

LOWESTOFT FLOOD RISK MANAGEMENT PROJECT

TIDAL BARRIER CONSULTATION

Monday 21 November – Thursday 12 January 2023



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.

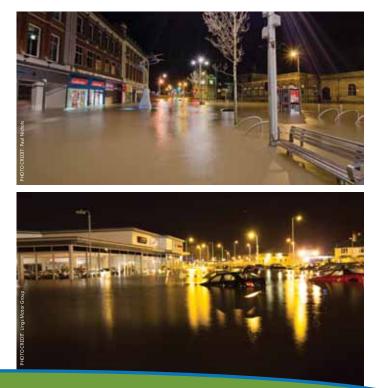
Why do we need flood defences in Lowestoft?

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

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

OPTION

1

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)

3 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 northeast 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.

Improve – defence raising (walls combined with a barrier) 3 barrier locations considered:

Outer Harbour

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

OPTION

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.

OPTION Within Lake Lothing combined with Gull Wing Bridge

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 southwest 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 ٠
- Potential regeneration benefits
- Potential benefits linked with **Gull Wing Bridge**



OPTION





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 autumn 2022. Construction on Package 2 to the south of Waveney Road, around the RNSYC and along the South Pier will begin in early 2022 and be completed spring 2023.













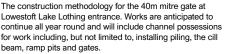


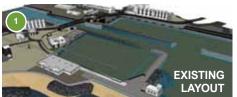






CONSTRUCTION METHODOLOGY







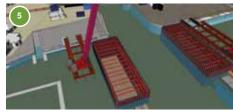
Once the abutment is constructed, the supporting frames and cofferdams will be removed and the sheet piles installed to join the abutment back to the tug arms.



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



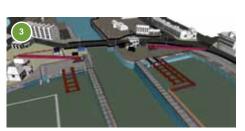
Erect 600t crawler cranes within the Yacht Club and APB port area - these will be used to facilitate the construction.



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

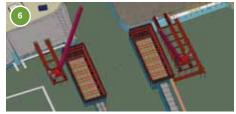


and cofferdams will be removed and the sheet piles installed to join the abutment back to the tug arms.

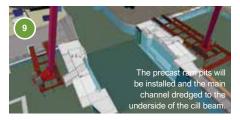


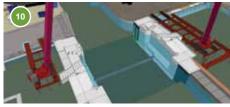
1ANAGEMENT PROJECT

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

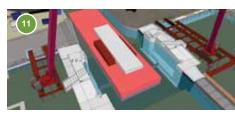


Tubular piles will be installed using the 600t crawler cranes. These piles will be delivered to the compound and bought to the work location by barge.





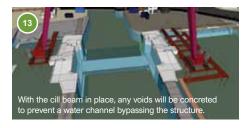
The sheet pile cut off wall will be installed using the 600t cranes. The sheet piles will be delivered to the compound and transported to site by barge.

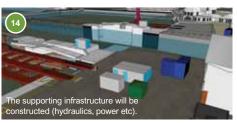


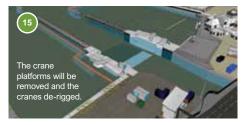
The in situ concrete cill, approx 1000t, which has been cast in the compound will be transported to site by barge and delivered in the shear leg crane ready for installation.



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









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



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 (SSI), 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.

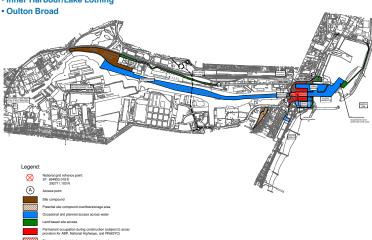


NAVIGATION IMPACT ASSESSMENT



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



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





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



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)

TRANSPORT WORKS ACT ORDER



What is the TWAO process?

Inform Defra of intention to make application Pre Application Phase * (18 months) **EIA Screening and Scoping** ÷ Consultation, production of Environmental Statement, Project is **Design Refinement** here ÷ Seek Defra comments on draft order Application Order and other documents submitted to Defra Phase £ (2 months) Newspaper Notices served Site notices notices on consultees displayed published and landowners 1 42 day period to deposit objections Objection and No objection(s) made Objection(s) made Inquiry Phase ŧ (9 - 12 months) Timeframe for resolution 1 Objection withdrawn **Objection maintained** Ŧ Defra decides how to proceed ŧ Hearing Written Representations Public Inquiry Report prepared Ť Secretary of State decides whether to make order **Decision Phase** Ť t (3 - 6 months) Order Refused Order Made

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

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

- Protective provisionsRepeals and disapplications

How does a TWAO compare to the planning process?

- Scope of TWAO is far wider (e.g. Compulsory Purchase Order and operational powers)
 All applications are determined by the Secretary of State
 Financial circumstances of applicant or likelihood of functions are a key consideration

- Ikelihood of funding are a key consideration
 Usually 5 years to implement (rather than 3
- Applicant proposes 'conditions' to be imposed



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

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
- Every month this closure period is increased to circa 50 minutes to include the closure/reopening of the associated secondary radial gates
- 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.

WHO'S INVOLVED?



Partners



Local Enterprise Partnership for Norfolk and Suffolk











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



The contractor on the LFRMP is **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.

CIVIL ENGINEERING

Social Value Impact

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

2054 students engaged	£8.4k donated to community schemes supporting vulnerable people	428	28 [§] 40 weeks of virtual and on site work experience placements	£3. 79 million spent with local SMEs
687 being of apprenticeships	129 by of graduate employment	429t carbon emissions saved through decarbonisation	200k car miles saved through car sharing	968 hours supporting young people into work
850 car miles saved through our bike scheme	123.75 spent on local school and college visits	£612 raised for local and national charities	of training opportunities for workforce (NVQs etc)	16 ^{local} people employed (FTE)

COMMUNITY ENGAGEMENT





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

@Lowestoft_FRMP
 @LowestoftFRMP
 @Lowestoft_FRMP
 www.lowestoftfrmp.org.uk

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, it's 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.

Working with Schools

In 2021 the project launched a virtual careers fair as part of the Norfolk and Suffolk Coast Forum conference. Following its success the project will be hosting another virtual careers fair in 2022.

The careers fair offers young people 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. The virtual careers fair has been made possible thanks to generous support from sponsors, including AECOM.

Visit the virtual careers fair here:



FEEDBACK



If you would like to leave feedback please complete the survey by scanning the QR code

Stay in touch:

www.lowestoftfrmp.org.uk lowestoftfrom@eastsuffolk.gov.uk

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