**Introduction**

A statutory environmental impact assessment has been undertaken to help protect the environment by ensuring that any significant impacts the scheme may cause are identified and taken into account in decision making.

This has entailed an assessment of the likely impacts of the Scheme both during construction and operation. Mitigation measures have been identified as part of the Environmental Statement (ES) which will form part of the TWAO application.

The ES submitted with the application will include a full assessment of the Scheme impacts both during construction and when in operation, and show how any negative impacts will be mitigated.

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**Environmental Impacts and Mitigation**

The follow describes the main adverse impacts of the Scheme and the measures proposed to mitigate those effects.

*Population and human health* –

- construction of the proposed barrier is likely to require closures of the [ ] channel would have significant effects on boats users accessing the Inner and Outer Harbour. Discussions on mitigation, timings and extents of the closures are still ongoing; the project is working closely with affected landowners and businesses.
- There is predicted to be dust soiling impacts from demolition, earthworks, construction activities and trackout activities (ie. the movement of materials around the construction site and out on to the local road network). The adoption of good practice dust mitigation measures to manage the generation of emissions at source would therefore be required, set out in a dust management plan.
- During operation, when the barrier is closed, this would prevent boat passage from the Outer Harbour into the Inner Harbour and vice versa. Barrier closures would occur for relatively short periods and would likely be communicated in advance, such that the effects could be managed and would not be significant.

*Noise and vibration* –

Temporary Noise and vibration effects are anticipated due to a number of activities taking place during construction. Significant daytime noise for receptors along Waveney Road, Commercial Road and Station Square will be experienced, due to piling for barrier abutments and demountable defences. Significant evening and night-time noise will be experienced for receptors along Waveney Road, Commercial Road, Station Square, Pier Terrace, The Harbour PH and the Royal Norfolk and Suffolk Yacht Club, during concrete pours and if in-channel piling overruns from the daytime. Mitigation will include a noise management plan and Best Practice Measures to reduce noise, erection of noise barriers around static construction plant and advance notice of noisy works to nearby residents.

Significant vibration effects on some port structures will occur during piling activity, with mitigation including ongoing vibration measurement during piling and investigation into alternative piling methods.

*Biodiversity, flora and fauna* – Impacts include disturbance to estuarine and marine mammals (harbour porpoise and seal) caused by noise and vibration from piling activities in the water and from other construction activities and to estuarine, marine and migratory fish within the vicinity of the works and from construction activities. Significant effects will be mitigated by implementing measures including searches for mammals before commencing piling, having someone present during the piling to spot whether any mammals move into the area and a procedure for the starting up of piling which minimises noise and vibration. Standard construction best practice (eg. production of an environmental management plan and a pollution prevention plan) will also be implemented. Damage/disturbance to benthic habitats and species under the footprint of the works and from construction activities will also be mitigated by the inclusion of standard construction best practice. The potential introduction of invasive non-native species will be mitigation via standard management procedures set out by the International Maritime Organisation. Disturbance to breeding kittiwake and/or destruction of nests during

construction will also occur. To compensate for the loss of nesting habitat, ledges will be incorporated into the design as alternative locations for nesting. The operational impacts of the Scheme are limited to preventing the movement of migratory fish between the North Sea and Oulton Broad when the barrier is closed. However, as this will occur infrequently and for a short duration only, the effect is not significant.

*Landscape and visual amenity* - The character and quality of the South Lowestoft and Kirkley Conservation Area will be temporarily affected during the construction period with the intrusion of construction activity and plant (particularly taller machinery) which would be visible across the local landscape and to visual receptors. During operation, the barrier's influence on the local landscape character would vary depending on it being open or closed, with it being most prominent in its closed position.

*Water, geomorphology and ground conditions* – A number of impacts on the water environment will occur during construction. There is potential for a change in tidal flows resulting from channel narrowing due to the abutments and cofferdams that will be in place during construction. Channel deepening associated with dredging may also affect tidal flows. Seabed disturbance from the construction of cofferdams, dredging, piling activities and disposal of dredged material is likely to result in increased suspended sediment concentrations within the water column. Construction works and use of haul routes taking place in and adjacent to water have the potential to affect water quality through spills and contamination. This may occur through the mobilisation of contaminated soils or the creation of new flow pathways. Excavations and piling have the potential to impact water quality and groundwater flows within the underlying aquifers. This may disturb bed sediment and create new flow pathways or mobilise contaminated sediment. Disturbance of land contamination and physical hazards in made ground during construction has the potential to impact human health. In channel works at the barrier location next to the Bascule Bridge have the potential to reduce flow conveyance at a location where there is an existing constriction of the channel. Mitigation measures include monitoring surveys, implementation of environmental and sediment management plans, stockpile management and pollution prevention, management of dewatering discharge and completion of a piling risk assessment.

When operational, the barrier has the potential to cause a number of impacts. Closure of the barrier has the potential to alter the tidal regime during surge events and maintenance. Periodic sediment management has the potential to increase suspended sediment concentrations and create a plume of sediments which could be transported offshore or into Lake Lothing depending on the stage of the tides when the barrier is operated. Barrier operation has the potential to result in changes to sediment deposition, leading to changes in the volume of dredging required. Periodic dewatering of the abutments has the potential to increase concentrations of pollutants, if the water becomes stagnant. New flow pathways resulting from the Scheme have the potential to contaminate groundwater. Mitigation includes sediment management and use of silt screens/booms during dredging and appropriate operation of the barrier to minimise risks to the environment.

*Historic environment* - Temporary impacts to the setting of heritage assets (eg. Grade II* listed Royal Norfolk and Suffolk Yacht Club building) is anticipated, due to the presence of construction activity and plant. There is a possibility that the excavation of material associated with construction has the potential to impact previously unknown archaeological remains. However, previous studies reviewed, indicate these would likely be of low value.

*Transport* – Subject to a review of change of compound location from Commercial Road to Riverside Road. It is expected that construction traffic associated with the Scheme will be light in comparison to the existing traffic in the area when spread over the full working day and therefore have only minor effects on the identified traffic and transport receptors. Construction will impact on existing parking provision, due to the displacement of vehicles which would normally park within the ABP and Royal Norfolk and Suffolk Yacht Club grounds. This issue will need to be managed by East Suffolk Council and appropriate alternative parking arrangements made.

*Navigation* - During construction, a number of navigation related impacts will occur. The temporary closure of the Inner Harbour Entrance Channel will be required for [ ] and create a number of long term restrictions to entering or departing the Inner Harbour for all users within the port, Lake Lothing and Oulton Broad. The duration of these possessions will vary but will for up to a number of weeks in length and may occur during sensitive periods for navigation. Construction will narrow the width of the Inner Harbour Entrance Channel, impacting navigability for larger commercial vessels. Use of the Yacht Basin

and Trawl Basin and associated infrastructure will be significantly disrupted for the duration of the construction period. Mitigation proposed to address these issues include navigational aids to assist vessels through the Inner Harbour Entrance Channel and alternative facilities for users of the Yacht Basin and Trawl Basin. During operation, when the barrier is closed, access is removed to and from the Inner Harbour in advance (up to six hours) of a tidal surge. Impacts to navigation will also be experienced during some periods of maintenance, as closures of the channel may be necessary during these times. As mitigation, agreed navigational aids will be in place during operation and will include lighting and fendering along the faces of the barrier gates. Prior to each barrier closure, East Suffolk Council will give notice of all temporary restrictions to navigation through the Inner Harbour Entrance Channel. Notice to Mariners will be provided by the Harbour Authority.

**Risks to the EIA**

There are currently a number of risks associated with completion of the Environmental Statement:

- Consultation is on-going with affected landowners and the port authority regarding the navigational impacts of the Scheme. If agreement on the issues to be determined is not reached, this will impede update and completion of the Navigational Impact Assessment and Navigation Management Plan, which will result in a delay to the update and completion of the navigation assessment reported in the Environmental Statement.
- Consultation with a range of statutory and non-statutory consultees is on-going. There remains a risk that this consultation can not be concluded in a timely fashion and any required updates to the Environmental Statement made prior to the TWAO submission deadline.
- The Scheme's Flood Risk Assessment is currently being updated to reflect the latest climate change allowances (UKCP18). There is a risk that this is not completed in time for the Environmental Statement to be updated prior to the TWAO submission deadline.
- Additional sediment and hydrodynamic modelling is currently being undertaken. There is a risk that this is not completed in time for the Environmental Statement to be updated prior to the TWAO submission deadline.