

# ABLE MARINE ENERGY PARK (MATERIAL CHANGE 2 – TR030006)

## UPDATED ENVIRONMENTAL STATEMENT

### CHAPTER 9: WATER AND SEDIMENT QUALITY

Able Marine Energy Park, Killingholme, North Lincolnshire



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## 9.1.0 Introduction

### Development Consent Order Context

- 9.1.1 The Development Consent Order (DCO) for the site approved a harbour development with the associated land development, to serve the renewable energy sector. The harbour will comprise a quay of 1,279m frontage, of which 1,200m is solid quay and 79m is a specialist berth formed by the reclamation of intertidal and subtidal land within the Humber Estuary.
- 9.1.2 The associated development also consented through the DCO includes:
- Dredging and land reclamation;
  - The provision of onshore facilities for the manufacture, assembly and storage of wind turbines and related items;
  - Works to Rosper Road, the A160 and the A180; and
  - Surface water disposal arrangements.
- 9.1.3 Documents, relevant to this chapter, that were included in the original Environmental Statement (the original ES) in support of the DCO application include:
- Environmental Statement Chapter 9: Water and Sediment Quality (AMEP site)<sup>1</sup>;
  - Environmental Statement Annex 9.2: Assessment of proposed reclamation impact on Centrica intake-outfall<sup>2</sup>;
  - Environmental Statement Annex 9.3: Assessment of proposed reclamation impact on EON intake-outfall<sup>3</sup>; and
  - Able Marine Energy Park and Habitat Compensation Scheme, Water Framework Directive Assessment (Revision 5)<sup>4</sup>
- 9.1.4 Other works relating to Water and Sediment Quality were undertaken with respect to the Compensation Site on the north bank of the Humber Estuary. These are however not considered of relevance to the material amendment being requested.

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- 1 AMEP, Environmental Statement Chapter 9: Water and Sediment Quality, 2012  
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000313-09%20-%20Water%20and%20Sediment%20Quality.pdf>
- 2 AMEP, Environmental Statement Annex 9.2: Assessment of proposed reclamation impact on Centrica intake-outfall, 2012,  
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000376-9.2%20-%20Assessment%20of%20proposed%20reclamation%20impact%20on%20Centrica%20intake-outfall.pdf>
- 3 AMEP, Environmental Statement Annex 9.3: Assessment of proposed reclamation impact on EON intake-outfall, 2012,  
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000377-9.3%20-%20Assessment%20of%20proposed%20reclamation%20impact%20on%20EON%20intake-outfall.pdf>
- 4 Able Marine Energy Park and Habitat Compensation Scheme, Water Framework Directive Assessment, Revision 5, HR Wallingford, TN DHM6835-02 R5, November 2012, <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-001692-121121%20TR030001%20Able%20Humber%20Ports%20Ltd.pdf>

## Consideration of Material Amendment

9.1.5 In the context of the proposed material amendment, this Chapter considers the following areas:

- changes in the water quality arising from the scheme and consideration of how this might vary as a result of the proposed material amendment; and
- changes in the sediment quality arising from the scheme and consideration of how this might vary as a result of the proposed material amendment.

## Purpose and Structure of Chapter

9.1.6 This Chapter of the Updated ES (UES) considers the impact of the proposed material amendment on Water and Sediment Quality.

9.1.7 Consideration is given to:

- changes in legislation, policy and guidance relating to Water and Sediment Quality since the DCO application and original ES;
- physical changes in the baseline context at the site as relevant to Water and Sediment Quality;
- any changes in the WFD status of the Humber Estuary adjacent to the site; and
- the material amendment to the proposed scheme.

## 9.2.0 Methodology

### Changes in Legislation, Guidance and Planning Policy

#### Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

- 9.2.1 These regulations revoke and replace the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (SI 2003 No. 3242). They continue to transpose Directive 2000/60/EC, for England and Wales, establishing a framework for Community action in the field of water policy (the Water Framework Directive).
- 9.2.2 They also transpose aspects of Directive 2006/118/EEC on the protection of groundwater against pollution and deterioration (the Groundwater Directive) and of Directive 2008/105/EC on environmental quality standards in the field of water policy (the Environmental Quality Standards Directive).

#### Water Framework Directive assessment: estuarine and coastal waters<sup>5</sup>

- 9.2.3 In December 2016, the Environment Agency published guidance on how to assess the impact of an activity in estuarine (transitional) and coastal waters for the Water Framework Directive (WFD). The guidance is called Clearing the Waters for All.

#### National Planning Policy Framework<sup>6</sup>

- 9.2.4 The National Planning Policy Framework (NPPF) was published in 2012. In paragraph 170 this requires planning policy to prevent “*new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans*”.

### Scoping Opinion

- 9.2.5 Table 9-1 summarises the key aspects of the scoping opinion as relevant to water and sediment quality This incorporates comments from the Environment Agency and North Lincolnshire Council (the Lead Local Flood Authority).

**Table 9-1: Scoping Opinion**

Page & Paragraph No.	Scoping Opinion	Comments	Outcome	Reference within UES
Page 20, Paragraph 4.3.1	New or different significant effects from alterations to site run-off and drainage during construction are	Impacts of runoff on water quality are also considered in Chapter 13 (Drainage and	Scoped Out	9.2.20 & 9.2.21

<sup>5</sup> Water Framework Directive assessment: estuarine and coastal waters, Environment Agency, Published December 2016 (updated November 2017), <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>

<sup>6</sup> National Planning Policy Framework, Ministry of Housing, Communities & Local Government, Published March 2012, Updated June 2019, <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

Page & Paragraph No.	Scoping Opinion	Comments	Outcome	Reference within UES
	unlikely and can be scoped out of the updated assessment	Flood Risk) and Chapter 7 (groundwater)		
Page 20, Paragraph 4.3.2	Cleethorpes Beach is located at some distance from the Proposed Development and is unlikely to experience new or different significant effects and can be scoped out of the updated assessment.	Agreed	Scoped Out	9.2.18
Page 20, Paragraph 4.3.2	The proposed change would result in large, albeit localised, changes to the impact characteristics within a number of designated sites. Indirect impacts to sites and features from changes in water quality during construction should be assessed in the updated assessment.	Updated assessments (Appendix UES8-1) have confirmed that new or additional dredged material is unlikely to give rise to significant water quality impacts and that potential impacts at the deposition site in terms of sediment loading are likely to be small when considered against the natural range of water quality in the Humber Estuary.	Potential effect assessed as not significant	9.4.3 to 9.4.8 and UES Appendix UES8-1
Page 21, Paragraph 4.3.3	The proposed changes are unlikely to alter the characteristics of impacts associated with sewage and trade effluent, accidental spills or litter (operational phase) such that new or different significant effects would occur. The Inspectorate agrees that these matters do not need to be scoped into the updated assessment.	Agreed	Scoped Out	9.2.20 & 9.2.21
Page 21, Paragraph 4.3.4	The Scoping Report explains that the existing Centrica outfall is no longer operational and that the applicable environmental permit is bespoke to the previous operator. The Applicant should provide evidence within the updated ES to demonstrate the agreement reached with relevant consultation bodies notably the EA as to this.	Agreement with the EA included in Appendix UES9-1	Scoped Out	9.2.19



Page & Paragraph No.	Scoping Opinion	Comments	Outcome	Reference within UES
Page 21, Paragraph 4.3.5	The need to update the assessment of sediment plume impacts and resuspension of contaminated sediment should be informed by the updated assessments for Geology, Hydrogeology and Ground Conditions and Hydrodynamic and Sedimentary Regime. Changes to impact characteristics in these aspects should inform the updated ES of impacts to water quality from sediment plume and resuspension of contaminate sediment.	Additional sediment sampling has confirmed that the dredge sediment is not significantly contaminated and modelling of the sediment plume (Appendix UES8.1) predicts only small uplifts in suspended sediment concentration. The potential effects are therefore small when set against the baseline characteristics of the Humber Estuary	Potential effect assessed as not significant	9.4.3 to 9.4.8 and Appendix UES8-1
Page 22, Paragraph 4.3.6	The Scoping Report suggests that changes to impact characteristics likely to alter the assessment of WFD objectives will be undertaken qualitatively. The Inspectorate does not agree with this approach uniformly and instead considers that where necessary quantitative assessment should be undertaken.	An updated WFD assessment has been prepared in support of the revised scheme and will be informed by updated monitoring and modelling where considered appropriate and as agreed with the Environment Agency.	Updated WFD Assessment	Separate document in the application

## Additional Consultation

9.2.6 Following consultation on the PEIR, the Environment Agency have provided further comments of relevance to this chapter as detailed below in Table 9-2.

**Table 9-2: EA response to PEIR**

Issue	EA Comment	Outcome	Reference within UES
The impacts on the thermal plume from the Uniper outfall as addressed in Appendix U9-4 of the PEIR.	The report is quite comprehensive, uses appropriate modelling and calibration. The conclusions indicate that the amended quay will have less impact on the intake due to the amended quay being set closer to the bank. The thermal plume is only deflected slightly towards the	Agreed. The report is included as a Technical Appendix to the UES.	Appendix UES9-5

Issue	EA Comment	Outcome	Reference within UES
	northeast instead of being directed directly over the intake, as modelling of previous quay design indicated. NB. Existing conditions let the, much longer, plume to be dispersed parallel to the bank. The quay will make the plume shorter, and it (the plume) will stay near the intake for longer, however the thermal impact is much lower than previously modelled, possibly due to the second outfall having been decommissioned.		
Thermal plume modelling for the former Centrica power plant outfall.	Centrica surrendered the Operating Permit on 18 July 2017, so no longer have permission to use the intake/outfall to the Humber. Therefore thermal plume modelling is not required by the EA for this.	Agreed	Impacts on the future sedimentation around the redundant plant is reported in Chapter 8.

9.2.7 Two further meetings were held with the Environment Agency to discuss the content of the PEIR and the forthcoming UES. These meetings were held on the following dates:

- 27<sup>th</sup> April 2021
- 18<sup>th</sup> May 2021

9.2.8 In addition to the above the Martine Management Organisation (MMO) also provided a response to the PEIR. With this with respect to Chapter 9: Water and Sediment Quality, they confirm that; *“In terms of chemical analyses, the MMO is of the opinion that additional samples are not required. The samples undertaken in 2020 are still timely and the spatial representation is sufficient to characterise the material to be dredged and from a chemical and physical characterisation perspective, the material can be disposed of to HU080, HU081 and HU082.”*

## Assessment Methodology

### Study Area

9.2.9 A study area for Water and Sediment Quality was not formally defined within the original ES.

9.2.10 The assessment considered all direct surface water receptors of the site including both the Humber Estuary and Killingholme Marsh, groundwater receptors present at the depth below the site and also areas within the estuary where direct impacts associated with dredging or deposition of

sediments are possible.

- 9.2.11 The same study area will be applied for this update.

### Significance of Effect

- 9.2.12 Significance criteria relating to water and sediment quality were defined in the Table 9.1 of the original ES. These same criteria will be applied for this update.
- 9.2.13 Criteria used for determining the risk to water quality are set out in Environmental Quality Standards (EQS) produced by the WFD UKTAG (2008) in line with the EU EQS Directive. EQS are identified for a range of water quality characteristics including temperature, dissolved oxygen and for a range of specific pollutants including trace metals.
- 9.2.14 Impacts will be assessed as significant if the impacts to water quality result in an exceedance of standards or guidance values, such as EQS for water quality or Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Action Levels for sediment quality. Any resultant non-compliance with WFD will also be considered as significant with regards to water quality. If impacts do not result in a non-compliance or exceedance of standards they will be considered to be non-significant.

### Magnitude of Change (Impact)

- 9.2.15 With the original ES the magnitude of change was incorporated into the definitions for the significance of effect. The same approach has been applied for the preparation of this UES.

### Mitigation Hierarchy

- 9.2.16 While not defined within the original ES, a hierarchy has been employed for mitigation. Where possible this seeks to avoid adverse effects and only where this is not possible are remedial options for reducing, remedying or compensating for any identified effects considered.

### Effects Not Requiring Further Assessment

- 9.2.17 The key receptor relating to Sediment and Water Quality, as identified in the original ES prepared for the DCO application, was the Humber Estuary. Other potential receptors also discussed in Chapter 9, of the ES (see Tables 9-2 and 9-4 of the original ES) include the channels within the Killingholme Marshes and the Chalk aquifer that underlies the site.
- 9.2.18 With regards to the Humber Estuary, Cleethorpes Beach is located at some distance from the proposed development and as such it is considered highly unlikely that this would experience new or different significant effects as a result of the proposed change in the quay alignment of any of the associated works. Impacts to Cleethorpes Beach is therefore scoped out of this assessment.
- 9.2.19 The Centrica power station that was operational at the time of the DCO has been demolished. As such, consideration of temperature impacts to the intake and outfall for that power station are no longer of concern. As set out in Appendix UES9-1, this has been confirmed in writing by the Environment Agency.
- 9.2.20 Assessment and mitigation detailed in relation to Flood Risk and Drainage (see chapter 13 of this document) is considered sufficient to address potential impacts to the quality of water within the surface watercourses and channels in and around the Killingholme Marshes. These are therefore

not considered further in this chapter.

- 9.2.21 Assessment and mitigation detailed in relation to Geology, Hydrogeology & Ground Conditions (see Chapter 7 of the original ES<sup>7</sup>) is considered sufficient to address potential impacts to the underlying Chalk aquifer. This is therefore not considered further in this chapter.

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7 AMEP, Environmental Statement Chapter 7 Geology, Hydrogeology & Ground Conditions  
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000316-07%20-%20Geology%20Hydrogeology%20and%20Ground%20Conditions.pdf>

## 9.3.0 Changes in Baseline Conditions

### DCO Baseline

9.3.1 Chapter 9; Water and Sediment Quality, of the original ES undertaken for the DCO application sets out the baseline status of the Humber Estuary detailing:

- its status under the Water Framework Directive;
- relevant ecological designations, the condition of these and, where appropriate reasons for failing to achieve good status;
- physico-chemical characteristics including details of temperature, dissolved oxygen and suspended sediment concentration and the variability of these parameters within the estuarine environment; and
- sediment quality.

9.3.2 The picture presented is one of a dynamic and energetic environment with valuable ecological characteristics. This environment has historically been significantly impacted by industrial activity but is now slowly recovering.

### DCO Future Baseline

9.3.3 While the original ES highlights a long-term trend of improving water quality in the Humber Estuary, no specific projections for future changes to the estuary are discussed within that document.

### Current Baseline

9.3.4 Summary details of the current Chemical and Ecological status of the estuary, based on Environment Agency WFD assessments (Cycle 2 – 2019), are provided in Table 9-3 below. This indicates that the reach of the estuary past the site, and also including the disposal grounds, has been assessed to have a *moderate* ecological potential. The reach is however classed as fail with regards to chemical quality.

9.3.5 The specific parameters that have failed to achieve good chemical status are:

- Cypermethrin (Priority hazardous);
- Dichlorvos (Priority);
- Benzo(b)fluoranthene;
- Benzo(g-h-i)perylene;
- Mercury and Its Compounds; and
- Tributyltin Compounds

**Table 9-3: Estuary Ecological and Chemical Quality (WFD Assessment)**

Topic	DCO (Cycle 1 – 2010)	Current (Cycle 2 -2019)
Waterbody name	Humber Lower	
Waterbody ID	GB530402609201	
Typology Description	Mixed water column, macro-tidal, extensive intertidal zone	
Hydromorphological Status	Heavily Modified	
Current Ecological Quality	Moderate Potential	Moderate Potential
Current Chemical Quality	Fail	Fail
Overall Physico-Chemical Water Quality	Moderate	Moderate
Dissolved oxygen (%)	High	High
Overall specific pollutant quality	Moderate	High
Copper	High	High

- 9.3.6 In connection to the DCO Schedule 8 Condition 39, an active monitoring scheme to measure marine environmental parameters during the project has been initiated with the collection of a year of baseline data. This comprised continuous monitoring at two locations, one on a buoy in the estuary adjacent to the site and one on a nearby Jetty. Full details of the monitoring arrangements and location are provided in the report titled 'Active Monitoring Scheme' included as Appendix UES9-2.
- 9.3.7 Baseline data at these two monitoring stations was collected for the period from July 2016 through to July 2017. The outputs from the monitoring are detailed in the report titled 'AMEP 'Limits of Acceptable Change' Assessment' included as Appendix UES9-3. Summary data is provided in Table 9-4.

**Table 9-4: Baseline Estuarine Water Quality Summary**

Buoy Sensor Statistics	Min	Mean	Max	95th percentile
Sea Temperature (°C)	4	12	20	19
Salinity (PSU)	3	18	27	25
Dissolved Oxygen (%)	7	9	12	11
Dissolved Oxygen (mg/l)	78	95	104	101
Total Suspended Solids (mg/l)	0	502	2888	1338
Jetty Sensor Statistics	Min	Mean	Max	95th percentile
Sea Temperature (°C)	4	12	20	19
Salinity (PSU)	5	20	29	26
Dissolved Oxygen (%)	7	9	12	11
Dissolved Oxygen (mg/l)	80	97	105	103
Total Suspended Solids (mg/l)	38	812	3303	1846

- 9.3.8 With regards to sediment quality, sampling was undertaken in May 2011. Based on this data the Marine Management Organisation (MMO) confirmed that *“the material to be dredged is suitable for disposal within the Humber Estuary”*. Further sampling of the surface sediments was undertaken in 2017 and 2020 in accordance with Sampling Plans agreed with the MMO.
- 9.3.9 The additional sediment quality data is provided within Appendix UES9-4 and, aside from PCBs no exceedance of the Cefas Action Level 2 thresholds were recorded.
- 9.3.10 With respect to PCBs in 2011 there were no exceedances of the Cefas Action Level 2 threshold; however, one exceedance was observed in the testing undertaken in 2020. Despite this one elevated reading overall there were significantly fewer exceedance of the Cefas Action Level 1 thresholds in the more recent data set.

### Changes in Baseline

- 9.3.11 Table 9-3 provides comparison of the WFD chemical and ecological status of the estuary, between the time of the DCO application and this present time. This indicates that, aside from a small improvement in the water quality, there has been little change in status.
- 9.3.12 With regards to the data summarised in Table 9-4 there is no earlier period of data against which a direct comparison can be made. Appendix UES9-3 does however include a review of the recorded data against other longer term data sets and concludes that the results obtained are realistic and do not demonstrate any fundamental changes in water quality.
- 9.3.13 With regards to sediment quality, the data collected in 2017 and 2020 does not demonstrate any significant variation in the sediment quality when compared to the testing undertaken in 2011. The MMO have reviewed this data and, in their consultation response, have agreed that the material is suitable for depositing at sea.

## 9.4.0 Assessment of Effects

9.4.1 The assessment of Water and Sediment Quality prepared for the original ES highlighted the following potential effects:

- Construction Phase:
  - dredging and disposal operations resulting in a sediment plume with the potential to affect the sediment quality of the depositional areas;
  - potential for release of contaminants from disturbed sediments;
  - deterioration of water quality due to higher fine sediment delivery through surface water run-off;
  - accumulation of litter affecting the water quality of the Humber Estuary with consequences for estuarine organisms; and
  - potential for accidental spillages of oils, lubricants and other industrial substances during the construction phase.
- Operation phase:
  - physical structure of the new quay has the potential for impacting on the mixing of existing outfalls and intakes from two gas fired power stations. Of particular concern is the possibility of changing the temperature at the intake;
  - potential for accidental leaks and spills that may release contaminants into surface waters; and
  - increased area of hard standing than currently exists with the potential for run-off and drainage to surface waters to increase.

9.4.2 A number of these areas of potential impact have however already been screened out of this review as they are either not of relevance to the proposed material amendment or they could not be reasonably be altered by the changes proposed.

### Additional Construction Phase Effects

9.4.3 Capital dredging is required to construct the berth pockets and turning area at the proposed AMEP. The sediments to be dredged consists of alluviums, soft clays, sand and gravels and glacial till. The sediment plume modelling undertaken for the original ES has been updated and is considered within Chapter 8 of this UES: Hydrodynamic and Sedimentary Regime, and more particularly in Technical Appendix UES8-1. In summary the report concludes that the difference in impact between the consented and amended schemes is minor but that the plume will extend slightly further up and downstream.

9.4.4 For the DCO application it was proposed that the dredging of alluviums, soft clays, sand and gravels be achieved using trailing suction hopper dredgers (TSHD)) with mechanical, backhoe (BHD) dredging used to remove the stiffer glacial till. It is now proposed to also utilise cutter suction dredgers (CSD) as well. Compared with the consented TSHD, the modelling indicates that CSD



dredging would result in lower peak sediment concentrations albeit with a larger overall plume footprint.

- 9.4.5 The volume of dredged sediment required for disposal will be increased by the material amendment, but the disposal will take place over a longer period. As such while the sediment plume that will develop following dredge disposal will be around for longer, it should not result in higher maximum sediment load. The proposed material amendment will therefore only have a small potential effect on impacts associated with the sediment plume and the resuspension of contaminated sediment occurring as a result of the capital dredge requirements.
- 9.4.6 The modelling indicates that dredging and disposal of sediments will not result in a significant change to sediment transport in the Humber Estuary, although temporary and significant rises in background concentrations are likely to occur locally during the dredging of sand / gravel over the course of a week (or less). With the exception of the dredging location itself all of the predicted increases in sediment concentration caused by dredging activity are assessed to be small compared to the natural variation in suspended sediment concentration. In line with the original ES, it is therefore concluded that the impact of dredging and disposal during construction on water quality within the Humber Estuary is not significant.
- 9.4.7 For contaminated sediments, updated sampling was undertaken in 2017 and 2020 and is provided within Appendix UES9-4. With exception of one PCB result, no exceedance of the Cefas Action Level 2 exceedance thresholds were recorded and the MMO have reviewed this data and, in their PEIR consultation response, agreed that the material is suitable for depositing at sea. On this basis, it is considered that there will be no change to the potential impacts associated with resuspension during construction over and above those considered within the original ES. This impact will remain not significant.

### Additional Operational Phase Effects

- 9.4.8 Flow patterns near the Uniper (formerly E.ON) power station intake and outfall could change as a result of the material amendment, with resulting impacts on the operation of the power station.
- 9.4.9 The changes to flows are reported in Chapter 8: Hydrodynamic and Sedimentary Regime, with supporting assessment undertaken in accordance with the methodology previously applied for the DCO. The assessment of the thermal impact at the Uniper outfall has then been updated to enable assessment of the potential changes in impacts arising from the proposed material amendment. This updated assessment is included as Appendix UES9-5.
- 9.4.10 Intake and outfalls from the power station were included within a thermal dispersion modelling for the reach of the estuary. This simulated the thermal plumes over a full spring-neap tidal cycle for two wind conditions. These simulations considered both the existing condition and the developed condition including the proposed material amendments to the DCO scheme.
- 9.4.11 The modelling indicates that under existing conditions the plume from the outfall is rapidly dispersed so that water abstracted at the intake is likely to be less than 0.1°C above the ambient temperature. The presence of the quay will affect the behaviour of the plume from the outfall and will result in a maximum uplift at the outfall of 0.3°C. This level of impact (i.e. the difference between baseline and proposed - 0.2°C) is however identical to that which was projected for the consented DCO scheme and is considered to be not significant.
- 9.4.12 In terms of the potential impacts of future maintenance dredging requirements on water and

sediment quality these will not be significantly different than previously assessed within the original ES. Updated modelling is reported in Chapter 8 of this UES: Hydrodynamic and Sedimentary Regime and concludes that potential changes in sediment concentration are small when considered in the light of natural variations within the Humber Estuary.

### **Additional Cumulative Effects**

- 9.4.13 There are no additional cumulative effects associated with Water and Sediment Quality.

### **Consideration of DCO**

- 9.4.14 It is concluded that the changes in baseline understanding and the changes to the scheme will not result in any new or significant increased effects on Water and Sediment Quality over and above those outlined in the original ES.

## 9.5.0 Requirement for Additional Mitigation

### DCO Mitigation

- 9.5.1 A dredge plume assessment was conducted and presented as part of the DCO application. This addressed the potential for dredging operations to affect the marine environment (see Chapter 8 of original ES<sup>8</sup>, updated within EX8.16<sup>9</sup> - Chapter 8 Signposting Document). Based on this assessment mitigation measures to control potential adverse effects were agreed by the conditions in Schedule 8.
- 9.5.2 Additional studies were also carried out to quantify the impact of the scheme on intakes of the (former) Centrica and E.ON (now Uniper) power plants. These were included as Annex 9.2<sup>10</sup>, Annex 9.3<sup>11</sup> and Annex 8.3<sup>12</sup> of the original ES. Based on these studies a commitment was made for ongoing maintenance dredging to be carried out at discrete intervals to prevent sedimentation at the E.ON and Centrica intakes.
- 9.5.3 Schedule 11 Requirement 22 requires a Code of Construction Practice to be approved by the Local Planning Authority for each stage of the works. This will set out the measures that will be implemented during construction to minimise pollution of the estuarine environment.
- 9.5.4 Schedule 8 Requirement Condition 31 requires detailed method statements to be approved by the MMO for all works before the level of MHWS. This provides further controls to be secured to minimise the risk of pollution of the estuarine environment.
- 9.5.5 Under DCO Schedule 8, Condition 39, an active monitoring scheme to measure marine environmental parameters during the project has been agreed and implemented. Full details of the monitoring arrangements and location are provided in Appendix UES9-2 with preliminary baseline results discussed in Appendix UES9-3.
- 9.5.6 Schedule 8 Condition 54 requires the licence holder to employ methods to minimise resuspension of sediment during the construction and dredging operations.
- 9.5.7 Within the DCO, trigger levels for key water quality parameters were specified or required to be agreed. These trigger levels have been confirmed with the MMO following the baseline monitoring programme and will be used during construction to confirm that adverse impacts are not occurring and, if ever required (i.e., if exceedances are observed), for working methods to be modified to

8 AMEP, Environmental Statement Chapter 8: Hydrodynamic and Sedimentary Regime, 2012 <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000312-08%20-%20Hydrodynamic%20and%20Sedimentary%20Regime.pdf>

9 AMEP, EX 8.16 – Chapter 8 Signposting Document, October 2012, <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-001740-121012 TR030001 Leslie%20Hutchings%20of%20Able%20Humber%20Ports%20Limited.zip>

10 Annex 9.2, Assessment of proposed reclamation impact on recirculation at Centrica intake/outlet, November 2011, <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000376-9.2%20-%20Assessment%20of%20proposed%20reclamation%20impact%20on%20Centrica%20intake-outfall.pdf>

11 Annex 9.3, Assessment of proposed reclamation impact on recirculation at E-ON intake/outlet, November 2011, <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000377-9.3%20-%20Assessment%20of%20proposed%20reclamation%20impact%20on%20EON%20intake-outfall.pdf>

12 Annex 8.3, Assessment of the Effects of a Proposed Development on the South Bank of the Humber Estuary on Fine Sediments, December 2011 <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR030001/TR030001-000373-8.3%20-%20Assessment%20of%20the%20Effects%20of%20Development%20on%20Fine%20Sediments.pdf>

achieve compliance.

## Alternate or Additional Mitigation

- 9.5.8 It is concluded that no further mitigation is required, over and above that committed to as part of the DCO application. This will be sufficient to control adverse effects to Water and Sediment Quality relating to the proposed scheme.

## 9.6.0 Residual Effects

### Construction Phase

- 9.6.1 Within the ES submitted for the DCO, following consideration of mitigation, the residual effects relating to Water and Sediment Quality during the construction phase were identified to be restricted to minor impacts associated with the dredging operations. These were considered to be not significant. Following additional assessment, no further significant residual impacts have been identified.
- 9.6.2 The updated modelling (Appendix UES8-1) predicts that;
- for backhoe dredging of glacial till the increases in suspended sediment concentration at the Uniper Power Station intake were a maximum of 70mg/l (near bed),
  - for the proposed dredging of alluvium by TSHD (without overflowing) the maximum uplift in concentrations were just 45mg/l (near bed),
  - Should overflowing be utilised during the TSHD dredging of alluvium the predicted increases in suspended sediment concentration above background and the deposition of fine sediment arising from this dredging will be considerably larger. Overflowing for ten minutes on every load would result in increases in suspended sediment concentration of up to 630mg/l (near bed), and
  - For capital dredging with the CSD it was predicted that peak concentrations exceeding 200 mg/l would be restricted to the area immediately around the dredger and barge.
- 9.6.3 The modelling indicates that increases in peak sediment concentration of more than 10mg/l will occur up to 17km from the point of dredging and will extend slightly further upstream for the amended scheme than for the consented scheme. However, when compared to the baseline range of suspended sediment concentrations (see Table 9-4 above) these potential small uplifts are not considered to be significant.
- 9.6.4 During construction, the removal of sediment through dredging may result in changes to the composition of surface sediments. A number of heavy metal contaminants, including copper, exceed the UK CEFAS Action Level 1 Guidelines. The removal of sediments through dredging will cause sediment bound contaminants to become widely redistributed within the estuary with a minor portion permanently removed from the estuary with the outgoing tides to coastal waters. The overall impact is not considered to be significant, because of the wide dispersion, and tendency of contaminants to remain bound to or quickly be readsorbed upon dissociation from the sediment. It is considered unlikely that average sediment quality in any given location will deteriorate.

### Operational Phase

- 9.6.5 Within the original ES, following consideration of mitigation, the residual effects relating to Water and Sediment Quality during the construction phase were identified to be restricted to thermal impacts and sediment impact associated with maintenance dredging. Following additional assessment, no further residual impacts have been identified.
- 9.6.6 In relation to thermal impacts it was previously identified that changes in circulation associated with

the quay could reduce mixing around the E.On intake and result in a slight uplift in peak temperature. The predicted change in temperature compared to the baseline situation was however small ( $<0.2^{\circ}\text{C}$ ). Updated modelling (Appendix UES9-5) has confirmed that the material amendment will result in no discernible change in this level of potential effect. This is not considered significant.

- 9.6.7 With regards to the impact associated with maintenance dredging this will be no greater than already considered in relation to the dredging required for construction. This should therefore not result in significant adverse effects.

### Consideration of DCO

- 9.6.8 It is concluded that there are no changes to the residual effects previously identified as part of the DCO.

## 9.7.0 Other Environmental Issues

9.7.1 This Section seeks to detail any considerations and environmental effects which have been identified with regard to the range of topics which have been introduced into EIA requirements through the EIA Regulations 2017. Where there are no such considerations or environmental effects, this is also specified below for clarity.

9.7.2 Refer to Chapter 25 for a summary of the 'Other Environmental Issues' identified across all of the technical assessments undertaken and the Chapters prepared as part of the ES.

### Other Environmental Issues of Relevance

#### Infrastructure

9.7.3 The risks associated with Infrastructure are not of relevance to this Chapter.

#### Waste

9.7.4 Aside from the disposal of dredge materials, which is already considered, the risks associated with Waste are not of relevance to this Chapter.

#### Population and Human Health

9.7.5 Aside from the potential impact to bathing water, which is already considered, the risks associated with population and human health are not of relevance to this Chapter.

#### Climate and Carbon Balance

9.7.6 The risks associated with climate and carbon balance are not of relevance to this Chapter.

#### Risks of Major Accidents and/or Disasters

9.7.7 The risk associated with major accidents and / or disasters is not of relevance to this Chapter.

### Summary

9.7.8 With regards to the EIA regulations 2017, in terms of Water and Sediment Quality there are not considered to be any likely significant effects with regards to Other Environmental Issues.

## 9.8.0 Summary of Effects

- 9.8.1 As detailed in the original ES residual effects relating to Water and Sediment Quality will be minimal provided that the proposed control measures and monitoring are fully implemented. Updated technical assessment and additional monitoring indicates that this conclusion will not be changed by the proposed material amendment.



## 9.9.0 Conclusions

- 9.9.1 The AMEP site is located within and adjacent to the Humber Estuary which is a dynamic and energetic environment with valuable ecological characteristics.
- 9.9.2 The proposed material amendment would involve changes to physical works within and immediately adjacent to the estuary. As a result, there is a potential for a change in the effect of the scheme during construction associated primarily with dredging and deposition of estuarine sediment. Detailed analyses and assessment have however confirmed that these impacts will remain small and are not significant.
- 9.9.3 The proposed material amendment would also involve a variation to the final quay profile extending out into the estuary. While associated impacts of this on flow patterns and sediment deposition are considered in Chapter 8 of this UES there is also a potential for changes in mixing and circulation to impact water quality. Detailed analyses and assessment have however confirmed that these impacts will remain small and are not significant.

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