighting of major trees that help define the space will help create a legible environment after dark. Lighting for temporary events is to be provided via an electrical and data infrastructure to be design and engineered by others.

The key elements of the lighting to this area are:

- 4m high post-top mounted lanterns using warm white LED (3000K) to provide general area lighting to the footpath.
- Adjustable in-ground luminaires using cool white light (4000K) to uplight trees to provide natural colour and texture.

Important note: Whilst illuminated by spill light the amphitheatre is not lit to a definable standard.

West Path

The West path is a primary route and is to be well illuminated with warm white light to provide a safe and secure environment after dark with positive vertical lighting to aid recognition. This will help to support and promote movement through the site. The lighting will be achieved through adjustable luminaires mounted at a higher scale which will help emphasise the importance of the routes and assist with way-finding. The entry points to the primary routes from the north will be announced by the feature lighting of existing mature trees and supplemented along the western route by the illumination of the water feature and tree groups immediately adjacent to the path and to tree groups only along the eastern route.

The key elements of the lighting to this routes is as follows:

- Adjustable in-ground luminaires using cool white light (4000K) to uplight major trees to provide natural colour and texture.
- 10m high adjustable column mounted spotlights using warm white light (3000K) to provide general area lighting to the footpath.
- Additional adjustable spotlights using warm white light (3000K) to be mounted onto the columns to provide positions for providing feature lighting to the mature trees adjacent to the footpath.
- Surface mounted linear luminaire using cool white LED (4000K) to be integrated into water feature to highlight changes of level and related movement of water. The primary routes are to be lit to provide an average maintained illuminance of 8.6 lux with a uniformity of 0.25 to meet class P2 as defined by BSEN13201/BS5489.

Secondary Routes

The secondary routes to this area are to be well illuminated with warm white light. Whilst lit to a lower level than the primary routes they will continue to provide a safe and secure environment after dark with positive vertical lighting to aid recognition. This will help to support and promote movement across the site between the primary routes. A reduced scale is achieved by using more human scale post top mounted luminaires. The key elements of the lighting to these routes is as follows:

- 4m high post-top mounted lanterns using warm white LED (3000K) to be located adjacent to the low hedges to provide general area lighting to the footpath.

The secondary routes are to be lit to provide an average maintained illuminance of 4 lux with a uniformity of 0.25 to meet class P4 as defined by BSEN13201/BS5489.

North Gate

The North Gate and general entrance area will be illuminated with white light to create a warm and welcoming environment. Whilst the area will be lit to provide a safe and secure entry into the site the lighting shall not be so bright as to detract from the principle vista through the main landscaped space. This is to be achieved by utilising a combination of lower scale column mounted lanterns and concealed low level landscape lighting. The main historic gateway is to be highlighted to assist with way-finding and create a positive threshold. The raised central lawn is to be lit as a feature to ensure the centre of the main space does not feel dark.

The key elements of the lighting to this area are as follows:

- Linear in-ground luminaires using warm white LED (3000K) to uplight existing gateways to frame views into entrance area.
- 4m high post-top mounted lanterns using warm white LED (3000K) to provide general area illumination and positive safety lighting to the shared surface.
- Surface mounted exterior lanterns using warm white LED (3000K) to illuminate the entrances to each of the listed gatehouse buildings (final selection of the fittings is to be sympathetic to the existing architecture).
- Surface mounted linear lighting using warm white LED (3000K) to be concealed to the edge of the raised lawn to supplement the general area illumination and provide a lit central feature.

The entrance area is to be lit to provide an average maintained illuminance of 4 lux with a uniformity of 0.25 to meet class P4 as defined by BSEN13201/BS5489.



Amphitheatre



Amphitheatre - event



Secondary routes precedent



Entrances

12.4 Technical

Sources

LED light sources are to be used throughout the scheme. To help guard against colour inconsistency, LEDs of a single colour temperature will be employed across the scheme that are within 3 step macadam ellipses. It is proposed to minimise the number of manufacturers to ensure colour consistency across the project.

Luminaires

Lighting equipment will be mounted such that key views to landmarks, features and nodes are protected as far as possible. The scale of lighting equipment should appear in proportion to its spatial context. The primary pedestrian routes use higher mounting positions to create a grand and processional, highly uniform route. By contrast, the second and tertiary routes make use of a low mounting heights to support a more intimate, less uniform ambience.

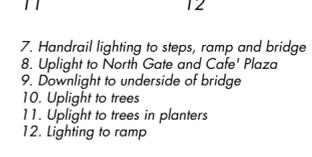
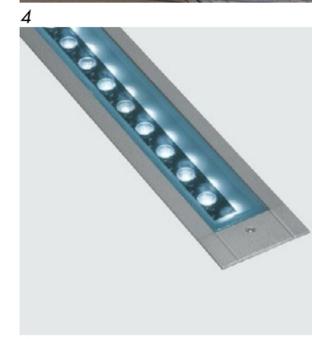
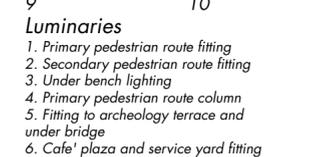
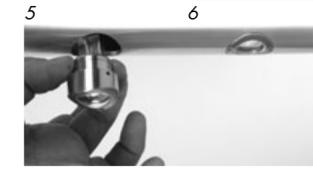
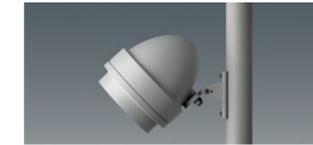
Control

A site-wide lighting control system will be implemented to provide a flexible and intelligent lighting system that is tailored to meet the needs of the University's students, staff, visitors and wildlife at all times and which ensures that lights are dimmed or switched down whenever/wherever possible but without compromise to safety and security. This should provide remote monitoring and individual addressing of light sources via a number of inputs such as astronomical time-clock, photocell, manual override and other remote triggers.

The Green Heart project is designed with a number of inter-linked lighting zones to allow additional flexibility, this enables the zones to have different pre-set lighting scenes or events running at the same times.

The lighting control system will provide a minimum of 5no static lighting scenes for each zone.

- Early Evening lighting scene: automatically activated by astronomical time-clock 30 minutes before sunset and remain in operation until 10pm.
- Late Evening lighting scene: automatically activated by astronomical time-clock at 10pm and remain in operation until 2am.
- Overnight lighting scene: automatically activated by astronomical time-clock at 2am and remain in operation until dawn when it will switch off.
- Event lighting scene: manually activated via the control panel and will remain in place until either the next timed-event or manually changed.
- Security lighting scene will be manually activated via the control panel and will remain in place until either the next timed-event or manually changed.



Lighting Standard diagram



Control - Early evening lighting scene



Control - Late evening lighting scene



Control - Overnight lighting scene

Luminaires

1. Primary pedestrian route fitting
2. Secondary pedestrian route fitting
3. Under bench lighting
4. Primary pedestrian route column
5. Fitting to archeology terrace and under bridge
6. Cafe plaza and service yard fitting

7. Handrail lighting to steps, ramp and bridge
8. Uplight to North Gate and Cafe Plaza
9. Downlight to underside of bridge
10. Uplight to trees in planters
11. Uplight to trees in planters
12. Lighting to ramp

13 SUDS Technical Summary

Infiltration is the primary means of surface water disposal throughout the Green Heart. Localised infiltration, or shedding runoff directly into adjacent landscaping, is used wherever possible with centralised storage and infiltration in the Library Square used for larger paved areas. Rainwater will be dealt with in each area as follows.

Chancellors Court

The paved areas will continue to discharge to the existing gullies and surface water drains

University Square

The main paths will be laid with surface falls toward 4 adjacent strips of planting. The soil level within the beds shall be set 100mm below the adjoining path so that rain discharges under gravity into these beds.

New Library Square

Paving will fall toward generous rain garden beds. The soil level will be set 100mm below the adjoining path so that rain discharges under gravity into these areas. The soil profile within the bed will have a domed profile so that the effects of de-icing salt will be kept to a minimum.

Amphitheatre

The grass steps will be laid with a back fall to facilitate surface retention of rain water.

North Gate

The central pear shaped lawn will be laid so that it is lower than the surrounding paving with falls laid toward this area of grass.

The site remains divided between north and south outfalls.

The existing subway and substation, and the east / west earthwork serve as a natural divide between extents of transformation, in that the bulk of site transformation occurs north of this barrier. However based on positions and levels of existing sewers, a portion of the northern catchment discharges to the southern outfall.

The Statutory required climate change percentage to be considered in drainage design has increased in 2016 from 30% to 40% in the 1 in 100 year storm event. The storage volumes will not produce any discharge in the 1 in 1 year event, and the 1 in 100 year plus climate change event will be restricted to the 1 in 30 year greenfield runoff rate. With this approach the proposed discharge from the development area will not be higher than the greenfield runoff rate for any return period.

Figures A and B reflect the existing and proposed hydrologic catchment areas including estimated discharge rates

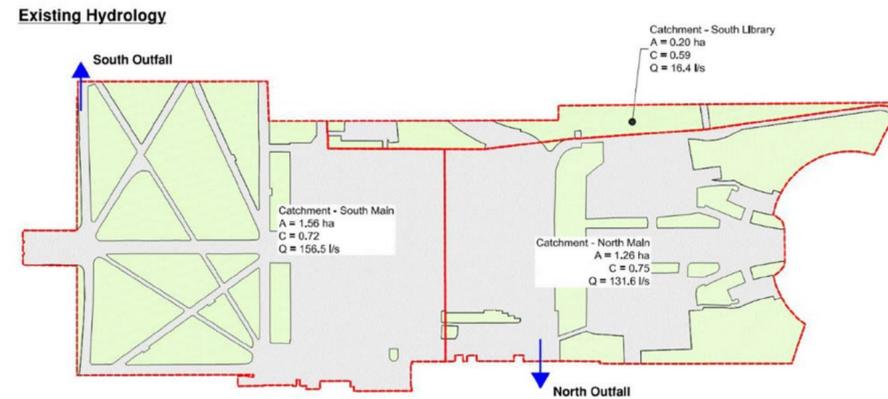


Figure A: Existing Hydrology

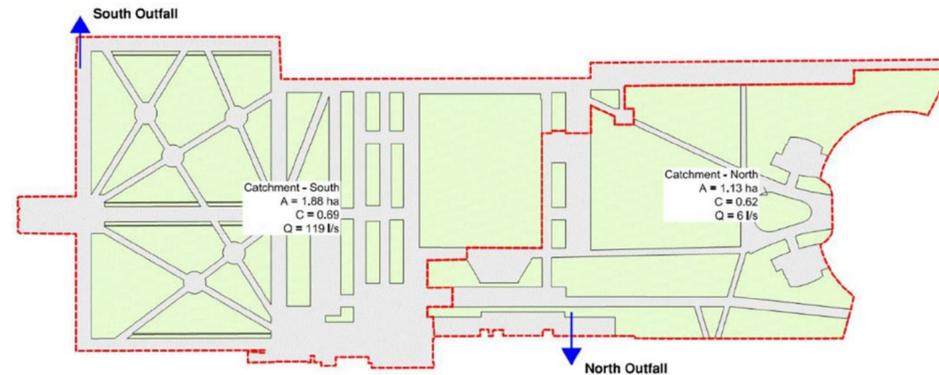


Figure B: Proposed Hydrology

Churchman

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