



A13 - Design and Access Statement

We are the Environment Agency. We protect and improve the environment.

Acting to reduce the impacts of a changing climate on people and wildlife is at the heart of everything we do.

We reduce the risks to people, properties and businesses from flooding and coastal erosion.

We protect and improve the quality of water, making sure there is enough for people, businesses, agriculture and the environment. Our work helps to ensure people can enjoy the water environment through angling and navigation.

We look after land quality, promote sustainable land management and help protect and enhance wildlife habitats. And we work closely with businesses to help them comply with environmental regulations.

We can't do this alone. We work with government, local councils, businesses, civil society groups and communities to make our environment a better place for people and wildlife.

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Quality Assurance

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EIA Quality Mark



This Environmental Statement, and the Environmental Impact Assessment (EIA) carried out to identify the significant environmental effects of the proposed development, was undertaken in line with the EIA Quality Mark Commitments.

The EIA Quality Mark is a voluntary scheme, operated by the Institute of Environmental Management and Assessment (IEMA), through which EIA activity is independently reviewed, on an annual basis, to ensure it delivers excellence in the following areas:

- EIA Management
- EIA Team Capabilities
- EIA Regulatory Compliance
- EIA Context & Influence
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1 Introduction

1.1 Introduction

- 1.1.1 This Design and Access Statement has been commissioned by the Environment Agency in support of its application under the Transport and Works Act, 1992 for a Transport and Works Act Order (TWAO) to authorise the construction, operation and maintenance of the proposed Boston Barrier Project (the Project). The TWAO application includes an associated request for a direction that planning permission be deemed to be granted for the Boston Tidal Barrier Project pursuant to section 90(2A) of the Town and Country Planning Act 1990.
- 1.1.2 The purpose of this Design and Access Statement (DAS) is to:
- Explain the design principles and concepts that have been applied to the Project;
 - Demonstrate the steps taken to appraise the context of the Project and how the design of the Project takes that context into account;
 - Explain the policy adopted in relation to access and how policies relating to access in relevant local plan policies have been taken into account;
 - Identify the consultation that has been undertaken on issues of access and demonstrate how any issues raised have been taken into account; and
 - Explain how any specific issues relating to access have been addressed.
- 1.1.3 This DAS is one of a number of documents submitted in support of an application for a TWAO and Deemed Planning Permission. Other documents submitted include:
- Letter of Application;
 - Draft TWA Order;
 - Explanatory Memorandum (explains purpose and effect of each Article and Schedule in Draft Order);
 - Statement of Aims (this explain what the Project aims to achieve)
 - List of all consents (all permissions/licences required for the purposes of the powers sought in the application);
 - Environmental Statement (ES) (the ES documents the outputs of the Environmental Impact Assessment (EIA) for the Project, which identifies the potential environmental effects of the Project and recommends measures to mitigate identified adverse effects);
 - Consultation Report (this sets out the consultation that has taken place with regard to the proposed Project, including schedule 5 and 6 parties);
 - Estimate of Costs (this details the estimated cost of carrying out the works provided for in the proposed Order);
 - Proposal for Funding (this details the applicant's proposals for funding the cost of implementing the Order);
 - Request for Direction under section 90(2A) of the Town and Country Planning Act 1990 and proposed planning conditions;
 - Book of Reference (identifies all landowners within the Site Application Boundary);
 - Order Plans (these comprise a Location Plan, Works Plans and Sections, Land Plan and Rights of Way map);

- Planning Direction Drawings (these show the boundaries of the planning application, and illustrate the design of the Project); and
- Planning Statement (this identifies and sets out the national, regional and local planning policy relevant to the Project).

1.2 Project background

- 1.2.1 The Environment Agency, is seeking to manage the flood risk from the tidal River Witham (known as the Haven, in this location) in Boston, Lincolnshire. The Environment Agency is proposing to provide protection against a 0.33% (1 in 300) annual probability of flooding over the 100 year project life in this location.
- 1.2.2 The works required to achieve this are outlined in the Boston Combined Strategy (BCS) (2008), and comprise of a tidal barrier along with flood risk management structures (flood walls and flood gates) along both banks of the Haven.
- 1.2.3 The Project works comprise the construction of a tidal barrier which can be raised when extreme high tides are predicted within the Haven, along with land-based flood risk management structures that tie into the barrier structure and improvements to existing flood management structures including the Wet Dock Entrance on the Port of Boston (PoB) Estate (known as 'the Project'). The barrier has a large moveable flood gate which, when not in use, would lie flat on the river bed, to be raised occasionally to prevent flooding in Boston during extreme tides (by acting as a tidal barrier). The gate and concrete side walls would sit on a reinforced concrete base slab, supported by deep steel piled foundations.
- 1.2.4 The Project area is located within and adjacent to the Haven, approximately 100m downstream of Black Sluice. The barrier structure is located adjacent to the Starch Berth (on the PoB Estate - left bank) and existing residential properties (along Wyberton Low Road - the right bank) (National Grid Reference TF 32836 42826). The flood defences extend from Black Sluice to the Western Power Distribution (WPD) site on the right bank, and from the barrier structure to Maud Foster Sluice on the left bank.

1.3 The need for the Project

- 1.3.1 Boston is a historic market town with an important maritime history. It is set in the low-lying, flat landscape of the Lincolnshire fens, much of which is below the level of the mean high water spring tides of the Haven. The tidal river presents a potential flood risk to Boston, particularly during extreme tides, such as those which occurred in December 2010 and 2013.
- 1.3.2 As stated in the BCS (2008), Boston is particularly vulnerable to extreme tides and subsequent flooding. Extensive damage was caused in the last serious flood incident in December 2013, causing extensive flooding to 800 properties and 100 businesses, when an

extreme tide breached the town's flood defences at a recorded level of 6.08m AOD (Above Ordnance Datum).

- 1.3.3 The existing flood risk management measures along the Haven are maintained by the Environment Agency. The existing standard of protection through the town of Boston itself is for a 2% (1 in 50 years) annual probability of flooding. The existing flood risk management structures consist of flood gates and flood walls within Boston town centre; along with a raised embankment on the right bank of the Haven from Black Sluice down to the operational WPD electricity substation. However, these flood risk management assets are subject to overtopping during high tides or high storm tides.
- 1.3.4 The BCS (2008) is a major strategy being delivered by the Environment Agency, Lincolnshire County Council (LCC) and Boston Borough Council (BBC) to manage flood risk from tidal flooding in Boston, whilst facilitating opportunities for regeneration of the town's waterways.
- 1.3.5 The BCS (2008) sets out 5 stages to reduce the risk to people and the environment from tidal flooding. The BCS also aims to deliver a safe and attractive navigation connection to the proposed Fens Waterways Link¹. The 5 stages are:
- Stage 1: A new navigation link between the Haven and South Forty Foot Drain at Black Sluice (this was completed in March 2009)
 - Stage 2: Refurbishment of the Haven river walls upstream of the proposed barrier;
 - Stage 3: The provision of a new multi-functional barrier; and
 - Stages 4 and 5: Waterways facility improvements and raising of the embankments downstream of the barrier respectively.
- 1.3.6 Stage 3 of the BCS (2008) outlines the delivery of a tidal barrier. This would be implemented through the Project, the aim of which is to improve the standard of protection in Boston from tidal flooding without affecting the existing fluvial flood protection provided upstream within the River Witham and South Forty Foot Drain (SFFD).
- 1.3.7 The Project has been designed to achieve this improved standard of protection, through the proposed barrier and associated flood management structures on the right and left banks and gate in the Wet Dock Entrance (WDE). The BCS (2008) proposed that water level management (WLM) be implemented alongside the tidal barrier in order to provide safer passage for pleasure craft onto the South Forty Foot, the first stage of the Fens Waterways Link.

¹ The Fens Waterways Link would, when finished, provide a route running through the cathedral cities of Lincoln, Peterborough and Ely. Only the first stage has so far been completed. Lincolnshire County Council and Boston Borough Council also aim to improve the aesthetic appeal of Boston town centre to enable an increase in tourism and to promote regeneration of the town by implementing WLM.

1.3.8 However, in January 2015, the Executive Committee of the County Council and the Environment Agency Boston Barrier Project Board confirmed removal of WLM from the scope of the Project. In making the decision, the Environment Agency, LCC and BBC confirmed that it remains the vision to provide WLM at a later date through a standalone project and consenting process. The Project has been designed not to compromise the introduction of WLM in the future.

1.4 Objectives

1.4.1 The BCS (2008) has set out one central strategic objective, underpinned by three project-specific objectives:

1.4.2 The strategic objective is “To reduce the risk from flooding while enabling opportunities for regeneration in Boston”.

1.4.3 The three Project-specific objectives are detailed below:

- Flood Risk Management: To reduce the risk to people and the developed and natural environment from flooding;
- Economics: To maximise amenity, social and economic opportunities; and
- Environment: To minimise the adverse impacts on the natural and built environment of the area and to maximise opportunities for environmental enhancement.

1.5 Consultation

1.5.1 Extensive consultation has been undertaken throughout the development of the Project. Consultation commenced in 2008 and engagement would continue to occur during the construction of the Project, until 2020.

1.5.2 Consultation has fed into notable outputs including: the BCS (2008); the Original Scoping Report (2011); the Updated Scoping Report (2014); and the ES. Further details of this consultation are outlined below.

1.5.3 Project consultation comprised of two principal components:

- Consultation with statutory bodies; and
- Wider stakeholder engagement.

1.5.4 Since 2008, over 50 organisations, including statutory bodies and non-governmental organisations, parish councils and the general public have been consulted at key stages of the Project and feedback sought through a variety of engagement techniques, including: group meetings, public exhibitions, workshops and site visits.

Specific consultation with statutory and non-statutory bodies

- 1.5.5 Consultation has been carried out at key stages in the development of the Project design and during the EIA process with the following organisations:
- Anglian Water Services Ltd;
 - Black Sluice Internal Drainage Board;
 - Boston and District Fishermen's Association;
 - Boston Borough Council;
 - British Waterways;
 - Canal and Rivers Trust;
 - Centre for Environment Fisheries and Aquaculture Science (CEFAS);
 - Crown Estate;
 - Department of Environment, Food and Rural Affairs;
 - Eastern Inshore Fisheries and Conservation Authority (EIFCA);
 - Harbour Master;
 - Heritage Trust for Lincolnshire;
 - Historic England;
 - Lincolnshire County Council;
 - Lincolnshire Wildlife Trust;
 - Lincolnshire Rivers Trust;
 - Marine Management Organisation;
 - Maritime and Coastguard Agency;
 - Natural England;
 - Port of Boston;
 - Sports England;
 - The Inland Waterways Association;
 - The Royal Society for the Protection of Birds (RSPB);
 - Trinity House;
 - Witham Fourth Internal Drainage Board;
 - Western Power Distribution; and
 - Witham Sailing Club.
- 1.5.6 The main purposes of these consultations were to understand the views and opinions of the statutory and non statutory bodies on the Project and to discuss what they consider to be key issues and priorities.
- 1.5.7 The Consultation Report and the ES (Volume 1): Chapter 5; Consultation provides a more detailed overview of the consultation undertaken during the development of the Project.

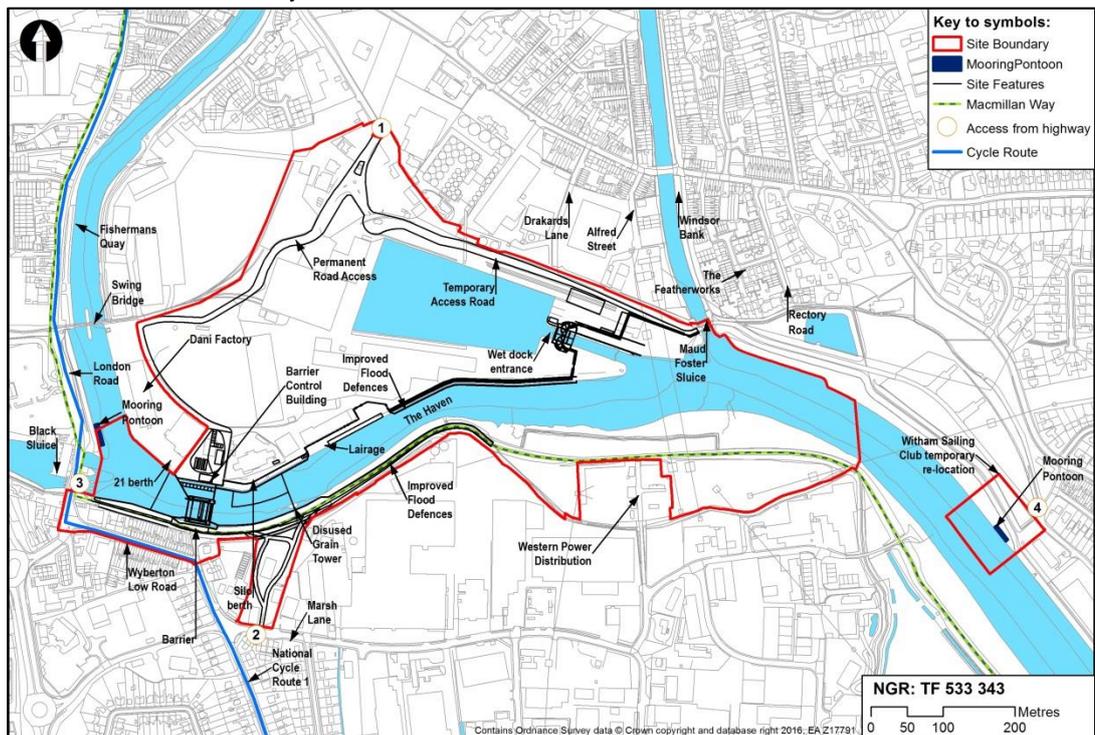
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2 The Proposed Development

2.1 Location of the Project

2.1.1 The Project area ('the site boundary') is located to the south of central Boston, Lincolnshire at National Grid Reference (NGR) TF 533 343. It includes a stretch of the Haven, between Black Sluice and Maud Foster Sluice (Grade II listed). This area encompasses the majority of the PoB Estate (left bank) and part of the Boston Public Footpath No. 14 (Macmillan Way) from London Road eastwards tying in with the embankment of the WPD site (right bank). The total area including land and water is approximately 34ha. The site boundary is shown in Plate 2.1 below.

Plate 2.1: Site Boundary



Source: Mott MacDonald 2016

2.1.2 The land use adjacent to the Project contains a mixture of commercial, industrial and residential uses on the left and right banks of the Haven. The PoB Estate occupies approximately 19ha of land within the Project area.

2.1.3 The land on the right bank is generally occupied by light industrial units at the Riverside Industrial estate. The Environment Agency's Community Hub for the Project currently occupies a leasehold site within the industrial estate identified as a preferred area for future waste development in the emerging Lincolnshire Minerals and Waste Local Plan There are

two storey terraced houses (along Wyberton Low Road) which back onto the embankment, within the Project area.

- 2.1.4 Boston Public Footpath No.14, also known as the Macmillan Way long distance footpath, follows the right bank of the Haven, downstream of Black Sluice to the mouth of The Wash then turns south west towards Stamford, see Plate 2.1.
- 2.1.5 National Cycle Network Route Number 1 is a long distance route connecting Dover and the Shetland Islands. It passes through Boston along both Wyberton Low Road and London Road. The route follows Wyberton Low Road on the south side of the Haven before turning onto Marsh Lane and then London Road.
- 2.1.6 A WPD electricity substation is located further downstream of the proposed barrier location along the right bank, see Plate 2.1. An area of grazing land is adjacent to the substation.
- 2.1.7 Pasture and arable fields along both sides of the Haven can be found further downstream.

2.2 Project overview

- 2.2.1 The Project will consist of a barrier structure within the Haven, along with land-based flood risk management structures that tie into the barrier structure and into existing flood management structures.
- 2.2.2 Project components are:
 - Barrier structure;
 - Barrier control building;
 - Control building for the WDE gate;
 - Sheet piled flood walls on the right bank, upstream and downstream of the river;
 - Sheet piled and concrete flood wall on the left bank, including vehicle access gates;
 - WDE widening and installation of a gate;
 - Demolition of the wooden quay and steel sheet piled structure on the right bank;
 - Demolition of one grain tower and construction of two new towers and a single extended aerial conveyor to be installed on the left bank in the PoB Estate;
 - Demolition of the buoy shed on the PoB Estate;
 - Extension of the existing loading platform on the PoB Estate;
 - Capital dredging;
 - Maintenance works to the existing PoB access road;
 - Diversion of 3 no. 11kv electricity cable;
 - Scour protection;
 - Permanent security fencing on the right bank surrounding the barrier structure;
 - Landscaping and lighting; and

- Temporary slipway, mooring pontoon, storage and welfare facilities for the Witham Sailing Club (WSC) and recreational river users.

2.2.3 A full Project description is provided in the ES Volume1: Chapter 2; Project Description.

2.2.4 As part of the request for a planning direction, under Section 90(2A) of the Town and Country Planning Act 1990, a number of conditions are proposed. These conditions have been developed to seek control of the development, and provide necessary mitigation of the impact of the Project. The conditions comprise time-limiting, pre-commencement and compliance conditions, and have been agreed in principle with the Local Planning Authority.

2.2.5 The proposed planning conditions are detailed in the Request for Direction under section 90(2A) of the Town and Country Planning Act 1990.

2.3 Barrier structure

2.3.1 The barrier structure would be constructed in the Haven, approximately 100m downstream of Black Sluice. It would be situated between Berth21 and the Silo berth on the PoB Estate on the left bank and existing residential properties along Wyberton Low Road on the right bank (see Plate 2.1). It comprises a U-shaped structure which provides a 25m navigable channel across the Haven that is 35m in length with a gate approximately 10m high, spanning the channel.

2.3.2 The top of the rising sector gate would stand approximately 5m above mean high water mark (MHWM) between two vertical supporting reinforced concrete side walls when fully raised. When not in use, this rising gate would lie level with the bed of the river at -3.0mAOD. The gate and concrete side walls would sit on a reinforced concrete base slab supported by deep steel piled foundations.

2.3.3 The gate of the barrier structure would be in operation when tidal levels are expected to exceed a level of 5.30mAOD² in the Wash. As the High Astronomical Tide (HAT) is 4.73mAOD the gate would only be operational during extreme high tides.

2.3.4 The presence of the barrier structure would reduce the existing channel width from 56m to approximately 25m, similar to the existing channel width at the Swing Bridge 300m upstream of the barrier structure. The position of the barrier would be slightly offset from the centre of the channel to the right side to ensure an adequate width is provided for a temporary navigation by-pass channel during the construction period.

² The 5.3mAOD would be the operating level. Should a 5.1mAOD rise be forecast, this would 'trigger' the barrier structure to operate (that is, raise the gate). This would ensure that upstream flood risk management measures through the town centre are capable of withstanding 5.3mAOD whilst accounting for a 200mm forecast error.

- 2.3.5 Warning signs, automatic signals and lighting for navigation would be installed and used to inform navigation traffic of the presence of the barrier structure, manage the movement of boats through the narrowed channel and provide advance warning of the gate's operation. Detailed proposals would be developed during the detailed design stage of the Project and be submitted to the Port of Boston Harbour Authority and Trinity House (who are responsible for shipping safety in British waters) for approval and implementation.
- 2.3.6 Foundations would be installed on the left bank of the barrier structure to support a 1,000 tonne mobile crane, which would be used to lift the barrier gate into position during construction. These crane foundations would provide a permanent facility for any future gate removal, or maintenance operations, which would be approximately once every 20 to 25 years.
- 2.3.7 A 1.8m high security fence would be provided on the right bank around the barrier to restrict access.

2.4 Barrier control building, buoy shed and Wet Dock Entrance (WDE) control building

- 2.4.1 A barrier control building with associated car parking (4 spaces) and HGV layby area (4 spaces) would be constructed on the left bank of the Haven. The site is currently occupied by a structure, the PoB's buoy shop. The buoy shed would be permanently removed and compensation would be paid for the loss of this facility in accordance with the compensation code.
- 2.4.2 It is envisaged the barrier control building would be a two storey structure. The ground floor would accommodate the plant and equipment required to operate the barrier structure. The first floor would have the control room office and welfare facilities and an outdoor observational area.
- 2.4.3 The barrier control building footprint would be approximately 21m by 7m (147m²) and 6m high. It is likely to be of a pre-fabricated glass reinforced plastic (GRP) construction set on a concrete base with a green 'living' roof, grey water systems and photovoltaic (PV) solar panels. The façade would be painted in a colour amenable to the surrounding environment, the details of which would be agreed with BBC via the discharge of a planning condition relating to siting, scale and external appearance of the building.
- 2.4.4 The barrier control building has been sited to meet the operational needs of the Environment Agency. Its position aligns with the barrier structure to provide the required sight-lines to the barrier structure and across the channel.

- 2.4.5 A control building is proposed adjacent to the WDE to allow for the operation of the gate. It is envisaged that a one storey building would accommodate a plant room, electrical room, control room and lobby.
- 2.4.6 The building footprint would be approximately 12m by 6m (72m²) and 4m high. The building is likely to be of a pre-fabricated GRP construction set on a concrete base. The façade will be painted in a colour amenable to the surrounding environment with details of the siting, scale and external appearance agreed with Boston Borough Council via the discharge of a planning condition.

2.5 Left bank flood wall

- 2.5.1 The left bank flood wall has two distinct elements; a flood risk management structure and sheet piling installed in front of the existing PoB quay wall to improve stability of the quayside (see ES (Volume 1): Appendix A: Maps and Figures; Figure 1.1).
- 2.5.2 The flood risk management structure is 7.55m AOD and provides protection to 7.12m AOD with a safety factor of 0.43m. The structure ranges in height from 1.5 to 2.4m above ground level depending on existing topography. The approximate reach of the flood risk management structure is 820m.
- 2.5.3 The flood management structure comprises two elements, the first is an extended sheet piled wall with concrete capping which starts at the barrier and extends downstream to the end of the existing load relieving platform. The second is a reinforced concrete wall, which provides the required flood protection from this point tying into Maud Foster Sluice beyond the WDE (see ES (Volume 1): Appendix A: Maps and Figures; Figures 2.4a to 2.4d). The concrete wall set back varies between 9 and 15m from the quayside to facilitate access.
- 2.5.4 In addition, a new sheet piled stabilisation wall would be installed in front of the existing PoB quay wall (see ES (Volume 1): Appendix A: Maps and Figures; Figures 2.4a to 2.4d) with associated anchorage sheet piling. Sheet piling would extend from the barrier structure downstream along the waterfront of the PoB (except along the existing load relieving platform and knuckle) and up to the Wet Dock. A section of sheet piled wall with anchorage sheet piling would also be provided along the northern face of the WDE.

2.6 Right bank flood wall

- 2.6.1 A new sheet piled flood wall would be installed along the right bank, adjacent to the new scour protection (approximately 100m upstream of the barrier structure). After this, the worst case would be that the sheet piling would be driven directly into the embankment to an embedment level of -8.0m AOD to provide a flood protection level of 7.55m AOD and would continue along to tie in with the flood protection by the WPD substation, approximately 470m from the barrier.

- 2.6.2 The flood protection level would be achieved with the sheet pile extending 1.2m above the crest of the embankment downstream of the barrier to the WPD site; this would result in a 1.2m high wall when viewed from the land side of the path and visible sheet pile between 2 and 3m in height when viewed from the riverside of the embankment. The embedded sheet pile would allow the bank to retain the existing sweeping vegetated profile. In front of the piles, the right bank embankment will be allowed to recolonise the existing sweeping bank. In front of the piles, the deposited mud and silt would be able to recolonise post construction
- 2.6.3 A 6m wide vehicle access route would run alongside the flood wall on the crest of the embankment to allow for routine maintenance by light vehicles such as mowing machines. The access route would be shared with pedestrians and users of the Boston Public Footpath No.14 (the Macmillan Way).

2.7 Wet dock entrance (WDE)

- 2.7.1 The width of the WDE channel would be widened from 15.3m to 18m to allow broader ships to enter the wet dock to moor up rather than use the Haven riverside quays.

Wet Dock Gate

- 2.7.2 A single gate would be installed at the location of the existing lock gates and would be selected to improve the management of flood risk and operational requirements of the PoB.

2.8 Port of Boston access gates

- 2.8.1 Access gates would be installed within the left bank flood wall from the barrier to Maud Foster Sluice to allow the passage of the PoB's road vehicles during normal operation. These manually operated gates would be double leafed, each 3m to 5m wide (6-10m total gate width). Eight gates at different junctures along the left bank wall are currently proposed.

2.9 Dredging requirement

- 2.9.1 The Environment Agency would carry out capital dredging to facilitate the construction of the Project. Approximately 38,300m³ of material would be removed across four phases:
- Phase 1 – To enable berthing facilities to be provided along the left bank (including Berth 21 within the PoB Estate), create a by-pass channel and install temporary scour protection. Dredging will also occur approximately 1.5km downstream of the barrier location to enable to construction of the Witham Sailing Club and recreational river users temporary mooring facility. This dredging phase would remove approximately 11,000m³ of material over a 3-4 week period;

- Phase 2 – To dredge along the remainder of the left bank quay wall and turning circle prior to the closure of the Wet Dock. It would remove approximately 20,000m³ of material over a 6-8 week period;
- Phase 3 – To allow installation of permanent scour protection. It would remove approximately 7,000m³ of material over a 2-3 week period; and
- Phase 4 – To sweep off any remaining built up material near the barrier structure at the end of the construction period. It would remove approximately 300m³ of material over a 1-2 week period.

2.10 Scour protection works

2.10.1 Temporary scour protection would be installed on the bed of the by-pass channel adjacent to the temporary cofferdam (within which the barrier will be constructed) following the first dredging phase. It is anticipated that the placement would be done by barge and two-way traffic will change to one-way through the bypass channel as a result.

2.10.2 It is envisaged the majority of the temporary scour protection would be reused as permanent scour protection for the barrier structure after the completion of the barrier works. It is anticipated that the placement would be done by barge. It is possible that vessel traffic within this stretch of the Haven would be temporarily stopped whilst the works are carried out for health and safety reasons. The length of time that navigation traffic in the Haven is to be stopped would be determined by the final size and type of scour protection to be used. This would be determined during detailed design; however, as a worst case it is anticipated that the Haven would only be closed for a few hours to a few days at a time.

2.11 Landscaping and lighting

Hard and soft landscaping

2.11.1 Landscaping is proposed along the right bank as shown in the landscape plans submitted with the ES (Volume 2a): Landscape and Visual Impact Assessment Technical Report: Appendix A. Details of the materials to be used in the landscape design would be identified in consultation with BBC and agreed through the discharge of a planning condition. It is proposed that the landscape mitigation would allow for transition between the urban character in the area of the Black Sluice and the barrier structure and the semi-natural character downstream, towards the WPD site. The crest of the right bank would be grass seeded and reinforced to allow light vehicle movements on top of the embankment for maintenance purposes and to cater for the needs of pedestrians, cyclists and persons of restricted mobility. There would be a footpath with seating areas with occasional low shrub planting to soften the view from the Boston Public Footpath No. 14 (Macmillan Way). The retention of the existing grass embankment and introduction of various grasses (that are saline tolerant) to the side of the new flood wall facing the water, would retain the semi-natural character of the right bank.

Lighting

- 2.11.2 A Lighting Statement (see the ES (Volume 2a): Landscape and Visual Impact Assessment Technical Report: Appendix C; Lighting Statement) has been developed to support the Project. It presents the permanent external lighting that would be installed in the following locations:
- Control building – entrance and surrounding perimeter, including the proposed HGV layby and car park areas;
 - WDE control building;
 - Barrier structure – perimeter lighting to allow operation and maintenance works;
 - WDE;
 - Key areas within PoB not currently covered by lighting; and
 - The barrier gate and WDE would have lighting to inform river users of barrier movement and closure.
- 2.11.3 At this stage additional light for construction purposes is not considered to be necessary as the PoB has extensive lighting already in place to allow it to operate 24hours a day. However, upon commencement of the works, the contractor will review the current lighting on the PoB Estate and the Marsh Lane Compound and review any requirement for additional illumination based upon the requirement for construction as well as 24/7 working to the wet dock area.
- 2.11.4 The permanent light fixtures proposed are column mounted floodlights for the HGV layby areas, control buildings and the access gates within the floodwall, while street lighting columns are proposed for car parking area. All columns would be hinged so they can be folded down for maintenance.

2.12 Enabling works

- 2.12.1 Cable diversion – The Project would require the diversion of existing (3No.) 11kV electricity cables. The proposed route would divert the cables from the right embankment, turn south along Wyberton Low Road for 200m, before heading back north onto the right embankment and tying into the existing services adjacent to Black Sluice.
- 2.12.2 Wooden quay structure (disused hoist) and grain tower – A disused hoist and associated piling on the right bank would be deconstructed and removed potentially via barge. Material would be recycled where possible. This is likely to occur during the 3rd Quarter of 2017. The existing grain tower conveyor (operated by Frontier) along the left bank of the PoB Estate would be permanently relocated further downstream (approximately 100m). Two new towers would be erected to enable a single extended aerial conveyor to be installed from Frontier building to the quay. This is likely to occur during the 4th Quarter of 2017.

- 2.12.3 Extending loading platform – The load relieving platform is intended to reinforce the quay side to support the additional loading expected while moored boats transfer goods to and from land. During detailed design consideration would be given to extending the existing loading platform on the PoB Estate.
- 2.12.4 Witham Sailing Club– temporary relocation – The temporary relocation of the Witham Sailing Club during construction only would be approximately 1.5km downstream from the proposed barrier. The mitigation would consist of (see the ES (Volume 1) Appendix A: Figures 2.7a to 2.7c):
- A single clubhouse with welfare facilities (anticipated to be a porta cabin type structure);
 - A safety boat storage container (anticipated to be a porta cabin type structure);
 - A fenced compound with storage for 4 dinghies; and
 - Parking facilities.
- 2.12.5 Alternative moorings – Mooring pontoons would be provided in two locations and would be available for recreational users during construction. There is an existing pontoon adjacent to the Black Sluice which has been provided by the Environment Agency for a previous project and a second pontoon would be provided approximately 1.5km downstream of the barrier. These have been provided for recreational users when they do not feel that it is safe to navigate the area during construction.
- 2.12.6 Boston and District Fisherman’s Association – temporary relocation – Subject to agreement with the PoB, which has been provided in principle, the fishing fleet would be provided with an alternative mooring location for the duration of the construction of the barrier. It is envisaged that Lairage Quay would be available to the fishing fleet for the duration of the construction of the barrier.
- 2.12.7 Works to access roads – The internal PoB roads required for construction access would be improved to provide the required turning circles, safety aids and sight lines for the additional construction traffic.

2.13 Project construction

- 2.13.1 Project construction is anticipated to commence in the 4th Quarter of 2017 (October 2017) and be completed by the 4th Quarter 2019 (December 2019). The construction period is based on a five day week, with working hours from 07:30am to 18:00pm. Potential exceptions to this as outline in the draft planning conditions include:
- Capital dredging works;
 - Works to construct WDE would be on a 24 hour per day 7 days a week (24/7) basis in line with the current operational hours for the PoB Estate;
 - Completion of operations commenced during the Core Working Hours which cannot safely be stopped;

- Completion of works delayed or held up by severe weather conditions which disrupted or interrupted normal construction activities;
- Highway works which the local highway authority requests be undertaken on a Saturday or a Sunday or outside the Core Working Hours; and
- Works required to be undertaken in the case of an emergency (provided that BBC is notified in writing within 24 hours of such works taking place).

3 Design Evolution

3.1 Introduction

3.1.1 The proposals for the Project were developed following a detailed assessment process, both as part of the development of the Boston Combined Strategy and the subsequent development of the Project following the identification of a preferred strategic option as part of that Strategy.

3.2 Boston Combined Strategy

3.2.1 As outlined within the Boston Combined Strategy, seven strategic options were individually appraised in terms of technical, environmental and economic opportunities created. The seven options, including beneficial and adverse effects and costs relative to the other options, are provided in Table 3.1.

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Table 3.1: Strategic options for Boston including key beneficial and adverse effects and costs relative to the other options

Protection standard	Option	Description	Key Beneficial Effects	Key Adverse Effects	Cost (relative to the other options)
Do Nothing	Do Nothing	With the Do Nothing Option no works are undertaken and all existing maintenance and operation of structures would stop. This is the baseline against which other options are considered	None	Increase in magnitude and frequency of flooding. Loss of land based infrastructure, high grade agricultural land and reduction in historic character. Would not provide any future opportunities for investment and employment. Would not make provision for recreation and infrastructure improvements.	No cost as no works proposed
Do minimum	Option I - Maintain defences and western waterway.	Pro-active maintenance of flood risk management assets and a channel linking the River Witham (via North Forty Foot Drain) to South Forty Foot Drain.	Least environmentally intrusive flood risk management option in the short term Provision of new recreational facilities. Improved access to wider waterway network	Option is not sustainable against climate change. Provides little opportunity for securing the future of and improving recreational facilities, infrastructure and agricultural land. Significant land acquisition required. Channel bypasses the town centre therefore opportunities would be missed to encourage visitors to Boston. Disturbance of North Forty Foot Drain which is a designated site.	Fourth most expensive (same cost as Option II and Option IV)
Do minimum	Option II - Maintain defences, new barrage and navigation link	Pro-active maintenance of FRM assets, a partial exclusion barrage to control the tidal range within Boston, and a new lock through, or adjacent to, Black Sluice.	Least environmentally intrusive flood risk management option in the short term. Encourages long term investment opportunities. Approach would provide an important recreational resource. Would allow safe navigation of The Haven and wider waterway network.	Option is not sustainable against climate change. Limited opportunity for securing the future of and improving recreational facilities, infrastructure and agricultural land. A barrage to control the tidal range would result in some loss of mudflat habitat and mitigation would be required.	Fourth most expensive (same cost as Option I and Option IV)
Sustain Standard of Protection	Option III - Maintain defences and	Sustain the current standard of protection (1 in 50 years) into the future by raising the levels of	Provides a contribution to reduction in frequency and severity of flood risk within Boston. Provisions of future investment opportunities due to management of flood risk however, this would	Provides little opportunity for securing the future of and improving recreational facilities, infrastructure and agricultural land. Adverse effects on heritage, landscape and biodiversity	Third most expensive

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Protection standard	Option	Description	Key Beneficial Effects	Key Adverse Effects	Cost (relative to the other options)
	western waterway	existing FRM assets to cater for the effect of climate change and a create a new channel linking the River Witham (via North Forty Foot Drain) to South Forty Foot Drain.	<p>be limited to the short term.</p> <p>Minimises environmental intrusion in the short term.</p> <p>Provision of new recreational facilities.</p> <p>Improved access to wider waterway network.</p>	<p>with higher defences, although mitigation possible in places.</p> <p>Significant land acquisition required.</p> <p>Channel bypasses the town centre therefore opportunities would be missed to encourage visitors to Boston.</p> <p>Disturbance of North Forty Foot Drain which is a designated site.</p>	
Sustain Standard of Protection	Option IV - Maintain defences, new barrage and navigation link	Sustain the current standard of protection (1 in 50 years) by raising the levels of existing FRM assets to cater for the effect of climate change, and create a new partial exclusion barrage to control the tidal range within Boston and a new lock through or adjacent to Black Sluice.	<p>Provides a contribution to reduction in frequency and severity of flood risk within Boston.</p> <p>Provisions of future investment opportunities due to management of flood risk however, this would be limited to the short term.</p> <p>Minimises environmental intrusion in the short term.</p> <p>Encourages long term investment opportunities.</p> <p>Approach would provide an important recreational resource.</p> <p>Would allow safe navigation of The Haven and wider waterway network.</p>	<p>Provides limited opportunity for securing the future of and improving recreational facilities, infrastructure and agricultural land.</p> <p>Adverse effects on heritage, landscape and biodiversity, although mitigation possible in places.</p> <p>A barrage to control the tidal range would result in some loss of mudflat habitat and mitigation would be required.</p>	Second most expensive
Increase Standard of Protection (1 in 300)	Option V - Flood barrier and western waterway.	Provide a flood tide barrier (advancing the line of defence) to increase the standard of protection to a minimum of 1 in 300 years and a channel linking the River Witham (via North Forty Foot Drain) to South Forty Foot Drain to the west of the town centre.	<p>Provides a significant contribution to reduction in frequency and severity of flood risk within Boston.</p> <p>Provides long term security of existing and future investments.</p> <p>Encourages long term investment opportunities.</p> <p>Provision of new recreational facilities.</p> <p>Improved access to wider waterway network.</p>	<p>Barrier may have some adverse effects on heritage or landscape, although mitigation possible through design.</p> <p>Significant land acquisition required.</p> <p>Channel bypasses the town centre therefore opportunities would be missed to encourage visitors to Boston.</p> <p>Disturbance of North Forty Foot Drain which is a designated site.</p>	Most expensive option
Increase Standard of Protection	Option VI – Multi-	Provide a flood tide barrier (advancing the line	Provides a significant contribution to reduction in frequency and severity of flood risk within	The barrier may have adverse effects on the landscape character and historic character of the study area,	Fourth most expensive (same

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Protection standard	Option	Description	Key Beneficial Effects	Key Adverse Effects	Cost (relative to the other options)
Protection (1 in 300)	purpose barrier and navigation link	of defence) to increase the standard of protection to a minimum of 1 in 300 years, combined with a partial exclusion barrage to control the tidal range within Boston, and a new lock through or adjacent to Black Sluice.	<p>Boston.</p> <p>Provides long term security of existing and future investments.</p> <p>Encourages long term investment opportunities.</p> <p>Approach would provide an important recreational resource.</p> <p>Would allow safe navigation of The Haven and wider waterway network.</p>	<p>although mitigation through good design is possible.</p> <p>A barrier to control the tidal range would result in some loss of mudflat habitat and mitigation would be required.</p>	cost as Option I and Option II)

Source: Mott MacDonald 2016 based on information from the Boston Combined Strategy 2008

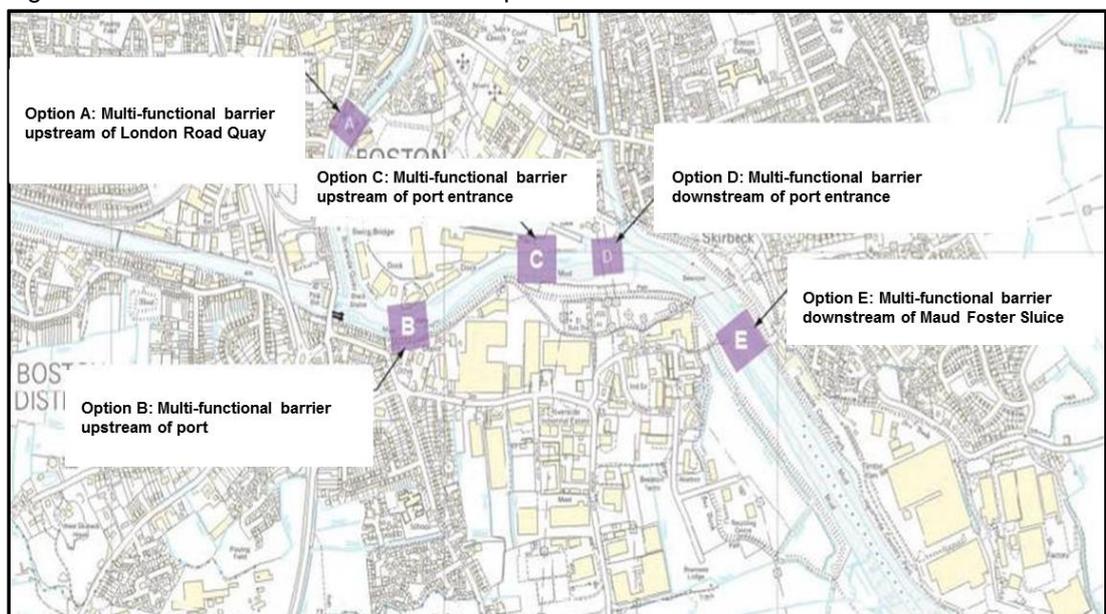
3.2.2 The preferred BCS strategic option was Option VI, namely a multi-functional barrier and navigation link. This option demonstrated the highest cost benefit ratio while achieving the required standard of protection which would reduce the severity of flood risk in Boston and encourage long term investment opportunities. Although potential environmental impacts were identified, it was considered that these could be mitigated.

3.3 Boston Project Appraisal Report (PAR)

3.3.1 Following the identification of the preferred strategic option, the Environment Agency appraised nine potential locations for the proposed barrier. Four of these options were discounted by the Environment Agency due to being costs being prohibitive or requiring additional work that was not actually required to deliver the Project objectives.

3.3.2 Five options were shortlisted for further detailed assessment. The five locations taken forward are shown on Figure 3.1.

Figure 3.1: Location of the five shortlist options



Source: Project Appraisal Report 2013

3.3.3 Following selection of the five shortlisted location options, a Public Open Forum was held in Boston in January 2010 to canvass the views of the local community. Members of the public indicated an overall preference for options further downstream, as they perceived that this would keep flood water furthest away from their homes. In fact, all options would provide the same level of protection from flood risk.

- 3.3.4 A key stakeholder workshop was then held on 4 March 2010 and wider consultation was also undertaken. The consultation resulted in options A and D being removed from the short list following identification of their unacceptability to key stakeholders and statutory consultees as follows:
- Option A was considered not to meet the navigation objectives of the Project, namely the provision of a safe navigation link between the Lower Witham and South Forty Foot Drain.
 - Option D was identified as having significant impacts on the operations of the PoB during and after construction.
- 3.3.5 Option E gave rise to similar concerns as Option D in terms of the effects it would have on the day to day business operations of the PoB. However, feedback received from the local community demonstrated a strong preference for Option E due to the perceived (but nonetheless misplaced) view that this would offer improved flood protection over other options. In view of this feedback, Option E was not discounted at this stage but instead it was taken forward for further appraisal alongside Options B and C.

3.4 Cost Benefit Analysis of B, C and E Options

- 3.4.1 A cost benefit appraisal was undertaken in respect of Options B, C, and E. All three options would provide the same flood risk benefits and therefore the appraisal focused on which option offered the most cost effective means of delivering those benefits.
- 3.4.2 Option B was identified as the most cost effective solution and was also identified as the option that minimised impacts on key stakeholders and facilitated the accommodation of the required mitigation measures. The appraisal took into account extensive consultation in reaching its conclusion.
- 3.4.3 The appraisal confirmed that Option E should be discounted on the same grounds as Option D, namely that it would give rise to significant impacts on the day to day business operations of the PoB. Further engagement with local residents was undertaken in order to address their misplaced perception that the location of the barrier affected their residual flood risk.
- 3.4.4 Option C, being further upstream, did not give rise to the same level of impact on the operations of PoB. However, it would have reduced quay space within the Port, thereby reducing or removing the availability of moorings that could otherwise have been made available to relocate smaller fishing vessels comprised of the Boston fishing fleet who currently operate from an existing quay located upstream from the proposed barrier. The construction of the barrier at the location identified as Option C and its regular operation to regulate water levels, as part of WLM as was originally proposed, would have obstructed their sailing routes and preclude opportunities to relocate them downstream of the barrier. A viable alternative relocation location was not identified in the Haven. As a result, Option C would have resulted in significant impacts to the Boston fishing fleet.

3.4.5 In contrast, it was identified that Option B would enable the Boston fishing fleet to be relocated immediately downstream of the Barrier and upstream of commercial port operations in the PoB. Option B was therefore selected as the preferred option for delivery of the Project.

3.4.6 As outlined in Section 1.3.8, WLM was subsequently removed from the scope of the Project and it is no longer necessary to relocate the Boston fishing fleet downstream of the barrier. However, aspirations remain to utilise the barrier to deliver WLM in the future. Accordingly, scheme options which were not progressed on the grounds that they would not facilitate WLM would preclude the delivery of WLM in the future. Accordingly, the removal of WLM has not changed the Agency’s preferred option for delivering the Project.

3.5 Design alterations after confirmation of preferred approach at scoping

3.5.1 In the period of time between the selection of the preferred location and the Updated Scoping Report (2014), Project design has undergone several changes (see Table 3.2). Importantly, until the Project reaches the completion of detailed design stage further changes may occur.

Table 3.2: Design changes post selection of preferred approach

Element	Changes made
Water Level Management	The Executive Committee of the County Council and the Environment Agency Boston Barrier Project Board confirmed removal of WLM from the scope of the Project. In making the decision, the Environment Agency, LCC and BBC confirmed that it remains the vision to provide WLM at a later date through a standalone project and consenting process. The Project has been designed not to compromise the introduction of WLM in the future.
Sheet piled provisions for a future Fish Pass	Following the removal of WLM from the scope of the Project, the requirement for a fish pass was no longer present. As the possibility of WLM remains at a later date, the construction plans will include an unanchored sheet pile structure to facilitate the future provision of a fish pass once anchorage has been installed.
Right bank – embedded sheet piling design	On the right bank, from the scour protection downstream towards the location adjacent to the WPD site, the right bank sheet piling design has been altered to retain the original sweeping bank morphology. Previously sheet piling was to be embedded into the front of the embankment, backfilled and a stepped aquatic margin emplaced; however, the new option is both preferential in terms of reduced environmental impact and cost to the Project. The piling will still require anchorage (see Section 2.6). This will reduce the impact of the construction on the townscape, heritage, visual amenity and ecology receptors.
Tie-in with Maud Foster Sluice	The concrete flood wall, which runs through the PoB at a height of 2m, has been designed to taper down into the sluice parapet. The height of the flood wall would be reduced by 1.4m over a 5m section so that it is the same height as the parapet, and by 0.63m, at the junction between the new wall and the parapet.
Sustainable infrastructure	The design will also incorporate LED lighting, a green ‘living’ roof, grey water reuse, solar panels and green car parking
Temporary relocation of the BDFA	During construction of the barrier, the BDFA would be temporarily relocated to the PoB quay side.
Temporary relocation of the Witham Sailing Club	During construction of the barrier, the Witham Sailing Club would be temporarily relocated downstream of the Project area.

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4 Design and Access Principles

4.1 Design

Introduction

- 4.1.1 The Environment Agency requires a simple low maintenance design that will work for 100 years. Like the totality of the Boston Barrier Tidal Project, the barrier and WDE control buildings need to promote environmental sustainability.
- 4.1.2 The barrier control building has been sited such that it meets both the operational needs of the Environment Agency as well as allowing for potential future public access to the area around it. Its position aligns with both the proposed flood walls and the barrier structure, and the control room office is situated so as to provide the required sightlines to the barrier structure and surrounding area.
- 4.1.3 The other elements of the Project have had their design determined by their function and to ensure the maximum longevity of their use. The junction between the wall and the Grade II listed Maud Foster Sluice has been designed to minimise the visual and physical impact on listed structure.

Location and context of Project area

- 4.1.4 The Haven runs through the Project area which is urban in character, low lying and flat. The exceptions include the flood embankments of the Haven, to the south of the PoB and to the east of the knuckle; which are higher elements in the townscape. The tidal mudflats within the Haven channel area are a constantly changing element in the townscape. They are exposed at low tide and covered by the incoming water at high tides.
- 4.1.5 Residential areas to the south include properties on Wyberton Low Road. Residential areas to the north-east on Rectory Road and Alfred Street are located below the flood embankments.
- 4.1.6 The Project area is characterised by industrial development on both sides of the Haven, with the substantial port buildings to the north and large-scale (commercial) developments, such as the industrial park on the right bank, to the south. There is little vegetation within the PoB Estate due to its industrial nature, aside from the row of trees and shrubs on the western edges of the PoB, on the riverbank and the small green area with vegetation by the entrance to the PoB.
- 4.1.7 The banks of the river are sparsely vegetated, with amenity grassland on the flood embankments and scattered shrubs and isolated semi-mature trees.
- 4.1.8 The industrialised setting has influenced the design and appearance of the Project as it's surrounded by industrial units and the PoB Estate, an operational port. . Were possible vegetation has been retained on the sweeping embankment on the right hand side of the

river, in order to soften the view, both from the Boston Public Footpath No.14 (Macmillan way) and the St Botolphs Church across the Haven to the barrier.

Architectural brief

- 4.1.9 Functionally, there are strict requirements for mechanical and electrical plant equipment that will service the barrier and WDE gate itself. The detail design will consider the options to make the barrier and WDE control buildings flood proof; however, currently the design indicates that all equipment in the barrier control building are located on the second floor, approximately 3m above ground level.
- 4.1.10 An upper level control room with critical lines of sight to the barrier would be required in the barrier control building. A minimum 180 degree vision would be provided upstream, downstream and to the barrier itself. Secondary, less critical sightlines would be required towards the WDE gate to the east.
- 4.1.11 Support facilities like a meeting area, kitchenette and WC, would be required for Environment Agency staff within the upper level of the barrier control building.

Design aspirations

- 4.1.12 The control buildings for the barrier and the WDE incorporate sustainability into the design, where possible. Sustainability in this context means the control buildings:
- Would be robust to withstand the open and exposed environment, and stand the test of time (minimum 100-year design life); and
 - Would be a carbon-zero building throughout operational life.

Design description

- 4.1.13 The siting of the barrier control building and the WDE control building are such that it meets the logistical needs of Environment Agency staff operating the barrier. The barrier control building and its geometry aligns with both the proposed flood wall and tidal barrier, becoming a focal point for navigation – by land and estuary. Clear sightlines and an open aspect are provided for so that safety and security is maximised around the building.
- 4.1.14 The barrier control building has distinct functions with the first floor of significantly smaller area than the ground floor. It will be a rectangular building with secondary flood protection to +7.55m AOD, with a green roof, photovoltaic (PV) solar panels, LED lighting and grey water recycling. The control building will be protected from flooding through the use of FloodProof doors and/or a raised floor level for the plant equipment.
- 4.1.15 The WDE control building will be a single storey rectangular building with secondary flood protection to +7.55m AOD. The control building will be protected from flooding through the use of FloodProof doors and/or a raised floor level for the plant equipment.

Materials

- 4.1.16 It is important to acknowledge the infrastructure and landscape components of the Project, so that a similar language of fabric and materials is employed.
- 4.1.17 The choice of structure, fabric and materials is governed by the need to attain a 100-year design life, balanced against the context of the development in the wider Project site and in line with best practice sustainable design. It is proposed that low embodied energy materials would be chosen for structural systems, fabric and finishes using recycled and locally sourced materials wherever possible.
- 4.1.18 The purpose built barrier has been designed with sustainable materials, ensuring longevity and quality. The barrier will be constructed from reinforced concrete and purpose treated steel. The tidal walls have been designed to complement the surrounding industrial area, and would be built from concrete and sheet piling. The barrier itself is designed out of concrete. The barrier would sit on the bed of the river for most of its life, and therefore has been designed to suit these conditions. Images of the barrier within the surrounding landscape can be seen in Plates 4.1 and 4.2. Plate 4.3 shows the view of the Boston Public Footpath No. 14 (Macmillan Way) from the left bank.
- 4.1.19 The barrier structure on the right bank will be protected by 1.8m high palisade security fencing (see Plate 4.1). This will provide added security and health and safety aspects.

Plate 4.1: Location of barrier structure with palisade security fencing



Source: Mott MacDonald 2016

Plate 4.2: Landscape surrounding barrier structure



Source: Mott MacDonald 2016

Plate 4.3: Landscape surrounding barrier structure



Source: Mott MacDonald 2016

- 4.1.20 The control building and WDE building that support the operation of the barrier would be subject to detailed design specification, and will be subject to approval by BBC in accordance with the planning conditions. At this stage the buildings have been designed to be constructed out of prefabricated GRP. The details of how the material of these buildings would be finished would be subject to approval by BBC. This would help to ensure that the buildings would fit into the industrial setting of the port and surrounding area, and contribute to a sustainable outcome for the Project.

Landscape design

- 4.1.21 Landscaping is proposed on the landward side of the right bank flood wall. The right bank landscape proposal follows the proposed flood wall route. The concept for the landscape design was inspired by the impounded old dock, its mechanical movement, strong sculptural structures and weathered materials. This influence has driven the selection of materials and layout.
- 4.1.22 The landscaping along the embankment is designed to integrate the industrial background with the environmentally sensitive river. The top of the embankment would be reinstated grass, reinforced to withstand light vehicle movement. The reinforcement of this area is vital for function of the surrounding industrial landscape, while the grass integrates this use with the natural environment.
- 4.1.23 The current footpath along the right bank would be reinstated, to allow the continued use of the area for recreational purposes. Following this footpath would be the concrete façade of the flood wall. Steps have been taken to reduce the impact of the proposed flood walls through design improvements, and thus the proposed façade will be ornamented with riverside scenes pending agreement with the heritage stakeholders. The scenes are inspired by natural riverside activity and feature seagulls, and reeds. The texture of the cement blends well with the surrounding industrial area, while the patterned sides facing the landscaped foot path softens this contrast for recreational users of the area.
- 4.1.24 Inland of the footpath, there will be a continuation of the influence of the natural environment, with reinstated grass reaching towards the industrial sites nearby. The area will be further gentrified with the planting of low shrubs on the right hand side of the Boston Public Footpath No.14 (Macmillan way).

Green Infrastructure

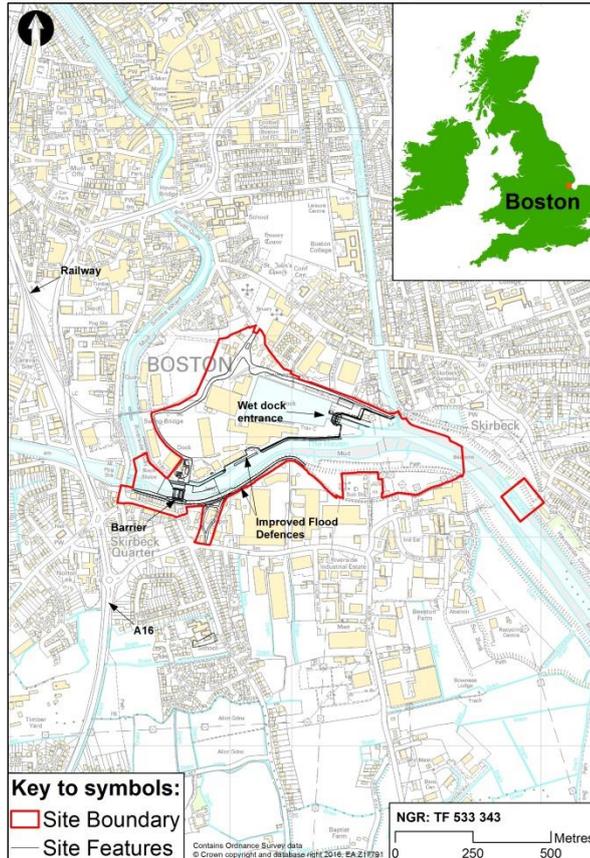
- 4.1.25 The Project will incorporate a number of green infrastructure components, in accordance with the Environment Agency's 2020 Sustainability Plan eMISSION. There will a green 'living' roof installed on the barrier control building. The design will also incorporate LED lighting, grey water reuse, solar panels and car parking. With the inclusion of green infrastructure components, the Project is in accordance with CEEQUAL principles. These design aspects are also in accordance with the NPPF's guidance for sustainable development, Paragraphs 11-14³.

³ National Planning Policy Framework 2012

4.2 Access

- 4.2.1 This section identifies the access proposals during both construction and operational phases of the Project and sets out the transport policy that has guided the mitigation techniques in relation to the Project. In support of this statement is the assessment of potential traffic and transport impacts that was undertaken as part of the EIA and reported in the ES (Volume 2d): Traffic and Transport Technical Report. The mitigation measures relating to access during both construction and operational phases of the Project have been developed in line with relevant national and local policy. A Construction Traffic Management Plan (CTMP) is also being provided to support the Project. The CTMP will detail the traffic plans for the construction phase of the project and will be adhered to as a requirement of the deemed planning consent by means of a compliance condition.
- 4.2.2 The A52 and the A16 form the primary routes through Boston. The A52 runs in a predominantly east to west direction and provides connections to the nearby towns of Grantham and Skegness. The A16 runs in a primarily north to south direction with links to Louth and Spalding. Both the A52 and A16 provide connections to the A17 which runs in an east to west direction to the south of the town providing wider access to East Anglia and the strategic road network at the A1, along with towns to the west including Sleaford, this is illustrated in Figure 4.1.

Figure 4.1: Location plan of the Project



Source: Mott MacDonald 2016

Construction access

- 4.2.3 Consideration has been given to the impact of construction traffic on access to surrounding businesses, properties and open space. Particular attention has been given to the potential increases in traffic volumes associated with construction and the associated impact on access and the perception of delay for these receptors. It is proposed that certain measures be implemented in order to prevent or reduce adverse effects. These are in line with relevant transport policy at both the national and local level as identified in the ES (Volume 2d): Traffic and Transport Technical Report. These considerations have formed the access routes and plans for the construction traffic of the Project.

Marine access

- 4.2.4 Barges will be required for the delivery of construction material to site, with up to 90% of construction material arriving by barge. Barges are also expected to be used during the dredging process of the Project to deposit material from the river onto the drying areas on

both sides of The Haven. This will work to minimise traffic impacts on local road users typically experienced with this type of development.

Mainland access

- 4.2.5 During construction HGV's can access the site from the North via the A16 and A1138 to gain access to the left bank construction compound or the South via A16 and Marsh Lane to gain access to the right bank construction compound. It is proposed that arrivals and departures to and from the site will generally be controlled by a Gateman, who will be able to hold vehicles within both site compounds to avoid conflicts with external traffic. The Environment Agency will work with the PoB to avoid conflict between Project HGVs and routine Port traffic. The proposed access routes for both the left and right bank construction compounds are illustrated on Figure 6.2 in Appendix A of this Report.

Dredging disposal

- 4.2.6 Disposal of dredged material out to sea, as defined by and in accordance with an appropriate Marine licence, would not be considered as an option.
- 4.2.7 Possible locations for treatment plant include vacant warehouse properties within PoB and nearby sites within the Project area with room for lagoons. Suitably treated and tested effluent from dewatering is expected to be discharged to the local sewer system, subject to discussions, approvals and monitoring requirements from the local utility provider.

Access to the left bank construction compounds

- 4.2.8 The main work compound for the works along the left bank is located within the PoB Estate. Access to this site will be achieved through St James Road, which is a private road leading to the gated PoB Estate. Vehicles associated with the construction of the Project will be able to obtain access through this gate. Consultation with the PoB Estate has been undertaken to ensure that this will be a suitable access route.
- 4.2.9 Access to the WDE entrance further downstream will also be achieved through the PoB Estate, with access through the same gate on St James Road.

Access to the right bank construction compounds

- 4.2.10 Vehicular access to the construction compound on the right bank is primarily via the A16 and Marsh Lane. There is a 7.5 tonne vehicle restriction in place along Wyberton Low Road, south of its junction with Marsh Lane which restricts access by goods vehicles from other directions. Marsh Lane provides access to a large industrial area to the south east and a number of HGVs were observed in this area.

- 4.2.11 Vehicular access between the left and right banks is via the A16 Spalding Road and the A16 John Adams Way Bridge.

Construction traffic movements

- 4.2.12 The total movement of traffic associated with the construction phase has been forecast and mitigation measures outlined to combat the potential impact of the construction traffic have been presented in the ES (Volume 2d): Traffic and Transport Technical Report. The proposed mitigation measures will prevent and/or reduce cumulative and in-combination effects associated with the Project. The mitigation for this phase of the Project ensure that access to and around the site are in accordance with the local and national policy (see the Planning Statement for specific policies).

- 4.2.13 A full review and update of the CTMP will be submitted to and approved in writing by the Local Planning Authority prior to any work commencing on site. The CTMP will be required by the appointed contractor prior to commencement on site. If any modifications or diversions are required to the highway, PROW and access routes during the construction phase, they will be returned to their existing condition or improved upon completion of the Project.

Operational access

- 4.2.14 Vehicle access to the control buildings on the left bank will remain through the PoB Estate. Consultations have led to an agreement in principle between the Environment Agency and PoB Estate, to allow access for Environment Agency vehicles.
- 4.2.15 Consultation continues with BBC in regards to the access via Boston Public Footpath No.14 (Macmillan Way). Following the completion of the works to the right bank, a permanent access route will be made available along Boston Public Footpath No.14 (Macmillan Way). This will include the alteration or removal of the bollards currently placed at the roadside access point. The change of these bollards will enable wheelchair users to access Boston Public Footpath No.14 (Macmillan Way). This access route will be further reinforced to facilitate access by small vehicles, to maintain the flood embankment and barrier.
- 4.2.16 Once the construction and commissioning phases are complete, the site will begin its operation, with vehicles only attending for routine maintenance checks once a month. It is concluded that with the proposed mitigation the Project will have no significant residual effects resulting from traffic and transport impacts. This is further detailed in the ES (Volume 2d): Traffic and Transport Technical Report

4.3 Lighting

- 4.3.1 A comprehensive Lighting Statement has been developed for the site, and surrounding landscaping to support the ES (see ES (Volume 2a): Landscape and Visual Impact

Assessment Technical Report; Appendix C; Lighting Statement). Lighting objectives were set, and recommendations and requirements for lighting have been established.

- 4.3.2 External permeant lighting would be installed in the following locations:
- Control building – entrance and surrounding perimeter, including the proposed HGV layby and car park areas;
 - WDE control building;
 - Barrier structure – perimeter lighting to allow operation and maintenance works;
 - WDE;
 - Key areas within PoB not currently covered by lighting; and
 - The Barrier gate and WDE gate would have lighting to inform river users of barrier movement and closure.
- 4.3.3 For the loading bay, storage area, loading area, HGV laybys, barrier area and WDE it is proposed to use column mounted floodlights. Twelve metre tall columns would be appropriate to achieve the required spread of light and limit the shadowing effect from obstructions. The existing floodlighting columns on the PoB site approximately range in height from 12m to 20m.
- 4.3.4 Eight metre street lighting columns are proposed for the car parking area where insufficient illumination is provided by the existing floodlighting. All columns should be hinged so that they can be folded down for maintenance. Additionally, bulkhead luminaires will be provided adjacent to the entry/exit doors of the control building. They will have integral batteries for back-up in the event of power failure.
- 4.3.5 The selection and positioning of luminaires will be such that excessive glare is avoided. This is particularly important where it will be necessary for workers to look above the horizontal plane, for example where Lorries may be loaded and unloaded.
- 4.3.6 The floodlights and street lighting will use high-pressure sodium lamps and the bulkheads compact fluorescent lamps, all with high-frequency control gear.
- 4.3.7 Further lighting requirements for the construction period will be developed by the contractor once appointed; however it is anticipated that the current lighting on the PoB Estate/Marsh Compound will be sufficient.

5 Conclusions

- 5.1.1 The design and access principles, as detailed in Section 4 of this Report, outline the design of the Project and provide information on the proposed design and access for the Project. The elements of the Project have had their design determined by their function and to ensure the maximum longevity of their use. Where appropriate, sustainable design components have been included, these are detailed within Section 4.1 of this Report.
- 5.1.2 Whilst the siting and scale of the Project is largely dictated by engineering considerations, they have also been influenced by the surrounding environment within which the Project is sited. As such, the proposal is considered to accord with acknowledged Design and Access requirements as set out in Article 9 of the Town and Country Planning (Development Management Procedure)(England) Order 2015.

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6 Abbreviations

Abbreviation	Definition
BBC	Boston Borough Council
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
EA	Environment Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
LCC	Lincolnshire County Council
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
PoB	Port of Boston
PROW	Public Right of Way
PS	Planning Statement
SFFD	South Forty Foot Drain
SI	Statutory Instrument
TWAO	Transport and Works Act Order
WDE	Wet Dock Entrance
WLM	Water Level Management
WPD	Western Power Distribution

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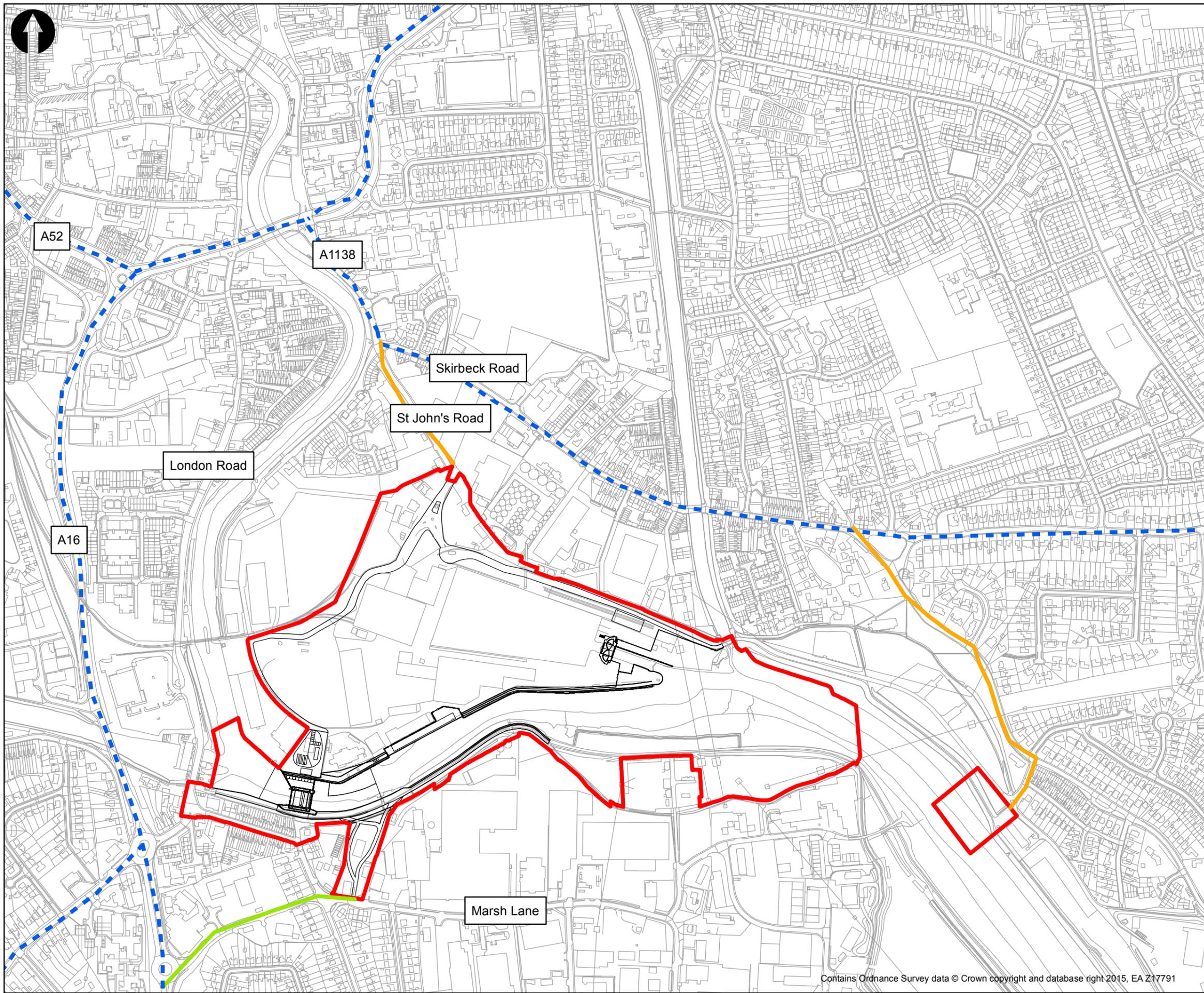
Appendices

A. Construction Traffic Routes _____ 41

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A. Construction Traffic Routes

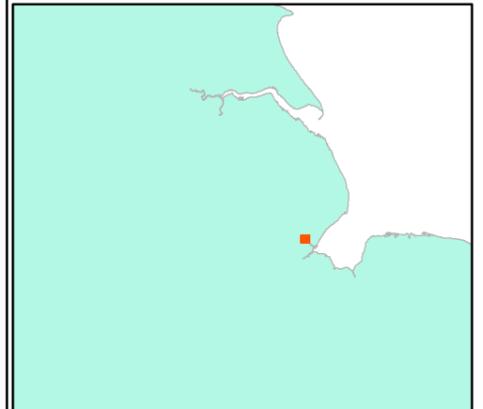
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Key to Symbols

- - - Access to both banks
- Left bank access
- Right bank access
- Site Application Boundary
- Site features

Key Plan



PO	04/08/16	LS	Draft	KC	EL
Rev	Date	Drawn	Description	Ch'k'd	App'd


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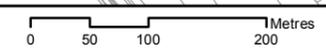
Client

Environment Agency

Title
**Boston Barrier Project
 Construction Traffic Access Route:
 Figure 5.2**

Designed	-	ENV Check	T Stirling
Drawn	LS	Coordinated	G Hughes
GIS Check	KC	Approved	E Lunt
Scale at A3	Status	Rev	
1:6,000	PRE	P0	

Figure Number **IMAN001472-CTR-FIG-532**



Boston Barrier Tidal Project
A13 – Design and Access Statement

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