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## Appendix G-7 – Consultation Materials: Design Process Summary

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# Great Yarmouth Third River Crossing Design Process Summary

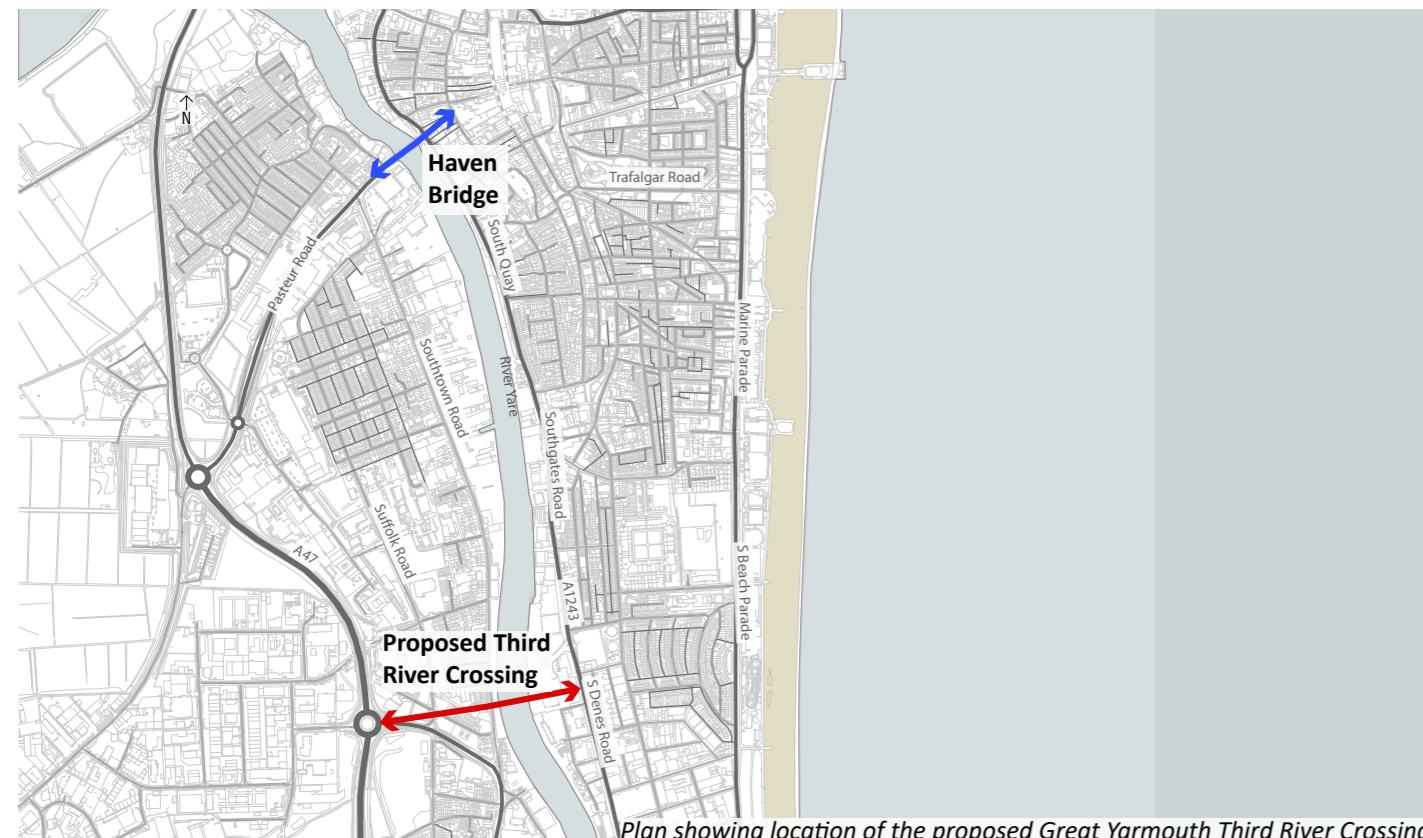
August 2018

## Introduction

The Third River Crossing scheme involves the construction, operation and maintenance of a new crossing of the River Yare in Great Yarmouth. The new crossing links the A47 at Harfrey's Roundabout with South Denes Road ("the Proposed Scheme").

The high level strategic objectives of the Proposed Scheme are:

- To support Great Yarmouth as a centre for both offshore renewable energy and the offshore oil and gas industry, enabling the delivery of renewable energy NSIPs and enhancing the port's role as an international gateway;
- To improve access and strategic connectivity between Great Yarmouth port and the national road network thereby supporting and promoting economic and employment growth (particularly in the Enterprise Zone);
- To support the regeneration of Great Yarmouth, including the town centre and seafront, helping the visitor and retail economy;
- To improve regional and local access by enhancing the resilience of the local road network, reducing congestion and improving journey time reliability;
- To improve safety and to reduce road casualties and accidents, in part by reducing heavy traffic from unsuitable routes within the town centre;
- To improve access to and from the Great Yarmouth peninsula for pedestrians, cyclists and buses, encouraging more sustainable modes of transport and also reducing community severance; and
- To protect and enhance the environment by reducing emissions of greenhouse gases and minimising the environmental impact of the Proposed Scheme.



In a Direction made under section 35 of the Planning Act 2008 dated 26th February 2018, the Secretary of State (SoS) confirmed that he was satisfied that the Proposed Scheme was nationally significant and directed that the Proposed Scheme, together with any matters associated with it, was to be treated as development for which development consent is required. The SoS was of the opinion that the Proposed Scheme was nationally significant for the following reasons:

- "The Port has a nationally significant role in the renewable energy sector and the offshore gas and oil industry and the scheme will substantially improve connectivity and resilience for port activities;
- The scheme will support the delivery of existing and potential renewable energy Nationally Significant Infrastructure Projects (NSIPs); and
- Supports the Port's role as an International Gateway".

It was also noted that, in addition, "the scheme will improve the offer of the Port through better connectivity to the Enterprise Zone". The consequence of the Direction is that the Proposed Scheme is now subject to the consenting regime comprised in the Planning Act and associated subordinate legislation (including the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The Proposed Scheme therefore cannot proceed unless the SoS decides to grant development consent by making a Development Consent Order (DCO). Norfolk County Council thus intends to submit an application for a DCO in Spring 2019.

## Design Intent:

A design-led development for the Proposed Scheme has ensured all parties involved in the development of the design share a common understanding of the underpinning objectives. The overarching aspirations are to ensure the Proposed Scheme and its connections with the surrounding context offer the most appropriate solution with opportunities maximised.

## Design Process

Assessment work to consider possible options was undertaken between 2003 and 2009 which led to Norfolk County Council adopting a preferred route for the Third River Crossing in December 2009. During the examination of crossing options the following alternatives have been considered and discounted:

**Tunnel** – a tunnel option would have no impact on the operation of the port once complete but would take approximately 3 years to construct, and would have a greater impact on the port during construction. A tunnel would require mechanical and electrical systems for ventilation, drainage and fire protection. It would be difficult to prevent flood waters from entering the tunnel so temporary closures due to flooding could be considered a possibility.

**Fixed bridge** - a fixed bridge that was high enough to allow vessels to pass beneath without opening would need much greater areas for approach ramps. This would have greater impact on surrounding residential and business areas and would make it very difficult to link with the existing highway network on either side of the river.

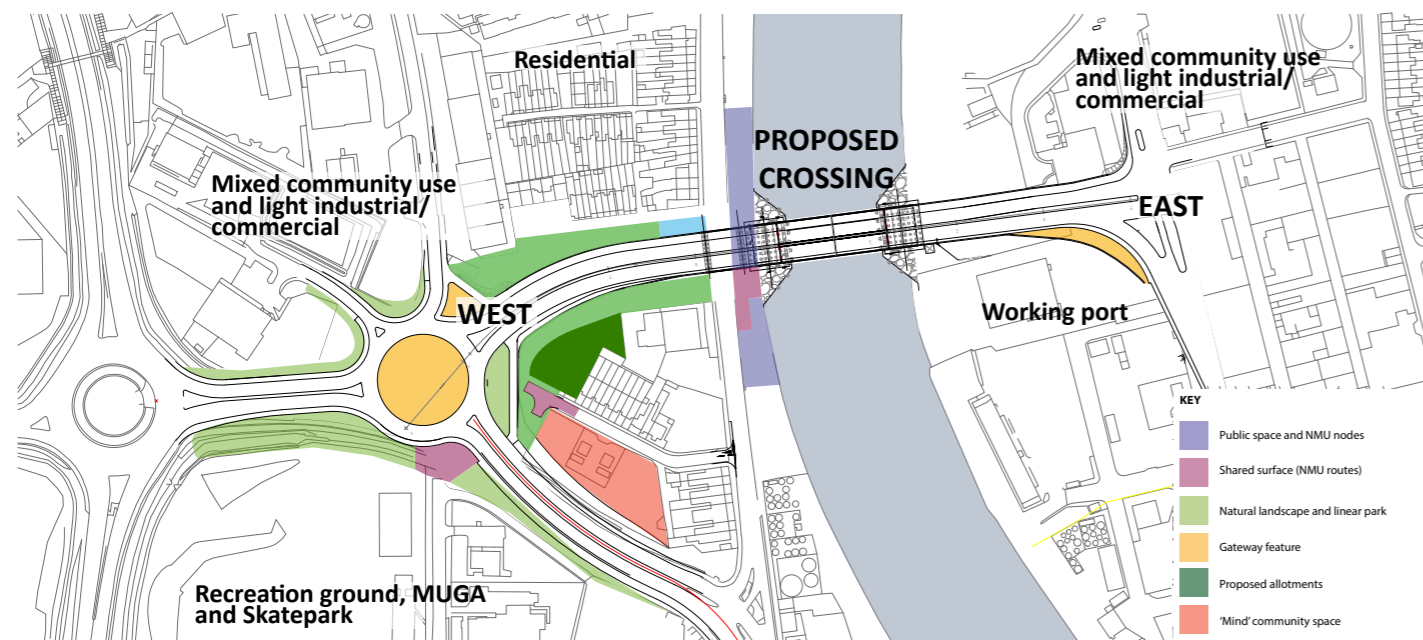
**Swing Bridge** – a swing bridge would require a greater area of quayside to accommodate it when open. At the Stage 2 consultations in Summer 2017 a swing bridge was presented as an alternative to the preferred option of a twin leaf bascule bridge. The results of this consultation confirmed the view that there is overall support for the proposed scheme of a bascule bridge at 4.5m clearance.

## Design Process

The Proposed Scheme is being developed by a multidisciplinary team including; transport planners; environmental specialists; landscape and urban designers; as well as engineers specialising in highways, structures, geotechnics, and maritime. This integrated team has collaborated with Norfolk County Council to design the most appropriate project for the town.

The design has been developed considering ways to maintain the functionality of the navigable river, and optimise the road network and the crossing as a whole. An opening bridge is required to allow the passage of boats and large vessels along the river. The Stage 2 Consultations in Summer 2017 helped to confirm that the best solution for an opening structure is a bascule bridge with a clearance of 4.5m above Mean High Water High Spring Level (MHWSL).

The Proposed Scheme design has evolved over recent years, with refinement of how the bridge could operate, look and how it will contribute to creating a new 'place' in Great Yarmouth. In line with the high level objectives of the project, the new crossing aims to offer a positive experience for all users and to enable healthy lifestyle choices for the people of Great Yarmouth.



Character Area Diagram with Below Deck Counterweight Option

## Design Components

Design development has followed an iterative process involving multiple design disciplines to create a cohesive scheme.

The scheme can broadly be divided into the following components:

- Bridge Mechanism
- Support structure and piers
- Other structures and furniture
- Highways and cycling/walking routes
- Approaches and public realm

## Bridge Mechanism:

The initial design for a double leaf bascule was compared with alternative mechanism options to determine if there was a more functional, cost effective option that would be quicker to build. Key criteria for comparing the mechanism options included; safety, reliability, constructability, cost, environmental impact, and compliance with the high level objectives and design intent.

The most suitable bridge mechanism for the crossing was identified as a twin leaf bascule bridge. This mechanism permits a movable span section providing a minimum of 50m clear navigation channel between fendering. It will also provide 4.5m clearance over the water above MHWSL to the underside of the bridge when lowered. In consultation with Great Yarmouth Port Company (GYPC), vessel simulation modelling has been undertaken to confirm the effects of setting the navigation channel width at a minimum of 50m between fenders.

There has been exploration by designers to determine the optimal double leaf bascule type. These have ranged between below deck counterweight and over-head counterweight options.

Although the height and horizontal alignment of the bridge deck is fixed, the design retains some flexibility in relation to the range of opening mechanisms under consideration. This will allow for some innovation by a contractor and hopefully reduce cost. The environmental assessments undertaken to date have taken account of this range of opening mechanisms by assessing a 'worst case'. The proposal for the opening mechanism will be fixed when the application for a DCO is submitted.



Below Deck Counterweight (possible illustrative design)



Above Deck Counterweight (possible illustrative design)

## Support Structure and Piers

The Proposed Scheme currently comprises a fixed bridge over Southtown Road\* and a central opening span over the River Yare. The height has been influenced by the gradients required for the highway connections to the existing network.

Depending on the overall design and the mechanism chosen to facilitate the opening of the central span, there may be supporting walls or piers beneath the bridge. A bascule bridge with below-deck counterweights may need structures extending into the river to accommodate the counter weight mechanism.

\*If a bridge with counterweights above the deck is constructed, the double-leaf bascule bridge and the single-span bridge over Southtown Road could be combined into a single, longer, structure, without separation between these two parts.

## Other Structures and Furniture

### Control Tower:

The location and scale of this functional structure means it must be designed appropriately for its setting and surrounding context. The requirement for a control tower will be informed by the anticipated Bridge Operator and Port Authority. It will contain key apparatus for operating the opening span of the bridge and provide appropriate field of vision to ensure the safety of bridge users and marine traffic.

Three provisional locations (A, B, C) have been identified for the control tower. The control tower location and design is dependent on the bridge and mechanism design and will be developed in tandem with these components. This is to maintain flexibility for the DCO and ensure all components fit with the functionality and aspirations of the Proposed Scheme.



Provisional Control Tower Locations With below Deck Counterweight Option

### Bridge Furniture:

Other functional bridge components such as lighting, parapets, and wigwags (crossing signals) are still being developed. The design of these will tie into the design of the bridge mechanism and the overall design aesthetic.

To ensure an optimum opening and closing sequence, pedestrian movement will be managed separately to vehicles. This requires separate pedestrian holding areas to be included in the design, allowing more traffic to pass over the bridge before opening and closing operations, decreasing the traffic build up back to the junctions.

## Highways and Cycling /Walking Network

The Proposed Scheme involves new highway links to the surrounding highway network including a new roundabout on William Adams Way connecting to Harfrey's Roundabout on the west and a new controlled junction at South Denes Road on the east side. The new roundabout on William Adams Way will be approximately 2m above the surrounding terrain and the new carriageway will rise to approximately 7.2m above Southtown Road. Access to Queen Anne's Road will be from Southtown Road. The design of the elevated bridge approach embankments is subject to the contractor design and will be retained either by reinforced soil or reinforced concrete retaining walls.

The Proposed Scheme will provide direct access for business and industrial traffic to the southern peninsula avoiding the town centre, tourism, heritage and residential areas. It will also provide a new strategic connection for cyclists and pedestrians linking communities on both sides of the River Yare, including Southtown Common Recreation Ground which is a key public space.

A network of walking and segregated cycle routes are linked by a combination of controlled and uncontrolled crossings at locations to encourage walking and cycling journeys. Southtown Road is an important north-south link supporting nine bus routes and the scheme provides the opportunity to improve the bus stop provision.



Proposed Scheme and Wider Cycling Network

The scheme considers the relocation of an existing bus stop on the eastern side of Southtown Road, a new section of segregates cycle path and a new crossing. This will enable this area to function as a transport hub along this key North to South route.

The proposed bridge and approach road include footways on either side and a segregated cycleway on one side. This connects to existing and proposed cycle facilities on the west side of the river. On the east side the segregated cycle lane links to advanced stop lines at the proposed traffic signalled junction on South Denes Road, allowing access onto Sutton Road and the wider cycle network beyond. The consideration of the provision of a shared footway and cycleway on both sides of the new crossing, as an alternative, is subject to further investigation and engagement with the stakeholders.

## Public Realm, Approaches and Planting

### Public Realm

The existing quay at Southtown Road sits above street level however part of the quay area has been incorporated into the scheme to create Bollard Quay: a new riverside public space associated with the new bridge structure. Proposed levels within the space will be designed to improve the relationship between street and riverside edge providing integrated accessible step and ramped access to the upper level that overlooks the river. The type of mechanism developed for the double leaf bascule bridge will determine the footprint of the support structures on Bollard Quay and inform the final design of the public space and connecting walking and cycling routes



Masterplan of Proposed Scheme with Below Deck Counterweight Option

### Approaches

The new roundabout and elevated approaches creates an opportunity to enhance cycling/walking connections and improve bio-diversity through varied planting and tree species on the western side of the proposed scheme.

The shared cycling/footway routes, referred to as 'green routes,' have been proposed to connect Suffolk Road and Southtown Common with Southtown Road and the wider cycle network.

The green routes have been designed to allow for maintenance access to the bridge approach embankments and proposed planting and trees.

The green route on the southern side of the bridge approach will connect to modified arrangements at the western end of Queen Anne's Road, the proposed allotment relocation site and the community 'Mind' site. The green route on the northern side of the bridge approach is a pedestrian and cycle connection to Suffolk Road and the bridge deck.



- ① Southtown Common
- ② Suffolk Road
- ③ Southtown Road
- ④ Northern green route
- ⑤ Southern green route
- ⑥ New roundabout
- ⑦ Relocated allotments
- ⑧ 'Mind' community space
- ⑨ Shared cycle and footway
- ⑩ Bridge approach
- ⑪ Control tower A, public stairs & lift
- ⑫ Ramp and steps

Plan of Proposed New Roundabout, Western Approach and Green Routes

### Conclusion

Whilst components of the bridge opening mechanism still retain an element of flexibility, the design process is underpinned by a robust review process to ensure the Proposed Scheme provides the best response to the opportunities and aspirations for the crossing and its connections to the wider context. The design process ensures that the High Level objectives are met and the crossing will optimise the functionality of the navigable river, the road network and create a new 'place' for the town of Great Yarmouth for all users to utilise and enjoy for years to come.