Great Yarmouth Third River Crossing

Application for Development Consent Order

Document 7.4a: Appendix A: Approach to Detailed Design

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) ("APFP")

APFP regulation Number: 5(2)(q)

Planning Inspectorate Reference Number: TR010043

Author: Norfolk County Council

Document Reference: 7.4a

Version Number: 0 – Revision for Submission

Date: 30th April 2019

Norfolk County Council

Great Yarmouth Third River Crossing

7.4a Appendix A - Approach to Detailed Design

CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

Development consent is sought for the construction, operation, and maintenance of the Scheme, within the parameters and the limits of deviation submitted in the Application.

As a Nationally Significant Infrastructure Project (NSIP), the Scheme has been designed in compliance with relevant policies, with best practice guidance (described in Section 3 of the Design Report), and in accordance with a set of design principles (explained in Section 4.3 of the Design Report). The Applicant is committed to embodying good design across the Scheme.

1.2 PURPOSE

The level of detail of design submitted for the Application incorporates some flexibility, restricted by the limits of deviation, to allow for buildability, further innovation and the opportunity for efficiencies in construction to be explored. The purpose of this guidance is to provide clarity on the detailed design requirements to be applied after the grant of consent, and compliance with the guidance in this document is secured by a requirement of the DCO.

This guide is primarily concerned with the aesthetic appearance of the above ground components of the Scheme and the interface between engineered infrastructure and the public realm. This guide does not cover the functional, engineering and safety standards for the design of highways (including bridges) which are set by the Design Manual for Roads and Bridges which are reflected in the design for which consent has been sought.

This document has been developed by the Applicant's multi-disciplinary delivery team, following discussions with the local planning authorities. It is based on the ethos of 'good design' described in the Design Report.

1.3 STRUCTURE

Guidance on detailed design for the Scheme is divided in this document into the following components:

- Highways
- Structures
- Landscape and public realm
- Lighting
- Environmental considerations

For each of the above components, this document includes a summary description of the component together with a discussion that identifies the key considerations guiding the detailed design of that component. These discussions are supplemented by images, plans, diagrams, material palettes, examples, design typologies and similar visual aids. All such visual aids shown in this document are indicative of how the detailed design could develop and must not be construed as binding the detailed design. Nonetheless, the items featured in the visual aid must be considered during the detailed design process.

Each section then specifies the Essential Design Requirements and Design Aspirations and Opportunities for that component.

The Essential Design Requirements are aspects or outcomes that the detailed design must deliver. The Essential Design Requirements recognise that the overall objective may be achieved in a number of different ways and, in preparing the detailed design for that component, consideration must be given to the guidance that precedes it.

Design Aspirations and Opportunities are aspects or outcomes that have been identified at this stage that could further enhance the Scheme. They are not necessary, or required, but should be considered when preparing the detail design for that component.

Illustrative Masterplan of the Scheme

2.1 INTRODUCTION

The highways design for the Scheme comprises carriageways, footways, cycleways, and associated furniture proposed for the crossing, and connections to the existing highway networks. For the western approach, a new roundabout at William Adams Way would connect the crossing to the A47 Harfrey's Roundabout, Suffolk Road, and the access to the Kingsgate Community Church (locally, and hereafter referred to as the 'King's Centre'). The crossing slopes up from the new roundabout over Southtown Road, to its highest point over the River Yare, where it descends to its connection with South Denes Road.

Crossing points for pedestrians and cyclists would be provided in appropriate locations. An inclusive design must be provided so that the Scheme can be accessed and used by as many people as possible, regardless of age, gender and disability. The Scheme has a 30mph speed limit on the crossing, and must be designed accordingly.

To accommodate the connection to South Denes Road, the one-way configuration currently operating on Sutton Road and Swanston Road would be reversed.

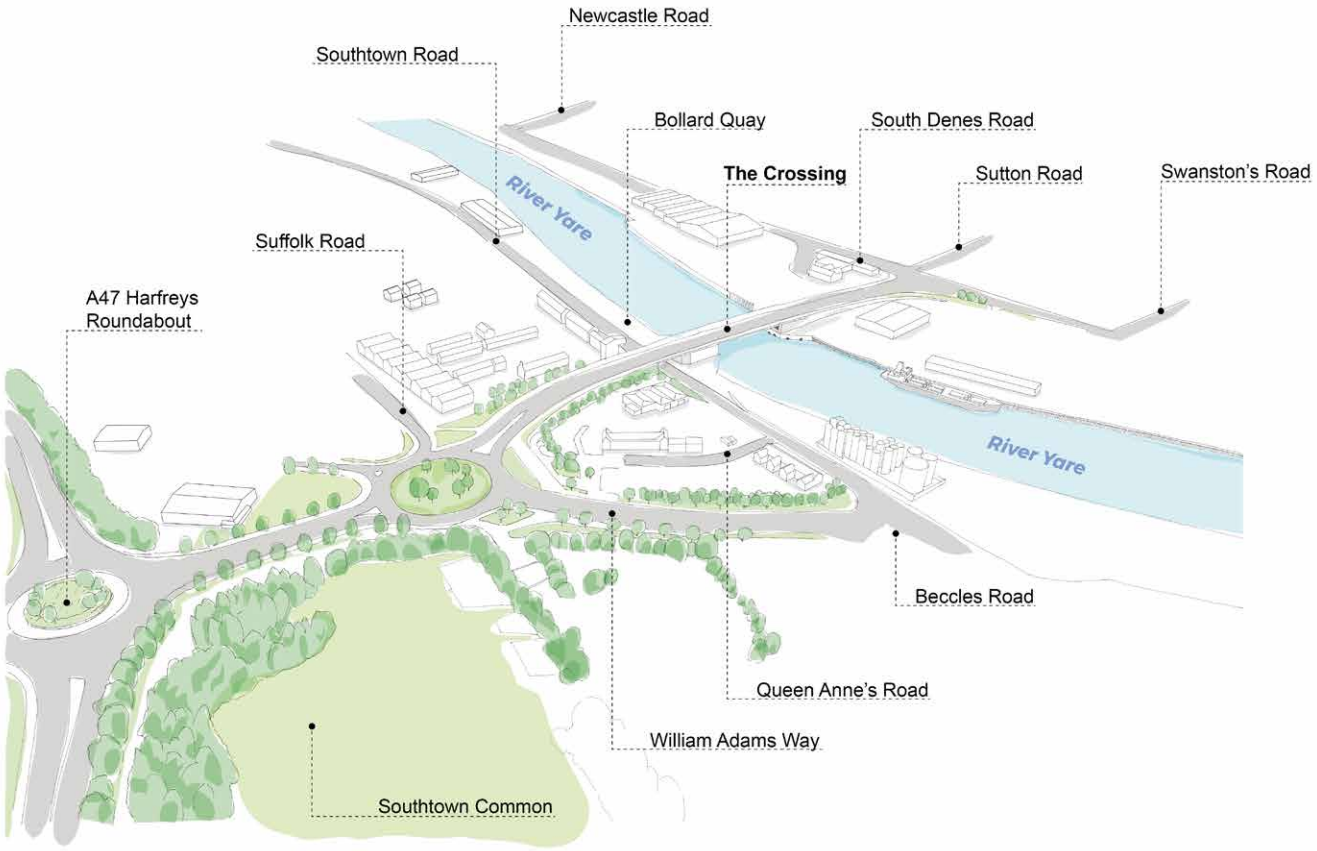


Diagram of the Scheme

2.2 NON-MOTORISED USERS AND CROSSINGS

Footways and cycleways should be designed to provide safe and comfortable routes for all users and abilities. A combination of controlled and uncontrolled crossings where appropriate would ensure safe crossing movement in response to key desire lines of these users.

A clear and simple palette of materials should be applied to the footways and cycleways and the crossing points across the Scheme. Material palette options are shown to the right for consideration. They have been selected to show suitable solutions which respond to the setting, other approaches that meet the essential design requirements may also be appropriate.

Essential Design Requirements:

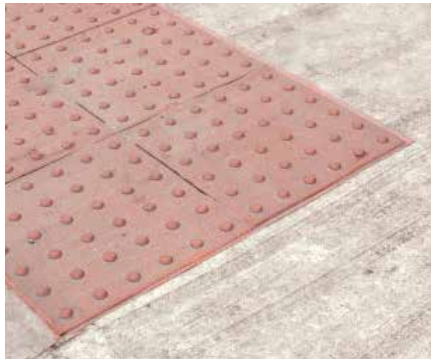
- Footways and cycleways should incorporate a maximum gradient of 5% (1:20 slope);
- Appropriate controlled and uncontrolled crossings in response to key desire lines and users;
- A clear and simple palette of materials that differentiates for users between carriageways, footways and cycle tracks.

Design Aspirations and Opportunities:

- Permeable paving and/or kerbs for sustainable drainage solutions.

Cycle track and kerb

Cycle track surfacing



Tactile paving

Coloured chipped macadam

Buff coloured macadam

Kerb drains for SuDS

Indicative material palette

2.3 SUTTON ROAD

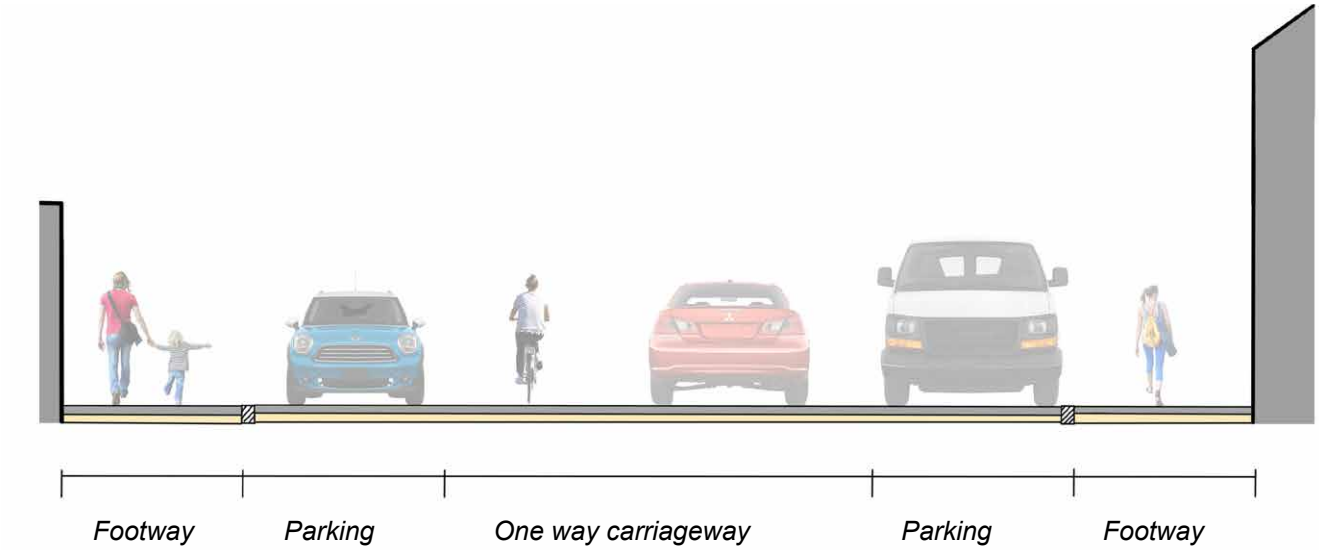
Sutton Road sits on the eastern side of the Scheme and would serve as a key pedestrian, cyclist and motorist link from the new crossing to the coastline of Great Yarmouth.

As part of the Scheme, the current one-way configurations of Sutton and Swanston's Roads would be reversed and Sutton Road requires improvements to facilitate all users.

Essential Design Requirements:

- Adopt a similar street typology to that shown in the section to the right;
- Retain existing access to garages and/or businesses.

Design Aspirations and Opportunities:
There is an opportunity to further enhance Sutton Road, as it may become a key pedestrian and cyclist route west to east across the bridge, and towards the coast. Enhancements may include the use of paving materials for the parking bays and footways, similar to public realm areas elsewhere in the Scheme.



Indicative Street Typology for Sutton Road

2.4 HIGHWAY FURNITURE

Highway furniture on the bridge crossing requires careful consideration of its aesthetics. This includes items such as the vehicle restraint system, pedestrian guardrails, parapets, traffic barriers and wigwag lighting (equipment warning bridge users of the raising and lowering of the bridge). The selection and design of these items, such as the parapet, can have affect the appearance of the bridge in elevation.

It would be important to achieve a simple 'uncluttered' arrangement of highway furniture on the bridge to allow adequate routes for pedestrians and cyclists at pinch points. This could be achieved through integrated designs or careful consideration of the placement of features to avoid clutter.

Essential Design Requirements:

- A clear and simple palette of materials;
- A simple 'uncluttered' arrangement of highway furniture on the bridge deck.

Design Aspirations and Opportunities:

- The pedestrian parapets could be designed to complement the bridge deck and aid the slender appearance of the bridge.
- Integrated designs of the highway furniture to reduce clutter and create a bespoke item that reflects the Scheme design narrative.

The illustrations on this page are suitable solutions for consideration. Other approaches that meet the essential design requirements may also be appropriate.

Example of de-cluttering wigwags and barriers

Opportunity - Example of integrated wigwags and barriers

2.5 RELOCATION OF BUS STOP

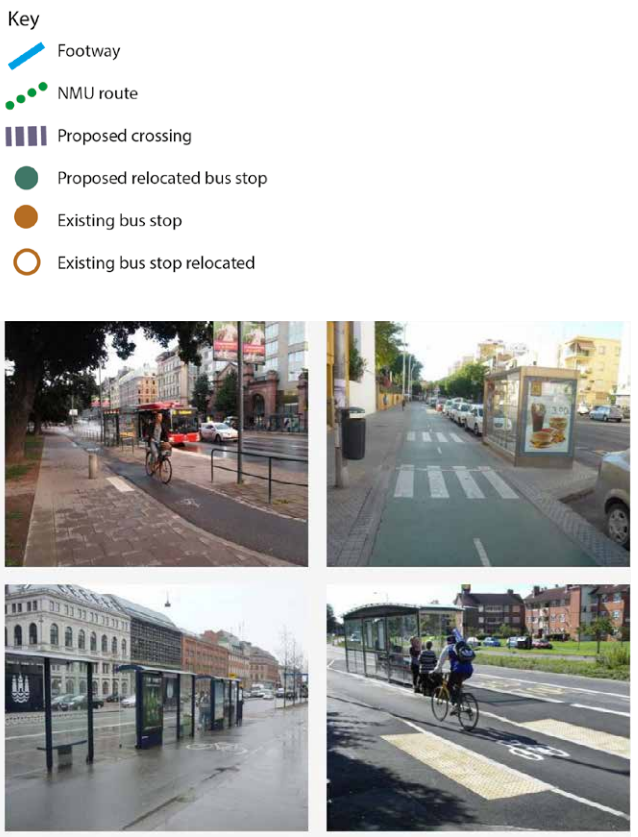
The southbound bus stop currently located north of the Scheme on Southtown Road would be relocated to provide better waiting and alighting areas for passengers, who would also benefit from the proposed crossing in this location. Guidance on the treatment of the bus stop island on Southtown Road is included in Section 4.2 of this guide.

Essential Design Requirements:

- Design will be based on best practice for bus stop and cycle track bypasses;
- Sufficient space for two buses to be stationary at the bus stop;
- Shelter for bus users with seating.

Design Aspirations and Opportunities:
There is an opportunity to provide a bus stop shelter that integrates the latest real-time technology, as well as sustainable features such as a green/brown roof.

Diagram of existing and proposed bus stop locations on Southtown Road



Examples of bus stop bypasses

2.6 ON STREET PARKING

As part of the Scheme, additional on street parking would be provided on Cromwell Road for residents. Additionally, with the reconfiguration of Sutton Road, improvements would be made to ensure the street is safe and legible for all users, involving the rationalisation of parking.

Essential Design Requirements:

- A clear and simple palette of materials

Design Aspirations and Opportunities:

- Demarcation of parking using pavers in place of painted marking
- Permeable paving

The following images illustrate appropriate examples of how the essential design requirements for parking bays in the Scheme could be met, but other approaches that meet the essential design requirement would be appropriate for the Scheme.

Diagram showing location of Cromwell and Sutton Road

Block paving demarcation

Coloured chipped macadam and block pavers for bay demarcation

King Street parking bays, Great Yarmouth

3. STRUCTURES

3.1 INTRODUCTION

The structures in the Scheme include the bridge decks, the opening mechanisms, the lifting central spans, the control tower, quayside ‘knuckles’ and the ramping approach roads from the west and east.

The aesthetic appearance of the structures is important in providing a solution which responds to the context of the town and contributes positively to the locality. The Scheme would be a piece of dynamic architecture, through the operation of its opening span, within the fabric of Great Yarmouth.

3.2 BRIDGE DECK

Visually the bridge deck should appear as one entity; a seamless structure which minimises any change in material as far as is practicable. The bridge deck should be of a streamlined appearance and slender in proportion to the abutments.

The surfacing should resemble a typical carriageway with an asphalt surface sitting on top of a lightweight steel plated structure. The combined footway and cycleway should be differentiated from the carriageway with an alternative surface treatment. Refer to section 2.2 for guidance on appropriate examples.

No essential design requirements or opportunities are included in this section.

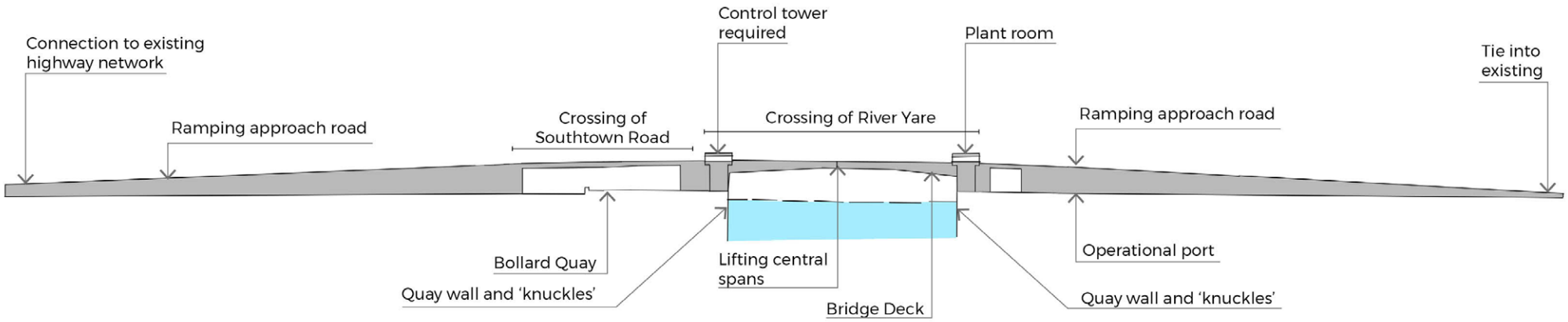


Diagram of structures and connctions comprised in the Scheme

3.3 SUPPORTING STRUCTURES

The crossing structure of the Scheme would consist of two fixed bridges connected by a central opening span over the River Yare. Reinforced earth embankments support the sloped sections of highway connecting to the existing highway network on the western and eastern approaches.

a) Reinforced earth walls

The Scheme requires western and eastern approach embankments joining at-grade junctions to the river crossing. These are required to carry vehicular traffic and provide for NMU (primarily pedestrians and cyclists). Key considerations are how the embankment would be integrated with the surrounding areas, environmental impacts, and the safe management of potentially contaminated soils.

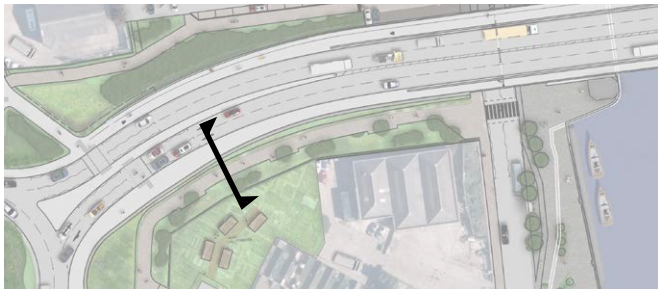
The western approach would be comprised of a sloped, vegetated, reinforced earth embankment on both the north and south sides. This would soften the appearance of the high approach embankment in the vicinity of existing residential properties. It would also enhance the aesthetics of the pedestrian and cycling NMU routes alongside the embankment. There are opportunities for the western approach to incorporate ecological benefits and biodiverse low maintenance planting. Any proposals should be in line with the Environmental Statement and the Environmental Considerations in section 6.3 of this guidance.

The eastern approach would have precast concrete vertical cladding, which is appropriate to the commercial nature of the area and minimises the land take from the operational port in comparison to a sloped embankment.

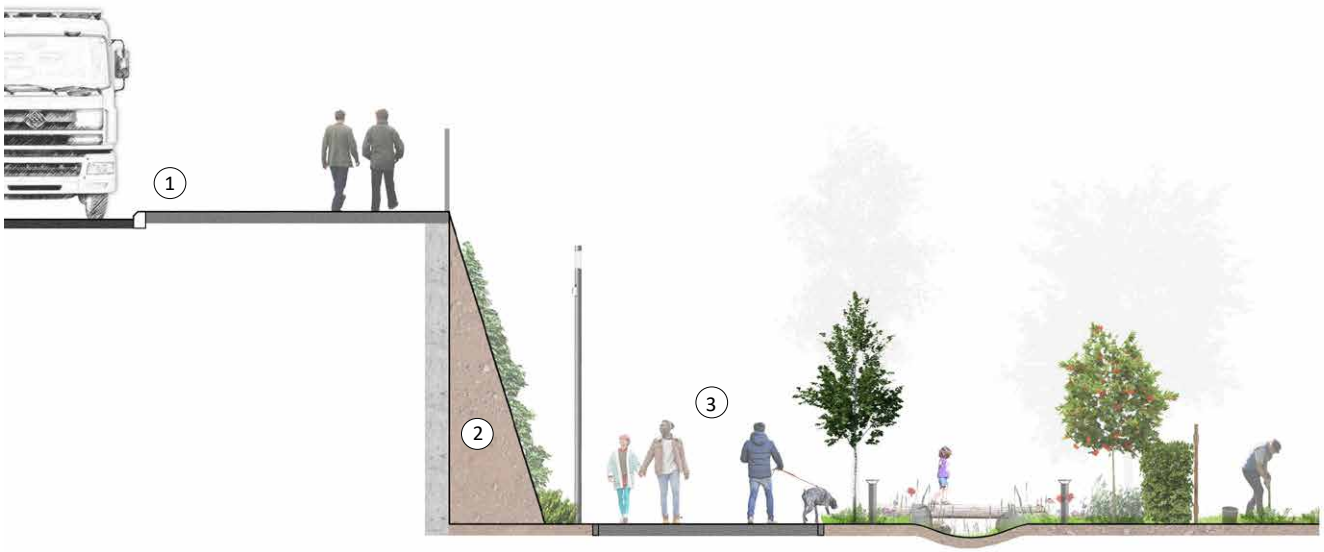
Essential Design Requirements:

- A vegetated slope for the western approach
- A vertical hard wall for the eastern approach.

No further design aspirations and opportunities have been identified.



Location of Indicative Section



Indicative section of reinforced earth embankment on the Southern green route

1. Bridge deck and footway
2. Reinforced earth embankment
3. NMU route

b) The Southtown Road abutment

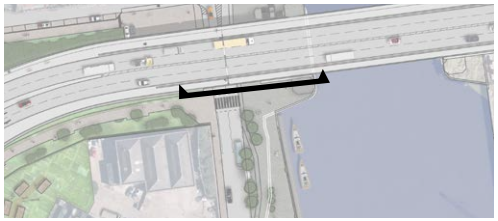
The pier and abutment/wall designs should provide a suitable solution for a public space and key pedestrian and cycle routes. The alignment of Southtown Road creates an underpass, in which user safety and experience should be carefully considered. The western approach is comprised of a sloped, grassed, reinforced earth embankment on both the north and south side. This softens the appearance of the high approach embankment in the vicinity of existing residential proper ties. It also enhances the NMU routes alongside the embankment.

Essential Design Requirements:

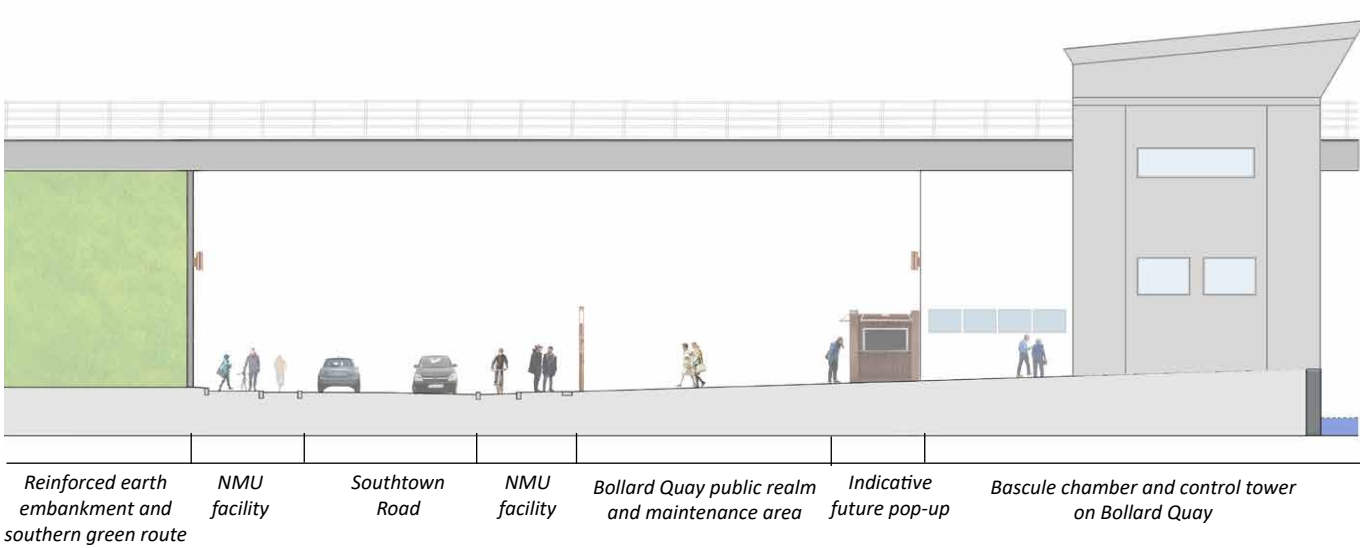
- A clear and simple palette of materials;
- A safe and inclusive design appropriate for all users;
- Appropriate lighting for pedestrians to create a safe public realm after dark.

Design Aspirations and Opportunities:

- Features such as wall lighting and refinement of the concrete to align with the finishes of the bascule chambers and the control tower;
- Future ready design elements could be incorporated into the underpass to allow for future events such as markets and/or pop-up cafés to make the most of the space. Refer to section 4.2a Future Proofing for design elements that could be incorporated.



Location of Indicative Section



Indicative section through Southtown Road abutment

c) Bascule chambers

The bascule chambers house the counterweight which opens and closes the bascule bridge. in addition, the areas inside other chambers beyond the path of movement of the counterweight can be used to store spare parts and to enable inspection and maintenance of the structure.

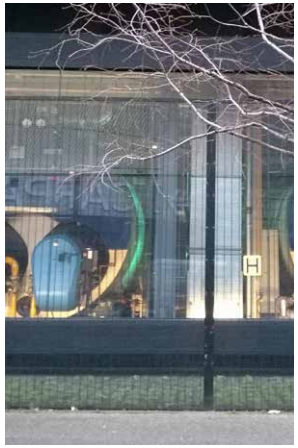
The bascule chamber on the western side of the river would also be a large feature within the public realm on Bollard Quay. The refinement of the concrete face and consideration of how the public interacts with the structure is required.

Essential Design Requirements:

- A clear and simple palette of materials that aligns with the overall material narrative of the Scheme;
- Design features that break up the face of the large concrete structure.

Design Aspirations and Opportunities:

- Viewing windows in the bascule abutment walls could be proposed. In addition to reducing concrete and steel quantities, these would provide an interesting feature for the public realm, and highlight the engineering feat of the Scheme. The size and location of the windows should be explored in relation to scale and public interaction.
- Lighting could be considered to highlight the bascule chamber structure within the public realm. This could create a beacon within the public realm at night.



Images showing exposure of mechanisms and windows exposing the interiors of infrastructures

3.4 CONTROL TOWER

The location and scale of this structure is dictated by its function and would require a design appropriate to its setting. The control tower would contain key apparatus for operating the opening span of the bridge and must provide appropriate visibility for operating the bridge safely for all bridge users and marine traffic.

The control tower is located on the west side of the river on Bollard Quay and the plant room on the east side of the river with occasional maintenance and operational use required. Longer-term parking for maintenance and operational staff is provided on the north side of the western approach embankment, with access via the pedestrian crossing on Southtown Road.

The control tower is an essential part of the Scheme but it also needs to be designed to fit into the public realm design. The control tower is placed alongside the quay wall such that dead areas between the tower and wall are avoided, as such dead areas could attract antisocial behaviour. Consideration of how the control tower looks, as it is a prominent feature in the public realm, and how it fits in with the design narrative of the Scheme, is required.

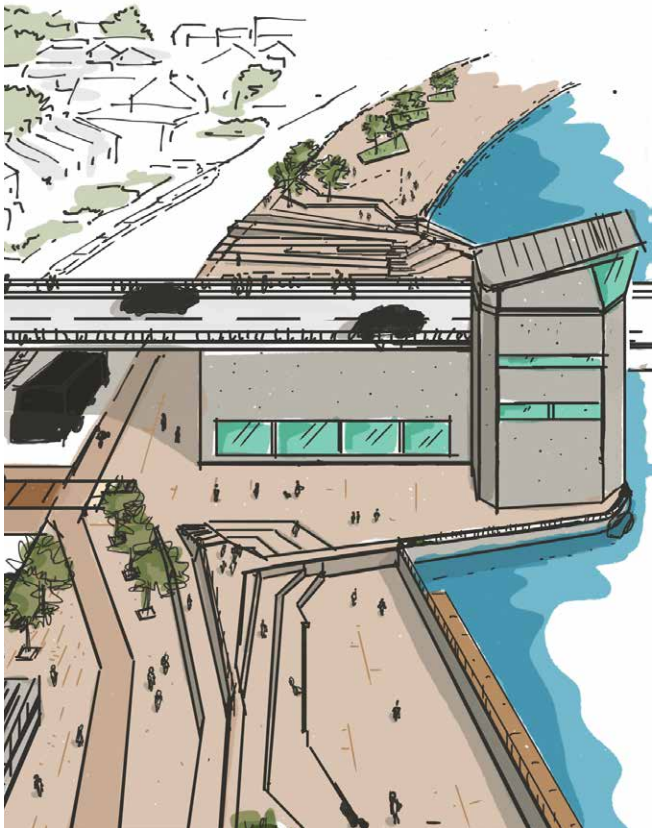
Essential Design Requirements:

- Appropriate in appearance and scale to its setting and the Scheme's design as a whole;
- Secure compound that provides reasonable security;
- Appropriate lighting, interior and exterior for safety purposes.
- Control room from which the opening span of the bridge is operated;
- Suitable visibility of bridge deck and marine traffic;
- Adequate CCTV to aid visibility and safe operation of the bridge;
- Workplace facilities for operator(s) 24/7 including necessary storage and mess spaces;
- Operator stair access from Bollard Quay and/or bridge deck level;
- Plant room;
- Substation;
- Parking facilities for operator and maintenance vehicles.

Design Aspirations and Opportunities:

- Architectural input into functional design of the control tower and associated facilities;
- Features and refinement of the structure's materials that aligns with the design narrative of the Scheme, the bascule chambers and abutments.

The following images illustrate appropriate examples of how the aspirations and opportunities for the control tower in the Scheme could be met, but other approaches that meet the essential design requirement would be appropriate for the Scheme.



Artists impression of the Control Tower on Bollard Quay

Example of refinement in materials and windows

Example of refinement in brick cladding

Example of using brick and timber

Windows could reflect historical industrial port setting

3.5 PUBLIC STAIRS

Public stairs are required on the western side of the bridge to provide pedestrian access between the bridge deck and Southtown Road and Bollard Quay. The location of the stairs should respond to pedestrian desire lines and consider pedestrian safety whilst using the stairs and when entering and exiting.

The detailed design should ensure that the risers are comfortable, with appropriate landings and hand rails. Dual height rails should be considered and the inclusion of a cycle wheeling channel is required. The materials should add to the function as well as connect to the surrounding structures and the Bollard Quay design narrative. The landing area on Bollard Quay needs to be designed in response to key desire lines of these users.

The provision of a public viewing platform is integrated with the stairs on the north side of the abutment. This should provide a space for the public to view the opening of the bridge as well as an area for rest.

Essential Design Requirements:

- A clear and simple palette of materials;
- Public stairs with comfortable risers, landings and handrails and in compliance with BS 8300 Part 1: Design of an accessible and inclusive built environment;
- A viewing platform;
- Refinement of the appearance should reflect the design narrative of the Scheme;
- Cycle wheel channel.

Design Aspirations and Opportunities:

- Dual height hand rails could be provided for adults and children;
- Refinement of the public stairs appearance could include details in the handrail. These could be timber to connect to the design of features and furniture on Bollard Quay;
- Lighting could be incorporated into the stairs and viewing platform.

Example of public stairs and a cycle wheeling ramp

Example of a cycle wheeling ramp

3.6 QUAY WALL

The quay wall would have a dual function; providing river edge protection and; defining the boundary to the new Bollard Quay. It would have a continuous level, that would be determined by tidal requirements, tying–in with the existing quay wall levels.

The new section of quay wall interfaces with the public space, and should therefore provide protection to the river edge and be designed using similar materials and details to the rest of the design for the Scheme.

Essential Design Requirements:

- An integrated quay wall design for public amenity and safety;
- Safety for navigational purposes;

Design Aspirations and Opportunities:

- The quay wall could incorporate features such as lighting or other elements that reflect the design narrative of Bollard Quay.

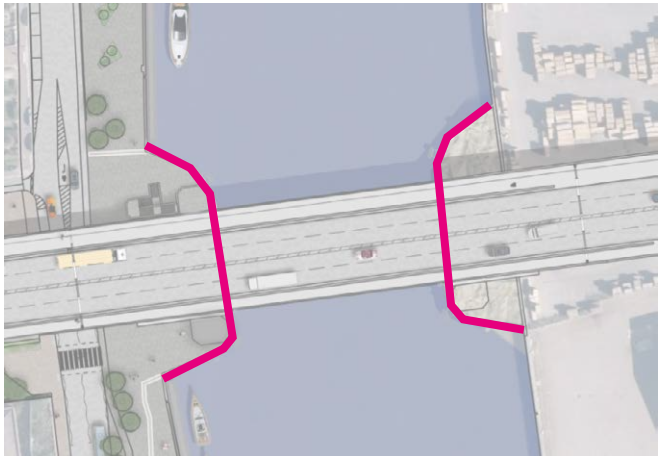
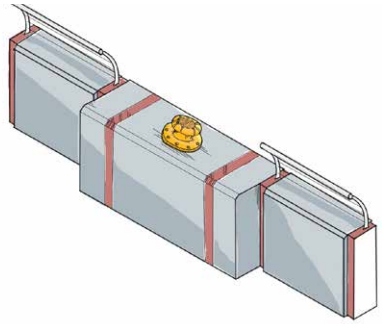


Diagram indicating location of new quay walls

Existing quay wall on Bollard Quay

Example of a quay wall and hand rail



Illustrative sketch concept for the new quay wall

3.7 INTEGRATION WITH ENVIRONMENT AGENCY PROPOSED FLOOD DEFENCE

The Scheme should be designed to tie into the future flood defence proposed by the Environment Agency (see below).

The Environment Agency's Proposed Flood Defence Works

The Applicant understands that the Environment Agency's proposed works would run parallel to Southtown Road set back from the kerb at a continuous height to provide flood protective measures. The wall would run onto land proposed to be used in the Applicant's Scheme for the Bollard Quay public realm. The preference is to create an integrated public realm solution incorporating the Environment Agency's works at the waterfront.

The precise timescales for the Environment Agency scheme coming forward is uncertain but it may occur during the detailed design stage of the Scheme.

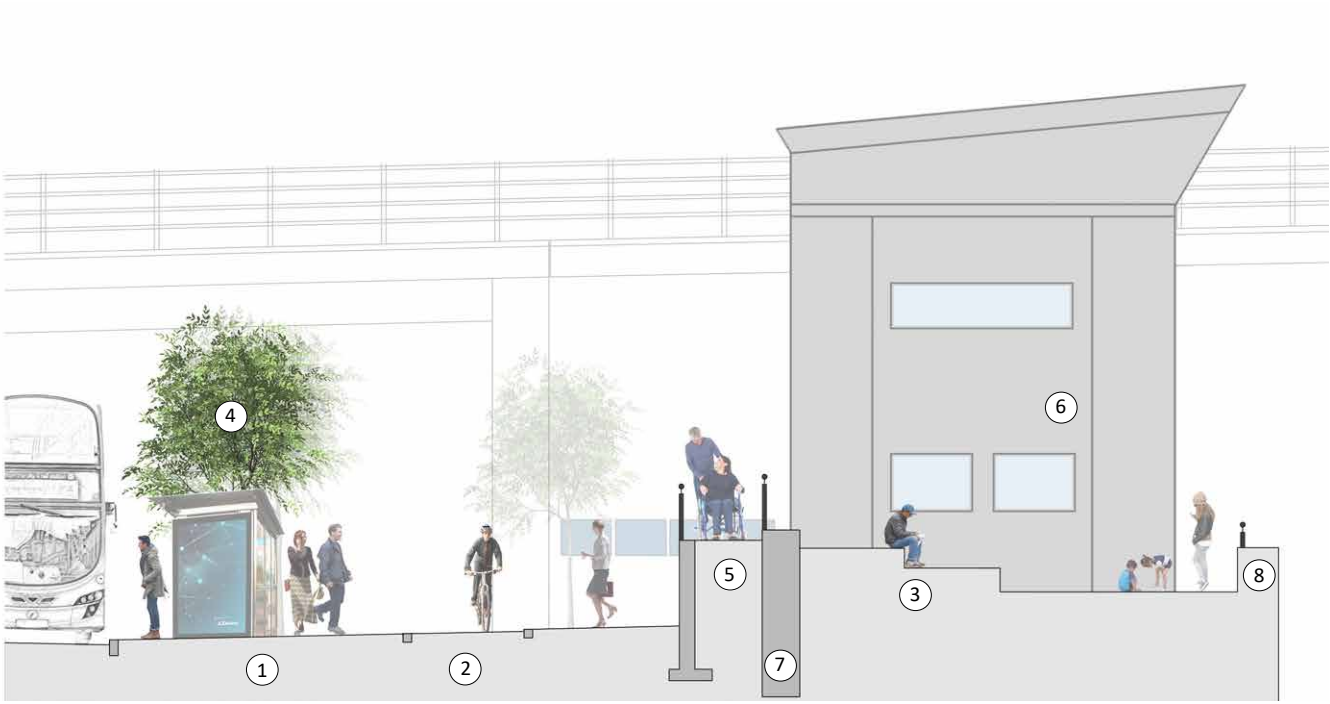
The detailed design for the Scheme, particularly the public space on Bollard Quay, maintenance areas, bridge footprint and new quay wall, may be required to integrate with the Environment Agency's works. Changes in level would need to be accommodated in the design and public access integrated while still maintaining flood defence functionality.

Essential Design Requirements:

- Integration with the existing flood defence and resilience for future flood defence schemes;
- An integrated wall design for public amenity and safety;
- Materials and detailing that reflects the design narrative;
- All Essential Design Requirements related to flood defence and Bollard Quay are subject to the protective provisions for the benefit of the Environment Agency contained in the development consent order for the Scheme.
- Design Aspirations and Opportunities:
- Lighting could be integrated into any wall, ramps and seating proposed, to reduce the amount of lighting columns and decluttering the public realm.

Example of integrated seating

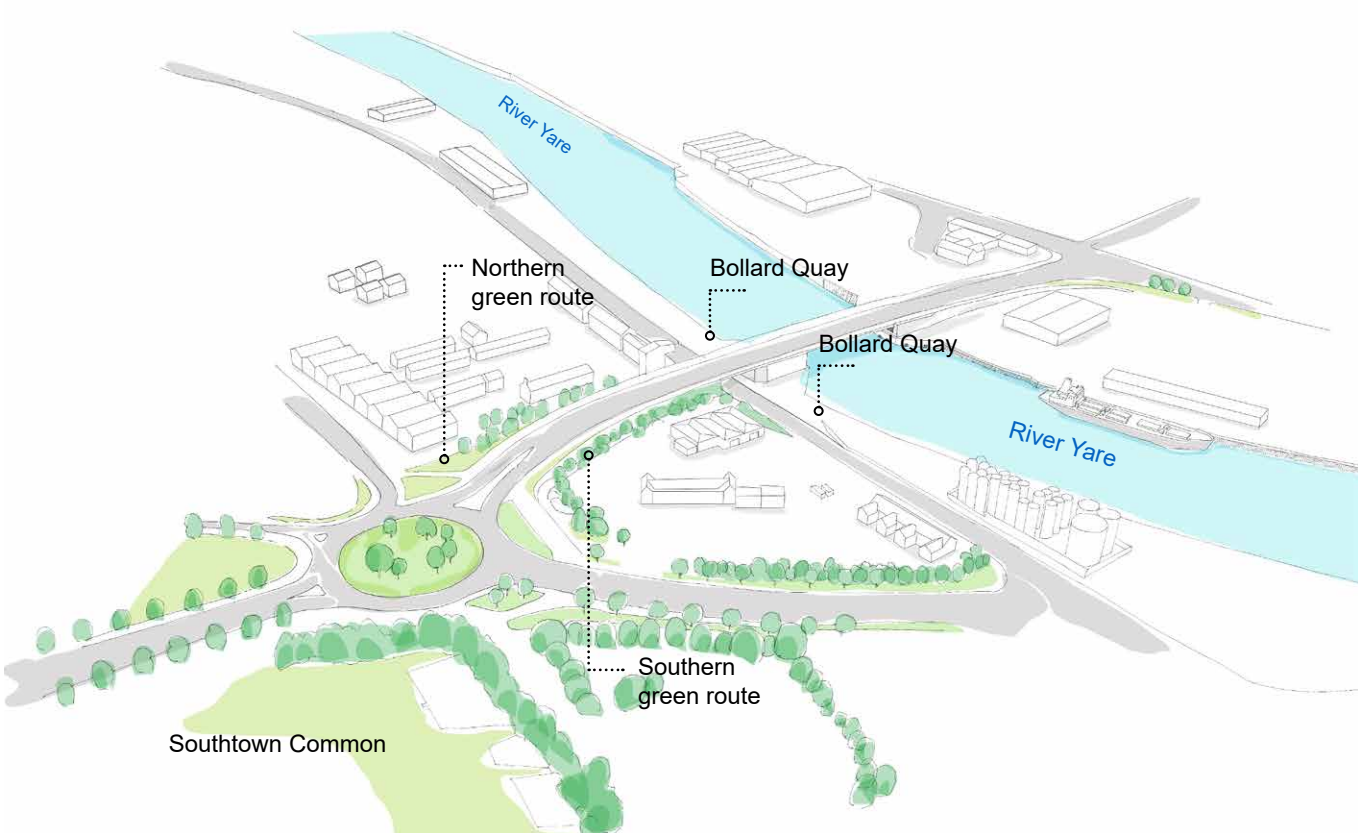
1. Bus stop
2. Cycleway
3. Terraced steps
4. Salt resistant trees
5. Ramp
6. Control Tower
7. Flood defence
8. Quay Wall



Indicative section of Bollard Quay and flood defence

4.1 INTRODUCTION

The public realm is predominantly located on the western part of the Scheme (control tower and plant room on eastern side not shown in image).



Public Realm Diagram

4.2 PUBLIC SPACE

a) Bollard Quay

Bollard Quay is currently non-operational due to structural issues. It sits above street level and does not currently provide access to the riverfront for the public. As part of the Scheme, a portion of Bollard Quay would provide public space utilising the areas around the bascule chambers to offer access at Southtown Road (street level). Integrated steps and ramps provide access for all up to the remainder of Bollard Quay at its higher level to maintain the use of this north-south route.

Bollard Quay would be a linking area of public realm where people may choose to travel to key destinations (north to the town centre, south to Gorleston on Sea, east to the beach). This would make it an important node for pedestrians and cyclists.

The Scheme would also involve the relocation of an existing southbound bus stop on Southtown Road (as explained in Section 2.5 of this guide). This area facilitates pleasant waiting and alighting areas for passengers, who would also benefit from the controlled crossing across Southtown Road to safely connect them onward in their journey's.

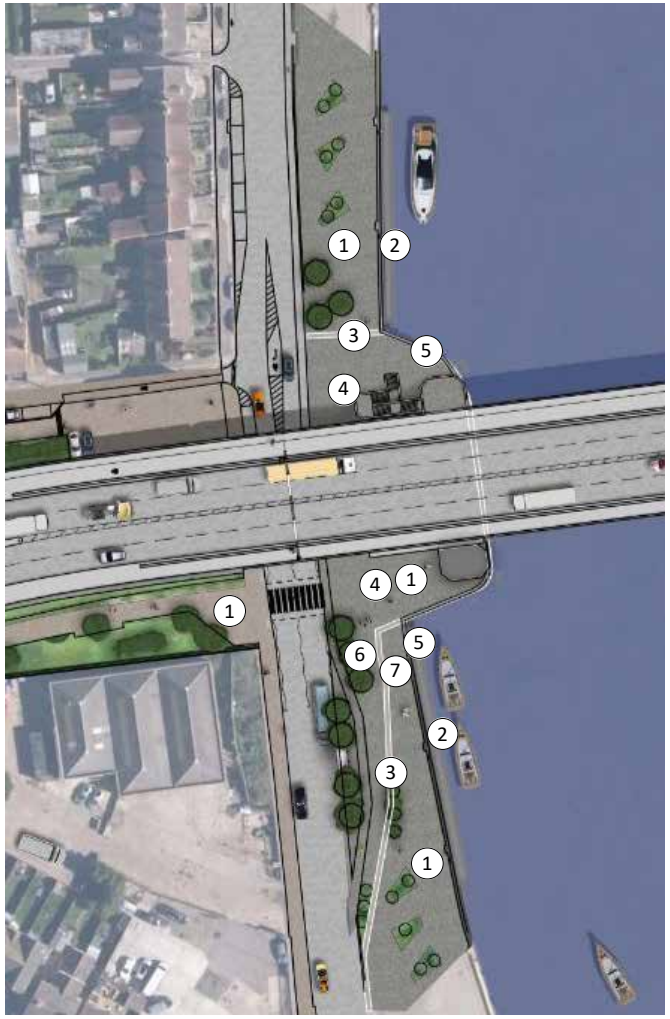
The public realm design, detailing and motifs should reflect the utilitarian appearance of the port setting and bridge structure.

Maintenance vehicle access for the bridge mechanism and structures require sufficient space for parking and turning without impeding circulation of non-motorised users unnecessarily. This space should be adaptable, to allow its use to predominantly be by the public unless closed for maintenance of the bridge.

Essential Design Requirements:

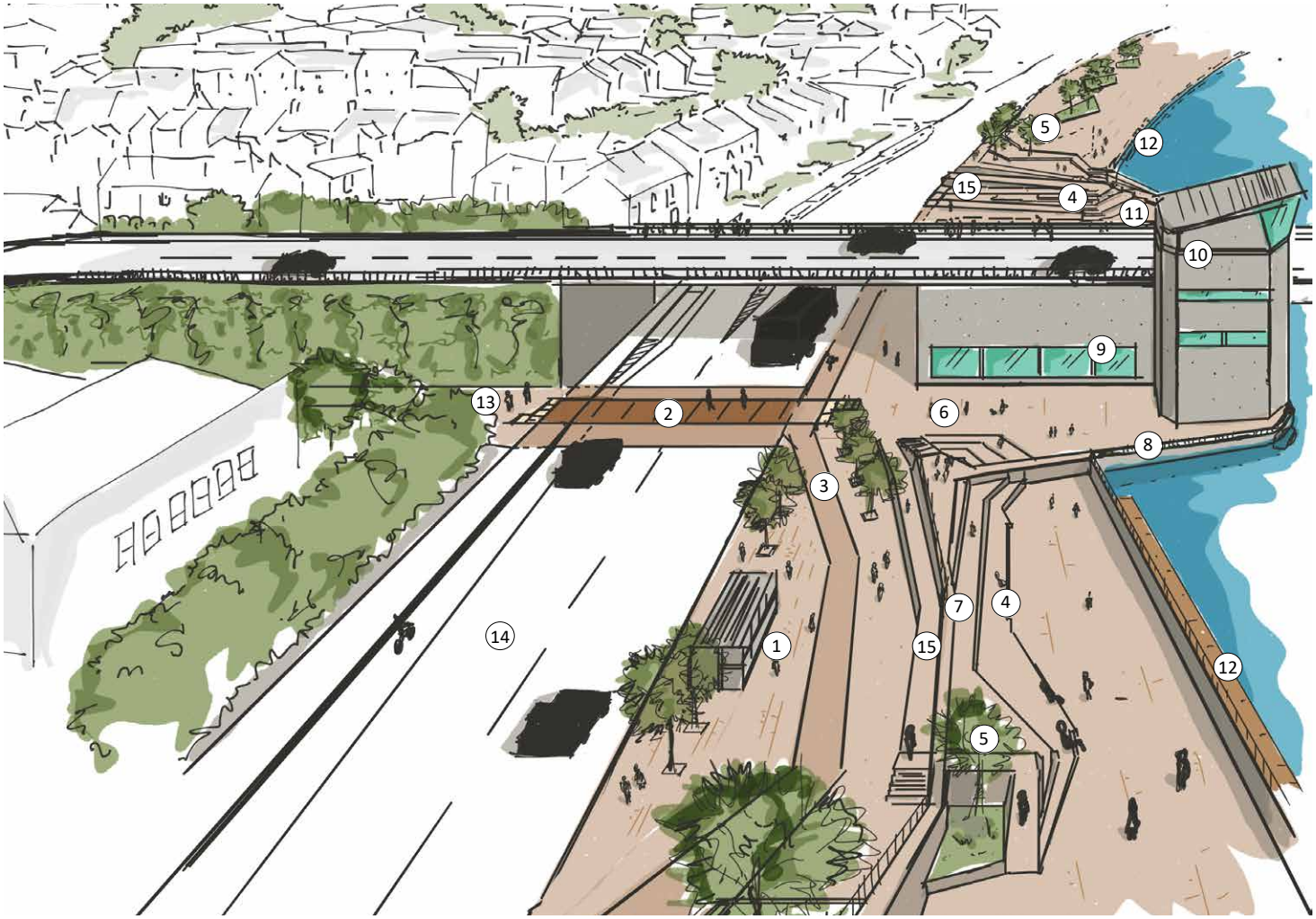
- Adaptable public space;
- Accessible space for all users (compliant with best practice), with waterfront seating and viewing areas;
- Maintenance access;
- Relocated bus stop;
- Appropriate pedestrian crossing;
- Improved cycle facilities with connections to existing network
- Adaptable to tie into any future flood resilience works. See section 3.7 of this guidance.

The following images illustrate how the design requirements and aspirations for the public realm in the Scheme could be met, but other approaches that meet the essential design requirement would be appropriate for the Scheme.



1. Public space
2. Vessel waiting facilities
3. Flood defence
4. Adaptable maintenance area
5. Quay wall
6. Salt resistant trees
7. Terraces

Illustrative plan of Bollard Quay



Artist impression of Bollard Quay public realm

1. Island bus stop
2. Controlled crossing
3. Segregated cycleway
4. Seating areas
5. Salt resistant trees
6. Maintenance area
7. Terraced steps
8. Quay wall
9. Bascule chamber windows
10. Control tower
11. Viewing platform & public steps
12. Vessel waiting facilities
13. Green NMU route
14. Southtown Road
15. Ramps (1:20)

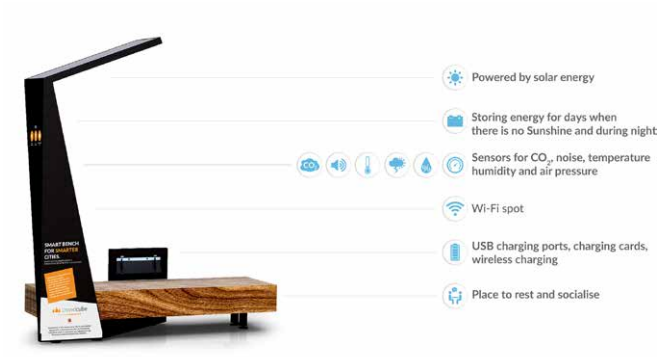
Design Aspirations and Opportunities:

Adaptable Spaces:
In accommodating this essential maintenance access, spaces could be adaptable so they may be utilised by the public where appropriate. Features such as moveable furniture are an example of a type of solution.

Future Proofing:
There is an opportunity to future proof Bollard Quay and the public realm by providing for potential future uses such as holding markets and events. Designs should consider services that may be needed to support events. As we continue to rely heavily on mobile phones, street furniture that incorporates charging points and Wi-Fi are increasingly expected elements of the public realm.

With an ageing population there is a rise in the use of mobility scooters. Bollard Quay and the public realm should be accommodating of mobility scooters with suitable space provision for manoeuvres.

Exchange Square, Manchester, moveable seating

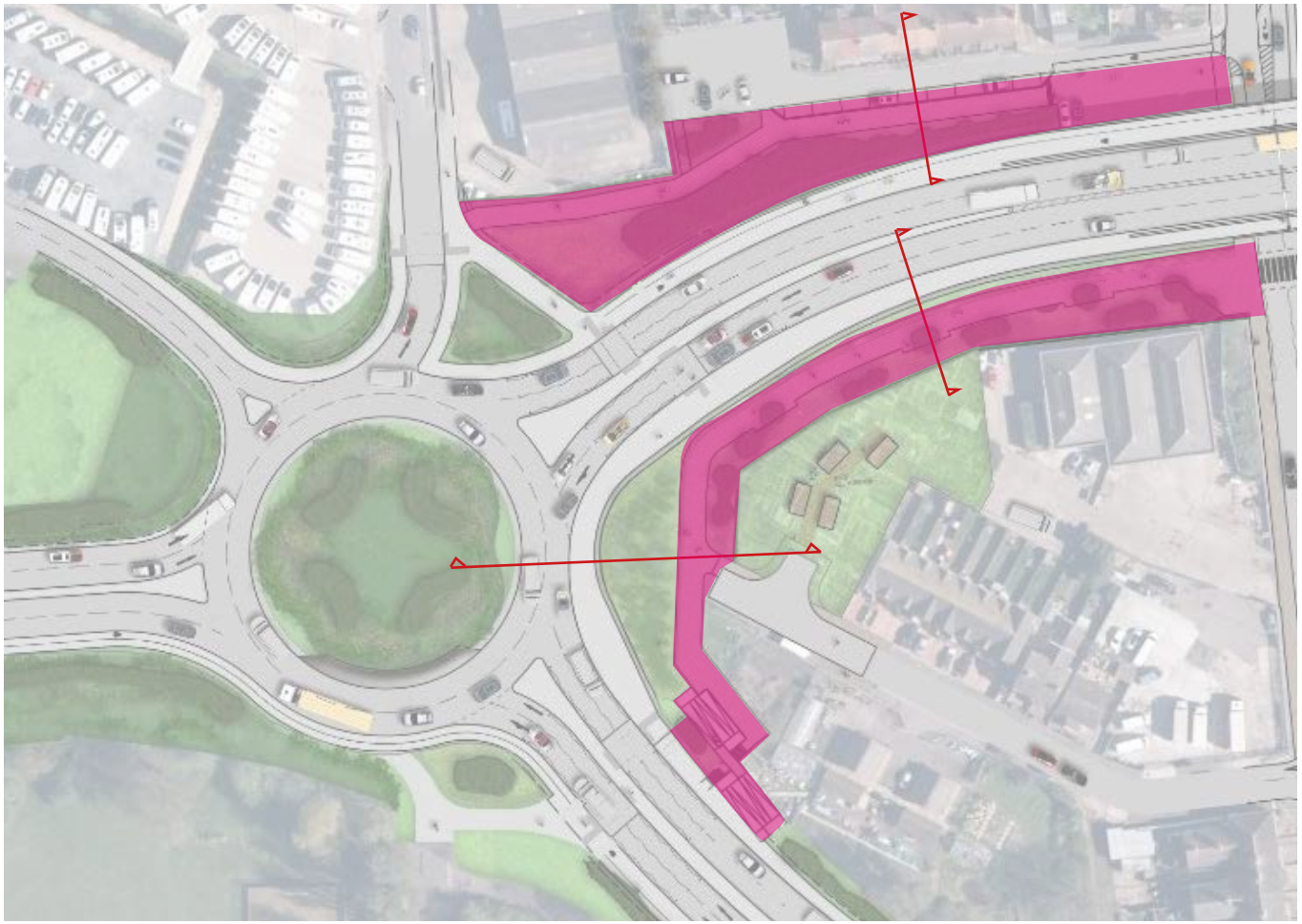


Example of a Smart Bench

b) Green Routes

The western approach to the bridge crossing would have sloping earth embankments that would incorporate walking and cycling routes north and south at the base of the structures. They would provide connectivity between Southtown Road and destinations west of this area including Suffolk Road, King's Centre, the allotments, MIND Centre and Grounds and Southtown Common. There is an opportunity for these inclusive and accessible routes to create an environment providing bio-diversity benefits through varied planting and tree species. These routes would facilitate access maintenance for the approach embankments as necessary.

Given these are primarily traffic-free (except maintenance access when required) and there is an opportunity for species rich planting to be considered, they are hereafter referred to as 'green routes' to differentiate from the standard footway routes provided elsewhere on the Scheme.



Indicative plan of Green routes and New Roundabout

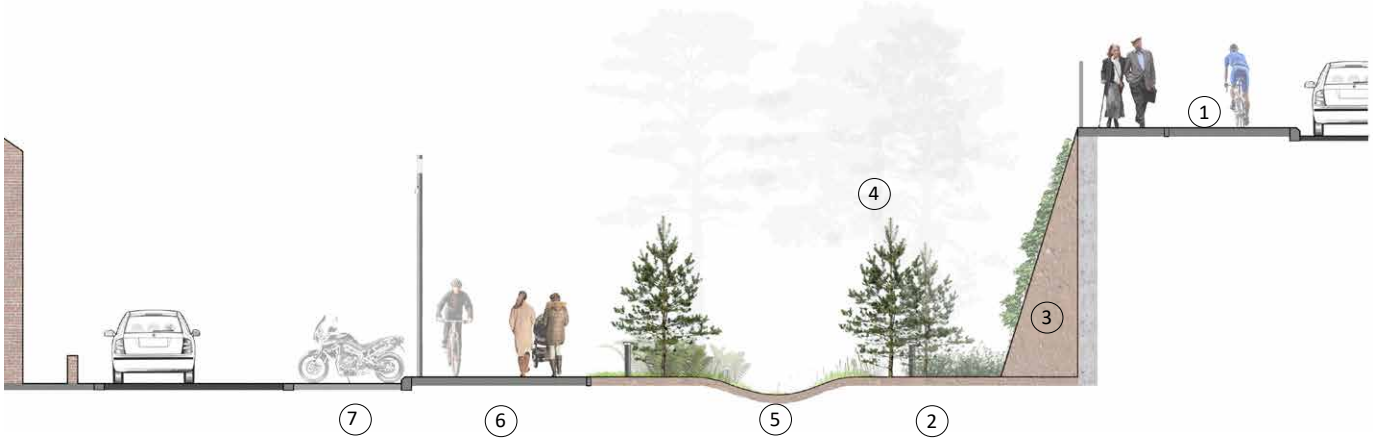
Essential Design Requirements:

- Walking and cycling routes (NMU) along the western approach embankments;
- Facilitation of maintenance to embankments;
- A biodiverse native planting strategy;
- Adequate and appropriate lighting levels for public spaces.
- Adequate resting points along the routes;
- Integrated sustainable drainage solutions (see section 6.2 of this guidance).

Design Aspirations and Opportunities:

Habitat creation:
There is an opportunity for habitat creation within the approach embankments and along the green routes. A variety of habitats can be provided through the planting and species selection. Further detail on these environmental opportunities is in Chapter 6 of this guidance.

Indicative section of new roundabout and Southern green route



1. Bridge deck, footway and cycle track
2. Bio-diverse planting
3. Reinforced earth wall embankment
4. Trees to screen bridge approach (shown at initial planting size)
5. Dry swale and species rich grasses
6. NMU route and maintenance access
7. Parking

Indicative section of Northern green route

4.3 WAYFINDING

Where possible, wayfinding signage or surface features for orientation should be incorporated at decision making points for pedestrians and cyclists to provide directions to key destinations such as: the town centre, the railway station, the beach, Gorleston-on-Sea.

Essential Design Requirements:

- A clear and simple palette of materials and orientation features.

Design Aspirations and Opportunities

- Contemporary interpretation boards referring to local history and the bridge mechanism could assist with way finding and create a visual link between Bollard Quay and the green routes to Southtown Common.

Examples of wayfinding signage relative to their context

4.4 COMMUNITY FACILITIES

The allotments currently located on the northern side of Queen Anne's Road would be reinstated as part of the Scheme. The MIND Centre and Grounds would also be reinstated where possible, at the toe of the embankment of the widened and elevated William Adams Way.

The detailed design of these spaces within the Scheme should be developed in collaboration with local community groups, especially those that could be directly affected by the Scheme. This would provide the community with an ownership of the spaces, contributing to the identity for the area and minimising the adverse effects of the Scheme on local residents. The design of these community spaces would be developed outside of this document.

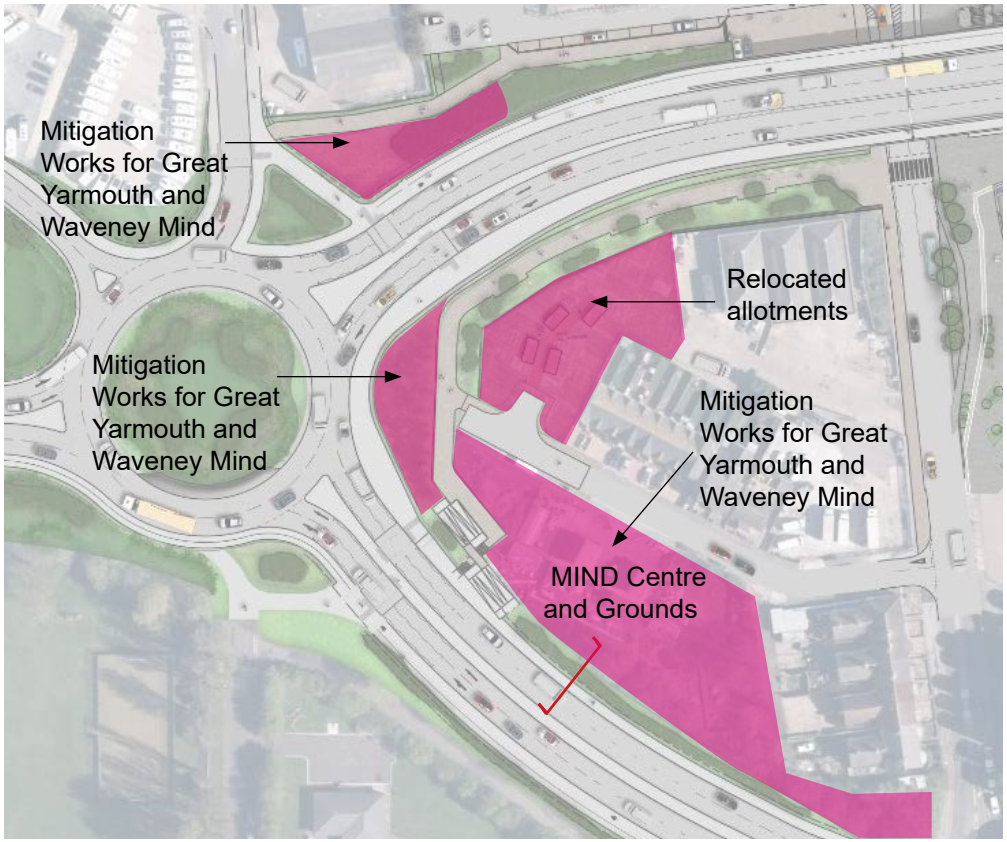


Diagram of locations for mitigation of community facilities

Boundary Treatment:

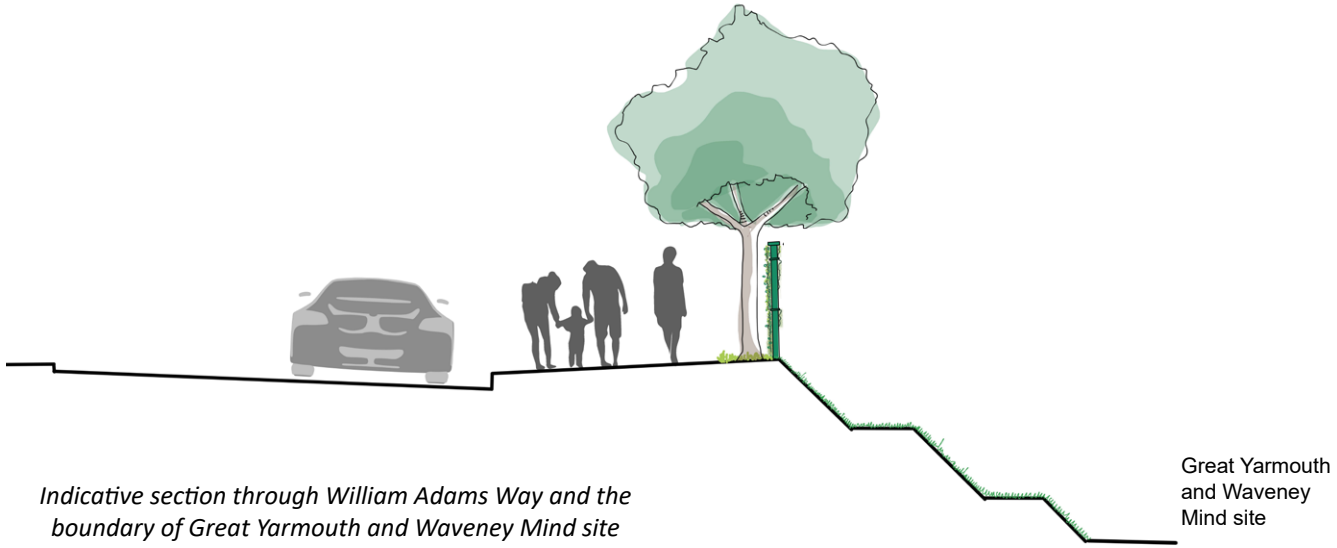
Boundary treatments to these relocated community facilities (see diagram on page 37) where they are public facing, would need to be considered as part of the detailed design of the public realm comprised in the Scheme.

Essential Design Requirements:

- Boundary treatments between the Scheme and the identified community facilities should be appropriate to the detailed design of the Scheme but sympathetic to the neighbouring land use at the time that they are to be installed.

Design Aspirations and Opportunities:

- Hedgerows or other vertical vegetation could be planted along fence boundaries to improve the visual appearance.



Indicative section through William Adams Way and the boundary of Great Yarmouth and Waveney Mind site

Examples of boundary treatments and hedgerows

4.5 MATERIALS AND STREET FURNITURE

The street furniture and materials in the public realm should reflect their setting in a mixed-use port area of Great Yarmouth with consideration of scale, use of the space and to palettes used elsewhere in the town as appropriate.

The Scheme is located away from the town centre's 'historical area,' therefore a new identity can be created through appropriate selection of materials and street furniture. The palette should reference the historical activities of the port areas, and of Bollard Quay's timber trade, within a modern infrastructure setting and a new public realm. Furniture to be approved by authority to be responsible for maintenance.

Essential Design Requirements:

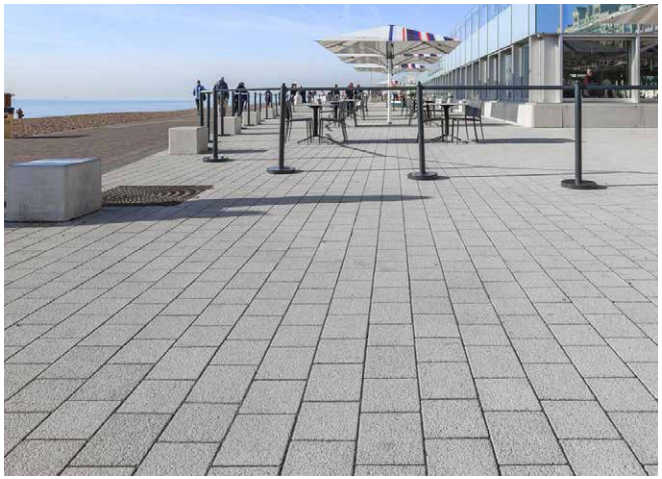
- Furniture and materials that are consistent and appropriate as part of the Scheme design;
- Appropriate resting areas along the green routes taking into consideration the need to creating spaces that attract anti-social behaviour;
- Ensure street furniture is placed appropriately and does not clutter footways and public spaces;
- Low maintenance and long-lasting materials and furniture choices that are sufficiently robust and suitably configured to deter vandalism and antisocial behaviour.

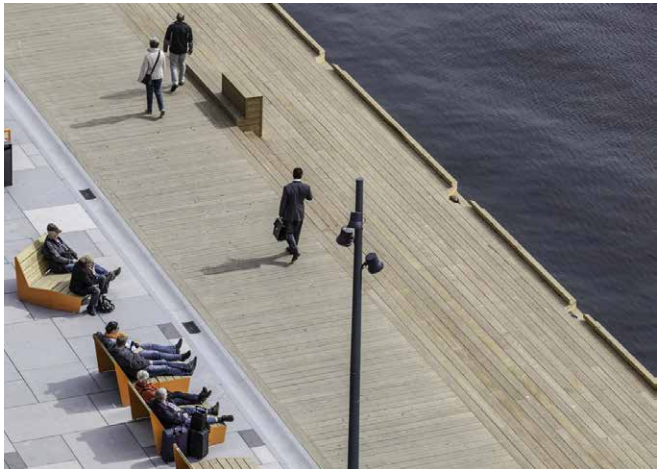
Design Aspirations and Opportunities:

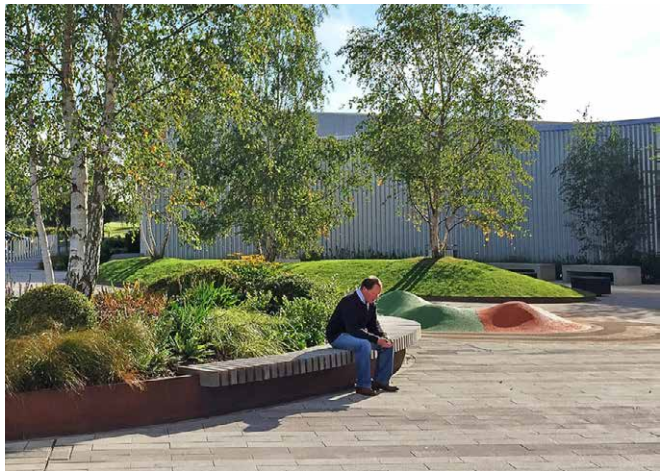
- Adaptable street furniture that could be moved to provide maintenance access or respond to future events that may take place on Bollard Quay;
- Permeable paving should be considered where appropriate.

Bollard Quay and the early 20th Century timber trade

Indicative materials and furniture palette for Bollard Quay:





Indicative materials and furniture palette for the green routes:

4.6 PUBLIC REALM PLANTING

a) Bollard Quay Planting

Planting for Bollard Quay should consider the location next to the River Yare, and any salt and wind impacts on growing capacity. The area for planting on Bollard Quay would be public realm, and species selection should take this into consideration by providing visual and seasonal interest, and species safe for public interaction. The chosen species should also consider the need to simplify maintenance and management regimes.

b) Green Route Planting

The planting for the green routes should be diverse with native species to reflect the surrounding Norfolk countryside and to increase bio-diversity. A mix of native and ornamental planting would attract wildlife and visually enhance these areas. The species chosen would consider the need to simplify maintenance and management regimes.

The following essential design requirements and design aspirations and opportunities apply to both Bollard Quay and the green routes planting strategies.

Tree lined South Quay, Great Yarmouth, 1917

Essential Design Requirements:

- The species chosen should simplify maintenance and management regimes;
- Species should be diverse and look to native Norfolk species that fit the conditions of the site;
- Tree selection for Bollard Quay needs to consider not only susceptibility to salt, but should also consider species tolerance to periodic flooding in order to provide a robust planting scheme designed for longevity despite adverse conditions;
- Green route species should provide habitat creation. See section 6.3 of this guidance.

Design Aspirations and Opportunities:

- The design could look to planting a number of varieties of tree specimen along Bollard Quay, to ensure survival of the majority, should site conditions not be fully known.

The following images illustrate appropriate examples of how the essential design requirements for public realm planting could be met, but other approaches that meet the essential design requirement would be appropriate for the Scheme. Refer to section 6.3 of this guidance for appropriate species for ecology.

Honey Locust

Bald Cypress

Salt Cedar

Lavender

Dogwood

Bio-diverse Grasses

Daisy tree

4.7 STREET TREE AND VERGE PLANTING

a) Street Trees

Street trees used adjacent to highways on the Scheme should be appropriate in size and crown shape to avoid conflict with vehicles and minimise maintenance. Trees with a regular shaped crown benefit a highway alignment as they create an avenue appearance for road users.

Species selection should look to local Norfolk species that fit the conditions of the site, such as tolerant of coastal environments, and of high ecological value that would attract pollinators and local wildlife. Examples of appropriate species are shown to the right. This is not an exhaustive list, but indicative of the types that may be used.

b) Shrubs and Grasses

Shrubs and grasses should not obstruct sightlines for road users or pedestrians on crossings, show a variety of seasonal colours and textures, suitable for the conditions of the local environment and be easily maintained.

The following essential design requirements and design aspirations and opportunities apply to both Bollard Quay and the green routes planting strategies.

Essential Design Requirements:

- The species should be appropriate in size and crown shape to avoid conflict with vehicles and minimise maintenance
- Planting should look to native Norfolk species; however, this is not always applicable for highway planting, and the chosen species should be approved by the authority responsible for the management and maintenance regime.

Design Aspirations and Opportunities:

- Species could be chosen that may filter contaminants and/or are applicable for sustainable drainage solutions.

The following images illustrate appropriate examples of how the essential design requirements for highway planting could be met, but other approaches that meet the essential design requirement would be appropriate for the Scheme.

Grey Alder

Turkish Hazel

Grasses

Hebe Varieties

4.8 LOCAL INITIATIVES

The Scheme presents an opportunity to engage with the community and key local groups allowing them to provide meaningful input to the design and additional features which contribute to the identity and character of the crossing as a new place in the town.

Art installations, sculptures, and educational pieces can be considered to animate and occupy some of the spaces offered by the design.
The Applicant is also open to working with organisations who would like to commission such works to be a feature of the public realm.

Essential Design Requirement:

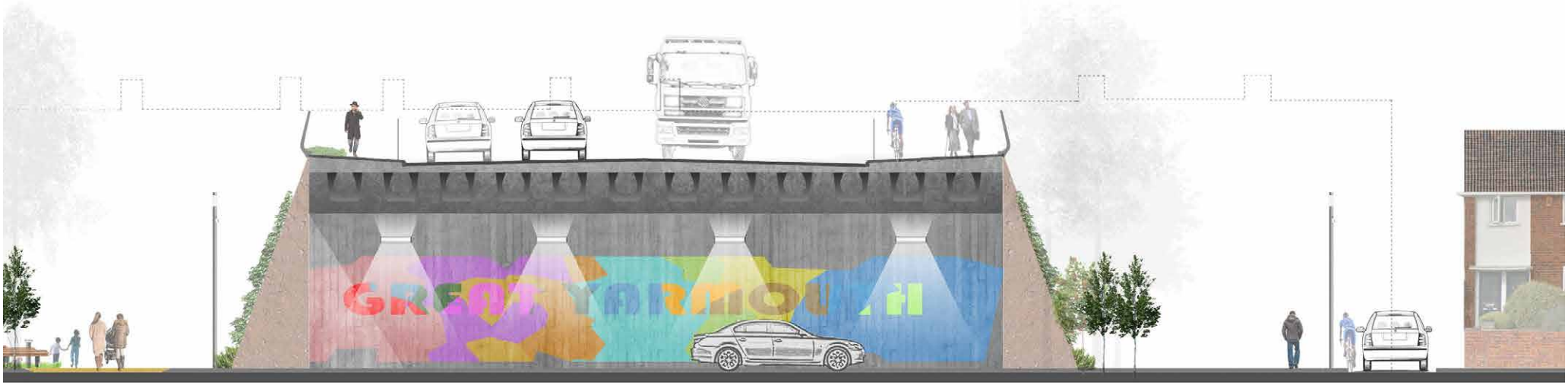
- Prepare and carry out an engagement strategy to engage local community groups on detailed aspects of the public realm.

Design Aspirations and Opportunities:
The Scheme presents a number of spaces and opportunities for local initiatives and installations. Areas identified could be:

- Green routes
- Bascule chambers, abutments and under croft areas
- On the fence line of the allotments
- Bollard Quay public realm
- William Adam's Way roundabout

Example of underpass local artwork

'Yarmouth Sublime' (2018) Public Art Poem at Great Yarmouth Station Forecourt



Illustrative section showing artwork under Southtown Road bridge

5. LIGHTING

5.1 INTRODUCTION

Whilst essential highway lighting is outlined in the Lighting Report, Appendix C of the Design Report, other lighting is considered in this guide.

Navigational lighting would be developed with the port operator and is not covered in this document.

5.2 PUBLIC REALM LIGHTING

To enable the general public to continue to safely utilise the public realm during hours of darkness, adequate and appropriate lighting would be required. Lighting would also provide a sense of security for the general public when using footways and help to deter anti-social behaviour.

The lighting in the public spaces should be chosen to reflect the design narrative of the Scheme, the industrial port setting of the crossing and should promote use of the space by the public.

No lighting should be such that it could be mistaken for navigational marks, so no red or green. It would be preferable to attempt to limit the amount of direct illumination on the River as this tends to cause reflection and glare that is distracting to navigators.

Essential Design Requirements:

- Adequate and appropriate lighting levels for public spaces;
- Ensures adequate visibility and safety across the Scheme;
- Location and LUX level appropriate for habitats and wildlife; and
- Style, material and finishes to reflect the design narrative of the Scheme.

Design Aspirations and Opportunities:

- Highlight structural features with lighting in the public realm, lighting could be a feature or event– with displays operated from the control tower or other nearby location;
- Use of Smart City / Future Ready lighting columns and bollards to allow for possible future events to take place on Bollard Quay. Refer to section 4.2a Future Proofing for design elements that could be incorporated.

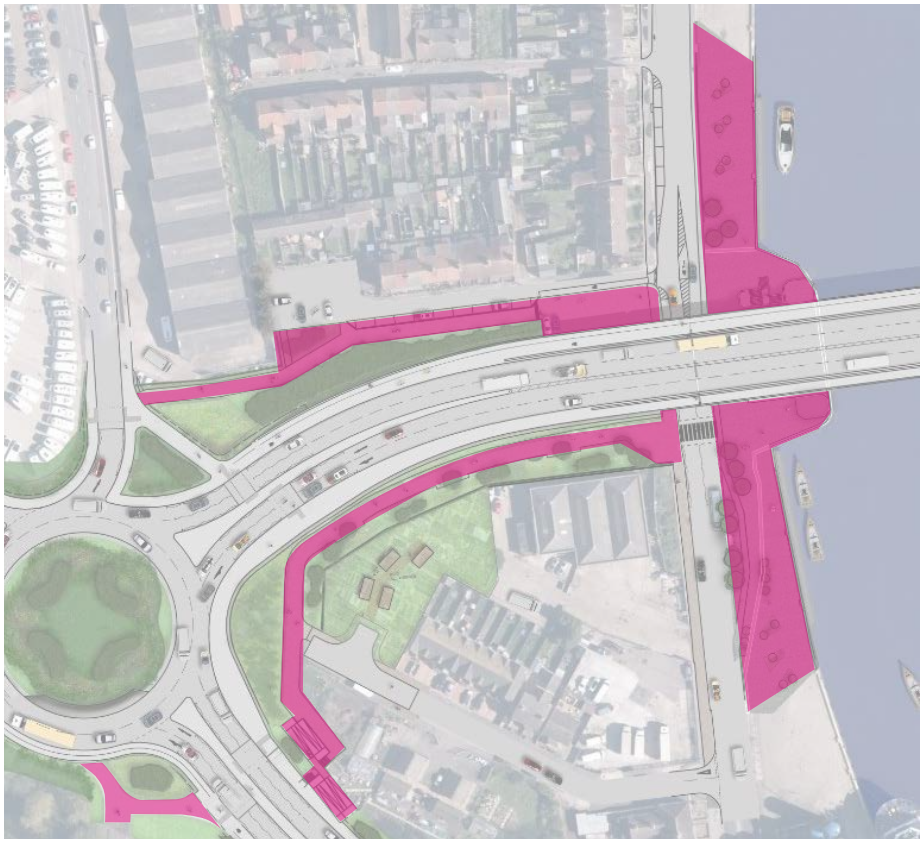


Diagram showing indicative areas for public realm lighting

Examples of bollard lighting and integrated terrace lighting

6. ENVIRONMENTAL CONSIDERATIONS

6.1 INTRODUCTION

There are opportunities to realise further benefits from the Scheme through small interventions or additions to the proposed design.

6.2 DRAINAGE

The Drainage Strategy is outlined in Appendix 12C within the Environmental Statement. The drainage strategy sets out the functional drainage for the Scheme.

There is a design aspect of the drainage strategy where the use of sustainable drainage solutions is possible. Where sustainable drainage solutions are possible, consideration of appropriate types of solutions and how these interact with ecology and landscape improvements is required.

Essential Design Requirements:

- Consideration of appropriate types of sustainable drainage solutions and how these interact with ecology and landscape improvements.

Design Aspirations and Opportunities:

Where practicable, and without conflicting with the approved drainage strategy, SUDS typologies for consideration within the Scheme could include:

1. Bio-retention planters/raingardens/storm water storage tree pits
2. Dry/wet swales
3. Storage and/or pollution treatment features
4. Permeable paving

The following diagram and images illustrate appropriate examples of how the opportunities for SUDS in the Scheme could be met, but other approaches could also be appropriate for the Scheme.

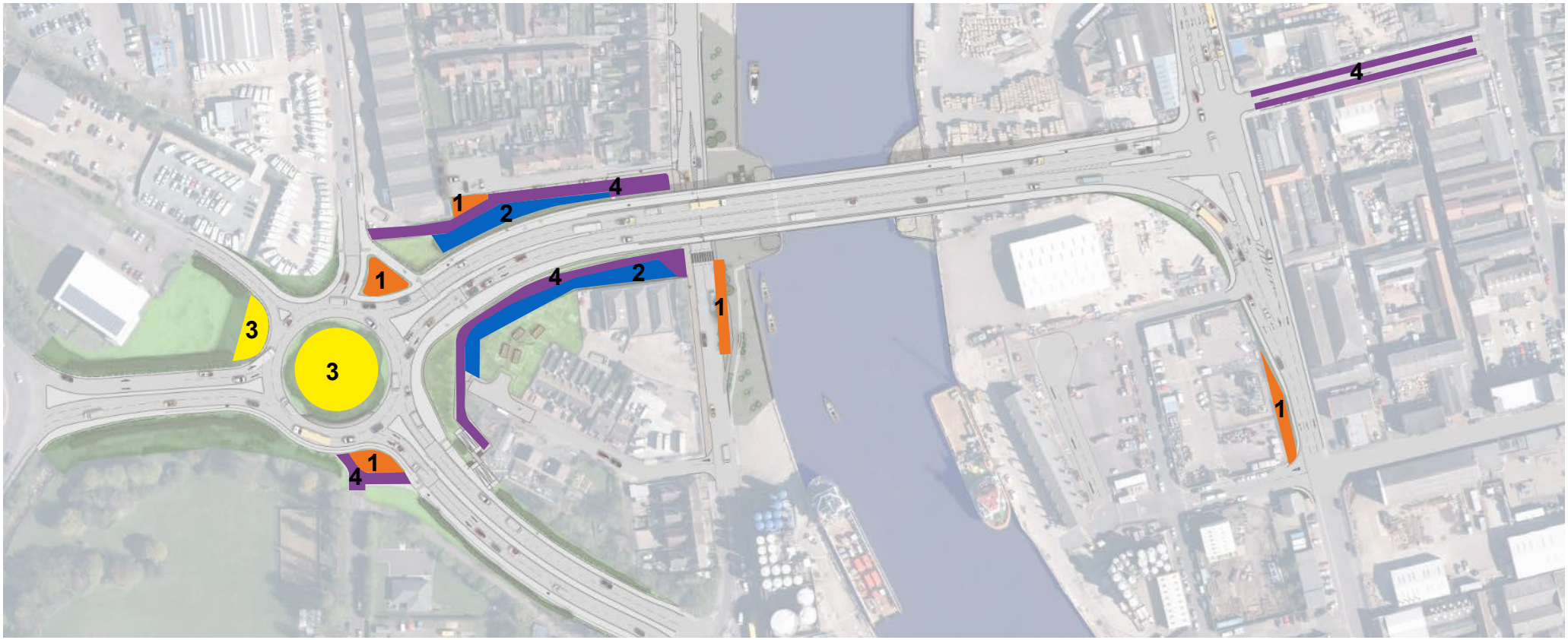
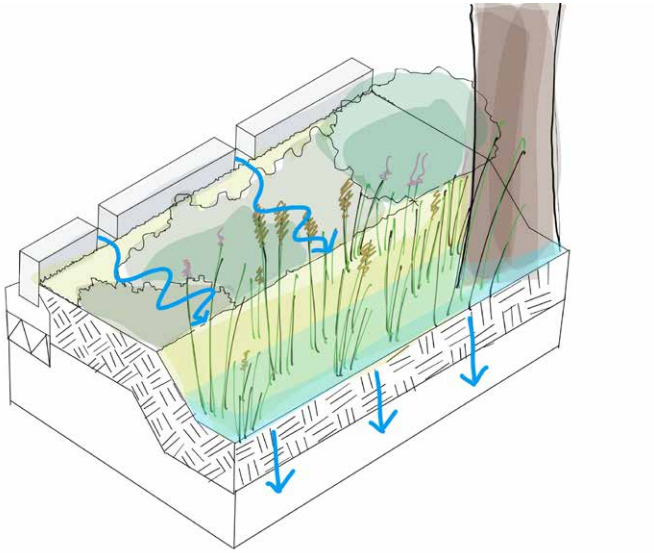
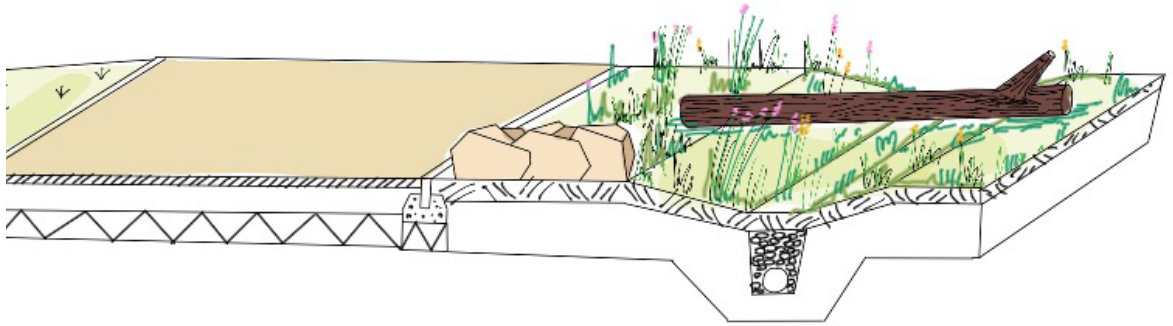


Diagram showing indicative areas for SUDS to be implemented



Illustrative sketch concept of a raingarden



Illustrative sketch concept of Southern Green Route SuDS

6.3 ECOLOGY

The Scheme is primarily a functional infrastructure design however it could provide opportunities for balanced enhancement of ecology and bio-diversity through interventions within the detailed design of the Scheme.

The following describes an essential design requirement as detailed in the Environmental Statement, as well as aspirations and opportunities for ecology identified for the Scheme, which should be implemented where appropriate and practicable.

Essential Design Requirement:

I. Terrestrial

Existing terrestrial habitat consists of small areas of relatively undisturbed, sparsely vegetated rocky terrain. This habitat supports unique invertebrates which are fed on by the Black Redstart (Phoenicurus ochruros). To enhance the habitat provision for the Black Redstart, terrestrial habitat could be incorporated in small areas such as at the base of the embankments of the approach roads. Terrestrial habitat should incorporate a mix of aggregate such as crushed brick and topsoil which should be overlain with rock and contoured to a variety of heights up to 50cm. Hibernacula should be at the higher points, these are a compacted soil mound with a 30-degree angle which is then covered in rocks 10-15cm in size. Preferable plant species include: Hypericum perforatum, Blackstonia perfoliata, Centaurium erythaea, Anthyllis vulneraria, Lotus corniculatus, Medicago lupulina, Geranium molle, Euphrasia nemorosa, Stachys officinalis, Succisa pratensis and Prunella vulgaris.

Design Aspirations and Opportunities:

I. Built Structures and Walls

Brick walls and structures such as the Control Tower or a brick clad Bridge Approach Embankment are opportune locations to provide for nesting birds. Certain species are particularly adapted to such locations in industrial

Example of terrestrial landscaping for Black Restarts

Example of bird boxes in a structure

environments, including the Black Redstart (Phoenicurus ochruros), an endangered bird found nesting within the local vicinity. Other species found in the area are Swifts (Aus apus). Brick bird boxes could be incorporated into the façade of a wall while brick matching can ensure the bird boxes blend seamlessly with the host wall. Bird boxes should be at least 1m off the ground, or higher in publicly accessible locations.

II. Grassland

The green routes and vegetated bridge approach embankments are good locations to create new habitat including species-rich grassland and wildflowers. These are attractive to a wide range of invertebrates which further support the local fauna. A wide number of species could be included to increase biodiversity.

Example of terrestrial landscaping for Black Restarts

Example of bio-diverse grasslands