

Great Yarmouth Third River Crossing

Application for Development Consent Order



Document 6.5: Environmental Statement: Non-Technical Summary

Planning Act 2008

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

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Foreword

This Environmental Statement: Non-Technical Summary accompanies an application (“the Application”) submitted by Norfolk County Council (“the Applicant”) to the Secretary of State for a Development Consent Order (‘DCO’) under the Planning Act 2008¹.

If made by the Secretary of State, the DCO would grant development consent for the construction, operation and maintenance of a new bascule bridge highway crossing of the River Yare in Great Yarmouth, and which is referred to in the Application as the Great Yarmouth Third River Crossing (“the Scheme”).

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) require that an application for a DCO be accompanied by the documents specified at Regulation 5(2)(a) to (r). This is one of those documents and is specified at Regulation 5(2)(a).

¹ References to legislation in this document are to that legislation as amended at the date of this document.

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Glossary of Defined Terms and Acronyms

Defined Terms

Term	Definition
The Applicant	Norfolk County Council (in its capacity as Highway Authority and promoter of the Scheme).
Application Site	The land bounded by the Order Limits, as shown by a red line on the Land Plans (document reference 2.5) and the Works Plans (document reference 2.6) and being land within which the authorised development may be carried out.
The APFP Regulations	The Infrastructure Planning (Applications - Prescribed Forms and Procedure) Regulations 2009 (SI 2009/2264).
Bridge Lowered	Position of the bascule bridge where it is closed to vessels, and open to vehicular traffic, cyclists and pedestrians.
Bridge Raised	Position of the bascule bridge where it is closed to vehicular traffic, cyclists and pedestrians, and open to vessels.
Crossing	The combined double leaf bascule bridge and the Southtown Road bridge structure (i.e. from its junction with the new roundabout on William Adams Way to the new junction on South Denes Road).
Double Leaf Bascule Bridge	Opening span and mechanism needed to operate the bridge.
The EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Kingsgate Community Centre	Kingsgate Community Centre is occupied by the Kingsgate Community Church, providing regular community events/activities, and a café.
Knuckles	<p>The areas of the River Yare into which the proposed development extends (from the existing quay walls). These areas consist of the following:</p> <ul style="list-style-type: none"> - Physical protection systems (which are protective structures provided adjacent to the bascule abutments) to fully or partial absorb the design ship collision loads from an aberrant ship or vessel. These protection systems are located on both the south and north of each bascule abutment. They consist of sheet piles

Term	Definition
	<p>driven to dense sands infilled with stone or granular material and capped with a reinforced concrete slab.</p> <ul style="list-style-type: none"> - A bascule abutment which accommodates and allows the movement of the counterweight and houses the mechanical, electrical, instrumentation, control and automation systems. The bascule abutment consists of driven piles and reinforced concrete slabs and walls. - Plant and control rooms on the western side and plant rooms on the eastern side. - Vessel Impact Protection Systems located at the interface between the physical protection systems, the bascule abutments and the River Yare. <p>There are knuckles on both the east and west sides of the River Yare.</p>
MIND Centre and Grounds	Land located to the south of Queen Anne’s Road, comprised within Plot Nos. [1-27, 2-03, 2-05, 2-06 and 2-07] on the Land Plans (document reference 2.5), which is currently leased to Great Yarmouth and Waveney Mind for the purposes of its charitable aims and objectives.
NCC	Norfolk County Council (other than in its Highway Authority role as promoter of the Scheme).
New Dual Carriageway Road	Description of road type on the Crossing.
Opening Span	Length of bridge structure that opens.
Order Limits	Limits of land within which the authorised development may be carried out, as shown on the Land Plans (document reference 2.5) and the Works Plans (document reference 2.6).
The Outer Harbour	Part of the Port of Great Yarmouth, the deep water Outer Harbour (completed in 2010) is situated at the southern end of the South Denes peninsula and offers direct access to the North Sea.
The Planning Act	The Planning Act 2008.
The Port	The Port of Great Yarmouth, comprising both commercial quays on both sides of the River Yare and Outer Harbour and within the jurisdiction of the Great Yarmouth Port Authority.

Term	Definition
Principal Application Site	The land comprised in the Application Site but excluding the Satellite Application Sites.
Proposed Scheme	Great Yarmouth Third River Crossing project at the time of statutory pre-application consultation.
Reinforced Earth Embankment	A reinforced earth or reinforced soil embankment is a general term which refers to the use of placed or in situ soil or other material in which tensile reinforcements act through interface friction, bearing or other means to improve stability. The reinforced earth embankment is supported by driven piles and pilecaps.
Satellite Application Sites	The parts of the Application Site within which Work Number 12 may be carried out, as shown on the Works Plans (document reference 2.6) and described in Schedule 1 to the draft DCO (document reference 3.1).
Scheme	The Great Yarmouth Third River Crossing project for which the Applicant seeks development consent.
Southtown Road Bridge	Bridge structure over Southtown Road.
Statutory Designated Sites	Sites which have been designated under UK and in some cases European or international legislation which protects areas identified as being of special nature conservation importance.
Study Area	The boundary/extents of a specific assessment.
Underpass	The underpass beneath the Crossing, located on the east side of the River Yare, to be constructed to provide a new private means of access for the benefit of owners and occupiers of adjoining land-
Vessel Impact Protection Systems	These are specific protection systems located at the interface between the physical protection system, the bascule abutments and the River Yare. These systems will take the form of fenders or equivalent (formed of different materials) which are used to deflect or redirect an aberrant vessel away from the knuckles. The fenders are designed to provide required levels of protection to both vessels, the “knuckles” and the fenders themselves in accordance with national and international recommendations for the protection of bridge structures on navigable waterways.

Term	Definition
Vessel Waiting Facilities	Provision of vessel waiting facilities to the north and south of the Crossing, either as floating pontoons or additional fendering to the existing berths, including any dredging and quay strengthening works that may be required.

Acronyms

Acronym	Definition
BPM	Best Practicable Means
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
EIA	Environmental Impact Assessment
EOAR	Environmental Options Appraisal Report
EPA	Environmental Protection Act
ES	Environmental Statement
EqIA	Equalities Impact Assessment
FRA	Flood Risk Assessment
GHG	Greenhouse Gas
GYBC	Great Yarmouth Borough Council
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
MA&D	Major Accidents and Disasters
NCC	Norfolk County Council
NMU	Non-motorised user
NO₂	Nitrogen Dioxide
NTS	Non-Technical Summary
OAR	Option Assessment Report

Acronym	Definition
OBC	Outline Business Case
PAS	Principal Application Site
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
SAR	Scheme Assessment Report
TA	Transport Assessment
VMS	Variable Message Signs
WFD	Water Framework Directive
WSI	Written Scheme of Investigation

1 The Role of the Non-Technical Summary

- 1.1.1 Norfolk County Council, in its capacity as Highway Authority and promoter, (referred to as ‘the Applicant’) is seeking to obtain consent for the construction of the Great Yarmouth Third River Crossing (referred to as the ‘Scheme’), in the town of Great Yarmouth, Norfolk.
- 1.1.2 Consultancy firm WSP has been commissioned by the Applicant to carry out an Environmental Impact Assessment (EIA) to inform Scheme design, identify the impact of the Scheme on the environment during construction and operation, and to support the application for consent. An Environmental Statement (ES) has been prepared which reports in detail the findings of the EIA process. The EIA has been undertaken in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the ‘EIA Regulations’). The purpose of the EIA is to identify the likely significant effects of the Scheme on the environment (including on human health and amenity). Where a likely significant effect is identified, recommendations for the prevention and mitigation measures for the effect are made, where feasible, and the resulting (residual) effects are reported. The method for determining significant effects can vary depending on the environmental topic.
- 1.1.3 This document is the Non-Technical Summary (NTS) of the ES. This NTS refers to significant effects when providing conclusions about the predicted effects on the environment. The term ‘significant’ is not defined in the EIA Regulations but it is used within the ES to have the same meaning as it would in other contexts. That is, something which is sufficiently great or important to be worthy of attention – and likely to be material to making a decision on the consent application. Each individual environmental topic assessment, which together form the EIA, sets out what constitutes a significant effect for that topic.
- 1.1.4 The purpose of this NTS is to summarise the relevant content and findings of the ES in a clear and concise manner. The ES is divided into specific topics chapters and this NTS refers to the corresponding chapters of the ES, where the full details of the assessments can be found.
- 1.1.5 Prior to the preparation of the ES, an EIA Scoping Opinion was received on the Scheme. The Scoping Opinion saw consultees commenting on the submitted EIA Scoping Report, which detailed the proposed EIA methodology and identified likely significant (and not significant effects). Prior to making the DCO application, the Applicant has undertaken consultations in accordance with the Planning Act 2008, the details and results of which can be viewed in the Consultation Report (document reference 5.1). As part of this a Preliminary Environmental Information Report (PEIR) (Appendix G of the Consultation Report (document reference

5.1)) was prepared. Subsequently, any issues raised by consultees, or gaps in the methodology, were taken forward and considered in the preparation of the ES.

- 1.1.6 The full ES should be consulted for more information on the Scheme or a greater understanding of any individual environmental topic. The ES can be accessed via the Applicant's website for the Scheme ([click here](#)) or a copy can be requested from the Applicant using the below details:

Freepost Plus RTCL-XSTT-JZSK
Norfolk County Council
GY3RC
Infrastructure Delivery Team - 2nd Floor
County Hall
Martineau Lane
Norwich
NR1 2DH

Email: gy3rc@norfolk.gov.uk Telephone: 0344 8008020

- 1.1.7 If you need this report in large print, audio, Braille, alternative format or in a different language please use the contact details above.

2 Description of the Scheme

2.1 Introduction

2.1.1 The following sections provide an overview of the Scheme. Chapter 2 of Volume I of the ES (document reference 6.1) provides a full description of the Scheme and is accompanied by the General Arrangement Plan (document reference 2.2).

2.2 Overview of the Scheme Location

2.2.1 Great Yarmouth is located at the mouth of the River Yare, one of the main waterways providing access to the Norfolk Broads. The river bisects Great Yarmouth, with the town centre, seafront, industrial areas and Outer Harbour being located on the narrow, 4km long, South Denes peninsula, which lies between the river and the sea, isolated from the rest of the town. To the south of the River Yare, Gorleston-on-Sea is just a few hundred metres away from the South Denes peninsula as the crow flies, but by road it is over 7km away.

2.2.2 Annex A shows the Application Site, and the location of the Scheme in the context of the administrative area of the Borough of Great Yarmouth. Other noteworthy areas in the vicinity of the Scheme are also shown in Annex A, namely:

- South Denes Local Development Order – an order adopted in 2012 by Great Yarmouth Borough Council covering an area of 136.3ha, of which 58.8ha is Enterprise Zone, to simplify the planning process for businesses in energy, offshore engineering, port and logistics sectors;
- Great Yarmouth Energy Park – a 20.2ha site near to the Port and Outer Harbour created to ensure that businesses related to the offshore energy sector have suitable land available so that the area is best placed to capture anticipated future jobs, investment, economic growth and regeneration opportunities;
- South Denes Business Park – part of the wider New Anglia Enterprise Zone where energy related businesses benefit from simplified planning, superfast broadband and rate relief for five years; and
- South Enterprise Zone – providing easy access to the Port and Outer Harbour.

2.3 Overview of the Scheme

2.3.1 The Scheme involves the construction, operation and maintenance of a new crossing of the River Yare in Great Yarmouth (see Plate 2.1). It consists of a new dual carriageway road, including a road bridge across the river, linking the A47 at Harfrey's Roundabout on the western side of the river to the A1243 South Denes Road on the eastern side (see Annex A). The Scheme would feature an opening span double leaf bascule (lifting) bridge across the river, involving the construction of two new 'knuckles' extending the quay wall into the river to support the bridge. The Scheme would include a bridge span over the existing Southtown Road on the western side of the river, and a bridge span on the eastern side of the river to provide an underpass for existing businesses, enabling the new dual carriageway road to rise westwards towards the crest of the new crossing.



Plate 2.1: The Scheme

2.3.2 If constructed, the Scheme would comprise the following principal elements (see Plate 2.2 for a visualisation):

- A new dual carriageway road, crossing the River Yare in an east-west orientation, comprising:
 - A new double-leaf bascule bridge providing an opening span to facilitate vessel movement within the river. This would include structures to support and accommodate the operational requirements of the bridge-opening mechanism, including counterweights below the level of the bridge deck. The bridge would be supported on driven piles;

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- New substructures, supported by driven piles, to support the double-leaf bascule bridge within the existing quays either side of the river and within the river itself, requiring new permanent 'knuckle' walls, creating cofferdams in the waterway to accommodate their construction;
 - A new five-arm roundabout connecting the new dual carriageway road with Suffolk Road, William Adams Way and the western end of Queen Anne's Road. Sections of the new five-arm roundabout would be supported on driven piles where deep soft ground is encountered;
 - A single-span bridge over Southtown Road, with reinforced earth embankments joining that bridge to the new roundabout at William Adams Way. Southtown Road bridge and the reinforced earth embankments would be supported on driven piles;
 - A single-span bridge to provide an accommodation underpass on the eastern side of the river, with reinforced earth embankments joining that single span bridge to South Denes Road. The underpass and reinforced earth embankments would be supported on driven piles; and
 - A new signalised junction connecting the new road with A1243 South Denes Road.
- The closure of Queen Anne's Road, at its junction with Suffolk Road, and the opening of a new junction onto Southtown Road providing vehicular and pedestrian access to residential properties and the MIND Centre and Grounds at the eastern end of Queen Anne's Road;
 - Revised access arrangements for existing businesses onto the local highway network;
 - Dedicated provision for cyclists and pedestrians which ties into existing networks;
 - Implementation of part of a flood defence scheme along Bollard Quay that is proposed to be promoted by the Environment Agency, and works to integrate with the remainder of the flood defence scheme;
 - A control tower structure located immediately south of the crossing on the western side of the river. The control tower would facilitate the 24/7 operation of the opening span of the new double-leaf bascule bridge;
 - A plant room located on the eastern side of the river for the operation of the opening span of the new double-leaf bascule bridge;

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- The demolition of an existing footbridge on William Adams Way;
 - Associated changes, modifications and/or improvements to the existing local highway network;
 - Additional signage, including Variable Message Signs (VMS) at discrete locations, to assist the movement of traffic in response to network conditions and the openings/ closings of the double-leaf bascule bridge;
 - The relocation of existing allotments to compensate for an area to be lost as a result of the Scheme and other accommodation works, including those at the MIND Centre and Grounds; and
 - New public realm, landscape, ecology and sustainable drainage measures.

2.3.3 The Scheme also includes works to facilitate construction, operation and maintenance including:

- Creation of temporary construction sites and accesses from the public highway;
- Provision of new utilities and services and the diversion of existing utilities;
- Provision of drainage infrastructure, lighting and landscaping;
- Demolition of a number of existing residential and commercial / business properties; and
- Provision of vessel waiting facilities to the north and south of the new crossing, either as floating pontoons or additional fendering to the existing berths, including any dredging and quay strengthening works that may be required.

Plate 2.2: Scheme Visualisation



2.4 Overview of the Construction Methodology

Indicative Programme

- 2.4.1 Subject to Development Consent being granted, it is anticipated that construction of the Scheme would commence in late 2020 and would take approximately two years to complete.

Construction Activities

- 2.4.2 Key construction activities would include:

- Mobilisation, site establishment and site clearance;
- Construction of Western Approach retaining structures;
- Construction of Eastern Approach retaining structures;
- Construction of Southtown Road Bridge;
- Construction of the underpass;
- Construction of the double-leaf bascule bridge;
- Construction of the vessel waiting facilities; and
- Construction of Western Roundabout, Eastern Signalised Junction, and other ancillary works (e.g. surfacing, landscaping).

Code of Construction Practice

- 2.4.3 Works would be carried out in accordance with the Outline Code of Construction Practice (Outline CoCP) (document reference 6.16) submitted as part of the application. The Contractor would be required to implement environmental protection measures detailed in the Outline CoCP, which also sets the framework for a full CoCP that the contractor would prepare in detail, prior to construction commencing.

Construction Compounds

- 2.4.4 Two main construction compounds, that would incorporate car parking, mess and welfare facilities, stores and laydown areas, would be required for the construction of the Scheme. The compounds are located within the Order Limits.
- 2.4.5 On the east side of the river a construction compound would be located on land between the River Yare and South Denes Road, immediately north of the new crossing. Access to this compound from the trunk road network is likely to be via Acle New Road, North Quay, South Quay South Denes Road and Fish Wharf, a side road opposite Barrack Road.
- 2.4.6 On the west side of the river a construction compound would be located on land between William Adams Way and Queen Anne's Road, immediately west of Suffolk Road. Access to this compound from the trunk road network is likely to be via William Adams Way, Suffolk Road and Queen Anne's Road.
- 2.4.7 Following the construction of the Scheme, areas used temporarily for construction compounds would be restored to their previous condition, unless otherwise agreed with the landowner.

Construction Staffing and Transport

- 2.4.8 The Applicant has considered the delivery profile of staff and construction materials as well as estimated the number of staff likely to be employed during the construction phase to inform the likely construction traffic movements. The peak in staff numbers is anticipated about half way through the construction period, with approximately 185 full time equivalents working on site each day. With regard to Heavy Goods Vehicle (HGV) movements the peak is anticipated to be 360 per week, or 72 per day assuming a 5-day week.

Construction Access

- 2.4.9 The contractor will ensure that works are planned to be delivered safely, minimise congestion and minimise disruption to all road users.

2.4.10 The approach to minimise disruption to the highway would be underpinned by a signage and communication strategy that would be developed with the Applicant and key stakeholders. Key aspects of this strategy would be set out in the Framework Construction Traffic Management Plan (Framework CTMP) (appended to the Outline CoCP (document reference 6.16)).

2.4.11 Temporary closures of some footpaths and public rights of way are likely to be necessary at certain points during the construction of the Scheme. Where this is the case, temporary diversion routes would be provided, details of which would be set out in the Framework Construction CTMP (appended to the Outline CoCP (document reference 6.16)).

Working Hours

2.4.12 Core (normal) construction hours during the construction period are outlined in Table 2.1 below:

Table 2.1: Summary of Core Working Hours

Day Period	Time Period
Weekdays (Monday-Friday)	07:00 – 19:00
Saturday	07:00 – 13:00
Sunday / Bank Holidays	None

2.4.13 The Outline CoCP (document reference 6.16) requires that the Contractor should endeavour to undertake all noisy activities that are likely to lead to disturbance within the core working hours. The activities detailed in Appendix 7C of the ES must be carried out within these core working hours.

2.4.14 Deviations to the core working hours may be required for some activities and these must be agreed pursuant to an application for prior consent from GYBC under Section 61 of the Control of Pollution Act 1974.

Task Lighting

2.4.15 Task lighting would be employed to minimise the lighting impacts on the overall site. Where practicable, task lighting would face away from nearby properties. The type of task lighting used would vary depending on the nature of works and be commensurate with the works being undertaken.

2.5 Operation and Maintenance

2.5.1 Operation of the double-leaf bascule bridge would be the responsibility of the Applicant, as the Highway Authority. It is intended that the proposed double-leaf bascule bridge would be operated on demand for commercial vessels and by agreement for recreational vessels at set times when requested in

advance. The double-leaf bascule bridge is expected to be operational 24 hours per day and 365 days per year.

- 2.5.2** It is anticipated that the bridge would open on average 15 times per day on a typical weekday. Individual opening durations would vary, however, traffic modelling undertaken for the Scheme has assumed that each opening would take on average approximately 5.5 minutes including vessel passage time, meaning that the crossing would be closed to traffic for approximately 82 minutes on a typical day.
- 2.5.3** Maintenance of the Scheme would be the responsibility of the Applicant, as the Highway Authority, and would involve routine, planned maintenance and system checks, as well as reactive maintenance and repairs.
- 2.5.4** Maintenance activities would be planned to enable them to be delivered safely and in a way which minimises congestion and disruption for river and road users.
- 2.5.5** It is considered that maintenance operations would all fall within the environmental envelope related to the initial construction phase, as they would involve similar or lesser activities than those required for construction.
- 2.5.6** Maintenance activities would be planned to enable them to be delivered safely and in a manner which minimises congestion and disruption for all river and road users and would not require the need for excessively noise plant or equipment.

2.6 Decommissioning

- 2.6.1** The Scheme would be designed to have a life of at least 120 years. Any decommissioning would be likely to be completed in less time than the construction of the Scheme and, whilst the Applicant has no plans to decommission and remove the Scheme, were it to be removed, it would be likely to require a similar degree of plant, equipment and disturbance within the navigation channel to that predicted during construction.
- 2.6.2** Given that the Applicant has no plans to decommission the Scheme, and as the environmental constraints in the mid-22nd Century cannot be reasonably predicted, further consideration of decommissioning is not considered appropriate.

3 Consideration of Alternatives

3.1.1 This section summarises the alternative designs that have been considered for the Scheme and the process of option selection that has been applied. The process can be divided into two stages: (i) option development; and (ii) option selection. For further information Chapter 3: Consideration of Alternatives of the ES (document reference 6.1) should be consulted.

3.2 Option Development

Option Development Stage 1

3.2.1 A Stage 1 Scheme Assessment Report (SAR) was commissioned in 2007 to understand existing constraints and potential engineering solutions available for a new crossing of the River Yare in Great Yarmouth. A broad area of interest was identified with three route alignments (the north, central and southern corridors). For each route alignment, three options were produced; a high-level bridge, a low-level bridge and a tunnel, giving a total of nine options.

3.2.2 In summary, the Stage 1 SAR concluded that a third river crossing would be feasible using either a tunnel or a bridge but that a bridge would be less expensive than a tunnel.

Option Development Stage 2

3.2.3 A Stage 2 SAR was commissioned in 2009 to develop options further. Five different types of crossing were considered: a fixed bridge, a swing bridge, a lifting bridge, a bascule bridge and a tunnel.

3.3 Option Selection

3.3.1 In December 2009, NCC's Cabinet considered all the technical findings and results of public and stakeholder consultation and adopted a bridge as the preferred option (over that of a tunnel) connecting to the A12 Harfrey's Roundabout.

Option Assessment Report (OAR) 2017

3.3.2 In 2017, a longlist of 40 identified options were put through an initial sift to narrow down to a selection of nine options, by removing those that did not make significant contributions to meeting the Scheme objectives, did not resolve identified problems or were not deliverable/feasible. The options were predominantly variants of tie-in locations for the preferred option corridor identified in 2009.

3.3.3 The nine options that successfully met the evaluation criteria were taken forward to the final stage of sifting. These nine options were variants of the preferred option.

3.3.4 In the Final Options Assessment, three design options were identified:

- Option 32 – Suffolk Road tie-in to the west;
- Option 33 – Suffolk Road tie-in to the west; and
- Option 37 – Southtown Road tie-in to the west.

3.3.5 The final three options were compared in relation to the following: overall journey times; distance travelled; queueing and total trips on the road network; cost; and environmental impact.

3.3.6 The OAR produced in 2017 assessed the impacts of the above three options. Overall, Option 32 was found to perform marginally better than the other two options and was taken forwards as the preferred Scheme option.

Environmental Options Appraisal Report

3.3.7 An Environmental Options Appraisal Report (EOAR) was also prepared to support the Outline Business Case (OBC). Whilst the OBC focused on the strategic, economic, commercial, management and financial case, the EOAR assessed the impacts on the environment for options 32, 33 and 37. The EOAR assessed Option 37 having the lowest environmental impact but on balance with other factors considered in the OBC, Option 32 was selected.

Final Design Selection

3.3.8 Alternatives considered in relation to scheme design have included the counterweight design and the western and eastern approach embankment construction methods. In addition, further design refinement was undertaken following the statutory consultation process in relation to commercial vessel waiting facilities and the MIND Centre and Grounds.

4 Air Quality

- 4.1.1 The studies carried out into the effects of the Scheme on air quality have considered both its construction and operational phases. In particular, the assessment has considered emissions associated with dust during the construction phase and vehicle emissions when the Scheme is operational.
- 4.1.2 Construction works have the potential to generate dust during earthworks and construction activities, and from the movement of vehicles onto public highways. Dust emissions can cause annoyance through soiling of buildings / surfaces and can adversely impact human health.
- 4.1.3 The baseline air quality study has shown that nitrogen dioxide (NO₂) emissions (typically, arising from vehicle exhausts) are highest to the west of the existing bascule bridge over the River Yare and on South Quay and routes connecting to Haven Bridge.
- 4.1.4 The construction phase assessment has shown that, without measures in place to reduce impacts (mitigation), there would be a high risk of dust-related impacts. With the mitigation set out in the Outline CoCP (document reference 6.16), however, there is unlikely to be a residual or significant effect on receptors within a distance of up to 500m from the Application Site and within 50m of the construction traffic access routes.
- 4.1.5 Operational phase impacts are expected to be associated with changes to vehicle emissions caused by re-routing of traffic. Overall the air quality impacts are expected to be negligible, more properties will see a moderate improvement (mostly to the north of the Scheme) in Air Quality than a moderate worsening (immediately adjacent to the Scheme, Blackfriars Road and Nelson Road Central). No sensitive receptors (residential, educational or health care properties, the King's Centre and ecological receptors within 200m of road links to the Scheme) will see an exceedance of any Air Quality Objectives as a result of the operation of the Scheme.
- 4.1.6 A detailed assessment of effects on air quality is included in Chapter 6 of the ES (document reference 6.1). Details on assessed receptors and their locations can be found within the ES chapter and supporting figures. The Outline CoCP (document reference 6.16) details the measures that should be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. These measures focus on the control of dust-generating activities, minimising the spread of dust and reducing air pollution. No mitigation measures are required for the operational phase.
- 4.1.7 The Scheme has not been shown to have a significant effect on human health, regional air quality, local air quality or designated sites and would not prevent compliance with planning policy or the ability of the UK to meet its air quality objectives.

5 Noise and Vibration

- 5.1.1 Noise and vibration assessments have focused on identifying likely significant effects upon residents and businesses located in the vicinity of the Scheme during construction and once the Scheme opens to traffic, and setting out mitigation for these.
- 5.1.2 There is the potential for construction phase impacts from noise and vibration during construction activities (including piling) and from construction traffic. Operational road traffic noise and wig wag alarms for bridge-opening are also potential impacts.
- 5.1.3 Existing noise conditions are typical of a built-up urban area, with noise levels dominated by traffic on the local road. This was true for weekday measurement periods, day, evening and night. During the weekend evening measurements, police sirens dominated noise levels. Secondary noise sources include more distant road traffic, domestic activities, as well as seagull calls. On the east bank, regular HDV movements were noted, together with industrial and commercial activities.
- 5.1.4 The construction phase assessment found that, prior to mitigation measures, there is the potential for very large noise and vibration impacts from construction activities on sensitive receptors. With proper implementation of mitigation measures, these effects will be reduced but will remain significant.
- 5.1.5 The operational phase assessment found that a range of effects on receptors as a result of short-term and long-term road traffic noise would occur, such effects were considered to be significant on some receptors. It is worth noting that an assessment of noise level increases in the opening year without the Scheme also found significant effects occurring on some receptors. No practicable mitigation can be proposed for these effects.
- 5.1.6 The detailed assessment of the effects of noise and vibration is included in Chapter 7 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. These measures focus on compliance with Best Practicable Means (BPMs) which would include maintaining communication and relations with residents, the timing of noisy works to take place in normal hours, and measures for the maintenance and operation of plant and equipment.

6 Nature Conservation

- 6.1.1 The assessment of potential effects on nature conservation resources has focused on the potential impacts of the Scheme on habitats, protected species and designated sites of ecological importance.
- 6.1.2 Construction and operation activities have the potential to disturb, kill or injure protected species and/or habitats. This could be as a result of activities such as spilling contaminants into or adjacent to suitable habitats, the movement and operation of construction traffic and the increased noise and vibration as a result of traffic conditions once the Scheme is operational.
- 6.1.3 The baseline nature conservation study showed the presence of a water vole population, the importance of the Site to foraging and roosting bats and the local value of the benthic (river bed zone) and fish community. There were three statutory designated sites in the Study Area for this assessment, the nearest being the Outer Thames Estuary SPA.
- 6.1.4 The construction phase assessment has shown that, without mitigation, the most significant adverse effects of the Scheme on nature would be the risk of killing or injury water voles during construction activities. Similar risks, though not as significant, exist for bats and breeding birds. There are also minor risks to water voles from other sources, such as contamination of habitats and noise disturbance. With proposed mitigation however, these would be reduced to minor and not significant effects on bats and water voles.
- 6.1.5 The operational phase assessment has shown that, prior to mitigation, all effects would be negligible except that there would be minor adverse effects on water voles as a result of noise disturbance and contaminated runoff.
- 6.1.6 A detailed assessment upon nature conservation is included in Chapter 8 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the mitigation measures that would be taken by the appointed contractor to minimise impacts of the Scheme during the construction period. These focus on measures to protect water voles, bats, breeding birds and benthic and fish ecology. No mitigation measures are required for the operational phase.
- 6.1.7 A Habitats Regulations Assessment (document reference 6.11) and a Detailed Arboricultural Report (document reference 6.2) have also been undertaken to assess the effects of the Scheme on European designated sites, and trees, respectively. The conclusion of these assessments found the Scheme will neither adversely affect European designated sites, nor trees.

7 Cultural Heritage

- 7.1.1** The assessment of cultural heritage resource has focused on identifying and describing potential impacts within four topic areas: archaeological assets (materials created or modified by past human activities, such as artefacts, monuments or landscape features); built heritage assets (architectural, designated or other structures with historical value, such as listed buildings); historic landscapes; and palaeoenvironmental assets (ancient organic matter).
- 7.1.2** There is the potential for impacts in both the construction and operational phases. These impacts could take the form of partial or complete loss of known and unknown below ground heritage assets in the Principal Application Site, the demolition of low value heritage assets in the Principal Application Site, impacts on the setting of designated and non-designated heritage assets and impacts of hydrology changes on palaeoenvironmental remains and below-ground assets.
- 7.1.3** The baseline heritage environment does not include any world heritage sites, registered battlefields, registered parks and gardens or protected wreck sites. One Grade II listed building is located adjacent to the Principal Application Site and no designated heritage assets are located within any Satellite Application Sites. Within the study area there are Scheduled Monuments, listed buildings (Grade I, II and II*), conservation areas, and buried heritage assets. The historical context of these sites is mostly in relation to the naval and fishing history of Great Yarmouth, religious buildings and World War II structures and bomb sites.
- 7.1.4** The construction phase assessment found that, without mitigation, there would be the potential for a range of effects from slight (not significant) to large impacts (significant) on below-ground non-designated heritage assets, potential for a range of effects from moderate to large impacts (significant) on palaeoenvironmental remains and potential moderate (significant) on built heritage assets (including the setting of listed buildings). Post mitigation these impacts will be reduced, with the largest potential impact remaining on heritage assets (listed buildings) through changes in setting.
- 7.1.5** The operational phase assessment found that, prior to mitigation, a moderate impact on the setting two heritage assets (Nelsons Monument and Gas Holders) and a slight to large impact on below-ground assets. With the implementation of mitigation measures, these impacts are anticipated to remain unchanged for the setting of heritage assets and reduced to neutral to moderate for below ground assets.
- 7.1.6** The detailed assessment of effects on cultural heritage and details of mitigation are included in Chapter 9 of the ES (document reference 6.1) and the Outline CoCP (document reference 6.16). A programme of evaluation

phase archaeological and palaeoenvironmental fieldwork will be undertaken in accordance to the Written Scheme of Investigation (WSI) (document reference 6.9) prior to the commencement of construction and would be used to inform any subsequent programme of mitigation to be undertaken either before or during the construction phases, where required. A level 1 Historic Building Survey will be undertaken prior to the demolition of late 19th century terraced properties on Southtown Road and Queen Anne's Road, in accordance with Historic England's 2016 guide, titled 'Understanding Historic Buildings. A Guide to Good Recording Practice'.

8 Townscape and Visual

- 8.1.1 The Scheme is likely to be visible from a number of locations around Great Yarmouth. The assessment has focused on two elements: the extent to which the Scheme, particularly the double-leaf bascule bridge will be visible; and how it may impact on the townscape character of Great Yarmouth.
- 8.1.2 There is the potential for impacts on the views and experience of users of nearby footpaths, residents and community facilities within Great Yarmouth.
- 8.1.3 The Scheme lies within the North-East Norfolk and Flegg, and the Broads National Character Areas, the Suffolk Coast and Heaths is also within 500m of the Scheme. The townscape of Great Yarmouth is urban and of particular note in this urban environment is the industrial nature of the river and port area which encompasses the largest proportion of the Scheme. Farmland, marsh, Breydon water and the Broads are additional landscape character areas on the fringes of the study area.
- 8.1.4 The construction assessment found that there would be no greater than a slight adverse (not significant) effect on townscape and up to moderate adverse effect (significant) on views during construction activities.
- 8.1.5 The operational assessment assessed effects on the year of opening and after 15 years of operation. At year 1 there will be no greater than slight adverse effects on townscape and moderate adverse (significant) on views during operation. The other townscape effects are all anticipated to be beneficial or neutral. By year 15 all mitigation will have been established and as a result no significant adverse effects on views are predicted. Additionally, no significant effects are anticipated on the wider landscape or on users experience of the Broads.
- 8.1.6 The detailed assessment of effects on townscape and visual is included in Chapter 10 of the ES (document reference 6.1). No additional mitigation measures are proposed as a result of the assessment, all mitigation is included within the design of the Scheme.

9 Road Drainage and the Water Environment

- 9.1.1 Assessments have been carried out to determine the impacts of the Scheme on the water environment from construction-related pollution; surface water and groundwater pollution from highway run-off; pollution from accidental spillages; changes to the patterns of erosion and deposition of sediments; and groundwater flows. In addition, a Water Framework Directive Assessment has been undertaken. The Water Framework Directive Assessment is presented in Appendix 11E of the ES (document reference 6.2).
- 9.1.2 The main surface water feature within the Study Area is the River Yare, which the Scheme will cross. The River Yare discharges into the North Sea at Great Yarmouth. The River Bure is a tributary of the River Yare and Breydon Water is connected to the River Yare upstream. Two bridges cross the River Yare at present in Great Yarmouth. The water quality of all three of these water bodies was given an overall status of moderate in 2016 by the Environment Agency; this was primarily due to sewage discharges and other activities pending investigation. This section of coastal water contains several marine protected areas. One major pollution incident and several minor incidents have occurred within 500m of the Principal Application Site since 2002. The groundwater conditions around the Principal Application Site vary.
- 9.1.3 The construction phase assessment found that there are no potential significant effects to surface water. Risks of accidental spillages of materials would be controlled by standard construction practices. For groundwater, the only potential significant effect would be the risk of pre-existing contaminants being drawn down from the surface through intrusive works (such as piling). With implementation of the proposed mitigation measures these effects are not considered to be significant.
- 9.1.4 The operational phase assessment found that potentially significant effects could occur to the erosion/deposition pattern within the River Yare, as a result of the narrowing of the watercourse caused by the Scheme. These effects would be localised to the vicinity of the Scheme. There would also be significant effects to existing ponds of local or community interest that would be lost as a result of the Scheme. Other effects to surface waters during operation would be managed through appropriate drainage design. The operational phase assessment to groundwaters concluded that there would be no significant effects.
- 9.1.5 The Water Framework Directive Assessment found that the Scheme would not change the potential for waterbodies to meet key Water Framework Directive objectives.

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- 9.1.6 The detailed assessment of effects on road drainage and the water environment is included in Chapter 11 of the ES (document reference 6.1). The Drainage Strategy (Appendix 12C of the ES (document reference 6.2)) and the Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. Further details on operational mitigation can be found in the chapter and within the Drainage Strategy (Appendix 12C of the ES (document reference 6.2)). For the water environment, these measures are focused on temporary drainage and spill prevention / response.

10 Flood Risk

- 10.1.1 The assessment of flood risk has focused on the risks of the Scheme from extreme flood events and also whether the Scheme would contribute to making flooding worse.
- 10.1.2 There is the potential for increased water levels and vulnerability to flood risk areas during construction due to flow restrictions. The operational bridge knuckles would result in a similar potential increased risk.
- 10.1.3 Great Yarmouth is already a flood risk area, and the Principal Application Site is predominantly within a Flood Zone 3 area (the Environment Agency's highest probability flood zone). Flood defences already exist throughout Great Yarmouth, of variable condition. The highest baseline flood risk comes from tidal flooding and much of the town is dependent on flood defences to protect it from tidal flooding. The effects of climate change are expected to see increased sea levels, groundwater levels and the probability of extreme storm events.
- 10.1.4 The construction assessment found that there would be slight risk of tidal and groundwater flooding risk during construction. The implementation of mitigation measures in the form of a flood management plan is deemed sufficient mitigation due to the short duration of construction and the low likelihood of an event occurring. As the construction footprint is the same as the operational footprint, the effects are anticipated to be the same in both phases and are outlined below.
- 10.1.5 The operation assessment found that the largest effects of the Scheme would be associated with increased tidal flood risk to some residential properties and commercial, which after mitigation would not be significant. These properties are located on the west bank of the River Yare south of the Scheme (Queen Anne's Road). Due to the small size of the area impacted, it has been deemed not practicable to provide specific mitigation. However, mitigation in the form of an emergency preparedness and response plan can be provided to reduce the risk to life and to property, which if implemented appropriately would mean that the significance of flooding to the two properties in question would be reduced from slight to moderate adverse to neutral to slight adverse. Tidal flooding is predictable and so these measures are considered to be reliable. Due to the existing level of flood risk in Great Yarmouth, it is not possible to fully remove the risk of flooding during a tidal flood event entirely.
- 10.1.6 A Flood Risk Assessment (FRA) was also undertaken. The FRA is a formal document required to be prepared as part of the consent application and has informed the ES. The FRA is presented in Appendix 12B of the ES (document reference 6.2).

10.1.7 The detailed assessment of effects on flood risk is set out in Chapter 12 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. These measures take the form of a flood management plan, the assessment of weather conditions and the maintaining of flood defences related to the Principal Application Site. Operational mitigation measures are detailed in the Chapter and take the form of closing the bridge element during a tidal flood event, adhering to flood emergency plans, and using sustainable drainage systems (where practicable).

11 Climate Change

11.1.1 The climate change assessment consists of two components:

- The contribution of the Scheme to climate change – considered in the greenhouse gas (GHG) emissions assessment; and
- The assessment of the vulnerability of the Scheme to climate change (climate change resilience and adaptation).

11.1.2 Potential impacts from GHGs could occur in the construction phase, in the form of materials manufacturing and emissions as a result of construction activities, and the operational phase, in the form of vehicle usage of the new infrastructure.

11.1.3 Baseline GHG emissions for traffic in the region are expected to increase by 11.7% between the opening year (2023) and 2038. The Scheme is located in East England which has currently a warmer and drier climate than the UK average. Climate predictions predict wetter winters, drier summers and increased extreme rainfall. Additionally, sea level rise predictions suggest a 30.5 cm increase by 2080.

11.1.4 The construction phase assessment found that the magnitude of GHG emissions during the construction phase would be negligible against the baseline.

11.1.5 The operation phase assessment found that, with mitigation measures in place, traffic GHG emissions in the area would see a slight reduction as a result of the Scheme, resulting in a neutral effect. Additionally, the operational phase was assessed from the point of view of climate resilience. With the climate adaptation mitigation measures incorporated as part of Scheme design, the risks of the Scheme to climate change have been assessed as not significant.

11.1.6 The detailed assessment of effects on climate change is set out in Chapter 13 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise impacts of the Scheme during the construction period. These measures include maximising the local sourcing of materials and waste management and the reusing of material arisings on Site.

12 People and Communities

- 12.1.1** The assessment of people and communities has focused on the effects of the Scheme on the relevant study areas in the form of employment, access to recreational activities, users of transport (motorised and non-motorised), land-take, increased demand for local services during construction, severance and disruption to terrestrial and marine services and community severance.
- 12.1.2** The assessment identified potential impacts during both the construction and operation phases. Construction impacts can include (but are not limited to) changes to non-motorised user facilities changes to vehicular journeys, changes to community severance, increased demand for local services, commercial and residential land acquisition, severance and disruption to land and water activities and the generation of employment opportunities and economic activity. Operational impacts can include (but are not limited to) changes to non-motorised user facilities, changes to vehicular journeys, changes to community severance, changes to access and activities associated with land and marine businesses and changes to recreational activities.
- 12.1.3** The areas immediately adjacent to the Scheme consists of industrial and residential properties. Key features are the MIND Centre and Grounds, allotment gardens, recreational vessels using the River Yare, commercial and residential properties (and land), and numerous community facilities.
- 12.1.4** The construction assessment found that the Scheme would be likely to have significant adverse effects on the Kingsgate Community Centre (due to community severance and changes to recreational activities), privately owned residential properties, the MIND Centre and Grounds, marine businesses (due to severance and disruption) and on marine recreational activities. Additional effects from minor adverse to minor beneficial are also likely to occur such physical changes to commercial properties (slight adverse) and economic and employment changes (slight beneficial).
- 12.1.5** The operational assessment found that the Scheme would be likely to result in significant beneficial effects on non-motorised users, community receptors (due to community severance) and terrestrial recreational activities. Additional, but not significant, beneficial effects are anticipated for terrestrial businesses. Some additional adverse effects, none of which are considered to be significant, are anticipated for non-motorised users (due to the removal of Adams Way footbridge), marine businesses, marine vessel movements and marine recreational activities.
- 12.1.6** The detailed assessment of effects on people and communities is set out in Chapter 14 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that should be taken by the

appointed contractor to minimise the effects of the Scheme during the construction period. The measures include the preparation of the full CTMP. As no significant adverse effects are anticipated during operation, no mitigation measures are proposed.

- 12.1.7** An Equalities Impact Assessment (EqIA) (document reference 6.15) was also undertaken to ensure that the Proposed Scheme would not disproportionately affect persons with protected characteristics under the Equality Act 2010. The EqIA predicted that, during construction, the Scheme would result in short term negative effects to persons and community facilities that support protected characteristics. Adverse effects would, however, be minimised through measures outlined in the Outline CoCP (document reference 6.16). During operation, long-term positive effects associated with increased accessibility would benefit persons with protected characteristics and community facilities.

13 Materials

- 13.1.1 The assessment of effects on material resources has focused on the use of materials that are required to construct the Scheme and the waste arisings that are likely to be generated during construction.
- 13.1.2 Effects on materials resources and waste arisings either within or beyond the first year of operation have been scoped out of this assessment as the extent of operational and maintenance activities is expected to be minimal. In summary, it is expected that all associated operational effects are not expected to be significant.
- 13.1.3 A review of baseline material consumption and waste disposal in the East of England has provided regional and national data, and a context in which the assessment has been undertaken. There are no unusual constraints on material availability to build the Scheme. Landfill capacity for the East of England by 2023 is anticipated to be up to 10% lower (than the 2016 levels). Material recovery and recycling rates of non-hazardous materials has remained above 90% since 2011.
- 13.1.4 The construction phase assessment found that, due to mitigation measures forming part of Scheme design, the effects of construction on use of materials are anticipated to be not significant. Similarly, effects from waste arisings and disposal of residual waste to landfill are not predicted to be significant.
- 13.1.5 The detailed assessment of materials and waste is set out in Chapter 15 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. Measures focus on the implementation of a Site Waste Management Plan, including hazardous waste considerations and waste minimisation measures, and the development of a Materials Management Plan (or equivalent).

14 Geology and Soils

- 14.1.1 The assessment of impacts on geology and soils has been undertaken with the inclusion of assessments on potentially contaminated soils, and any subsequent risk of impacts on human health, controlled waters and the environment.
- 14.1.2 Potential impacts regarding geology and soils are the disturbance of contaminated land, groundwater and ground stability during construction works, release of pollutants due to construction activities, potential exposure of future users to contamination, potential build up and exposure to ground / landfill gas and potential for mobile contaminants to be released to controlled waters.
- 14.1.3 No geologically designated sites exist in the area of the Scheme. No risks to ground stability were assessed to be present. No contaminated land was determined to be within the Principal Application Site, but historical ground works (made ground) are present with the River Yare Quay, which may have introduced contaminated materials into the area. An EA licensed landfill is also noted to be present to the south-west.
- 14.1.4 The construction phase assessment found that, prior to mitigation, potentially significant effects to human health would occur as a result of contaminant release and the risk of collapse of excavations. Similarly, significant adverse effects could occur in the form of releases of pollutants to controlled waters. With adherence to mitigation measures, all these impacts will be reduced to a level of not significant.
- 14.1.5 The operation phase assessment found that, prior to mitigation, potentially significant effects to human health could occur as a result of exposure to contaminated soils. Additionally, operational infrastructure could be exposed to migrated contaminants. With the proposed mitigation measures, all of these impacts would be reduced to a level of not significant.
- 14.1.6 The detailed assessment of effects on geology and soils is set out in Chapter 16 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. These measures primarily consist of piling recommendations and site user protections. Construction mitigation measures will inherently mitigate any operational phase effects.

15 Traffic and Transport

- 15.1.1 The assessment of traffic and transport effects has considered the capacity of the existing and proposed road junctions and how the Scheme would alter traffic flow through them. It has also considered how non-motorised users (NMUs), such as pedestrians and cyclists, would be affected.
- 15.1.2 Potential effects on the assessed receptors are impacts on journey times and delays, collisions and safety risks, and exposure to fear and intimidation from road traffic.
- 15.1.3 At present, Great Yarmouth has two road bridges to provide crossing points across the River Yare, both bridges experience high traffic volumes and severe congestion during peak periods. Congestion problems also occur in the town during the summer when greater numbers of tourists visit Great Yarmouth.
- 15.1.4 The construction phase assessment shows that, with the proposed mitigation, the effects would be slight adverse and not result in any significant effects.
- 15.1.5 During the operation phase, the assessment has shown that the Scheme would have a significant beneficial effect on journey times and delay (for all motorised users, bus users, pedestrians and cyclists), and a not significant but beneficial effect on fear and intimidation (for NMUs). As these effects are all positive, no mitigation is required.
- 15.1.6 The detailed assessment of effects on traffic and transport is set out in Chapter 17 of the ES (document reference 6.1). The Outline CoCP (document reference 6.16) details the measures that would be taken by the appointed contractor to minimise the effects of the Scheme during the construction period. These measures include the preparation and implementation of the full CTMP, aiming to reduce vehicle numbers and trips, and a Framework Workforce Travel Plan including measures such as public transport and lift sharing incentivisation.

16 Major Accidents and Disasters

- 16.1.1 Consideration of likely significant effects to and from the Scheme in respect of major accidents and disasters (MA&D) is a requirement of the EIA Regulations and have been considered from two aspects:
- The vulnerability of the Scheme to such events; and
 - The Scheme's potential to cause a MA&D event.
- 16.1.2 Potential impacts are primarily associated with flood risk and extreme weather events (such as storms and tidal surges), industrial accidents, urban fires, major pollution events and major naval/ traffic collisions.
- 16.1.3 The baseline assessment for major accidents and disasters draws on historical records of any MA&D events that have occurred within the area of the Scheme. This assessment concluded flooding events, severe weather, discovery of unexploded ordnance, power failure and major traffic accidents, all of which are or relate to potential MA&D events, have occurred. The baseline assessment has also referred to assessments of other environmental topics, such as flood risk.
- 16.1.4 The construction phase assessment concluded a significant residual risk of tidal flooding and industrial and urban accidents. Flood risk is due to an inherent baseline flood risk that cannot be entirely removed due to the location of the Scheme.
- 16.1.5 The operation phase assessment concluded a significant residual risk of tidal flooding and industrial and urban accidents. Flood risk is due to an inherent baseline flood risk that cannot be entirely removed due to the location of the Scheme.
- 16.1.6 The detailed assessment of major accidents and disasters is set out in Chapter 18 of the ES (document reference 6.1). Mitigation measures are included within the Scheme design and include measures from other topic assessments. Many of these are detailed in the Drainage Strategy (Appendix 12C of the ES (document reference 6.2)), existing Health and Safety Legislation (Appendix 18A of the ES (document reference 6.2)), other topic chapter assessments (document reference 6.1), the Outline CoCP (document reference 6.16) and other non-ES documentation such as the Preliminary Navigational Risk Assessment (document reference 6.14).

17 Cumulative Effects

17.1.1 The assessment of cumulative effects has considered two forms of cumulative impacts:

- Different environmental impacts interacting on common receptors (effect interactions); and
- Impacts of the Scheme combined with impacts of other developments in the area (in-combination effects).

17.1.2 Information on other developments in the study area from other environmental assessments was gathered to inform the in-combination assessment.

17.1.3 The potential cumulative impacts relate to the interaction of multiple environmental effects on one receptor, resulting in a significant effect interaction, or a development having impacts of a nature that it has a multiplying effect on a receptor or receptors when combined with the impacts of the Scheme.

17.1.4 The results of the effect interaction assessment found that, in the construction phase, no significant effect interaction is anticipated. All the common receptors identified are anticipated to have not significant (minor adverse) effect interactions. These are:

- Residents;
- Recreational facilities and users of said facilities;
- Motorised vehicle users;
- Non-motorised vehicle users;
- Surface and groundwater;
- Community facilities and users of said facilities;
- Human health; and
- Amenity.

17.1.5 The results of the effect interaction assessment found that, in the operation phase, no significant effect interaction is anticipated. All identified common receptors have a not significant (neutral or minor beneficial) effect interaction except surface and ground water (which has a slight adverse). These are:

- Motorised vehicle users (beneficial);
- Non-motorised vehicle users (beneficial);
- Residents;
- Recreational facilities and users of said facilities;
- Surface and groundwater (adverse);
- Community facilities and users of said facilities;

-
- Human health; and
 - Amenity

17.1.6 The results of the in-combination assessment found that, in the construction phase, the most significant effects to be on materials (waste generation) on four developments and one as a result of people and communities receptors within Great Yarmouth.

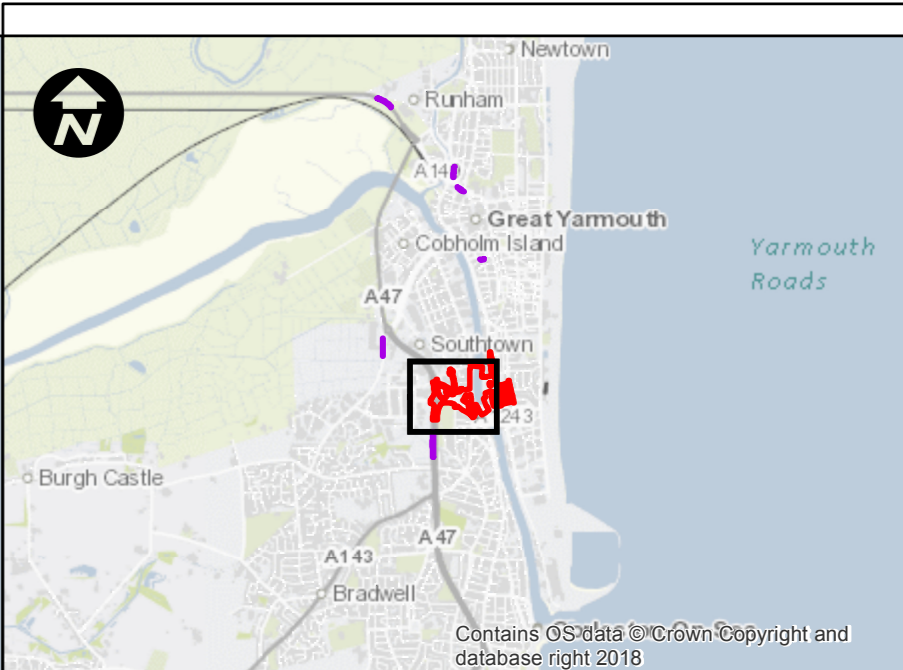
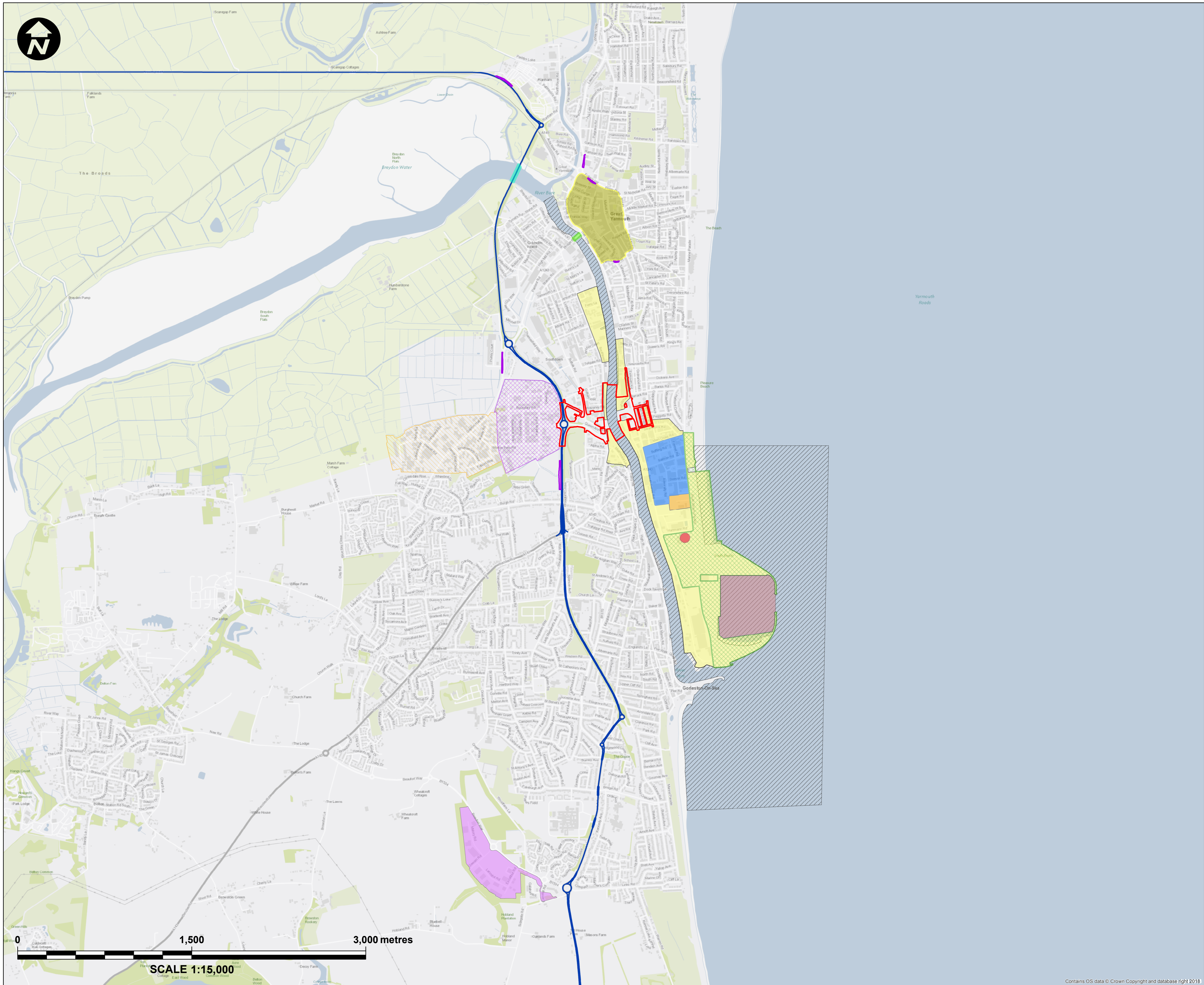
17.1.7 The results of the in-combination assessment found that, in the operation phase, the most significant adverse effects to be on the River Yare as a result of the Operation and Maintenance facility and land reclamation within the South Denes enterprise zone. The operation phase saw more significant beneficial in-combination effects, namely on people and communities' receptors as a result of the Pleasure Beach and North Denes Middle School developments.

17.1.8 The detailed assessment of cumulative effects is presented in Chapter 19 of the ES (document reference 6.1).

17.1.9 No mitigation measures for effect interactions or in-combination effects have been proposed due to them either not being required or there being no practicable measures beyond those already included in the Scheme.

Annex A: Strategic Location Plan

Presented overleaf.



- Key:**
- Principal Application Site
 - Satellite Application Sites
 - Town Centre
 - Breydon Bridge
 - Haven Bridge
 - Peel Ports Great Yarmouth
 - Outer Harbour
 - Local Development Order
 - Great Yarmouth Energy Park
 - South Denes Business Park
 - Harfreys Industrial Estate
 - Gaptown Hall Industrial Estate
 - South Denes Enterprise Zone Site
 - Beacon Park Enterprise Zone Site
 - Extent of Statutory Harbour Limits
 - A47

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REVISION	DRAWN	CHECKED	APPROVED	DATE

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PROJECT TITLE
**GREAT YARMOUTH
 THIRD RIVER CROSSING**

DRAWING TITLE
**6.5 - ANNEX A -
 STRATEGIC LOCATION PLAN
 (REGULATION 5(2)(a))**

DRAWING STATUS
FOR DCO APPLICATION

DRAWN	CHECKED	APPROVED	AUTHORISED
SR	HH	JW	MK
SCALE @ A1 SIZE 1:15,000		DATE 08/04/2019	REVISION P00

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