

Hull UK City of Culture 2017  
**Project Blade**  
Feasibility Study

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 249697

**Ove Arup & Partners Ltd**  
Admiral House Rose Wharf  
78 East Street  
Leeds LS9 8EE  
United Kingdom  
[www.arup.com](http://www.arup.com)

**ARUP**

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# 1 Introduction

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Arup has been commissioned by Hull UK City of Culture 2017 Ltd (“Hull 2017”) to undertake this study into the feasibility of realising the installation of Nayan Kulkarni’s temporary public artwork ‘Blade’ – comprising the installation of a Siemens B75 wind turbine blade within Queen Victoria Square at the centre of the city of Kingston upon Hull.

This report describes the concept for the installation and identifies the key governance, technical, programme and economic issues associated with the realisation of the artwork. A high level risk assessment has also been undertaken to identify some of the key risks associated with this project.

The purpose of this report is to inform Hull 2017’s, and other stakeholders, consideration of the viability of this proposal and their decision as to whether or not to commission the work as part of the ‘Look Up’ programme of temporary artworks.

*This is a confidential report – all parties given access to this document are deemed to have signed Hull 2017’s Non-Disclosure Agreement and are bound by its terms.*

## 2 The Proposal

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### 2.1 General

Throughout 2017, Hull will be celebrated as the UK's City of Culture. The first three months of 2017 are themed "Made in Hull". Artist Nayan Kulkarni was commissioned by Hull 2017 to develop his concept of 'interrupting' the newly revitalised Queen Victoria Square with the installation of a single, 75 metre long wind turbine blade – one of the first to be made in Hull.

*Nayan Kulkarni proposed that "the artwork should be finely poised on the cusp between a material fact and an image, an interruption in the square that is a material fact, a hand crafted object. It will be a beautiful and spectacular re-orientation of the city centre. And, simply a 'readymade' which will contribute to a revolving pattern of recycling and regeneration. A sculpture which takes its form from an object born out of ecological concern. A work which by its very presence is also a surprise – like a ship in a bottle raises questions and incites wonder."*

As part of wider initiatives to develop the UK's offshore wind industry, Siemens have invested £310m in a new wind turbine blade manufacturing facility in Alexandra Dock, Hull. The facility is nearing completion and will shortly move into production. Siemens have appointed a significant part of their workforce and are implementing a programme in Hull and Denmark to train these new workers to make the turbine blades. The largest wind turbine blade Siemens produce is the B75 – this is 75.4m long and 4.6m diameter at the "root" end of the blade. This blade will be made in their Hull facility.

Programmed to mark the start of UK City of Culture 2017, and the significance of Siemens' commitment to Hull, it is proposed that a B75 turbine blade is installed within the city centre as part of the "Made in Hull" season.

This artwork was conceived by the artist Nayan Kulkarni and he has been commissioned by Hull 2017 to develop his proposal. The working title for the project is 'Blade'.

### 2.2 Parties Involved

The parties involved in the project to date are as follows:

- Hull 2017 – Project Sponsor, responsible for coordinating funding and overall delivery of the project.
- Siemens – Loan and transportation of the blade
- ALE (as subcontractor to Siemens) – specialist transport and installation.
- Arup – technical project definition, costing and risk management.
- Nayan Kulkarni – Artist

- Andrew Knight & Hazel Colquhoun (as consultants to Hull 2017) – ‘Look Up’ curators

## 2.3 Location Chosen for the Installation

It is proposed that the blade be installed within Queen Victoria Square. This location has been selected based on consideration of the following criteria:

**Table 2.1: Selection criteria for locating the installation**

| Criteria                                          | How applied                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Visibility                                        | To help promote Hull to a UK audience and to communicate the wider issues related to the blade, a highly visible location is preferred. Locations within the retail core of the city are therefore preferred. Images of the blade will be seen worldwide – the background to these images should show a positive image of the city and its heritage.                        |
| Impact on highways                                | It is preferred that the blade is located in a pedestrianized area so that impact to traffic (including buses and taxis etc.) is minimised. Where the blade overhangs a service route, an appropriate clearance envelope will be maintained.                                                                                                                                |
| Minimum impact on retail premises                 | The selected location should not block access to retail units. It should also have minimum impact on sightlines between retail units many shoppers like to “zig-zag” between retail units along a street.                                                                                                                                                                   |
| Minimum impact on residential premises            | On some of the streets, residential premises are located above shops and impact on these residential units should also be minimised.                                                                                                                                                                                                                                        |
| Access for servicing vehicles                     | Some of the pedestrian areas are used for servicing retail units and civic buildings (e.g. City Hall) which do not have rear access. Large articulated lorries can access across the pedestrian areas from time to time.                                                                                                                                                    |
| Access for emergency vehicles                     | Emergency vehicle access is required to all areas. Safe routes for emergency vehicles must be provided around the installation.                                                                                                                                                                                                                                             |
| Coordination with Public Realm construction works | Construction works to repave many of the pedestrianised streets are currently underway. The majority of these works are due to be complete on 23 <sup>rd</sup> December 2016, however some areas including King Edward St North & Jameson St East (outside BHS), Beverleygate and areas north and south of the City Hall do not complete until 24 <sup>th</sup> March 2017. |
| Available transport routes                        | The blade must be able to be transported to/from the proposed location without undue disruption.                                                                                                                                                                                                                                                                            |
| Impact on buses on Carr Lane                      | The position of the blade at Queen Victoria Square will cause the tip of the blade to extend over Carr Lane. The blade will be orientated at a gradient and an appropriate clearance envelope will be maintained over the carriageway to allow vehicles (including buses) to pass under.                                                                                    |

After considering a number of options, the preferred location for the blade in Queen Victoria Square has a number of significant benefits - this location does not obstruct the highway and minimises impact on retailers, residents and servicing. The square contains many of Hull’s emblematic buildings (including the Ferens Art Gallery) and will be one of the focal points for the Hull 2017 celebrations.

It is recognised that a key risk (see also Section 10) for this location is a potential delay to the completion of the public realm construction works in Queen Victoria Square. For this reason, two potential options within the Square have been defined as follows:

- Option A (preferred) – located from the end of King Edward Street and passing between the Queen Victoria Statue and City Hall. This arrangement is shown on drawing 249697-SK-001 contained in Appendix A.
- Option B (alternative) – located from the end of King Edward Street and passing to the west of the Queen Victoria Statue – this option will only be used if the Public Realm works around City Hall are not completed by the end of the year. This arrangement is shown on drawing 249697-SK-002 contained in Appendix A.

## 2.4 Project Commencement

It is proposed that the Blade will be installed within Queen Victoria Square on the morning of 1<sup>st</sup> January. This date will firmly mark the opening of the 2017 City of Culture celebrations. The blade will make a dramatic statement which should capture national and international media attention and make a very positive statement about Hull.

Whilst it is recognised that installation on the 1<sup>st</sup> January may bring some additional labour costs, it is noted that this day is a public holiday and there will be less traffic and pedestrian activity in the city centre which will help make the installation process more straightforward.

## 2.5 Confidentiality

It is intended that the public will initially encounter the realisation of this work as a surprise and a dramatic manifestation of what ‘Made in Hull’ means. All parties and stakeholders involved in the project will therefore be required to abide by the conditions of Hull 2017’s Non-Disclosure Agreement.

However it is noted that there is a risk that the licence and permit applications will need to give some description of the event and this will need to be carefully managed. In particular, a planning application will need to be consulted on publically which would result in disclosure of information – this process therefore must be carefully managed.

## 3 Ownership & Liabilities

### 3.1 Ownership & Loan Agreement

It is proposed that the blade will remain the property of Siemens. Hull 2017 will enter into a “Loan Agreement” with Siemens to use the blade in the “Blade” art installation.

A draft form of this Load Agreement has been drafted. This identifies the “Period of Loan” as follows

**Table 3.1: Period of Loan**

| Loan Period        | Description                                                                          |
|--------------------|--------------------------------------------------------------------------------------|
| Start of agreement | Date and time when blade is installed onto its supports within Queen Victoria Square |
| End of agreement   | Date and time when blade is removed from the supports within Queen Victoria Square   |

Under the agreement, Siemens will be responsible for the operations to transport the blade to and from Queen Victoria Square and for the lifting operation. Siemens will subcontract these operations to their supplier ALE>

During the period of the loan, Hull 2017 shall be liable for the following:

- Damage caused to the blade – it is recommended that a condition survey is undertaken before handover and after return of the blade. The value of the blade is approximately £350,000.
- Damage caused to third party property
- Injuries to persons employed during the execution of the project
- Injuries to members of the public during the execution of the project.

### 3.2 Insurance

It is recommended that Hull take out an “All risks” insurance to cover for these risks, or specifically extends their current insurance to include Project Blade. The Insurance Company may wish to review and input into the risk management process for the project (see section 11).

Subcontractors and sub-consultants appointed by Hull 2017 should be required to carry Third Party [Public] Liability Insurance, and Employers Liability Insurance and Contractor’s All Risks or Professional Indemnity insurance as appropriate in order for Hull 2017 to manage their liabilities.

As identified above, ALE are likely to be employed as a subcontractor to Siemens for the transport of the blade. ALE will be expected to carry insurances to cover their works. It is recommended that a collateral warranty is put in place between Hull 2017 and ALE to cover the transport operation.



## 4 Permissions and Licences

### 4.1 Summary of Licence Requirements

This project will require Hull 2017 to obtain a number of permissions and licenses as set out in the table below. This list should be reviewed with the relevant authorities.

**Table 4.1: Likely Permission, Permit and License Requirements**

| Authority                        | Required Prior to Installation                                                                                                                                                                                                                                                                                     | Required Prior to Removal                                                                                                                                                                                                                                                                                          |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hull City Council Planning       | <ul style="list-style-type: none"> <li>• Planning consent</li> </ul>                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                    |
| Hull City Council Events         | <ul style="list-style-type: none"> <li>• Event license and/or similar to occupy Queen Victoria Square.</li> </ul>                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                    |
| Hull City Council Highways       | <ul style="list-style-type: none"> <li>• Abnormal Loads license;</li> <li>• Traffic management and Temporary Traffic Regulation Orders;</li> <li>• Suspension of parking bays, loading bays, etc.</li> <li>• Removal/reinstatement of safety barrier and street furniture.</li> <li>• Oversail license.</li> </ul> | <ul style="list-style-type: none"> <li>• Abnormal Loads license;</li> <li>• Traffic management and Temporary Traffic Regulation Orders;</li> <li>• Suspension of parking bays, loading bays, etc.</li> <li>• Removal/reinstatement of safety barrier and street furniture.</li> <li>• Oversail license.</li> </ul> |
| Highways England                 | <ul style="list-style-type: none"> <li>• Abnormal Loads license (HESO);</li> <li>• Traffic management and Temporary Traffic Regulation Orders;</li> <li>• Removal/reinstatement of safety barrier and street furniture.</li> </ul>                                                                                 | <ul style="list-style-type: none"> <li>• Abnormal Loads license (HESO);</li> <li>• Traffic management and Temporary Traffic Regulation Orders;</li> <li>• Removal/reinstatement of safety barrier and street furniture.</li> </ul>                                                                                 |
| Police                           | <ul style="list-style-type: none"> <li>• Police escort;</li> <li>• Removal of vehicles causing obstruction or illegally parked cars.</li> </ul>                                                                                                                                                                    | <ul style="list-style-type: none"> <li>• Police escort;</li> <li>• Removal of vehicles causing obstruction or illegally parked cars.</li> </ul>                                                                                                                                                                    |
| Private landowners (if required) | <ul style="list-style-type: none"> <li>• Oversail license.</li> </ul>                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Oversail license.</li> </ul>                                                                                                                                                                                                                                              |

### 4.2 Planning Consent

As the structure is >4m in height it could be classed as development. However if the Blade is to be positioned within Queen Victoria Square for up to 28 days, it will be deemed to be a temporary installation and planning consent will not be required.

Should Hull 2017 wish to retain the Blade in the square for >28 days, Hull 2017 should submit a planning application to obtain formal consent.

It is noted that a planning application would make the installation public and part of the artwork is the element of “surprise” created by its installation. It is recommended that discussions are held with the Head of Planning and Chair of the Planning Committee to agree an acceptable approach.

### **4.3 Event Licence**

Hull 2017 will require an Events licence from Hull City Council to site the Blade on the Public Highway and to run the “event”.

### **4.4 Transport Licences**

The dimensions of the blade and the potential axle loads will require the transport of the blade to comply with ‘abnormal load’ regulations. This will require the relevant authorities to be notified including Highways England, Hull City Council (as local highway authority) and Police.

It should be noted that the application process for obtaining an Abnormal Loads license, traffic management, temporary suspension of on-street parking and securing Police escort is likely to take around 12 weeks.

## 5 Transport (including Removal)

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### 5.1 Access Route Options

Abnormal Load Engineering Limited (“ALE”) have been instructed by Siemens to consider the route options available for transporting the B75 blade by road between Alexandra Docks/Siemens factory yard to Queen Victoria Square.

The following have been considered in the high level route review:

- The overall dimensions of the B75 Turbine Blade are taken from Siemens drawing D3179302 rev. 003 as 75.422m (length), 6.378m (width) and approx. 4.6m (height).
- The transport weight of the B75 Turbine Blade is approx. 30 tonnes.

A number of route options have been considered by the project team and a high level review has been undertaken by ALE to identify the most feasible route from the options discussed.

### 5.2 Preferred Route

A high level review of routing options found “Route D” to be the most feasible to transport the blade from King George Docks to Queen Victoria Square in Hull city centre.

Route D is shown in Appendix B. The route comprises of Hedon Road, A63 Garrison Road, Myton Bridge, Market Place, Lowgate, Alfred Gelder Street, Queens Dock Avenue, Bond Street and Saville Street.

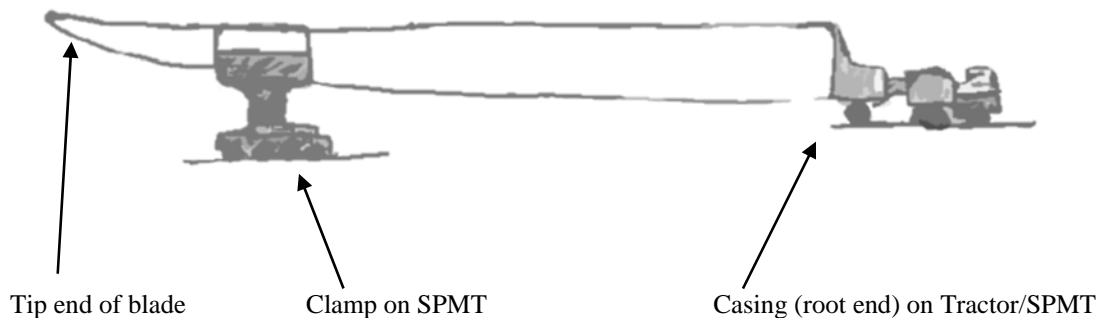
A further detailed study has been recently completed to “track” the path of the Blade and identify every item of street furniture that will be affected during transportation. A copy of this study is also included in Appendix B. The preferred route identifies potential conflicts with a building canopy and a tree, however subsequent surveys on site and refinement of the tracking have provided confidence that these obstruction can be bypassed with careful control of the SPMTs.

The preferred route will also need agreement from Highways England (Authority for the A63) and Hull City Council (as the Authority for the local highway network) to obtain the transport permits, arrange traffic management and street furniture alterations.

### 5.3 Transportation

The current proposal is to transfer the blade using self-propelled modular trailers (SPMT). SPMTs allow tight manoeuvres (smaller turning circles) to be achieved and travel at approximately 3mph which allows time to identify potential obstacles during turning movements.

An SPMT will be positioned at two location of the blade – at the root end and at a strengthened section of the blade towards the tip end. Bespoke fixtures have been specially designed to aid transporting of the blade – this comprises of a casing for the root end of the blade and a clamp towards the tip end of the blade. The blade has been designed to be transported in this manner.



*Illustration of blade support positions during transport*

Considering the end position of the blade at Queen Victoria Square, the blade will be transported “root” first until the Lowgate/Alfred Gelder Street junction at which point the blade will travel in reverse (“tip” first) along Alfred Gelder Street and Saville Street.

The Blade will therefore enter Queen Victoria Square “tip first” and be delivered to a position adjacent to the supports. There will be a relatively straightforward operation to then crane the Blade from the SPMTs onto the supports.

## 5.4 Affected Street Apparatus

All affected street furniture will be visited at least 4 weeks prior to the installation date and a schedule of advanced highway works (pre-installation activities) prepared. This will include identifying ‘cast in concrete’ columns/poles that can be re-installed into NAL type sockets (“socketed”) for easier removal and replacement.

It is proposed that a Contractor is appointed to undertake the “pre-installation activities” and that these works are undertaken at least two weeks prior to the installation date. This is reflected in the project programme.

On the day of the installation, street apparatus will be temporarily removed immediately before the blade passes and reinstalled immediately after the blade passing. This operation will be prioritised for traffic and regulatory information (including signs and traffic signals).

Ideally, the same labour gangs should be used for the pre-installation activities and for the removal/re-installation of street apparatus on the day the blade is transported.

## 6 Installation

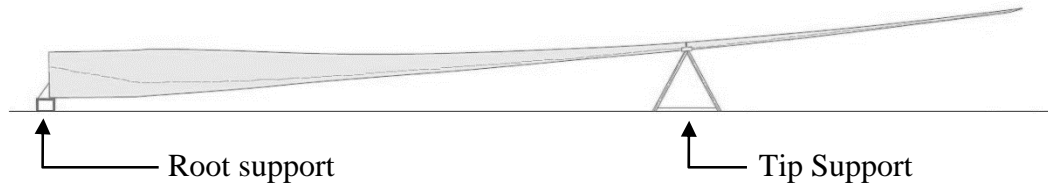
### 6.1 Supports

A visit has been made to Siemens’ production facility in Alborg and further technical information has been made available by Siemens to identify how the blade is to be supported.

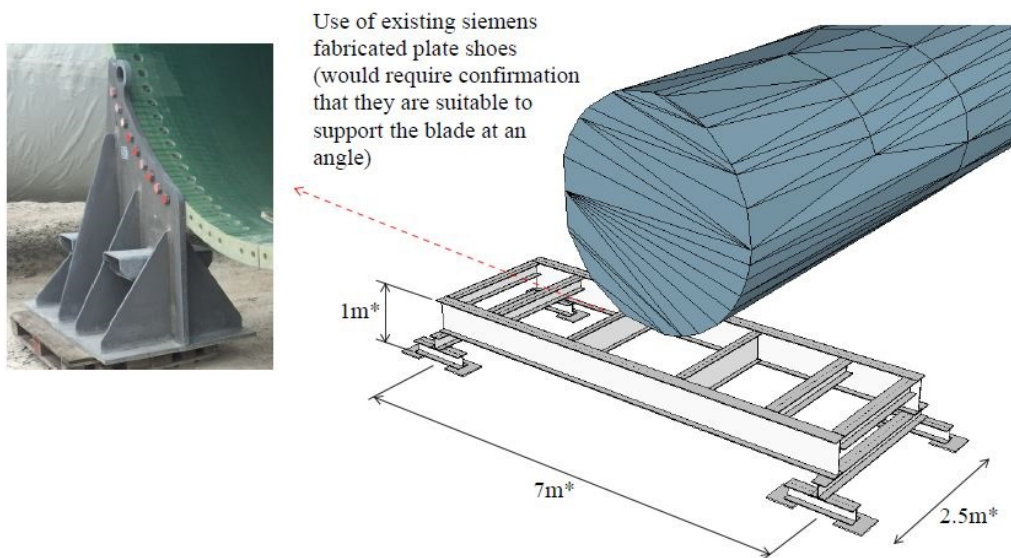
The current proposal is to pre-fabricate steelwork structures to hold the blade at its “root” end and also part-way along the length of the blade. These structures can be fabricated off site and then brought so site and bolted together on the date of the installation.

It is proposed that the supports simply sit on the surface of the public realm. The supports will have sufficient mass to resist the wind loads applied to them. These loads will be spread over the surface of the public realm so that the loading is less than a HGV wheel-load (the criteria that has been used for the design of the pavement).

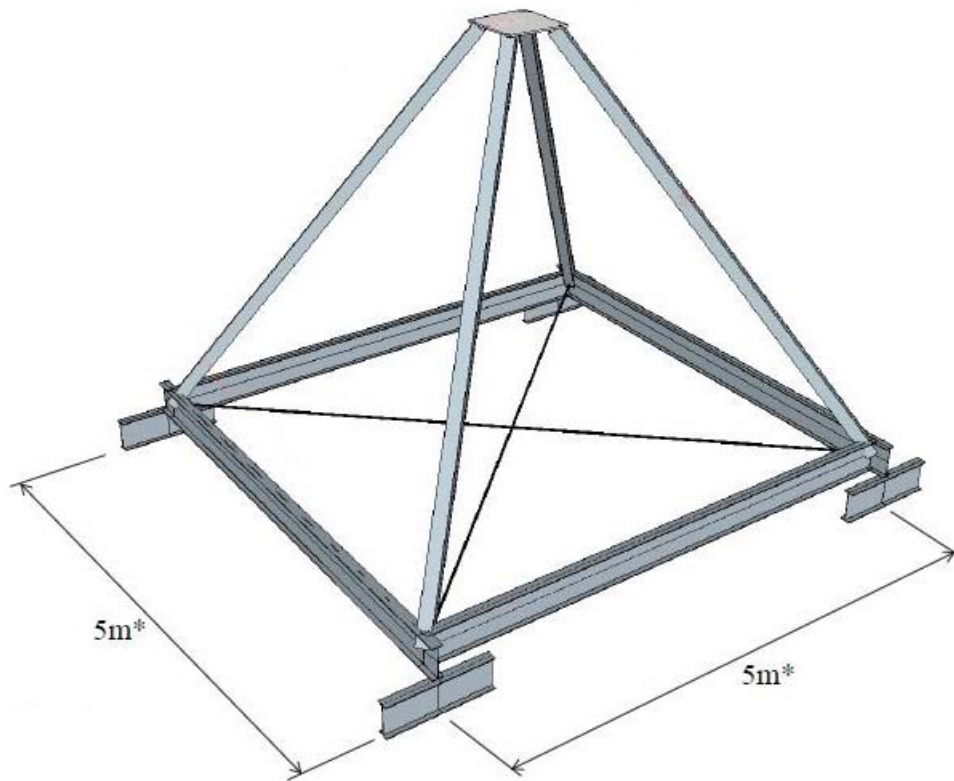
It is intended that the standard fixings used by Siemens to hold down the blade will be used to connect the blade to the supports. In addition a strap will be placed over the tip end of the blade to provide an additional level of security should the clamp start to loosen.



*Illustration of Proposed Installation at Queen Victoria Square*



*Illustration of Root Support*



*Illustration of Tip Support (Blade Clamp Omitted)*

## 6.2 Mock Up

It is proposed that the supports are delivered to Siemens' yard in Alexandra Dock to enable a "mock up" of the installation to be undertaken. This "mock up" process will involve locating the supports in position, craning the blade into position and bolting it down. The blade can then be removed and supported to ground level.

This mock up process will provide a valuable opportunity to check that the blade is supported correctly and to make any modifications to the supports if these are required. It will also give the installation teams a chance to practice the operation and get a better idea of time requirements etc.

## 6.3 Headroom Clearances

Arup's drawing 249697-SK-001 shows the plan position of the blade in Queen Victoria Square and highlights the areas below the blade that have less than 2.3m clearance from ground level (for pedestrians and cyclists) and also areas with less than 5.5m clearance (for vehicles).

Benches will be positioned below the blade where a 2.3m headroom clearance cannot be achieved. The position of the benches should be such that it prevents people from bumping into the blade and directs blind/partially sighted people around.

## 7 Operation

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Safety and security during the operational phase of the project will be of paramount importance. The operational phase of the project is considered to be the duration of the blade in Queen Victoria Square.

### 7.1 Security Presence

The propensity for human interaction with the blade and the accessibility of the blade to the public has raised a number of risk items (see Risk Register/Section 10). This includes people climbing onto the blade, graffiti and vandalism.

It is anticipated that initially a 24 hour, 7 days a week security presence will be required. Security personnel on site will interface with Hull City Council wardens and emergency services (as required).

Queen Victoria Square is monitored by Hull City Council via CCTV cameras and this operation will also help to detect problems.

Security requirements should be reviewed on a weekly basis by Hull 2017, Hull City Council, Security personnel and representatives from the emergency services. Safety and security risks, i.e. vandalism, may reduce over time and there may be scope to reduce security presence on site whilst still being supported by wardens and CCTV coverage.

### 7.2 Secure Design

To help prevent vandalism and personal injury (through attempts to climb onto the blade), the following will be considered as part of the detailed design and implemented during the operational phase:

- Restricted access to blade supports – a “clam shell” arrangement around the blade support is being considered to prevent members of the public climbing onto the structure.
- Benches will be positioned below the blade where a 2.3m headroom clearance cannot be achieved.
- Anti-climb paint will be applied to supports (where appropriate).
- Display of information boards (with relevant contact telephone numbers), signs informing the public of surveillance and orders not to climb will be positioned around the blade.

### 7.3 Maintenance

A maintenance regime for cleaning, repairing and repainting the blade and supports will be established for the entire duration of the operational phase. The maintenance strategy will be developed during detailed design stage.

## 8 Programme

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### 8.1 Overall Programme

A programme for the project is included in Appendix C. This identifies the overall duration of the scheme including design, approval and procurement activities.

The activities relating to design of the supports, procurement and fabrication of the supports, and mock up sit on the critical path. A delay to these activities potentially impacts on the opportunity to undertake a mock up and identify potential problems prior to installation at Queen Victoria Square.

In order to achieve the programme, a decision to proceed should be made by 26<sup>th</sup> August 2016 followed immediately by signing of agreements/contracts and commissioning of the detailed design for the supports.

The programme allows a day for a mock installation in Siemens' factory yard at the beginning of December 2016 followed by a lessons learnt meeting. This allows two weeks for any adjustments to be made to the supporting structures prior to installation in Queen Victoria Square.

The programme also allows 8 working days for pre-installation activities in December 2016. Pre-installation activities includes transferring anchored/'cast in concrete' street apparatus into NAL type sockets or bolted arrangements to help expedite removal/reinstallation of street apparatus during the transport of the blade.

### 8.2 Detailed Installation Programme

A detailed programme will need to be developed for the day of installation (and also removal) so that all activities are coordinated efficiently and safely. For the purposes of this feasibility study, the following timeline is proposed.



**Table 8.1: Initial detailed programme for installation**

| <b>Date / Time</b>                          | <b>Activity</b>                                                                                                                                                                                                     |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Friday 30<sup>th</sup> December 2016</b> |                                                                                                                                                                                                                     |
| 11.00                                       | Meeting with key project members to review following: <ul style="list-style-type: none"> <li>• Completion of preparation works</li> <li>• Detailed Installation programme</li> <li>• Risk Register</li> </ul>       |
| 13.00                                       | <ul style="list-style-type: none"> <li>• Team building meeting with all persons involved. Remind them of roles &amp; responsibilities</li> </ul>                                                                    |
| <b>Sunday 1st January 2017</b>              |                                                                                                                                                                                                                     |
| 6.00                                        | <ul style="list-style-type: none"> <li>• Meet at Siemens Yard.</li> <li>• Health and Safety Induction</li> </ul>                                                                                                    |
| 6.30                                        | <ul style="list-style-type: none"> <li>• Load steel supports onto lorries – transport to site</li> <li>• Cranes into position in Queen Victoria Square</li> <li>• Gangs start to remove street-furniture</li> </ul> |
| 7.30                                        | <ul style="list-style-type: none"> <li>• Blade leaves Siemens Yard under police escort</li> <li>• Steel supports lifted into position and bolted together</li> </ul>                                                |
| 8.30<br>(approx.)                           | <ul style="list-style-type: none"> <li>• Blade leaves A63 (Highways England property)</li> <li>• Gangs start to replace street furniture</li> </ul>                                                                 |
| 10.00                                       | <ul style="list-style-type: none"> <li>• Blade arrives in Queen Victoria Square</li> </ul>                                                                                                                          |
| 11.00                                       | <ul style="list-style-type: none"> <li>• Blade lifted into position</li> </ul>                                                                                                                                      |
| 12.00                                       | <ul style="list-style-type: none"> <li>• Blade securing in position</li> <li>• Safety checks</li> </ul>                                                                                                             |
| 13.00                                       | <ul style="list-style-type: none"> <li>• Cranes demobilised &amp; removed from site</li> <li>• Clean Up</li> </ul>                                                                                                  |
| 14.00                                       | <ul style="list-style-type: none"> <li>• Hand-over</li> </ul>                                                                                                                                                       |

## 9 Cost Estimate

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### 9.1 Approach

This is a unique project and therefore reference rates and costs are not available. A “bottom up” approach has therefore been used to establish the cost estimate for this Feasibility Study.

It is recommended that this cost estimate is revisited as the project progresses and more accurate costing information becomes available as the design of the supports is developed and discussions with streetworks contractors and others advance.

The cost estimate is split into six sub-headings as follows:

- **Transportation** – estimated costs to remove and reinstall street furniture in order to transport the blade between Queen Alexandra Docks to Hull city centre. The proposed transport route has been walked and an initial assessment made of the requirements to remove and relocate street furniture. To reduce risk an “enabling” contract is envisaged to place street furniture into sockets to facilitate removal and reinstallation on the day of the move. Costs have been estimated on the basis of providing 4 gangs of labour plus support plant to undertake the installation operation. Additional sums have been allowed for security, Police attendance and temporary traffic management.
- **Installation** – costs for manufacture of the supporting structure including provisional sum allowances for security and pedestrian control and adjustment to lighting apparatus.
- **Maintenance** – allowances for cleaning, repainting, security and reactive maintenance.
- **Removal** – The removal costs are very similar to the initial transportation costs as the operation to remove and replace street furniture to transport the blade between Hull city centre and Queen Alexandra Docks is very similar.
- **Management and Consultancy** – A provision sum is included to allow for project and commercial management, structure design, Health and Safety, and Planning. The sum excludes for local authority fees (including planning fees).

It is noted that the capital cost of the blade is excluded from the cost estimate. ALE’s technical input and transportation costs, storage and trial erection, and craneage (via subcontractor) form part of the Siemens offer and has also been also excluded from this estimate.

The cost estimate is contained in Appendix D along with the scope and assumptions applied.

## 10 Risk Register

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### 10.1 Approach

A Risk Register has been prepared to identify the key risks, impact, risk rating, mitigation measure(s) and current risk owner and a copy of the Risk Register is contained in Appendix E. The project team has input to the Risk Register at a workshop held on 23<sup>rd</sup> June 2016.

The Risk Register will require reviewing by the project team/board throughout the subsequent stages of the project. As part of the review, the project board will be responsible for setting/reviewing contingency allowances against the risk items and ensure that an appropriate overall contingency amount is allowed for.

The following project stages are suggested for a review of the Risk Register:

- Prior to submission of Planning application/permit.
- Award of Planning Consent
- Completion of detailed design.
- Tender document review (prior to commencing tender process).
- Construction contract signing.
- Following trial assembly (at Siemens site).
- Prior to transport/installation of blade in Hull city centre.
- Following installation.
- Prior to removal of blade from Hull city centre.

The number of project stakeholders is expected to increase as the project progresses and therefore it is imperative to undertake further reviews to capture the potential risks as seen by all stakeholders.

Currently, the risks identified have been allocated to a current member of the project team. It may be that some of these risks can be re-allocated to another party (i.e. to a Contractor) but this can only be considered once the risks are well defined and the other party is in the best position to manage the potential consequences of the risk occurring.

Formal risk management procedures should be implemented during the next stage of the project and continued through to the end of the project. A Risk Manager should be identified who will apply the following procedures to mitigate/control the risks:

- Risk Management Workshops
- Costing of the Risk Register
- Reviews with Risk Owners

## 10.2 Summary of Risk Register

In the following table, key project risks (red and orange category risks scoring over 9 – see Appendix E) have been identified together with the proposed strategy to manage the risks. A more detailed risk register is included in Appendix E.

**Table 10.1: Summary of Key Project Risks**

| Risk                                                    | Mitigation Action                                                                                                                                                                                                                                                                                                            | Risk Allocation (Owner) |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Delay to Queen Victoria Square Public Realm Works       | Engage with Public Realm works Contractor and monitor programme to ensure completion of works. Propose "Plan B" location for the Blade with reduced risk of conflict.                                                                                                                                                        | Hull 2017               |
| High winds during installation & removal                | In Method Statement identify safe wind speeds for transport and lifting operations. Monitor weather forecasts. Check wind speeds on day. Be prepared to delay transport movements if too windy                                                                                                                               | ALE                     |
| Public interfere with blade during installation/removal | Recruit wardens (or similar) to help manage public. Use fencing / barriers to clearly cordon on working area & remove public. Do not advertise installation/removal process. Installation / removal to occur during quiet periods (e.g. early Sunday morning)                                                                | Hull 2017               |
| Damage caused to Public Realm                           | Ensure that loading on surface is less than design loading (i.e. spread loads from cranes, supports etc.). Place protection materials (geotextiles, timbers etc.) between foundation pads & new surface. Undertake photographic survey before and after installation, Repair damage following removal of blade and supports. | Hull 2017               |
| People collide with blade (eg blind person, cyclist)    | Install physical barrier (e.g. a bench) to prevent people walking under lowest part of blade (i.e. where headroom is <2.3m                                                                                                                                                                                                   | Hull 2017               |
| People try to climb onto the Blade                      | Install "No climbing" sign. Provide physical security presence as deterrent. Use CCTV cameras to monitor activity around blade. Install anti-climb paint on supports. Use "clam shell" concept to close up supports and create physical barrier during "closed periods" (e.g. night-time)                                    | Hull 2017               |
| Straps securing blade become loose                      | Implement checking regime to check that blade is held firmly - e.g. tightness of straps and tension in bolts. Tighten if necessary                                                                                                                                                                                           | Hull 2017               |
| Deliberate attempt to set the Blade on fire             | Provide security presence to deter vandals & use CCTV to monitor. Engage with Fire Service to assess risk. Consider use of specialist intumescent paints in areas accessible by people.                                                                                                                                      | Hull 2017               |
| New Year's Eve                                          | Address issue with workforce in team briefing before installation. Use breathalyser to check for alcohol. Ensure sufficient resources are employed to cover for risk that an employee may not turn up and to help manage public                                                                                              | Hull 2017               |
| Budget exceeded                                         | Develop a cost plan and update it at regular intervals. Include a contingency allowance to cover uncertainty in pricing                                                                                                                                                                                                      | Hull 2017               |

| <b>Risk</b>                                                     | <b>Mitigation Action</b>                                                                                                                                                                                            | <b>Risk Allocation (Owner)</b> |
|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Political objectors                                             | Set out an Engagement Plan to inform political leaders of project and gather support. Implement in good time so that there are few surprises                                                                        | Hull 2017                      |
| Planning consent is not granted                                 | Engage with planners at early stage to understand and address potential issues. Engage with Chair of Planning Committee.                                                                                            | Hull 2017                      |
| Planning consent delayed                                        | Engage with all statutory consultees as part of the pre-application process. Undertake pre-application consultation to solicit views and, in application, demonstrate how these views have been taken into account. | Hull 2017                      |
| Temporary Planning Consent limits installation to 28 days       | Engage with Planners. Submit full planning application if longer period required.                                                                                                                                   | Hull 2017                      |
| Enforcement Action possible if Blade installed without planning | Engage with Planners to agree strategy. Engage with Chair of Committee & gain political support. Submit planning application if 28 day period will be exceeded.                                                     | Hull 2017                      |
| Surprise element                                                | Engage with planners to see if temporary planning route would be acceptable. Carefully control information (particularly visual information) about the sculpture and who it's sent to.                              | Hull 2017                      |

## 11 Next Steps

### 11.1 Actions

Subject to a decision to proceed, the following actions will need to be undertaken within the first month (August):

- Hull 2017 to confirm whether to proceed with the project
- Sign Loan and sponsorship agreement(s) – Hull 2017 & Siemens.
- Arrange insurances and warranties.
- Hull 2017 to appoint Consultants (PM, Structural Engineer, CDM).
- Progress detailed design of supports.
- Prepare to commence procurement process for supports.
- Siemens to appoint specialist transporters (ALE).
- Discussions with the Events team.
- Informal meeting with Planner(s).
- Establish Communications Plan.

### 11.2 Roles and Responsibilities

The following table (Table 11.1) sets out the anticipated project team needed to deliver the project.

**Table 11.1: Anticipated Project Team Roles**

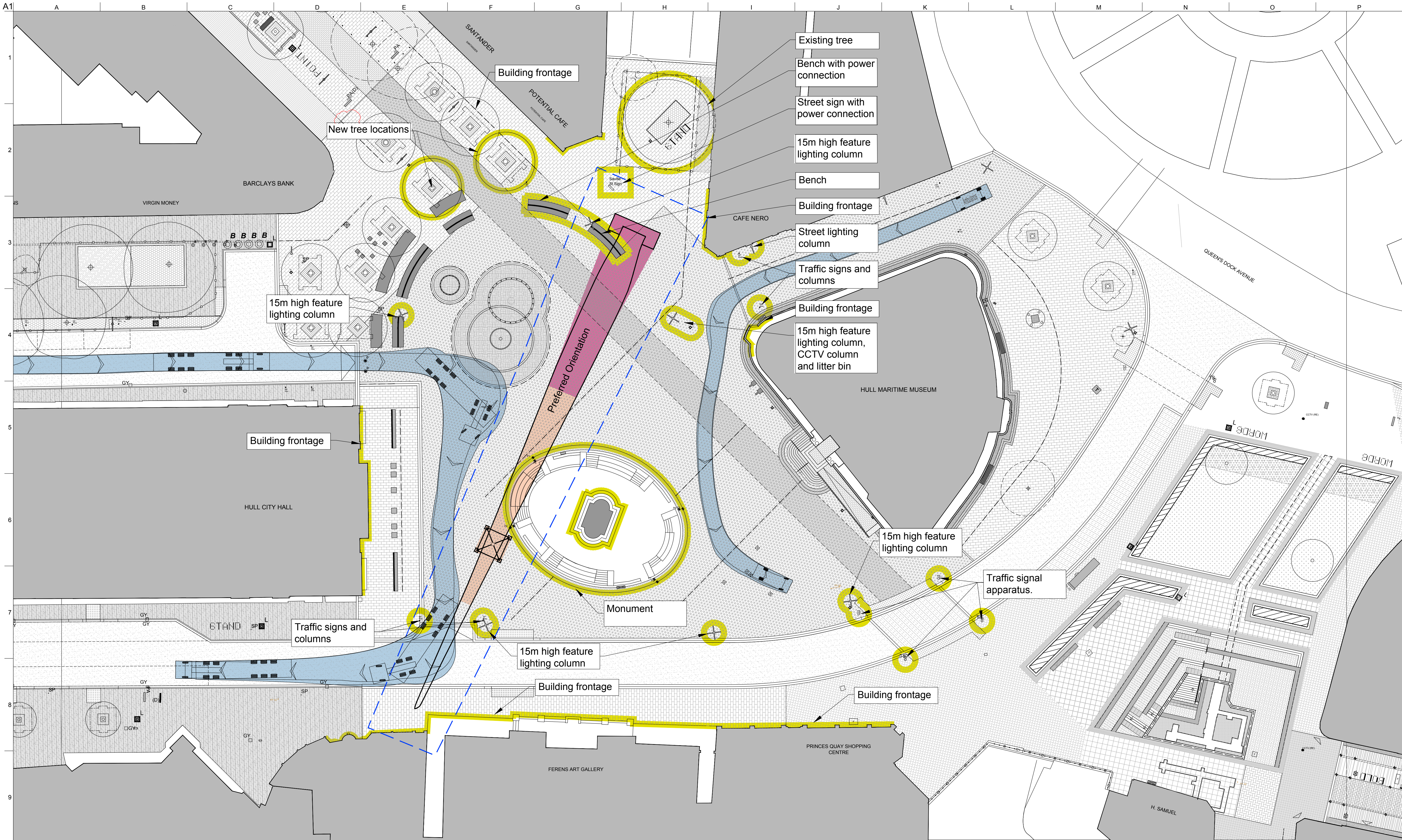
| Role                           | Potential Scope                                                                                                                                                         | Organisation                    |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Project Sponsor                | Responsible for the overall delivery and funding of the project. Ensuring that the work is governed effectively and delivers the objectives that meet identified needs. | Hull 2017 & Siemens             |
| Client Project team            | Appoint the project delivery team, arrange insurances/indemnity, prepare the Communication Plan, key stakeholder engagement.                                            | Hull 2017                       |
| Blade supplier                 | Temporary loan of a blade (and storage supports) for the art installation.                                                                                              | Siemens                         |
| Transport (including craneage) | Specialist transporter and logistics planning. Obtain all relevant licenses/permits for transport of blade.                                                             | ALE                             |
| Artist                         |                                                                                                                                                                         | Nayan Kulkarni                  |
| 'Look Up' Curators             |                                                                                                                                                                         | Andrew Knight & Hazel Colquhoun |

| <b>Role</b>                                      | <b>Potential Scope</b>                                                                                                                                                                                                    | <b>Organisation</b> |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Public Relations                                 | Input into the Communication Plan. Pre and post-installation public and stakeholder engagement in accordance with the Communication Plan.                                                                                 | To be arranged      |
| Video Maker                                      |                                                                                                                                                                                                                           | To be arranged      |
| Project Manager                                  | Manage and monitor the project against programme, cost and risk management.                                                                                                                                               | To be arranged      |
| Cost Control                                     | Prepare a project Cost Plan and monitor costs against plan.                                                                                                                                                               | To be arranged      |
| Structural Engineer                              | Detailed design of blade supports.                                                                                                                                                                                        | To be arranged      |
| Planning Agent                                   | Planning advice. Pre-application discussions with Planning Authority. Preparation and submission of planning application, and post-application discussions in order to secure Planning consent.                           | To be arranged      |
| Principal Designer (CDM)                         | Plan, manage, monitor and coordinate Health and Safety in the pre-construction phase. Liaison with the Principal Contractor, keeping them informed of any risks that need to be controlled during the construction phase. | To be arranged      |
| Security (during operation)                      | Work jointly with the Client Project Team to prepare a Surveillance and Security Plan. Security presence at Queen Victoria Square for the entire duration of the operation phase.                                         | To be arranged      |
| Maintenance (during operation)                   | Input into a maintenance plan. Cleaning, repairing and repainting of the blade and supports.                                                                                                                              | To be arranged      |
| Highway works team (Street Furniture Contractor) | Street apparatus alterations – including pre-installation activities and works required during blade alterations.                                                                                                         | To be arranged      |
| Crowd Control                                    | Crowd control on route during delivery/removal of the blade and at Queen Victoria Square during installation.                                                                                                             | To be arranged      |
| Police Escort                                    | Police escort during delivery and removal of the blade.                                                                                                                                                                   | Humberside Police   |
| Supports Fabricator                              | Fabrication and supply of supporting structures.                                                                                                                                                                          | To be arranged      |

## **Appendix A**

### **Preferred and Alternative Installation Arrangements**





**Notes:**

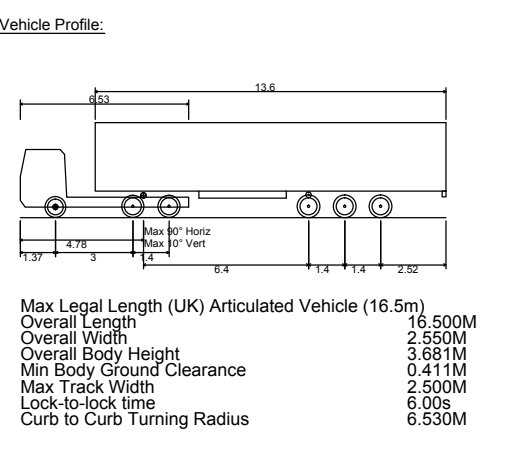
- Preliminary layout subject to detailed design including full CDM compliance, progress of Public Realm works and Local Authority approval.
- Two way bus services to continue to operate along Carr Lane. Bus gates to be implemented at locations indicated.
- Area shown to have less than 5.5m height clearance under the blade is measured from 50.07m from the edge of the blade at 'top' end. See Hayan Kulkarni drawing ZYR-LOC-B (dated 28/06/2016).

**Background drawing:**

- Area 12 - Queen Victoria Square General Arrangement Plan (drawing no: RFM-12-DR-LA-0001 Rev. C3)
- NK-QUEST/06/007161
- Area 12 Planning Works (doc. ref: Hull CCPR-PHAS-06)

**Key:**

- Apparatus potentially affected by blade installation
- Safe working zone (5m offset from edge of blade)
- Area with less than 2.3m height clearance under the blade
- Area with less than 5.5m height clearance under the blade



ISSUED FOR DISCUSSION PURPOSES

| Issue       | Date     | By | Chkd | Appd |
|-------------|----------|----|------|------|
| A           | 22/07/16 | JH | RB   | RB   |
| First issue |          |    |      |      |

Client  
Hull UK City of Culture 2017

Job Title  
Hull Zephyr

Drawing Title  
Preferred Arrangement  
Queen Victoria Square

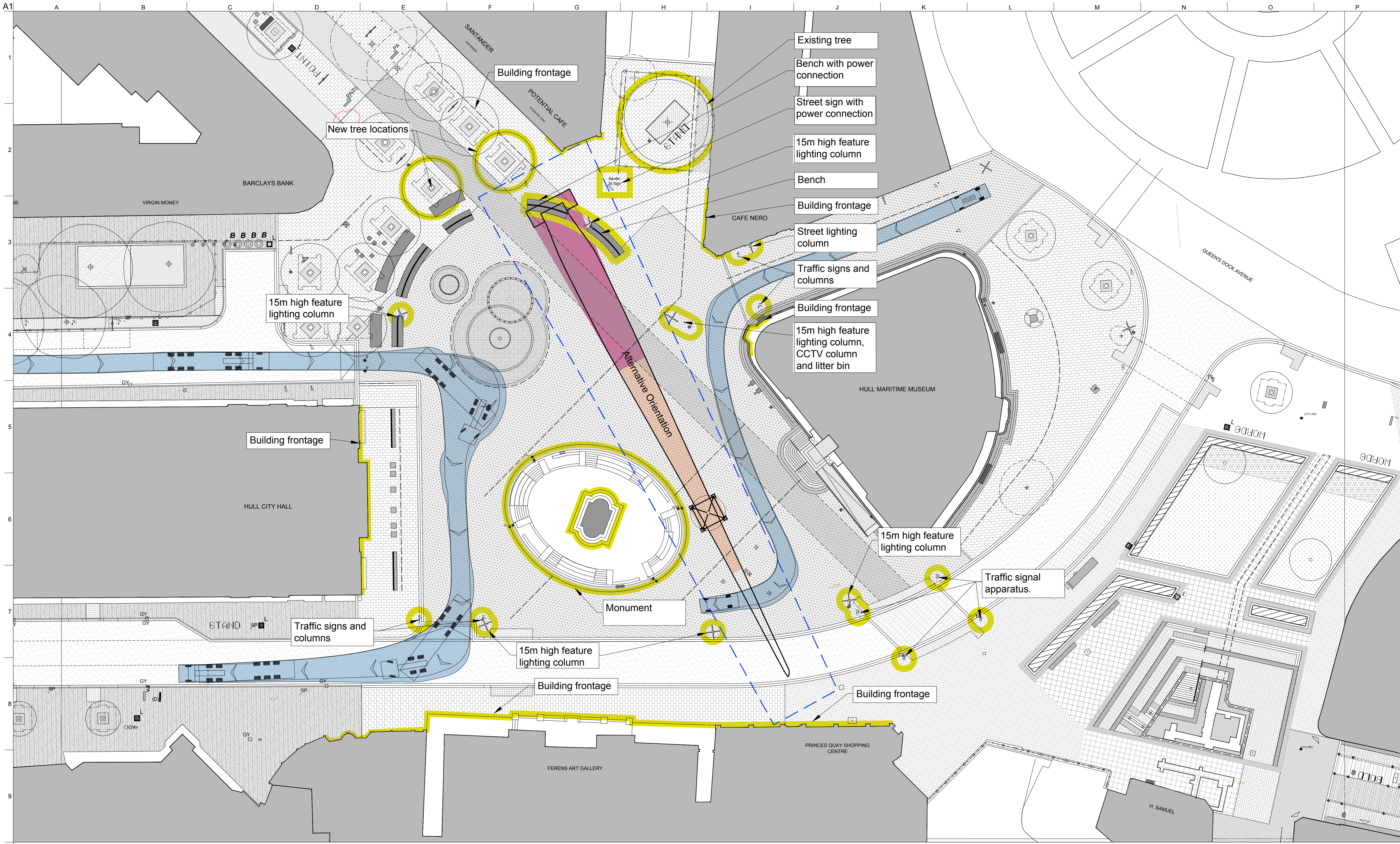
**ARUP**

Admiral House Rose Wharf  
78 East Street Leeds LS9 8EE  
Tel +44 (0)113 242 8498 Fax +44 (0)113 242 8573  
www.arup.com

Scale at A1 1:250  
Plot ID 48ADBCEE-76F3-4307-A482-96B8C966E314

**For information**  
 Job No 249697 Drawing No 249697-SK-001 Issue A





**Notes:**

- Preliminary layout subject to detailed design including full CDM compliance, progress of Public Realm works and Local Authority approval.
- Two way bus services to continue to operate along Carr Lane. Bus gates to be implemented at locations indicated.
- Area shown to have less than 5.5m height clearance under the blade is measured from 50.07m from the edge of the blade at 'top' end. See Nayan Kulkarni drawing ZYR-LOC-B (dated 28/06/2016).

**Background drawing:**

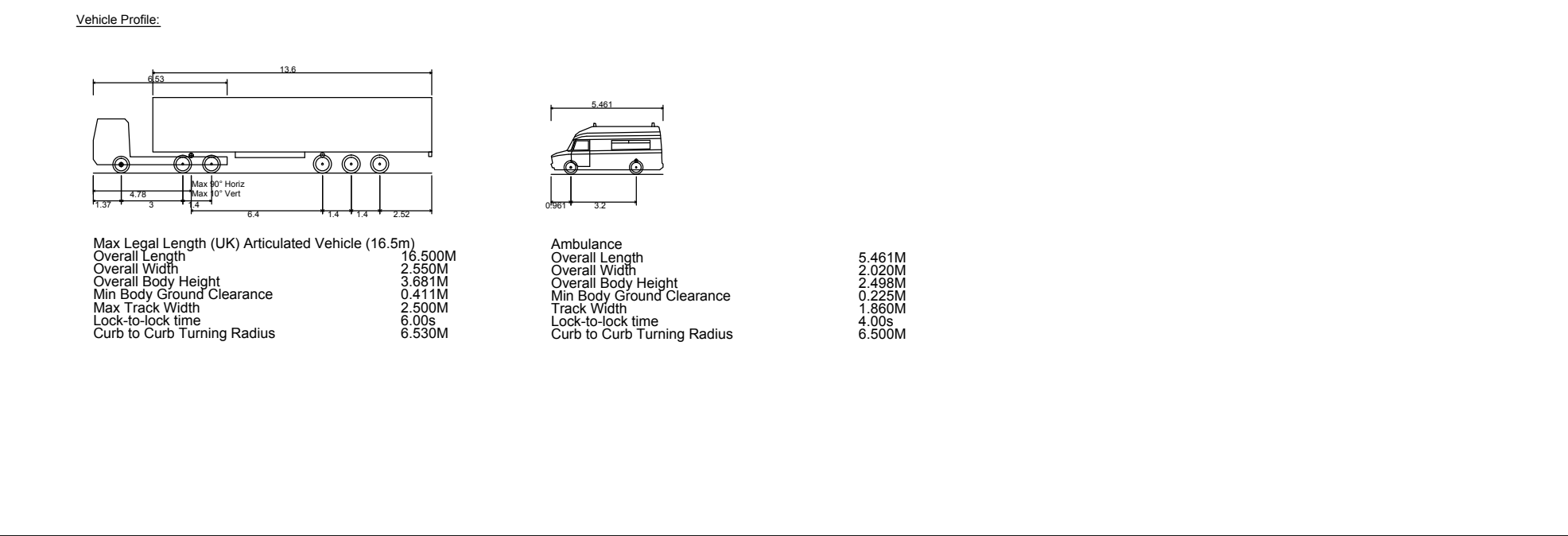
- Area 12 - Queen Victoria Square General Arrangement Plan (drawing no: RFM-12-DR-LA-0001 Rev. C3)
- NK-QUEST-UKM-0001/16.1
- Area 12 Planning Works (doc. ref: Hull CCPR-PHAS-06)

**Key:**

- Apparatus potentially affected by blade installation
- Safe working zone (5m offset from edge of blade)
- Area with less than 2.3m height clearance under the blade
- Area with less than 5.5m height clearance under the blade

**Vehicle Profile:**

|                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Max Legal Length (UK) Articulated Vehicle (16.5m)</p> <p>Overall Length 16.500M</p> <p>Overall Width 2.550M</p> <p>Overall Body Height 3.681M</p> <p>Min Body Ground Clearance 0.411M</p> <p>Max Track Width 2.500M</p> <p>Lock-to-lock time 6.00s</p> <p>Curb to Curb Turning Radius 6.530M</p> | <p>Ambulance</p> <p>Overall Length 5.461M</p> <p>Overall Width 2.020M</p> <p>Overall Body Height 2.498M</p> <p>Min Body Ground Clearance 0.252M</p> <p>Track Width 1.860M</p> <p>Lock-to-lock time 4.05s</p> <p>Curb to Curb Turning Radius 6.500M</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



**ISSUED FOR DISCUSSION PURPOSES**

|             |          |    |      |      |
|-------------|----------|----|------|------|
| A           | 22/07/16 | JH | RB   | RB   |
| First issue |          |    |      |      |
| Issue       | Date     | By | Chkd | Appd |

Client  
Hull UK City of Culture 2017

Job Title  
Hull Zephyr

Drawing Title  
Alternative Arrangement  
Queen Victoria Square

**ARUP**

Admiral House Rose Wharf  
78 East Street Leeds LS9 8EE  
Tel +44 (0)113 242 8498 Fax +44 (0)113 242 8573  
www.arup.com

Scale at A1 1:250

Plot ID 332A5802-7A30-459D-AA34-98AC3DF4F804

Drawing Status  
For information

|                         |                                    |                   |
|-------------------------|------------------------------------|-------------------|
| Job No<br><b>249697</b> | Drawing No<br><b>249697-SK-002</b> | Issue<br><b>A</b> |
|-------------------------|------------------------------------|-------------------|

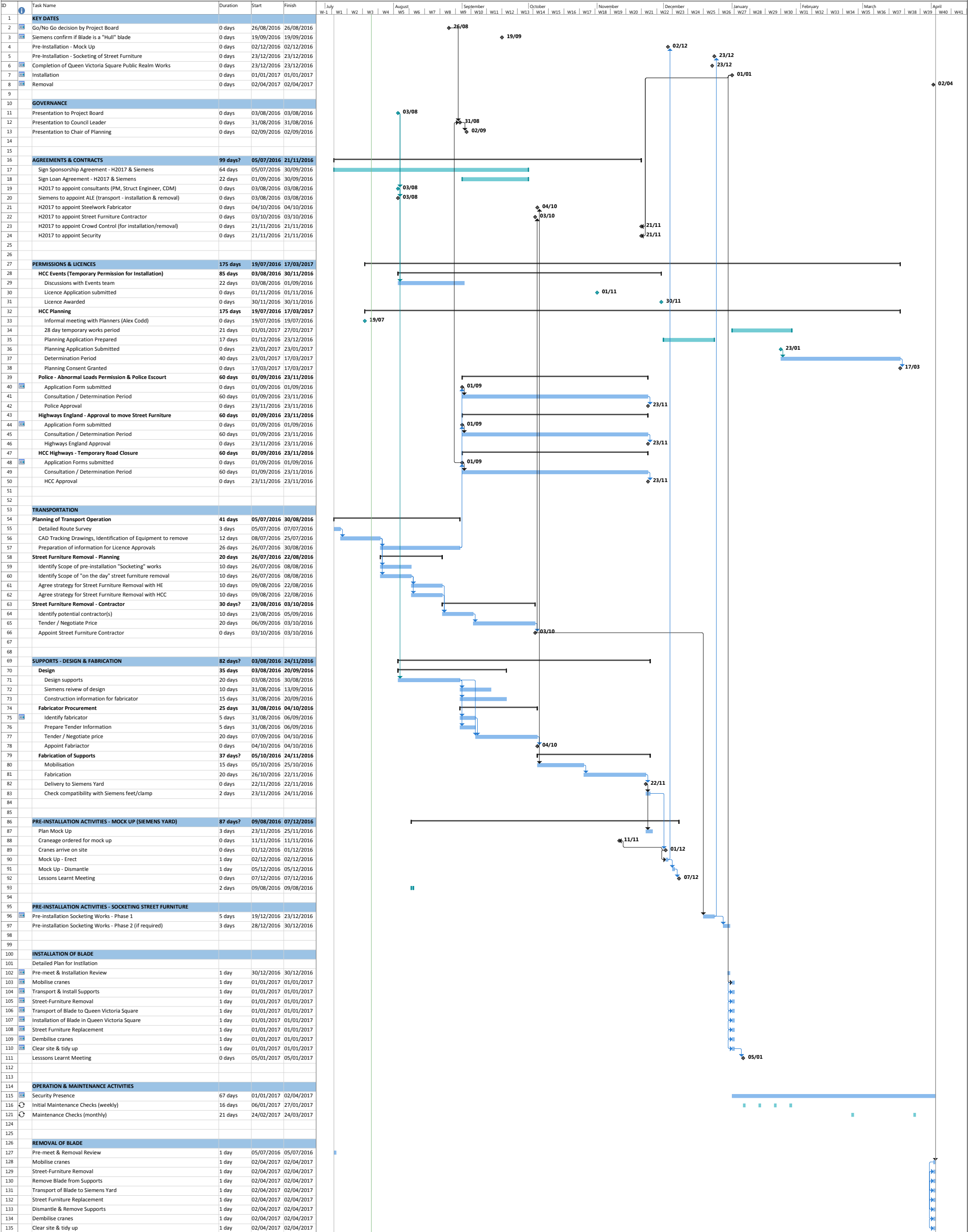


## **Appendix B**

### **Transport Route**

## Appendix C

### Programme



## Appendix E

### Risk Register

# Hull UK City of Culture 2017 - Project Zephyr Risk Register

Project Title Project Zephyr  
Arup Project Ref Code 249697  
Version No. Revision 0  
Author Name Javed Hussain, Arup

| Ref | Risk Name                                               | Risk Description                                                                                                                                                                                  | Impacts                                                                     | Risk Rating |        |                        | Mitigation Measures                                                                                                                                                                                                                                                                                                          | Risk Owner | Notes                                                                                                                                                                                               |
|-----|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                         |                                                                                                                                                                                                   |                                                                             | Probability | Impact | Total                  |                                                                                                                                                                                                                                                                                                                              |            |                                                                                                                                                                                                     |
|     |                                                         |                                                                                                                                                                                                   |                                                                             | 1 - 5       | 1 - 5  | 12+<br>9 - 11<br>1 - 8 |                                                                                                                                                                                                                                                                                                                              |            |                                                                                                                                                                                                     |
|     | Delay to Queen Victoria Square Public Realm Works       | Public realm improvements to Queen Victoria Square not completed in time. Potential conflict with Blade supports. Poor PR image for Hull                                                          | Physical difficulties in installing blade. Negative PR                      | 3           | 5      | 15                     | Engage with Public Realm works Contractor and monitor programme to ensure completion of works. Propose "Plan B" location for the Blade with reduced risk of conflict.                                                                                                                                                        | Hull 2017  | See Arup drawing 249697-SK-001 for preferred and alternative blade installation locations.                                                                                                          |
|     | Public interfere with blade during installation/removal | Queen Victoria Square not closed off to the public in time to accept delivery of blade. Public get in the way of installation/removal. Crowds are attracted to see operation.                     | Potential Health & Safety Risks. Delays to installation process             | 4           | 3      | 12                     | Recruit wardens (or similar) to help manage public. Use fencing / barriers to clearly cordon on working area & remove public. Do not advertise installation/removal process. Installation / removal to occur during quiet periods (e.g. early Sunday morning)                                                                | Hull 2017  |                                                                                                                                                                                                     |
|     | Damage to Public Realm                                  | Damage is caused to public realm during installation / removal of blade and/or by supports. Damage apparent as cracked pavements, settlement etc.                                                 | Additional costs. PR impact - public realm has only recently been completed | 4           | 3      | 12                     | Ensure that loading on surface is less than design loading (i.e. spread loads from cranes, supports etc.). Place protection materials (geotextiles, timbers etc.) between foundation pads & new surface. Undertake photographic survey before and after installation, Repair damage following removal of blade and supports. | Hull 2017  |                                                                                                                                                                                                     |
|     | Budget exceeded                                         | The costs for the project are in excess of Hull 2017's budget.                                                                                                                                    | The project might have to be abandoned or additional funding made available | 2           | 5      | 10                     | Develop a cost plan and update it at regular intervals. Include a contingency allowance to cover uncertainty in pricing                                                                                                                                                                                                      | Hull 2017  |                                                                                                                                                                                                     |
|     | Political objectors                                     | Politicians object to the project. Politicians try to block scheme (e.g. refuse planning permission) and/or attack scheme in Media                                                                | Public Relations damage                                                     | 2           | 5      | 10                     | Set out an Engagement Plan to inform political leaders of project and gather support. Implement in good time so that there are few surprises                                                                                                                                                                                 | Hull 2017  | There is a desire to keep the project secret so that it creates a "surprise". The Engagement Plan should identify how much information can be communicated                                          |
|     | Planning consent is not granted                         | Planning consent is refused for the blade                                                                                                                                                         | Project cannot be realised                                                  | 2           | 5      | 10                     | Engage with planners at early stage to understand and address potential issues. Engage with Chair of Planning Committee.                                                                                                                                                                                                     | Hull 2017  | An alternative option to install the blade under temporary powers (<28 days) is being considered                                                                                                    |
|     | Fire                                                    | Vandals could seek to set blade on fire. If set alight, resin would create a major chemical fire.                                                                                                 | Major health & safety impact. Damage to blade. Damage to public realm       | 2           | 5      | 10                     | Provide security presence to deter vandals & use CCTV to monitor. Engage with Fire Service to assess risk. Consider use of specialist intumescent paints in areas accessible by people.                                                                                                                                      | Hull 2017  |                                                                                                                                                                                                     |
|     | People collision with blade                             | People will be encouraged to walk under blade. Potential for people to hit their heads when walking below blade                                                                                   | Health and Safety risk                                                      | 5           | 2      | 10                     | Install physical barrier (e.g. a bench) to prevent people walking under lowest part of blade (i.e. where headroom is <2.2m)                                                                                                                                                                                                  | Hull 2017  | Consider if we want to encourage people to touch blade or not.                                                                                                                                      |
|     | High winds during installation & removal                | High winds during installation / removal blow blade and make craning and transport unsafe                                                                                                         | Damage to blade. Health & safety risks. Delay to installation / removal     | 3           | 3      | 9                      | In Method Statement identify safe wind speeds for transport and lifting operations. Monitor weather forecasts. Check wind speeds on day. Be prepared to delay transport movements if too windy                                                                                                                               | ALE        |                                                                                                                                                                                                     |
|     | Planning consent delayed                                | More time required for planners to consult with statutory authorities & respond to comments. Planning application not determined within 8 weeks                                                   | Delay to implementing project                                               | 3           | 3      | 9                      | Engage with all statutory consultees as part of the pre-application process. Undertake pre-application consultation to solicit views and, in application, demonstrate how these views have been taken into account.                                                                                                          | Hull 2017  |                                                                                                                                                                                                     |
|     | Legal Enforcement Action                                | Blade installed under delegated powers (temporary installation <28 days). Legal objection raised that Hull 2017 always meant to install the blade for >28 days.                                   | Potential legal action from Hull City Council to remove blade. Poor PR      | 3           | 3      | 9                      | Engage with Planners to agree strategy. Engage with Chair of Committee & gain political support. Submit planning application towards end of 28 day period                                                                                                                                                                    | Hull 2017  | A Temporary Consent route would avoid putting information into the public domain prior to installing the blade. Route may not be strictly in conformance with planning regulations                  |
|     | Temporary Planning Consent                              | Planners do not accept temporary planning consent route (<28 days).                                                                                                                               | Only install blade for less than 28 days or run risk of legal action        | 3           | 3      | 9                      | Engage with Planners. Plan to submit full planning application. Be prepared to manage PR around potential enforcement action                                                                                                                                                                                                 | Hull 2017  |                                                                                                                                                                                                     |
|     | Surprise element                                        | Planners require Hull 2017 to submit planning application. Media and others publicise images before blade is installed. People comment & some criticise.                                          | Reduced Media Impact. Poor PR                                               | 3           | 3      | 9                      | Engage with planners to see if temporary planning route would be acceptable. Carefully control information (particularly visual information) about the sculpture and who its sent to.                                                                                                                                        | Hull 2017  | Hull 2017 wish for the installation of the blade to be a surprise.                                                                                                                                  |
|     | New Year's Eve                                          | Ambition to install Blade during early hours of January 1st - some workers may have been drinking previous night. Some workers may not turn up on day. Some members of public likely to be drunk. | Health and Safety Impact                                                    | 3           | 3      | 9                      | Address issue with workforce in team briefing before installation. Use breathalyser to check for alcohol. Ensure sufficient resources are employed to cover for risk that an employee may not turn up and to help manage public                                                                                              | Hull 2017  |                                                                                                                                                                                                     |
|     | Climbing                                                | People (e.g. University Climbing Club) attempt to climb onto blade and or climb up supports. People slip off and are injured                                                                      | Health and Safety risk to general public. Damage to blade                   | 3           | 3      | 9                      | Install "No climbing" sign. Provide physical security presence as deterrent. Use CCTV cameras to monitor activity around blade. Install anti-climb paint on supports. Use "clam shell" concept to close up supports and create physical barrier during "closed periods" (e.g. night-time)                                    | Hull 2017  | Blade is 4m diameter at root end - will be difficult to climb. Blade designed to support people during maintenance - Siemens verbally confirmed blade will be strong enough to support people loads |
|     | Straps securing blade                                   | Over time, straps securing blade to the supports may relax. Blade not held firmly and may start to move                                                                                           | Damage to blade. Health & safety risks                                      | 3           | 3      | 9                      | Implement checking regime to check that blade is held firmly - e.g.. tightness of straps and tension in bolts. Tighten if necessary                                                                                                                                                                                          | Hull 2017  |                                                                                                                                                                                                     |
|     | Objection from General Public                           | General public object to proposals - possible grounds include aesthetics, impact on retail, "waste of money" etc.                                                                                 | Objections to planning application                                          | 4           | 2      | 8                      | Carefully consider protocols for the release of information, including as part of the Planning application submission.                                                                                                                                                                                                       | Hull 2017  |                                                                                                                                                                                                     |
|     | Planning committee meeting delayed                      | Targeted committee meeting missed (for example there is already too much on the agenda). Decision date deferred                                                                                   | Delay to implementing project                                               | 2           | 4      | 8                      | Agree a target committee meeting with planners. Give members a pre-application presentation of the scheme to gather views. Work with planners to ensure all issues addressed                                                                                                                                                 | Hull 2017  |                                                                                                                                                                                                     |
|     | Fit with supports                                       | Blade does not fit in supports.                                                                                                                                                                   | Potential damage to blade & instability of structure. Health & Safety Risks | 2           | 4      | 8                      | Undertake "mock up" at Siemens Yard to check that supports and blade fit. Identify and correct any issues prior to main installation operation.                                                                                                                                                                              | Hull 2017  |                                                                                                                                                                                                     |

|                                             |                                                                                                                                                                               |                                                              |   |   |   |                                                                                                                                                                                                      |           |                                                                                                                     |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------|
| Funding delayed                             | Funding for the project is not available - there is a delay in being able to pay bills                                                                                        | Potential delay to project                                   | 2 | 3 | 6 | Consider alternative funding sources and impact on overall programme.                                                                                                                                | Hull 2017 |                                                                                                                     |
| Parked vehicles cause obstruction           | Obstruction caused by vehicles parked on route.                                                                                                                               | Time                                                         | 3 | 2 | 6 | ALE to arrange for vehicle to drive up ahead and clear route. Police assistance may be required to remove vehicle.                                                                                   | ALE       |                                                                                                                     |
| Removal of street furniture                 | Affected street furniture is not removed in time and/or is more difficult to remove. Blade transport is delayed                                                               | Delay to installation process                                | 3 | 2 | 6 | Undertake enabling works to install all affected street furniture in sockets so they can be easily removed during transport. Have sufficient labour on site to address any difficulties encountered. | Hull 2017 |                                                                                                                     |
| Conflict with January Sales / Easter events | Increased shoppers expected during times when blade is installed / removed. People could start queuing from early hours                                                       | Health & Safety risks                                        | 3 | 2 | 6 | Plan installation / removal process to avoid periods of high retail activity. Ensure sufficient wardens (or similar) present to manage public during installation & removal processes                | Hull 2017 |                                                                                                                     |
| Delays in design & planning                 | Deadlines / targets are not met which leads to programme slippages                                                                                                            | Potential delay to installation                              | 3 | 2 | 6 | Develop detailed programme and regularly monitor to identify whether works on track. Appoint Project Manager to monitor progress and proactively address issues.                                     | Hull 2017 |                                                                                                                     |
| Graffiti                                    | Blade is graffitied whilst on display. Siemens require blade to be returned in original condition                                                                             | Visual appearance. Cost to remove graffiti                   | 3 | 2 | 6 | Allow budget to repaint blade from time to time. Provide on-site security presence to deter graffiti artists. Consider using anti-graffiti paint                                                     | Hull 2017 | Allow costs for use of cherry picker and team to repaint blade if graffitied                                        |
| Vehicle collision with supports             | Vehicles (e.g. street sweepers, service vehicles etc.) collide with support structures                                                                                        | Damage to blade / supports                                   | 3 | 2 | 6 | Locate supports carefully to provide sufficient clearance for vehicles to move around. Consider painting/appearance of supports to make them visible.                                                | Hull 2017 |                                                                                                                     |
| High winds during operation                 | High winds during operation create significant forces on structure. Support structures are heavily loaded. Blade "flaps" excessively in wind.                                 | Damage to blade. Damage to public realm if supports move.    | 3 | 2 | 6 | Design supports to resist high wind loads. Check assumptions with Siemens.                                                                                                                           | Hull 2017 | Blade is designed to withstand far higher wind loads (i.e. North Sea) than are experienced in the city centre.      |
| Blind people - DDA compliance               | Blind people may walk into blade. Need to ensure installation is DDA compliant                                                                                                | Not compliant with DDA regs. Poor PR. Health & Safety risks  | 2 | 3 | 6 | Install physical barrier (e.g. bench) & tactiles/edge to warn blind people that they are approaching an obstacle                                                                                     | Hull 2017 |                                                                                                                     |
| Transport Route                             | A suitable transport route cannot be identified.                                                                                                                              | Project cannot be realised                                   | 1 | 5 | 5 | Consider alternative modes of transport.                                                                                                                                                             | Siemens   | Initial surveys have been undertaken and feasible transport route identified                                        |
| Supply of Blade                             | Loan Agreement with Siemens is not in place.                                                                                                                                  | Project cannot be realised                                   | 1 | 5 | 5 | Siemens to confirm offer by end of June 2017.                                                                                                                                                        | Siemens   | Siemens & HCC are well progressed with Sponsorship Contract Discussions. Loan Agreement discussions to be commenced |
| Blade from Denmark                          | Blade cannot be transported from Denmark to UK in time.                                                                                                                       | Delay to realising project.                                  | 1 | 5 | 5 | Track blade delivery date - put milestone on programme                                                                                                                                               | Siemens   |                                                                                                                     |
| Blade damaged during transport              | Blade becomes damaged during transport - e.g. collision, dropped during lifting                                                                                               | Damage to blade. Potential impact on Loan Agreement          | 1 | 5 | 5 | ALE appointed to transport blade. Ensure method statement are written prior to transport - method statement to be reviewed by team. ALE & Hull 2017 to carry sufficient insurances                   | ALE       |                                                                                                                     |
| Buses below blade                           | Bus operators object to proposals to position the Blade above Carr Lane. Fear of collision with buses                                                                         | Potential objection to planning application. Poor PR         | 2 | 2 | 4 | Set out and confirm highway clearances as part of Planning application submission. Engage with Bus operators to explain how design proposals do not impact on bus operations.                        | Hull 2017 |                                                                                                                     |
| Secretary of State Call In                  | Planning Application is called in by Inspector / Secretary of State                                                                                                           | Delay to implementing project                                | 1 | 4 | 4 | Undertake full consultation and work to address concerns of potential objectors. Explain the aims of the Hull UK City of Culture programme.                                                          | Hull 2017 |                                                                                                                     |
| Judicial Review                             | Objectors object to scheme and mount Judicial Review                                                                                                                          | Delay to implementing project. Additional costs to defend JR | 1 | 4 | 4 | Abort project if planning application is refused or JR is mounted                                                                                                                                    | Hull 2017 | A JR process would take more than 3 months.                                                                         |
| Blade supports obstruct manholes/chambers   | Access to manholes and chambers to underground are blocked by blade supports - objections from Utility Companies                                                              | Physical obstruction created                                 | 2 | 2 | 4 | Carefully position supports to avoid impacting manholes, inspection chambers etc.                                                                                                                    | Hull 2017 |                                                                                                                     |
| Breakdown during transport                  | Transport vehicle(s) breakdown en route. Potential to cause congestion due to extended road closure.                                                                          | Delay to installation process                                | 1 | 4 | 4 | Check vehicles are properly maintained. Check vehicles one week before installation date.                                                                                                            | ALE       |                                                                                                                     |
| Conflict with other Events                  | Installation / removal of blade clashes with other events in Hull City Centre, i.e. Hull 2017 Launch event. Blade prevents other events in Queen Victoria Square taking place | Relationships with other organisations potentially impaired  | 2 | 2 | 4 | Hull 2017 to engage with HCC Events Team to coordinate events and minimise potential for conflict.                                                                                                   | Hull 2017 |                                                                                                                     |
| Emergency Services                          | Blade causes an obstruction to emergency services accessing Queen Victoria Square.                                                                                            | Health & Safety                                              | 2 | 2 | 4 | Engage with emergency services during Planning to understand their requirements. Track vehicles to ensure emergency access to Queen Victoria Square can be maintained at all times.                  | Hull 2017 |                                                                                                                     |
| Birds and bird droppings                    | Birds sit on blade. Birds defecate on blade which is unsightly                                                                                                                | Unightly image                                               | 4 | 1 | 4 | Allow budget to clean blade with cleaners working from cherry picker                                                                                                                                 | Hull 2017 | Blade surface very smooth - difficult for birds to land, especially if blade is installed at an angle.              |
| Lighting strike                             | Lighting strikes blade                                                                                                                                                        | Damage to blade. Health and safety risk                      | 2 | 2 | 4 | Position blade so that it is lower than surrounding buildings                                                                                                                                        | Hull 2017 | Blade has an in-built lighting conductor.                                                                           |
| Static electricity                          | Movement of blade could generate build up of static electricity                                                                                                               | Risk of electric shock                                       | 2 | 2 | 4 | Ensure that blade is earthed via supports                                                                                                                                                            | Hull 2017 |                                                                                                                     |
| Police escort delayed / not available       | Police escort does not arrive on time and therefore transport of the blade is delayed.                                                                                        | Delay to installation process                                | 1 | 3 | 3 | Engage with Police prior to installation date. Hold regular meetings to make sure police are fully engaged with project. Try to get names & meet officers who will be involved in project            | Hull 2017 |                                                                                                                     |



|                                             |                                                                                                                         |                                                   |   |   |   |                                                                                                                                                                                                                    |           |                                                                                                 |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------|
| Road signage                                | Incidents and road safety issues arise as a result of the temporary removal of regulatory and information signs.        | Increased risk of accidents                       | 1 | 3 | 3 | Make sure that all signs removed are reinstalled after blade has moved through affected area. Take photographic survey before/after to confirm. Address as part of Quality Control procedures.                     | Hull 2017 |                                                                                                 |
| Congestion                                  | Rolling road closures during transport of blade causes significant traffic disruption on A63 and local highway network. | Public Relations                                  | 3 | 1 | 3 | Engage with HCC and Highways England operations early to understand constraints and gain their support to proposals. Move blade during periods of low traffic flows (e.g. early Sunday morning, night-time etc.)   | Hull 2017 |                                                                                                 |
| Support Structures in Queen Victoria Square | Support structure not assembled/ready in time to accept blade.                                                          | Delay to installation process                     | 1 | 2 | 2 | Undertake "Mock Up" at Siemens Yard to practice assembly of supports. Use lessons learnt to develop Programme for the real installation process. Plan float to avoid any delays impacting on overall installation  | Hull 2017 |                                                                                                 |
| Damage to Third Party Property              | Private property is damaged during delivery of blade.                                                                   | Additional costs                                  | 1 | 2 | 2 | Track routes to avoid blade over sailing private property. Consider organising photographic survey before and after blade installation/removal                                                                     | Hull 2017 |                                                                                                 |
| Projectiles                                 | People try to "shoot" blade (e.g. with air rifle) or throw objects at blade                                             | Damage to blade                                   | 2 | 1 | 2 | Security presence to deter vandals. Use CCTV surveillance                                                                                                                                                          | Hull 2017 | Siemens have confirmed that blade is constructed of thick resin and fairly resistant to impact. |
| Blade Root                                  | Root of blade is hollow. People could access into the blade                                                             | Health & Safety risk                              | 2 | 1 | 2 | Board up end of blade with plywood or similar to prevent access                                                                                                                                                    | Hull 2017 |                                                                                                 |
| Planning submission delayed                 | Planning Application not registered - further information required by planners                                          | Delay to implementing project                     | 1 | 1 | 1 | Agree requirements for planning application submission with Planners as part of Pre-application process.                                                                                                           | Hull 2017 |                                                                                                 |
| Damage to Highway Infrastructure            | Highway infrastructure damaged during delivery/removal of blade.                                                        | Additional costs                                  | 1 | 1 | 1 | Undertake enabling works to put infrastructure in sockets to facilitate easy removal & reinstallation. Highway Authority asset managers (or representatives) to be available to assess damage and mitigate impact. | Hull 2017 |                                                                                                 |
| Insurances                                  | Insurances do not cover risks of damage to blade, third party damage and/or members of public                           | Additional costs to fight claims                  | 1 | 1 | 1 | Hull 2017 to confirm insurances in place prior to mobilisation. Hull 2017 to engage with insurance companies to check that they are covered - share this Risk Assessment with insurers.                            | Hull 2017 |                                                                                                 |
| Litter                                      | Litter collects under supports.                                                                                         | Unightly. Potential fire risk                     | 1 | 1 | 1 | Implement cleaning regime - liaise with Hull City Council Streetscene                                                                                                                                              | Hull 2017 |                                                                                                 |
| Flood Risk                                  | Blade creates barrier to surface water movement - dam effect. Hull is flooded and blade floats                          | Flooding of adjacent properties. Damage to blade. | 1 | 1 | 1 | Blade is position above the ground - will not create a dam effect and will be above any flood waters. Blade will be firmly attached to supports                                                                    | Hull 2017 |                                                                                                 |