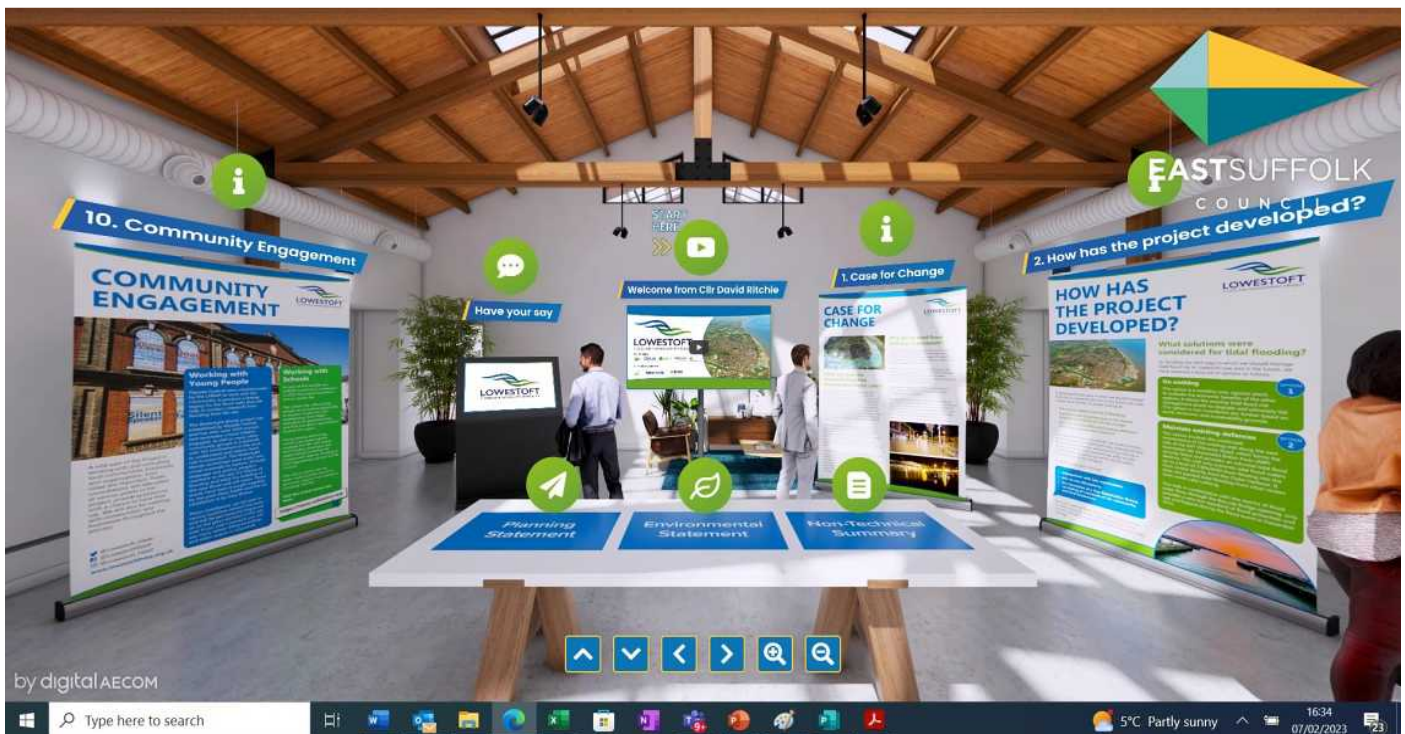




Appendix 4. Consultation materials



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2016 Consultation Materials

How will we pay for future defences?

To do any works to carry out the Strategy will rely on availability of funds. Some funding is available from central government, this is known as 'Flood Defence Grant in Aid' or 'FDGiA'.

The amount of money the government contributes depends upon the number of households and other assets, such as businesses, being protected.

1 Gorleston

£8 to 10 million, including works to protect the southern boundary, with £5 to 6 million spend on construction work in the first 10 to 20 years

2 Corton

Up to £20 million to defend Corton and prevent outflanking, with most of that for construction work over the next 10 to 20 years

3 Hopton to Corton

Around £5 million (works to construct hard points within next 10 years)

4 Hopton

£6 to 7 million costs over next 100 years, with around £2 to 3 million spend in the first 10 to 20 years for works to address potential outflanking

5 Gorleston to Hopton

Around £4 million (for works to construct hard points within the next 10 years)

6 Gunton Warren

Less than £0.3 million for removal of failed groyne components

7 Lowestoft North Denes

Around £30 to 35 million in total to improve the seawall, with £20 to 30 million of that in the first 20 years

8 Lowestoft Ness

Around £7 to 8 million costs for remedial works, with an estimated £2 to 3 million of that in the first 10 to 20 years

How will we pay for future defences?

Along this Strategy coastline it is unlikely that we will be given full funding from Flood Defence Grant in Aid. But it is possible that projects may qualify for partial funding and still go ahead in time if other funding can be found to meet the remainder of the cost. So we have been looking at ways that we can find funding from others in order to pay for future works. An important next stage will be to secure funding for projects.

Pakefield south

Up to £3 million costs if any works south of present defences are required

Pakefield north

Between £2 and 9 million depending upon beach behaviour and the need for new structures to be built

Lowestoft South Beach (South)

Between £3 and 9 million, depending upon beach behaviour and whether we need new groynes

Lowestoft South beach (North)

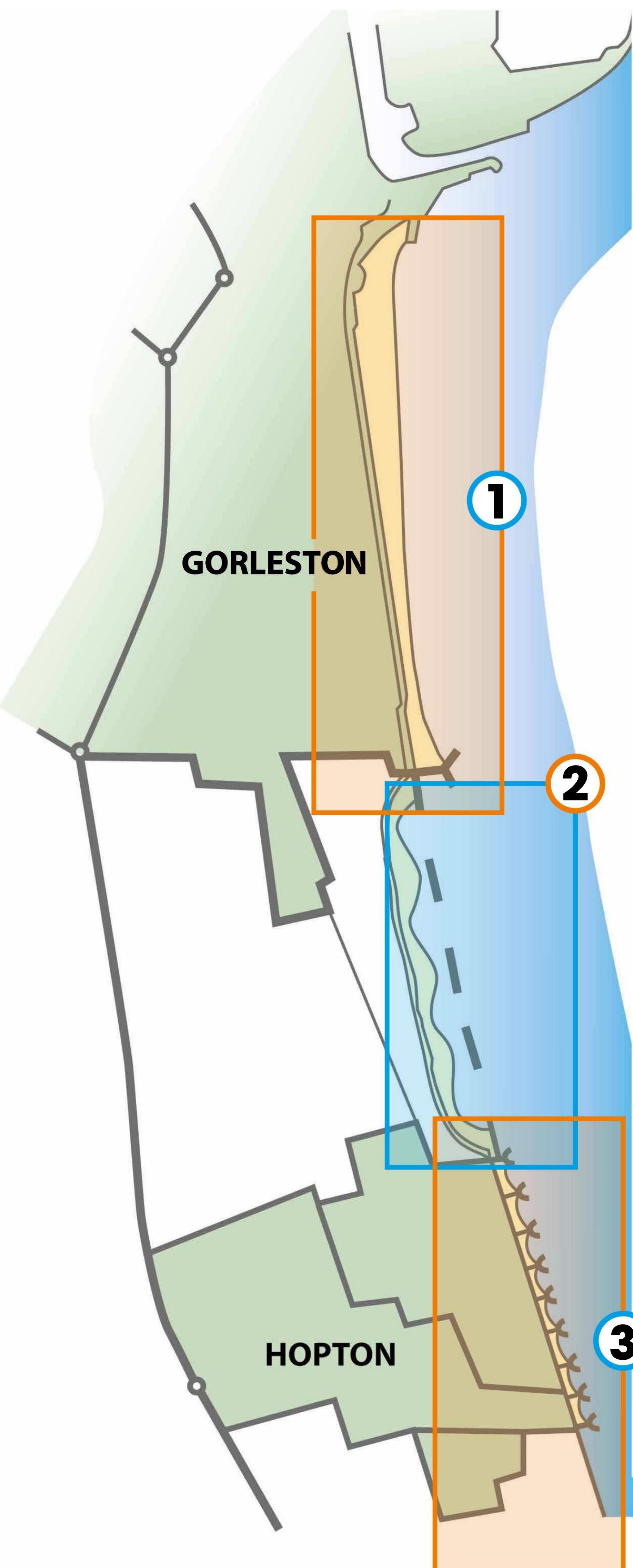
Between £2 and 9 million costs over the next 100 years, depending upon beach behaviour and the need to do further works

Lowestoft Harbour

Costs for the flood protection scheme are being determined by the Lowestoft Tidal Defence Scheme



What will the strategy mean?



Gorleston 1

The beaches are in a good condition, but we may need to do works in the future. The timing of these will depend on how the beach changes but we do not expect the seawalls to be at risk within the next 10 years.

If the beach starts to deteriorate, we think that the best option is to construct a headland structure at the southern end of Gorleston. This will stabilise the beach along the southern end of the Gorleston seawall, where the beach is most narrow at the moment. It will also protect the end of the seawall and protect properties behind from erosion.

We will monitor the beaches to decide when best to do these works, to secure the future of Gorleston and the communities and businesses it supports.

Gorleston to Hopton 2

Beaches along this stretch have been narrowing, particularly to the south and the current alignment of this frontage is not sustainable.

Our preferred approach is to create a series of hard points, which will (1) reduce the rate of cliff erosion and land loss (2) encourage the development of safe and accessible beaches. We would construct these by placing rocks over sections of the existing defences to create a series of 'rock bunds'. We would then remove the intervening sections of defence.

This approach will require private investment. If this is not available, we recommend a programme of monitoring, regular liaison with the Golf Club and removal of failed defences as funds permit.

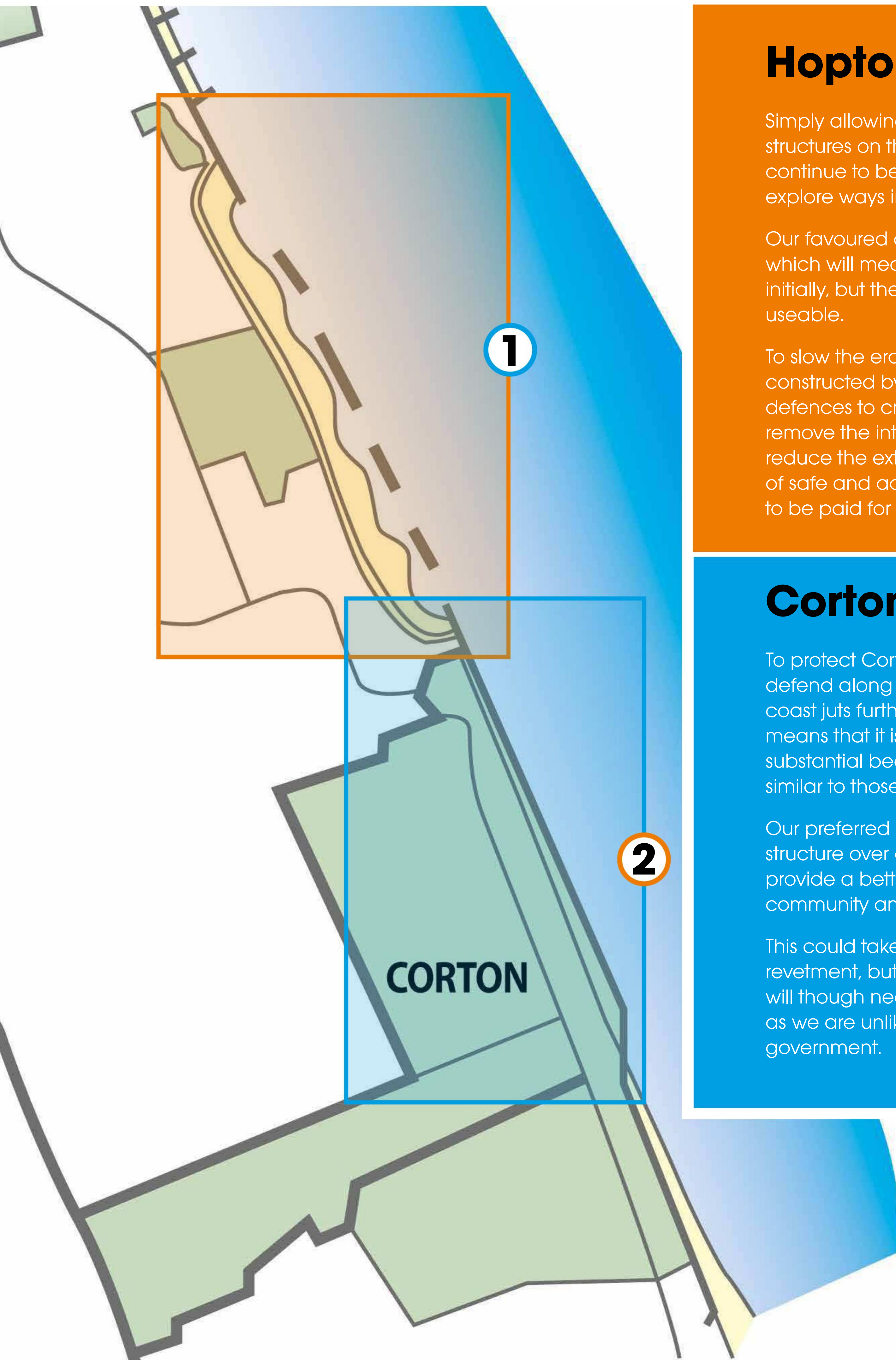
Hopton 3

New coastal defence works were constructed in 2014 and plans to extend with similar works southwards to the district boundary have been recently approved and are expected to be built during 2016.

The preferred option can therefore be achieved through maintaining and minor repair works to the defences. It is unlikely that such works would attract any government funds, so maintenance and repairs would need to be undertaken privately.

The Strategy for the frontages to the north and south is to allow some coastal realignment, so some additional works will be required to ensure that the defences along this section are not eroded from behind. We will need to update the Shoreline Management Plan.

What will the strategy mean?



Hopton to Corton 1

Simply allowing defences to fail and remain as derelict structures on the foreshore means that the beaches will continue to be inaccessible. There are also opportunities to explore ways in which the beaches can be improved.

Our favoured option is to remove the failing defences, which will mean that the rate of cliff erosion will increase initially, but the beach area could become accessible and useable.

To slow the erosion a series of hard points could be constructed by placing rocks over sections of the existing defences to create a series of 'rock bunds'. We would then remove the intervening sections of defence. These should reduce the extent of land loss and promote development of safe and accessible beaches. Such works would need to be paid for privately.

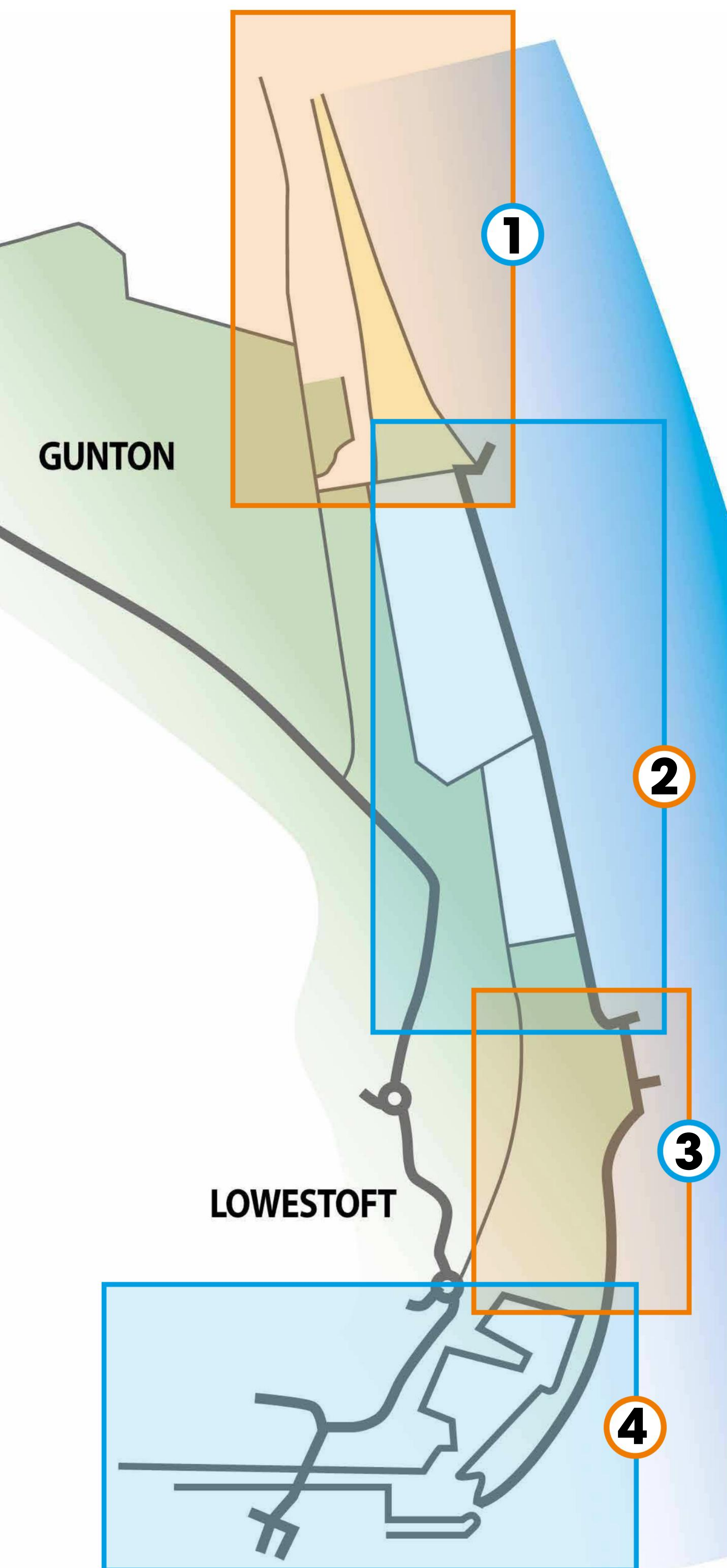
Corton 2

To protect Corton as it is, we will need to continue to defend along the current defence line. This part of the coast juts further out to sea than adjacent sections. This means that it is more exposed and it is unlikely that a substantial beach could form, even if we built structures similar to those at Hopton.

Our preferred approach is to build a more substantial structure over and above the existing wall. This would provide a better, longer term protection to the coastal community and businesses.

This could take the form of a new seawall or rock revetment, but this will be decided at a later stage. We will though need to find funding to carry out these works as we are unlikely to gain significant funds from central government.

What will the strategy mean?



Gunton Warren 1

At the moment there is a wide sand-shingle beach that provides the main defence along this frontage.

Slumping of the cliffs at the back of the beach is currently an issue. This is due to drainage issues within the cliff face and is not something that can be addressed through coastal defence works. We therefore plan to investigate this problem further, separate to this Strategy.

There is no need for us to do major coastal works along this frontage in the foreseeable future. There are remains of old groynes along the beach and we do intend to remove these if we need to, to ensure the beach remains safe. If beach levels do start to change we may need to look at measures to prevent erosion of the cliffs, but we don't think this will be necessary within the next few decades.

Lowestoft North Denes 2

It is very unlikely that a beach would return along this frontage as it is too exposed. We also expect that the narrow beach along the northern end of the frontage will diminish further. As well as protecting properties and leisure amenities, the current seawall also prevents exposure of an old municipal dump site that is buried beneath the Denes.

We are looking at improving the existing seawall, by constructing a full height rock revetment in front of the seawall, like at Ness Point, with a low level wall along the foot of the promenade. This will protect assets inland and make the promenade safer for users.

We are also looking at constructing a headland structure at the end of North Denes seawall. This will both reduce the risk of local erosion here and help stabilise the beaches along Gunton Warren.

Lowestoft Ness 3

The existing defences are substantial, but we know we need to replace the steel sheet piling that runs behind the rock work in the coming years. We also need to refurbish or replace the steel in the sewer outfall.

If we don't do these works the seawall will be at risk. But we can do this work in phases.

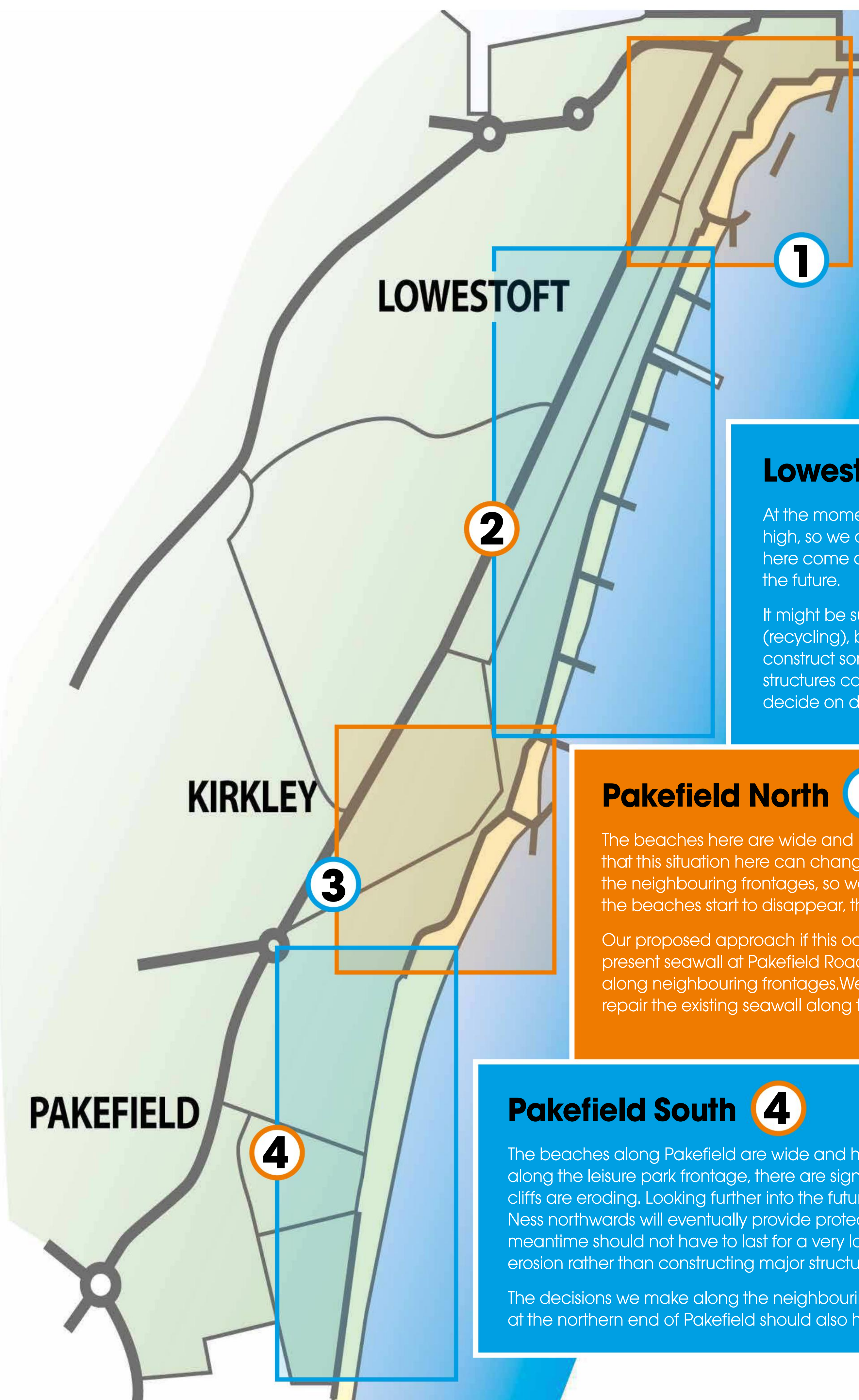
There is also an opportunity for enhancements in this area such as constructing a low wall or hand railing to improve safe public access. These details will be considered when works are designed.

Lowestoft Harbour 4

The Harbour and associated structures are owned and maintained by Associated British Ports (ABP), who would be responsible for any future works. Associated British Ports have confirmed that their intention is to maintain the current line of the existing structures.

The Lowestoft Tidal Defence Scheme is developing a flood protection scheme designed to protect residential and commercial properties within Lowestoft from the combined effects of tidal, fluvial and surface water flooding.

What will the strategy mean?



Lowestoft South Beach (North) 1

The beach is a key asset of our frontage at Lowestoft, but it is also important as part of our coastal defences. So we want to have a good beach along the frontage. Recent low beach levels here (north of Triton Statue) led to us undertaking urgent work to help protect the seawall and to make improvements to this end of South Beach.

But it is possible that this beach will not get any better, so we are considering future additional structures to hold a larger beach if necessary, such as a headland rock groyne or additional shore-parallel rock structures. We will also need to improve the stability and effectiveness of the spur breakwater.

Lowestoft South Beach (South) 2

At the moment the beaches south of Triton Statue are generally wide and high, so we don't need to do anything at this stage. But we know that beaches here come and go, so we have considered what works might be needed in the future.

It might be sufficient to simply move sand from one area to another (recycling), but if beach levels drop significantly it is likely that we will need to construct some structures to help trap material in front of the seawalls. Possible structures could include timber or rock groynes, but we will only need to decide on details when we design the scheme.

Pakefield North 3

The beaches here are wide and high and protect the seawall. But we know from past experience that this situation here can change rapidly. Any work we do here will affect what happens along the neighbouring frontages, so we need to think about the Lowestoft frontage as a whole. Should the beaches start to disappear, this would threaten the stability of the seawalls.

Our proposed approach if this occurs is to build a structure that would extend seaward of the present seawall at Pakefield Road. This would both protect this area and help to hold the beach along neighbouring frontages. We might also need to do short term works to bolster or patch and repair the existing seawall along the southern end of this frontage, should the beach diminish.

Pakefield South 4

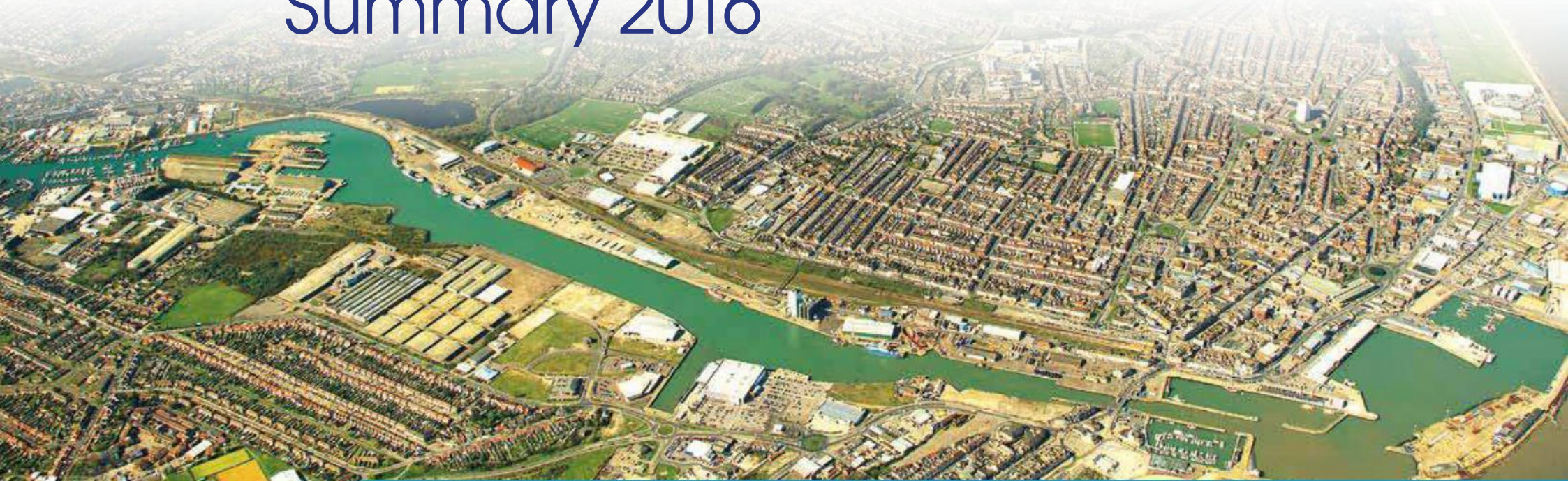
The beaches along Pakefield are wide and high at the moment and protect this frontage. But to the south, along the leisure park frontage, there are signs that the beach is starting to disappear and the neighbouring cliffs are eroding. Looking further into the future, we anticipate that the continued movement of Benacre Ness northwards will eventually provide protection to Pakefield. This means that any work we do in the meantime should not have to last for a very long time and so we recommend low cost measures to reduce erosion rather than constructing major structures.

The decisions we make along the neighbouring seafront will affect this frontage. Construction of a headland at the northern end of Pakefield should also help us to hold a beach here.

Lowestoft

FLOOD RISK MANAGEMENT STRATEGY

Summary 2016



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Introduction

This Strategy Summary Document is a brief overview of the Strategy for managing the risk of flooding to Lowestoft from the sea, rivers and extreme rainfall. More information can be found by visiting our website [**www.lowestoffrmp.org.uk**](http://www.lowestoffrmp.org.uk)

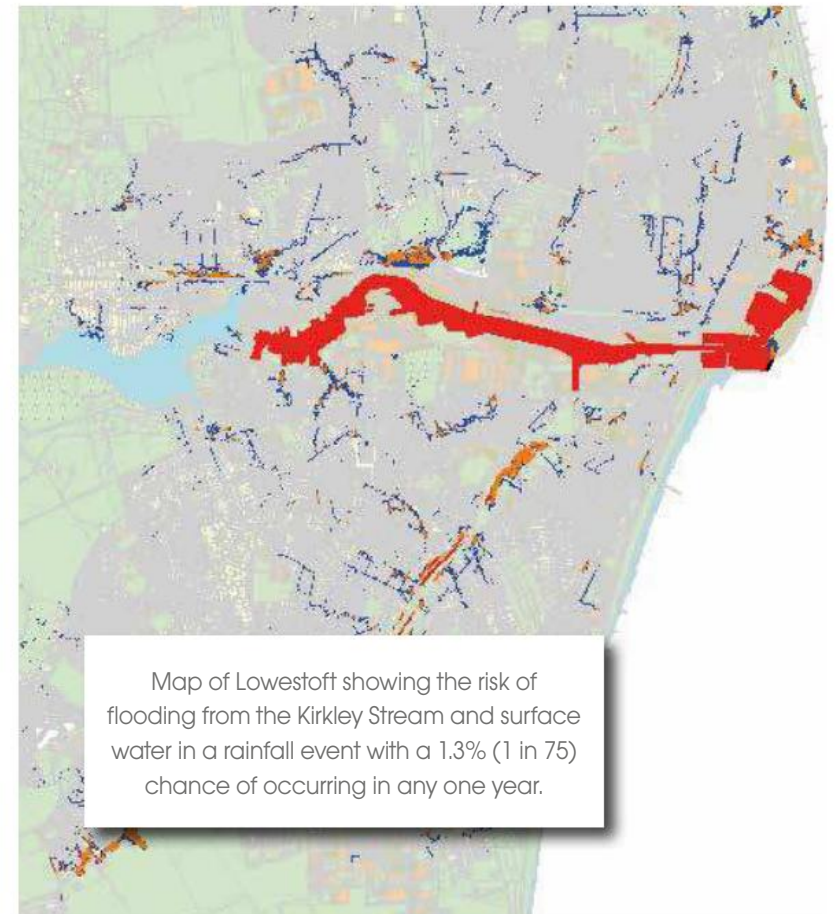
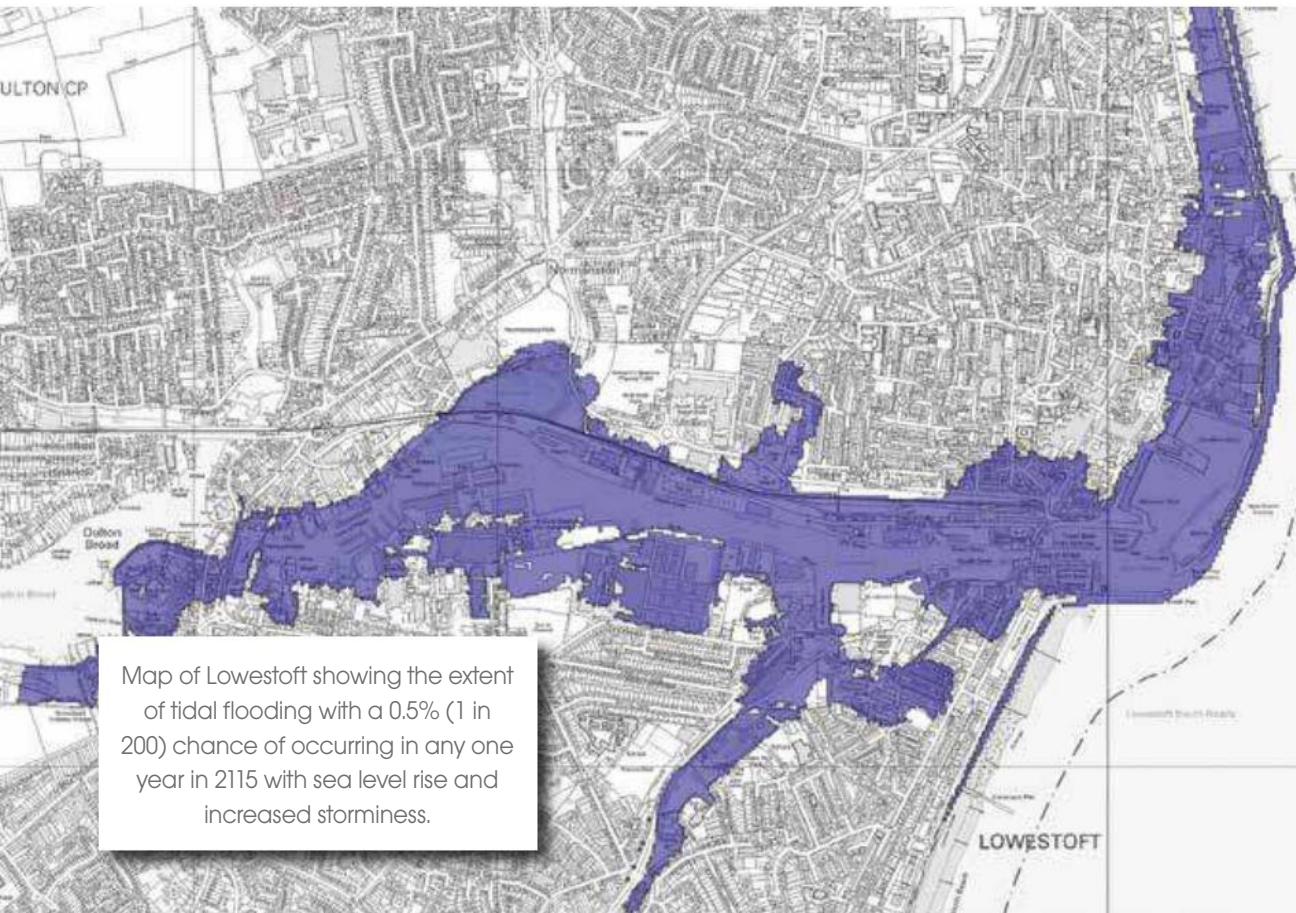


What area does the Strategy cover?

This Strategy covers the areas of Lowestoft deemed to be at significant risk from tidal flooding between the Outer Harbour and the western end of Lake Lothing at Mutford Lock; from river flooding along Kirkley Stream, and from surface water flooding both adjacent to Kirkley Stream and other key areas identified to the north and south of Lake Lothing.

The main risk from tidal flooding is from the sea caused by a tidal surge that develops in the North Sea along the eastern coastline of the United Kingdom as was demonstrated by the events in 1953 and most recently in December 2013. Lowestoft has very limited existing tidal flood defences and without further investment, the town will remain at significant risk.

The risk from river flooding was demonstrated by the event last July 2015 along Kirkley Stream. The risk of surface water flooding from extreme rainfall events has been considered within a number of local flood risk zones. In both cases it is important to consider the zone or area that contributes to the flood risk rather than a specific location where the flooding occurs.



Why do we need a Strategy?

The December 2013 tidal surge flood event which resulted in over 160 properties being affected and business brought to a standstill, highlighted the inadequacy of Lowestoft's flood defences and the impact it has on existing and potential growth for the town.

This was further reinforced by the flooding in the Kirkley area of Lowestoft in July 2015 following an extreme

rainfall event. This demonstrated Lowestoft's vulnerability to all forms of flooding from the sea, rivers and extreme rainfall.

Solutions are needed to address all these forms of flooding to offer the best possible flood risk management for Lowestoft.

Lowestoft has very limited existing flood defences and, without further investment, there is a risk that the instances of flooding will increase as the impacts of climate change increase. Unless we act there is a risk that in the future losses to property and businesses from flooding within Lowestoft will become unsustainable and will prevent any future growth.

We need a Strategy so that we can gain approval from the government for the schemes and help secure public grant aid monies to contribute to the cost of the flood risk management solutions. The Strategy will also feed into our local plans.

This Strategy forms the first step in setting out our future approach to managing this flood risk. In making decisions about this, we need to consider how our actions in one area could affect another and also make sure that choices we make now will not have a negative impact on our long term plans.

Following on from this Strategy there will be a number of activities before any schemes can take place. These will include detailed appraisal of the options, confirming funding sources and planning.



How has the strategy been developed?

In deciding the best ways in which we should manage flood risk in Lowestoft now and in the future, we have carried out a number of studies looking at:

- the current extent and risk of flooding
- how flood risk could increase in the future through the impacts of climate change
- the costs and benefits of providing different flood risk management solutions

To ensure that impacts to people, the local economy and the environment have been fully understood and taken into consideration, everyone living, visiting or working on or around Lowestoft has been invited to take part in determining how flood risk within Lowestoft should be managed.



To date this has been through:

- engagement with key stakeholders
- one-to one discussions
- the formation of a Project Advisory Group, consisting of members of the community and local businesses.

We have used the feedback from this consultation to make decisions on the best approach and the options that are proposed to be taken forward in the strategy.

How will we pay for future defences?

To undertake any works identified within the Strategy it will rely on the availability of funds. Some funding is available from central government - this is known as 'Flood Defence Grant in Aid' or 'FDGiA'.

The amount of money the government contributes depends upon the number of households and other assets, such as businesses, being protected.

For Lowestoft it is unlikely that we will be given full funding from Flood Defence Grant in Aid. But it is possible that projects may qualify for partial funding and still go ahead in time if other funding can be found to meet the remainder of the cost.

So we have been looking at ways that we can find funding from others in order to pay for works now and in the future.

How does this strategy tie-in with the the Gorleston to Lowestoft coastal strategy?

This strategy abuts and overlaps in some areas with the Gorleston to Lowestoft Coastal Strategy which is considering the shoreline and coastal defences.

Due to these overlaps both strategies are being consulted on together and will seek approval with the Environment Agency and Defra at the same time.



What strategic flood risk management solutions have been considered for tidal flooding?

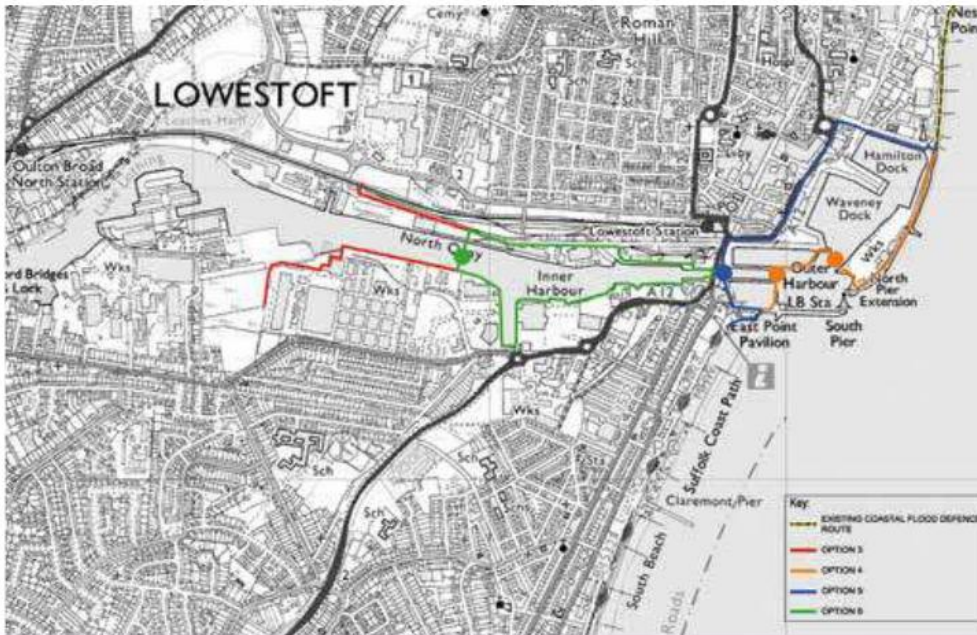
In deciding the best ways in which we should manage tidal flood risk in Lowestoft now and in the future, we have assessed a long list of options as follows:

- Do nothing (Option 1)
- Maintain existing defences (Option 2)
- Improve - defence raising – walls only (Option 3)
- Improve - defence raising – walls combined with a barrier
 - 3 barrier locations considered
- Outer Harbour (Option 4)
- seaward of Bascule Bridge (Options 5)
- within Lake Lothing combined with 3rd crossing (Option 6)

What criteria have been used to assess the strategic flood risk management solutions considered?

In assessing the possible options the following criteria have been used to decide which of those solutions offer the best with ways to manage tidal flood risk in Lowestoft now and in the future:

- Level of flood risk reduction
- Impact on navigation
- Impact on residents and businesses
- Environmental and landscape impact
- Impact on highways and bridges
- Buildability
- Delivery timescale
- Cost – capital and whole life
- Potential regeneration benefits
- Potential benefits linked with 3rd Crossing project



Tidal flood risk management options

Option 1 Do nothing

This option is a baseline only against which to evaluate the economic benefits of the other options. It allows the existing tidal flood risk management assets to degrade and ultimately fail.

This option is not considered any further based on social, economic and sustainability grounds.

Option 2 Do minimum - maintain

This option involves the continued maintenance of the existing wall along the east side of the A12 Waveney Road, which forms the foundation for ABP's security fence and provides an informal tidal flood defence. This wall only prevents tidal flood waters up to a level



of 2.90m AOD from flowing into the town centre directly from the Outer Harbour. It does not prevent tidal flooding from other routes from inside Lake Lothing.

This wall, in combination with the restrict of flood water flows through the Bascule Bridge opening, only provides a very low standard of flood protection (7) and was overtopped during the flood event in December 2013.

Option 3 Improve – Flood walls only

This option involves the construction of 5km of flood walls to the north and south of Lake Lothing, as well as in front of the Royal Norfolk & Suffolk Yacht Club to the south and along the perimeter of the Outer Harbour to

the north where it ties in with the existing coastal flood defences at the north-east corner of Hamilton Dock.

The flood defence wall on the north side of Lake Lothing would need to tie into high ground at its western end. This can only be achieved by either a flood gate across the dual Norwich to Lowestoft railway line near the Peto Way/Barnards Way roundabout or by a further 750m of wall construction to the west. On the south side the wall would need to tie into high ground at its western end close to Waveney Drive.

There would be numerous floodgates, especially on the north side, to allow access to the port quayside area in front of it. The walls between 0.4m and 1.7m in height would also be crossed by a significant number of drainage outfalls.



Option 4

Improve – Outer Harbour barriers & walls

This option involves the construction of the barrier across the channel entrance to Lake Lothing on the seaward side of the Bascule Bridge as well as another barrier at the entrance to the Outer Harbour.

It involves the construction of 0.7km of floodwall which ties into the same point of high ground to the south as per the other improve options as well as to the harbor sea wall to the north.

The number of floodgates required and the number of drainage outfall crossings would be minimal in comparison to all the other improve options considered. This option was considered to understand if there would be any benefit to the Outer Harbour area and the key businesses that operate in that area.



Option 5

Improve – Bascule Bridge barrier & walls

This option involves the construction of the barrier across the channel entrance to Lake Lothing on the seaward side of the Bascule Bridge.

It involves the construction of 1.5km of floodwall along the same alignment as Option 3 but the floodwalls would tie into the barrier structure rather than continue further west within Lake Lothing to tie into high ground.

The height of the floodwalls would vary between 0.4m and 1.7m. The number of floodgates required and the number of drainage outfall crossings would be significantly less than those for Options 3 and 6.



Option 6 Improve – 3rd Crossing barrier & walls

This option involves the construction of the barrier across Lake Lothing adjacent to the Riverside Business Park at the proposed location for the 3rd Bridge Crossing to consider whether there were any benefits from that joint construction.

It involves the construction of 3.7km of floodwall along the same alignment as Option 3 but the floodwalls would tie into the barrier structure rather than continue further west and tie into high ground at the north-west and south-west ends.

As for Option 3 there would be numerous floodgates, especially on the north side, to allow access to the port quayside area in front of it. The walls would also be crossed by a significant number of drainage outfalls.

What could the barrier structure look like?



What could the flood walls and gates look like?



Assessment of the tidal flood risk options considered

Option 1 **Do nothing**

This option is a baseline against which to evaluate the economic benefits of the other options. It allows the existing tidal flood risk management assets to degrade and ultimately fail.
This option is not considered any further based on social, economic and sustainability grounds.

Option 2 **Maintain**

Does not offer credible standard of flood protection
Not sustainable as it relies on third party structures which are not formal flood defence assets

Option 3 **Improve – Flood walls only**

Estimated cost = £28million
Significant impact and constraints imposed on land based port operations especially within Lake Lothing
Does not reduce flood risk to properties at western end of Lake Lothing
Buildability and operational issues with flood gate across railway line
Resiliency of defences compromised by large number of flood gates and drainage outfalls

Option 4 **Improve – Outer Harbour barriers**

Estimated cost = £55million
Significant impact on port operations
Buildability issues with construction of two barriers affecting entrances to both Lake Lothing and Outer Harbour at the same time
Compromises Outer Harbour designation as “safe haven”

Option 5 **Improve – Bascule Bridge barrier**

Estimated cost = £17million
Least impact on port operations
Disruption to navigation during construction of barrier across Lake Lothing entrance
Benefits from integrating with Bascule Bridge control facility and mechanical stand-by plant

Option 6 **Improve – 3rd Crossing barrier**

Estimated cost = £52million
Significant impact on port operations and navigation within Lake Lothing
Resiliency of defences compromised by large number of flood gates and drainage outfalls
Potential cost benefit from joint construction offset by traffic and other impacts

What strategic flood risk management solutions have been considered for river and surface water flooding?

In deciding the best ways in which we should manage river (fluvial) and surface water (pluvial) flood risk in Lowestoft now and in the future, we have assessed a long list of options. To date we have only looked at one rainfall scenario – that with a 1.3% or 1 in 75 chance of occurring in any one year. This gives us a guide as to which options might be worth considering further.

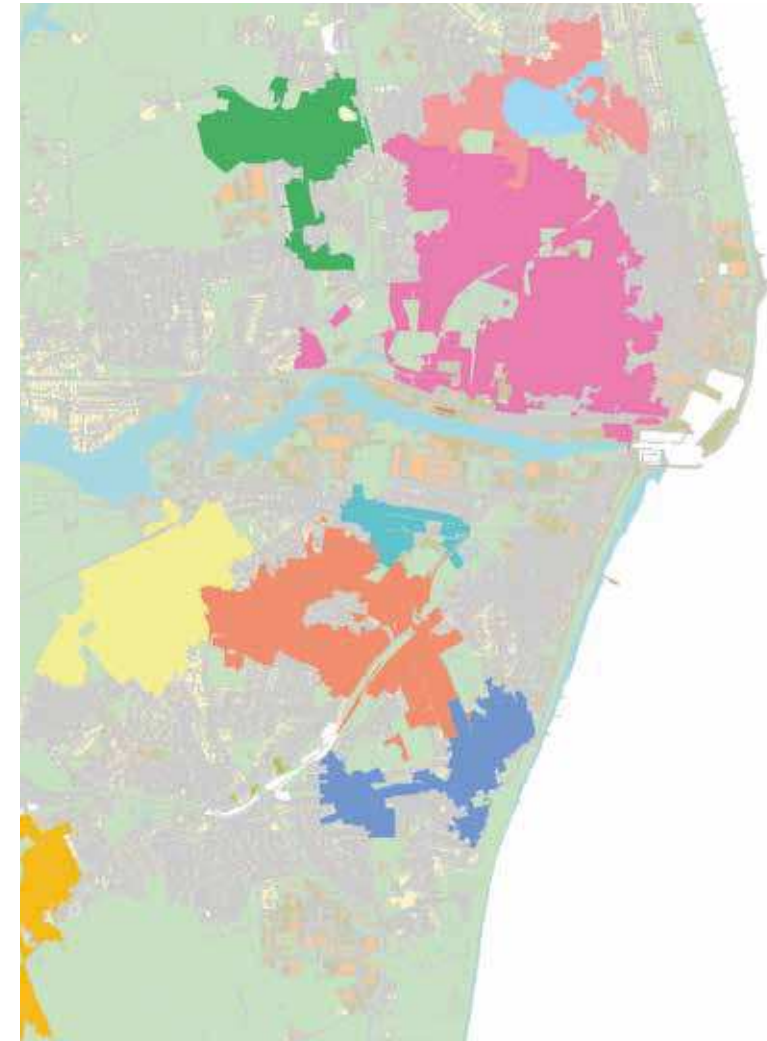
What criteria have been used to assess the strategic flood risk management solutions considered?

In assessing the possible options the following criteria have been used to decide which of those solutions offer the best ways in which we should manage flood risk in Lowestoft now and in the future:

- Level of flood risk reduction
- Impact on residents and businesses
- Local acceptability and availability of land
- Environmental and landscape benefits and impact
- Impact on highways and bridges
- Buildability
- Delivery timescale
- Cost – capital and whole life
- Potential regeneration benefits

Surface water management using sustainable drainage systems

The risk of surface water flooding depends on a complex interaction between the quantity of rain, where it falls, the topography, the amount of permeable land and the drainage systems. One of the key ways to manage surface water flooding is to work with nature, increasing the area of permeable land and places where water can naturally be held or stored. This is known as Sustainable Drainage and is the strategic option being considered in all areas. The location of sustainable drainage options will be targeted within the zones that contribute to the flood risk and can include a wide range of different measures.



Map of target area reduction zones

At this stage we are starting to consider which combination of sustainable drainage features are likely to be the most technically effective in reducing flood risk in each target zone. The range of such features is illustrated below. Whether these are taken

forward will depend on the willingness of individuals and communities to accept them and whether these options can be delivered at a cost that reflects a benefits provided and also the availability of land to install such features.

Source control



Options for the Kirkley Stream

Due to the recent flooding, which led us to undertake a detailed investigation into the way the stream and local drainage systems operate, we have more data about the area. This enabled us to consider a wider range of options to manage the flood risk along the Kirkley Stream. These are all based on the assumption that the stream is maintained in its current (May 2016) state. We know that keeping the stream clear of vegetation is important as one of the key factors that led to the flooding in July 2015 was blockages by vegetation and debris.

Pictures of Kirkley Stream at the time of flooding and after vegetation clearance - This is the baseline from which we will judge whether any other interventions will further reduce local flood risk.



Fluvial Options Overview – Location & Description

Options Considered

- 01 Create new storage and restrict flows
- 02 Additional storage in existing green spaces
- 03 Re-routing of the watercourse
- 04 Reducing flows from upstream watercourses
- 05 Restrict flows to use capacity in existing drainage systems
- 06 Create embankments
- 07 Installing a two stage channel in Kirkley Stream
- 08 Earlier operation of surface water pumps
- 09 Increasing capacity of existing storage areas
- 10 Removal of silt and re-grading of the watercourse
- 11 Adding non return valves on the network
- 13 Installing local mitigation measures
- 14 Optimising throttles in the river
- 15 Strategic non-return valve and underground storage



Assessment of the flood risk options considered for Kirkley Stream

Option	Description of Option	Assessment of option
01 - New storage and restrict flows	Using upstream greenspace to store flood water.	Reduces flood risk to The Street, Carlton Colville. We suggest this option is considered further.
02 - Additional storage in existing green spaces	Using greenspace in Meadow Park to store flood water.	Not effective alone as doesn't reduce flood risk in Carlton Colville, Aldwyck Way/Velda Close or Tom Crisp Way, in a 1 in 75 storm,. May work during more extreme storms so we suggest it is considered as part of wider package of storage measures
03 - Re-routing of watercourse	Diverting and re-routing part of Kirkley Stream which currently enters a culvert under properties in Carlton Colville.	This has been demonstrated to reduce flood risk and we suggest this should be considered further
04 - Reducing flows from upstream watercourses	Implementing measures upstream (such as basins and swales) that reduce the flow of water.	This reduces flood risk to The Street, Carlton Colville and should be considered further as part of a wider package of SuDS and storage measures.
05 - Restrict flows in existing surface water system	Using drains with spare capacity during storm events to maximise the current drainage system.	This will be technically challenging and risks transferring flood risk to other areas. We do not propose to take this option further.
06 - Creating embankments	Raising the banks of Kirkley Stream around Aldwyck Way & Velda Close.	This does not appear to reduce flood risk in the Aldwyck Way/Velda Close area in a 1 in 75 storm, but may work in more extreme rainfall events. We suggest this is considered further
07 - Implementation of two stage channel	Increasing the capacity of Kirkley Stream by re-profiling the river banks.	On its own, this is shown to have limited benefit in reducing flood risk to Tom Crisp Way. However, we believe this is worth being considered as part of a wider package of measures.

Option	Description of Option	Assessment of option
08 - Earlier operation of surface water pumps	Switching on the water pumping stations earlier during a flood event.	This does not have any impact on flood risk and we will not be taking this forward in the short-list of options to be considered.
09 - Increased capacity of existing storage areas	Clearing silt from the existing flood storage area (off Tom Crisp Way) to increase storage capacity for flood water. Doesn't reduce flood risk to the area in a 1 in 75 year flood.	This was not shown to be effective in reducing flood risk to the area in a 1 in 75 year flood but may work in more extreme rainfall events. We believe this is worthy of further consideration as part of a wider package of storage measures.
10 - Removal of silt and re-grading of the watercourse	Clearing silt from 1.5km stretch of Kirkley Stream. Doesn't reduce flood risk in 1 in 75 year flood.	Modelling demonstrated no reduction in flood risk in 1 in 75 year flood. On its own this option does not appear to be effective but may be worthy of consideration as part of a wider package of measures to improve the flow along the stream.
11 - Installation of non-return valves	Installing non-return valves to stop water from Kirkley Stream going back up into the drainage network.	Whilst the initial results do not appear to reduce flood risk we believe it is worthy of further consideration, looking at different valve locations along the stream.
13 - Local mitigation measures	Installing raised doorways, blocked airbricks and other Property Level Protection measures.	Demonstrated to reduce flood risk for a 1 in 20 year flood. We suggest this is considered as part of a Property Level Protection measures appraisal across the whole project area.
14 - Removing restrictions in the river	Removing restrictions in Kirkley Stream including increasing the size of culverts.	No demonstrable benefit in a 1 in 75 rainfall event, but we suggest this may be worthy of being considered as part of a wider package of measures to improve flows in the stream. This might be technically challenging and expensive to achieve.
15 - Strategic non-return valve and underground storage	Installing a storage tank alongside the Aldwyck Way area of Kirkley Stream with non-return valves and a water pump.	This demonstrated some flood risk benefit and we suggest it is considered further.

Proposed short list of pluvial/fluvial options

Having explored individual options as described in the table above, few appear to merit progressing alone so we suggest exploring further a range of measures in combination including:-

- Upstream Storage
- Sustainable Drainage Systems
- Improving conveyance of water through the stream
- Installing non return valves
- Local mitigation measures such as property level protection measures

As well as further studying the technical aspects of these options, we will be looking at whether they provide benefits during more frequent and/or more extreme storms and whether the benefits they provide outweigh the costs of implementation. Our ability to deliver many of these options will depend on the availability of suitable land and landowners' co-operation.

Have your say...



If you would like to comment on the Strategy presented in this document, please complete the following questions and return to Sharon Bleese (Waveney District Council Project Manager), or alternatively you can provide specific comments by letter, phone or email:

post to Riverside, 4 Canning Road Lowestoft, Suffolk NR33 0EQ

phone 01502 523 346

email Sharon.bleese@eastsoffolk.gov.uk

We would appreciate your response by the 29th July.

About you Name (optional): **Organisation / business** (if relevant):

I am particularly interested in knowing more about:

Do you... live in Lowestoft or the surrounding area? (please circle) YES NO Work or run a business in Lowestoft or the surrounding area YES NO

Visit Lowestoft for leisure? YES NO

How do you feel about the overall draft options we have presented here (please circle)?

I generally agree I partly agree I don't agree I don't know I don't understand the information

Please give any reasons:

How do you feel about particular options we have presented here (please tick)?

	I generally agree	I partly agree	I don't agree	I don't know	I don't understand the option
Tidal barrier option 1					
Tidal barrier option 2					
Tidal barrier option 3					
Tidal barrier option 4					
Tidal barrier option 5					
Tidal barrier option 6					
Surface water flooding (rivers and extreme rainfall)					
Option 1					
Option 2					
Option 3					

	I generally agree	I partly agree	I don't agree	I don't know	I don't understand the option
Option 4					
Option 5					
Option 6					
Option 7					
Option 8					
Option 9					
Option 11					
Option 13					
Option 14					
Option 15					

Your thoughts about flooding from rivers and extreme rainfall (known as surface water flooding)

.....

.....

.....

.....

.....

In this document you will see that we have identified areas potentially at risk of flooding. Do you agree with this information? (please circle)

Yes No

Tell us about your local experience of where flooding occurs.

.....

.....

.....

.....

In this document we have shown different options that can be used for sustainable drainage (see page 10). We would be grateful for your thoughts about which options would be acceptable to you and why.

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Do you have any other suggestions? (please continue on the next page)

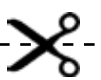
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Do you have any outstanding concerns or issues with the information presented here? (please continue on the next page)

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.....
Thank you for your time in completing these questions, we value your feedback.

If you would like to be kept informed about the project's progress please tell us how best to contact you.

By post - Your address:

.....
.....
.....
By email - Your email address:





Sharon Bleese
Project Manager
Lowestoft Flood Risk Management Strategy
Waveney District Council
Riverside
4 Canning Road
Lowestoft
NR33 0EQ

21 July 2016

Dear Sharon

Lowestoft Flood Risk Management Strategy

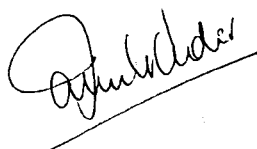
Thank you for the opportunity to comment on options for the Lowestoft Flood Risk Management Strategy.

At a meeting of the Lowestoft and Waveney Chamber of Commerce (LWCoC) Board in March 2014 we agreed, in finalising our Transport and Infrastructure Manifesto, a number priorities from the business perspective for Lowestoft and Waveney District. These included "Support the proposed Lowestoft flood defence scheme aimed at protecting the built, road and rail infrastructure from the adverse effects of tidal, pluvial and fluvial flooding."

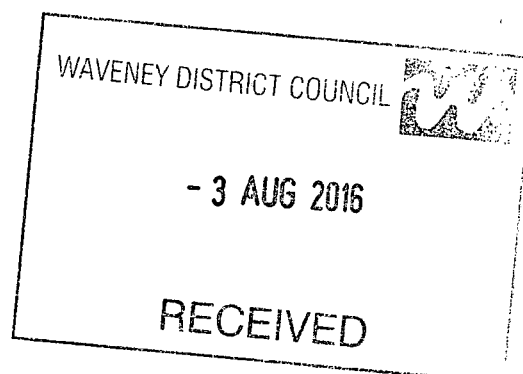
When our Board met on 14 July we considered the tidal flood risk management options set out in the current consultation document and agreed our support for option 5 'Improve – Bascule Bridge barrier and walls'.

We hope that this is helpful and we look forward to continuing to work closely with you as the flood risk proposals are finalised.

Yours sincerely



James Reeder
Chair



Background to the project

During the December 2013 tidal surge over 150 homes and businesses in Lowestoft were flooded. In addition to this road and rail networks were significantly disrupted.

The Lowestoft Flood Risk Management Project is developing a way forward to manage the flood risk to Lowestoft from all sources of flooding, river, rain and tidal, to allow the economic growth and regeneration of Lowestoft and protecting existing residential and commercial properties.

This has been identified as part of the Lowestoft Transport and Infrastructure Plan.

The extent of the area at risk of tidal flooding encompasses the area from the outer harbour entrance through Lake Lothing to the A1117 Bridge Road crossing and Mutford Lock, which forms the boundary with Oulton Broad. This will include the construction of a tidal barrier and raised or improved walls to provide protection from tidal flooding.

The project is also examining the extent of flood risk from the extreme rainfall and what can be done to alleviate the risks of flooding from sources such as rivers and extreme rainfall.



Funding and project partners

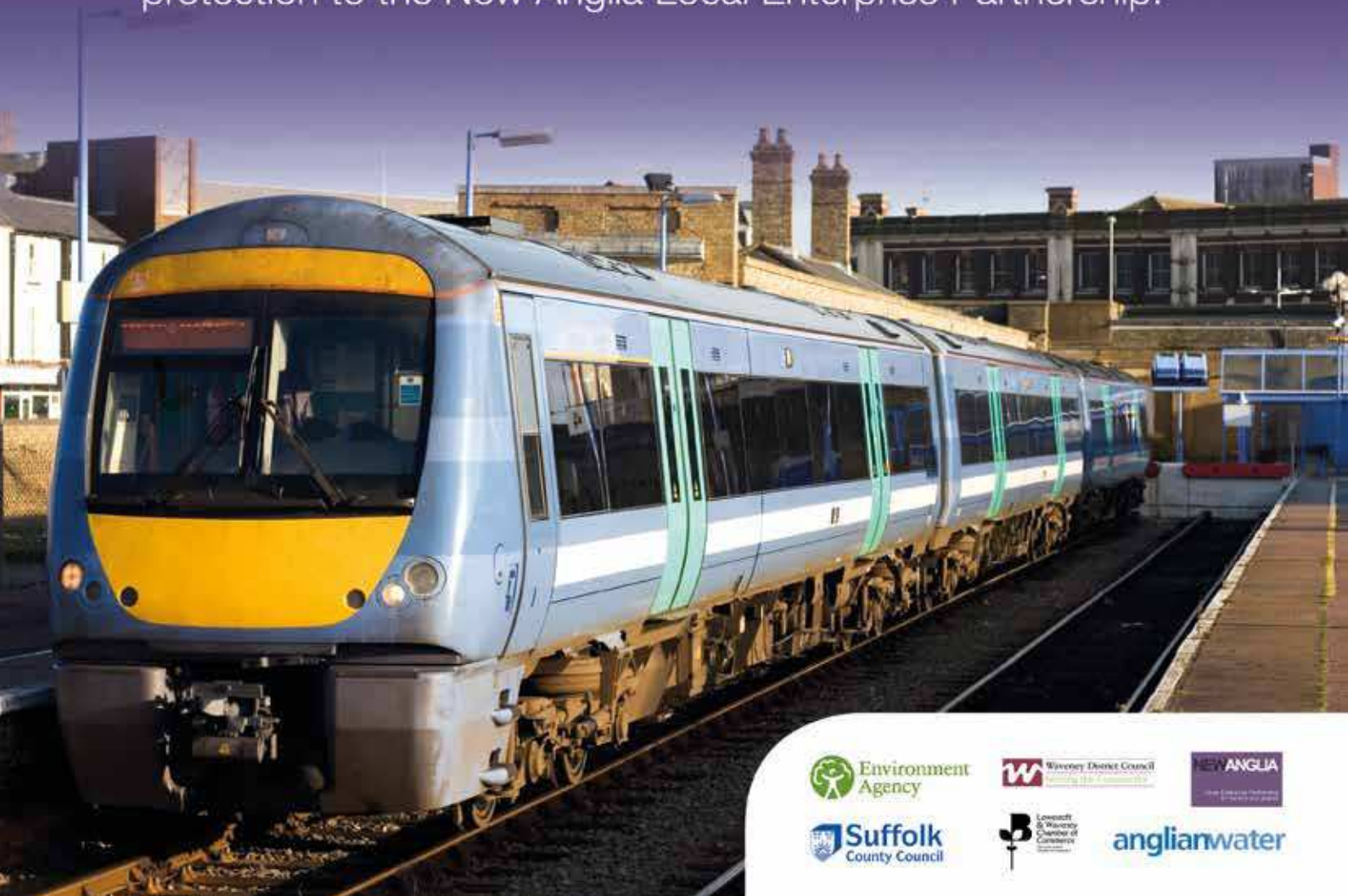
This project is a major capital investment for Lowestoft of around £25m. Funding has come from Defra's Flood Defence Grant in Aid, administered by the Environment Agency, New Anglia Local Enterprise Partnership, Local Levy, Anglian Water and from Suffolk County Council and Waveney District Council.

We are also pleased to be working in partnership with Associated British Ports and the Lowestoft and Waveney Chamber of Commerce.



Where are we now

In order to obtain Environment Agency approval to access national flood funding and Local Levy funding, an overarching strategy is being developed. This has included completing modelling and studies such as a Strategic Environmental Assessment. These will be complete by the end of 2015. We will then hold a public consultation in early 2016. As part of the development of the strategy and to help secure funding we have provided evidence of the economic value of flood protection to the New Anglia Local Enterprise Partnership.



What happens next & working with you

Tidal flooding

Once the strategy has been approved by the Environment Agency, we will need to apply for a Transport Works Act Order (TWAO). This is granted by the Secretary of State and is needed when construction can change or affect navigation. A TWAO can take up to two years to be approved but we are working with our partners and key stakeholders to make sure that we address concerns as early as possible which might hold up the Order being made.

This means that, from early 2016 we will be consulting with communities, business and organisations that are affected by this work to hear your comments and concerns.

Flooding from rivers and extreme rainfall

We are currently investigating the areas most at risk from surface water flooding and developing ideas for how to reduce the risks. These ideas will be part of the public consultation in early 2016, and will be developed further as the project progresses.



Who can you contact?

If you are interested in being kept informed about the project then please contact:

Sharon Bleese

Project Manager – Lowestoft Flood Risk Management Project
Suffolk Coastal and Waveney District Councils
Riverside
4, Canning Road
Lowestoft
NR33 0EQ

Direct dial: 01502 523346

or email: sharon.bleese@eastsoffolk.gov.uk



2017 Consultation Materials

Lowestoft Flood Risk Management Project

Consultation 30th October to 14th December 2017

Flooding from the sea



Introduction

During the December 2013 tidal surge over 160 homes and businesses in Lowestoft were flooded. In addition to this road and rail networks were significantly disrupted.

The Lowestoft Flood Risk Management Project is about developing a way forward to reduce the risk of flooding from the sea, rivers and from extreme rainfall. The target date for completion is 2020 and when finished, the project will support the economic growth and regeneration of Lowestoft and reduce the risk of flooding to existing homes and businesses.

In order to obtain Environment Agency approval to access national funding and to build a strong business case for the project's other funders, such as the New Anglia Local Enterprise Partnership, an overarching strategy has been developed to support the project. This includes modelling and studies, such environmental studies to help make sure that we are doing the right thing in the right way. These studies will also support the project's planning application for construction of the tidal walls and a Transport Works Act Order application that is needed for the tidal barrier.

A vital part of the project is working with, involving and consulting, local communities, businesses and organisations. Your views are important. At various points in the project there will be public consultations, providing everyone with a chance to have their say. We have also been meeting with communities and businesses throughout the process. In addition, we have formed a Business and Community Advisory Group to support the project. This is independently chaired by SSE and vice chaired by Lowestoft Rising. The project is being managed by Coastal Partnership East on behalf of the project partners and Waveney District Council as lead authority. Partners include Waveney District Council, Suffolk County Council, the Environment Agency, Anglian Water, Associated British Ports, the New Anglia Local Enterprise Partnership and Waveney and Lowestoft Chamber of Commerce.



What are we considering and how has the project progressed?

Flooding from the sea

The main risk from tidal flooding is from the sea caused by a tidal surge that develops in the North Sea along the eastern coastline of the United Kingdom as was demonstrated by the events in 1953 and most recently in December 2013. Lowestoft has very limited existing tidal flood defences and without this investment, the town will remain at significant risk.

The part of the project addressing tidal flooding covers the areas of Lowestoft deemed to be at significant risk between the Outer Harbour and the western end of Lake Lothing at Mutford Lock.

In deciding the best ways in which we should manage flood risk in Lowestoft now and in the future, we have carried out a number of studies looking at:

- the current extent and risk of flooding
- how flood risk could increase in the future through the impacts of climate change
- the costs and benefits of providing different flood risk management solutions

How are we assessing what solutions will work best?

In assessing the possible options the following criteria have been used to decide which offer the best with ways to manage tidal flood risk in Lowestoft now and in the future:

- Level of flood risk reduction
- Impact on navigation
- Impact on residents and businesses
- Environmental and landscape impact
- Impact on highways and bridges
- Buildability
- Delivery timescale
- Cost – capital and whole life
- Potential regeneration benefits
- Potential benefits linked with 3rd Crossing project

Flooding from rivers and extreme rainfall

Vulnerability to surface water flooding in Lowestoft, particularly around Kirkley Stream, Aldwick Way and Velda Close, was starkly demonstrated in July 2015. The project is exploring options to reduce the risk to properties vulnerable to flooding from extreme rainfall. The criteria for assessing potential options are the same as for the tidal project. Extensive modelling has already been completed and final options will be consulted on during October and November. These include:

- Upstream storage
- Sustainable Drainage Systems
- Improving conveyance of water through the stream
- Installing non-return valves
- Local mitigation measures such as property level protection
- Construction of a flood wall

As well as further studying the technical aspects of these options, we are looking at whether they provide benefits during more frequent and / or more extreme storms. Our ability to deliver some of these options will depend on the availability of suitable land and landowners' co-operation.

Maintenance has already taken place to improve capacity and conveyance and a planned programme of future maintenance is already in place.

Project progression

In May 2016 the Environment Agency's Large Project Review Group (LPRG) approved our Strategic Outline Case. In June 2017 Waveney District Council, as lead council, approved the progression of the project to Outline Business Case and the development of a Transport Works Act Order (TWAo) application.

The Outline Business Case will be presented to LPRG in early 2018. This is the final stage to pass through with the Environment Agency and will then allow the project to access Flood Defence Grant in Aid funding.

A Parliamentary Agent has been appointed (Bircham, Dyson, Bell) to progress the TWAo application. Once the Outline Business Case has been successfully signed off by LPRG and Waveney District Council and Suffolk County Council, a planning application can be submitted mid year 2018 for the construction of the tidal walls. Once the planning application has been approved then construction can begin.

Dependent upon the public consultation starting in late October, a preferred option for the pluvial and fluvial element of the project has been agreed then work can progress post LPRG approval of the Outline Business Case in spring 2018.

How has the project been procured?

The project has been procured through the SCAPE procurement framework. SCAPE is a framework owned and designed by five local authorities. The project is managed through the Civil Engineering and Infrastructure package and delivered by Balfour Beatty.

How is the project addressing the potential of tidal flooding to Lowestoft in the interim period?

In November 2016 we took delivery of 1400m of temporary flood barriers which will help to reduce the risk of flooding to Lowestoft whilst the main project is being completed. We have worked closely with partners such as the blue light services, the Environment Agency, Associated British Ports and Highways England to make sure that we have the right plans and people in place. So should we receive advice

that the flood barriers need to be put up, everything is in place to ensure that this can happen in a timely fashion.

Such an event happened in January 2017 and the barriers were deployed safely and in time, although due to a change in wind direction not tested at this time. On 26th and 27th September the temporary barriers will be part of an annual emergency planning session which will see them deployed and equipment checked ahead of winter. The Lowestoft temporary flood barriers are managed by Coastal Partnership East on behalf of Waveney District Council and deployed in partnership with the Water Management Alliance and Waveney Norse.



Before



After

ABP Port Entrance

- Steel mitre gates will be installed on both the incoming and outgoing road to Port. The gate height will be approximately 1.3m.
- The walls leading from Waveney Road to the flood walls will comprise brick clad steel sheet pile flood wall with concrete cap. The height of wall will vary from 1.2-1.3m above road level. The wall will incorporate steel sheet pile cut-off below ground to stop seepage.
- Security fencing will be installed on top of and flush with the outer face of the proposed flood wall. Finished level of the fence will be 2.4m above the footpath level as specified by the ABP.
- Security fencing will be in accordance with Department for Transport Maritime Security requirement and as per agreement with ABP (Weld mesh fence to BS 1722.14)
- A section of the proposed flood wall will comprise demountable flood barriers to provide an easy access or larger size trucks to enter straight into the port area. The demountable barriers for this section will be for the full height (to 2.4m above road level) and it is envisaged that ABP will only remove these demountable barriers as and when access for larger size trucks will be required.
- The foot path on the north-western side of the proposed flood gates will comprise demountable barrier.
- Demountable barriers alignment will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On the ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate alignment of the proposed demountable barriers for the users to keep it clear.
- Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.



Before



After

Waveney Road

- Proposed flood wall will follow the alignment of existing palisade fence along the Waveney Road
- The flood wall will comprise steel sheet pile brick clad flood wall with concrete cap, 600-700mm high above footpath level and will incorporate cut-off wall below ground to arrest seepage. Where utility services will prohibit the installation of a cut-off wall, injection grouting will be utilised to reduce seepage
- Security fencing will be installed on top of and flush with the outer face of the proposed flood wall. Finished level of the fence will be 2.4m above the footpath level as specified by the ABP.
- Security fencing will be in accordance with Department for Transport Maritime Security requirement and as per agreement with ABP (Weldmesh fence to BS 1722.14)



Before



After

Station Square Part 1

- Proposed flood wall will follow the alignment of existing palisade fence along the Waveney Road
- The flood wall will comprise steel sheet pile brick clad flood wall with concrete cap, 600-700mm high above footpath level and will incorporate cut-off wall below ground to arrest seepage. Where utility services will prohibit the installation of a cut-off wall, injection grouting will be utilised to reduce seepage
- Security fencing will be installed on top of and flush with the outer face of the proposed flood wall. Finished level of the fence will be 2.4m above the footpath level as specified by the ABP.
- Security fencing will be in accordance with Department for Transport Maritime Security requirement and as per agreement with ABP (Weldmesh fence to BS 1722.14)



Station Square Part 2

- Proposed flood wall will follow the alignment of existing palisade fence along the Waveney Road
- The flood wall will comprise steel sheet pile brick clad flood wall with concrete cap, 600-700mm high above footpath level and will incorporate cut-off wall below ground to arrest seepage. Where utility services will prohibit the installation of a cut-off wall, injection grouting will be utilised to reduce seepage
- Security fencing will be installed on top of and flush with the outer face of the proposed flood wall. Finished level of the fence will be 2.4m above the footpath level as specified by the ABP.
- Security fencing will be in accordance with Department for Transport Maritime Security requirement and as per agreement with ABP (Weldmesh fence to BS 1722.14)



Before



After

Tidal Flood Barrier

- Proposed tidal barrier will comprise a concrete structure and steel mitre gate aligned with Bascule Bridge. Below the river bed, steel sheet pile cut offs will be installed to stop seepage from underneath the structure
- The barrier will be 28m clear width for port and navigation use.
- Gate top level will be approximately 600mm higher than the existing road level at Bascule Bridge to provide 1 in 200 years standard of defence (includes allowance for the expected climate change over next 100 years).
- Tidal barrier gate will be operated and controlled from existing control building, using hydraulic rams through the existing power supply.
- Floodwalls either side of the barrier will comprise demountable flood barriers and will only be deployed when required.
- Demountable barriers alignment will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On the ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate the alignment of the proposed demountable barriers for the users to keep it clear.
- The Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.



Before



After

Yacht Club (north side)

- The proposed glass flood wall will continue to the end of the existing awning. Further to the north, the proposed flood defence along the edge of quay side will comprise demountable flood barriers (with supports). The demountable barriers will continue around the boat slipway and through the boat storage area to meet the proposed barrier.
- Along the suspended quay slab, steel beams will be installed below suspended slab to transfer load from the proposed demountable barriers to the quay walls structure
- Height of demountable barriers will vary from 800mm to 1m
- Demountable barriers alignment will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate the alignment of the proposed demountable barriers for the users to keep it clear.
- Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.



Before



After

Yacht Club (south side)

- The south side of the Royal Norfolk & Suffolk Yacht Club building will comprise 1m high glass wall
- Access point to marina will have demountable aluminium barrier to slotted into guide channels incorporated into the glass wall.
- Steel beams will be required under the suspended slab to support and transfer load from proposed glass wall to the quay structure



Before



After

Yacht Club (central view)

- The flood defences in front of Royal Norfolk & Suffolk Yacht Club (RN&SYC) will comprise 1m high glass wall along the existing awning and on south side of the yacht club building.
- Access point to marina will comprise demountable aluminium barrier to slot into the guide channels incorporated in the glass wall.
- Steel beams will be required under the suspended slab to support and transfer load from proposed glass wall to the quay structure.



Before



After

South Pier

- Existing wall along the south pier amusement arcade will be replaced with 700-800mm high brick clad wall with concrete coping
- Above the proposed wall, flood defence will comprise glass panels to provide flood defence benefit while providing unhindered view to the marina and the outer harbour
- Finish height of the glass panel will be 1.8 to 2m above the pathway or road level
- A glass panel wall will be flush with the outer face of the brick clad wall
- The last length of the flood defence across the south pier will comprise demountable barriers section.
- Demountable barriers alignment will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On the ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate the alignment of the proposed demountable barriers for the users to keep it clear.
- Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.



Before



After

Outer South Pier

- Existing wall along the south pier amusement arcade will be replaced with 700-800mm high brick clad wall with concrete coping
- Above the proposed wall, flood defence will comprise glass panels to provide flood defence benefit while providing unhindered view to the marina and the outer harbour
- Finish height of the glass panel will be 1.8 to 2m above the pathway or road level
- A glass panel wall will be flush with the outer face of the brick clad wall
- The last length of the flood defence across the south pier will comprise demountable barriers section.
- Demountable barriers alignment will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On the ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate the alignment of the proposed demountable barriers for the users to keep it clear.
- Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.



Before



After

Hamilton Road Part 1

- The proposed floodwall from the western end of Hamilton Road to the entrance of Kwik fit car garage will comprise brick clad steel sheet pile wall with concrete coping, incorporating cut-off below ground to arrest seepage and provide stability to the flood wall. The wall height above ground will vary from 500-800mm
- From Kwik fit garage to Associated British Ports rear entrance, the length will comprise demountable flood barriers with a height of 800mm to 1.2m
- Demountable barriers sections will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate the alignment of the proposed demountable barriers for the users to keep it clear.
- Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.
- Further east of the demountable section, the floodwall will comprise concrete clad steel sheet pile wall incorporating cut-off. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage. The height of the flood wall above ground will vary from 1.2-1.3m.



Before



After

Hamilton Road Part 2

- The proposed floodwall from the western end of Hamilton Road to the entrance of Kwik fit car garage will comprise brick clad steel sheet pile wall with concrete coping, incorporating cut-off below ground to arrest seepage and provide stability to the flood wall. The wall height above ground will vary from 500-800mm
- From Kwik fit garage to Associated British Ports rear entrance, the length will comprise demountable flood barriers with a height of 800mm to 1.2m
- Demountable barriers sections will incorporate steel sheet pile cut-offs below ground to arrest seepage. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage.
- On ground, a base or sill beam will provide a levelled surface for the installation of demountable barriers. The sill beam will be flush with the existing ground and will delineate the alignment of the proposed demountable barriers for the users to keep it clear.
- Sill beam will incorporate fixing bolts (set below ground level) for vertical supports channels for demountable barriers at regular interval.
- Further east of the demountable section, the floodwall will comprise concrete clad steel sheet pile wall incorporating cut-off. Where utility services will prohibit installation of cut-off wall, injection grouting will be utilised to reduce seepage. The height of the flood wall above ground will vary from 1.2-1.3m.



Considering the environment

In accordance with relevant legislation, the tidal barrier element of the LFRMP (the tidal barrier scheme) is considered to require a statutory Environmental Impact Assessment (EIA) to inform the applications for the various consents required for the scheme – the Transport Works Act Order, marine licence and planning consent. A Preliminary Environmental Information Report (PEIR) has been prepared to provide a preliminary analysis of the environmental issues, risks and opportunities associated with the tidal barrier scheme and identify any potential effects that will require further assessment – i.e. the 'scope' of the EIA. It will be used to support a request for a statutory EIA scoping opinion for the tidal barrier

scheme from the consenting authorities for the scheme: The Secretary of State for Environment, Food and Rural Affairs and the Marine Management Organisation. The PEIR considers only the tidal barrier element of the LFRMP.

We would welcome your feedback on the PEIR. You can access a PDF version on our website www.lowestoftfrmp.org.uk an online feedback form can also be found here.

If you would like a printed copy of the PEIR and feedback form please email sharon.bleese@eastsoffolk.gov.uk

Tell us what you think

Your views are extremely important to the development and successful delivery of the Lowestoft Flood Risk Management Project. We'd like to know what you think about our proposals for the look of the walls and barrier. If you are a river user we'd like to hear how you feel this might affect you. We would also like your feedback about the Preliminary Environmental Impact Report.

Telling us what you think is simple, please visit our website www.lowestoftfrmp.org.uk and you can complete our feedback form online. Or if you'd like a hard copy just email sharon.bleese@eastsuffolk.gov.uk

Keeping in touch

If you'd like to be kept in touch with the project's development please email Project Manager Sharon Bleese at sharon.bleese@eastsuffolk.gov.uk

You can also contact us by telephone on **01502 523346**

Or by post:

Sharon Bleese, Project Manager
Lowestoft Flood Risk Management Project
Waveney District Council
Riverside
4 Canning Road
Lowestoft NR 33 0EQ

Our Partners



Managed by



Our Contractors



For more details:

Visit our website

www.lowestoftfrmp.org.uk

Or contact

Sharon Bleese, Project Manager

Waveney District Council

01502 523346

sharon.bleese@eastsoffolk.gov.uk



LOWESTOFT

FLOOD RISK MANAGEMENT PROJECT

Welcome



Introduction to the project
Sharon Bleese, Project Manager

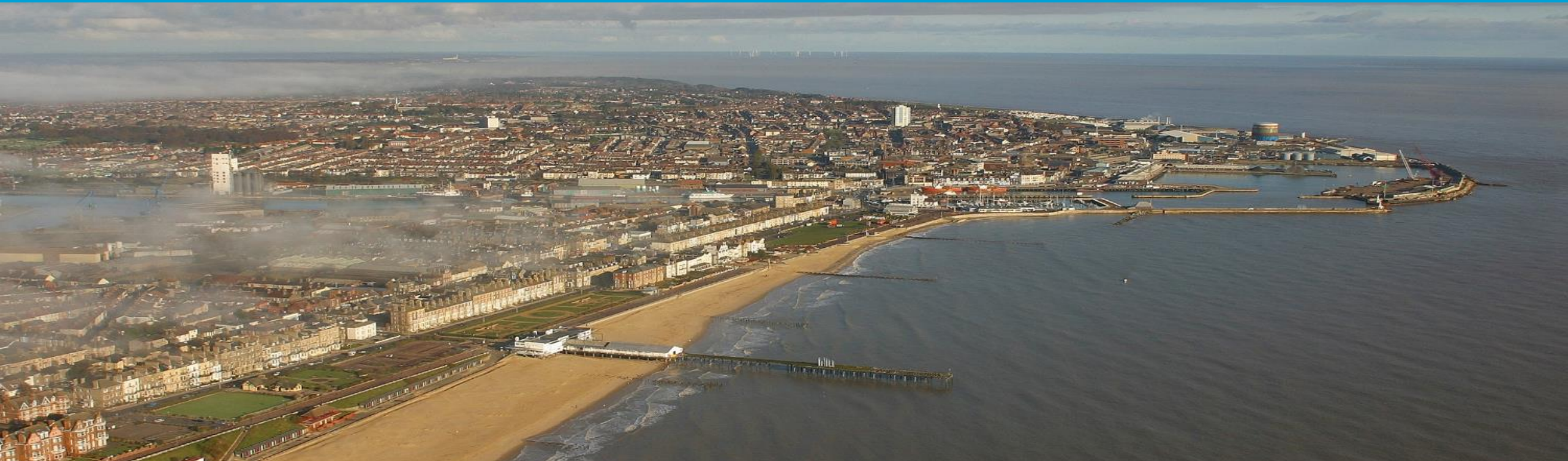
Lowestoft Flood Risk Management Project

reducing risk, supporting growth, creating opportunities

ch2m



Balfour Beatty



ABP ASSOCIATED
BRITISH PORTS



NEWANGLIA
Local Enterprise Partnership
for Norfolk and Suffolk



Waveney
District Council

December 2013 tidal surge impacts

ch2m



Balfour Beatty



- Largest in Lowestoft since 1953
- Over 160 properties affected
- Businesses brought to standstill
- Highlighted the inadequacy of Lowestoft's defences and the impact on existing and potential growth



Economic study headlines (1)

Proportion of current economic footprint at risk of flooding under two scenarios

Scenarios	Without climate change		With climate change	
	Jobs	GVA	Jobs	GVA
1. Do minimum	22%	23%	63%	71%
1. Preferred tidal gate and wall scheme	2%	2%	2%	2%

Total jobs: 10,900

Total GVA (million) £499

Economic study headlines (2)

Future economic footprint (assuming AAP delivered)

Proportion of future economic footprint at risk of flooding under two scenarios

Without climate change

With climate change

Scenarios	Jobs	GVA	Jobs	GVA
1. Do minimum	28%	27%	70%	77%
1. Preferred tidal gate and wall scheme	2%	2%	3%	3%

Total jobs: 14,400

Total GVA (million) £694

Lowestoft Flood Risk Management Project

Reducing tidal risk - temporary defences





Tidal Flood Risk Management
Ben Purkiss, CH2M

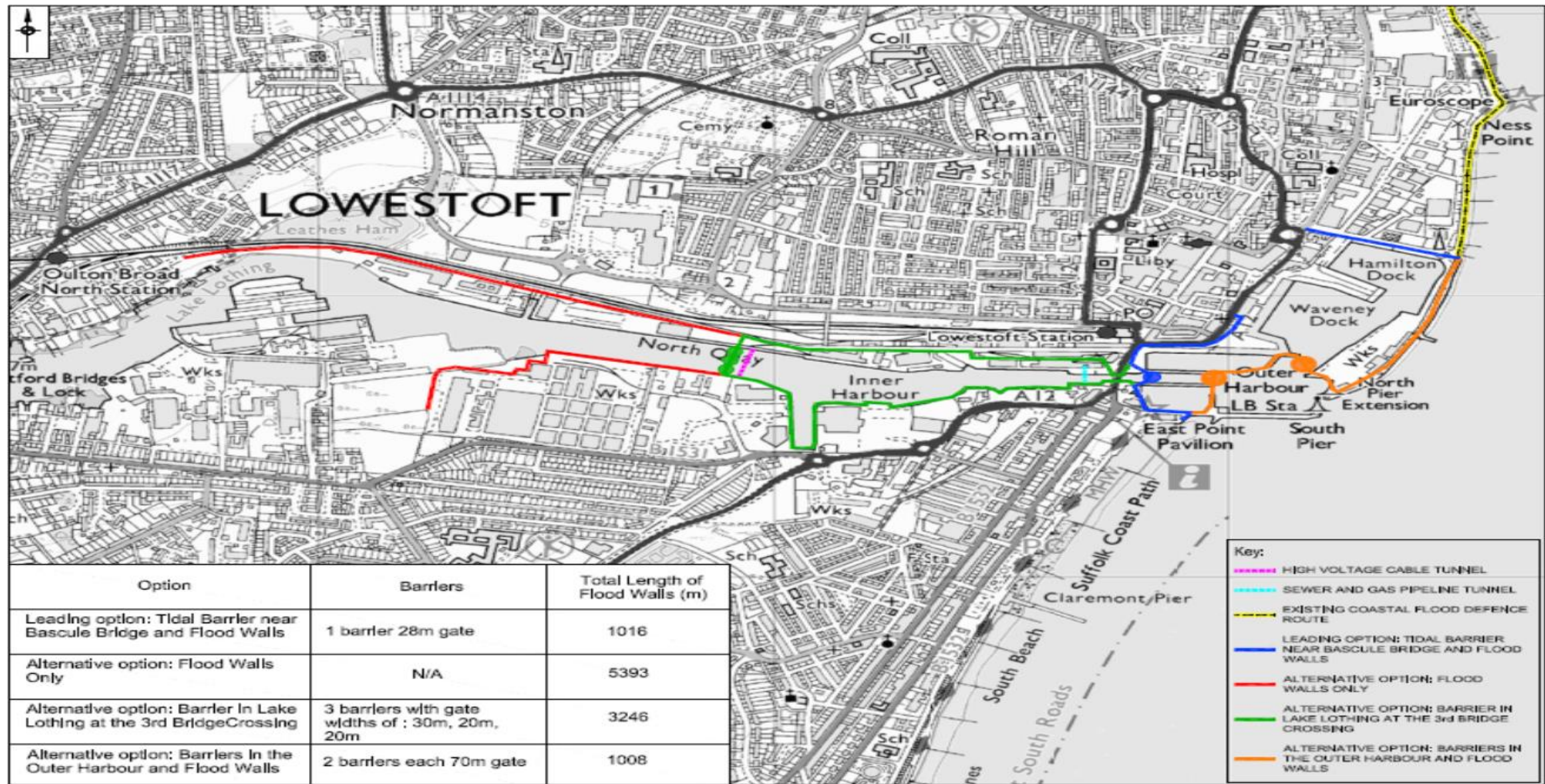
Lowestoft FRMP – Tidal scheme

Options considered

1. Do nothing – walkaway
2. Do minimum – maintain status quo
3. **Improve: Walls only**
4. Improve: Outer harbour barriers & walls
5. **Improve: Bascule bridge barrier & walls**
6. **Improve: Barriers at Third Crossing & walls**
7. Temporary flood defences
8. Property level resilience

(Shortlisted options in bold)

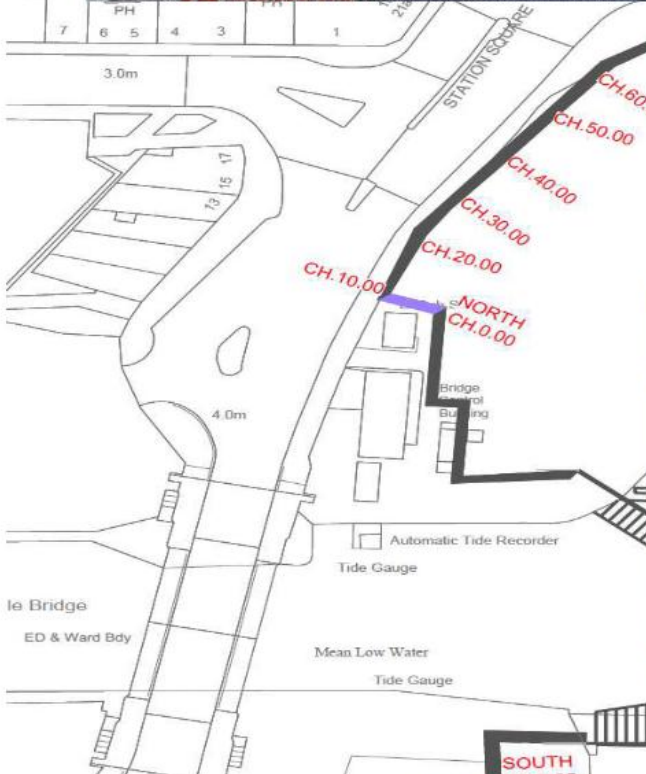
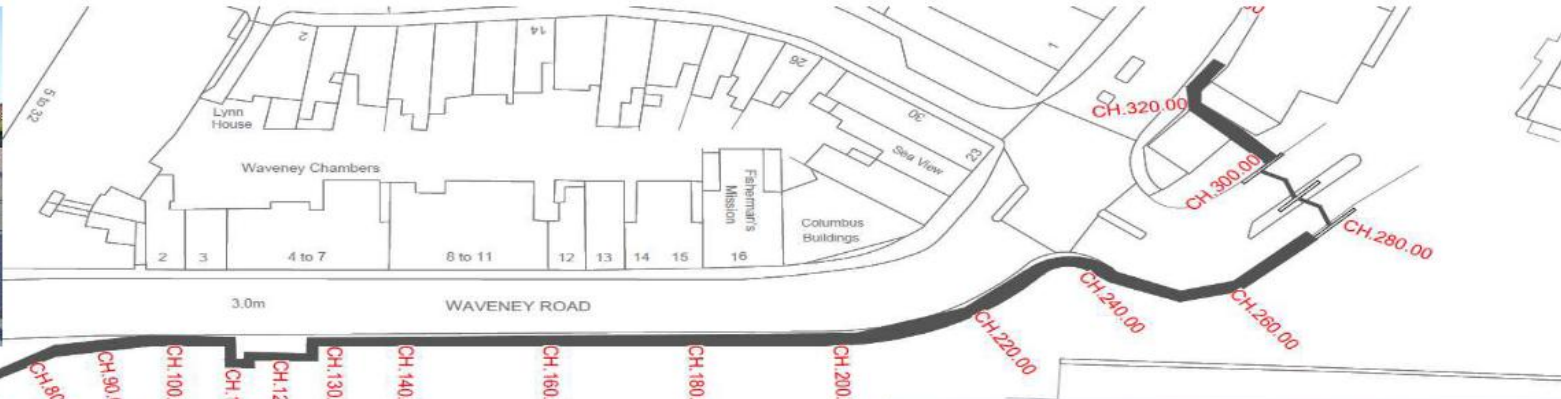
Options considered



Key shortlisted options

3. Improve – flood walls only	Discounted, due to: <ul style="list-style-type: none"> • Tidal inundation into Lake Lothing. • Increased flood risk - 5 times longer sea frontage. • Walls built on existing quay wall, interact with major services, businesses, road/ rail network. • Raising of bascule bridge or road closure for temporary demountable at Waveney road beyond year 50
5. Improve – Bascule Bridge barrier & walls	Recommended as the preferred option, due to: <ul style="list-style-type: none"> • Shorter length of floodwalls. • Single barrier in narrow river channel.
6. Improve – Barriers at Third Crossing & walls	Discounted, due to: <ul style="list-style-type: none"> • 3 barriers, longer length of walls, interaction with quay walls, major services • Disruption to quayside businesses during construction. • Raising of Bascule Bridge/road closure for temporary demountable Waveney Road beyond year 50. • New control building required.

Waveney Road

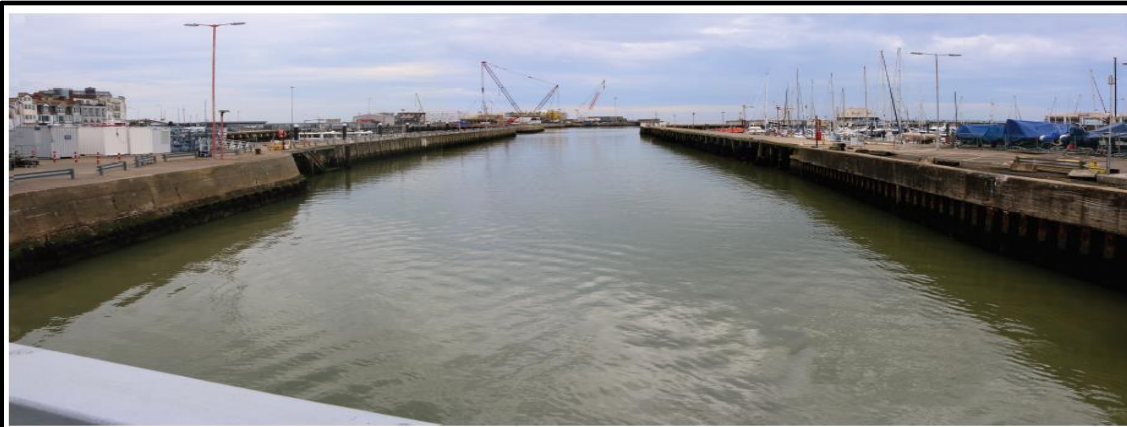


Light (Fixed Green)
Li (Fixed)

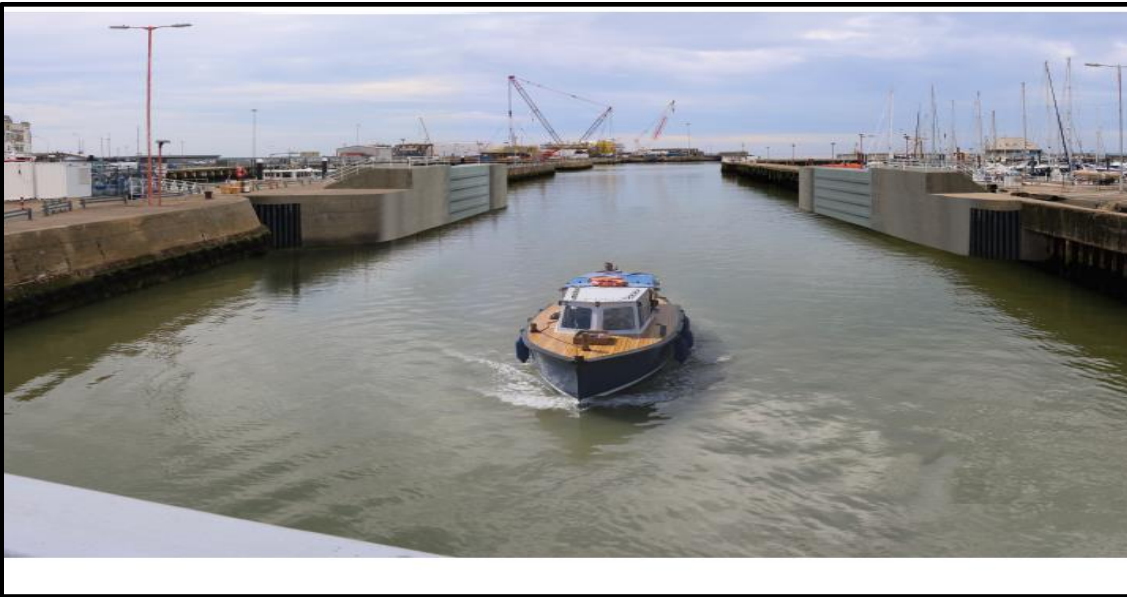
MLW

Light (Fixed Red)

Tidal barrier – before and after

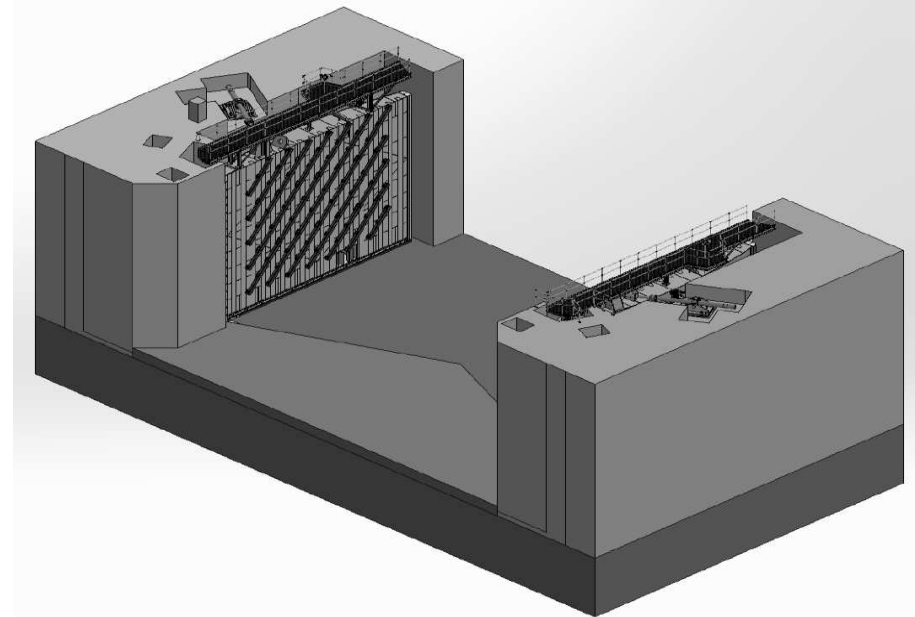
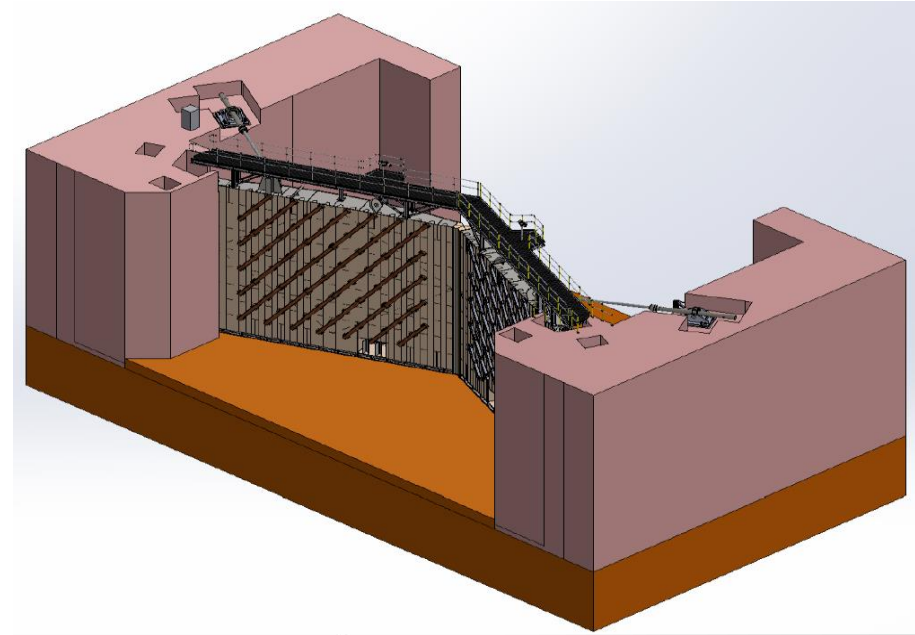


Before



Tidal Barrier

- Mitre Gates
- Barrier width- consultation with ABP



Station square- before and after



Waveney Road- before and after



Port Entrance- before and after



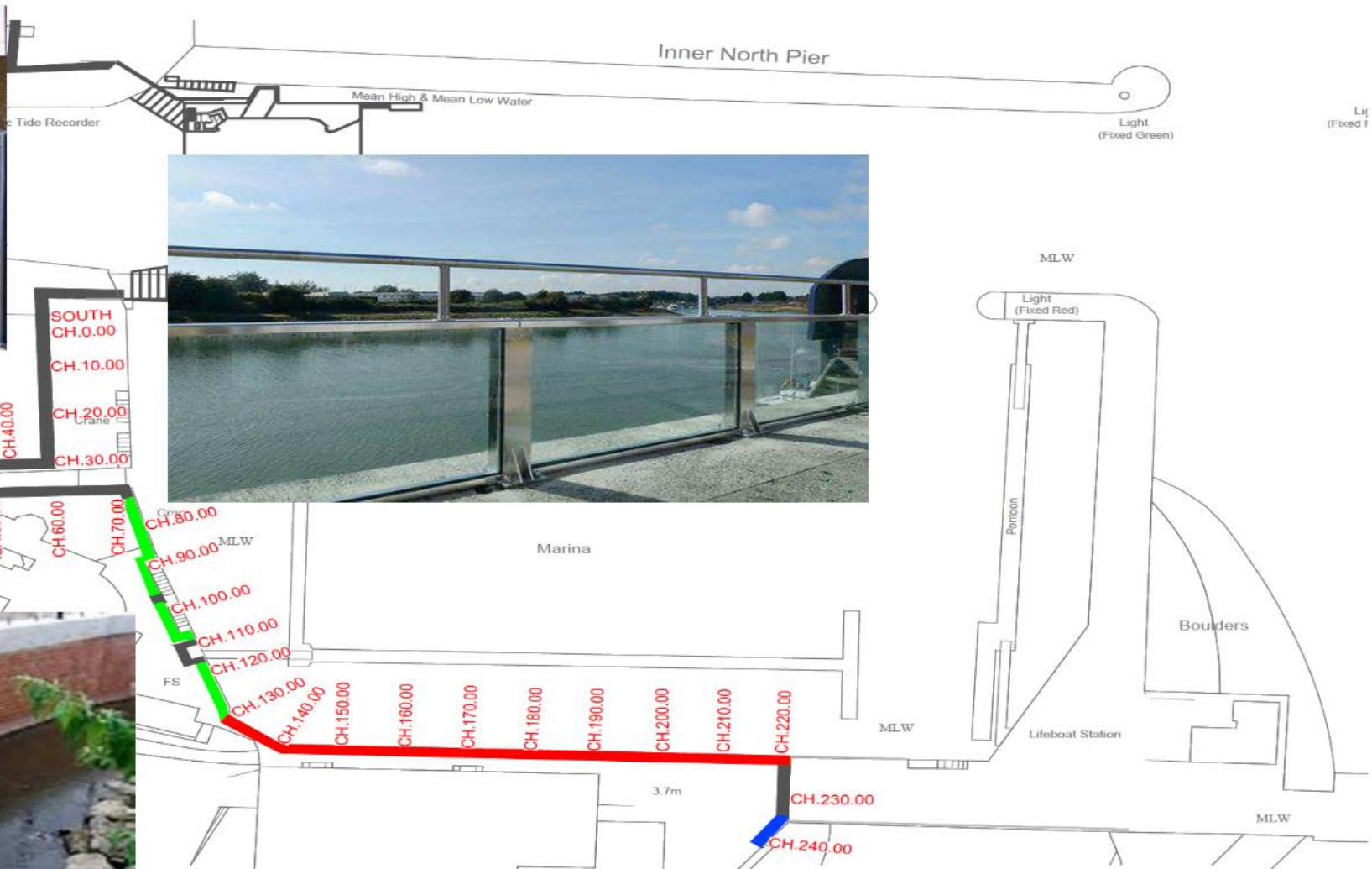
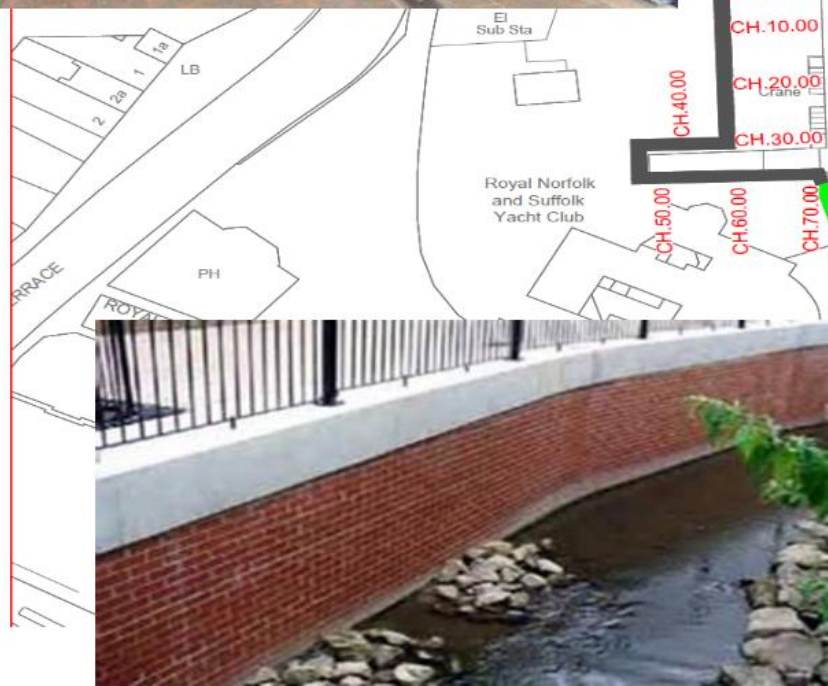
Hamilton Road



Hamilton Road – before and after



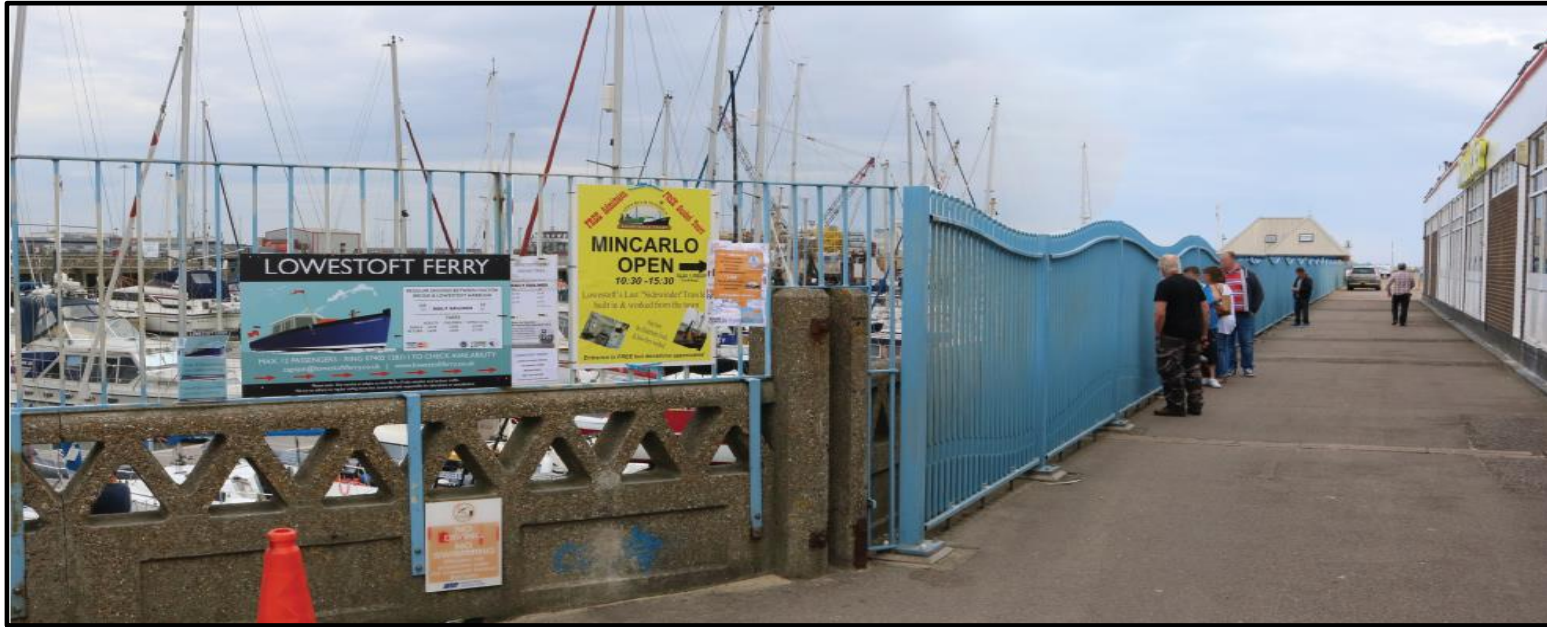
Yacht Club and South Pier/Beach



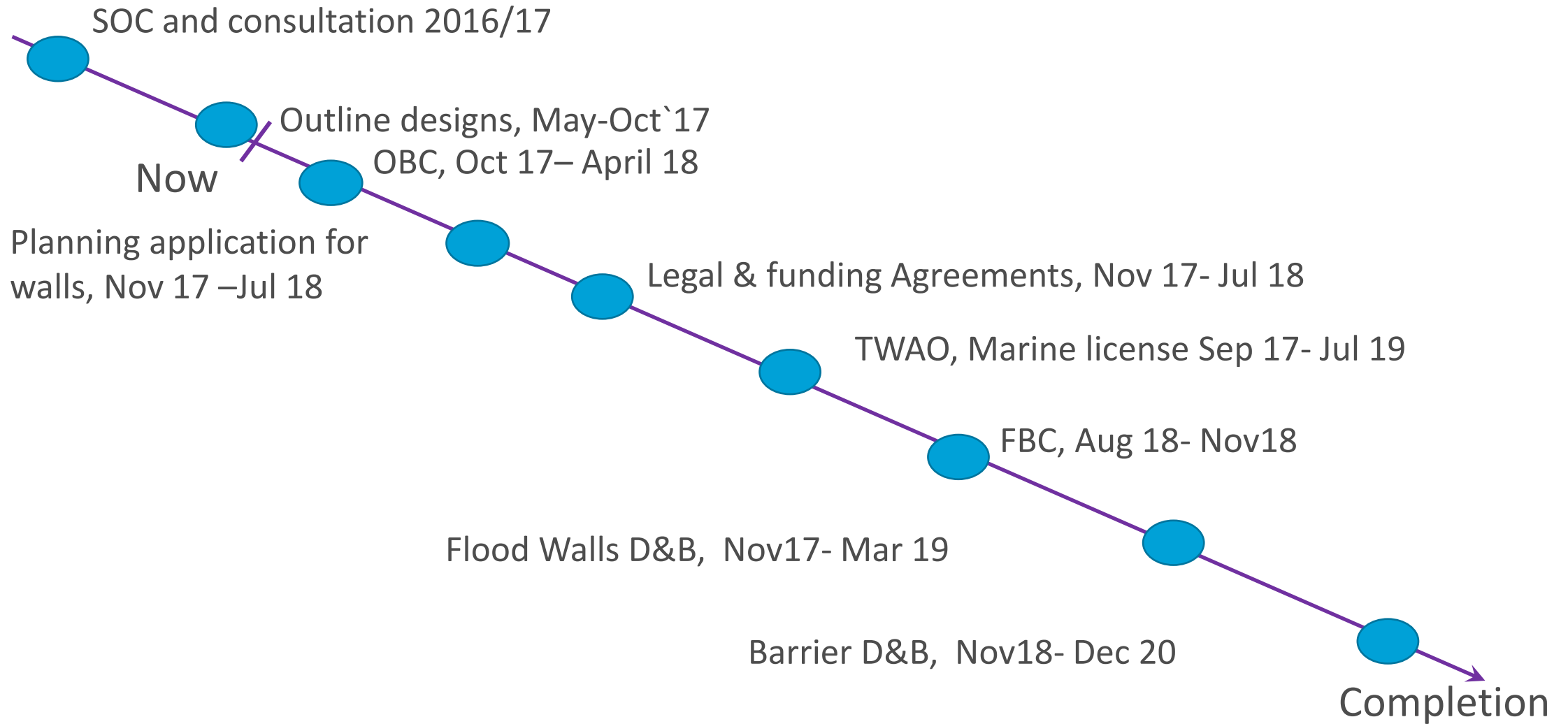
Royal Norfolk & Suffolk Yacht Club – before and after



South Pier- before and after



Further activities and programme



Thank You

ch2m



Balfour Beatty

ABP ASSOCIATED
BRITISH PORTS



NEWANGLIA
Local Enterprise Partnership
for Norfolk and Suffolk





Summary and next steps
Sharon Bleese, Project Manager



LOWESTOFT

FLOOD RISK MANAGEMENT PROJECT

The

Lowestoft Flood Risk Management Project

team invites you to an Open Day

An opportunity to view the plans and visualisations to reduce the flood risk to Lowestoft and we'd like to hear what you think

During the December 2013 tidal surge over 160 homes and businesses in Lowestoft were flooded. In addition to this road and rail networks were significantly disrupted.

The Lowestoft Flood Risk Management Project is about developing a way forward to reduce the risk of flooding from the sea, rivers and from extreme rainfall. The target date for completion is 2020 and when finished, the project will support the economic growth and regeneration of Lowestoft and reduce the risk of flooding to existing homes and businesses.

2pm - 7pm - Thursday 30th November 2017
Riverside, 4 Canning Road,
Lowestoft, NR33 0EQ

Visitor parking available at 2 Canning Road

You are invited to drop-in to the event any time between 2pm – 7pm. Presentations about the project will be repeated at each of the times below

- 2.30pm
- 4.30pm
- 6.30pm

We are seeking your views on:

- a potential scheme to reduce flood risk to Lowestoft from rivers and extreme rainfall (fluvial)
- proposals for the look of the walls and barrier to reduce flooding from the sea (tidal)
- the environmental aspects for the tidal elements of the project
- views from the river and harbour users

Plans and visualisations are available to view online during the consultation at www.lowestoffrmp.org.uk

This public consultation is open between
30th October – 14th December 2017



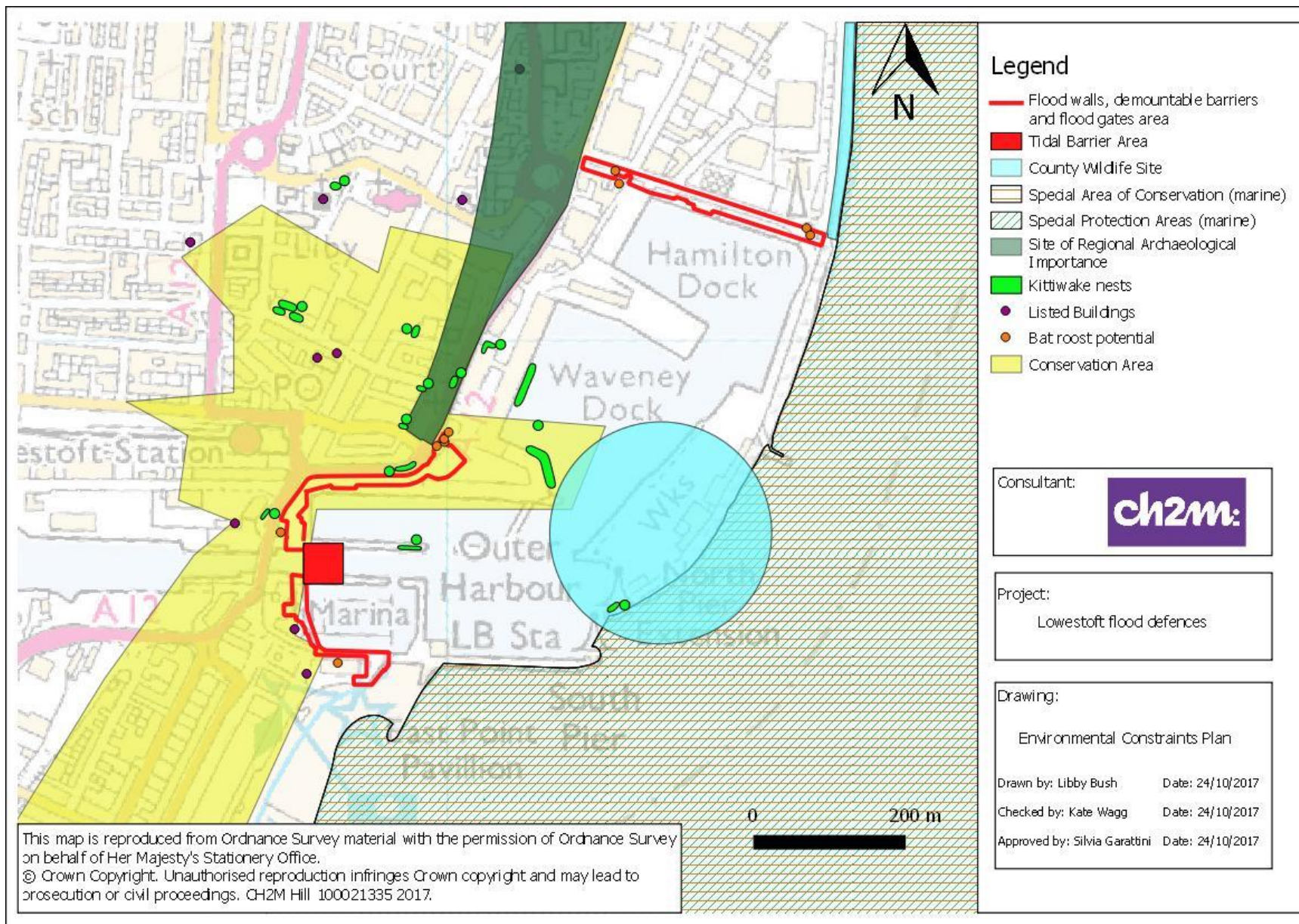
LOWESTOFT
FLOOD RISK MANAGEMENT PROJECT

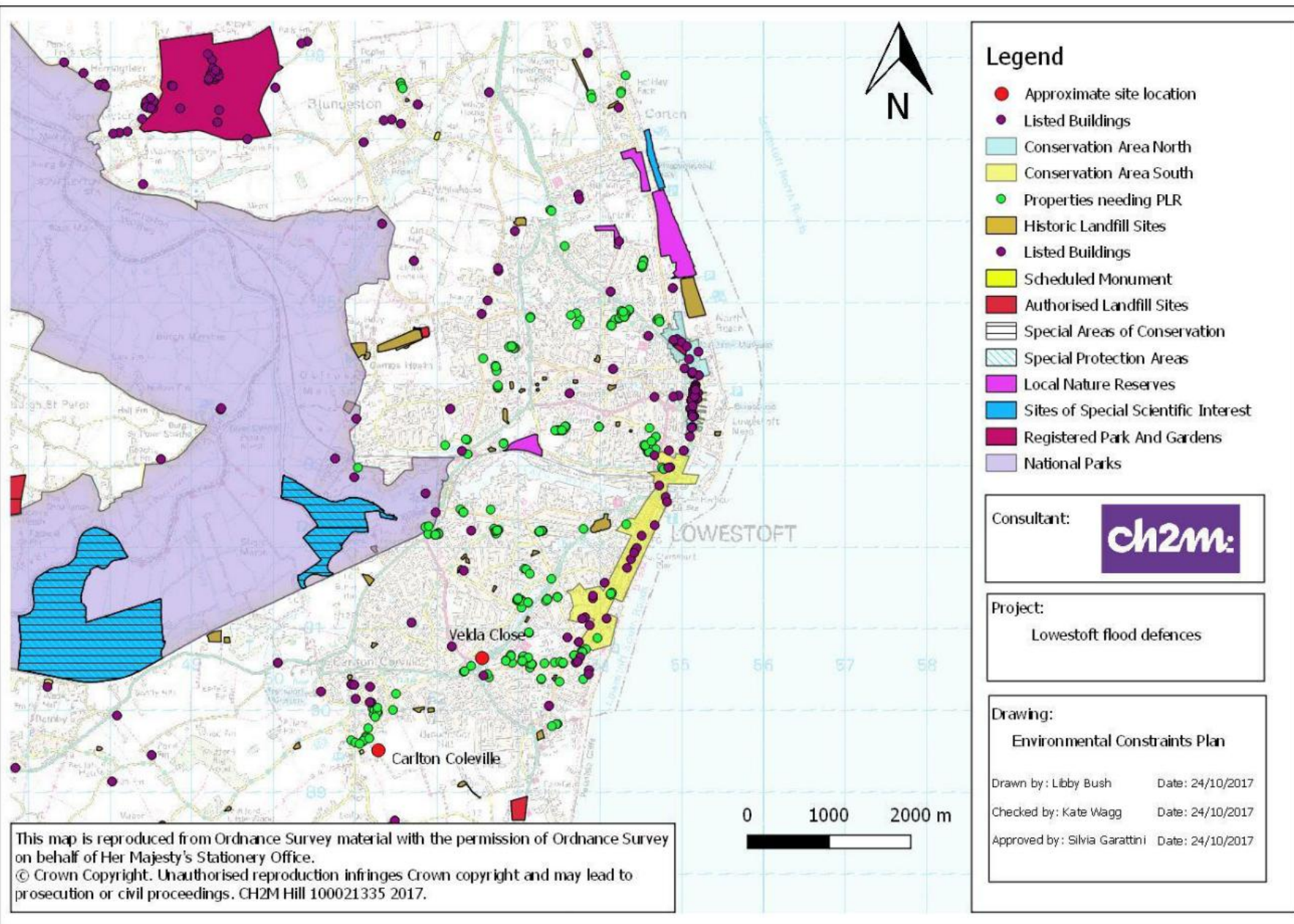
Environmental
Considerations Ben
Purkiss, CH2M

Lowestoft FRMP

Environmental assessment requirements

- Tidal barrier – EIA being undertaken to support TWAO and marine licence. Requests for scoping opinions being made.
- Flood walls - do not require statutory EIA for planning consent, confirmed by Waveney DC.
- Pluvial and fluvial measures – statutory EIA unlikely, but to be confirmed.





Environmental studies undertaken

- Preliminary ecological appraisal, inc habitat survey
 - Bat Risk Assessment
 - Nesting Kittiwake Survey
- Cultural heritage desk based assessment
- Outline landscape and visual impact appraisal
- Geo-technical desk study and ground investigation

- Preliminary Water Framework Directive assessment

Tidal barrier and walls: key topics and issues

- **All topics**
 - Significant benefits from reduction in flood risk
- **Biodiversity, flora and fauna**
 - Designated sites: subject to consultation with Natural England
 - Habitats and species: subtidal habitats and species, roosting bats, nesting birds, spread of Japanese Seaweed
- **Historic environment**
 - Setting of designated heritage assets (e.g. listed buildings, Conservation Area)
 - Unknown archaeological assets which may be present within the footprint of the proposed scheme
- **Townscape**
 - Potential impacts on a range of visual receptors including listed buildings and the Conservation Area

Tidal barrier and walls: key topics and issues

- **Transport and navigation**

- potential for impact on the local road network, particularly the A47
- navigation through the Bascul Bridge channel and within the Inner and Outer Harbours

- **Population and health**

- noise and vibration disturbance to local residents and businesses
- impact on port operations, disruption to boat users, the Lowestoft Marina and The Royal Norfolk and Suffolk Yacht Club

- **Water and hydromorphology**

- potential for impact on underlying groundwater aquifer
- risks to water quality and biology
- changes to the ecology and morphology of the estuary and coast

Tidal barrier and walls: next steps

Tidal flood barrier

- Statutory EIA to be informed by scoping opinions.

Flood walls

- Environmental report to accompany planning application.
Requirements being confirmed via pre-application discussions.
 - Noise – background noise measurements and level of noise assessment to be agreed with the Waveney District Council Environmental Health.
 - Archaeological mitigation to be agreed with Suffolk County Council and Historic England

Pluvial and fluvial scheme: next steps

- Specific studies underway of affected areas.
- Pre-application discussions with Waveney District Council needed.
- Statutory EIA - unlikely to be required.
- Supporting information requirements to be determined i.e. environmental report.



LOWESTOFT
FLOOD RISK MANAGEMENT PROJECT

Any Questions?

Summary of Feedback from workshops on 1.11.17

Tidal

1. What are your concerns about the project?

- Glass wall desired for Waveney Road - more aesthetically pleasing
- Want to see visualisations of new security fencing
- Confusion over height of wall
- Clear timescale needed - how will construction work with 3rd Crossing and will TWAO impact
- Who is responsible for deployment of barriers and demountables
- Will it last? - appearance in 50 years
- Who approves the designs?
- Will local companies be used for construction?-clear communication about construction is needed and provide a sample section of wall for people to engage
- Is funding available?
- Tourists and the England Coastal Path need to be considered
- Work with economic development teams
- Is there an possibility of overtopping?
- Could there be a secondary surge? - would a barrier elsewhere in the Broads help this?
- Wind farm access to port and port security
- Get young people involved
- Issues over size of barrier and how control tower will work
- Minimise impact on boat users and provide safety moorings
- Cleaning and maintenance of glass
- Aldwyk Way issues

2. What do you consider are the positives?

- Opportunity to work with Broads Authority
- Linking with Broadland Futures
- Minimal local impact
- Employment opportunities - local companies, traing, economic uplift
- Staying dry
- Regeneration, investment, business in Lowestoft
- Showcases British Engineering
- Fits in with town aesthetically
- Health and Safety - easy viewing (glass)

3. Is what we are presenting clear?

- Clarity needed for flap valves in Lake Lothing
- Less abbreviations and technical terms
- Some visualisations clear others not so

4. Have we considered everything?

- Need for an archaeological survey - may find WW2 bombs
- Life boat other side of barrier in case of event

- Funding concerns
 - Is there a backup for the demountables?
 - Army help?
 - Is storage secure?
 - Explained well and professional
 - 3rd Crossing communication
 - Clarify intension in the case of a surge from Broads side of lock
- 5. Is there anything missing?**
- Map in consultation document
 - Defence position north of the harbour?
 - Inter-relation between this and the project?
 - Need to keep doing this
 - Good example of collaborative partnership working
 - Flooding was really bad in Station Square and London Road south
 - Sewers backing up was bad and cause of flooding - porous tarmac?
 - Discussion of importance of making sure Lake Lothing secure
 - Positives having barrier wide as possible
 - Positive that disruption to port minimised
- 6. Do you largely agree with what we are presenting?**
- Yes

Environment

- 1. What are your concerns about the project?**
- Marine mammals and shell fisheries
 - Dredging and sediment quality
 - Identify potential issues early - impact on flows, river users and bathing water quality, Japanese seaweed
 - Fence required for security of port but gives wrong feel to area
 - Transport and congestion
 - Issues around clearance of Kirkley Stream
 - Vandalism of glass and glare
 - Timing of construction work
 - Issues with surface water
 - Avoid abbreviations
 - Long term maintenance and investment needed
 - Impact on local wave environment and silt build up
 - Consult Historic England on proposal/Yacht club
- 2. What do you consider are the positives?**
- No impact on beach or environmental concerns
 - Working with 3rd crossing team to share information

- Short term impacts
- Ensure Carlton Colville diversion actively improves situation
- Development and investment
- Sense of place and social benefits - wellbeing
- Proactive approach
- Passive property protection is age friendly and inclusive
- Environmental benefits vs. not doing something
- Health and safety issues well addressed
- Glass walls will not even be seen as flood defence by most
- Insurability benefits

3. Is what we are presenting clear?

- Ensure townscape considered – street furniture – enhancement
- Environmental screening of Kirkley stream options
- Certainty over ability of diversion option to be delivered – need to ensure policy reflects aspirations of project
- Traffic management
- Visual/appearance – ensure not impact current/future

4. Have we considered everything?

- Consider traffic issues during construction and plant movement
- Consult Highways England and others to ensure project isn't to the detriment of future plans
- The maintenance and upkeep of assets is key e.g. around south pier
- Risk of damage/vandalism to glass walls needs to be addressed – protective layer
- Red brick might stand out – try to match nearby structures – Somerleyton yellow bricks – link to heritage
- Do the defences work in harmony with Yacht Club/other places?
- Environmental benefits near Carlton Colville – potential?
- Consider impact to water quality and Blue Flag status – WFD
- PLR needed to address sewerage backflow
- PLR can cause people to be isolated in properties – how address this?
- Property value – PLR might impact the assumption is positive but this should be considered
- Drilling in 3rd crossing could cause pollution
- Ground conditions – 3rd crossing team might know

5. Is there anything missing?

- Ensure work closely with 3rd crossing team
- PEIR (Preliminary Environment and Information Report) review needed by stakeholders
- Name of structure? – Competition to name?
- Create walkway/ nature trail along Carlton Colville diversion – actively enhance wellbeing
- Enhance options to incorporate technological advances
- Enhance streetscape – furniture/lighting etc.
- Locally sourced materials? – Recycling?

- Transport materials by water?
- Apprentices as part of construction
- Flood risk assessment (FRA) results – needed as part of planning application
- Permits
- Diversion channel – not in WDC master plan – could compromise delivery – need to refine policy
- Maintenance is important
- Leaflets to people affected from flooding previously to update them on project
- Initial PLR must be age friendly/passive
- Benefits to Mutford Lock – gate can be opened to release water – overtopping risk
- Build up of siltation when gate is closed – both sides
- 6. Do you largely agree with what we are presenting?**
- A lot of abbreviations
- Links to useful online sites (awareness)

Rivers and Rain

1. What are your concerns about the project?

MEASURE 1

- Not enough certainty – reliant on private developer
- Ongoing maintenance
- Planning consultation on development adjacent to Kirkley stream diversion has been aware of the proposal for diversion and flood attenuation
- Reporting of household flooding needs to be promoted
- Relevance of SUDs in the new developments that much more important as Kirkley stream already at capacity/overloaded
- Management plan to tackle aquatic invasive non-native plants
- Would a future developer have to do the additional enhancements e.g. planting and picnic area – part covered by local plan
- What's timescale? (at least 5-10years)
- Needs very careful communication that no scheme going to be built yet
- Community aren't seeing bigger picture
- Access points
- Heavily invasive method
- 1 in 1000 benefits – more information needed

MEASURE 2

- Old flaps hard to maintain
- Generally seen as an improvement to the area
- Possible swimming pool effect on house side
- Access for maintenance of bank- sheet piling makes difficult
- Trees currently provide screening from road – place closer to fence than channel or even in gardens– prevent blockages

- More regular unblocking of Kirkley stream
- Expense of piles

MEASURE 3

- Never flooded – owners may say no
 - Make available to others than the 261
 - Do flood PLP measures be put in new builds – flood risk not passed
 - Who owns them
 - Garden protection
 - Manage at a strategic level - contractors do public comms, identify appropriate approach per house
 - They're not yet all aware that they are one of the 261
- 2. What do you consider are the positives?**

MEASURE 1

- Win win with property developers
- Flood risk reduction
- Cheaper for public purse
- This scheme is linked but can be developed from the tidal scheme, both in timescale and budget
- Potential for showcasing positive measures being taken by Suffolk County Council
- Planning policy largely deals with water management now

MEASURE 2

- Not much change in look/feel
- Danger of over promise – re engine solution
- Generally positive re proposals but just need to work out the most cost effective options
- Good engagement with residents of the two roads affected
- Recognition there is a problem and something is being done
- Better water flow
- Positives outweigh concerns – only need to be considered

MEASURE 3

- Good if taken up
- 3. Is what we are presenting clear?**
- Greater clarity on how these schemes nest with tidal scheme and overall flooding strategy
 - Are the two current schemes the only at risk locations? Modelling and reporting have driven current sites
 - Don't want to give impression that plans are going to happen when not certain
 - People see benefit of potential housing
 - Attenuation areas for MEASURE 1 if development
- 4. Have we considered everything?**

GENERAL COMMENTS

- Tie in with others maintaining surface water e.g. highways, council grounds maintenance, Anglian Water river care
- Community events – awareness and direct local actions
- Urban catchment – possibility of retrofitting SUDs considered but cost prohibitive for benefit gained

MEASURE 1

- Be honest with residents about time scales
- Clarity above diagram – how does draining relate to development

MEASURE 3

- Good opportunity to get good prices for the work as part of bulk buy
- Are all properties removed from risk at Carlton Colville? If not will they get PLP
- Will flood wall at Velda Close increase flood risk down stream?

5. Is there anything missing?

- How pluvial/ fluvial element linked to wider scheme
- Encourage repenting of flooding
- Will the highway issue be solved The Street at Carlton Colville?

6. Do you largely agree with what we are presenting?

GENERAL COMMENTS

- Generally positive – sensible solutions

MEASURE 1

- Principle ok – disappointed with time scale

Lowestoft Flood Risk Management Project

Response to consultation 30th October – 14th December 2017

Date: 3 January 2017

Author: Lucy Williams, Partnership and Engagement Officer

Sign off: Bill Parker, Acting Project Manager

The Lowestoft Flood Risk Management Project sought views on four areas of the scheme to develop a way to reduce flood risk in Lowestoft. Information was shared with the community through a range of means including an Open Day, a Stakeholder workshop, through email to businesses, residents, those previously flooded, key stakeholders, as well as politicians and community groups. Information was also shared through local media publications and social media, and through posters in prominent areas of Lowestoft.

Documents were made available with stakeholders, and those in at risk areas, as well as being available on the LFRMP website, www.lowestoftfrmp.org.uk

Over 50 key stakeholders attended a workshop was held at the Orbis centre on 1st November 2017 to engage with each area of the project, comments were recorded and have been summarised as part of this feedback.

Comments were sought in online surveys:

A potential scheme to reduce flood risk to Lowestoft from rivers and extreme rainfall (fluvial/pluvial)	26 responses to online survey	p. 2
Proposals for the look of the walls and barrier to reduce flooding from the sea (tidal)	22 responses to online survey	p.5
The environmental aspects for the tidal elements of the project	6 responses online 2 responses by email / letter	p.8
Views from river and harbour users	12 responses to online survey	p.11

Overall the feedback from the consultation show that

The project is widely supported by the community. Particularly for regenerating the area and for the opportunities and involvement for young people.

Concerns raised for coordination of projects. To link key strands of this project and other projects such as 3rd crossing where possible.

Maintenance is a concern in all areas. Maintenance of streams, clearing, drainage, flap valves and future maintenance of glass screens.

Ensuring streetscape and furniture is properly thought out and in keeping with heritage of area was a common theme.

Some misunderstandings shared such as mesh fence on Waveney Road undesirable but cannot be changed. Or location or design of barrier and wall suggestions which are not feasible.

A potential scheme to reduce flood risk to Lowestoft from rivers and extreme rainfall (fluvial/pluvial)

Responses to survey online: 26

46% respondents heard about the event by email.

17% respondents heard about the event through word of mouth.

38% heard about the event by 'other' (including internal comms, through stakeholder event, social media and EDP article)

We would like to know what particular interests or concerns prompted you to attend today. What experience have you had of flooding in Lowestoft? (24 answered. 2 Skipped)

12/24 of respondents were interested to learn about the project but had not been flooded.

6/24 of respondents were interested to attend because their home had previously been flooded.

3/24 of respondents each either had a road in their neighbourhood flooded or their work place has previously been flooded.

How concerned are you about the likelihood and effects of flooding in Lowestoft as caused by: On a scale of 1 to 10, 1 being Not Concerned, and 10 being Very Concerned. (25 answered. 1 skipped)

Most respondents responded with a concern for flooding

Flooding from the river; average 7.71 on scale 1-10

Flooding from rainfall; average 8.04 on scale 1-10

We would like to know your thoughts on the possibilities for reducing flood risk from river and rainfall: See A, B and C below (comments on p.3)

A. Flood defence wall at Velda Close/Aldwyck Way (25 answered. 1 skipped)

19/25 respondents support possibility for Flood defence wall at Velda Close / Aldwyck Way

2/25 were not sure, and **4/25** provided comments

B. Channel diversion of the Kirkley Stream in Carlton Colville (22 answered. 4 skipped)

18/22 respondents support possibility for reducing flood risk from river and rain in Carlton Colville

1/22 felt there was not enough flood risk benefit and **3/22** were not sure.

C. Property Level Protection measures (24 answered. 2 skipped)

19/24 respondents support possibility for reducing flood risk with the proposed property level protection.

1/24 Felt that there was not enough flood risk benefit from it and **4/24** were not sure.

If your residential property is at risk of flooding in a 1 in 20 year flood event, then you could be eligible for individual property level protection. If so, would you be interested? (23 answered. 3 skipped)

17/23 of respondents were interested

6/23 were not interested

Respondents to the survey felt that the information and event was helpful to understanding the flood risk in Lowestoft and for investigating ways of reducing the risk.

Comments from online survey

A. Flood defence wall at Velda Close/Aldwyck Way

- Carlton has been affected by allowing building on the old pond area, Oulton Broad around the D park entrance area housing has no defence - what are you doing to help those houses? 130-146 etc. Some of us cannot afford the house insurance because of the designated flood area.
- Velda close and Aldwyck are the lowest points along this stretch of stream. July it was flooded four times in the rear gardens just through rainfall.

B. Channel diversion of the Kirkley Stream in Carlton Colville

- The Project team need to look at the 6 points summarised in the SCC Flooding Sub Committee Meeting of June 2016:
training for Anglian Water telephone handlers when an Emergency call comes in; education for children through local schools re flytipping and how using the Kirkley Stream as a play area or waste tip; equally SCC was required to regularly clear the stream of foliage to improve water flow.
- An excellent proposal which will hopefully reduce the regular flooding which occurs in The Street. It is hoped that the works can progress at the earliest opportunity as the current ditch (Kirkley Stream) receives very little maintenance and is constantly overgrown reducing flows.
- More detailed requested

C. Property Level Protection measures

- Broads Authority manage Mutford Lock so any protection to its electrical operating infrastructure is a consideration for us
- To what level of assistance are you willing to supply.
- Useful, but pushes responsibility away from the council & water companies and onto individual property owners. Residents may not be home during rainfall to defend property, water should be held by proper defences.

Other comments

- Ultimately, a lot of this could have been avoided if the sea and river defences plus adequate drainage systems had been installed and maintained. Like lots of superstructure and logistic networks in Lowestoft they have been allowed to become in-adapted for current use and also been allowed to deteriorate and decline in effectiveness
- Kirkley Stream has a long and interesting history, being indirectly referred to in the Domesday Survey (1086) in the name of Beckton - a small settlement later absorbed by Pakefield. In tandem with the new sea defences, it is important that the marshland area to the west of Lowestoft is prudently managed as part of the overall flooding strategy. Well-dredged dykes and adequate river-walls and banks must be part of the whole package. To tie in with highways, maintenance, Anglian Water etc

Summary learning from Key Stakeholder event (1/11/2017)

Overall the comments received were positive. Trending concerns, and queries highlighted below:

Measure 1 (Diversion of the Kirkley stream at Carlton Colville)

- Lack of certainty – reliant on property developer. Reliance on SUDs now much more important.
- Could be good for property developers
- Will the highway issue be solved The Street at Carlton Colville?
- Ongoing maintenance / proper management plan needed
- More information needed i.e. timescale, what is 1 in 1000 benefits
- Principle ok – disappointed with time scale
- Clarity required for diagram – how does draining relate to development
- Reporting of household flooding needs to be promoted
- Community are not seeing bigger picture

Measure 2 (Flood defence wall at Velda close/ Aldwyck Way)

- Generally seen as an improvement to the area / pleased for recognition of issue
- There has been good engagement with residents of the two roads affected
- Old flaps hard to maintain
- Trees currently provide screening from road – place closer to fence than channel or even in gardens– prevent blockages
- More regular unblocking of Kirkley stream needed
- Access for maintenance of bank - makes sheet piling difficult / expense of piles

Measure 3 (Property level protection)

- Residents not yet all aware that they are one of the 261
- Make available to others than the 261
- Never flooded – owners may say no
- Good if taken up
- Manage at a strategic level: contractors do public communications, identify appropriate approach per house
- Will flood wall at Velda Close increase flood risk down stream?

Generally

Urban catchment – possibility of retrofitting SUDs considered but cost prohibitive for benefit gained

Proposals for the look of the walls and barrier to reduce flooding from the sea (tidal)

Responses to survey online: 22

19 respondents had seen the visuals. 3 responded that they had not.

The 3 respondents who had not seen the visual representations did not submit responses to other sections of the survey. Therefore the average scores for each section of the wall were not affected.

Generally speaking, 60% of respondents felt the visualisations look suitable. 25% felt they look neither suitable nor unsuitable. 15% felt they looked unsuitable.

Generally speaking, how do you feel about the visual representations of the flood barrier? (20 Answered. 2 skipped)

12/20 of respondents felt the visualisations look suitable.

5/20 felt they look neither suitable nor unsuitable.

3/20 felt they looked unsuitable.

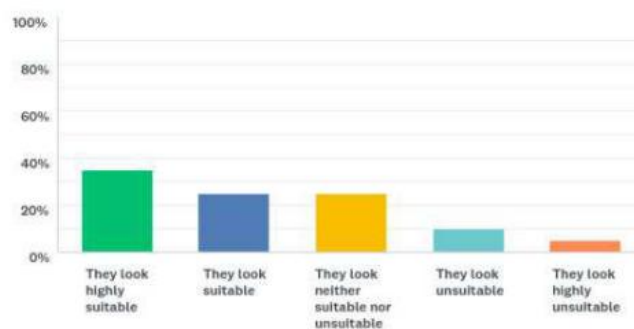


Figure 1

More specifically, how do you feel about the individual sections listed below:

The majority of respondents felt that the 12 visualisations of the tidal project looked suitable (fig 1.) A small proportion felt the appearance was neither suitable nor unsuitable, and a small proportion (varying between 1 and 3 respondents) felt that the appearance was unsuitable.

For those that submitted an unsuitable response, these responses were mixed in a combination of suitable / unsuitable, rather than all sections appeared unsuitable (fig 2)

Comment summary

- Mesh is an improvement to the railing around the port but a glass screen would have been preferred.
- It is disappointing that the adjustment to the harbour fencing that were undertaken not that long ago did not include an increase in the height of the supporting wall.
- Concern for glass wall along South Pier remaining clean and pleasant before it degrades / vandalised.
- Who will maintain it wall and cleanliness of glass?

- Approve of glass around the yacht club and South Pier however concern for use of chrome. The yacht club is famous for it's copper roof. Surely white, black or verdigree would be easier to maintain and blend into the historic environment better.
- There should be a brick wall and fencing on the seating area next to the life boat man statue and run up next to the SLP yard
- One comment related to disapproval for survey as no alternatives given or asked for in the survey..

Some comments show that the consultation material not completely understood:

- Many ports do not have security fences so why should they be necessary in Lowestoft? They are ugly
- Glass not a suitable material for a barrier
- The defences should start the seaward side to protect the whole coast not just bits.

Summary learning from Key Stakeholder event – Overall positive comments and in agreement with proposals

- Good opportunity to work with Broads Authority – link with Broadland futures
- Good for investment to Lowestoft
- Glass wall desired for Waveney Road - more aesthetically pleasing
- Request to see better visualisations of new security fencing
- Clear timescale needed - how will construction work with 3rd Crossing and will TWAO impact
- How long will it last? What will it look like in 50 years?
- Who is responsible for deployment of barriers and demountables
- Will local companies be used for construction?-clear communication about construction is needed. Suggestion made to provide a sample section of wall for people to engage
- Minimise impact on boat users and provide safety moorings
- Clarity needed for the flap valves in Lake Lothing
- Less abbreviations and technical terms needed to help understanding
- Have you considered an archaeological survey - may find WW2 bombs
- Have you considered a life boat / station other side of barrier in case of event

	THIS SECTION LOOKS HIGHLY SUITABLE	THIS SECTION LOOKS SUITABLE	THIS SECTION LOOKS NEITHER SUITABLE NOR UNSUITABLE	THIS SECTION LOOKS LOOK UNSUITABLE	THIS SECTION LOOKS HIGHLY UNSUITABLE	TOTAL	WEIGHTED AVERAGE
ABP port entrance	36.84% 7	36.84% 7	10.53% 2	5.26% 1	10.53% 2	19	2.16
Tidal flood barrier	57.89% 11	31.58% 6	0.00% 0	5.26% 1	5.26% 1	19	1.68
Station square part 1	52.63% 10	26.32% 5	15.79% 3	0.00% 0	5.26% 1	19	1.79
Station square part 2	52.63% 10	26.32% 5	15.79% 3	0.00% 0	5.26% 1	19	1.79
Waveney Road	52.63% 10	26.32% 5	15.79% 3	0.00% 0	5.26% 1	19	1.79
Yacht Club (central view)	42.11% 8	36.84% 7	5.26% 1	10.53% 2	5.26% 1	19	2.00
Yacht club (north side)	36.84% 7	31.58% 6	15.79% 3	10.53% 2	5.26% 1	19	2.16
Yacht club (south side)	42.11% 8	31.58% 6	10.53% 2	10.53% 2	5.26% 1	19	2.05
South Pier	47.37% 9	31.58% 6	5.26% 1	10.53% 2	5.26% 1	19	1.95
Outer South Pier	47.37% 9	31.58% 6	5.26% 1	10.53% 2	5.26% 1	19	1.95
Hamilton Road part 1	36.84% 7	36.84% 7	5.26% 1	5.26% 1	15.79% 3	19	2.26
Hamilton Road part 2	42.11% 8	31.58% 6	5.26% 1	5.26% 1	15.79% 3	19	2.21

Figure 2

Environmental Assessment for the tidal elements of the project

Responses to survey online: 6

Responses by other method: 2

9 responses to the Environmental Assessment for the tidal elements.

2 of these (Anglian Water and Natural England) sent their responses in letter / email format

1 response was a 'bot' whose responses have been removed.

We believe that the key topics and issues which need to be considered as part of the environmental assessment for the tidal elements of the LFRMP are as follows:

- 1. Biodiversity, flora and fauna (potential impact on roosting bats, nesting birds, spread of Japanese seaweed, loss of subtidal habitats and fauna of unknown value)**
- 2. Historic environment (potential impact on the setting of designated heritage assets (e.g. listed buildings, Conservation Area) and unknown archaeological assets which may be present within the footprint of the proposed scheme)**
- 3. Landscape (potential changes in townscape and impacts on a range of visual receptors including the Royal Norfolk and Suffolk Yacht Club and Port House Listed Buildings)**
- 4. Transport and navigation (potential for impact on the local road network, particularly the A47, navigation through the Bascule Bridge channel, operations at the Royal Suffolk and Norfolk Yacht Club)**
- 5. Population and health (noise and vibration disturbance to local residents and businesses, impact on port operations, disruption to boat users, the Lowestoft Marina and The Royal Norfolk and Suffolk Yacht Club)**
- 6. Water and hydromorphology (potential for impact on underlying groundwater aquifer, risks to water quality, changes to the ecology and morphology of the estuary and coast) Please indicate your level of agreement or disagreement and reason for this for each of the key topics identified. Please identify any additional issues which you think should be considered. Are there any other topics that you think should be considered? If so, please describe below.**

Nearly all responses were in agreement with the key topics highlighted in the Environmental Aspects of the survey.

Comments for Biodiversity, flora and fauna

- Provision needed for the Kittiwake and other seabird populations in the design and structure of flood prevention barriers

Comments for Historic Environment

- It is important to take the opportunity to improve the streetscape and public place whilst providing flood defences
- So much of Lowestoft's heritage has been lost or very neglected and it is vitally important that the Historic environment is maintained for future generations.
- The impact on the historical environment is an acceptable consequence of providing flood protection for the town and harbour.

Comments for Landscape

- It is important to take the opportunity to improve the streetscape and public place whilst providing flood defences
- The impact on the landscape is an acceptable consequence of providing flood protection for the town and harbour.

Comments for Transport and Navigation

- If there is to be a channel barrier (which I believe to be over the top) then it should be incorporated into the design of the third crossing i.e. west of the present bridge not the seaward side.
- Important to maintain navigation rights during the construction of the tidal barrier. It is accepted that navigation will stop when the occasions the flood barrier is closed during tidal surges.

Comments for Population and Health

- I think this project can only enhance the town and therefore as a consequence, the population and health of the town.

Please highlight any key issues which you think should be considered as part of the environmental assessment for the pluvial and fluvial elements of the LFRMP

- | |
|---|
| <ul style="list-style-type: none">• No tidal gates on the seaward side of the bridge and all defences on the seaward side of the coastline should be reviewed and improved.• The road floods extremely badly at the junction where the pedestrians have to cross the road (outside Tuttles) to get to the other side to then cross over the Bascule Bridge.• Kirkley Stream and the dyke on the other side of Tom Crisp Way is an issue |
|---|

Natural England support the overall EIA approach. They have stated that guidance stresses the need for a full set of environmental information to be available for consideration prior to a decision being taken on whether or not to grant planning permission.

Anglian Water responded to support the management of the risk to bathing waters downstream from nature of this scheme. Bathing Waters are classified annually using previous 4 years sample data, meaning spikes in bacteria could stay on the record for a number of years.

Summary learning from Key Stakeholder event

Concerns

- Marine mammals and shell fisheries could be affected
- Dredging and sediment quality could affect environment
- Identify potential issues early e.g. impacts on flows, river users and bathing water quality, Japanese seaweed
- Issues around clearance of Kirkley Stream
- Impact on local wave environment and silt build up in harbour
- Diversion channel is not in WDC master plan. This could compromise delivery – need to refine policy
- Avoid abbreviations when communication with wider public

Positives

- Sense of place and social benefits - wellbeing
- Passive property protection is age friendly and inclusive

Other

- The maintenance and upkeep of assets is key e.g. around south pier
- Red brick might stand out – try to match nearby structures – Somerleyton yellow bricks – link to heritage
- Drilling in 3rd crossing could cause pollution
- Consider impact to water quality and Blue Flag status – WFD
- Create walkway/ nature trail along Carlton Colville diversion – actively enhance wellbeing
- Have you considered name of structure? – A competition to name it?
- Have you considered enhancing streetscape – furniture/lighting etc.
- What about locally sourced materials? – Recycling?

Lowestoft River Users

Responses to survey online: 12

Are you a river user? (12 Answered. 0 Skipped)

10/12 answered 'Yes'

2/12 answered 'No'

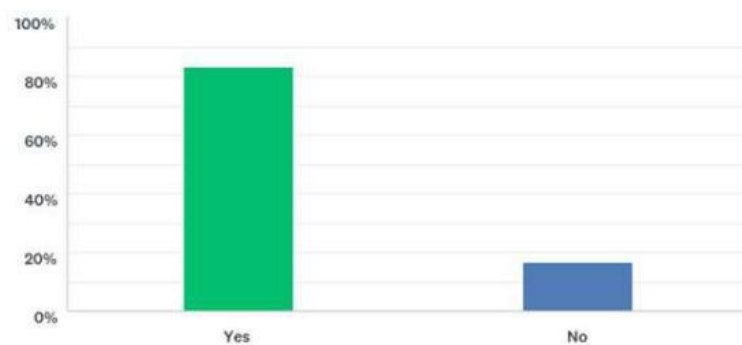
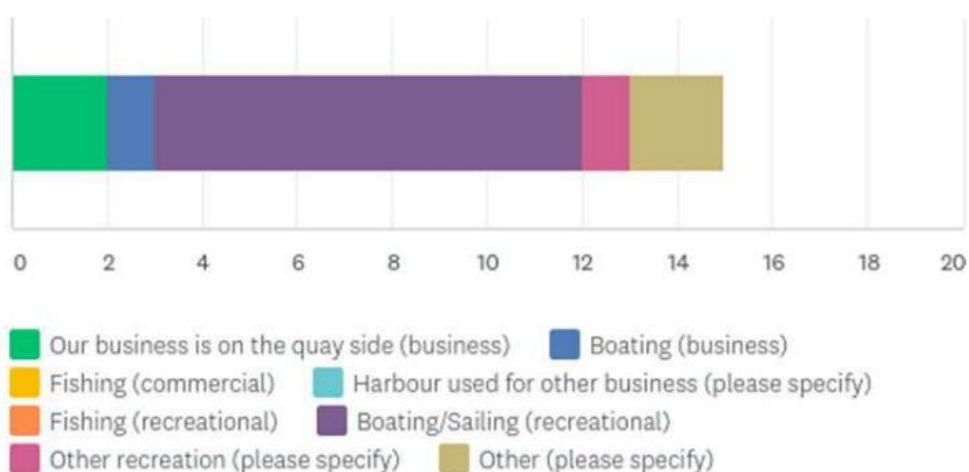


Figure 3

What do you use the river for? (please select all relevant) (11 Answered. 1 Skipped)

Our business is on the quay side (business)	2/11
Boating (business)	1/11
Fishing (commercial)	0/11
Harbour used for other business (please specify)	0/11
Fishing (recreational)	0/11
Boating/Sailing (recreational)	9/11
Other recreation (please specify)	1/11
Other (please specify)	2/11



How often to you use the river area? (11 answered. 1 skipped)

Once a year or less	1/11
Once or twice a month	3/11
Weekly	1/11
Daily	3/11
Other	5/11

Comments

Variable (including monthly weekly, daily depending on time of year)

More frequently between May and September

At what times would you usually use the river (10 answered. 2 skipped)

Respondents to the survey use the river more frequently in warmer months. The river area is used midweek and at weekends. The least used time period is evenings or overnight.

Spring	9/10
Summer	10/10
Autumn	10/10
Winter	2/10

Weekdays	7/10
Weekends	9/10

Morning	7/10
Afternoon	8/10
Evening	6/10
Overnight	5/10

Do you foresee benefits or disadvantages with the proposed scheme (10 Answered. 2 Skipped)

9 responses supporting benefits from the scheme

1 response of unsure yet

Comments included

- Benefits as long as access to check craft once barriers in place (seaward side)
- Benefit to the Lake and the area. It provides the potential to create more destination spots for the town centre.
- Protection from tidal flooding by the proposed barrier would give the Broads Authority far more confidence in the ability of the historic structure of Mutford Lock to be able to cope with extreme events.

How would the presence of the completed scheme change your use of the river area (12 Answered. 0 Skipped)

No change	10/12
Use more	1/12
Use less	1/12

What does the Lowestoft Flood Risk Management Project need to consider for river users (9 answered. 3 skipped)

Summary of comments

- Access past Tidal barrier and ease of use by leisure user is important
- Barrier should be opened promptly once danger has passed
- More obstacles to river use such as bridge openings not needed
- The potential impact from closure of the tidal barrier during flood events would restrict navigable access to the lock from vessels coming into the Broads from the sea. If closure was only for emergency situations, then clear and active communication with the Broads Authority would need to be maintained. The Broads Authority would also support the wider communications of the closure through our communication channels. We would expect Notice to Mariners or similar formal notifications to be issued as appropriate.

Please share your thoughts and experience about flooding if you would like to. Please specify whether the flooding is tidal, or whether it is caused by rivers and rainfall (6 answered. 6 skipped)

Summary of comments

- Tidal flooding from the seaward side of the Lock has previously damaged electrical systems which operate the hydraulic lock gates. Debris and siltation associated with the tidal surges also then fouled the lock gates and made subsequent openings difficult.
- Flooding is tidal our workhouse 1.10m under water
- Experience over several years of grandparents and aunt's houses being flooded by river/flooded roads. Flooded vehicles at LCC.
- We are fortunate to be just outside the flood zone, but with my Lowestoft Vision Hat on. Several businesses were affected by the tidal floods.
- At Lowestoft Cruising Club we suffer from tidal surge flooding. Hopefully the tidal barrier in conjunction with the raised walls will protect all of Lake Lothing, and all the business and leisure activities and interests. Will the barrier work at the highest recorded tidal surge of 4.21m in 1969 (<http://www.ntsif.org/data/hilev?port=Lowestoft>) or even higher allowing for rising sea levels resulting from global warming?

2019/21
Consultation
Materials

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

ADVOCACY MEETING

18 February 2019

Present:	Peter Aldous (Chair), Cllr Mark Bee, Stephen Baker, Richard Perkins, Cllr David Ritchie, Cllr Craig Rivett, Nick Khan, Philip Ridley, Sharon Bleese, Paul Mackie, Martin Pavitt, David Harvey, Joanna Young, Keith Moore, Liz Chettleburgh, Steve Crissall, Kingsley Farrington, Chris Merren, Daniel Johns, Troy Doherty, Charles Schelpe and Bill Parker
1.	Welcome and opening remarks
	<ul style="list-style-type: none"> • The meeting was opened by Peter Aldous MP and introductions were made. • The purpose of the meeting was to provide a full briefing on the Flood Risk Management Project and to find ways for both the private and public sector to work together in order to obtain the additional funding required to complete the flood defence infrastructure. • Peter Aldous outlined the key developments currently underway in Lowestoft and the opportunities afforded by offshore wind energy, fishing and the third river crossing. Flood infrastructure is vital to ensure that these opportunities are realised.
2.	Growth, regeneration and resilience in Lowestoft
	<ul style="list-style-type: none"> • Attendees had been hand picked to become an advocate for the project given the particular insight each has in terms of the town and the impact of flooding. • The world of funding has changed and we need to be in a position to lobby at every opportunity in order to raise the project's profile. • Lowestoft has unique potential and the Sizewell C development will also present opportunities.
3.	Introduction to the Flood Risk Management Project
	<ul style="list-style-type: none"> • The major flooding incident in December 2013 has been the catalyst for change. At that time, the town had no flood defences in place at all. • Project partners and governance outlined. • The project has two stages. Stage 1 is to reduce the risk of flooding from rivers and extreme rainfall. This stage is fully funded and includes property protection, flood walls, a small pumping station and an improved maintenance programme. Stage 2 is to reduce the risk of flooding from the sea. There is sufficient funding to cover the flood walls and gates but a significant budget gap exists in terms of the tidal barrier. • Agreed that every partner around the table will benefit from a tidal barrier. • The key challenges are to protect the Port (which is legally required to remain open and has no opportunity to divert channel), protect Tourism and aid Regeneration (giving confidence to potential investors).
4.	Developing the capital project – present and future risks

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

ADVOCACY MEETING

18 February 2019

	<ul style="list-style-type: none"> • The current risk of tidal flooding in Lowestoft is very high - 20% (1 in 5 years). This will increase with climate change. • Maps were shown showing the impact of a 1 in 5 years event and also the impact should sea levels increase by 1m. • Potential investors will find this risk too high and will be looking at a risk of 1 in 200 (0.5%). • The importance and relevance of the Transport and Works Act Order (TWAo) were discussed. • In order to obtain such an Order, the project needs to consider navigational, transportation and environmental impacts. Each process must be meticulously carried out in order to avoid challenge. We also need a wide and comprehensive consultation report, as well as legal agreements from ABP, the Royal Norfolk & Suffolk Yacht Club, Highways England and Crown Estates. These will only be obtained if each party feels properly consulted and properly protected. • Key TWAo procedure milestones outlined. • Period of objection can be used strategically by some; need to avoid a Public Inquiry at all costs. • Economics considered. The duration of the benefits of the scheme must be realised for 100 years. Costs must also include future maintenance costs. • Currently 63% of jobs and 71% of GVA is affected by Lowestoft's flood risk. • Grant in Aid funding from the Government = £4.34m and is primarily based on the flood risk to residential properties. Funding is driven by the number of houses being moved from significant to lower risk. • Funding will not be released until we can demonstrate that the project is fully funded. • Whether the third river crossing is in the process of being constructed, or has been constructed, will not impact on the flood defence works. However, there will be an impact in terms of the highway network and labour.
5.	Construction methodology
	<ul style="list-style-type: none"> • The works required in the channel have been designed to have the least impact on the Port (which will remain open throughout) and are phased to work outside of the peak tourism season. • Presentation given on the method of construction. The cranes that will be used can be easily suspended in order to allow for vehicle and vessel movements. • The work will be carried out over three winters. During the tourist season, other elements of the build will take place at Lake Lothing and brought onto site at the appropriate point. • Adverse weather conditions during the winter months may have a slight impact, but this has already been factored into the timetable.

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

ADVOCACY MEETING

18 February 2019

6.	Funding challenges
	<ul style="list-style-type: none"> • Case for investment considered. • A 1 in 200 year flood incident will have a direct impact on 38 x electricity sub stations, 3 x water pumping stations, 1 x gas facility, 1 x train station, the Port, Bascule Bridge, 2 x health facilities, 2 x government buildings, 1 x education facility, 1 x residential institution and 1 x leisure centres. • If the tidal gates were in place now and activated, it would have an immediate value in terms of protecting 12 x electricity pumping stations, 1 x water pumping station, unquantified telecoms assets, the Port, the railway station, elements of the A12, 500 families and local businesses. This gives an economic footprint of £499m and 11,000 jobs. • The tidal gate will reduce risk to 2% for both jobs and GVA. • Overall funding requirement is £62.4m. We have committed funding of £23.8m from WDC, the LEP, Council Tax levy, SCC and FDGiA. • We therefore need to secure a further £38.6m and are looking at obtaining £10m from bids from appropriate sources of which there are currently 17. £15m of risk has been built into the project which is currently operating at a 30% risk ratio. The remaining balance will need to come from Government capital. • It is much harder to obtain funding in connection with mitigating flood risk because you cannot include many of the benefits you can include when applying for funding for other infrastructure projects. • A draft infrastructure prospectus was provided to each attendee. Feedback on this was encouraged. The prospectus would carry more weight if everyone's logo could be included. In addition, the collective support for any funding bid put forward is invaluable.
7.	Development project advocates
	<ul style="list-style-type: none"> • The meeting then moved into open discussion. • Lowestoft has a number of positives that will help us when competing against others for funding. For instance, we have a strong data set, no flood defences at present, an established partnership approach and a number of areas of deprivation. • If we do nothing, then our reliance on the Government's Bellwin fund will continue. • Accepted that Government is very objective and will not take into account heritage or economic development since any displacement is likely to go elsewhere in the country. However, if we feel we may lose out to another country, then that will be taken into consideration. • Government will look more kindly on a bid if we can demonstrate that we have obtained (or tried) to source funding locally from those who will benefit.

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

ADVOCACY MEETING

18 February 2019

	<ul style="list-style-type: none">• There is a lack of data available on the 'real' impact of the 2013 flood. However, it may be possible to obtain such data if it was considered helpful to the cause. Agreed that this data should be collated. The Chamber of Commerce will be able to help with this and Richard Perkins will discuss this with John Dugmore.• Agreed that reputational loss is very harmful and a further flooding incident may blight the town forever. Daniel Johns will provide advice and guidance in this regard following a study done in Calderdale.• Aviva has an investment arm, but will require a return on investment and in cases of flooding, this is difficult. Liz Chettleburgh will speak to Aviva in this regard.• An HMRC scheme still exists whereby any local businesses who invest in flood alleviation schemes may be eligible to reclaim tax on their investment. This should be promoted locally.• The UK Shared Prosperity Fund will be administered by the LEP. The project team will ensure that we input into the consultation about this fund in order to help shape its future use. Paul Mackie will consider how the project can benefit from this fund.• Agreed that we must not underplay the effect of flooding on our tourism industry.
8.	Summary and next steps
	Stephen Baker closed the meeting having gained commitment from all attendees to lend their support and push the project forward at every opportunity. The project team confirmed that they would be happy to present to any organisation who wishes.

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

PUBLIC MEETING



WELCOME, INTRODUCTIONS AND AIMS FOR THE MEETING



PROJECT OVERVIEW, UPDATE AND QUESTIONS

-

TIDAL







WHY DO WE NEED FLOOD DEFENCES IN LOWESTOFT?

- December 2013 tidal surge
- 90 homes flooded
- 143 businesses flooded
- Road and rail infrastructure impacted
- No formal flood defences
- January 2017 – a near miss
- Increasingly vulnerable to tidal flooding



Key infrastructure in tidal flood plain (1 in 200 year +climate change to 2117):

- Circa 1500 homes (inc P/F) over 100ys +CC
- 825 businesses
- 38 electricity substations
- At least 14 telecoms assets
- 3 water pumping stations
- 1 gas facility
- Lowestoft Railway Station plus 2km of rail
- Port of Lowestoft
- Bascule Bridge
- 4km of A roads

Local services in tidal flood plain:

- 2 health facilities
- 2 government buildings
- 1 community centre
- 1 education facility
- 1 place of worship
- 2 residential buildings for vulnerable adults
- 1 sport centre



Plus multiple other key assets and community facilities at risk of severe disruption due to flooding / failure of transport and utilities infrastructure, as was seen during the 2013 storm surge.

THE SOLUTION;

AN INTEGRATED FLOOD RISK SCHEME



Package 1 Tidal Floodwalls – Hamilton Road, ABP port entrance, Waveney Road from ABP entrance to bus stop near Station Square.



Package 2 Tidal Floodwalls – Bus Stop round to South Pier including RNSYC.



Phase 2 – Tidal barrier

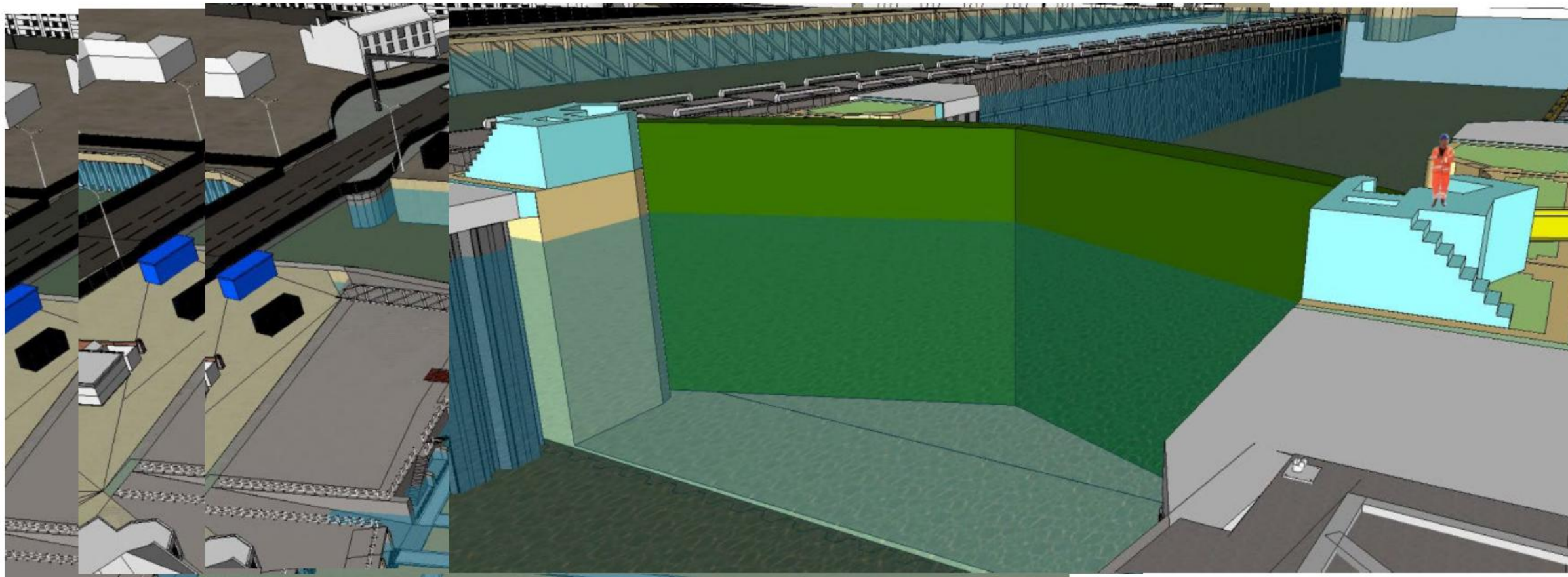
TIDAL FLOOD WALLS





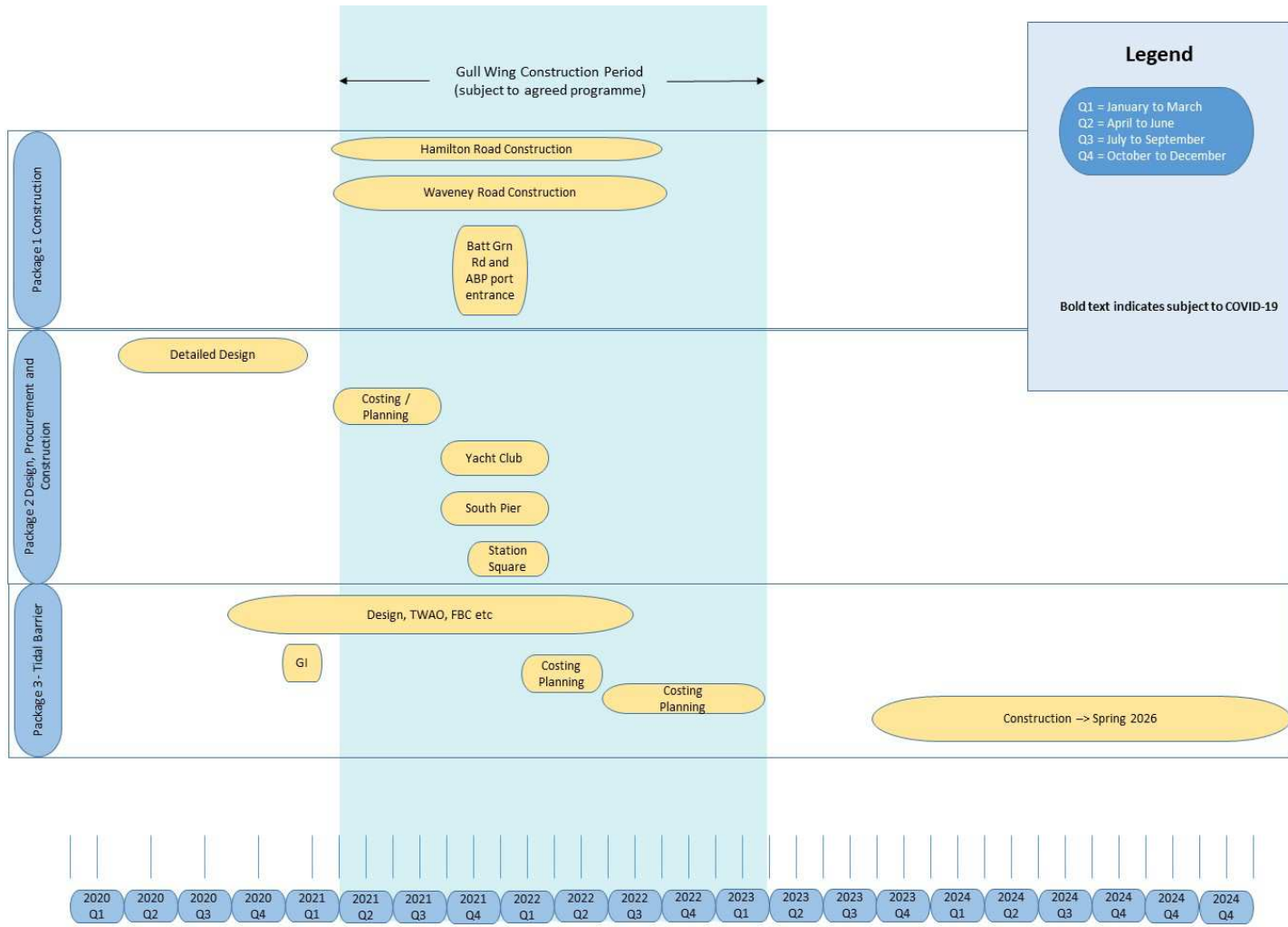


TIDAL FLOOD BARRIER

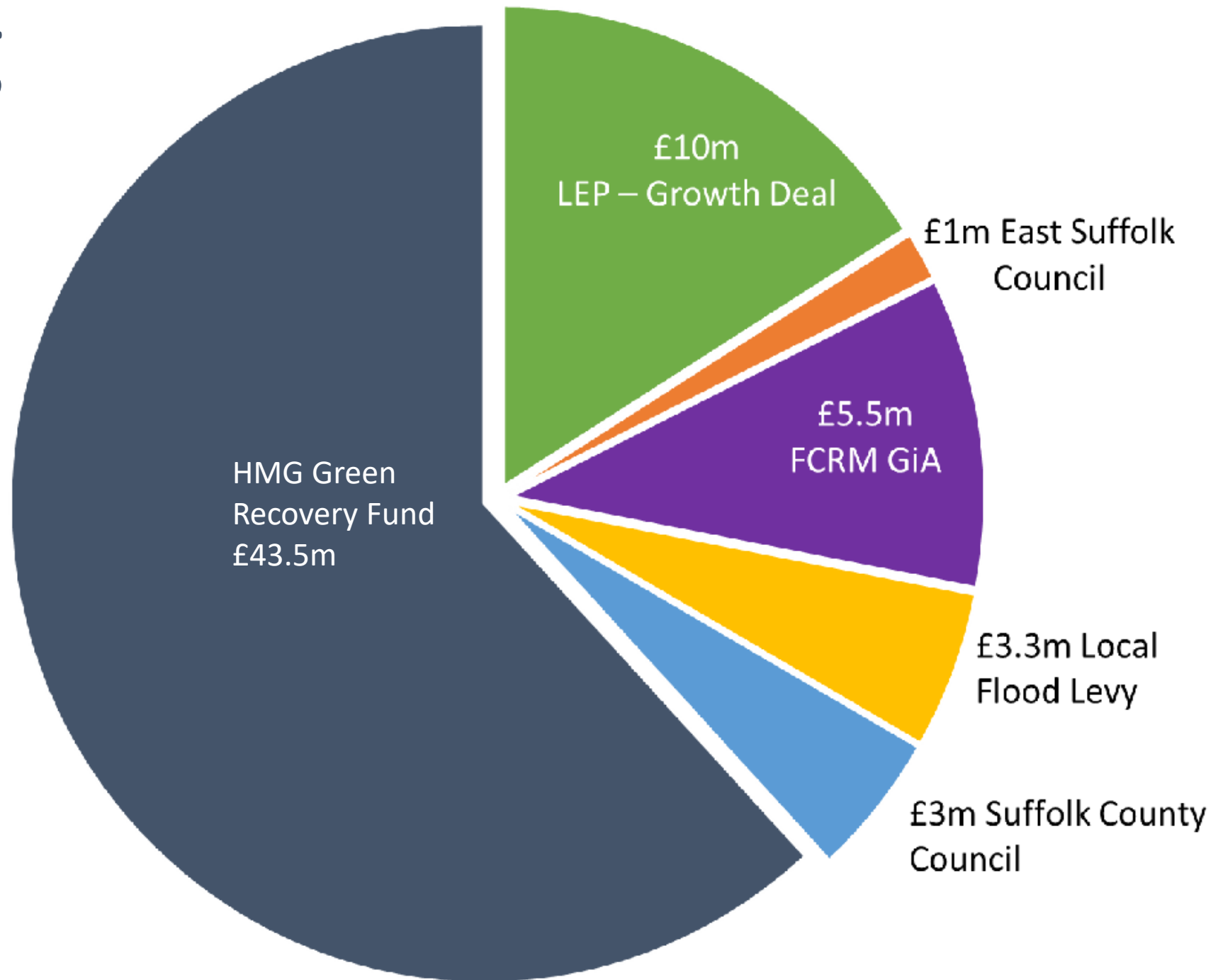




PROGRAMME



Funding Position



TRANSPORT WORKS ACT ORDER (TWA0)

- A TWA0 is needed for the tidal barrier because it permanently alters the navigation channel
- TWA0 gives the Project land access needed to complete construction
- Does not replace the planning application process
- Approved by the Secretary of State (Defra)

DELIVERING A LEGACY & SOCIAL VALUE

SOCIAL VALUE IMPACT

1500
students



engaged through
East Suffolk
Council work
and Balfour
Beatty work at
conferences and
virtual events

10 
work experience
placements
hosted virtually
with more planned
for summer 2021

258 weeks
of apprenticeships
on the project –
local young
people



Volunteering
in Lowestoft food
bank in December
2020



2 **NEETs**
are to be hired in
April 2021



£5,300
contributed
to community
resilience training
through charity
Groundwork

Bike scheme installed in the
compound saving approx.
of car travel and local
traffic each day

30
miles



£353,420
spent with local
SMEs – Velda
Close/PLR



32 **job**
opportunities
created so
far on the
scheme



**£511,
899.00**
spent with local
SMEs – Tidal Walls

Savings in Co2 planned
through
eco cabins,
electric vehicle
charging
points and
electric vans

Car miles saved so
far on the project
through working at
home and hosting
virtual meetings:
122,206

£515 
raised for Breast
Cancer Now by
one of our site
team running
100km in March

Balfour Beatty



QUESTIONS AND DISCUSSION

**More information available at
our project website:**

www.lowestoftfrmp.org.uk

Follow us on social media:



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CLOSE



CASE FOR CHANGE



What area does the Lowestoft Flood Risk Management Project cover?

The Lowestoft Flood Risk Management Project (LFRMP) is about developing a way forward to reduce the risk of flooding from the sea, rivers and from extreme rainfall. The Project covers the areas of Lowestoft deemed to be at significant risk from tidal flooding between the Outer Harbour and the western end of Lake Lothing at Mutford Lock; from river flooding along Kirkley Stream, and from surface water flooding both adjacent to Kirkley Stream and other key areas identified to the north and south of Lake Lothing.

The main risk from tidal flooding is caused by a tidal surge that develops in the North Sea along the eastern coastline of the United Kingdom as was demonstrated by the events in 1953 and most recently in December 2013. Lowestoft has very limited existing tidal flood defences and without further investment, the town will remain at significant risk.

The risk from river flooding was demonstrated by the event in July 2015 along Kirkley Stream. The risk of surface water flooding from extreme rainfall events has been considered within a number of local flood risk zones. In both cases it is important to consider the zone or area that contributes to the flood risk rather than a specific location where the flooding occurs.

Why do we need flood defences in Lowestoft?

The December 2013 tidal surge flood event, which resulted in 90 homes and 143 businesses being affected, highlighted the inadequacy of Lowestoft's flood defences and the impact it has on existing and potential growth for the town.

This was further reinforced by the flooding in the Kirkley area of Lowestoft in 2015 and 2019 following an extreme rainfall events. This demonstrated Lowestoft's vulnerability to all forms of flooding from the sea, rivers and extreme rainfall.

Solutions are needed to address all these forms of flooding to offer the best possible flood risk management for Lowestoft.

Lowestoft has very limited existing flood defences and, without further investment, there is a risk that the instances of flooding will increase as the impacts of climate change increase. Unless we act there is a risk that in the future losses to property and businesses from flooding within Lowestoft will become unsustainable and will prevent any future growth.



HOW HAS THE PROJECT DEVELOPED?



In deciding the best ways in which we should manage flood risk in Lowestoft now and in the future, we have carried out a number of studies looking at:

- **the current extent and risk of flooding**
- **how flood risk could increase in the future through the impacts of climate change**
- **the costs and benefits of providing different flood risk management solutions**

To ensure that impacts to people, the local economy and the environment have been fully understood and taken into consideration, everyone living, visiting or working on or around Lowestoft has been invited to take part in determining how flood risk within Lowestoft should be managed.

To date this has been through:

- **engagement with key stakeholders**
- **one-to-one discussions**
- **the formation of a Key Stakeholder Group, consisting of members of the community and local businesses**

We have used the feedback from this consultation to make decisions on the best approach and the options that are proposed to be taken forward in the strategy.

What solutions were considered for tidal flooding?

In deciding the best ways in which we should manage tidal flood risk in Lowestoft now and in the future, we have assessed a long list of options as follows:

Do nothing

OPTION
1

This option is a baseline only, against which to evaluate the economic benefits of the other options. It allows the existing tidal flood risk management assets to degrade and ultimately fail. This option is not considered any further based on social, economic and sustainability grounds.

Maintain existing defences

OPTION
2

This option involves the continued maintenance of the existing wall along the east side of the A47 Waveney Road, which forms the foundation for Associated British Ports (ABP) security fence and provides an informal tidal flood defence. This wall only prevents tidal flood waters up to a level of 2.90mAOD from flowing into the town centre directly from the Outer Harbour. It does not prevent tidal flooding from other routes from inside Lake Lothing.

This wall, in combination with the restrict of flood water flows through the Bascule Bridge opening, only provides a very low standard of flood protection and was overtopped during the flood event in December 2013.



Improve – defence raising (walls only)

This option involves the construction of 5km of flood walls to the north and south of Lake Lothing, as well as in front of the Royal Norfolk & Suffolk Yacht Club (RNSYC) to the south and along the perimeter of the Outer Harbour to the north where it ties in with the existing coastal flood defences at the north-east corner of Hamilton Dock.

The flood defence wall on the north side of Lake Lothing would need to tie into high ground at its western end. This can only be achieved by either a flood gate across the dual Norwich to Lowestoft railway line near the Peto Way/Barnards Way roundabout or by a further 750m of wall construction to the west. On the south side the wall would need to tie into high ground at its western end close to Waveney Drive.

There would be numerous floodgates, especially on the north side, to allow access to the port quayside area in front of it. The walls, between 0.4m and 1.7m in height, would also be crossed by a significant number of drainage outfalls.

OPTION
3



Improve – defence raising (walls combined with a barrier)

3 barrier locations considered:

Outer Harbour

OPTION
4

This option involves the construction of the barrier across the channel entrance to Lake Lothing on the seaward side of the Bascule Bridge as well as another barrier at the entrance to the Outer Harbour.

It involves the construction of 0.7km of floodwall which ties into the same point of high ground to the south as per the other improve options as well as to the harbour sea wall to the north.

The number of floodgates required and the number of drainage outfall crossings would be minimal in comparison to all the other improve options considered. This option was considered to understand if there would be any benefit to the Outer Harbour area and the key businesses that operate in that area.

CHOSEN OPTION Seaward of Bascule Bridge

OPTION
5

This option involves the construction of the barrier across the channel entrance to Lake Lothing on the seaward side of the Bascule Bridge.

Some of the defences are adaptive and will therefore need to be raised in 50 years in line with sea level rise predictions.

It involves the construction of 1.5km of floodwall along the same alignment as Option 3 but the floodwalls would tie into the barrier structure rather than continue further west within Lake Lothing to tie into high ground.

The height of the floodwalls would vary between 0.4m and 1.7m. The number of floodgates required and the number of drainage outfall crossings would be significantly less than those for Options 3 and 6.

Within Lake Lothing combined with Gull Wing Bridge

OPTION
6

This option involves the construction of the Gull Wing Bridge across Lake Lothing adjacent to the Riverside Business Park at the proposed location for the 3rd Bridge Crossing to consider whether there were any benefits from that joint construction.

It involves the construction of 3.7km of floodwall along the same alignment as Option 3 but the floodwalls would tie into the barrier structure rather than continue further west and tie into high ground at the north-west and south-west ends.

As with Option 3 there would be numerous floodgates, especially on the north side, to allow access to the port quayside area in front of it. The walls would also be crossed by a significant number of drainage outfalls.

What criteria have been used to assess the strategic flood risk management solutions considered?

In assessing the possible options, the following criteria have been used to decide which of those solutions offer the best ways to manage tidal flood risk in Lowestoft now and in the future:

- Level of flood risk reduction
- Impact on navigation
- Impact on residents and businesses
- Environmental and landscape impact
- Impact on highways and bridges
- Buildability
- Delivery timescale
- Cost – capital and whole life
- Potential regeneration benefits
- Potential benefits linked with Gull Wing Bridge

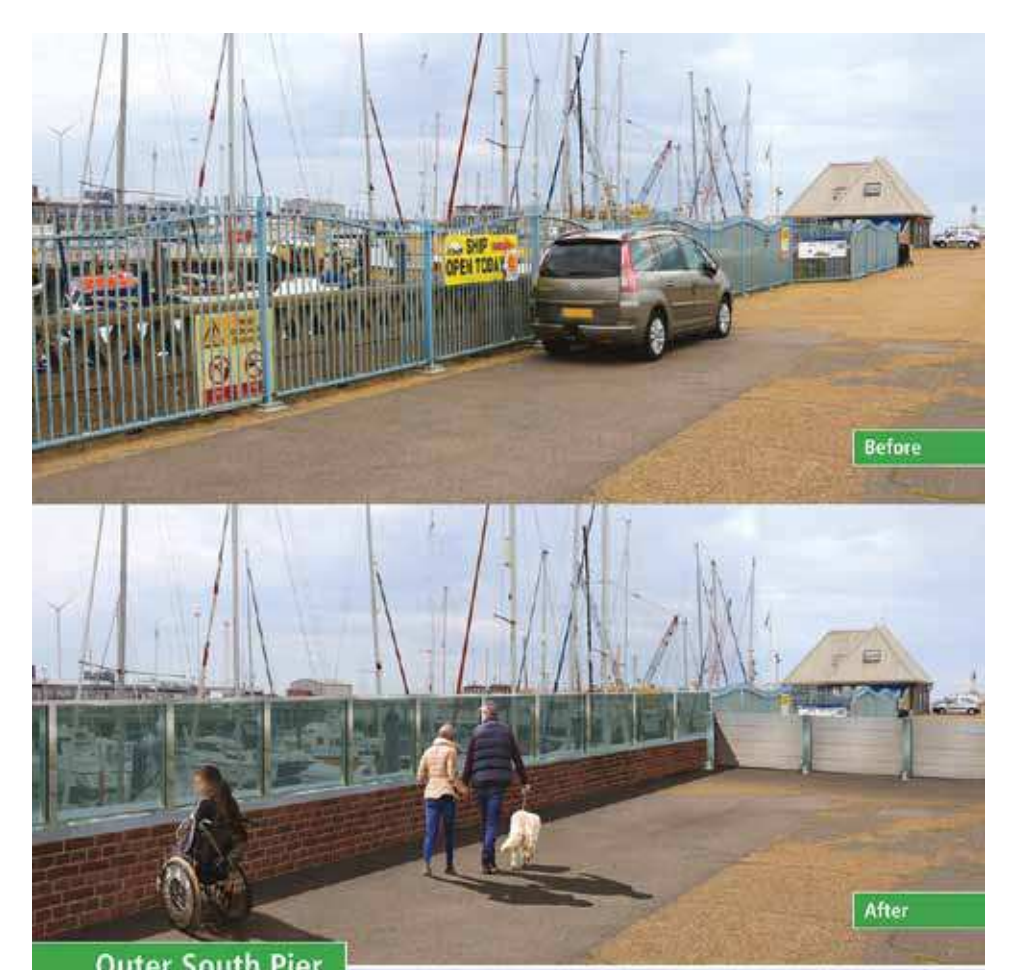
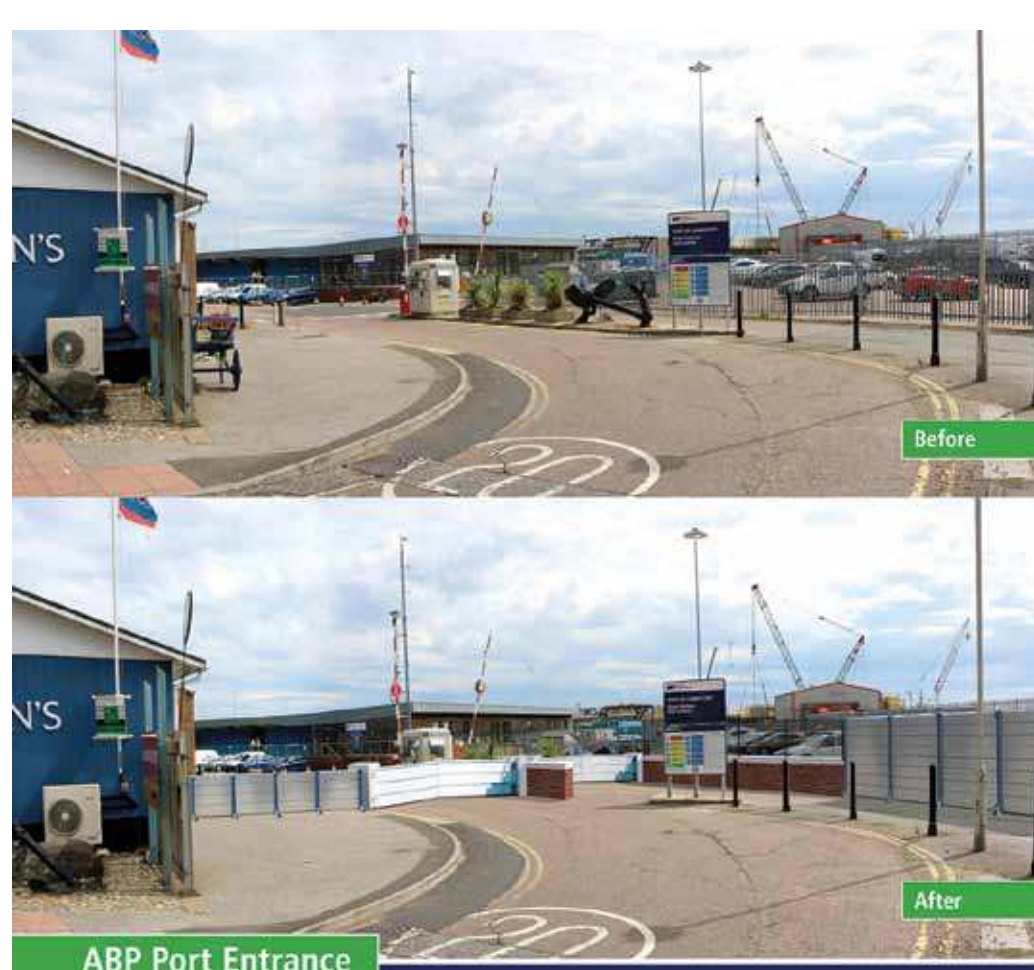
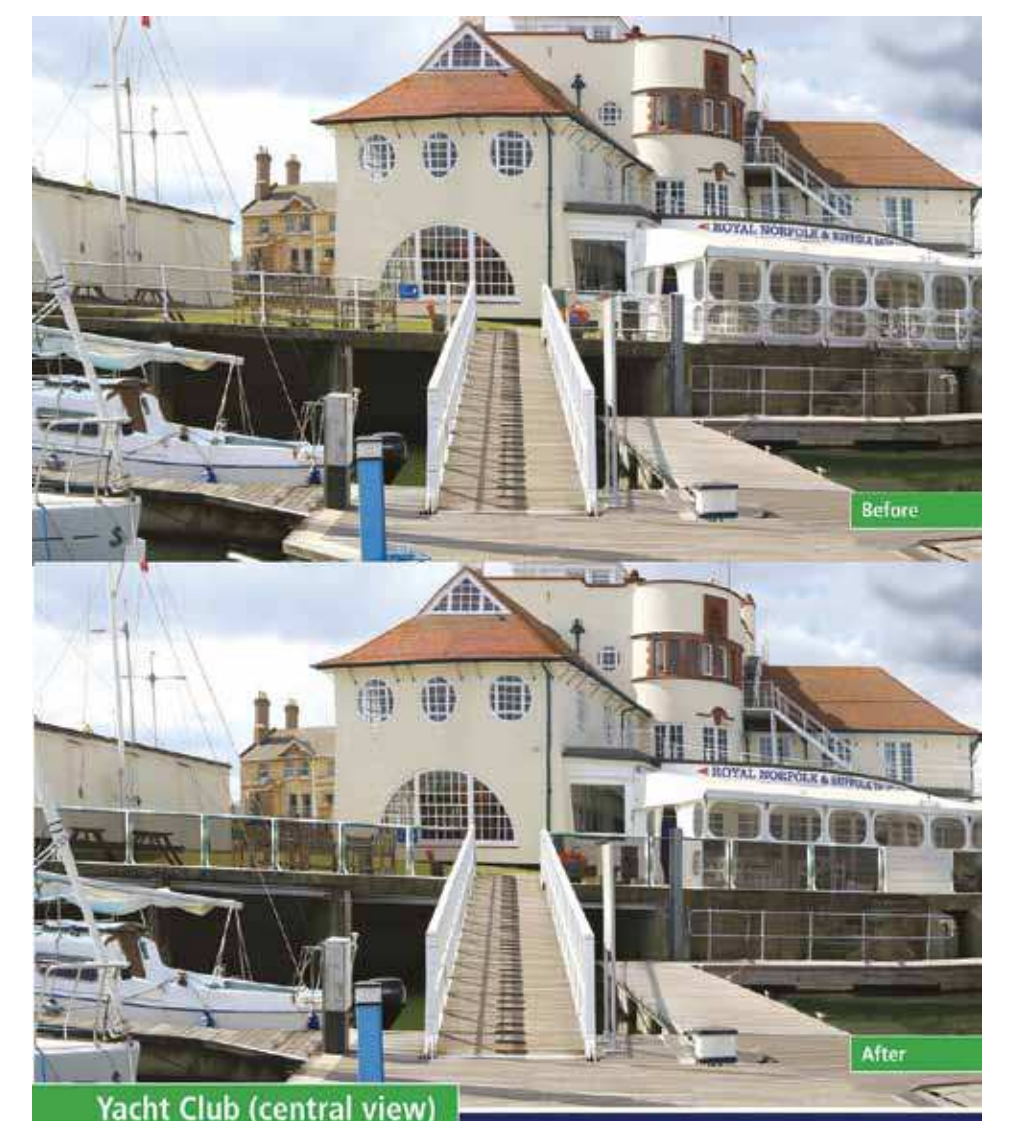
PROTECTION FROM THE SEA TIDAL FLOODWALLS



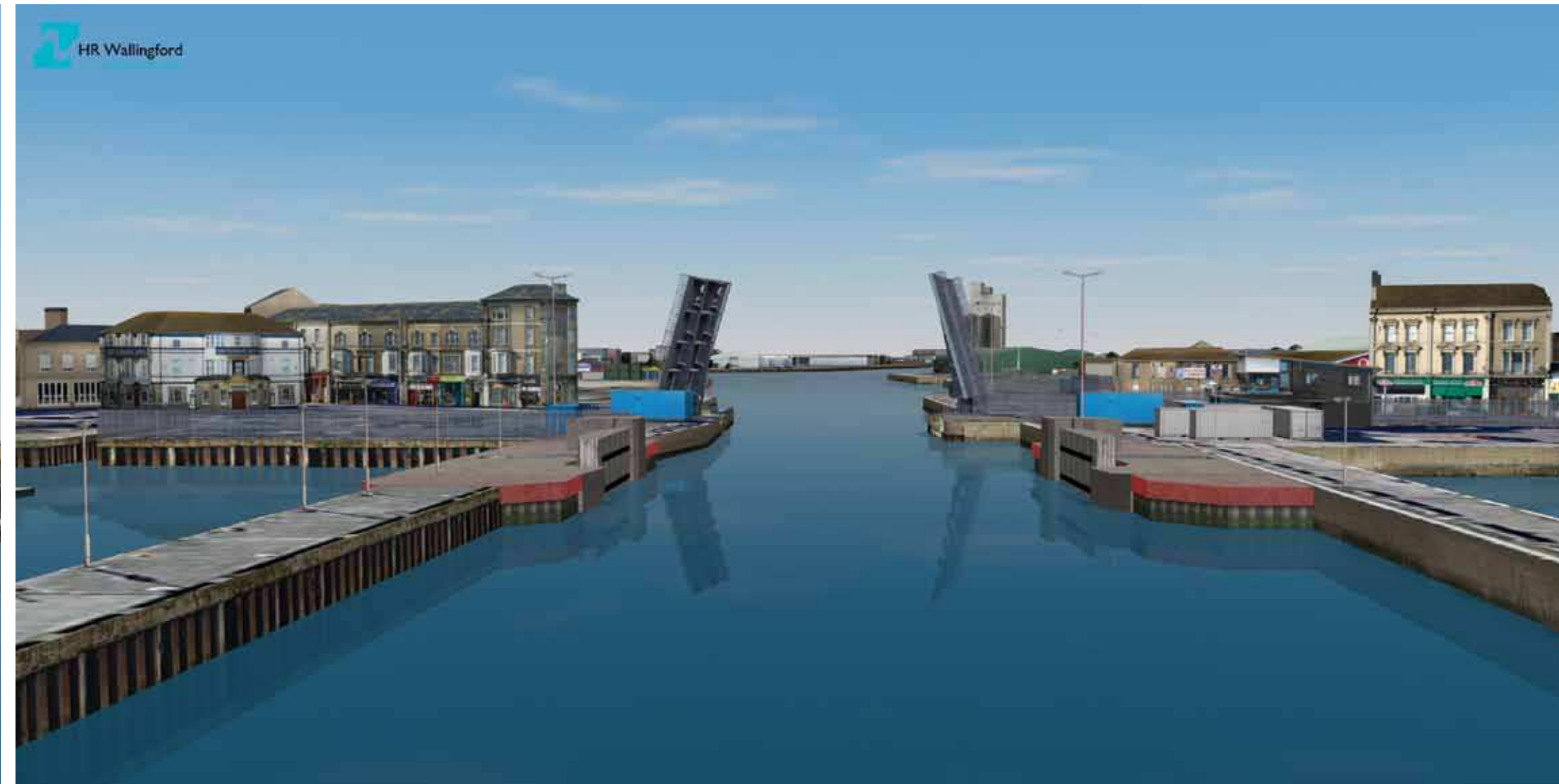
Tidal floodwalls will be built along Hamilton Road and Waveney Road to the north and around the RNSYC and South Pier to the south as shown on the map above.

There will be a mixture of solid floodwalls, demountable defences, floodgates and glass floodwalls. The glass floodwalls will run around the RNSYC and the South Pier to maintain views of the marina and port.

Construction of Package 1 of the tidal floodwalls on Hamilton Road and Waveney Road began in April 2021 and will be completed in summer 2022. Construction on Package 2 to the south of Waveney Road, around the RNSYC and along the South Pier will begin in October 2021 and be completed spring 2022.



TIDAL BARRIER

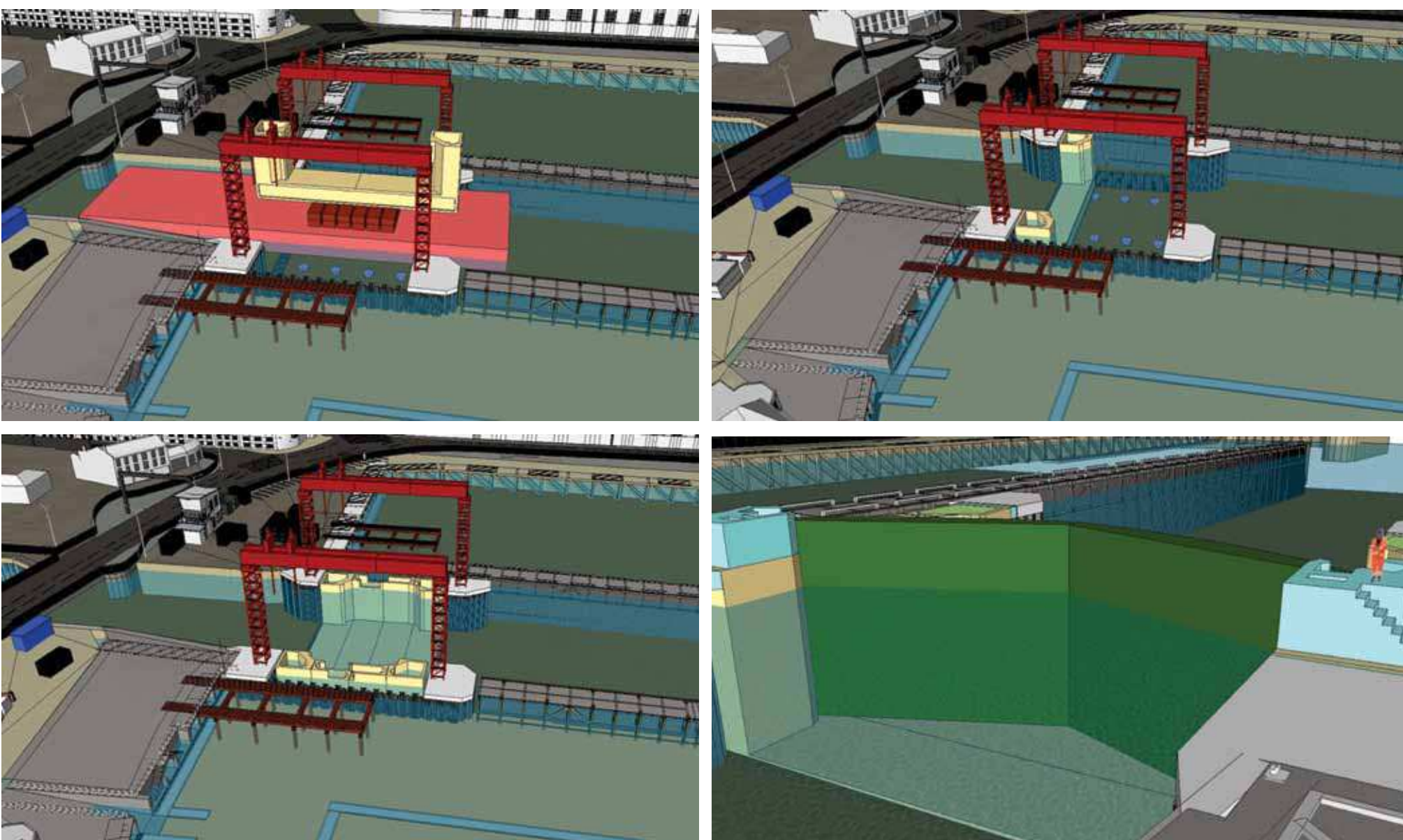


A tidal barrier will be built across the channel entrance to Lake Lothing on the seaward side of the Bascule Bridge.

The tidal barrier will consist of four concrete sills, each approximately 40m long, 7m wide and 10m tall, weighing about 2,500 tonnes. A steel mitre gate will be installed on top, aligned with the Bascule Bridge.

As there is nowhere to divert the navigation channel, the barrier has been designed to keep disruption to a minimum by working over the winter months and closing the channel for only short periods of time. As such, the concrete sills will be built at a site in Lake Lothing and then taken via barge to the barrier site and lowered in place using a crane. The cranes will be built on temporary jetties on either side of the channel. The barrier will leave 28m clear width for port and navigation use.

The mitre gate's top level will be approximately 600mm higher than the existing road level at the Bascule Bridge to provide 1 in 200 years standard of defence (includes allowance for the expected climate change over the next 100 years).



Navigation Simulation

In April 2021 navigation simulations took place at the HR Wallingford UK Ship Simulation Centre. This involved a fully functioning simulator, where the ship bridge was surrounded by a 360-degree simulation of a ship coming into Lowestoft. The simulations were piloted by ABP pilots, just as they do in their day-to-day job. A variety of weather and tide conditions were simulated in both day and night time. The simulations took into consideration both the construction and operational phases of the Project.

The navigation simulation is an important stage for the tidal barrier. From this, the Project team and ABP will produce a navigation plan for the barrier. There will be opportunities for other navigation users to view the simulation and let us know of any thoughts and concerns that they might have so that they can be considered as part of the navigation plan.

Transport Works Act Order

The tidal barrier requires a TWAO. This is granted by the Secretary of State and is needed when construction can change or affect navigation. A TWAO can take up to two years to be approved but we are working with our partners, stakeholders and the community to make sure that we address concerns as early as possible.

One of the critical elements of a Transport Works Act Order is to sufficiently understand and address any areas of concern from those who are affected by the work needed to build the tidal flood walls and barrier. We are making sure that we engage and consult with you to allow ample opportunity for concerns to be raised. These will be fed back through the Project's governance system to enable input from our Board, Strategic Steering Group and Key Stakeholder Group.

PROTECTION FROM RIVERS & RAINFALL

Fluvial and Pluvial Flood Risk Works

Suffolk County Council has responsibility for managing flood risk from surface water and small watercourses. This role includes the identification of locations at particular risk from these sources and, where possible, developing projects to reduce the risk of future flooding. The Council has welcomed the opportunity to partner with East Suffolk Council via Coastal Partnership East to be part of the wider LFRMP which has resulted in the flood risk being reduced for over 150 properties across the town.

Velda Close Flood Defence Scheme

Properties in Velda Close and Aldwyck Way were at very significant risk of flooding; there is a long history of events that resulted in internal flooding of houses. The two most serious occurred in 2015 and 2019 when over 20 homes flooded up to 600mm deep. The project has been designed and is due to complete construction in June 2021 of a new flood wall and pumping station that will significantly reduce the risk of flooding occurring in the future. The main source of flooding was from the Kirkley Stream that drains surface water from much of this area of Lowestoft; the new sheet piled flood wall has effectively raised the banks to reduce the risk of water overtopping. In order to ensure the existing surface water systems can continue to drain into the stream even during storm events, a pumping station has been constructed behind the wall and a new outfall placed on the bank. Anglian Water will be adopting and maintaining the pumping station once complete and Suffolk County Council will maintain the flood wall.



The Kirkley stream channel with sheet piled wall during construction.



New outfall with pumping station being constructed behind.

Property Level Resilience

Where properties were identified as being at risk from surface water flooding, but could not be protected by a community defence such as the one alongside Kirkley Stream, they have been offered Property Level Resilience measures by the Project. The work to install these in over 130 homes is nearing completion. The measures include flood doors, non-return valves in external pipe work and self-sealing airbrick covers, designed to reduce the risk of water being able to enter the property. The systems we have prioritised are those that work without active intervention by the homeowner, i.e. the flood doors are watertight when closed normally (no need to fit an additional barrier or tighten brackets). This means the homes are resilient to a flood that may occur without warning or if residents are away at the time.



HOW IS THE PROJECT FUNDED?

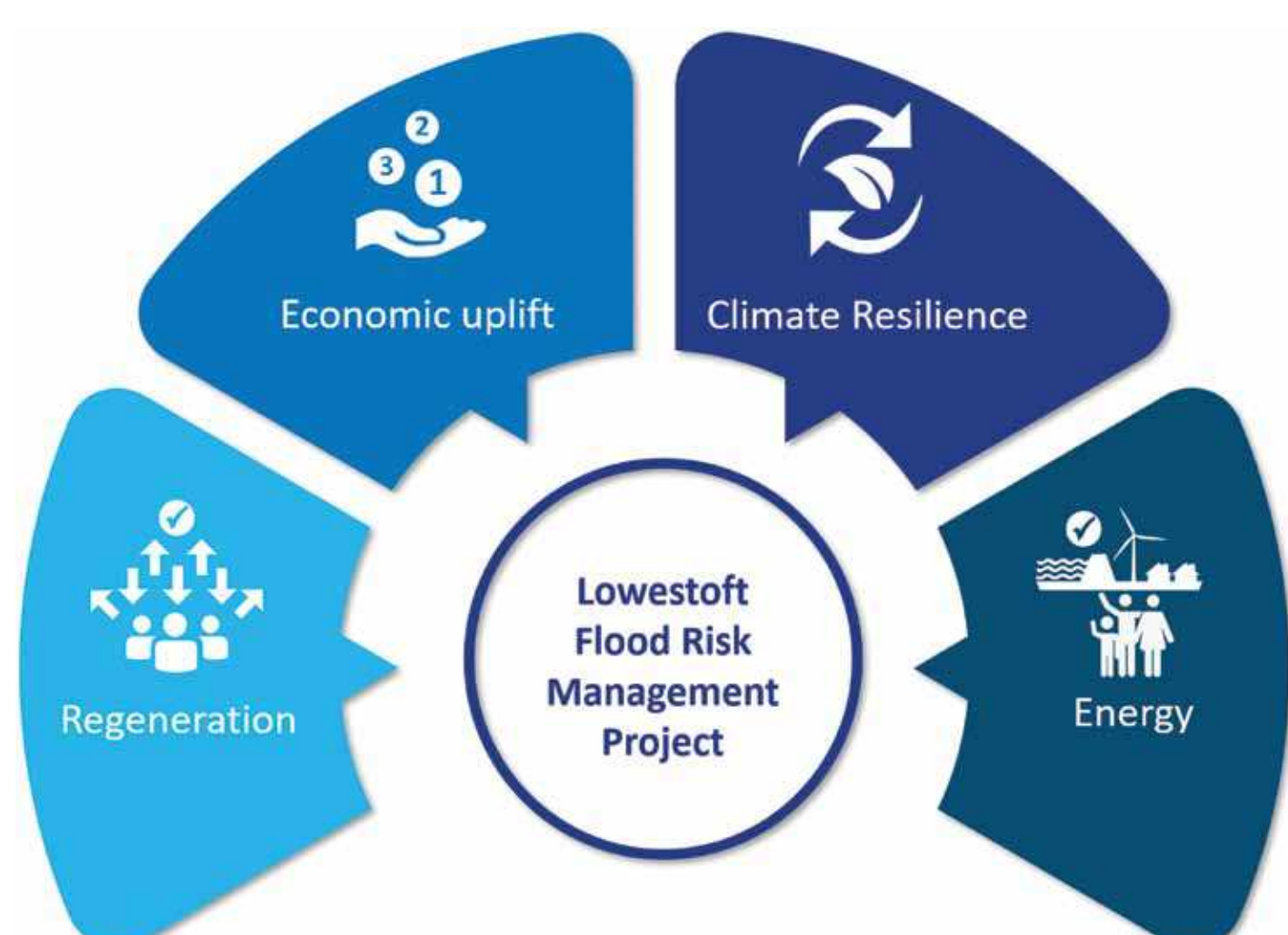
A unique project like the LFRMP requires a unique funding package.

As shown by the 2013 storm surge and recent severe rainfall events, the risks to Lowestoft from flooding is significant. A large number of homes, businesses, infrastructure, utilities and other services have been impacted. This means that the town and business operations are at risk of disruption or even complete shut down in the case of a severe flooding incident.

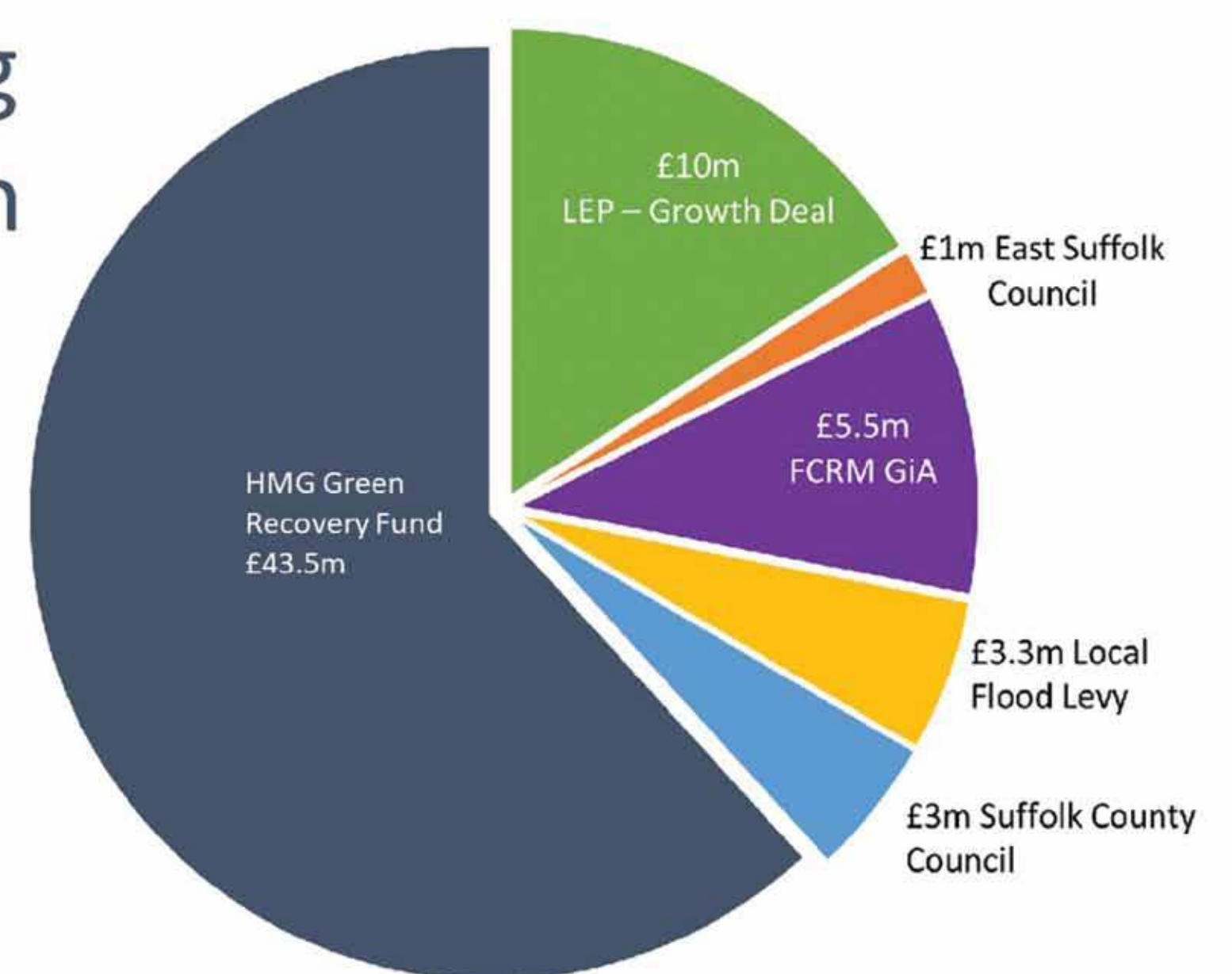
Lowestoft is also at the beginning of a major regeneration journey. Many of the key areas of the town are at flood risk or are at risk of disruption. This impacts the viability of development due to the costs of essential site-level flood defences.

Climate change projections show that sea levels are predicted to rise and the number of severe rainfall and storm events will increase. This means that many more homes, businesses and infrastructure will be at risk over the coming years.

Due to the local and national importance of the offshore energy Projects being supported by the project now and over the coming decades, it is essential that the port remains operational during the construction of the tidal barrier. Closure for any extended period could result in disruption to these nationally critical projects and place future projects at risk, resulting in local and wider economic impact.



Funding Position



Funding partners

As a result of the opportunities that the LFRMP will unlock, an innovative funding package has been assembled thanks to the close collaboration between the multiple funding partners.

These are:

- HM Government (Green Recovery fund): **£43.5M**
- New Anglian Local Enterprise Partnership (Growth Deal Fund): **£10M**
- Defra & Environment Agency (Flood Defence Grant in Aid): **£5.5M**
- Regional Flood & Coastal Committee (Local Flood Levy): **£3.3M**
- Suffolk County Council: **£3M**
- East Suffolk Council: **£1M**

These partners recognise the risks to the community and businesses but also the huge opportunities to enable resilient job creation, economic growth and wider social benefits that the LFRMP will deliver. These partners also support the vision for a thriving town and port that is resilient and can adapt to future climate change impacts.

WHO'S INVOLVED?



Partners



The contract was procured via the **Scape Civil Engineering** framework.



The contractor on the LFRMP is **Balfour Beatty**.

Balfour Beatty

About Balfour Beatty

Balfour Beatty is a leading international infrastructure group. They finance, develop, build and maintain the vital infrastructure that we all depend on.

Their teams operate across the full infrastructure life cycle, combining world-class investments capability and leading construction and support services to deliver large, nationally critical complex infrastructure through to local and regional projects right at the heart of local communities.

- They finance
- They design and project manage
- They develop and construct
- They operate and maintain assets

Their main geographies are the UK, US and Hong Kong with 26,000 employees worldwide. Their customers are government departments and agencies, regulated utilities and private sector organisations.

With over 110 years of experience in delivering highly complex infrastructure schemes through to projects at the heart of local communities, Balfour Beatty operate with the highest levels of quality, safety and technical expertise, integrate with customers and local supply chains and support local communities.

Balfour Beatty's Sustainability Strategy ensures they leave a positive legacy for the people they work with, the communities they work in, and the world in which they operate. Balfour Beatty want to enhance their impact on the environment, working with their supply chain partners, customers and communities to ensure their choices are sustainable. Making the right choices is embedded through Balfour Beatty operations and supported with a robust governance framework.

www.balfourbeatty.com

ABOUT SCAPE SOCIAL VALUE



About Scape

The LFRMP has been procured on the Scape Civil Engineering Framework. Scape is a public sector organisation, in its ownership and its ethos. It has a clear public purpose: the creation of an efficient and effective route to market for all built environment services.

Through a consistent and industry recognised performance management approach, setting appropriate strategic objectives and embedding relevant measures of performance, Scape ensures that all delivery partners in our supply chains and partnerships prioritise social value outcomes as an essential element in publicly procured projects and commissions.



Social Value in Lowestoft

The LFRMP will measure the social value the project generates using the National TOMs Framework. The National TOMs Framework aims to provide a minimum reporting standard for measuring social value.

Our social value work in Lowestoft will focus on creating apprenticeships, reducing carbon emissions, hiring NEETs, saving car miles and initiatives to support older, vulnerable, and disabled people. We will also engage local students, community groups and charities with the project through our community engagement work.

If you'd like to hear more, contact lizzie.forbes@balfourbeatty.com

Social Value Impact

£515 
raised for Breast Cancer Now by one of our site team running 100km in March

1500
students


engaged through East Suffolk Council work and Balfour Beatty work at conferences and virtual events

10 
work experience placements hosted virtually with more planned for summer **2021**

£511,899.00
spent with local SMEs – Tidal Walls

258 weeks
of apprenticeships on the project – local young people 

Volunteering
in Lowestoft food bank in December 2020


2 NEETs
are to be hired in April 2021 

£5,300
contributed to community resilience training through charity Groundwork

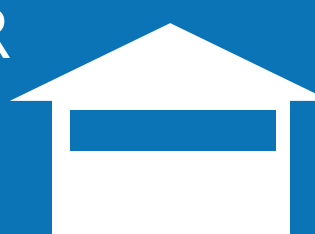
Savings in Co2 planned through eco cabins, electric vehicle charging points and electric vans

Bike scheme installed in the compound saving approx. of car travel and local traffic each day



30
miles

£353,420
spent with local SMEs – Velda Close/PLR



32 job
opportunities
created so far on the scheme 

Car miles saved so far on the project through working at home and hosting virtual meetings:
122,206

COMMUNITY ENGAGEMENT



A vital part of the Project is working with and consulting local communities, businesses and organisations. Your views are important. At various points in the Project there have been public consultations, providing everyone with a chance to have their say. We will also be meeting with communities and businesses throughout the process.

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Working with Young People

Flipside Festival were commissioned by the LFRMP to work with the community to produce a lasting legacy for the flood walls that will help to protect Lowestoft from flooding from the sea.

The Watertight Words project was established by Flipside Festival and has seen over 1000 primary and secondary school children engaged, as well as many other community groups in Lowestoft, with the involvement in the work to understand and reduce flood risk in Lowestoft. The Watertight

Words workshops used audio and visual materials to explore, through language and poetry, people's reactions to the sea, its history of flooding and what the building of the new flood wall will mean. These words have been brought together by the poet Dean Parkin and the art installation is by Gary Breeze.

These installations can be seen in various locations around the town and will be permanently engraved on to the glass sections of the sea wall. If you visit Lowestoft you will see many others filling boardings and other spaces in Lowestoft.



LOWESTOFT
FLOOD RISK MANAGEMENT PROJECT

Issue 4
July 2021

Newsletter



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Community engagement 4

Your involvement 4

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Welcome

Over the past few months we have made vital progress with the Lowestoft Flood Risk Management Project. As you may be aware, in July 2020 the project was awarded £43m from the Government's Green Recovery Fund, which added to funding from the New Anglia Local Enterprise Partnership, Flood Defence Grant in Aid, Local Levy contributions, funding from the Department of Education and contributions from Suffolk County Council and East Suffolk Council means that the project can progress.

Since then, the project has progressed at a pace, with construction of the tidal floodwalls officially beginning in May. Progress has also been made on the design phase of the tidal barrier, with marine ground investigations taking place in February and the completion of the navigation simulation in April.

In May we opened our virtual visitor centre – a place where you can find out about the project, ask any questions you have and leave feedback via a survey. We will be updating the centre throughout the project as we progress. Visit the centre here:

www.lowestoftfrmp.org.uk/consultations

We hope that the information is helpful to you, but if you have any queries at all, please do get in touch.

Best wishes

David Ritchie

Chair, Lowestoft Flood Risk Management Board



Virtual Visitor Centre

In May we launched our virtual visitor centre providing information about development and construction of the tidal flood walls and tidal barrier.

The virtual centre provides information about the history of the project, how it has progressed and the ways in which the project is providing opportunities for Lowestoft.

Information boards feature visualisations of how the flood defences will look and images of work that has already been completed. Visitors can ask questions using a chat facility, which will be collated and answered by the project team. Visitors can also share their views and concerns via a survey.

Visit the centre here:

www.lowestoftfrmp.org.uk/consultations



Flooding from the Sea

Tidal Floodwalls

In May 2021 ground was officially broken on package one of the tidal floodwalls. We welcomed representatives from our partners to a small, socially distanced ceremony on Hamilton Road. We were pleased to share the ceremony via a livestream to over 150 people. The full ceremony can now be viewed on our website here:

<https://www.lowestoftfrmp.org.uk/construction>

Full details of where the tidal floodwalls are being built can be found at our virtual visitor centre.



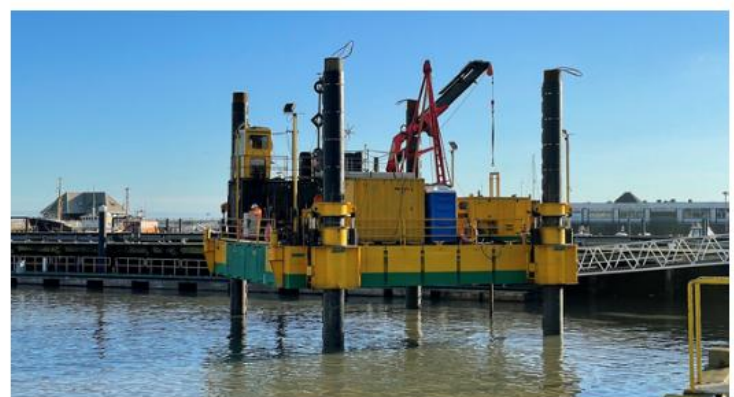
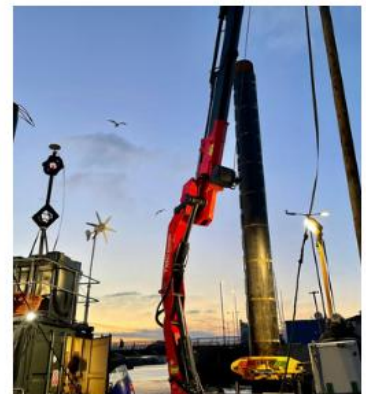
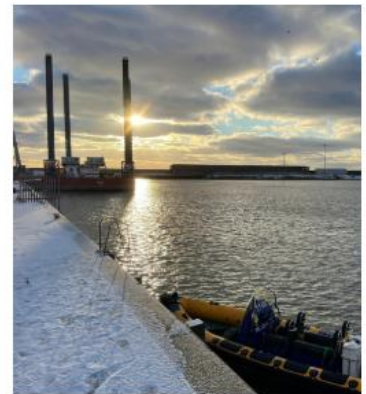
Photos: Warren Page

Tidal Barrier

Progress has been made towards the outline design for the tidal barrier.

Marine Ground Investigations

In February 2021 marine ground investigations were completed. These involved the drilling of test holes in the seabed ranging from 10 to 40 metres deep, from a jack-up barge. Material samples were taken for testing to assess the geotechnical properties of the ground, the results of which will inform the foundation design of the tidal barrier. The analysis will also be used to develop the design of temporary jetties that will be installed for the construction phase of the tidal barrier.



Photos: James Hamnett (Jacobs)

Flooding from Rivers and Extreme Rainfall

Suffolk County Council has responsibility for managing flood risk from surface water and small watercourses. This role includes the identification of locations at particular risk from these sources and, where possible, developing projects to reduce the risk of future flooding. The Council has welcomed the opportunity to partner with East Suffolk Council via Coastal Partnership East to be part of the wider project which has resulted in the flood risk being reduced for over 150 properties across the town.

Construction of a new floodwall and pumping station is nearly complete, which will significantly reduce the risk of flooding of Velda Close occurring in the future.

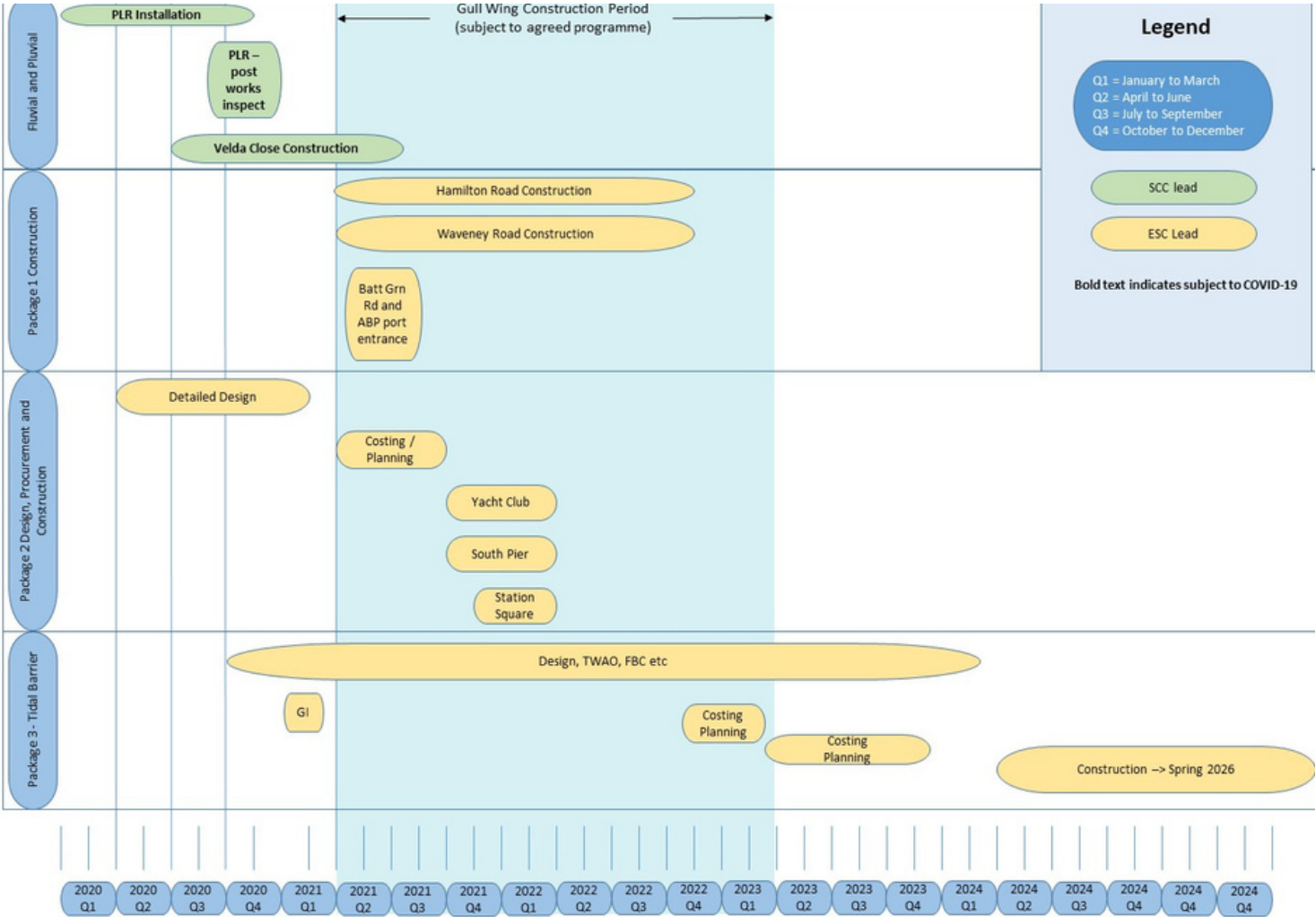
Where properties were identified as being at risk from surface water flooding, but could not be protected by a community defence, they have been offered Property Level Resilience measures. These include flood doors, non-return valves in external pipe work and self-sealing air blocks. Installation of these measures into 123 homes is now nearing completion.

For full details of protection from rivers and rainfall visit our virtual visitor centre here:



www.lowestoftfrmp.org.uk/consultations

Project Timeline



Community Engagement

Our project was procured through the Scape framework, giving us an opportunity to generate social value at each stage of the project. Our social value work in Lowestoft will focus on creating apprenticeships, reducing carbon emissions, hiring NEETs, saving car miles and initiatives to support older, vulnerable, and disabled people. We will also engage local students, community groups and charities with the project through our community engagement work. So far this year this has included:

- In February we provided four virtual work experience placements for students interested in the industry.
- In June our apprentices gave presentations to over 100 students at East Coast College. We employed a local videographer to film the presentations so that we can share them across our website and social media.
- In July we attended Constructarium's Women in Construction event at CITB headquarters in Bircham Newton. We met bright and talented people interested in joining the industry, who we hope to welcome to our site for work experience in the future.
- We have engaged local social enterprise Access Community Trust to provide our onsite catering for our meetings and training days.
- We are installing electric charging points around our site compound and hiring electric vans.
- We have procured bikes from a local company to use around site, saving up to 30 car/ van miles per day.



Your Involvement

This year we have begun engaging with the public to understand your views and concerns about the project as we progress. We have re-established our Strategic Steering Group and Key Stakeholder Group, which meet at regular intervals to provide the project team with input about our activity.

In May we hosted a series of Virtual Public Meetings, inviting members of the public to join us on a Zoom call to hear about the project and ask any questions. If you missed these, we will be hosting some bite size update sessions soon.

Stay in touch

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Our Partners



Our Delivery Partners





LOWESTOFT
FLOOD RISK MANAGEMENT PROJECT

Newsletter

Issue 5
December 2021



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Welcome

Since our July newsletter great progress has been made on the Lowestoft Flood Risk Management Project.

The construction on the tidal floodwalls has progressed well, with the first of the brick cladding on the wall on Waveney Road being installed, smartening the area while also providing vital protection against flooding.

The tidal barrier structure will now take the form of a 40m mitre gate, the first to be built without diverting the navigation channel and the second largest in the UK. This decision was taken following navigation simulations of the original 28m design which showed a necessity to maintain the current width of the navigation channels for larger vessels using the inner harbour. This will allow Lowestoft to continue developing as a hub for offshore wind energy.

The project has also been working closely with schools and young people to offer opportunities of work experience, training and employment.

Our Virtual Visitor Centre where you can find out more about the project, ask any questions you have and leave feedback via a survey is open now and will remain so for the duration of the project. Visit the centre here:

www.lowestoftfrmp.org.uk/consultations

We hope that the information is helpful to you, but if you have any queries at all, please do get in touch.



Best wishes

David Ritchie
Chair, Lowestoft Flood Risk Management Board

Flooding from the Sea

Tidal Barrier

A 40m mitre flood gate, the second largest in the UK, will be built in the entrance to Lake Lothing. The ambitious project will see the mitre flood gate be the first of such structure in the UK to be built without diverting the navigation channel. The gate will form the tidal barrier element of the project and be built over a number of winter seasons to maintain access to the inner harbour.

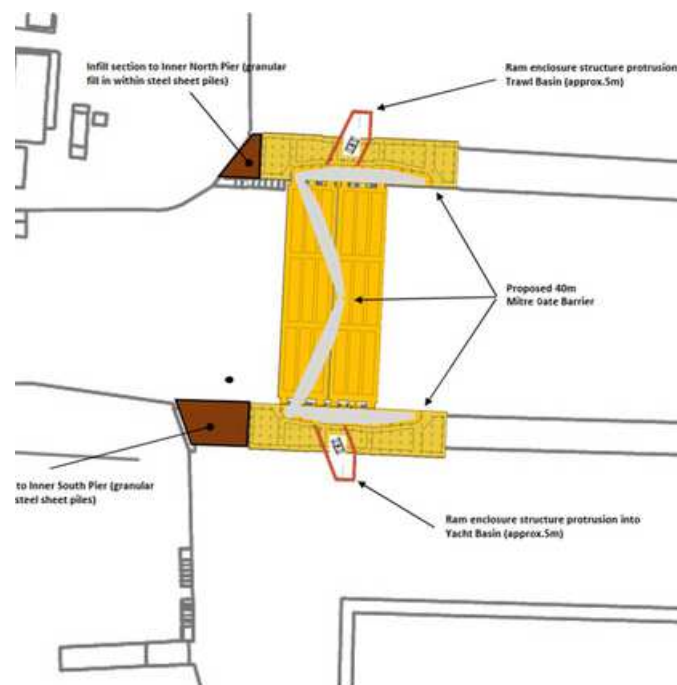


Image: Colne Barrier

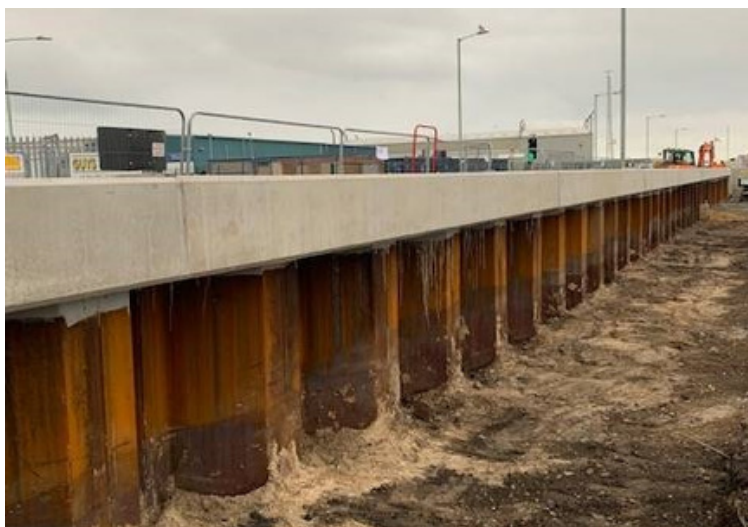
Members of the project team recently visited two other tidal barriers in the region: the Colne barrier and the Ipswich barrier.

Learning will be taken from both these projects to inform the Lowestoft tidal barrier.

Tidal Floodwalls

Construction on package one of the tidal floodwalls officially began in May 2021, with works continuing at a pace along Hamilton Road and Waveney Road. The tidal floodwalls are starting to take shape on

Waveney Road, with brickwork and coping stones already installed. Elsewhere on Hamilton Road, we are making great progress with painting of sheet piling underway.



The construction on package two of the tidal floodwalls around the Royal Norfolk and Suffolk Yacht Club and South Pier is expected to start in early 2022 and will be split over two winter seasons,

with work stopping in March 2022 and recommencing in October 2022. Work can only take place over the winter months due to the impact construction would have on tourism in the summer.

Flooding from Rivers and Extreme Rainfall

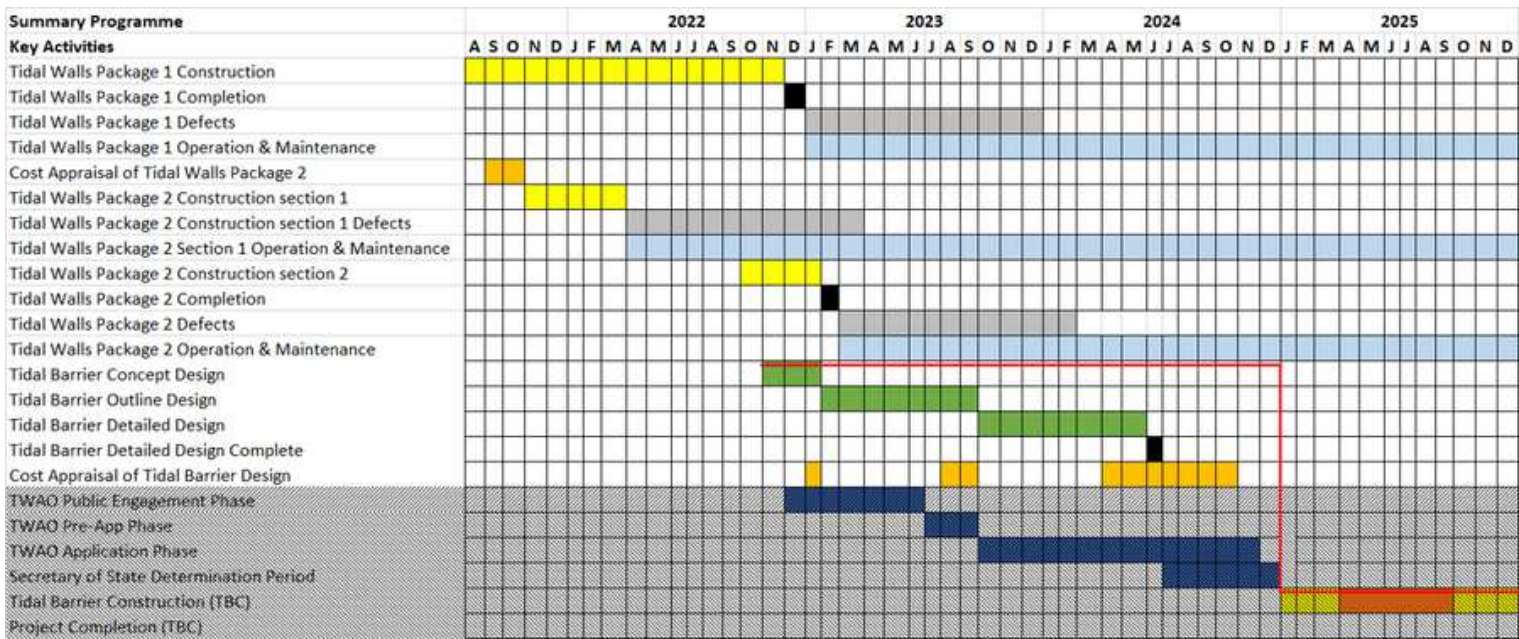
The fluvial and pluvial works have been led by Suffolk County Council and involve the installation of new flood walls and a pumping station at Velda Close. These works were completed in summer 2021.

Property Level Resilience (PLR) measures have also been installed in 123 households. Following final checks, this element of the project was completed November 2021.



Project Timeline

The change in design of the barrier gate has had an impact on the project timeline. The detailed design phase for the mitre gate will begin next year and provide a firm completion date. As a result of this the programme below indicates the current programme, with the greyed out section representing the elements of the project subject to change until the detailed design has been completed.



Your Involvement

The tidal barrier requires a Transport Works Act Order (TWAO). This is granted by the Secretary of State and is needed when construction can change or affect navigation. To complete this work and to enable us to go ahead with the project we will of course need to work closely with local communities, businesses and organisations. As the detailed design of the barrier is developed we will be holding a series of public consultations next year to better understand your concerns. We will share details of these consultations across all our platforms including this newsletter.

Working with young people

Over the past few months we have been working widely within the community, particularly around working with schools and young people.



Virtual Careers Fair

At the Norfolk and Suffolk Coast Forum we launched a Virtual Careers Fair for young people offering an unrivalled opportunity to explore routes into civil engineering, from higher education to apprenticeships, and find out about opportunities local to the region.

Using gaming technology, visitors can independently navigate the fair, with stands from leading employers and organisations including the Environment Agency, Institute of Civil Engineering and East Suffolk Council.

The Virtual Careers Fair has been made possible thanks to generous support from sponsors, including Aecom.

Visit the Virtual Careers Fair at <https://nscec.exhibition.app>

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Work Experience

With the start of construction on the tidal floodwalls we have been delighted to welcome a number of young people on work experience placements on the project.

In June our contractor Balfour Beatty attended the Constructionarium Women in Construction event where we met Irena who completed a work experience placement in September.



We have also been working closely with East Coast College to offer opportunities to their construction students. During the October half term we welcomed Zak, who we have subsequently been able to offer a long-term work placement and joins our team each Friday.



In November we worked with the Prince's Trust to offer a two-week work placement to Sean as part of their Team Programme in Lowestoft. During his placement Sean also gained an Industrial Cadets Silver Certificate.



Our Partners



Our Delivery Partners



2022/23

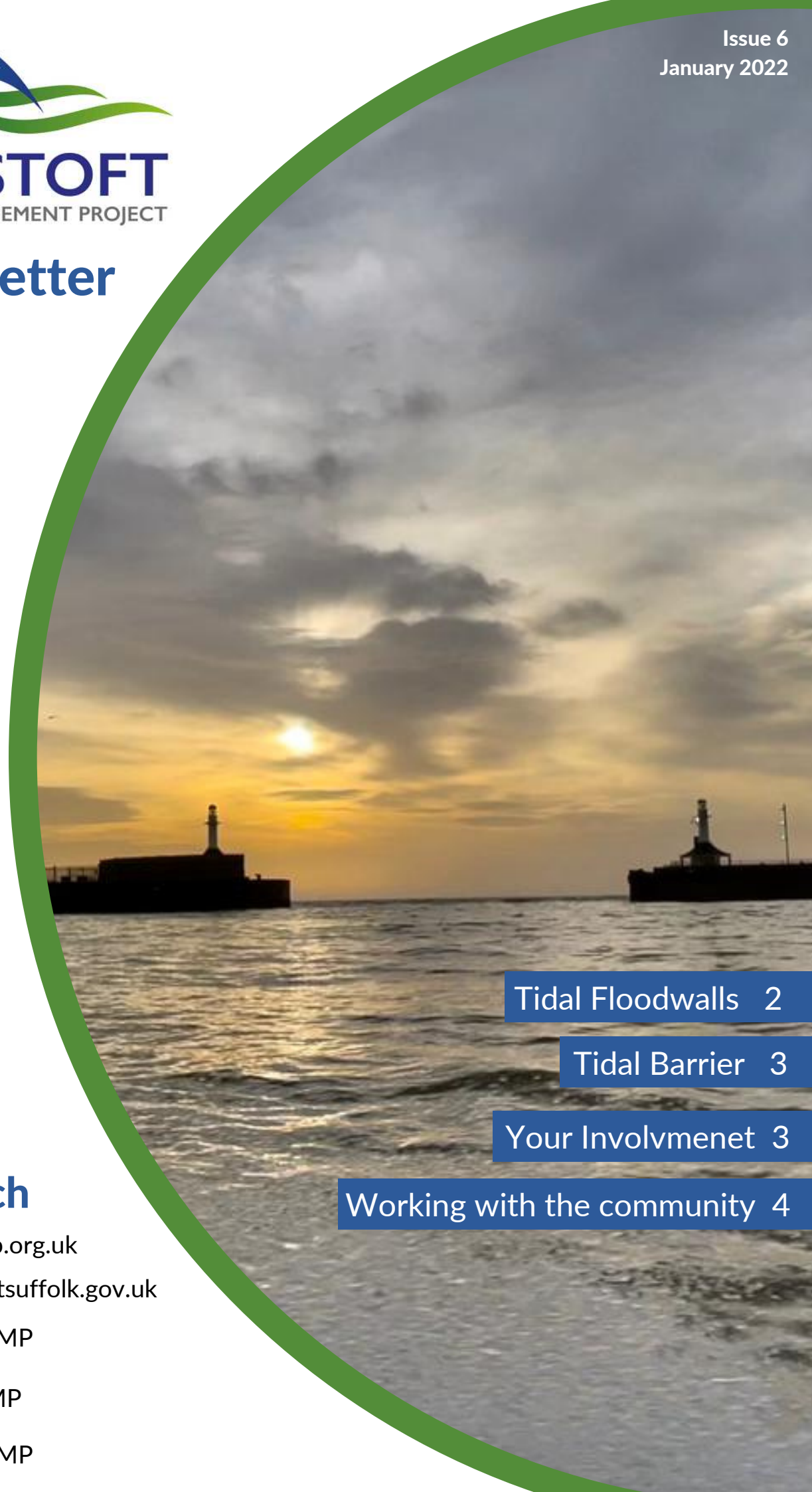
Consultation Materials



LOWESTOFT
FLOOD RISK MANAGEMENT PROJECT

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Issue 6
January 2022



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Welcome

We have begun the new year with the start on construction of the next phase of the tidal floodwalls. This will see glass floodwalls around the Royal Norfolk and Suffolk Yacht Club and South Pier, which will maintain site lines across the harbour and marina. I am delighted to confirm we have also recently completed the first stretches of the floodwalls in the Fisherman's Quay area on Hamilton Road and a stretch of wall on Waveney Road, look through the newsletter for photos of this fantastic work.

Over the past month we have continued to work closely with community groups to ensure our project is bringing maximum value to Lowestoft. Take a look through this newsletter to see how we are upcycling our pallets, working with the Prince's Trust and helping Lowestoft based charity Re-Utilise.

The design phase of the tidal barrier continues. As we develop this we will be asking to hear your views and concerns about the design and construction. We will be holding a consultation in the coming months, please keep an eye on our social media channels and this newsletter for details of how to be involved. In the meantime our Virtual Visitor Centre remains open with all the latest information about the project. Visit the centre here:

www.lowestoftfrmp.org.uk/consultations

Best wishes

David Ritchie
Chair, Lowestoft Flood Risk Management Board



Flooding from the Sea

Tidal Floodwalls

We began work to divert utilities along the South Pier on 17th January 2022. Construction will continue until March, when work will break over the summer. This break is to prevent disruption to the area during the busy tourist season.

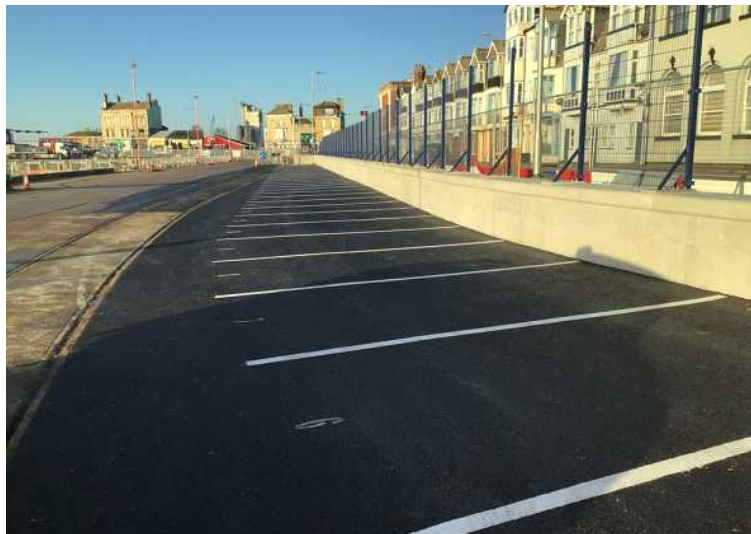
Works at the Royal Norfolk and Suffolk Yacht Club and remaining works along the South Pier will commence in October 2022 and are planned for completion in 2023.

The floodwalls on South Pier will be a brick clad wall with concrete coping topped with glass panels and the floodwalls around the RNSYC will be a one metre high glass floodwall. These will provide flood defence while maintaining an unobstructed view to the marina and outer harbour.



Tidal Floodwalls (Continued)

Construction on the tidal floodwalls along Waveney Road and Hamilton Road is continuing well, with sections around the Fisherman's compound on Hamilton Road and a stretch on Waveney Road now complete. The photo (bottom, left) shows a trial deployment of the demountable defences along Hamilton Road.



Tidal Barrier

The concept design of the 40m mitre flood gate structure was completed before Christmas. A Navigation Simulation for the design will take place in January, an update on this will be available in our February newsletter.

Your Involvement

The tidal barrier requires a Transport Works Act Order (TWAO). This is granted by the Secretary of State and is needed when construction can change or affect navigation. To complete this work and to enable us to go ahead with the project we will of course need to work closely with local communities, businesses and organisations. As the detailed design of the barrier is developed we will be holding a series of public consultations next year to better understand your concerns. We will share details of these consultations across all our platforms including this newsletter.

Working with the community

Last month we helped a number of projects in the community as part of our work.

Upcycling Pallets

We donated pallets leftover from our construction work to the foundation and progression courses at East Coast College, where they will be upcycled. In December 2021 they created some Christmas decorations, and this year plan to make animal boxes for birds and hedgehogs and some compost bins.

We hope to continue donating our pallets as the project progresses.



Racking Donation to Re-utilise

We recently donated some racking to Re-Utilise in Lowestoft, a social enterprise set up to divert waste from landfill, provide craft workshops and a Community RePaint scheme. Here are Bradley and Matt from Balfour Beatty with the racking. While there they also put up some other shelves and fitted some kitchen cabinets!



Prince's Trust Mock Interviews

Our contractor Balfour Beatty supported participants on the Prince's Trust TEAMS programme with Inspire Suffolk. This was a valuable occasion for participants to spend time with a local employer and get interview practice.

Support of Food Delivery Vans

We and our contractor Balfour Beatty have come together to support food delivery vans, providing meals and support to vulnerable people and families.

The Access Community Trust set up PINK Orange at the start of the pandemic to support struggling families with a vital food provision, in the form of easy-to-follow ingredient kits. Their aim was to not only provide essential food support but also encourage children and the young people of the household to learn how to cook in a simple way, through simple recipe cards and YouTube videos.



Considerate Constructors

We are proud to have been awarded a certificate of excellence from the Considerate Constructors scheme. We have maintained our high score - including 9/9 for Respect the Community, Care about Appearance and Care about Safety!

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LOWESTOFT
FLOOD RISK MANAGEMENT PROJECT

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Welcome

The first few months of 2022 have seen great progress to both the construction of the tidal flood walls and the ongoing design phase of the tidal barrier.

Stretches of tidal flood wall are now complete on Hamilton Road and Waveney Road, with construction moving into new areas including the South Pier and in the Port entrance. Read on to see photos of these works.

In January navigation simulations took place for the new design for the tidal barrier, a 40m mitre flood gate. Below you will find images of the simulations kindly provided by HR Wallingford.

We have also continued working with the community, including providing Easter

Eggs to Lowestoft FISH (Food in School Holidays), welcoming STEM students for a site visit and continuing to offer work experience placements.

Our Virtual Visitor Centre remains open and offers an useful overview of the project so far and offers the opportunity to get in touch with the project team and ask any questions you may have.

Visit the centre here:

www.lowestoftfrmp.org.uk/consultations

Best wishes

David Ritchie
Chair, Lowestoft Flood
Risk Management Board



Flooding from the Sea

Tidal Flood walls

In April we moved onto the next stage of the tidal flood walls, beginning construction on a section of Waveney Road from the bus stop around to the Port control office.

This required a short night closure on Waveney Road to install a barrier on the footpath. A diversion to the footpath is clearly signed.



Tidal Floodwalls (Continued)

Construction on the tidal flood walls on Waveney Road and Hamilton Road continues. Work on the South Pier has paused over the summer months to prevent any impact on tourism the construction might bring, work will recommence in the autumn. Below are a selection of images which show our progress.



Concrete pour on the South Pier.



Temporary access to the South Pier.



Coping stones near the Port entrance on Waveney Road.



Crane assisting sheet piling works on Hamilton Road.



Completed tidal wall and fence on Hamilton Road.



Completed tidal wall on Hamilton Road.

Tidal Barrier

We are currently in the Outline Design Phase of the tidal barrier, which will take the form of a 40m mitre flood gate.

At the end of January a Navigation Simulation was successfully completed on the design for the 40m mitre flood gate. This took place at HR Wallingford UK Ship Simulation Centre. Fully functioning bridge simulators were used, where the bridge was surrounded by a 360-degree simulation of a ship coming into Lowestoft. The simulations included a variety of weather conditions both in day and night time.



Image: HR Wallingford



Image: HR Wallingford

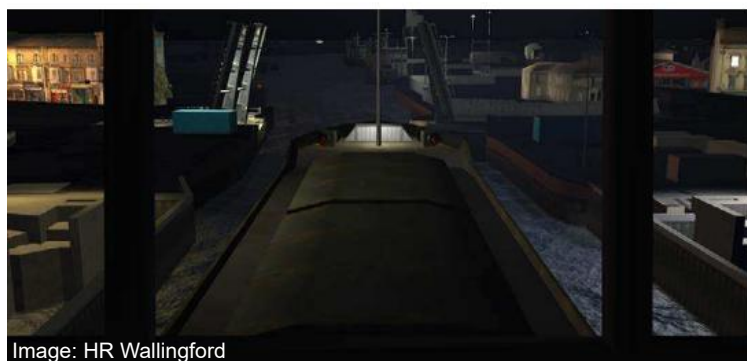


Image: HR Wallingford



Image: HR Wallingford

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Virtual Visitor Centre

Our Virtual Visitor Centre is open now and is a fantastic place to find out more about the project and ask any questions you may have.

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Working with the community

We have continued provide opportunities for young people and work with community groups in Lowestoft.

Easter Eggs

We have donated 200 Easter Eggs to Lowestoft FISH (Food in School Holidays). Run by Lowestoft Community Church, FISH supports many families in the town.



Site Visit

In March we welcomed engineering, science and maths students from University Technical College Norfolk to our site for a tour of Waveney Road, Hamilton Road and the South Pier. Students were able to see our construction operations happening in real time and get a feel for where we are building flood defences in Lowestoft, from the safety of their minibus.

Following the site tour, students were given a presentation on apprenticeship opportunities, effective networking and communication skills as part of their programme with charity Career Ready.



Work Experience



We have been working with The Prince's Trust and their latest cohort of TEAMS programme participants. As part of this we have supported three work experience placements, including Ryan who was really engaged with the project, asked loads of questions and enjoyed his time on our site.

We also ran some mock interviews for the students, enabling them to get some practice with employers before their programme ends.

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Welcome

In this edition of the Lowestoft Flood Risk Management Project newsletter, you can see the progress being made in the construction of the tidal flood walls, including the installation of flood gates into the entrance to the port and further progress to the defences on Hamilton Road.

We are delighted to be partnering with Lowestoft Heritage Open Days, with an exhibition taking place at the Parcels Office on Tuesday 13 September where there will be information about project. We will also be hosting some sessions with schools on Wednesday 14 September. Read on to find out more.

We have also included a dashboard of our social value work. Produced by our contractor Balfour Beatty, the dashboard includes detail of how much money the

project has spent with local small and medium sized enterprises, as well as details of social value activities including volunteering activities and work experience placements.

Our Virtual Visitor Centre remains open and offers an useful overview of the project so far and offers the opportunity to get in touch with the project team and ask any questions you may have.

Visit the centre here:
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Best wishes

David Ritchie
Chair, Lowestoft Flood
Risk Management Board



Tidal Flood Walls

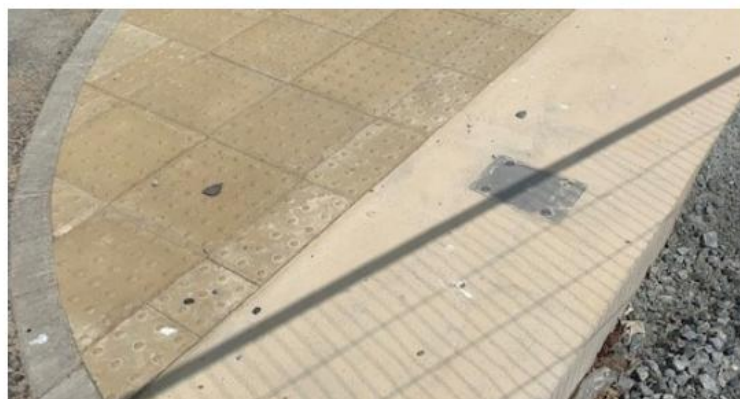
Construction on the tidal flood walls is continuing well. The works on Hamilton Road continue at pace, with much of the work now completed. We have continued to make progress on the works to the port entrance with flood gates now installed.



Flood gates installed in the port entrance.



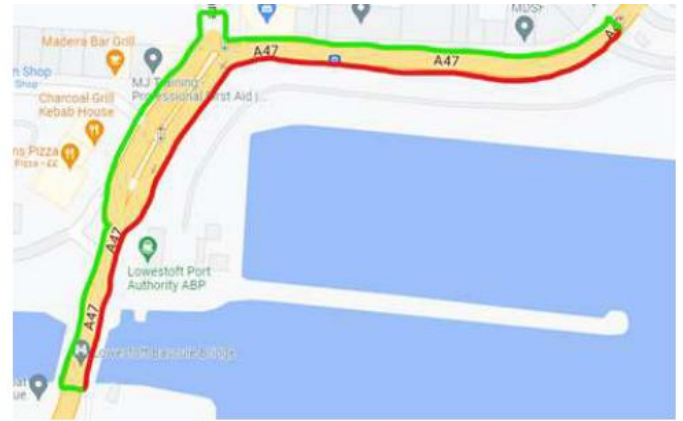
Waveney Road works area
and traffic management.



Newly installed tactile paving
and curb on Hamilton Road.

Tidal Flood Walls (Continued)

Work on Waveney Road has progressed into the Station Square area. As part of this work the footpath on the port side of Waveney Road will be closed until spring 2023 from the port entrance to the end of the bascule bridge as shown by the red line on the map.



A diversion has been signed from the port entrance to the end of the closure, allowing pedestrians to cross the A47 safely. This is outlined in green on the map. We are grateful for your cooperation as construction takes place on these vital defences and apologise for any inconvenience caused by this closure.

Tidal Barrier

We are continuing with the outline design phase of the 40m mitre flood gate. This month we have commenced the Environmental Impact Assessment for the barrier design. We will be consulting our stakeholders on this in the autumn.

Lowestoft Heritage Open Days

As part of the Lowestoft Heritage Open Days 2022, we will be holding an exhibition where you will be able to find out about the history of flooding in Lowestoft and the innovative ways our project is working to help protect the town from future flood events. This will also be an opportunity to talk to members of the team and ask any questions you have.

Exhibition times: Tuesday 13 September, 11.00am - 2.00pm
Venue: Parcels Office, Lowestoft Railway Station, Denmark Road, Lowestoft NR32 2EG

No booking required

Full details: <https://www.heritageopendays.org.uk/visiting/event/protecting-lowestoft-from-future-flooding>

We are also holding sessions for schools where as well as sharing exciting news and developments of the project, there is an opportunity for students to take part in an interactive naming competition and be part of Lowestoft's future heritage.

These sessions will last approximately 50 minutes and are aimed at Key Stage 4 and Key Stage 5 students.

Session times: Wednesday 14th September at 12pm, 1pm and 2pm
Venue: Parcels Office, Lowestoft NR32 2EG
Booking required, please contact charlotte.flight@eastsoffolk.gov.uk





Virtual Visitor Centre

Our Virtual Visitor Centre is open now and is a fantastic place to find out more about the project and ask any questions you may have.

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Your Involvement

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SOCIAL VALUE | APRIL 2020 - JUNE 2022

Balfour Beatty

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

Balfour Beatty work with the Social Value Portal to measure the social value add of the Lowestoft Flood Risk Management Project. This infographic shows how the decisions made by Balfour Beatty, East Suffolk Council and the supply chain are providing added social value in the community we are working in (to date).



Environmental Benefits

£35k

Social Benefits

£1m

Economic Benefits

£2.4m

Total Social Value Add: £3.5million



19 SMEs

Local small and medium sized enterprises engaged



£445,500

spent with local large organisations

£3million

spent with local small and medium sized enterprises (SMEs)



More than **8,000 days** worked on the project by local people

14 local people (FTE) employed



Working with **x2 social enterprises**

£4,226

generated through volunteering

2,000

students reached



429 tonnes

saved through decarbonisation

200,000

car miles saved on the project through car-sharing, public transport and bike scheme



six apprentices employed

£540k

of added value through local employment

Note: Local is defined as within 40 miles

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Working with the community

We have continued provide opportunities for young people and work with community groups in Lowestoft.

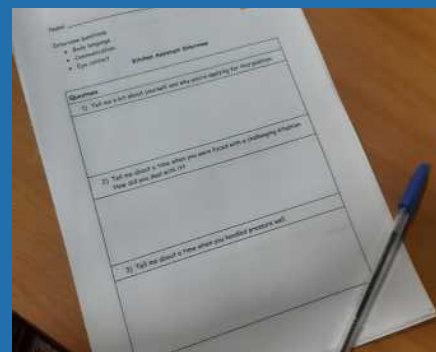
Beach Clean

In May a team of volunteers from Coastal Partnership East, Balfour Beatty, AECOM, SCAPE and Claret Civil Engineering came together to help keep Lowestoft's beaches clean.



Mock Interviews

We were pleased to help Ormiston Denes Academy with mock interviews. We met with Year 10 students and provided them with a mock interview experience. We were really impressed with the student's enthusiasm, giving some really engaging answers.



Upcycling

Earlier this year we supplied East Coast College with some pallets for their students to use in upcycling projects, including the construction of these planters.



Work Experience

We have continued to welcome students onto our site for work experience, including Katerina, from University Technical College Norfolk, who sought out work experience following a site visit in March.



**Key Stakeholder Extended Consultation –
hosted by the Lowestoft Flood Risk Management Key Stakeholder Group
Friday 21st October 2022**

Agenda

Timings	Item	Responsible
9:00am	Coffee, arrival and networking	
9:30am	Welcome and aims of the day	Phil Aves, Chair LFRMP Key Stakeholder Group
9:45am	Project update, barrier construction, next steps and findings of Navigation Impact Assessment followed by questions and answers session	Tamzen Pope, Project Director, LFRMP Tom Farley, Balfour Beatty Charles Schelpe, Jacobs PLC
11:00am	Tea/coffee break	
11:15am	Introduction to the Environmental Impact Assessment	Emma Adam Jacobs Plc
11:30 am	Introduction to the workshop	Sharon Bleese, Coastal Partnership East
11:35 am	Workshop exploring: Impacts of EIA, barrier construction and NIA on you/your business	All
12:30 pm	Lunch	
1:20 pm	Welcome back- setting the scene for the afternoon programme	Phil Aves, Chair LFRMP Key Stakeholder Group
1:30 pm	Barrier operation explanation followed by questions and answers	Tamzen Pope, Project Director, LFRMP Charles Schelpe, Jacobs PLC
2:15 pm	Introduction to the workshop	Sharon Bleese, Coastal Partnership East
2:20 pm	Workshop exploring: Operational impacts Existing protocols and policies Maintenance and impacts of annual exercise Regular operation and impacts on navigational use.	All
3:20pm	Reflections on the day from workshop participants	All – led by Phil Aves, Chair LFRMP Key Stakeholder Group
3:35 pm	Summary, next steps and close	Sharon Bleese, Coastal Partnership East
3:45 pm	Meeting close	

Questions and Answers

Session 1 – project update

Q. In terms of maintenance plan work – Great Yarmouth (GY) is out of action. Are you looking at liaison with GY to ensure Broads are accessible and not closed off?

A. Yes. Looking into the future as well with options for Yarmouth. About planning and timing.

Q. How are materials going to arrive? Impact on properties around Bascule Bridge. Plans for piling also? How long for?

A. Piling operations timing tbc. Most materials to be delivered by road to Commercial Road. From there it will be brought by barge to the construction site. Most materials will be stored in Commercial Road. Options of storing materials on platform in channel. Gates to be fabricated in Europe and come via Sea. Cill beam to be constructed in Commercial Road.

Q. Will piling operations be 24/7 or daytime?

A. At the moment plans for daytime operations only.

Q. If the piles are 40m long, are they going to be brought in?

A. Brought in 12m sections as per limits. Then welded in Commercial Road then lift onto pontoon/barge and float down to site.

Q. You mentioned 3 years, how much notice are we going to have for restrictions on navigation?

A. 12 weeks' notice – as per industry standard. Programmed dates can be shared ahead of time.

Q. Continuous concrete pouring – will this be one abutment at a time or both?

A. One at a time. One pour one day, one pour another day. Some pours will be 24 hours. 11 pours in total per side but some will be a lot smaller so shorter in duration

Q. A lot of lorries coming in via Commercial Road? Is concrete going to be mixed on Commercial Road?

A. No, ready mixed.

Q. How many lorries per pour?

A. 75 lorries per day on the big pours (only for 3 of the pours). Lorries using all available routes to site.

Q. Construction materials on top of the lorry movements for concrete?

A. Staggered but not on same day. Fewer movements for construction materials.

Q. Will concrete be poured in the middle of summer? Impact on traffic and increased visitors to the town.

A. Not sure yet – depends on when we start. We will coordinate with concrete supplier to finalise. Ideally will take place in Spring due to temperature.

Q. Has aggregate coming in via Barge been considered?

A. Not viable to mix on site, space and money implications.

Q. Will the new bridge be open? Worries about gridlock

A. Current programme suggests so.

Q. Who has responsibility for initiating a closure of the barrier? Mention of fish gates further up channel which have failed.

A. ESC – with input from other organisations. Similar to temporary defences.

Q. Have you got a projection of length of time the navigation will be stopped?

A. Still working on. Another level of design coming in New Year. Current thinking for concrete pours, keep the bascule bridge shut during pour. When cill beam is installed, there will be a need for dredging, 5 or 6 days forecast at this time for that. Cross channel sheet piling approx. 3 or 4 days. Same for cofferdam. 5 days for testing. These will all be planned in advance to mitigate impact. Need to understand further from stakeholders.

Q. With navigation closures, is there any facility for boats coming back to Yacht Club from abroad, will there be more moorings there for them?

A. This will be built into conversations with RNSYC and ABP.

Q. What about fuelling for boats? Fuelling facility is well known to boaters up and down the coast.

A. Started discussion with RNSYC that fuelling point will be located during construction phase. Not sure on exact location but this will be probably located nearby so this can still be accessed by boaters during this time.

Q. Possibility of the yacht basin being unsuitable for large vessels for refuelling so this will need to be considered?

A. This will be part of ongoing conversations with RNSYC etc.

Session 2 – environment

Q. The access to the RNSYC – as not a highway the surface not suitable for heavy plant and traffic?

A. It has been considered. Negotiations with RNSYC for repairs required for access. Temporary works will be required for cranes coming in and lorry movements. Upgrades will be needed. Also realigning the gate to RNSYC, widened as part of Tidal Walls project. Protection measures will be put in place where required. Discussions will be required with highways authority.

Q. Proposed environmental platform to be built to southeast of harbour entrance. Is that going to be constructed at the same time?

A. All being well construction of that will begin later this year, so no disruption forecast to the barrier construction. The purpose of the platform is habitat creation for Kittiwake nesting. No further detail able to be shared.

Q. Are you going to do precondition surveys on nearby buildings?

A. Yes. These will be carried out as standard. We have done the same for Tidal Walls. Ongoing monitoring such as noise and vibration will be installed. Alerts sent to team.

Q. As well as dredging sides of barrier, will there be further dredging further up the channel?

A. Yes, at Commercial Road there is potentially going to be some dredging. If compound to be relocated or elsewhere there will be dredging as required. There may be other elements required due to refuelling relocation etc.

Q. The BB compound at the top of the harbour end, is there going to be works up there or just storage compound? Need to consider parishioners affected by potential noisy works.

A. There will be works, the cill beam will be constructed in the compound as well as piles welded. Community engagement will be required for the housing estate opposite railway before works.

Q. What about eels? We have looked at eel ladders around Mutford Lock, to allow eels to come through Lake Lothing. If there will be restrictions on navigation and closure of barriers there will be some impact?

A. Team will take this away and consider. Recognition that the barrier will have an impact on fish and eel populations.

Session 3 – operation & maintenance

Q. In terms of operation, would you need a specific or bespoke flood warning

A. Multi agency warnings already in place for other barriers so partners are aware of what is expected and the notification process for warnings. Currently flood warnings in place for temporary defences is sufficient in EA's view so this is likely to stay the same.

Q. flood warnings – currently there is a bespoke warning system in place for south side of bridge, does this need to remain or combine as a dual warning

A. Use as dual warning. Currently 5-day warning from EA so can fit with 3-day mobilisation turnaround. Flood alert can be issued to everyone who is in the area covered by the barrier.

Q. Who is responsible for opening and closing the flood gates around the town?

A. ESC with support of our contractors as the tidal barrier will be. Demountable defences will be deployed first with support from different organisations and teams. Deployment plan for section of tidal walls is updated to ensure everyone knows who is responsible in the event of a flood.

Workshop Notes

Table One: Sharon Bleese (facilitator), Tamzen Pope (technical support), Lizzie Forbes (scribe), Chris Merren (RNSYC), Daniel Turner (Natural England), Jon Southgate (Suffolk Lowland Search and Rescue), Louise Thomas (ESC), Henry Carter (RNLI), Richard Perkins (Suffolk Chamber of Commerce), Nik Dockree (ESC), Richard Bennett (Balfour Beatty)

Table Two: Charles Schelpe (facilitator), Jon Stockwin (technical support), Sharon Richardson (scribe), Andrea Armstrong (National Highways), Chris Trindall (Elizabeth Holdings), John Kitching (Jet Adventures), Kate Moran (ABP), Mark Jackson (Suffolk Police), Peter Langford (Suffolk Resilience Forum), Tom Duit (ABP)

Table Three: Emma Adam (facilitator), Tom Farley (technical support), Lucy Goodman (scribe), David Spray (MMO), Jemma Pawley (EA), Jon Butler (Eastern IFCA), Jonathan Rudd (NALEP), Steve Kingston (Sheder Marine), Steve Walbridge (CEFAS)

Table Four: Phil Aves (facilitator), Chris Finbow (technical support), Charlotte Flight (scribe), Ben Falat (Royal Yachting Association), Gail Kingston (LHMBG), Jon Hopes (Broad's Authority), Karol Petryka (Excelsior Trust), Paul Gray (Lowestoft Cruising Club)

Morning workshop – Temporary Impacts During Construction

1. What significant impacts could result due to the vibration/ noise caused by the construction activities – particularly the piling?

Table One	<ul style="list-style-type: none"> • Environment protection team will be inundated with queries and people contacting them about noise and vibration concerns • We will be producing a Section 61 notice as part of the TWAO. We will build this into the construction methodology mitigations. Hammer piling will need to take place, so we will liaise with Environmental Health. • Learning from Gull Wing (GW) project. Going above and beyond in terms of community engagement – replicate where possible. Visit public personally. This has been very effective on GW project. This will need to be contractor-led. • Precondition surveys. Properties properly inspected. Potential for noise to be bigger issue than vibration. Impact on tourism during summer months. Sink holes in Yacht Club area – risk. Not stable. Anglian Water pipework. • Take learnings and experiences from Tidal Walls. Also expand areas for consultation. • Possible update to HRA required for year-round working if previously only done for winter-working only. • Each 40m pile takes approx. five hours to drive. Up to four weeks continuous piling activity. Programme being developed – unsure of when piling activity will occur (summer or winter) risks will be higher for complaints in summer. Same for concrete pours. All depends on when construction will start. • Piling on both sides at same time to mitigate length of operations. • ABP do regular channel surveys. We have carried out marine ground investigations, further investigations required. Also channel surveys on north side. • National Highways has raised concern about impact of vibration on Bascule Bridge. Potential disruption should bridge fail. Detailed inspection of bridge required before, during and after construction. More robust vibration monitoring in area. Data from Tidal Walls as reference. Also detail from test piling.
Table Two	<ul style="list-style-type: none"> • ABP – Office close by 24/7 port operators, impacts of sustained noise. Operators on radio to vessels need clear listening capacity. Bridge control kit – mitigating equipment. • Highways need to look at large projects in the area to see if there will be cross impacts from the effect of road and pedestrian restricted access in the area. • Elizabeth Holdings PLC (have marked businesses on the map) concerned re impacts on businesses renting their properties

	<p>especially the impacts of those with outside seating areas. Also concerned re effects on possible future expansion plans. Worried re impacts on Weatherspoons, if causes financial pressures landlord will not be paid. Residential properties may also vacate due to noise/vibration.</p> <ul style="list-style-type: none"> • Jet Adventures – will this drive tourist away and therefore we will have less trade. Very concerned about radio conversations they communicate regularly with ABP and others for departure permissions. • Both of the above very worried about prolonged and continued noise/vibration affecting trade. And driving people away. Would appreciate insight into how disruptive this would be. They could potentially lose a years' worth of business, can they recover? Require council to engage with them further on this issue so they can understand and mitigate. Also will compensation be available? • Jet Adventures mentioned that Lydia Eva and Mincarlow Trust (not represented today) have a Floating museum in area and will have same issues as above.
Table Three	<p>Noise EIAs from Third Crossing and LEEF project suggest no significant impact of noise.</p> <ul style="list-style-type: none"> • Disturbance to pets / domestic animals owned by local residents/boaters or people walking dogs near the site. • If not danger posed by noise levels, then increased stress/irritation/disturbance to people/public/boaters/local employees working close to the site or accessing the yacht basin. • MMO delegate highlighted the East Marine Plan Refresh- and to consider this carefully during licence application. There will be conditions in the marine licence associated with noise levels. Means of minimising, mitigating and noise avoidance to be demonstrated. MMO's Tourism Policy also to be considered with regards to noise. • Fish and migratory Fish (mainly eels) disturbance - concern from E.IFCA / CEFAS / MMO • If migratory fish use the Great Yarmouth route to inland water ways – has the access/egress at Great Yarmouth, the timing and cumulative impacts of projects there been considered? • Bird and breeding Bird disturbance - question raised as to whether ongoing bird surveys have been completed. • Other sensitive species (including land and marine mammals and their food sources) – the timing of the construction activities is important to consider to minimise impact. • Question raised as to whether any noise modelling had been completed. <p>Vibration</p> <ul style="list-style-type: none"> • Building shaking – causing annoyance/disturbance to local residents/business owners their customers and employees. Concern raised for any cafes/restaurants in the site vicinity and their potential temporary loss of income. • Disruption to functions/events/normal activities in the Yacht Club and potential for associated loss of revenue. • Disturbance to pets / domestic animals. • Disturbance to birds / sensitive species.

Table Four	<p>Vibration</p> <ul style="list-style-type: none"> • Old buildings don't look to be that secure – CF - monitors used to monitor vibrations continuously. Above ground and in boreholes underground (on Ipswich). Test pile to see the vibration and noise impact. Current monitors could provide a baseline. • Concrete pour – four lorries on rotation, 75 total deliveries. • CF – biggest challenge of the Ipswich pour was weather. Issues if pouring in winter or summer. Spring good. • Excelsior Trust – would like to know if it will affect the season – May and June busy times for the Excelsior. Important to have as much notice as possible. • Excelsior Trust keen to help the project, need notice if effected running from the Heritage Quay – with enough notice can plan to moor somewhere else (e.g. Ipswich) or change programme. But planning now for 2024. • Broads Authority – important to consult with boaters on the broads – Norfolk Yacht Agency and Suffolk Boating Association. Broads Authority also willing to help. <p>Noise</p> <ul style="list-style-type: none"> • Lakeland Drive Housing Estate – north of the railway/ compound – there may be some impact from a noise/ vibration perspective on them. Important to engage the estate and see if BB can put any mitigation measures in place to decrease the effects. • Piling – buildings, businesses, residents. Shift workers might be impacted during the day. Shift workers complained in Ipswich. Important to give shift workers advance notice – engage Birds Eye. • Percussion piling – will be several months of daytime activity • Concerns re. businesses/ residents on the other side of Mutford Lock – might be impacted by road. • When would be best for 6-month season to pile? Outside of season best, loads of tourists in the summer. Dark hours during the day easier on shift workers – easier to sleep.
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2. What significant impacts could result from planned construction activities effecting road and pedestrian traffic in the area?

Table One	<ul style="list-style-type: none"> • Not as many footpath diversion for Barrier as Tidal Walls. May need short-term closures and diversions. • Gull Wing open to traffic should mitigate some concerns of impact on Bascule Bridge. Envisage bigger impact on pedestrians for those travelling into town centre. • Impact on road access in front of Yacht Club. Potential of impact from Sizewell C too. Combined effects from EI assessment will take other projects into account. As the moment projected earliest start for Tidal Barrier is 2024. • Potential labour issues/material availability. • Concerns about lorry movements. This will be incorporated into traffic management plan, developed in construction sequencing. Consultation with bus operators will be required.
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	<ul style="list-style-type: none"> • Standing area for vehicles arriving to site. Deliveries planned according to construction needs. Possible opportunities for waiting area. Parking for construction team – possible ESC car parks?
Table Two	<ul style="list-style-type: none"> • Suffolk Police – concerns are traffic congestion, time bascule bridge elevated, need mapping around project start and finish and key pinch points e.g bridge elevation, lorries/transport. Key issues are if arrest during prolonged bridge elevation period would mean taking offender to a different facility according to if they have access North or South. Need to know traffic impacts for operations e.g raids, pursuits etc. • Accepting Gull wing operational if bascule bridge is not operational congestion builds in Oulton Broad and the police are often called. Impact = call rate increases, extra officers, impact on costs and response times. Also applies to Fire and Ambulance. Need advanced plans to mitigate. • Increase in accidents, more traffic filing through alternative routes, congestion, annoyed drivers associated impacts. • What does transport along Lake Lothing look like? How will longer or more frequent bascule elevation affect traffic/operations. • Site security – night clubs in the area would like details of security of compounds/machinery. Bridge rail climbers need negotiators, access restrictions would be a problem. • Very concerned about the co-ordination of 75 lorries into the town. Backed up lorries, where will these be parked? • Signage critical. • Will we remodel traffic lights, change timing etc. Andrea Armstrong, Highways will look into it. • Elizabeth Holdings suggested old QD site to be used (not sure of landowner). For list of tenants and property owners contact chris.trindall@elizabethholdings.co.uk who will be happy to provide this. • Jet Adventures – their business brings more footfall therefore pedestrian access across Royal Plain needs to be managed due to heavy vehicles traffic flow. People told to park in Royal Green and walk along South Pier to them. Does not feel fair that a single area of the car park allocate to Yacht Club when there are other businesses impacted LifeBoat shop and Pavillion not allocated space. • Risk to pedestrians from increased/disrupted traffic. Disabled access.
Table Three	<ul style="list-style-type: none"> • CEFAS Endeavour Survey vessel moored on inner harbour, has an advanced schedule of movements which will be affected by the construction activities. Crew access, provisioning of goods to the vessel will also be impacted if traffic through town is slow/diverted. • Sufficient planning time is required by CEFAS and other organisations to make appropriate alternative arrangements to get crews and stores to vessels, which may have been temporarily relocated. Notice to Mariners, Highways Agency road closures etc need to be delivered >3months in advance.
Table Four	<ul style="list-style-type: none"> • What route will they use? Four lorries on turnaround for 24 hours – would be useful the know routes.

	<ul style="list-style-type: none"> • Traffic management plan will be in place – will follow route of least resistance. There may be pauses around rush hour. • Victoria Road – bad route. Particularly at school run time. Trunk roads preferable rather than side roads. • Oulton Broad entrance from Beccles – loads to traffic, can take c. 30/40mins. • Consider pea season w/ Birds Eye – arrive on tractors 24/7 – engage local businesses to understand times to avoid. • Could arrange minimal openings of Gull Wing during this time. • If bridge is open for extended period of time a bus service could be offered to pedestrians to North/ South of river (PA – this has happened when bridge has been stuck before). • Excelsior Trust expects bridge to be closed during the day of the pour.
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3. What significant impacts on water quality could result from the planned construction activities?

Table One	<ul style="list-style-type: none"> • Two impact pathways from NE. • Physical disturbance, covered in HRA. Disturbance to harbour base from piling. • Water quality – dredging. We will be going deeper than current maintenance. Samples to be taken and mitigation will follow. • In combination for HRA – look at Sizewell C boat traffic.
Table Two	<ul style="list-style-type: none"> • No major concerns recorded. • Asked regarding air quality issues for children using fountains etc. Dust suppression. Children's corner, will this be impacted by pollution?
Table Three	<ul style="list-style-type: none"> • Water Temperature – monitoring requirement stipulated by MMO and CEFAS. • What are the acceptable limits of temporary change that could affect marine life? • Potential for local bathing water quality implications during construction. • Change in turbidity – implications for sedimentation. • Will the sedimentation from dredging activity or piling within Lake Loathing change drafts around berths (ie. CEFAS Endeavour-potential impact on their own two-year birth dredging schedule).
Table Four	<ul style="list-style-type: none"> • Risk attached to leakage of hydraulic fluid. CF – will specify use of biodegradable oil. • Broads Authority - dredging will affect the water. • Sediment mitigation plan will be in place for construction. • Nature reserve – impact on the Ham – in the EIA. • Re. water quality – presumably Lowestoft won't apply for Blue Flag status during construction – water quality is why the town stopped bidding • With gate operated every two weeks, will this have caused prolonged impact on Blue Flag status?

	<ul style="list-style-type: none"> This could go into the post project monitoring plan – 5-10 year monitoring, might need to alter regime once known.
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4. What significant impacts on the local ecology could result from the planned construction activities?

Table One	<ul style="list-style-type: none"> Demolishing sections of pier structure, contamination risk. Quay side not being excavated. Tests ongoing. Ground investigation works. Demolition of tug arms. Air quality – EIA process. Potential negative impact to be considered.
Table Two	<ul style="list-style-type: none"> No concerns recorded other than Kitiwake displacement.
Table Three	<ul style="list-style-type: none"> Effect on Goby and Eel breeding/ behaviour /habitat value. Increased stress for porpoises, seals, otters and Kittiwakes. From 3rd Crossing and LEEF project EIA results, no further monitoring of local impacts deemed necessary – but delegates questioned whether it is reasonable to apply the same EIA assumptions to this project taking place at the port entrance, and thereby impacting all marine access and egress to Lake Loathing. Consider delays to Boston Barrier project due to issues with Smelt. (European eel, smelt and sprat are UK Biodiversity Action Plan species. Eel Regulations, 2009, require the management of the river basin to allow escapement to sea of 40% biomass of eels that would have emigrated prior to human influence. Eels are listed on the IUCN Red List as ‘Critically Endangered’.)
Table Four	<ul style="list-style-type: none"> Concerned about Eels getting stuck – this would be seasonal Eel passages may be a mitigation – could be a bigger issue when the gates are closed for an event

5. What duration of planned intermittent closures of the Inner Harbour Entrance Channel/Bridge Channel to navigation to facilitate the barrier construction would result in a significant operational impact to your organisation or business?

Table One	<ul style="list-style-type: none"> Closures to channel. For some businesses this cannot be longer than 24 hours. RNLI will have access at all times. RNLI may need to have boat in Lake Lothing to mitigate potential impact during construction on access. Potential locations to be discussed, this needs to be progressed now. Beyond 24 hours, some businesses will need to relocate to fulfil contractual obligations if channel shut. Discussions on this have already started with TP, ESC team and ABP. Linked to LEEF. Mutford Lock is currently only access to Broads. Need to liaise with Broads Authority. Ensure both sides of the Broads are not closed at the same time. New river crossing at South Denes planned to open in Spring. Haven Bridge repairs are planned by NCC Highways.
Table Two	<ul style="list-style-type: none"> Jet Adventures – can manage harbour impacts if know when. More concerned with getting out to sea.

	<ul style="list-style-type: none"> • Will there be any affect on the lifeboat? • If bridge down for period of time how does this affect people? Harbour tours go under the bridge but only 5-10% of business • Fisherman access, how will they be impacted? Check with South Pier Trust (contact Danny Ward).
Table Three	<ul style="list-style-type: none"> • Are fisherman to be consulted/represented on any impacts it will cause them i.e. Temporary loss of manoeuvring, fuelling or storage space - they felt they'd lost space due to construction of the flood wall. • Commercial fishers shouldn't be affected but recreational anglers may be impacted. • Amenity/pleasure vessels will need to be evacuated at certain times during the construction ie for concrete pours. This may effect small local businesses such as sail training/powerboat schools. • MMO reiterated that Marine Plans must be consulted as there are policies pertaining to: <ul style="list-style-type: none"> ○ Temporary closures and change of access ○ Fish policies (ie. development can't access fishers access to fish grounds). ○ Port and Shipping policies. ○ Tourism policies. ○ Social/recreational policies – personal/small vessel access and mitigation hierarchies. • Advance notice of channel closure timing and duration could be given, perhaps as a range of dates initially, and then narrowed down, but should mirror road closure procedure and be issued well in advance (12 weeks minimum), with a monthly update and flow of information.
Table Four	<ul style="list-style-type: none"> • Lowestoft Cruising Club – If 7-day closure – people may get stuck. Access problems with the Broads at the moment (problems with bridge in Great Yarmouth). Moorings on both sides of the barrier needed. People might want to moor in outer harbour. • Concerns over space – less capacity in the RNSYC • Important to have a plan and inform people what it is. • Excelsior Trust – make note in Reeds Almanac – provides all information in this area of the North Sea to mariners – plan roughly when it is going to happen and make note, directing mariners to contact to find out if any restriction. Big lead time. Include info re. 7-day closures. Mariners will get in contact for specific information. • Work with Excelsior/ Cruising Club to get the phrasing right. Include information re. refuelling changes. • Also: Notice to mariners. Broads Authority comms can help. • Excelsior Trust – Diesel berth – Only two places. Need place to go in outer harbour for the Excelsior to refuel. • Places to take on water also needs consideration.

6. What other significant environmental impacts could result from the construction activities?

Table One	<ul style="list-style-type: none"> • Lorry movements. How will community react to increased traffic and construction traffic? Risk of protest. • Social media. Crisis management. • Kittiwake impact and assessment. Things to consider re public image. More risk for marine impacts? Nests on tug arms. Bird nesting seasons. No nets! • Early on, share environmental credentials. Gates arriving by sea. Ecological impact likely to be point of concern. • High profile environmental groups and action across UK. Consider potential of this. Link to Sizewell C. • RSPB. Follow advice from Adam Rolands. Marine data re transit and migration. Eels.
Table Two	
Table Three	<ul style="list-style-type: none"> • Where is the area of dredged material disposal to be? Will it be screened before being dumped? Impacts to fishers from nets caught on bikes/trolleys etc. • Benthic fauna impacts- will surveys/grab samples be done? • Sediment analysis to ascertain heavy metal presence (level 1 or 2) • Marine Archaeological finds <ul style="list-style-type: none"> ○ a watching brief exists around the south pier and yacht club. ○ the area of tug arm installation needs consideration ○ MMO suggest Heritage Policy must be consulted/considered. • Impacts of sedimentation to benthic fauna- being buried • Impacts of sedimentation and sill installation on water depth and vessel draft (TF notes the sill is lower than existing bed level). • Increased potential for marine pollution incidents <ul style="list-style-type: none"> ○ E.g. fuel spills from additional transport movement and deliveries to site by lorry or vessel ○ from coffer dam activities ○ ABP pollution management plan to be consulted and prevention/mitigation measures sought. • Temporary rise in air pollution/lowering of air quality e.g during construction when 75 lorries/day are arriving with concrete premix. • Dust creation and issues for people/public/local employees with respiratory issues - potential for dust forecasting and mitigation – i.e. dust creating activities to be timed with suitable weather conditions. • Impact of finding UXO – surveys completed?
Table Four	

Afternoon workshop – Impacts During Operation and Maintenance

1. What significant impacts on water quality could result from the planned O&M activities?

Table One	
Table Two	
Table Three	<ul style="list-style-type: none"> • Pollution caused by hydraulic leakage during test operation. • E.IFCA – discharge into water of any pollutant e.g. oils/ fuel. • Submerged jets on the barrier to dislodge sediment build up and remove barnacle/macro-algae.

	<ul style="list-style-type: none"> ○ will the dislodged material affect bathing water quality ○ sedimentation changes ie will there be a need for additional dredging of vessel berths in Lake Loathing? Is there an impact on Benthic faunal community? • Is there an OPPORTUNITY for creation of macroalgal habitat via ecological engineering i.e., to encourage molluscs, crustaceans etc to colonise textured concrete. This would then increase the habitat value of the area, provide food chain essentials and encourage mammals (back) to the area after construction.
Table Four	<ul style="list-style-type: none"> • Re. jet flush – will it have knock-on effect on dredging further up Lake Loathing? Something to monitor.

2. What significant impacts on the local ecology could result from the planned O&M activities?

Table One	<ul style="list-style-type: none"> • Routine maintenance likely to take place in daytime or at weekends to ensure team availability – silt cleaning • Construction period likely to be more ecologically sensitive. Natural England have no ecological concerns with regular maintenance – refer to HRA. • Barrier operation plan will incorporate stages of maintenance. • Species are going to be used to a certain level of disturbance in the area already.
Table Two	<ul style="list-style-type: none"> • Jet Adventures, Concern: will silt move in East side of yacht basin to a position that could cause difficulty for small vessels? • Peter Langford - Can the barrier be closed unplanned for an oil spill inside the port?
Table Three	<ul style="list-style-type: none"> • Impacts e.g., ground compaction or damage to habitats, from access and use of large tonnage mobile or marine based cranes and/or heavy plant on site. • Impacts of the cathodic protection for antifouling of the in-water asset elements –electrical charges disturb sensitive species e.g eels and elasmobranchs. • Consider the likelihood of having to disturb Kittiwakes nesting on the mitre gates and other sub-aerial asset elements (despite the spiked design and two weekly maintenance ops). • Biodiversity net gain – how is this to be incorporated in to the project? (i.e. by ecological engineering). More consideration of opportunities to improve local ecology should be designed in to compensate for the cumulative impacts of successive O&M impacts on wildlife. • Delegates desired more information about the Kittiwake breeding platform installation (currently under NDA) as compensation for disturbance by LEEF project – are these tried and tested?
Table Four	<ul style="list-style-type: none"> • Concern raised re. Carlton Ham. • Dredging and pluvial and fluvial work should have solved the Carlton issues.

	<ul style="list-style-type: none"> • Could be part of the monitoring to keep an eye on. Jet is not routinely done, not normally sending sediment into Lake Lothing. Will happen approx. once a year.
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3. What duration of planned intermittent closures of the Inner Harbour Entrance Channel/Bridge Channel to navigation to facilitate the barrier operation and maintenance would result in a significant operational impact to your organisation or business?

Table One	
Table Two	<ul style="list-style-type: none"> • Q: What impact will shopping trolleys and other dumped material have in terms of barrier getting stuck or them being retrieved? • If we close this channel it is important that GY is open or we effectively cut off the broads. • Need to make sure onsite people available for planned maintenance/exercises • Jet Adventures -Tide height that would invoke a closure? Advised 2.6m above ordnance = minus 1.5 to get chart data figure (needs to be confirmed with relevant stakeholders please). • There would be a number of Boat based businesses within harbour impacted with closures. Feel it would be difficult to get a straight answer from the businesses as to an agreed least impact times due to the different nature of business and times of departure. • Possible problems with docking when maintenance in place/closures. Manageable if known.
Table Three	<ul style="list-style-type: none"> • With third crossing hopefully finished before start of construction the impacts on channel/bridge closure should be minimised. More important than the duration of closure is the prior notice of closure to enable businesses and services to plan for inconvenience well in advance. • The annual schedule of routine maintenance and barrier operations should be published well in advance – with caveat about having to change O&M plans due to weather constraints. This schedule of annual and biweekly ops should be made publicly available. • Night closures of the channels/roads may be preferable for businesses and local commercial operations but would not be suitable for the project. • In the case of any prolonged (multiday) closures of the inner harbour, active working vessels will need a temporary berth in the outer harbour- this needs to be planned and organised well in advance. Space for any vessels needing an emergency berth should still be available. • Yacht club/public/pedestrian access to the barrier needs to be controlled during O&M. Usual access will be closed during ops- how will this be managed.
Table Four	<ul style="list-style-type: none"> • Broads Authority – only long one once a year for exercise – fine as long as well communicated and planned. • In Great Yarmouth there is one point of contact – four pinch points in Lowestoft (barrier, bascule bridge, Gull Wing and railway bridge) –

	would be useful for operating procedure to have one point of call for passage through.
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4. What prior notice period a channel closure for routine operational and maintenance activities would best mitigate any significant operational impact to your organisation or business?

Table One	<ul style="list-style-type: none"> • Regular inspections from divers (1 or 2 days, once per year). Longer period of channel closure during this time. Could be timed/planned to coincide with other planned maintenance to minimise disruption. • Major maintenance – 25, 50 year planned maintenance activities will have major impact • Closure impacts. 24 hours is business critical – channel will not be closed for maintenance for longer than this so effects will be minimised. Planned closures will be organised with liaison with businesses and stakeholders and likely use local / social media. • Routine closure – 1 weeks' notice. In anger – 5 days out flood warning. Liaise with landowners 36 hours, 24 hours until flood event. • Annual schedule of routine closures visible for landowners and stakeholders. Possibly annual diving activity planned in. • Annual training exercise. September – can be planned a year in advance.
Table Two	<ul style="list-style-type: none"> • If routine maintenance cancelled no problem if it changes needs to be communicated. • Bascule bridge maintenance contacts could be utilised, liaise with Highways.
Table Three	<ul style="list-style-type: none"> • 12 weeks or 3 months would be a minimum time for prior notice of closures, including any for any emergency O&M on the barrier (TF suggests the lead in time for getting heavy plant and materials on site is 3months anyway). • E.IFCA – prior notice 1 month before closure via LNTM and local Fisherman Association
Table Four	<ul style="list-style-type: none"> • Broads Authority – will need notice to mariners every time • In Ipswich this is planned out every six months • Does the timing move around? • The high tides that work best are picked. If regularity works better (e.g. every other Thursday) that is something to consider whether it be day or night. • Website should show planned closures, social media etc. Broads Authority do this. • Bridge closures – all pre-planned – barrier closure can plan around them. Information board for road bridge & barrier? There should be more information – historically not been very good at sharing what we know.

5. What other significant environmental impacts could result from the O&M activities?

Table One	<ul style="list-style-type: none"> • Gate lift – future maintenance • EIA looking into potential impact on the Broads. • Evacuation procedure. Business continuity for port businesses. • Gates to be last to close. • RAMS, business continuity plans for port area. Offer to test and review these plans and assessments.
Table Two	<ul style="list-style-type: none"> • Hydraulic oil in marine environment impacts queried. Response = Have to use vegetable based oil now. • Noise? Siren (and flashing lights) will sound when closing starting 5 mins prior, this will be at any hour. Mentioned but nobody concerned. Could be lit with colours when closed. • Chris said can we put a Christmas tree on it!
Table Three	<ul style="list-style-type: none"> • Passage of fish into inner harbour – temporary disturbance to wildlife behaviour /routes/ food availability. • E.IFCA – impact on fish and marine mammals. • Public interest in watching the barrier in action could result in people stopping on the Bascule bridge to watch the O&M procedure- H&S implications. <ul style="list-style-type: none"> - suggestion of a specially designated public viewing point at Heritage Quay, for people to observe the barrier in action. • OPPORTUNITY for public engagement with the engineering project – suggestion for interpretation/information boards to be put up around the site- at locations where public <i>can</i> access during O&M procedures. Information signs to facilitate learning about the engineering of the barrier, it's operation and maintenance, funding, and about the flood risk in Lowestoft etc.
Table Four	<ul style="list-style-type: none"> • Walkways – danger to the public? • Site security will be looked at – how to secure off areas but keep them open for operatives. Barrier will not be left unmanned when closed.

6. Impacts during an event on current policies plans and procedures

Table One	
Table Two	<ul style="list-style-type: none"> • If there is a problem. Everything will have been planned say 3 days out then there is a sudden failure to close and change of plan. • Assuming compromised gates mean revert to full traditional flood level procedures e.g ESC run control room communicating to multi agencies? • From a police perspective they door knock vulnerable flood zone areas. Assumption would be not needed if we have a barrier so resources would have been placed elsewhere that's a problem if emergency. • Jet Adventures. Re gaps for demountables. Competing businesses, every business has a reason to be closed last. Problems with vehicle and pedestrian access.
Table Three	
Table Four	

ENVIRONMENTAL IMPACT ASSESSMENT



Introduction

The Lowestoft tidal barrier scheme aims to reduce the risk of flooding to Lowestoft. An environmental impact assessment is required to help protect the environment by ensuring that any significant impacts the scheme may cause are identified and taken into account in decision making. Both construction and operation of the tidal barrier are considered.

We have considered impacts from the tidal barrier in relation to the following:

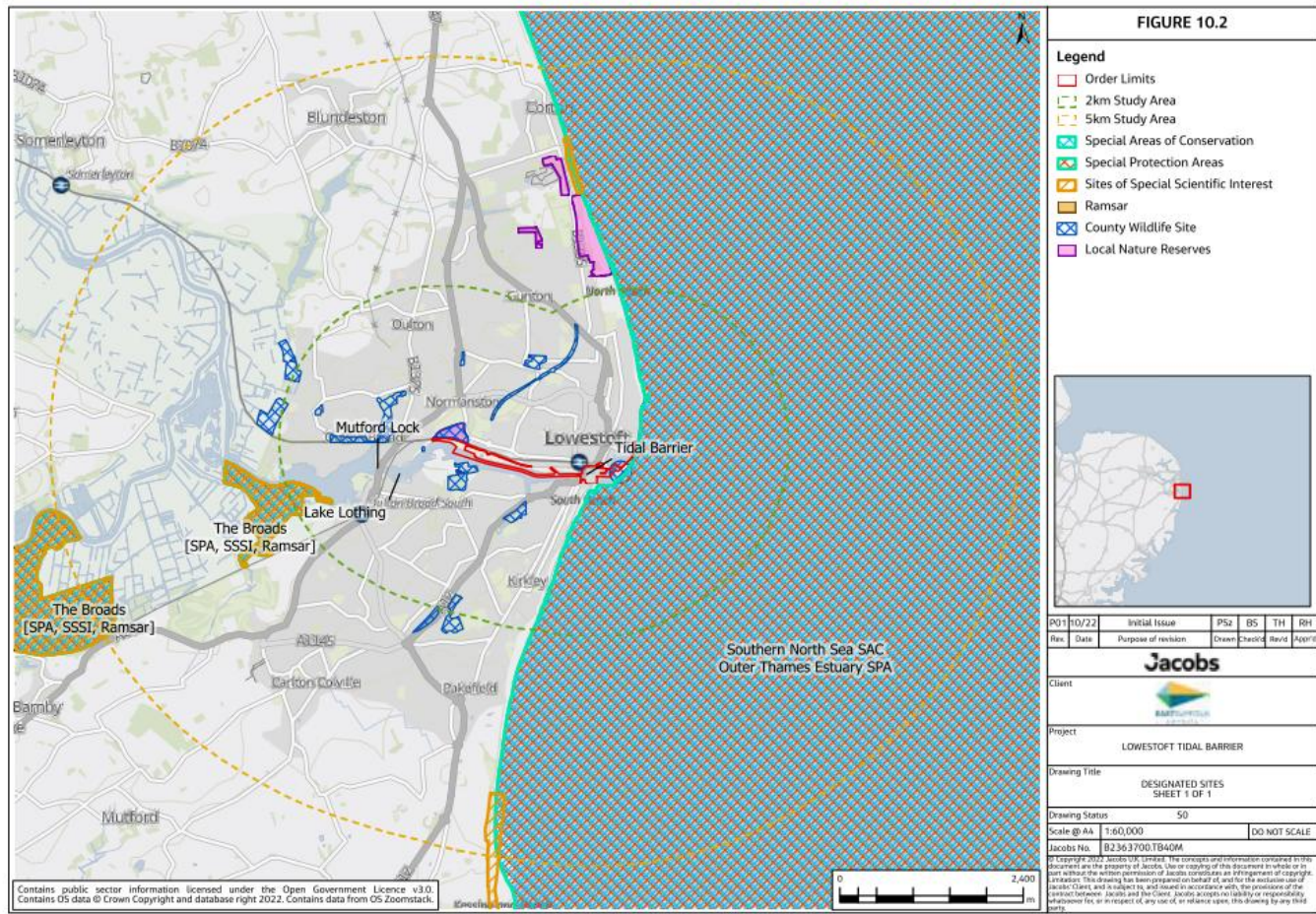
Ecology

Key designated ecological sites near the scheme include The Southern North Sea Special Area of Conservation (SAC), Outer Thames Estuary Special Protection Area (SPA), The Broads Ramsar, SPA, SAC & Site of Special Scientific Interest (SSSI), Sprat's Water & Marshes & Carlton Colville SSSI, Leathes Ham Local Nature Reserve, Harbour Kittiwake Colony County Wildlife Site. These sites support a number of habitats and/ or protected species, including harbour porpoise, fish species and various bird species.



During construction there could be impacts on the local ecology as a result of:

- Disturbance and loss of potential Kittiwake habitat
- Disturbance to fish and other marine species as a result of underwater noise from activities such as piling
- Potential for the introduction or spread of invasive species



During operation the barrier, when closed would also be a barrier to the passage of fish from the Broads out into the North Sea.

Water Environment & Ground conditions

The river Waveney discharges into the North Sea at Lowestoft and to the south of the scheme is South beach, which is used for sea bathing.

During construction there could be impacts on the water environment, resulting from:

- Potential changes in tidal flow due to channel narrowing from cofferdams used for construction
- Disturbance to the seabed resulting in increased suspended sediment
- Potential for pollution incidents from works taking place next to the water, resulting from accidental spillages or surface water run-off

During operation of the barrier there could be potential changes in the tidal flow regime resulting from barrier closure. There could also be changes in sediment deposition and concentrations. There would be a major benefit in terms of the reduction in flood risk.

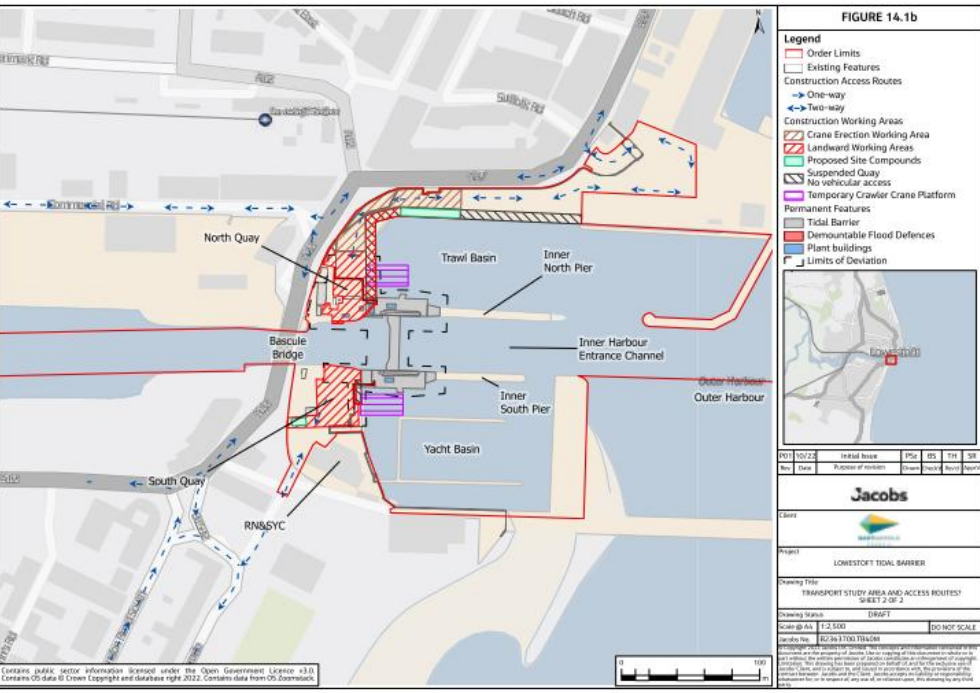
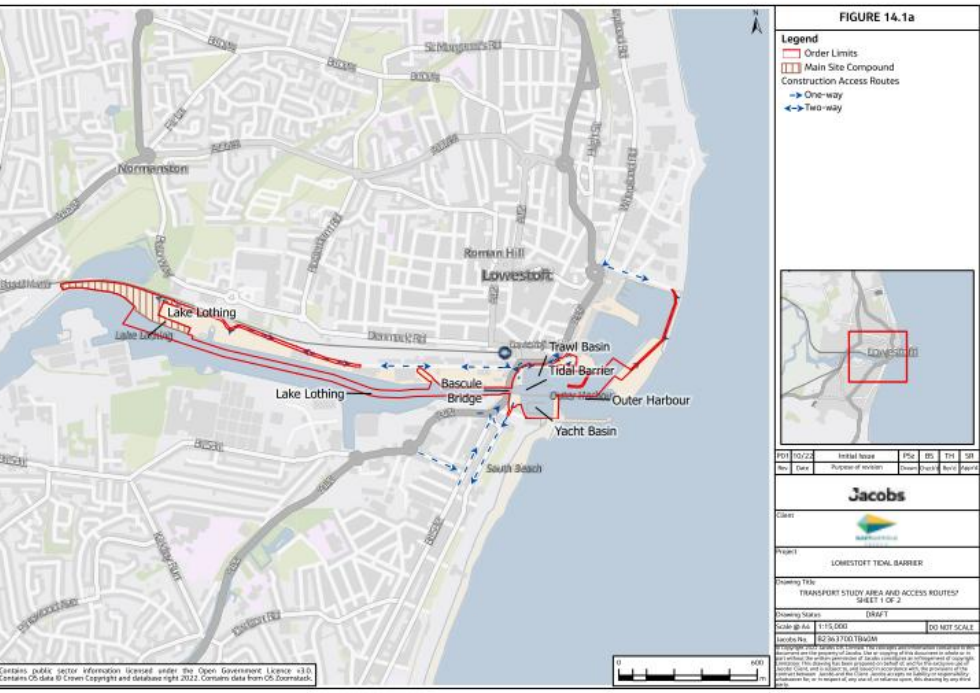
Transport

Local roads suffer from congestion at peak times, particularly around openings of the Bascule Bridge.

Construction traffic associated with the scheme could have potential impacts on local businesses and residents, particularly during peak construction periods for example during concrete pours. Construction activity would also impact on parking due to the displacement

of vehicles which would normally park within ABP and Royal Norfolk and Suffolk Yacht Club, particularly during the summer months when the town experiences high demand for tourist parking.

During operation there would be minimal effects on traffic. There could be some peaks when major maintenance is needed but this would be infrequent and of short duration.



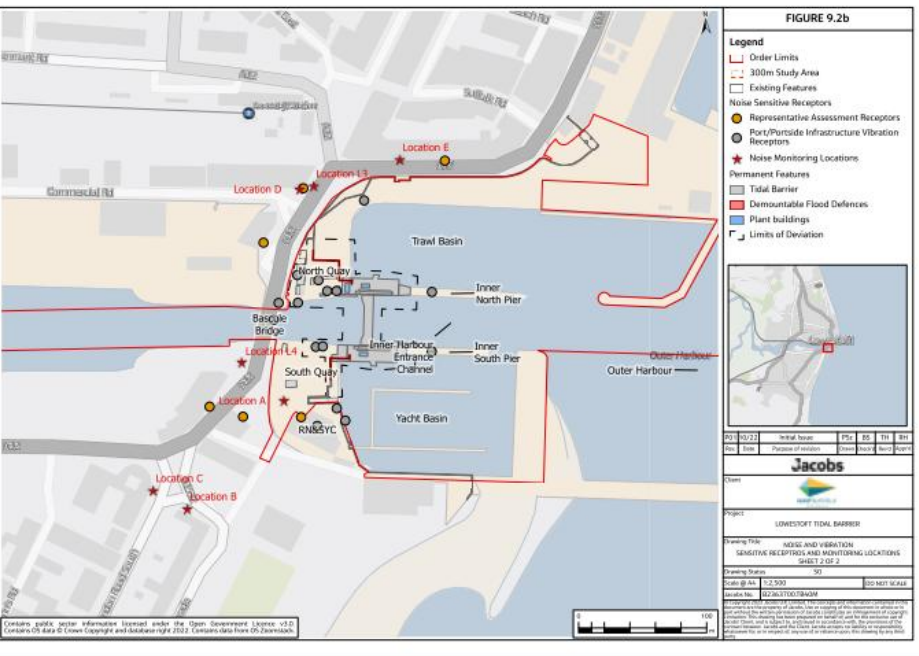
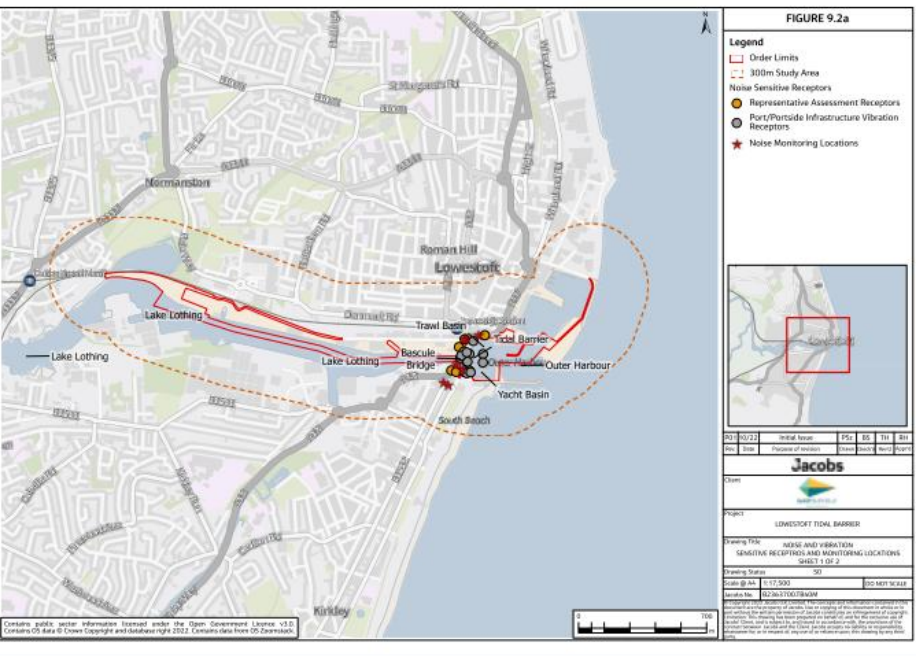
Noise & Vibration

There are residential properties to the north and south of the scheme, the closest being on Waveney Road, Station Square and Pier Terrace. The Royal Norfolk and Suffolk Yacht Club is also considered to be sensitive to noise and vibration and some Port structures could be sensitive to vibration. Background noise in the area comes from traffic on the A47 and also seabirds.

Construction activities are by their very nature noisy. Construction of the barrier is planned to last for approximately 2 years, during which there would be numerous noisy activities, as follows:

- Daytime noise for receptors along Waveney Road, Commercial Road and Station square during piling
- Night-time noise for receptors along Waveney Road, Commercial Road, Station Square, Pier Terrace, The Harbour public house and the Royal Norfolk and Suffolk Yacht Club during concrete pours or if piling activity over-runs
- Vibration during piling for some Port structures within 20m of the piling activity.

During operation the barrier would create minimal noise. Noise effects during operation have not been considered.



Other environmental topics

The barrier would have impacts on a range of other environmental topics, including:

- Impacts on tourism and recreation through disturbance and loss of amenity, including some restrictions to access during construction
- Socio-economic impacts during construction as a result of disruption and in relation to navigational impacts
- Impacts on the character of the area as a result of large machinery, which would be visible for the duration of the works
- Impacts on setting for listed buildings, including the Royal Norfolk and Suffolk Yacht Club, Grade II* Listed building and the potential for impact on previously unknown marine archaeology during excavations and demolition of existing structures
- Beneficial impacts on health and wellbeing as a result of the reduction in flood risk during operation of the barrier

Next Steps

As a project we are currently looking at potential mitigation options, working in conjunction stakeholders and interested parties to reduce the impacts of the scheme as far as is reasonably practicable.



BARRIER OPERATION & MAINTENANCE



Barrier Operation for Tidal Flood Event

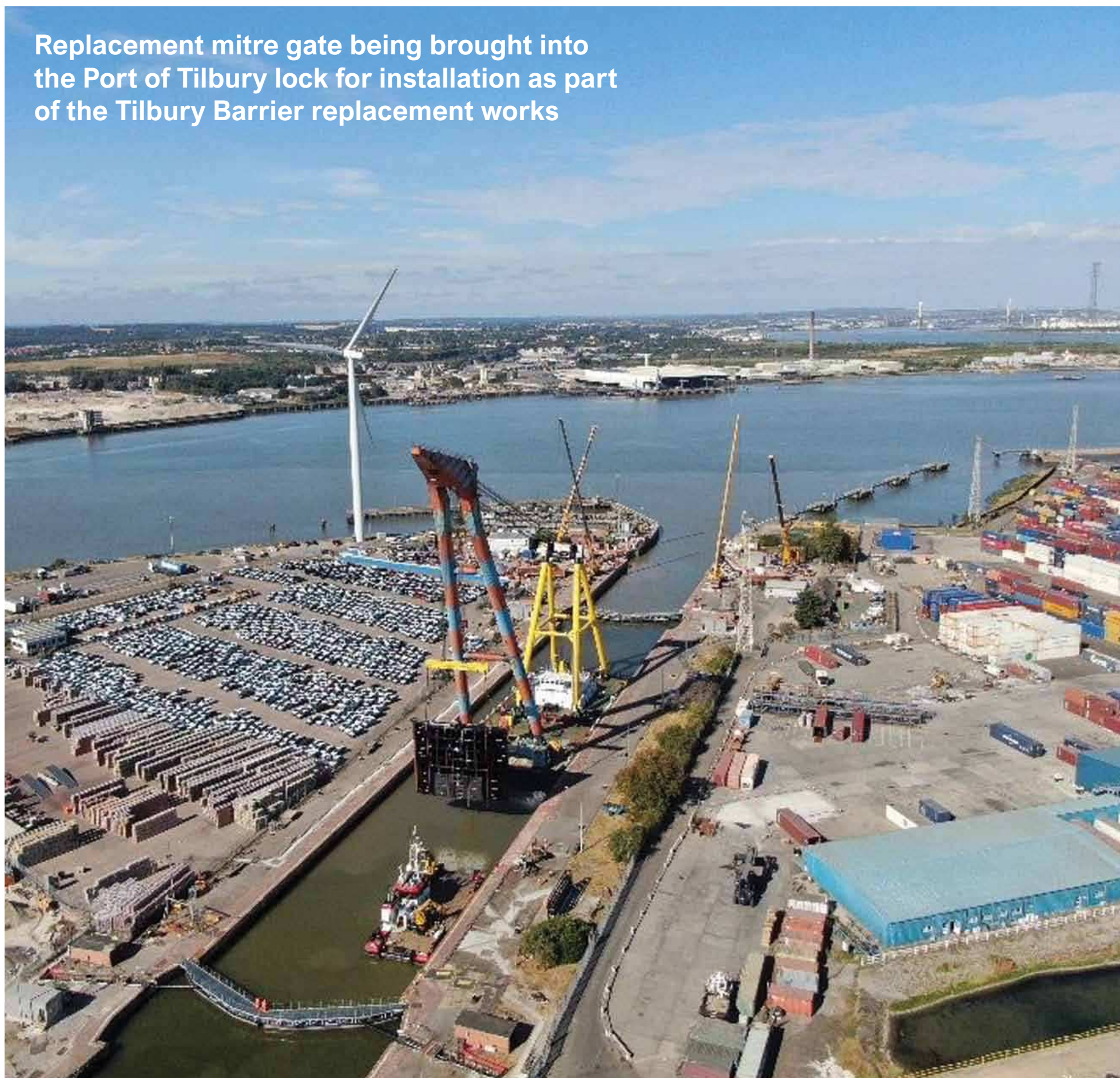
- Closure for flood event on forecast +2.6m AOD (+4.1m CD) peak level
- Closure on preceding low tide/slack water
- Estimated closure frequency for tidal flood events
 - present - once every 2 years
 - 2120 – two to three times a year
- Reopening on falling tide when Lake Lothing and Outer Harbour water levels the same
- Likely closure duration 8 to 12 hours
- Timelines for gate operation to allow for deployment of redundancy measures in case

Barrier Operation for Routine Maintenance

- Barrier operated regularly
 - to exercise the gate and its associated plant and equipment
 - to agitate/manage silt accretion within the operating arc of the gate and its recesses
- Closure and reopening of mitre gates over circa 30 minute period every 2 weeks at high tide
- Every month this closure period is increased to circa 50 minutes to include the closure/reopening of the associated secondary radial gates
- Full test closure once a year in September/October – same procedure as for a flood event
- These will generally be planned operations timed with a slack tide, and when the bascule bridge is down



Replacement mitre gate being brought into the Port of Tilbury lock for installation as part of the Tilbury Barrier replacement works



Barrier Maintenance

Unless an emergency, maintenance works will be planned in advance that will seek to minimise the impacts.

- Maintenance dredging
 - Timed with ABP twice yearly maintenance dredging of channel
 - Will involve channel closures
 - Methodology likely to change to water injection dredging adjacent to barrier structure
- Major maintenance
 - Working area can be similar to that for the barrier construction
 - Will involve channel closures (gate refurbishment, diver inspections, etc)
 - Frequency related to asset life and reliability of components
 - Frequency expected to increase over time as assets age

Closure Deployment Notification

- Notification timeline for barrier closure for a flood event will be similar to the existing protocol for the temporary flood defence deployment
- Navigation notification and control procedures
 - Co-ordinated by Port Control/Harbour Master
 - Comply with port procedures & protocols
 - Notification by Notice to Mariners
 - Notification to Broads Authority at Mutford Lock
 - Seek to notify wider commercial and recreational navigation interests in Lake Lothing, and Oulton Broad who are potentially affected

Next Steps

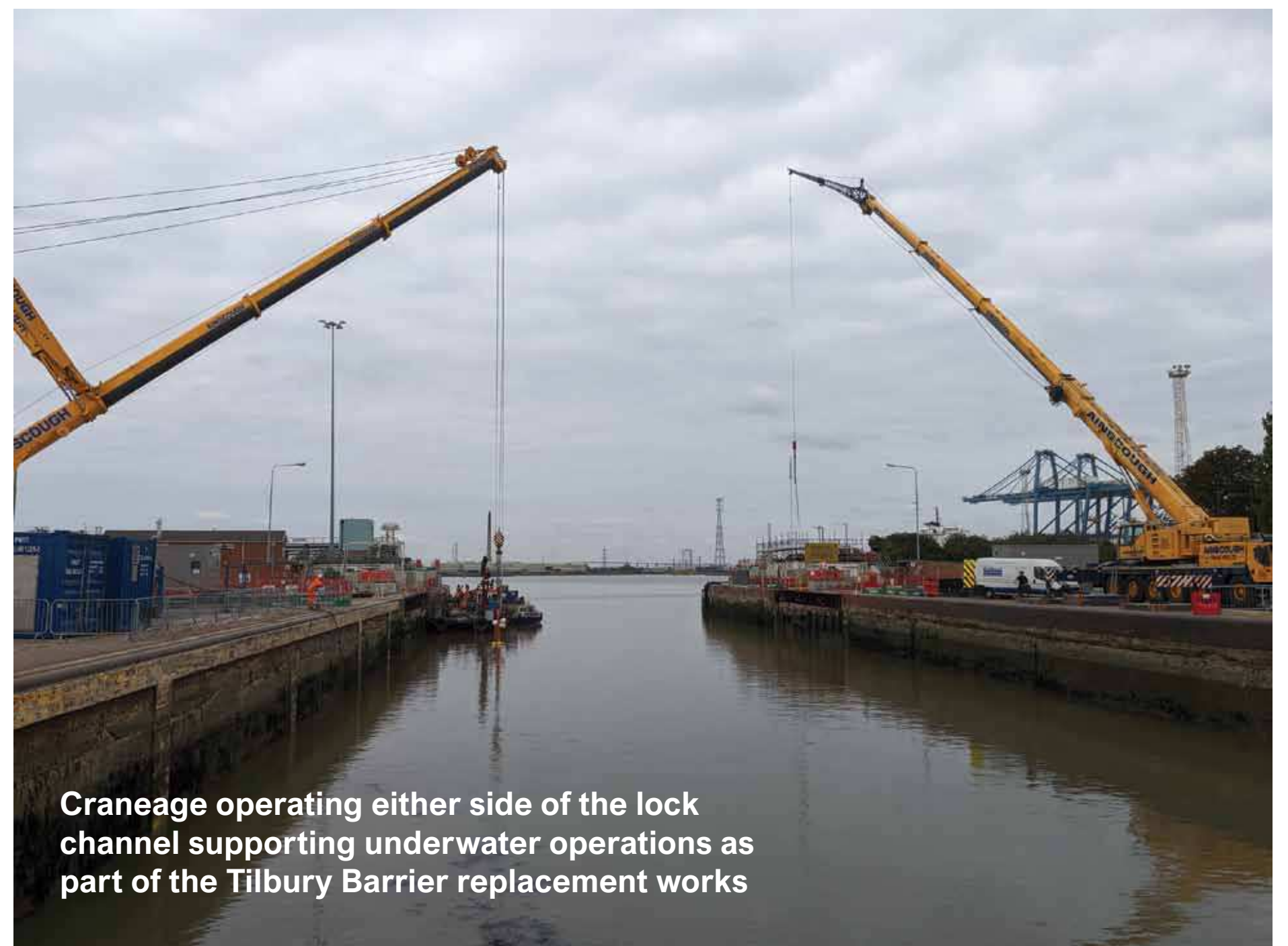
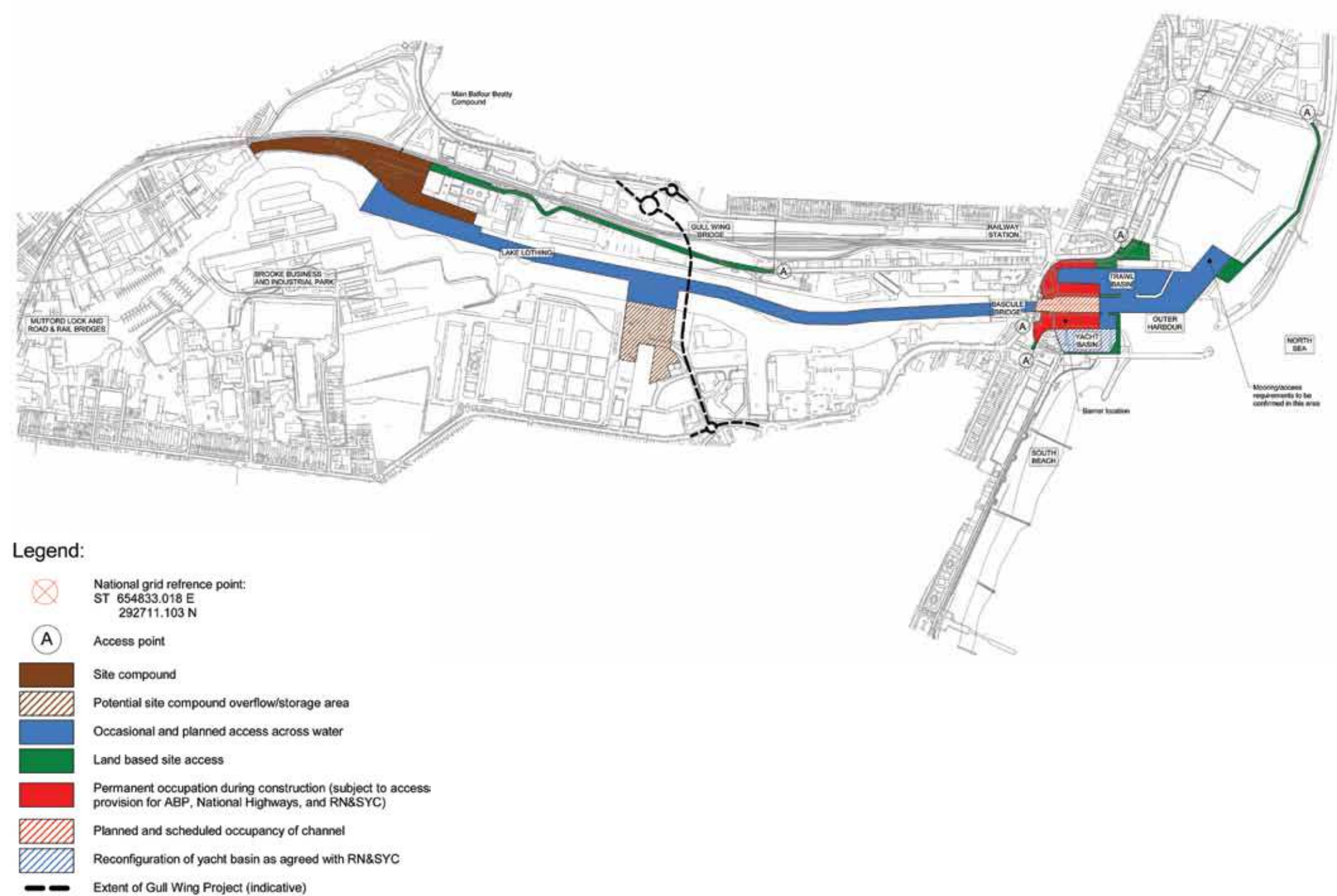
As a project we are further developing our barrier operation and maintenance plans working with stakeholders, blue light responders and interested parties.

NAVIGATION IMPACT ASSESSMENT



A key element of the Lowestoft tidal barrier scheme is the barrier itself and its gate that operates across the entrance channel between Lake Lothing and the Outer Harbour. The construction, operation and maintenance of this barrier will therefore potentially interfere with, and have an impact on the following areas:

- Outer Harbour
- Inner Harbour Entrance (Bridge) Channel
- Trawl Basin
- Yacht Basin
- Inner Harbour/Lake Lothing
- Oulton Broad



Craneage operating either side of the lock channel supporting underwater operations as part of the Tilbury Barrier replacement works

Navigation Impact during Construction

- Temporary time constraints to access through Inner Harbour Entrance Channel
- Delay to normal navigation activities – short and longer duration channel closures
- Safety risks of construction fixed plant (cranes, etc) clashing with navigation
- Safety risks of vessels striking the cofferdam (day and night)
- Safety risks of water based plant (barges, etc) interfering with navigation
- Additional/longer duration raising of Bascule Bridge to facilitate key in-channel works

We have considered impacts from the tidal barrier in relation to the following:

Navigation Interfaces with Construction

- Inner Harbour Entrance Channel
 - Channel width reduced for cofferdam/temporary works
 - Working alongside channel within cofferdams and on completed abutments
 - Working within channel – during normal windows when Bascule Bridge down
 - Working within channel – channel closures
- Outer Harbour - use of quayside to prepare gates for installation
- Trawl Basin & Yacht Basin – reduction in operational space and facilities within the basins
- Inner Harbour/Lake Lothing - Loading and offloading materials from site compound quaysides and transporting to and from barrier works site by barge
- Outer Harbour - use of quayside to prepare gates for installation
- Oulton Broad - access to Outer Harbour & North Sea constrained



Placement of concrete sill structure for the Nieuwpoort Barrier in Belgium – photo courtesy of Departement MOW Vlaanderen

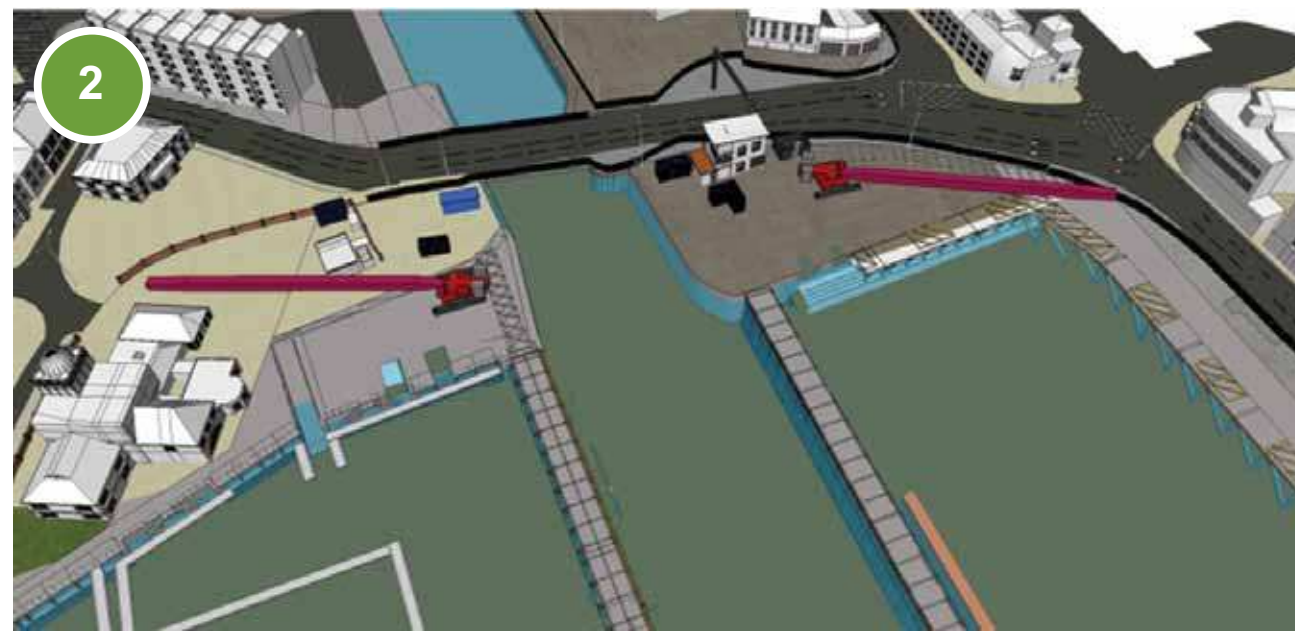


Maintenance Impacts

- All planned interventions except in an emergency
- Routine maintenance
 - Closure and reopening of mitre gates over circa 30 minutes period every two weeks at high tide
 - As above plus deployment of secondary gates over circa 45 minute period every month at high tide
 - Full test closure once a year in September/October – as per flood event
- Maintenance dredging
 - Timed with ABP twice yearly maintenance dredging of channel
- Major maintenance
 - Will involve channel closures (gate refurbishment, diver inspections, etc)

CONSTRUCTION METHODOLOGY

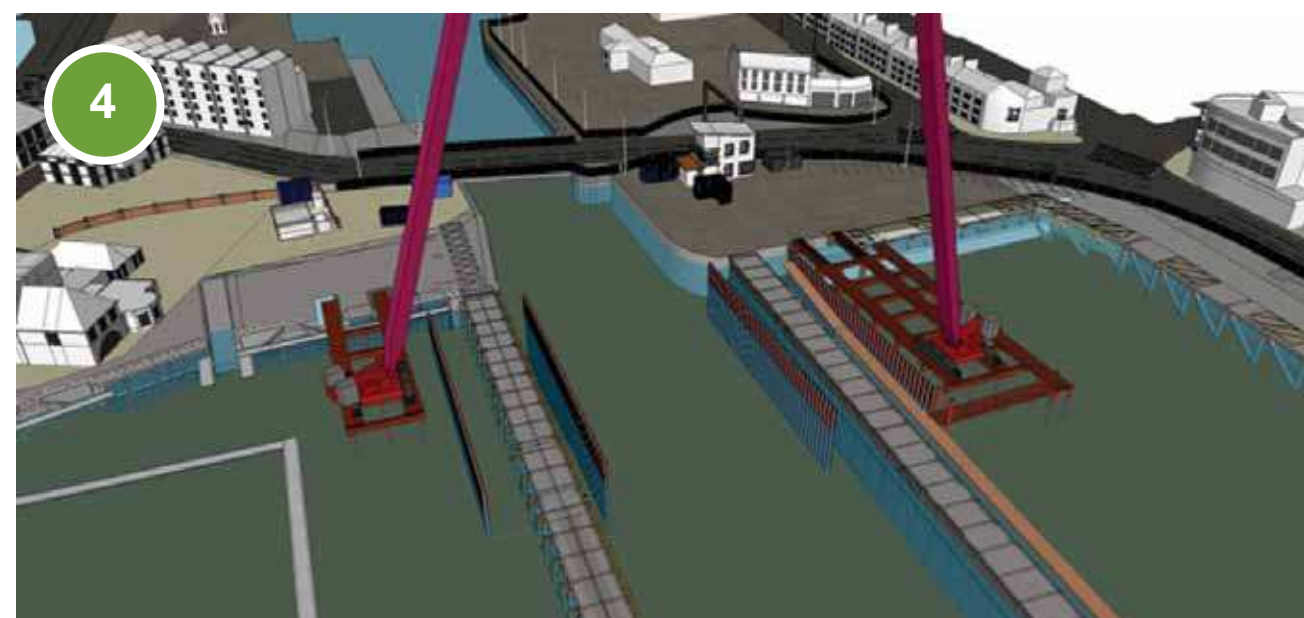
The construction methodology for the 40m mitre gate at Lowestoft Lake Lothing entrance. Works are anticipated to work all year round and will include possessions (not limited to) for the installation of the piles, cill beam, ram pits and gates.



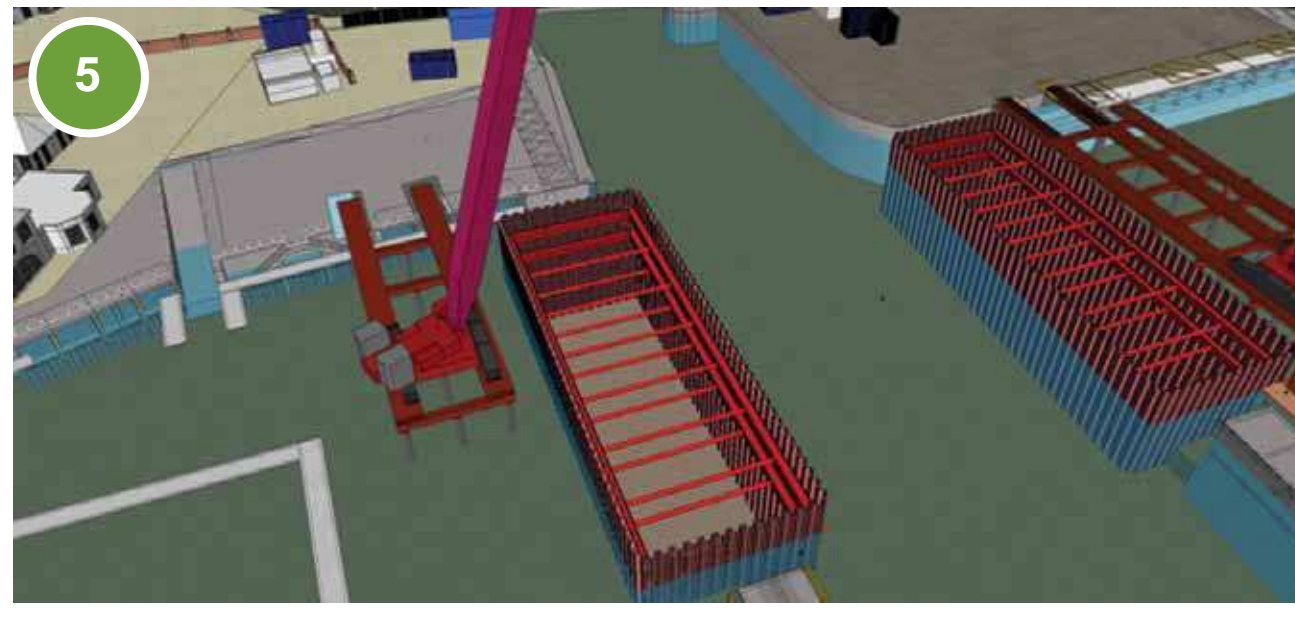
Erect 600t crawler cranes within the Yacht Club and APB port area - these will be used to facilitate the construction.



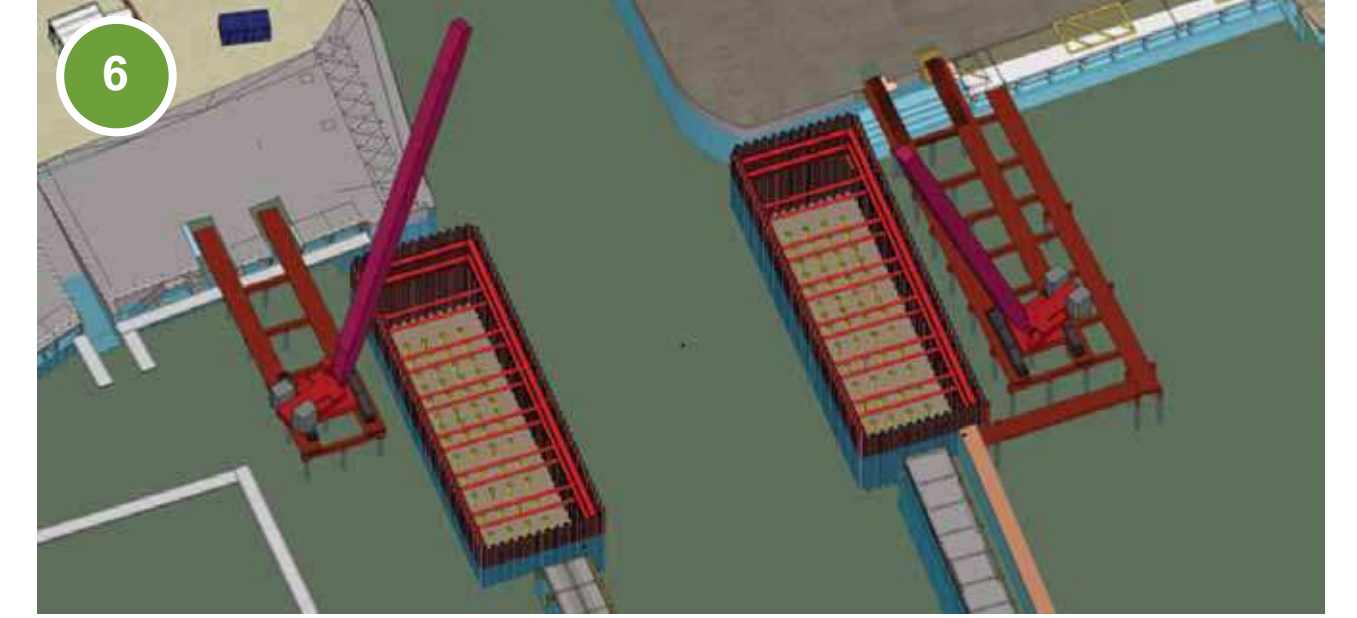
The 600t crawler cranes will work on platforms in the Yacht Club and APB port area.



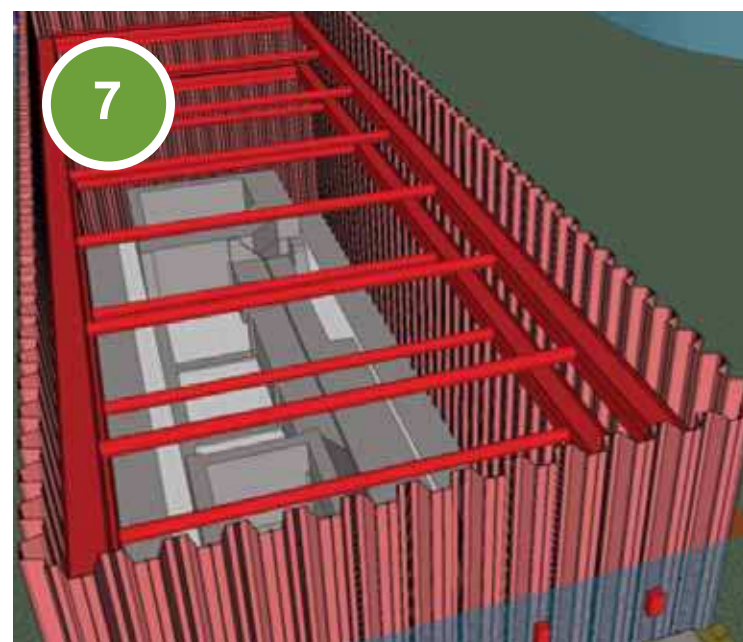
Once the abutment is constructed, the supporting frames and cofferdams will be removed and the sheet piles installed to join the abutment back to the tug arms.



Debris screens will be installed in the channel and Yacht Club and APB basins to prevent demolition material entering the channel.



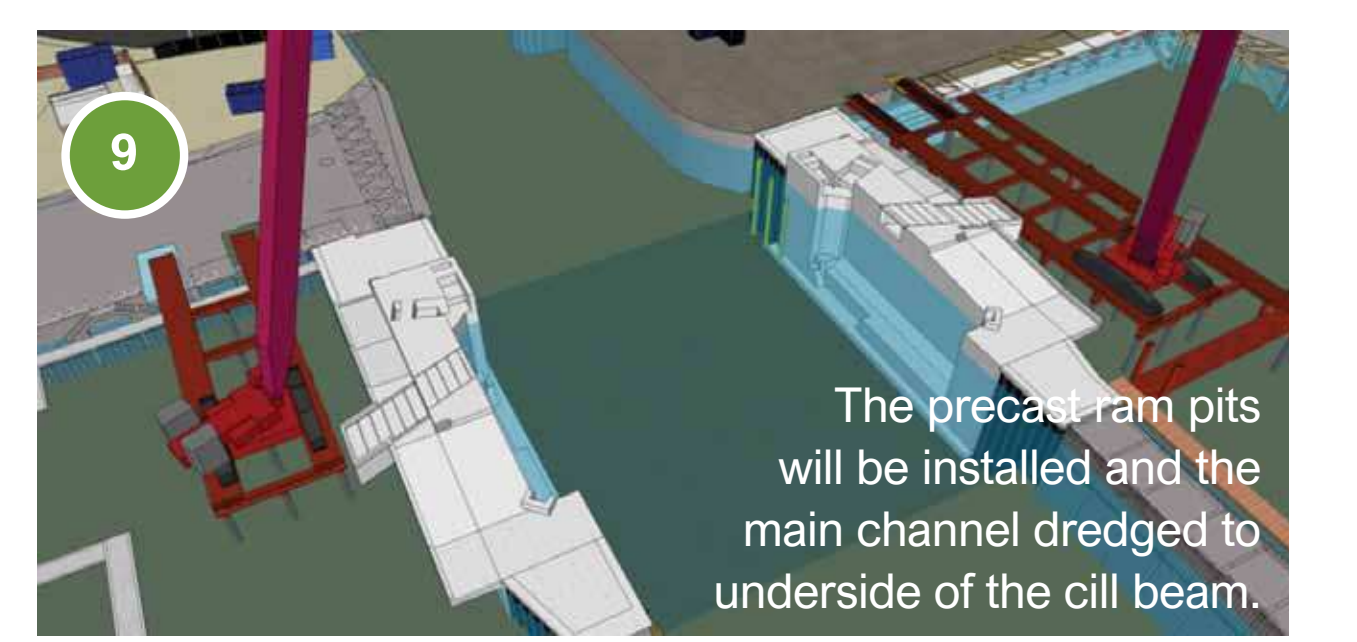
Tubular piles will be installed using the 600t crawler cranes. These piles will be delivered to the compound and brought to the work location by barge.



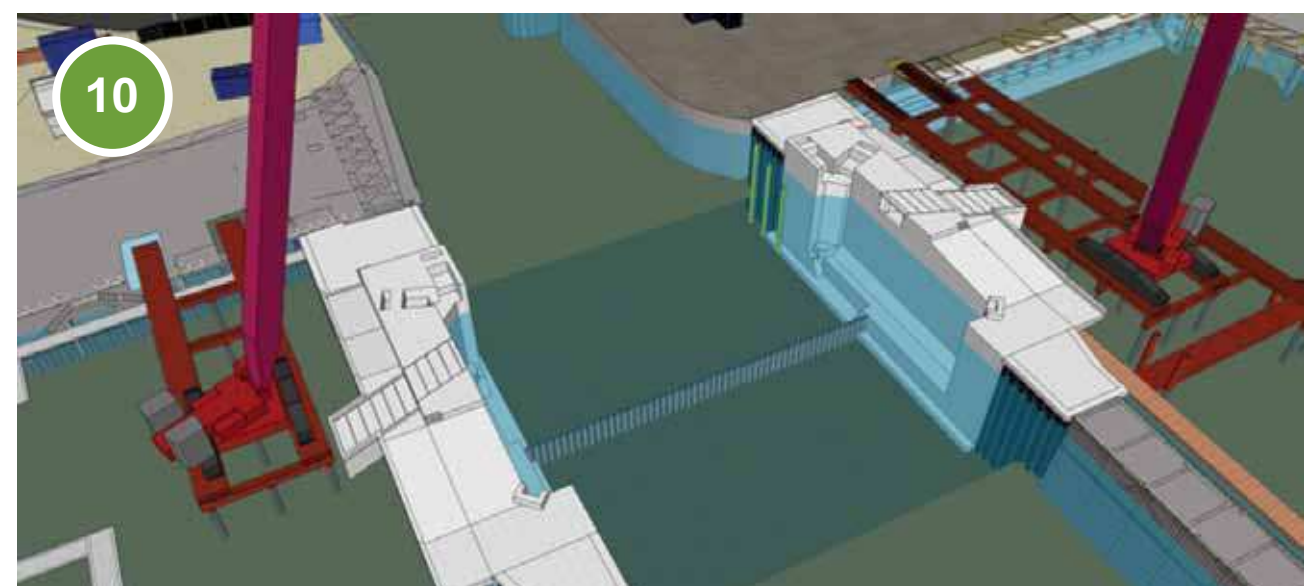
The insitu base and walls to the barrier abutments will be formed using reinforcement and concrete. Some concrete pours are 600 to 800m³ and will require 24 hours to pour of this size, the remainder will be around 300m³.



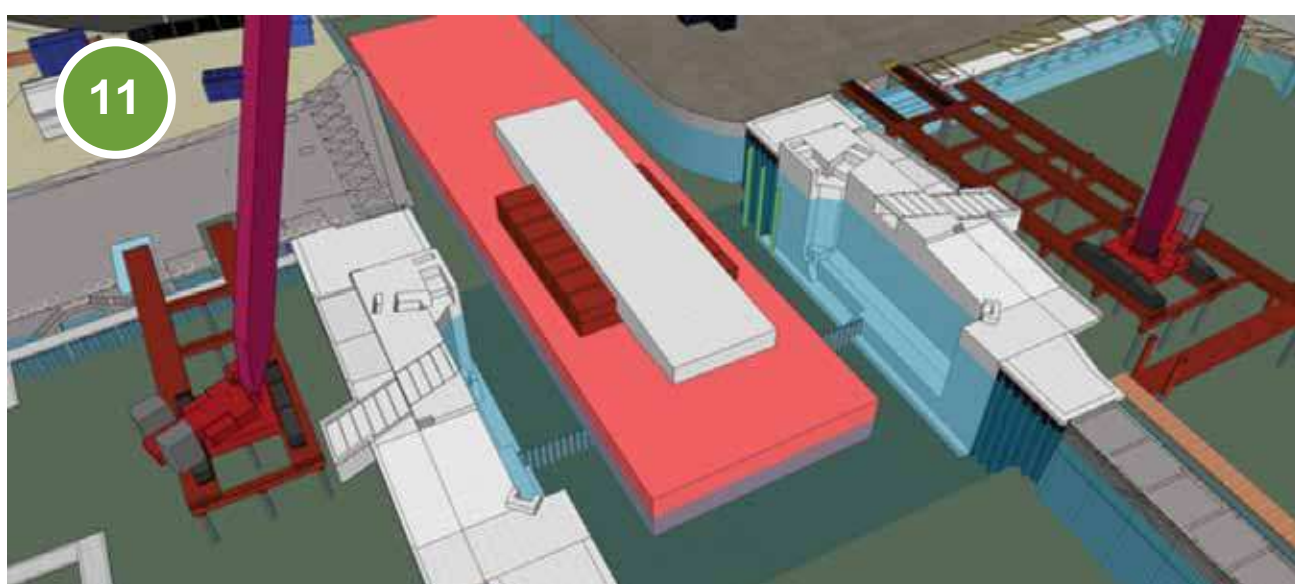
Once the abutment is constructed, the supporting frames and cofferdams will be removed and the sheet piles installed to join the abutment back to the tug arms.



The precast ram pits will be installed and the main channel dredged to underside of the cill beam.



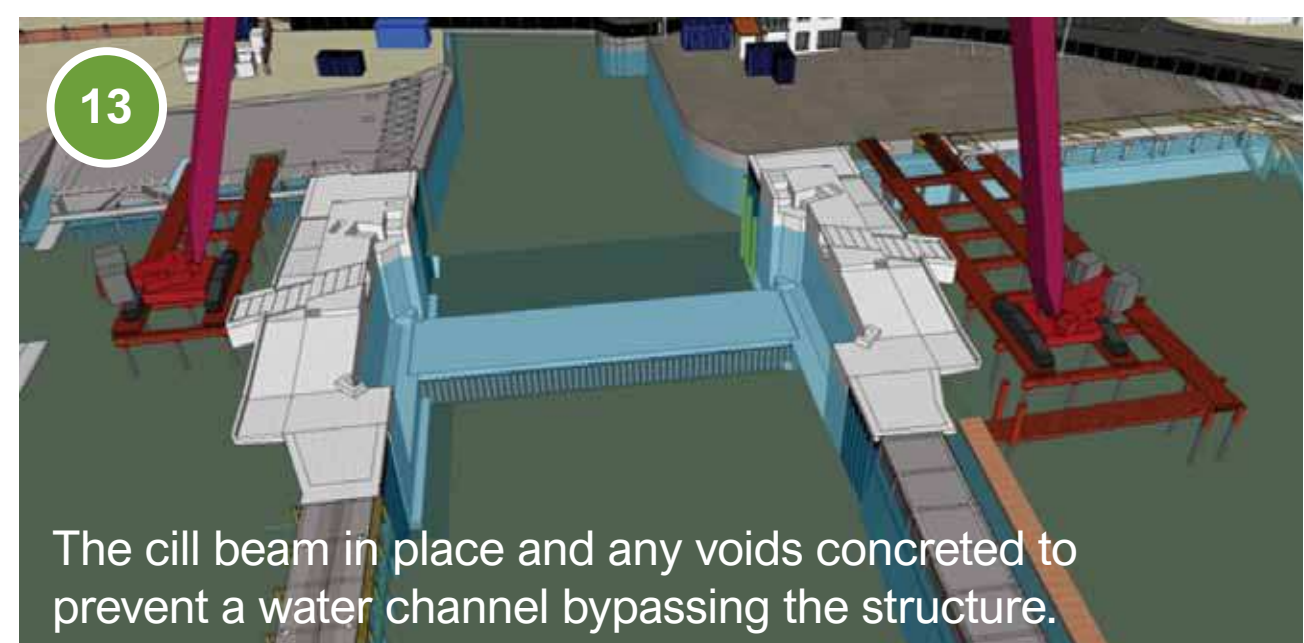
The sheet pile cut off wall will be installed using the 600t cranes. The sheet piles will be delivered to the compound and transported to site by barge.



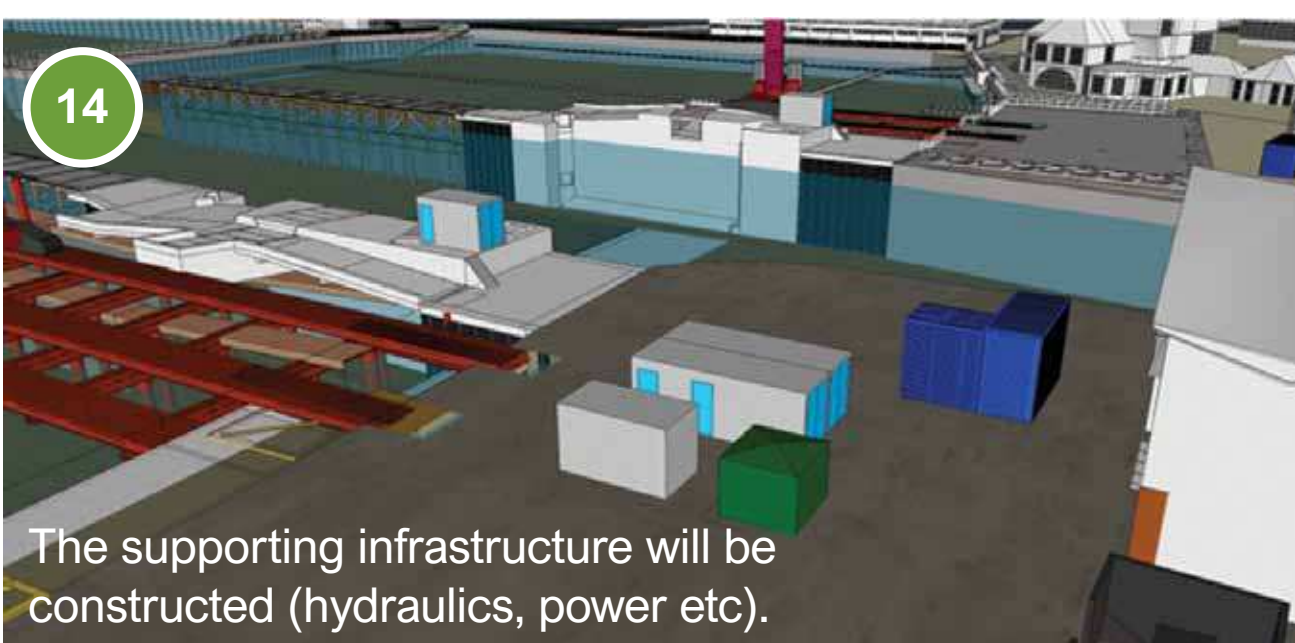
The insitu concrete cill, approx 1000t which has been cast in the compound will be transported to site by barge and delivered in the shear leg crane ready for installation.



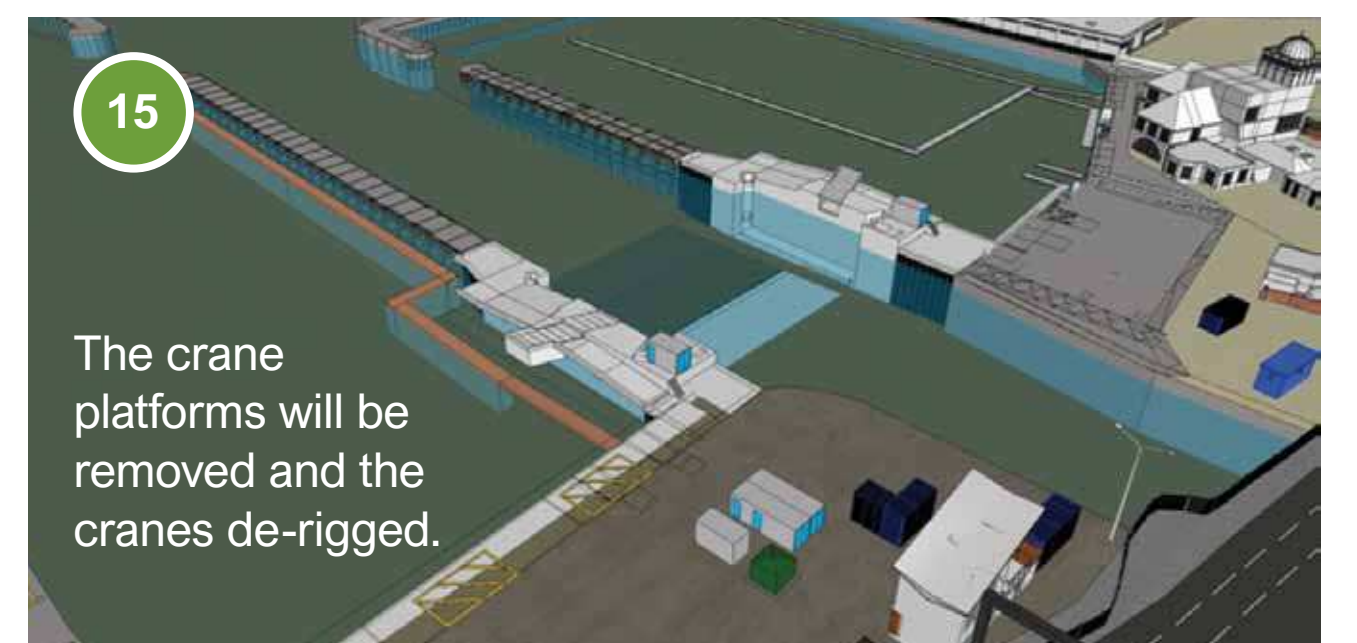
The shear leg crane will lift the cill beam and transport in into place.



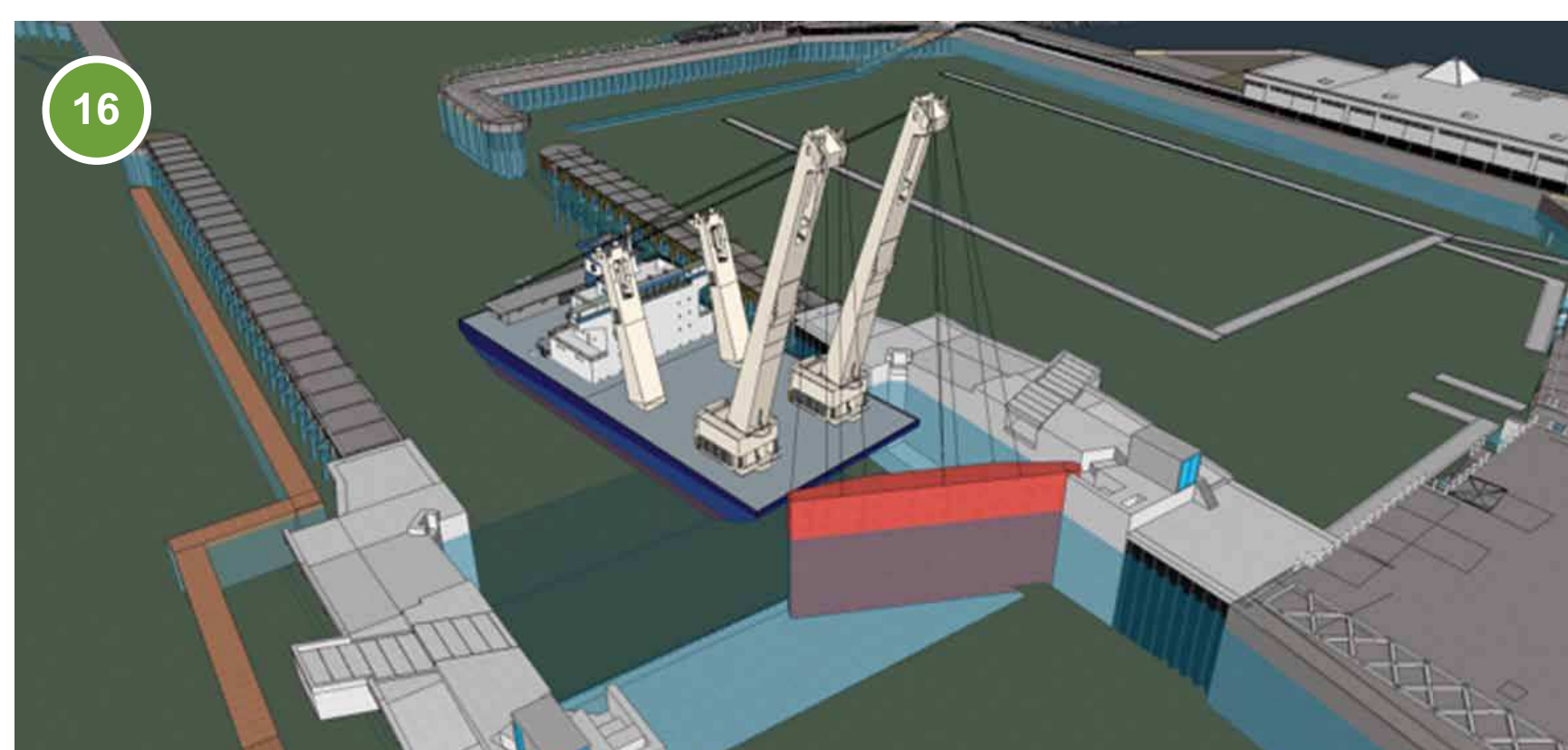
The cill beam in place and any voids concreted to prevent a water channel bypassing the structure.



The supporting infrastructure will be constructed (hydraulics, power etc).



The crane platforms will be removed and the cranes de-rigged.



The gates will be transported from the fabricator (Europe) and the shear leg will lift the gates into place.



VISUALISATION OF THE COMPLETED GATE

TRANSPORT WORKS ACT ORDER



The tidal barrier requires a Transport Works Act Order (TWAO). This is granted by the Secretary of State and is needed when construction can change or affect navigation. A TWAO can take up to two years to be approved but we are working with our partners and stakeholders to make sure that we address concerns as early as possible.

What is a Transport Works Act Order?

The TWAO is a statutory instrument “made” by the relevant Secretary of State, in this case the Secretary for the Environment, Food and Rural Affairs.

The TWAO grants “statutory authority” to construct, operate and maintain works, including powers to acquire land and interests in land.

TWAOs are routinely employed for rail and urban transit schemes but are also used in relation to a number of recent flood defence schemes. A TWAO applies when you are permanently altering navigation.

What powers are included in the TWAO?

- Construction of works
- Compulsory purchase of land – acquisition of rights permanent or temporary
- Temporary use of land
- Interference with highways
- Interference with navigation – protection of those who use the water
- Powers of operation
- Protective provisions
- Repeals and disapplications

How does a TWAO compare to the planning process?

- Scope of TWAO is far wider (e.g. CPO and operational powers)
- All applications are determined by the Secretary of State
- Financial circumstances of applicant or likelihood of funding are a key consideration
- Usually 5 years to implement (rather than 3 years)
- Applicant proposes ‘conditions’ to be imposed
- Scope of consent is usually more flexible

What is the TWAO process?

Pre Application Phase
(18 months)

Project is here

Inform Defra of intention to make application

EIA Screening and Scoping

Consultation, production of Environmental Survey, Design Refinement

Seek Defra comments on draft order

Application Phase
(2 months)

Order and other documents submitted to Defra

Newspaper notices published

Site notices displayed

Notices served on consultees and landowners

42 day period to deposit objections

Objection and Inquiry Phase
(9 - 12 months)

No objection(s) made

Objection(s) made

Timeframe for resolution

Objection withdrawn

Objection maintained

Defra decides how to proceed

Written Representations

Hearing

Public Inquiry

Report prepared

Decision Phase
(3 - 6 months)

Secretary of State decides whether to make order

Order Refused

Order Made





LOWESTOFT

FLOOD RISK MANAGEMENT PROJECT

Tidal Barrier Public Consultation

Monday 21 November - Thursday 12 January 2023

Information is available
to view at:

- Lowestoft Library
- Riverside
- Online virtual visitor centre
by following the QR code



Find out about:

- Construction
- Environmental impacts
- Navigational impacts
- Barrier operation and maintenance

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