Able Marine Energy Park: Pumping Station Outfall Channel

Supplementary Habitats Regulations Assessment Report

DRAFT FOR CONSULTATION

Executive Summary

This document provides a supplementary Habitats Regulations Assessment (HRA), with additional information to inform the HRA of the variation application. It specifically includes further assessment in relation to the current planned schedule of works for the construction of the pumping station outfall.

This document does not present a full stand-alone HRA but rather to supplement the existing assessment focussed on the specific construction works for the pumping station outfall channel.

The requirement for this Assessment is set out under Article 6 of Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, (the 'Habitats Directive'). Article 6 requires that any plan or project which is not directly connected to, or necessary to the management of a Natura 2000 site and which is likely to have a significant effect on the conservation objectives of the site, either individually or in combination with other plans and projects, should be subject to an appropriate assessment.

This Assessment has been prepared with due consideration given to the information provided in Planning Inspectorate's (PINS) tenth advice note on 'Habitat Regulations Assessment relevant to nationally significant infrastructure projects (NSIP)'. It provides the competent authority with the information required to assess and review the information and make its determination of effect for an Appropriate Assessment.

The AMEP outfall channel construction was considered to have the potential to have effects on the Humber Estuary SPA, the Humber Estuary Ramsar site and the Humber Estuary SAC. It concludes Likely Significant Effects for eight of the qualifying SPA species (avocet, marsh harrier, bar-tailed godwit, black-tailed godwit, dunlin, redshank, shelduck and redshank) and for six of the wintering waterbird assemblage species (curlew, lapwing, mallard, ringed plover, shoveler and teal).

There would also be LSE for the Humber Estuary SAC, for its (a) estuarine habitat; (b) intertidal mudflat, (c) *Salicornia* and other annuals colonising mud and sand; (d) Atlantic sea meadows (*Glauco-Puccinallietalia maritimae*); (e) grey seal and (f) river lamprey populations.

With the proposed mitigation measures in place, it was concluded that the Outfall Channel construction would have no adverse effect on the ecological integrity of the Humber Estuary SPA and Ramsar site, and the Humber Estuary SAC.

1. Introduction and Background

1.1. This document provides a supplementary Habitats Regulations Assessment (HRA), with additional information to inform the HRA of the variation application. It specifically includes further assessment in relation to the current planned schedule of works for the construction of the pumping station outfall.

1.2. The HRA for the consented scheme did not address a specific construction programme or assess the impact of the pumping station outfall being constructed in advance of any compensation being provided. The need for compensation is only triggered by the start of the Quay works.

1.3. The new outfall lies within the 'disturbance zone' to the south of the quay and that area is being compensated for within the Cherry Cobb Sands site (for disturbance resulting from quay operations - this area in which the dredging channel would be located lies within the predicted disturbance footprint of the quay).

1.4. This report (currently in draft for consultation) forms part of the application for a variation to the consented Able Marine Energy Park Development (referred to hereafter as the 'Project'). It addresses the nature conservation issues raised by the Project, specifically in relation to the Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations'). It supplements the Habitat Regulations Assessment (HRA) that has been undertaken for the project as a whole (most recently for the Material Change 2), and considers the proposal's potential to have a likely significant effect on relevant sites of international nature conservation importance.

1.5. It is not the purpose of this document to present a full stand-alone HRA but rather to supplement the existing assessment focussed on the specific construction works for the pumping station outfall channel.

1.6. The document is set out as follows, incorporating both the LSE screening (HRA Part 1) and Appropriate Assessment (Integrity Test, HRA Part 2):

- Description of the Outfall Channel construction works;
- Description of the habitat changes that will result.
- Assessment of the impacts of construction of the new drainage channel on bird disturbance (a Method Statement to inform that assessment will be provided by Able UK)
- Baseline specifically relevant to this part of the development
- SPA/Ramsar/SAC populations/communities affected by this part of the development
- An assessment of whether the Project would have a likely significant effect with regard to the designated features of the international sites under consideration, or on any designated feature's supporting habitats and species, to identify species/communities to take forward for Appropriate Assessment in Part 2 of the HRA
- Where LSE cannot be ruled out, an Appropriate Assessment to determine if there would be any adverse effects on the integrity of the Humber Estuary SPA/Ramsar/SAC.
- Mitigation measures that will be implemented.

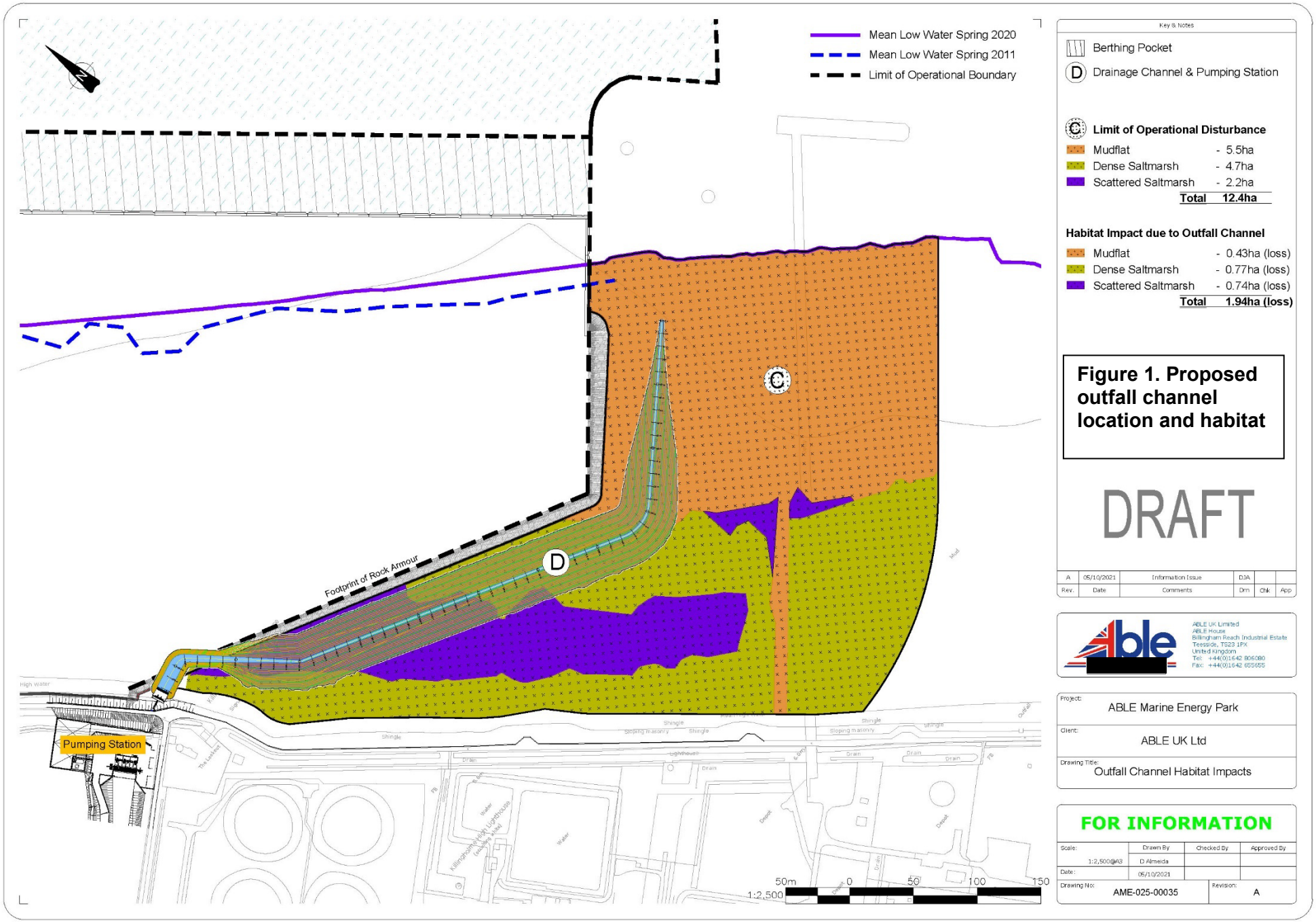
2. Project Description

2.1. The proposed location of the outfall channel is shown in Figure 1. It will take the water from the AMEP pumping station outfall into the Humber Estuary, routing around the southern edge of the proposed AMEP Quay location.

2.2. All of these works are within the disturbance zone of the AMEP quay, for which compensation agreed for the indirect loss of all of this area through operational disturbance.

2.3. A description of the consented Project is set out in Chapter 2 of the shadow HRA Information Report submitted by the Applicant with the original application in December 2011 (see footnote 1). Details of the proposed material change are given in the HRA report for the Material Change 2 (UES Document TR030006/APP/7).

2.4. The specific details for outfall channel construction and operation are described in the Pumping Station Outfall Channel Construction Methodology that forms Appendix 1 to this report.



Key & Notes

Berthing Pocket

D Drainage Channel & Pumping Station

C Limit of Operational Disturbance

Mudflat	- 5.5ha
Dense Saltmarsh	- 4.7ha
Scattered Saltmarsh	- 2.2ha
Total	**12.4ha**

Habitat Impact due to Outfall Channel

Mudflat	- 0.43ha (loss)
Dense Saltmarsh	- 0.77ha (loss)
Scattered Saltmarsh	- 0.74ha (loss)
Total	**1.94ha (loss)**

Figure 1. Proposed outfall channel location and habitat

DRAFT

Rev.	Date	Comments	Drn	Chk	App
A	05/10/2021	Information Issue	DJA		

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Project: ABLE Marine Energy Park

Client: ABLE UK Ltd

Drawing Title: Outfall Channel Habitat Impacts

FOR INFORMATION

Scale:	Drawn By	Checked By	Approved By
1:2,500@A3	D Almeida		
Date:	05/10/2021		

Drawing No: AME-025-00035 Revision: A

3. Consultation

3.1. This current document represents the first draft for consultation with NE and other stakeholders, which will be undertaken prior to the application being submitted.

4. Baseline Conditions: Bird Populations within the Potential Impact Zone of the works

4.1. The potential impact zone of the outfall channel works includes the footprint of the works themselves which will be directly affected, and a wider area around this that could be indirectly affected through disturbance. The extent of that wider area has been defined as a 275m buffer, the same distance as used in the previous HRAs (e.g. see Material Change HRA Report Part 2 Table 11).

4.2. The main bird species that could be affected are the shorebirds foraging on the intertidal habitats through which the drainage channel will pass. Works could also potentially affect the birds using the functionally-linked terrestrial land adjacent to the site, so this is also considered. There would be no effect on the North Killingholme Haven Pits given that it lies 1,400 m from the outfall channel works.

4.3. Ornithological baseline data were obtained from a range of sources, including the following:

- BTO Wetland Bird Survey (WeBS) high tide (core) counts (2014-15 to 2018-19) - the most up-to-date 5-year mean peak core high tide counts currently available;
- BTO WeBS low tide counts (November 2011 through to February 2012) - the most recently available low tide counts;
- Site-specific surveys of the Killingholme Marshes Foreshore undertaken by JBA (2019) during the 2017-18 autumn and winter. This included:
  - Autumn Passage – autumn migration. Weekly visits between late September and November.
  - Winter - two surveys per month between October to March inclusive;
  - Spring Passage – spring migration. Weekly visits between March to Mid-May inclusive.
- ABP data 2018-19 and 2019-20 - through the tide counts of the Killingholme Marshes Foreshore, twice-monthly from October through to March.
- Additional survey data from the Killingholme Marshes Foreshore collected by Nick Cutts during winter 2020-21.
- Survey data from the Killingholme Fields (the terrestrial fields located between the Humber Sea Terminal and Immingham Dock) from the DCO ES and update surveys in 2016 and 2020-21.

BTO WeBS Data

4.4. Table 1 summarises the most recently available five-year mean peak counts from the Killingholme Marshes Foreshore (KMFS) count sector, the five-year means for 2004-8 (as presented in the original ES) and from the percentages that these comprise of the whole Humber Estuary populations.

Table 1. Five-year BTO Wetland Bird Survey (WeBS) core high tide mean peak count for the Killingholme Marshes Foreshore sector and for the whole Humber Estuary, 2015-16 - 2019-20, and for 2004-08 (as presented in the original ES).

Species	SPA species*	Sector 5-year mean peak ES (04-08)	Sector 5-year mean peak update (15-19)	% SPA mean peak in sector ES	% SPA mean peak in sector update
Mute swan		3	2	1.0%	1.5%
Shelduck	Q	9	75	0.2%	1.7%
Shoveler		11	53	8.9%	24.7%
Gadwall		4	21	2.9%	9.6%
Mallard	A	13	45	0.6%	4.3%
Teal	A	13	244	0.5%	6.6%
Pochard	A	1	0	0.3%	0.0%
Tufted duck		4	2	1.0%	0.7%
Smew		1	0	50.0%	0.0%
Little grebe		2	1	2.2%	2.1%
Grey heron		1	1	2.3%	3.6%
Little egret		0	1	0.0%	0.7%
Cormorant		0	1	0.0%	0.2%
Water rail		0	0	0.0%	0.0%
Moorhen		4	6	2.7%	13.1%
Coot		31	31	2.7%	11.9%
Oystercatcher	A	1	4	0.0%	0.1%
Avocet	Q	0	49	0.0%	2.0%
Lapwing	A	15	730	0.1%	4.4%
Ringed plover		0	68	0.0%	9.3%
Little ringed plover		0	1	0.0%	18.2%
Curlew	A	61	66	1.4%	2.5%
Bar-tailed godwit	Q	0	1	0.0%	0.1%
Black-tailed godwit	Q	50	1524	1.3%	33.5%
Turnstone	A	1	4	0.2%	1.8%
Knot	Q	1	2	0.0%	0.0%
Ruff	Q	0	0	0.0%	0.2%
Dunlin	Q	87	326	0.5%	2.0%
Snipe		0	1	0.0%	1.1%
Common sandpiper		0	0	0.0%	0.6%
Redshank	Q	83	116	1.6%	4.0%

* Q = qualifying species, A = assemblage species.

4.5. The BTO Low Tide Counts from 2011-12 for KMFS (the most recent available data as no further BTO low tide surveys have been undertaken since 2012) are summarised in Table 2. It should be noted that these surveys did not cover the main mid-winter period, which may also explain the lower numbers of some species in comparison with the other data sets.

Table 2. BTO Low Tide Count totals for the Killingholme Marshes Foreshore sector (CH066), 2011-12.

Species	01/10 /11	01/03/ 12	01/04/ 12	01/05/ 12	01/06 /12	01/07 /12	01/08 /12	01/09 /12	PEAK
Greylag Goose	0	2	2	4	0	0	0	0	**4**
Shelduck	0	12	2	1	2	0	0	0	**12**
Mallard	3	2	2	4	7	0	0	5	**7**
Teal	11	4	0	0	0	0	0	0	**11**
Grey Heron	0	0	0	0	1	0	2	0	**2**
Little Egret	0	1	0	0	2	2	2	0	**2**
Cormorant	2	0	0	0	0	0	2	0	**2**
Moorhen	0	0	1	1	0	1	0	0	**1**
Oystercatcher	0	0	0	0	1	0	0	2	**2**
Avocet	0	2	5	0	0	0	0	0	**5**
Little Ringed Plover	0	0	0	0	0	0	1	0	**1**
Curlew	4	3	0	0	0	0	0	0	**4**
Black-tailed Godwit	0	0	0	0	0	0	2000	650	**2000**
Redshank	0	0	0	0	1	0	0	0	**1**
Black-headed Gull	0	0	0	0	3	4	0	0	**4**
Common Tern	0	0	0	0	0	1	0	0	**1**

JBA Data

4.6. The results of the 2017-18 JBA surveys are summarised in Table 3 for the Killingholme Marshes Foreshore. The Table gives peak count recorded each month at each site.

Table 3. Monthly peak counts from Killingholme Marshes Foreshore, September 2017- May 2018 (Source: JBA 2019).

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	PEAK
Greylag goose	0	0	21	16	12	2	17	11	5	21
Pink-footed goose	0	0	0	0	0	0	0	0	0	0
Mute swan	0	0	0	0	0	0	0	1	0	1
Shelduck	5	168	102	105	64	74	96	41	20	168
Shoveler	0	0	4	0	0	0	0	0	0	4
Gadwall	0	0	0	0	0	0	0	0	0	0
Wigeon	0	125	0	0	0	0	0	0	0	125
Mallard	1	3	2	0	0	0	0	3	0	3
Teal	29	310	298	71	122	173	133	32	0	310
Pochard	0	0	0	0	0	0	0	0	0	0
Little grebe	0	0	0	0	0	0	0	0	0	0
Grey heron	1	0	1	1	0	0	0	0	0	1
Little egret	0	2	1	0	0	0	0	1	0	2
Cormorant	0	0	3	0	0	1	2	1	0	3
Marsh harrier	0	0	0	0	0	0	0	0	0	0

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	PEAK
Oystercatcher	0	0	0	0	0	0	7	7	7	7
Avocet	0	36	16	0	0	15	34	15	4	36
Lapwing	0	200	212	342	665	233	18	2	1	665
Grey plover	0	45	0	0	0	0	0	0	0	45
Ringed plover	33	18	0	0	0	5	11	39	28	39
Whimbrel	0	0	0	0	0	0	0	0	0	0
Curlew	4	35	70	60	65	119	136	30	2	136
Bar-tailed godwit	0	0	5	0	0	0	0	0	0	5
Black-tailed godwit	362	267	24	0	6	2	1	0	538	538
Turnstone	2	17	26	0	0	0	1	0	0	26
Knot	0	0	67	0	0	0	0	0	0	67
Ruff	0	0	0	0	0	0	0	0	0	0
Sanderling	0	0	0	0	0	0	0	0	0	0
Dunlin	18	376	503	156	501	12	80	26	42	503
Little stint	0	3	0	0	0	0	0	0	0	3
Snipe	0	3	5	1	0	0	0	0	0	5
Redshank	70	806	284	292	370	135	115	111	0	806
Greenshank	0	2	0	0	0	0	0	0	0	2

ABP DATA 2018-19 and 2019-20

4.7. Data were obtained from ABP from their monitoring surveys undertaken over several sites, including KMFS. The recent data from 2018-19 and 2019-20 for KMFS are summarised in Table 4, which gives the monthly peak counts over this survey period, and the annual peaks for each of the two years. Of particular note are the higher numbers of teal, lapwing and avocet than recorded in previous surveys.

Table 4. ABP Survey Data for Killingholme Marshes Foreshore sector, October-March 2018-19 and 2019-20: monthly peak counts and annual peaks.

Species	Oct	Nov	Dec	Jan	Feb	Mar	Peak 2018-19	Peak 2019-20
Greylag goose	0	25	27	0	3	6	**0**	**27**
Mute swan	4	0	0	0	0	0	**4**	**0**
Shelduck	31	44	56	48	51	76	**76**	**56**
Wigeon	0	2	0	0	4	0	**0**	**4**
Mallard	22	3	0	0	1	10	**22**	**10**
Teal	413	915	510	828	1064	888	**1064**	**828**
Little egret	1	0	0	0	0	0	**1**	**0**
Cormorant	4	3	2	1	2	1	**0**	**4**
Oystercatcher	0	0	0	0	2	8	**8**	**4**
Avocet	251	33	23	0	76	152	**104**	**251**
Lapwing	65	372	1642	1550	2374	6	**2374**	**1254**
Golden plover	0	0	0	0	1	0	**0**	**1**
Grey plover	1	0	0	0	0	0	**0**	**1**

Species	Oct	Nov	Dec	Jan	Feb	Mar	Peak 2018-19	Peak 2019-20
Ringed plover	24	16	1	3	6	7	**19**	**24**
Curlew	49	62	96	68	63	63	**68**	**96**
Bar-tailed godwit	0	0	2	3	14	0	**2**	**14**
Black-tailed godwit	2183	22	220	162	372	271	**2070**	**2183**
Turnstone	12	37	1	2	7	8	**17**	**37**
Sanderling	0	0	0	0	0	2	**0**	**2**
Dunlin	455	512	659	680	381	136	**680**	**512**
Snipe	4	0	15	5	0	0	**4**	**15**
Redshank	184	140	156	170	117	204	**204**	**140**

Able Data 2020-21

4.8. The data collected for Able UK by Cutts and Hemingway (2021) during December 2020 – May 2021 from the Killingholme Marshes Foreshore are summarised in Table 5, where the total counts from each survey are presented. As for the ABP surveys, higher peak numbers of teal, lapwing and avocet were recorded in this area than previously.

Table 5. Count totals Killingholme Marshes Foreshore sector, December 2020- May 2021 (Source: Cutts and Hemingway 2021). *Note: partial coverage of north end of sector only during Dec-Jan).*

Species	09/12/20	23/12/20	07/01/21	21/01/21	04/02/21	18/02/21	05/03/21	22/03/21	06/04/21	19/04/21	03/05/21	17/05/21
Greylag Goose	0	0	0	0	0	13	0	0	0	0	0	0
Shelduck	8	0	2	0	20	34	13	2	10	4	10	14
Wigeon	0	0	0	0	0	0	0	0	0	4	0	0
Teal	1466	994	470	520	431	212	354	101	64	12	4	0
Mallard	2	2	14	4	13	4	8	2	0	0	3	4
Oystercatcher	0	0	0	0	0	0	13	0	2	2	3	1
Avocet	0	0	0	0	0	0	205	9	0	2	0	3
Ringed Plover	0	2	0	0	0	0	0	0	0	6	7	7
Golden Plover	0	0	0	0	14	0	0	0	0	0	0	0
Lapwing	980	950	310	1121	240	0	0	0	0	0	0	0
Dunlin	75	35	40	0	22	232	10	5	0	0	0	0
Black-tailed Godwit	0	0	0	0	170	0	0	0	0	0	0	0
Curlew	6	3	11	2	28	26	29	16	10	26	7	4
Redshank	13	71	42	7	53	52	43	20	15	4	6	1

Summary of Baseline KMFS Survey Data

4.9. The data sources on waterbird numbers within the area that could be affected by the outfall channel works are summarised in Table 6, which gives the peak count for each key species at KMFS. Overall, there is broad agreement between the sources with regard to the important waterbird populations in this zone, i.e. shelduck, teal, avocet, lapwing, ringed plover, curlew, bar-tailed godwit, black-tailed godwit, dunlin and redshank were all recorded regularly in important numbers in the context of the SPA/Ramsar site. 'Important' numbers were identified on the basis of the proportion of the SPA/Ramsar population recorded using the area regularly exceeding 1%. Whilst peak numbers of some other species did on some occasions exceed this 1% criterion, the large majority of records were of numbers well below this threshold, so were not, applying professional judgement, deemed to be 'important' in this context.

Table 6. Overall peak waterbird counts for the Killingholme Marshes Foreshore.

Species	SPA status	ES TTTC	ES WeBS	*% Humber ES*	WeBS Core 15-19	WeBS Low 11-12	JBA 2017-18	ABP 2018-19	ABP 2019-20	NC 2021	*% Humber update*
Brent goose	A	0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Canada goose		0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Greylag goose		0	0	*0.0%*	0	0	21	0	27	13	*1.7%*
Pink-footed goose		0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Mute swan		2	3	*1.0%*	2	0	1	4	0	0	*2.7%*
Shelduck	Q	109	9	*2.4%*	75	138	168	76	56	34	*3.7%*
Shoveler		0	11	*8.9%*	53	0	4	0	0	0	*24.7%*
Gadwall		0	4	*2.9%*	21	2	0	0	0	0	*9.6%*
Wigeon	A	24	0	*0.7%*	0	0	125	0	4	0	*4.7%*
Mallard	A	14	13	*0.7%*	45	10	3	22	10	14	*4.3%*
Teal	A	12	13	*0.5%*	0	6	310	1064	828	1466	*39.6%*
Pochard	A	0	1	*0.3%*	0	0	0	0	0	0	*0.0%*
Tufted duck		0	4	*1.0%*	2	0	0	0	0	0	*0.7%*
Scaup	A	0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Goldeneye	A	0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Smew		0	1	*50.0%*	0	0	0	0	0	0	*0.0%*
Great crested grebe		0	0	*0.0%*	0	1	0	0	0	0	*4.3%*
Little grebe		0	2	*2.2%*	1	0	0	0	0	0	*2.1%*
Bittern	Q	0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Grey heron		0	1	*2.3%*	0	0	1	0	0	0	*3.0%*
Little egret		0	0	*0.0%*	1	0	2	1	0	0	*1.0%*
Cormorant		2	0	*1.4%*	1	2	3	0	4	0	*1.2%*
Water rail		0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Moorhen		0	4	*2.7%*	6	0	0	0	0	0	*13.1%*
Coot		2	31	*2.7%*	31	0	0	0	0	0	*11.9%*
Oystercatcher	A	12	1	*0.4%*	4	12	7	8	4	13	*0.2%*
Avocet	Q	0	0	*0.0%*	49	8	36	104	251	205	*10.1%*
Lapwing	A	325	15	*1.8%*	0	3	665	2374	1254	1121	*14.4%*

Species	SPA status	ES TTTC	ES WeBS	*% Humber ES*	WeBS Core 15-19	WeBS Low 11-12	JBA 2017-18	ABP 2018-19	ABP 2019-20	NC 2021	*% Humber update*
Golden plover	Q	0	0	*0.0%*	0	2	0	0	1	14	*0.0%*
Grey plover	A	0	0	*0.0%*	0	0	45	0	1	0	*1.5%*
Ringed plover		210	0	*17.0%*	68	4	39	19	24	2	*9.3%*
Little ringed plover		0	0	*0.0%*	1	0	0	0	0	0	*18.2%*
Whimbrel	A	2	0	*2.8%*	0	0	0	0	0	0	*0.0%*
Curlew	A	158	61	*3.7%*	66	109	136	68	96	29	*5.1%*
Bar-tailed godwit	Q	123	0	*4.4%*	1	35	5	2	14	0	*2.4%*
Black-tailed godwit	Q	2566	50	*66.0%*	1524	816	538	2070	2183	170	*48.0%*
Turnstone	A	0	1	*0.2%*	4	1	26	17	37	0	*15.5%*
Knot	Q	0	1	*0.0%*	2	0	67	0	0	0	*0.4%*
Ruff	Q	1	0	*1.6%*	0	0	0	0	0	0	*0.2%*
Sanderling	A	0	0	*0.0%*	0	0	0	0	2	0	*0.3%*
Dunlin	Q	1029	87	*5.7%*	326	289	503	680	512	232	*4.3%*
Little stint		0	0	*0.0%*	0	0	3	0	0	0	*46.9%*
Snipe		0	0	*0.0%*	1	0	5	4	15	0	*11.7%*
Common sandpiper		3	0	*12.0%*	0	2	0	0	0	0	*5.8%*
Redshank	Q	540	83	*10.5%*	116	38	806	204	140	71	*28.0%*
Greenshank	A	0	0	*0.0%*	0	0	2	0	0	0	*4.3%*
Black-headed gull		252	0	*6.7%*	0	203	0	0	0	0	*1.8%*
Mediterranean gull		2	0	*142.9%*	0	0	0	0	0	0	*0.0%*
Common gull		73	0	*12.5%*	0	0	0	0	0	0	*0.0%*
Great black-backed gull		0	0	*0.0%*	0	7	0	0	0	0	*2.4%*
Herring gull		7	0	*7.3%*	0	8	0	0	0	0	*0.8%*
Yellow-legged gull		1	0	*27.8%*	0	0	0	0	0	0	*0.0%*
Lesser black-backed gull		0	0	*0.0%*	0	4	0	0	0	0	*5.9%*
Common tern		0	0	*0.0%*	0	0	0	0	0	0	*0.0%*
Little tern	Q	0	0	*0.0%*	0	0	0	0	0	0	*0.0%*

Killingholme Fields

4.10. It was identified in Chapter 11 of the DCO ES (paragraphs 11.5.90 et seq.) that some of the Killingholme Fields (the terrestrial fields located between the Humber Sea Terminal and Immingham Dock) are regularly used by waterbird species associated with the Humber Estuary. The fields were identified in the DCO ES as providing functionally linked land for the SPA, particularly for feeding and roosting curlew (with a peak count of 106, or 2.4% of the Humber Estuary population at that time). Redshank, black-tailed godwit, lapwing, redshank, whimbrel, and shelduck were also recorded during the original ES baseline surveys but in numbers below 1% of the Humber Estuary population.

4.11. A further survey in autumn 2016 (Cutts and Hemingway 20171) found reduced curlew numbers present in the AMEP fields than previously (peak 15, equivalent to 0.6% of the Humber population), possibly because of their less favourable condition (with a longer sward developed as arable/improved grassland fields have reverted to neutral grassland). The same study reported a higher use (peak 110 curlew, 4.1% of the Humber population) on grassland on the adjacent operational Tank Farm (outside the AMEP site), over both high and low tide periods, so the species was simply as still present in the area but preferring other nearby grassland at that time.

4.12. The area of terrestrial fields remaining within the AMEP site, is reducing as the DCO development is being implemented, as reported in the AMEP Monopile Factory ES. Overall, use of this part of the AMEP site by curlew is likely to continue to reduce, but has been mitigated for by the creation of alternative wetland habitat at the Halton Marshes Wet Grassland Mitigation Area (following consent from the Secretary of State to transfer the mitigation measures to this site from the previous Mitigation Area A).

4.13. The results of the 2020-21 surveys of the Killingholme Fields by curlew is summarised in Table 7, which gives the totals from each count from December 2020 through to May 2021. Given the seasonality of curlew occurrence in the general area from other surveys (e.g. WeBS for the Killingholme Marshes Foreshore – see Table 2), it is unlikely that any period of higher curlew counts would have been missed by these surveys. Use of the area by curlew is year-round, though with generally higher numbers recorded in spring (March-April).

Table 7. Counts for the Killingholme Marshes fields, December 2020 - May 2021 (within 300m of the proposed Development).

Species	09/12/20	23/12/20	07/01/21	21/01/21	04/02/21	18/02/21	05/03/21	22/03/21	06/04/21	19/04/21	03/05/21	17/05/21
Curlew	10	0	0	1	3	8	32	29	45	7	7	3

[1] Cutts, N. & K. Hemingway. 2017. *Able Curlew Fields and North Killingholme Frontage Ornithological Survey Programme Autumn 2016.* Report to Able UK Ltd. Institute of Estuarine & Coastal Studies, University of Hull.

5. Baseline Conditions: Other SAC/Ramsar Qualifying Features within the Potential Impact Zone of the works

Saltmarsh Communities

5.1. Habitats affected by the outfall channel are shown in Figure 1, comprising dense saltmarsh, scattered colonising saltmarsh and mudflat.

5.2. At the time of the original DCO baseline work, this area was all mudflat [add ref]. Since there, there has been a clear expansion in the extent of saltmarsh communities e.g. as surveyed in 2020 and 2021 (PEIR Appendix U10-1: Thomson Environmental Consultants, 2020. North Killingholme Marshes Saltmarsh Survey 2020) on the intertidal frontage of the proposed AMEP development site since the DCO ES baseline work of the DCO. This was not unexpected but rather as predicted as a result of the construction of the HIT. The potential for accretion of the intertidal mudflat and associated increase in elevation and potential colonisation by saltmarsh was identified in the DCO Examining Authorities Report (2013).

Estuarine Habitats

5.3. A range of mud, sands and gravels are present within the subtidal area of middle estuary, these with associated biological communities, and with biotopes describing these in Chapter 10 Table 10-3.1 of the PEIR.

5.4. The area within which AMEP will directly impact tends to exhibit muddier sediments with muddy sands or sandy muds sometimes with small quantities (<1%) of gravel (slightly gravelly sandy mud or slightly gravelly muddy sand). Additional surrounding habitats that could be affected by the development include included muddy habitats including sandy muds or muddy sands (or slightly gravelly muddy sand/sandy muds) and two sandier sites (Allen, 2020: Appendix U10-4).

5.5. The direct impact and surrounding areas were also characterised by low numbers of *Capitella* sp. but included modest numbers of species such *Corophium volutator* and *Streblospio shrubsolii*. However, many of the taxa present in these areas were recorded at relatively few sites. In terms of biomass the direct impact area was dominated by *Carcinus maenas* (1 site only), *Limecola balthica, Corophium volutator, Arenicolidae* sp. (*Arenicola marina*) and *Gammarus salinus* these species collectively accounting for over 90% of total biomass.

Intertidal mudflats

5.6. Allen (2006) describes the intertidal benthic community of the middle estuary south shore to be less diverse than in outer estuary, being dominated by *Corophium volutator, Streblospio shrubsolii, Hediste diversicolor* and the Spionid polychaete *Pygospio elegans*. Low abundances of *Macoma balthica* were also present with numbers increasing towards the outer estuary and in mid shore areas. These communities are typical for an estuarine habitat and primarily structured according to salinity, shore height and presumably sediment type. Whilst some communities are relatively impoverished these appear to be typical for such habitats and some variation in community structure is expected in a dynamic estuary.

5.7. The increase in intertidal elevation and colonisation by saltmarsh communities at the AMEP site has led to a loss of mudflat extent and influenced the distribution of several key species of invertebrate such as *Hediste diversicolor*. However, in the muddier areas, the 2015 and 2016 surveys recorded a broadly similar assemblage to that recorded in the baseline of 2010 for the original ES (PEIR Appendices U10-3 and U10-4).

5.8. The original ES baseline commonly recorded *Tubificoides benedii*, Nematoda, the polychaete *Streblospio shrubsolii* and the amphipod crustacean *Corophium volutator* from the intertidal survey. The bivalve *Macoma* (*Limecola*) *balthica* was widespread and the polychaete *Hediste diversicolor* was present at most of the upper shore stations.

5.9. A broadly similar intertidal invertebrate assemblage was recorded in 2015 and 2016 at the AMEP site (PEIR Appendices U10-3 and U10-4), although with some restrictions in the extent of the typical intertidal mudflat community correlating to saltmarsh community colonisation.

5.10. It is considered likely that the increase in elevation and saltmarsh colonisation seen in 2015 and 2016 has continued to the present day, with a substantial extent of the AMEP development intertidal frontage now featuring saltmarsh in the upper to mid shore. As such, it is likely that the extent and/or composition of the intertidal invertebrate community recorded in this area will have altered in response to the increase in elevation and associated saltmarsh development.

5.11. The 2016 subtidal survey (Allen, 2020: PEIR Appendix U10-4) reported the subtidal bed to feature a very impoverished faunal community typical for the middle Humber and in line with findings from previous surveys (as described in the original ES and in the PEIR supporting documentation Appendices U10-3 and U10.4), including species such as *Capitella* sp., *Arenicolidae* sp. (*Arenicola marina*), *Eurydice pulchra, Gammarus salinus*, *Corophium volutator*, *Nematoda* spp., *Polydora cornuta, Pygospio elegans, Streblospio shrubsolii* and *Tubificoides benedii*.

5.12. Allen (2016) concluded that the infaunal communities recorded during the 2015 subtidal survey around the potential dredge disposal areas were typical for dynamic mud, sand or mixed sediment subtidal sediments in the mid to outer Humber Estuary.

5.13. On this basis, it is concluded that there is the probability of natural variation in community composition over time, reflecting changes in estuarine dynamics, but given the community adaptation and continued active utilisation of the dredge deposit grounds, no significant change outwith these parameters is expected.

Fish Assemblage

5.14. The direct comparison between the different fish baseline data is limited by the use of different sampling methods, with different selectivity, used in different habitats and with variable sampling effort (e.g. within and between seasons). Also, the natural variability in population dynamics (e.g. inter-annual fluctuations in recruitment) may affect the fish species occurrence and abundance in the catches over time. Two fish species are qualifying features of the SCA and Ramsar site, river lamprey and sea lamprey.

5.15. As reported in the Material Change HRA, the fish fauna recorded at the AMEP site and in the surrounding areas has remained a reflection of the typical assemblage of intertidal and subtidal areas of this part of the estuary, and of the role of these habitats in supporting young stages of estuarine and marine migrant fish (especially gobies and flatfish), also through provision of abundant food resources. There was no evidence of preferred use of these areas by migratory fish. Only a single river lamprey was recorded, during the November-December 2013 subtidal otter trawling (from the control area north of the APEM site; see PEIR Table 10-3.9), and there were no records of sea lamprey during these surveys.

Marine Mammals

5.16. Due to the low frequency of occurrence and high mobility of marine mammals in the low to middle estuary, dedicated surveys were not conducted for the DCO ES nor for the material change. The occasional presence of these species, including grey seal (the only marine mammal that is a qualifying feature of the SAC and the Ramsar site) in the vicinity of the AMEP development relates to the potential presence of prey items (see text on Fish and Invertebrate Communities), and the populations of the species in the wider region e.g. Southern North Sea.

Supporting Habitats

5.17. The Supporting Habitats that could be affected by the outfall channel include:

- Intertidal sand and mudflats
- *Salicornia* and other annuals colonising mud and sand
- Saltmarsh (Atlantic salt meadows)
- Inland areas of wet grassland, rough grassland and agricultural land (both arable land and permanent pasture)
- Water column

6. Effects of the Outfall Channel

Construction Effects

6.1. The construction of the outfall will result in a range of environmental impacts including:

- Change in intertidal habitat within the Humber Estuary SPA/SAC through construction of the outfall channel;
- Temporary indirect loss of terrestrial habitat functionally linked to the Humber Estuary SPA/SAC;
- Temporary indirect habitat loss through disturbance to birds, fish and marine mammals (noise and visual);
- Underwater noise disturbance affecting fish and marine mammals;
- Dredging and other construction effects on water quality;
- Disposal of dredge spoil.
- Cumulative effects.

6.2. The habitats that will be directly and indirectly affected are given in Table 8.

Table 8. Habitat change/availability resulting from the construction of the proposed outfall channel.

Change	Habitat Type	Description	Area affected by outfall channel (ha.)
Direct - change from outfall channel construction	1140	Mudflat/sandflat not covered by seawater at low tide	0.43
	1310/1330	Salicornia and other mud and sand colonizing annuals/saltmarsh	0.74
	1310/1330	Saltmarsh	0.77
Indirect - temporary functional loss through construction disturbance	1140	Mudflat/sandflat not covered by seawater at low tide	13.3
	1310/1330	Salicornia and other mud and sand colonizing annuals	6.0
	1310/1330	Saltmarsh	8.6

6.3. There would be no effect of the outfall channel on the North Killingholme Haven Pits as this site lies 1,400m from the outfall channel location at its closet point.

Operational Effects

6.4. Environmental impacts during operation will likely be limited to:

- Maintenance dredging impacts, including boat disturbance.

7. Likely Significant Effect Screening Statement

7.1. The only European Protected Natura 2000 sites that could be affected by the outfall channel construction are the Humber Estuary SPA, the Humber Estuary Ramsar site and the Humber Estuary SAC.

7.2. The same criteria have been used in this supplementary HRA as for the original DCO HRA and that for the material change 2, That agreed approach determined that there could be LSE for all species that occurred in numbers ≥1% of the Humber Estuary population, and will be affected by loss / changes in habitat and / or disturbance. The results are summarised in Table 9.

Table 9. Likely Significant Effects on Bird Populations.

Effect	**Internationally important Populations of Regularly Occurring Annex I Species**			**Internationally Important Migratory Species**		**Other Species of Waterfowl Assemblage**
	Breeding	*Passage*	*Wintering*	*Passage*	*Wintering*	
Permanent direct loss of intertidal mudflat	-	-	Bar-tailed godwit	Black-tailed godwit, dunlin and redshank	Black-tailed godwit, dunlin, redshank and shelduck	Curlew, lapwing and ringed plover
Indirect changes in intertidal mudflat		-	Bar-tailed godwit	Black-tailed godwit, dunlin and redshank	Black-tailed godwit, dunlin, redshank and shelduck	Curlew, lapwing and ringed plover
Loss of terrestrial habitat	Marsh harrier	-				Curlew and lapwing
Disturbance to birds at KMFS	Avocet and marsh harrier	-	Avocet and bar-tailed godwit	Black-tailed godwit, dunlin and redshank	Black-tailed godwit, dunlin, redshank and shelduck	Curlew, lapwing, mallard, ringed plover, shoveler and teal

7.3. No LSE was concluded for the following species:

- Not recorded by Through-The-Tide-Count surveys at KMFS – arctic tern, bittern, barnacle goose, Bewick's swan, black-throated diver, brent goose, common scoter, common tern, curlew sandpiper, eider, great white egret, garganey, goosander, green sandpiper, greenshank, greylag goose, goldeneye, great crested grebe, hen harrier, jack snipe, kittiwake, little stint, long-tailed duck, little tern, pink-footed goose, pintail, red-throated diver, roseate tern, sanderling, shag, scaup, spotted redshank, whooper swan, wood sandpiper, woodcock.
- Not reliant on habitats at KMFS– black-headed gull, common gull, coot, grey heron, herring gull, gadwall, great black-backed gull, lesser black-backed gull and Mediterranean gull.
- Species that although they occurred in numbers ≥ 1% their ecology makes them resilient to impacts - moorhen, snipe.

- Only one or two birds recorded by TTTC, or percentage of Humber Estuary population recorded is so low as to be insignificant – Canada goose, cormorant, golden plover, grey plover, little grebe, little egret, knot, mute swan, oystercatcher, pochard, ruff, smew, tufted duck, turnstone, water rail, whimbrel, wigeon and yellow-legged gull.

7.4. LSE was excluded for the loss of sub-tidal habitat in respect of the SPA and the bird interests of the Ramsar site, as none of the bird species significantly affected are reliant on the sub-tidal habitat.

7.5. In-combination effects were concluded not to occur for the remaining non-LSE bird species for one of the following reasons:

- they were not reliant on the habitats lost (e.g. gull species recorded and others such as coot, heron and gadwall);
- there were only records of one or two birds; or
- they occurred in a such a small percentage of the Humber Estuary population as to be insignificant.

7.6. The Likely Significant Effect tests for the Humber Estuary SPA are summarised in Appendix 2.

Supporting Habitat Change

7.7. The outfall construction would result in a change in the intertidal habitat within the SPA. As any direct effect on SPA supporting habitat would be considered as an LSE, this has been taken forward for Appropriate Assessment. The Supporting Habitats that could be affected by the outfall construction include:

- Intertidal sand and mudflats
- *Salicornia* and other annuals colonising mud and sand
- Saltmarsh (Atlantic salt meadows).

Additional Ramsar Qualifying Features

7.8. The Ramsar citation does not identify any additional ornithological qualifying features.

7.9. Non-avian Ramsar features include river lamprey, sea lamprey and grey seals (which are also features of the Humber Estuary SAC). LSE could not be ruled out for grey seal and river lamprey, so these have been taken forward for Appropriate Assessment.

SAC

7.10. The Likely Significant Effect tests for the Humber Estuary SAC are summarised in Appendix 3. The following LSE are identified:

- Change in estuarine habitat (H1130)
- Increase in intertidal mudflat (H1140)
- Reduction in saltmarsh habitat (H1330 / H1310)

- Indirect effects on estuarine habitat (H1130).
- Indirect effects on intertidal mudflat (H1140)
- Indirect effects on saltmarsh (H1330 / H1310)
- Disturbance to grey seal and river lamprey (S1364 and S1099).

In-combination Effects

7.11. The qualifying interest habitats listed on the Humber Estuary SAC citation for which LSE was not identified for AMEP alone (e.g. sandbanks which are slightly covered by the sea at all times and various dune communities) will not be affected at all by AMEP, and hence an in-combination assessment for them is not necessary (this remains the same position as agreed for the consented DCO statement of common ground (ERM 2012).

7.12. The SPA qualifying bird species for which LSE was not identified for AMEP alone were largely species that were not recorded as part of site-specific surveys or only records infrequently/in trivial numbers, and hence will not be affected at all by AMEP. In-combination ornithological effects were also concluded for the consented DCO not to occur because either (a) they were not reliant on the habitats lost (e.g. gull species recorded and others such as coot, heron and gadwall); or (b) there were only records of one or two birds; or they occurred in a such a small percentage of the Humber Estuary population as to be insignificant.

Conclusion

7.13. LSE cannot be ruled out for the outfall channel construction and therefore Appropriate Assessment is required for the following species/habitat with regard to the Humber Estuary SPA and for the Ramsar site ornithological features:

Qualifying Species:

- Avocet;
- Marsh harrier;
- Bar-tailed godwit;
- Black-tailed godwit;
- Dunlin;
- Redshank;
- Shelduck; and
- Redshank.

Additional Assemblage Species:

- Curlew;
- Lapwing;
- Mallard
- Ringed plover;

- Shoveler; and
- Teal.

Supporting Habitat:

- Intertidal sand and mudflats
- *Salicornia* and other annuals colonising mud and sand
- Saltmarsh (Atlantic salt meadows)
- Inland areas of wet grassland, rough grassland and agricultural land (both arable land and permanent pasture)

7.14. With regard to the potential effects on the Humber SAC, the following features have been identified for which LSE cannot be ruled out, and therefore require Appropriate Assessment:

- Estuarine habitats;
- Intertidal mudflats;
- Salicornia and other annuals colonising mud and sand;
- Atlantic sea meadows (*Glauco-Puccinallietalia maritimae*);
- Grey seal; and
- River lamprey.

7.15. Further information to inform the Appropriate Assessment is provided in the following section.

8. HRA Part 2: Information to Inform the Appropriate Assessment

8.1. In Part 1 of the HRA above it was concluded that a LSE could not be excluded on the Humber Estuary SPA, Ramsar site and SAC for a range of species and habitats. This second part of the HRA therefore provide information to inform the required Appropriate Assessment, focusing on these species and their supporting habitats.

8.2. The specific likely significant effects on the SPA were as follows:

- The effects of the permanent change in estuarine intertidal mudflats from KMFS on waterfowl that it supports.
- Temporary functional loss of intertidal habitat as a result of disturbance.
- The effects of loss of terrestrial habitat within the AMEP site at North Killingholme which is used by SPA birds (predominantly curlew).

8.3. The specific likely significant effects on the SAC were as follow:

- The effects of permanent change estuarine habitat from the footprint of the outfall channel.
- The effects of capital and maintenance dredging on estuarine habitats and intertidal mudflats.
- The effects of disposal of dredged material on estuarine habitats and intertidal mudflats.
- The effects of the change in intertidal mudflat from Killingholme Marshes Foreshore (KMFS) due to the footprint of the development.
- The effects of the change in saltmarsh.
- The effects of indirect habitat changes on qualifying habitats (estuarine habitat, intertidal mudflat and saltmarsh).
- The effects of underwater noise from piling on the feeding behaviour of grey seals and the migratory movements of river lamprey.

8.4. As for the original DCO assessment and the Material Change 2, the possibility of 'in combination' effects has been considered in relation to other proposed developments that could affect these SPA species. Consideration of present day in-combination effects is included within this report in relation to whether site integrity might adversely be affected in combination with any other developments in the region.

9. Mitigation

9.1. A package of mitigation and compensation measures have been agreed for the AMEP Quay DCO scheme and the Material Change 2. However, specific additional mitigation will be implemented for the outfall channel to reduce any disturbance effects resulting from the construction works. A restriction on the timing of construction will be implemented, to avoid main periods for which the mudflat is important for the SPA/Ramsar species that it supports.

9.2. The baseline data were used to inform the definition of that restriction period:

- BTO WeBS counts (Table 10 - generally low peak counts through Apr-June (no counts available for July - not counted as presumably considered low importance). Occasional records of higher numbers in April.
- BTO Low Tide counts 2011-12 (Table 2) - very low counts throughout April-July.
- JBA KMFS counts 2016-18 (Table 3) - data from April and May - generally low, with occasional higher numbers in May.
- Able 2020-21 surveys - very low number through April and May.

9.3. Overall, though there have been some higher counts in April and May, the April-July period generally supports much lower numbers of SPA species than at other times of year. As a result, restricting the outfall channel construction to these months will considerably reduce the magnitude of the temporary disturbance impacts that will occur. This will mean both that fewer birds are affected, and also that, as lower densities are present in the area there will be higher availability of alternative feeding areas nearby outside the disturbance zone. The outfall channel construction works will, therefore, be restricted to the April-July period.

Table 10. BTO WeBS monthly peak counts for the Killingholme Marshes Foreshore, 2015-16 - 2019-20.

Species	Jan	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec
Shelduck	50	221	102	43	60	4	75	49	81	105	32
Shoveler	78	47	58	40	10	4	3	93	0	70	91
Mallard	47	23	16	8	18	32	58	73	43	46	98
Teal	428	273	150	63	2	0	12	67	298	303	296
Marsh Harrier	0	0	0	0	0	0	0	0	0	0	0
Avocet	0	13	131	33	24	2	0	0	48	2	15
Lapwing	1930	876	22	4	6	0	4	0	26	445	363
Ringed Plover	1	1	5	0	0	0	305	22	2	0	0
Curlew	68	66	105	16	13	0	48	53	65	97	120
Bar-tailed Godwit	1	0	0	0	0	0	0	0	0	0	6
Black-tailed Godwit	19	600	578	420	63	0	1650	2450	1120	1982	2400
Knot	0	0	0	0	0	0	0	0	12	0	0
Dunlin	245	400	202	0	61	0	6	680	91	609	1000
Redshank	166	154	58	210	0	0	52	82	101	203	180

9.4. The mitigation measures for the DCO include provision to provide greenfield terrestrial foraging and roosting habitat for birds from the SPA assemblage

(predominantly curlew), to replace that lost to AMEP and to reduce noise and lighting impacts to birds. This will mitigate all of the lost functionally-linked land, including the area that could potentially be disturbed by the outfall channel construction. This mitigation has already been implemented (at Halton Marshes Wet Grassland), so any disturbance effect of the construction works on this land has already been mitigated.

10. Ecological Integrity Test

10.1. If there is deemed to be a likely significant effect on the SPA/SAC (as has been concluded for the outfall channel in Part 1 of this HRA report), then the Competent Authority will be required to decide whether the plan or project would adversely affect the integrity of the site, in the light of the relevant conservation objectives. An adverse effect on integrity is one that is likely to prevent the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of its designation.

10.2. The Conservation Objectives for the Humber Estuary SPA[2] are as follows:

- "Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - The extent and distribution of the habitats of the qualifying features
  - The structure and function of the habitats of the qualifying features
  - The supporting processes on which the habitats of the qualifying features rely
  - The population of each of the qualifying features, and,
  - The distribution of the qualifying features within the site."

10.3. The conservation objectives for the Humber Estuary SAC are as follows:

- Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;
  - The extent and distribution of qualifying natural habitats and habitats of qualifying species
  - The structure and function (including typical species) of qualifying natural habitats
  - The structure and function of the habitats of qualifying species
  - The supporting processes on which qualifying natural habitats and habitats of qualifying species rely
  - The populations of qualifying species, and,
  - The distribution of qualifying species within the site.

10.4. Site-specific objectives were also considered in the assessment for all LSE species/communities, as set out in Natural England's Supplementary Advice on Conservation Objectives for the Humber Estuary SPA[3] and for the Humber Estuary SAC[4].

[2] Source: Natural England web site: [redacted]
=humber&SiteNameDisplay=Humber+Estuary+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=15

[4] [redacted]
=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8,8

11. Assessment of Effects on SPA and SAC Species and Communities

Construction Phase

11.1. The main potential effects of the construction of the outfall channel on SPA and SAC features (as set out in Section 6 and Table 8 above) are:

- Change in intertidal habitat within the Humber Estuary SPA/SAC through construction of the outfall channel;
- Temporary indirect loss of terrestrial habitat functionally linked to the Humber Estuary SPA/SAC;
- Temporary indirect habitat loss through disturbance to birds, fish and marine mammals (noise and visual);
- Underwater noise disturbance affecting fish and marine mammals;
- Dredging and other construction effects on water quality;
- Disposal of dredge spoil.
- Cumulative effects.

11.2. Each of these is considered in relation to the Integrity Test, in conjunction with the specific pressures identified by Natural England in their Advice on Operations relating to 'Construction of Port and Harbour Structures'. The following are given by NE as medium-high risk category:

- Above water noise
- Abrasion/disturbance of the substrate on the surface of the seabed
- Barrier to species movement
- Changes in suspended solids (water clarity)
- Emergence regime changes, including tidal level change considerations
- Habitat structure changes - removal of substratum (extraction)
- Introduction of light
- Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
- Physical change (to another seabed type)
- Physical change (to another sediment type)
- Physical loss (to land or freshwater habitat)
- Removal of non-target species
- Smothering and siltation rate changes (Heavy)
- Smothering and siltation rate changes (Light)
- Underwater noise changes
- Vibration
- Visual disturbance

- Water flow (tidal current) changes, including sediment transport considerations
- Wave exposure changes.

11.3. Low risk pressures during construction included the following, though it should be noted that NE states for these that "*Unless there are evidence-based case or site-specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of an assessment*." These have therefore been considered, but it was concluded that there are no factors at this site that would increase the risk above low, so they are not considered as possible risks to site integrity.

- Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)
- Collision below water with static or moving objects not naturally found in the marine environment
- Deoxygenation
- Hydrocarbon & PAH contamination
- Introduction of other substances (solid, liquid or gas)
- Introduction or spread of invasive non-indigenous species (INIS)
- Nutrient enrichment
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
- Transition elements & organo-metal (e.g. TBT) contamination.

Construction Effects: Habitat Change

11.4. The construction of the outfall channel will result in a change in intertidal habitat within the footprint of the channel, as set out in Table 8. That footprint includes 0.43 ha. mudflat, 0.77 ha. dense saltmarsh and 0.74 ha. scattered saltmarsh. The saltmarsh habitats will be largely changed to intertidal mudflat (within and on the slopes of the drainage channel), so there will be a net loss of 1.51 ha. saltmarsh but a net gain of the same area of mudflat. Whilst this represents a change in the SPA/Ramsar/SAC habitats, it will actually be a reversion to the habitat that was present in that area 10 years previously at the time of the original DCO application. Additionally, only a very small area within the SPA/Ramsar/SAC will be affected. It is concluded therefore that this result in **no adverse effect on integrity**.

11.5. Furthermore, in a previous consultation about outfall discharges with Able UK[5], Natural England has advised that construction of a discharge outfall (such as that being assessed here) would constitute a "*functional change in habitat rather than a loss*".

[5] *K. Jennings, Natural England, email of 12/11/07 to R. Cram at Able UK.*

Construction Effects: Disturbance

11.6. The construction works for the outfall channel will result in disturbance to the bird populations using the Killingholme Marshes Foreshore. There would be temporary functional loss of habitat through construction disturbance. Assuming a precautionary 275m displacement distance around the works (as was used for the original DCO and for the Material Change 2 HRA), this would temporarily affect an area of 13.3 ha of mudflat, 6.0ha of scattered colonising saltmarsh and 8.6ha of dense saltmarsh, for the duration of the works.

11.7. In order to mitigate this disturbance impact, a restriction on the timing of construction will be implemented, to avoid the main periods for which the mudflat is important for the SPA/Ramsar species that it supports, as set out in Section 9 above. No construction works for the outfall channel will be undertaken outside the April-July period. With this mitigation in place, there would be **no adverse effect on integrity**.

11.8. Construction disturbance could also affect functionally-linked terrestrial habitat (grassland), used primarily by curlew. However, mitigation measures have already been implemented for the DCO at Halton Marshes Wet Grassland, providing greenfield terrestrial foraging and roosting habitat for birds from the SPA assemblage for the loss of the whole AMEP site (including this functionally-linked land that could be affected by disturbance from the outfall channel works). With this mitigation already implemented, there would be **no adverse effect on integrity**.

11.9. **No adverse effect on integrity** was found for disturbance to grey seals and river lampreys, given that the habitats and areas that would be affected are not important for these species.

Operational Phase

11.10. The only potential effect of the operation of the outfall channel would be:

- Maintenance of channel (occasional dredging).

11.11. This is identified a low risk pressures by NE relating in its advice on 'Operation of Ports and Harbours'. This would result in **no adverse effect on integrity**.

12. Summary and Conclusion

12.1. This report has provided baseline data and analysis to provide supplementary information for the assessment process should the Competent Authority determine that an Appropriate Assessment is required (as was concluded in the Likely Significant Effects assessment).

12.2. The SPA and SAC Conservation Objectives (as set out in Section 10 above) against which this assessment needs to be made seek to maintain the habitats of the qualifying species in favourable condition.

12.3. The predicted effects of the outfall channel construction on the relevant SPA and SAC qualifying habitat and assemblage species in the context of the Habitats Regulations have been assessed above, and are summarised in Section 6 and Table 8 above, and in Appendices 4 and 5. The predicted effects have been assessed against the SPA and SAC Conservation Objectives, to determine whether there would be any adverse effect pf the development on the ecological integrity of the Humber Estuary SPA/SAC/Ramsar site.

12.4. The residual effects of the outfall channel construction and operation, taking account of the mitigation, will have no adverse effect on the integrity of the Humber Estuary SAC, SPA and Ramsar site.

12.5. In summarising the likely effects on the qualifying bird populations for the SPA, the assessment process illustrated in the flow diagram in the Planning Inspectorate's Advice Note 10 is undertaken as follows:

- *"Is the project likely to have significant effect on the site?"*
  - For eight qualifying species, and six assemblage species of the Humber Estuary SPA, and for six features of the Humber Estuary SAC, this cannot, under the definition of likely significant effect under the Habitats Regulations, be ruled out, so the next stage is:
- *"Assess the implications of the effects of the proposal for the site's conservation objectives"*
- *"Will the project affect integrity of the site?"*
  - No qualifying or assemblage species has been identified as being significantly affected by the Project (either alone or in combination). In terms of the relevant tests under the Habitat Regulations, it can be safely concluded that the Project would not threaten the ecological integrity of the Humber Estuary SPA/Ramsar/SAC (with the proposed mitigation in place). Hence the end result is that "*consent may be granted*."

12.6. In conclusion therefore, the proposed AMEP Pumping Station Outfall Channel would not adversely affect the ecological integrity of the Humber Estuary SPA/Ramsar/SAC, either alone or in combination with any other plan or project, and therefore authorisation for the project may be granted.

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ABLE MARINE ENERGY PARK

APPENDIX 1

PUMPING STATION OUTFALL CHANNEL

CONSTRUCTION METHODOLOGY

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REVISION REGISTER

Rev	Date	Status	Author	Reviewer	Approved	Date
0	07/12/21	Draft	NJD	RC	RC	
1						
2						

CONTENTS

ABBREVIATIONS

1 INTRODUCTION

1.1 OVERVIEW

1.1.1 A new pumping station is being constructed, which requires an outfall channel to be constructed to take the water discharge from the new outfall to the River Humber.

1.1.2 The purpose of this report is to consider the construction methodology that will be required for the works. The methodology must be covered by the Deemed Marine Licence which will be revised for this element of work.

1.2 EXISTING MATERIAL

1.2.1 The following extracts provide a description of the material profile of the ground concerned.

1.2.2 A review of LIDAR data from 2000 onwards has been undertaken by HR Wallingford, refer to Annex 2 and abstract below. The review shows that up to 5m of sediment has accreted since 2001 and that, therefore the majority of the channel will be excavated through river silt.

1.2.3 A site investigation that incorporated part of the foreshore was undertaken by Fugro Engineering Service Limited in 2012. Boreholes in the proximity of the channel describe the material within the range of the channel excavation as *'very soft slightly sandy silty CLAY'*. PSD analysis of surface deposits showed them to be around 75% SILT with the balance being clay and sand in broadly equal proportion

1.2.4 A site investigation of the terrestrial areas within the footprint of the PS showed firm clay at between 0-1mAOD (3.9 - 4.9mCD)

Figure 1. Proposed location of pumping station and outfall channel

2 DRAINAGE CHANNEL DESIGN

2.1 OVERVIEW

2.1.1 The drainage channel is required to fall from the outfall level of 3.1mCD, to MLWN level of 2.6mCD. It will be aligned around the proposed quay footprint. The overall length will be approx. 560m. See Appendix A.

From the outfall, the channel will run in a straight line NEE for approximately 20m before taking a 90degree right hand turn SE.

The channel will maintain this direction for a further 100m before taking a slight left hand turn.

The line is then maintained for a further 280m before making another 90 degree left hand turn towards NE.

The channel then continues on for a further 160m where it meets the MLWN tie in point.

2.2 CHANNEL CHARACTERISTICS

2.2.1 The start of the channel will be formed with sheet piled walls with a concrete/rock base, for a maximum length of 20m.

2.2.2 The remaining channel will be a cut channel, formed by dredging the existing estuary material to a designed profile.

2.3 DEPTH

2.3.1 LIDAR data shows that the existing estuary levels vary from a maximum of 7mCD down to 4mCD (all levels approx.). The majority of the cut being in the deeper range.

2.3.2 To achieve a channel depth of 2.6-3.1mCD, generally, an approximate cut depth of 4m will be required.

2.3.3 Construction dredging techniques may require over dredging to a greater depth than the channel design profile, to provide suitable conditions for the equipment operations.

2.4 WIDTH

2.4.1 The width of the sheet piled wall channel will be approx. 10m.

2.4.2 It is anticipated that the cut channel will have a minimum base width of 2m. The overall width of the cut channel will depend on the slope design. Assuming a 10 degree slope, the overall plan width of the channel will be 42m.

2.5 SLOPE

2.5.1 The channel slope profile will be designed to suit the existing soil material. A slope between 10 to 15 degrees is expected.

2.6 LOADINGS

2.6.1 The channel will be required to accommodate a flow of 10.5m3/s.

2.6.2 Allowance in the slope design will be made for loading at the top of the slope for surcharge from excavation plant.

2.7 REVETMENT

2.7.1 The use of revetment in the channel will influence the maintenance requirement for the channel. However any revetment beyond 20m of the outfall will need to be agreed with the MMO.

3 CONSTRUCTION METHODOLOGY

3.1 OVERVIEW

3.1.1 The outfall channel will be a combination of a sheet piled wall with base protection and a cut channel formed in the existing foreshore.

3.2 RAMP ACCESS OVER THE SEA WALL

3.2.1 In order to allow access below the MHWS, a temporary stone ramp will be constructed over the existing sea wall. Imported hard stone will be laid over the top of the defence so that the integrity of the structure is not impacted.

3.3 SHEET PILED WALL CHANNEL

3.3.1 The sheet piled wall will be from the north and south sides of the channel as it leaves the outfall. It will run in a straight line for approximately 20m up to the bend.

3.3.2 The final sheet pile penetration is to be determined but the majority of the piling will be through glacial till, which has two defining strata's: an upper stratum of soft clay/silt which has a depth of approx. 4m, overlying a lower firm clay which is present for the remainder of the required penetration.

3.3.3 Installation of the sheet piles will be from the land side of the sea wall where practical.

3.3.4 Method for installing sheet piles from foreshore may require a temporary piling mat and/or the use of marine equipment.

3.3.5 Percussive piling not allowed between 7 April and 1st June.

3.4 EXCAVATION OF SHEET PILED WALL CHANNEL

3.4.1 The foreshore sediment will be excavated up to a depth of approximately 4m.

3.4.2 Where practical excavation will be made by long reach plant from the shore side of the sea wall.

3.4.3 Works beyond the sea wall will be undertaken by amphibious diggers and tracked dumpers.

3.5 BASE PROTECTION FOR SHEET PILED WALL CHANNEL

3.5.1 The base of the sheet piled wall will be protected from scouring by constructing a rock mat or a concrete base for the full 20m length of the piled wall.

3.5.2 The footprint area will be approximately 200m^2.

3.5.3 The rock mat will be installed with appropriate plant operating below the MHWS.

3.5.4 The concrete base will be cast in situ, pumped from the shore.

3.6 CUT CHANNEL

3.6.1 The cut channel will begin where the piled wall channel ends. The length of the cut channel will be approximately 540m. The channel will be formed using land/wet dredging equipment. See Appendix B and C.

3.6.2 The soft clay/silt material will be removed with wet dredging. An estimated cut volume of 80000m^3 of material will be removed to form the new channel, including approximately 25000m^3 of clay.

3.7 WET DREDGING EQUIPMENT

3.7.1 Due to the large volumes of cutting required, wet dredging will be the most appropriate method. The specific technique is to be determined, cutter suction, back hoe and pumped dredging will be considered.

3.7.2 Tides will influence the time periods for wet dredging operations.

3.7.3 Disposal of the material will be to a designated disposal site via hopper/barge.

3.7.4 The method could utilise pumping to send the deposits to land and/or barge for onward disposal at a designed site.

3.8 LAND DREDGING

3.8.1 Excavation near the outfall and where required in the cut channel, amphibious excavators and tracked dumpers will be used to undertake land dredging. The material will be disposed of on shore via the access ramp.

3.8.2 Where appropriate tracked excavators may be used to work beyond the sea wall.

3.9 DISPOSAL

3.9.1 For sea disposal material will be taken to designated deposit site HU060.

3.9.2 The vast majority of the excavated material will be taken for sea disposal.

3.9.3 Excavated material close to the outfall and clay material not suitable for dredging will be taken to land via the access ramp and held for appropriate disposal.

3.9.4 The total anticipated quantity for disposal is 80000m^3. It is estimated that this could include 25000m^3 of firm clay.

3.10 REVETMENT

3.10.1 Should revetment be required to protect the channel it will installed by tracked equipment.

4 TIME

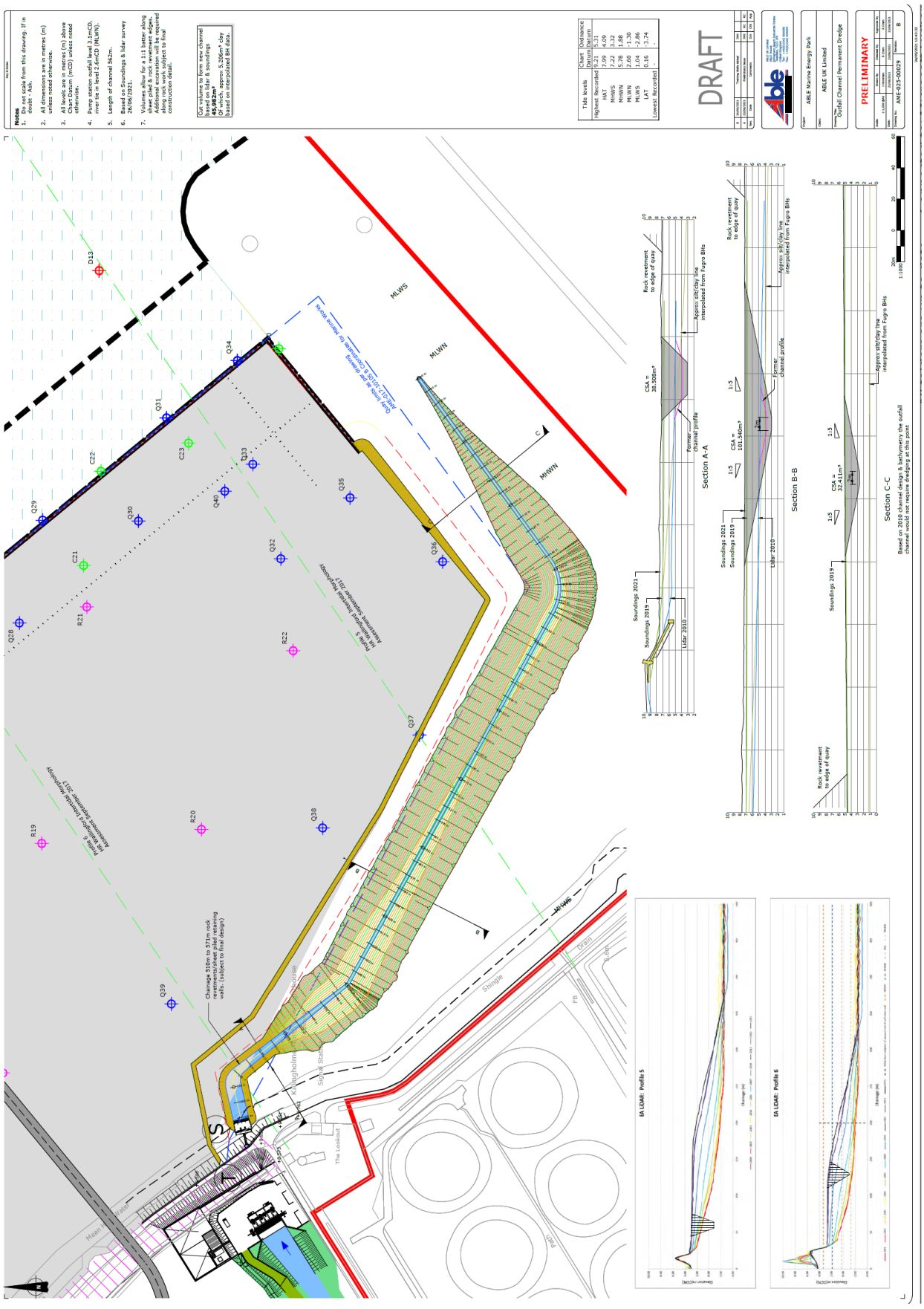
4.1 PLANNED WORK

4.1.1 The work is envisaged to be carried out between April and July 2022.

4.2 PRODUCTIVITY

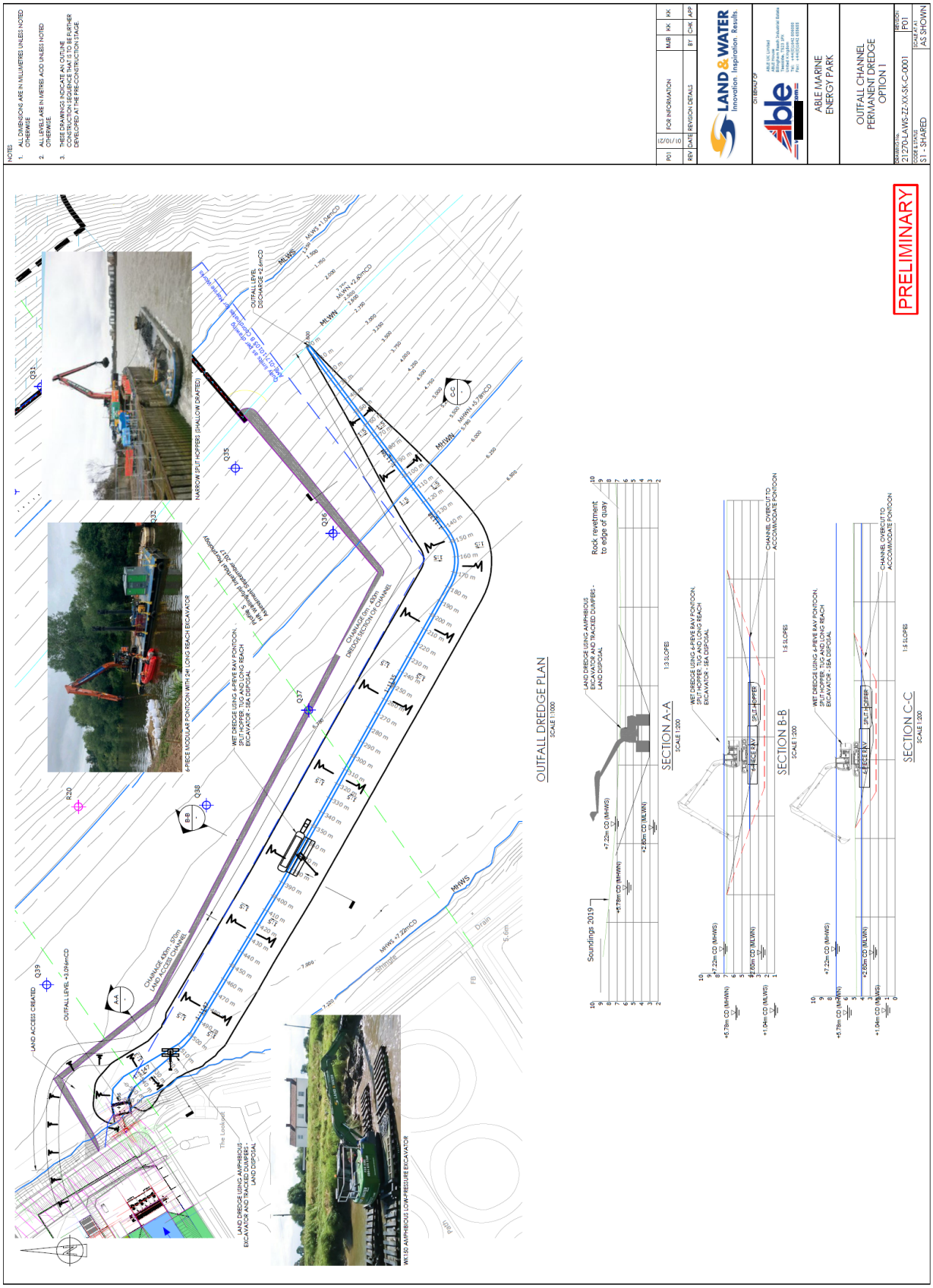
4.2.1 The productivity of wet dredging varies from 500m^3 to 1000m^3 per day. Therefore choice of method should be carefully considered to ensure the work is completed in the desired time window.

APPENDIX A – Able Preliminary Drawing

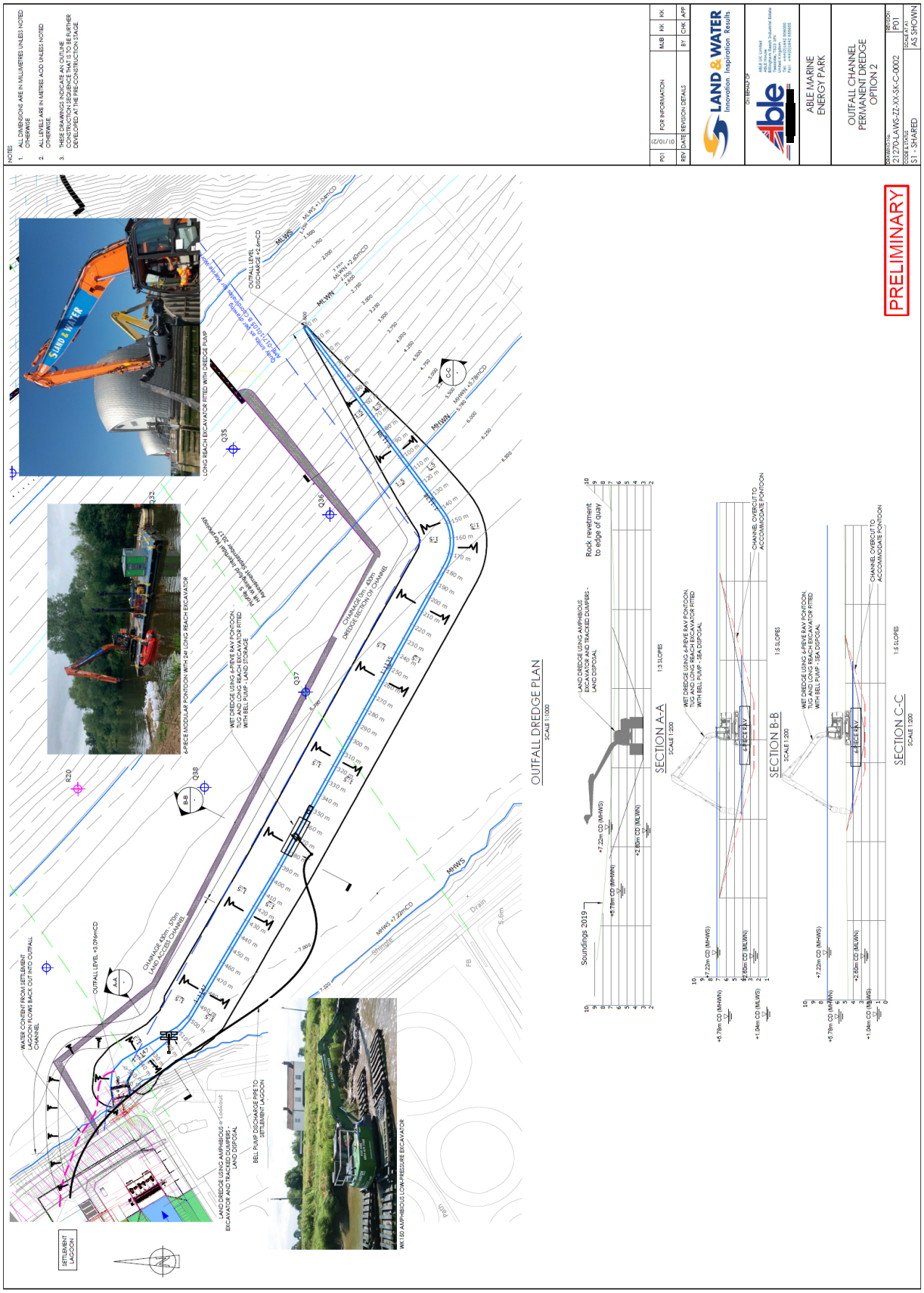


APPENDIX B-Land and Water

Option 1-Back Hoe



Option 2-Dredge Pumping



APPENDIX C – Humber Work Boats Limited (cutter suction)

KILLINGHOLME PUMPING STATION OUTFALL CHANNEL

CUTTER SUCTION DREDGING PROPOSAL REV02

Introduction

An outfall channel for the new KMPS is required to be dredged and the Client has provided an outline scope of works for tendering (REV0 04/10/21), which contains various documents including Drawing Number AME-025-00029 outlining a previous proposal and cut profile.

45982m^3 of material is required to be cut, with 5206m^3 of it being clay (based on interpolated Borehole Data).

The new channel is to be dredged to MLWN (2.6m Chart Datum / -1.30 Ordnance Datum) and is circa 562m in length to the outfall gates.

The cut profile/design slope of the above drawing, in HWB's opinion are unachievable, and HWB's plant (Cutter Suction Dredger) cannot remove clay. However, discussions have taken place with the Client and a volume of 87000m^3 has since been mentioned. An agreement in principle to the slope/cut profiles has been made but HWB are still awaiting a drawing to be published identifying this.

HWB propose to mobilise their Cutter Suction Dredger JOHN-M and associated discharge pipeline and remove the silts and uncompacted sands from the channel and pump it to a discharge point ashore; exposing the clay – if found – for the Client to remove.

The JOHN-M is ideally suited to tidal outfalls and channels in silt achieving production levels of up to 1000m^3 per hour, at an 80:20 water:silt ratio.

Figure 1 Cutter Suction Dredger JOHN-M, Hedon Haven 2021

Cut Profile

The dredger requires approx. 1.2m of water to float/operate in, hence if the channel ties in at 2.6m CD, the river level would need to be 3.8m CD before the machine can commence dredging. Given dredging would then have to cease once the river level had fallen after High Water, on average there would only be approx. 14 hours dredging per 24hours.

HWB would propose to start the dredge with a bed level of 1.0m CD continuing for as long as is achievable in the soft silts; although more material is being removed, the machine is working for longer and overall, being more productive.

The initially proposed finished channel width of 2m is not sufficient to accommodate the dredger either, a 7m wide flat bottom profile is needed. Utilising the dredgers long arm, it is proposed it makes 25m wide cuts, down to 1.0m CD where possible and let the banks of the channel be formed from the natural slumping/settlement. Once the majority of the silt has been removed, an exit 'hoovering up' campaign can be carried out.

Due to the slumping that will occur, HWB propose to plough the dredged channel weekly, in an attempt to remove any sandbars formed from the settlement.

Proposed Methodology

At HWB's waterside facility the 'wet side' discharge pipe would be assembled in strings of 6No x 12m hoses.

A manifold would be positioned by the client on the sea wall adjacent to the discharge area to which the wet side discharge pipe would be installed.

HWB can provide approx. 1km of land side discharge pipe if required by the Client.

Client to remove the top 1m of silt/vegetation of the channel route.

On an agreed date, and subject to all relevant permits and permissions, the JOHN-M would be assembled at HWB's yard and launched into the river. Following a series of post-assembly tests, the dredger would be mobilised to the starting location of the dredge. The onboard computer and GPS software would be uploaded with the intended cut profile etc and starting location.

The pipe strings will then be connected together and mobilised to the dredger, where they will be connected up to the discharge pipe. A sinker block may be required to be laid to secure the midsection of the floating pipeline in position.

The free end will then be winched up the beach to seawall and connected to the manifold.

The dredger will then commence removing material, utilising the onboard GPS positioning & dredge software, working 24hours a day, 7 days a week, crewed by 2 shifts of 3 crew.

As the dredger begins to head inshore, the floating discharge pipeline will be adjusted to suit utilising HWB's other floating plant.

If the production levels begin to drop, the cut profile will be raised as required.

If any clay is encountered, it will be marked on the dredge computer and the positions relayed to the client. The dredger will then continue on up the channel, having removed the silts from on top of the clay berm – client to remove the clay material.

Appendix 2. Humber Estuary SPA and Ramsar site species and habitats and their exposure to risk of any effect from the AMEP outfall channel. Q = qualifying species (as per SPA citation and/or SPA Review), A = assemblage species (as listed in SPA Review and citation, [redacted]).

Species	Humber Estuary SPA	Humber Estuary Ramsar site	Present within potential impact zone in 'non-trivial' numbers	Full AMEP DCO LSE	Outfall channel LSE	Comments
Avocet (breeding and wintering)	Q		✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Bittern (breeding and wintering)	Q					Only seen in potential impact zone infrequently in low numbers, no LSE
Hen harrier (wintering)	Q					Only seen in potential impact zone infrequently in low numbers, no LSE
Golden plover (wintering)	Q	Q				Only seen in potential impact zone infrequently in low numbers, no LSE
Bar-tailed godwit (wintering)	Q	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Ruff (passage)	Q					Not present in potential impact zone, no LSE
Marsh harrier (breeding)	Q		✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Little tern (breeding)	Q					Not present in potential impact zone, no LSE
Shelduck (wintering)	Q	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Knot (wintering and passage)	Q	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Dunlin (wintering and passage)	Q	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.

Species	Humber Estuary SPA	Humber Estuary Ramsar site	Present within potential impact zone in 'non-trivial' numbers	Full AMEP DCO LSE	Outfall channel LSE	Comments
Black-tailed godwit (wintering and passage)	Q	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Redshank (wintering and passage)	Q	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out
Brent goose (non-breeding)	A					Only seen in potential impact zone very infrequently in low numbers, no LSE
Wigeon (non-breeding)						Only seen in potential impact zone very infrequently in low numbers, no LSE
Teal (non-breeding)			✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out
Mallard (non-breeding)			✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out
Shoveler (non-breeding)			✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out
Pochard (non-breeding)						Only seen in potential impact zone infrequently in low numbers, no LSE
Scaup (non-breeding)						Only seen in potential impact zone very infrequently in low numbers, no LSE
Goldeneye (non-breeding)						Only seen in potential impact zone infrequently in low numbers, no LSE
Oystercatcher (non-breeding)						Only seen in potential impact zone infrequently in low numbers, no LSE
Ringed Plover (non-breeding)	A	Q	✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.

Species	Humber Estuary SPA	Humber Estuary Ramsar site	Present within potential impact zone in 'non-trivial' numbers	Full AMEP DCO LSE	Outfall channel LSE	Comments
Grey plover (non-breeding)						Only seen in potential impact zone infrequently in low numbers, no LSE
Lapwing (non-breeding)	A		✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Sanderling (non-breeding)	A	Q				Only seen in potential impact zone infrequently in low numbers, no LSE
Whimbrel (non-breeding)	A					Only seen in potential impact zone infrequently in low numbers, no LSE
Curlew (non-breeding)	A		✓	✓	✓	Regularly present in potential impact zone in non-trivial numbers, LSE cannot be ruled out.
Greenshank (non-breeding)	A					Only seen in potential impact zone infrequently in low numbers, no LSE
Turnstone (non-breeding)	A					Only seen in potential impact zone infrequently in low numbers, no LSE
Grey seal		Q		✓	✓	
River lamprey		Q		✓	✓	
Sea lamprey		Q				No suitable habitat in potential impact zone, no LSE
Natterjack toad		Q				No suitable habitat in potential impact zone, no LSE
Coastal lagoons				✓		Not affected by the Outfall Channel
Freshwater and coastal grazing marsh				✓		Not affected by the Outfall Channel
Inland areas of wet grassland, rough grassland and				✓	✓	

Species	Humber Estuary SPA	Humber Estuary Ramsar site	Present within potential impact zone in 'non-trivial' numbers	Full AMEP DCO LSE	Outfall channel LSE	Comments
agricultural land (both arable land and permanent pasture)						
Intertidal sand and mudflats				✓	✓	
Salicornia and other annuals colonising mud and sand				✓	✓	
Saltmarsh (Atlantic salt meadows)				✓	✓	
Water column				✓	✓	
Other supporting habitats						No direct or indirect loss, so no LSE

Appendix 3. Summary of Like Significant Effects on the Humber Estuary SAC resulting from the AMEP Outfall Channel.

Potential Effect	Significance of Effect on SAC Qualifying Interest Features (Full AMEP DCO)	Outfall Channel
Permanent direct loss of estuarine habitat (H1130)	**Likely Significant Effect** due to losses of habitat under the footprint of the new quay, effects on lamprey and the effects of capital and maintenance dredging and disposal. Appropriate Assessment (AA) required.	LSE
Permanent direct loss of intertidal mudflat (H1140)	**Likely Significant Effect** predominantly due to losses caused by the new quay. Effects of dredging and disposal as per estuarine habitat above. AA required.	LSE
Permanent direct loss of saltmarsh (H1330 / H1310)	**Likely Significant Effect** due to loss of saltmarsh for breach on compensation site. AA required.	LSE
Indirect effects on estuarine habitat (H1130).	**Likely Significant Effect** with changes in the composition of the estuarine habitats present to the north and south of the quay. AA required.	LSE
	No Likely Significant Effect has been concluded about the effects on sub-tidal habitat for lamprey, the effects of the compensation site at CCS on the hydrodynamics of the estuary and the effects on water temperatures of the relocation of the power station outfall pipes for reasons listed below.	No LSE
	No likely significant effects on sea lamprey due to the small indirect changes (see *Annex B*).	No LSE
	Relocation of the outfalls to the front of the new quay will change the thermal plume, but there will be no significant changes to the temperatures of the receiving water (*EX9.7 – Assessment of the Relocation of the E.ON and Centrica Outfalls on Thermal Recirculation*), The relocation has yet to be agreed with E.ON and Centrica, however, the receiving water will be no warmer with AMEP even if the outfalls remain in their current location.	No LSE
Indirect effects on intertidal mudflat (H1140)	**Likely Significant Effect** predominantly due to changes in habitat to the north and south of the new quay and geomorphological changes due to rise in water levels. AA required.	LSE
	No Likely Significant Effect has been concluded about the effects of erosion at the breach location of the compensation site at CCS and due to the discharge from the pumping station and increased wave heights due to the new quay. The reasons are set out below.	No LSE
	Downstream of the breach at the compensation site, erosion and enlargement of the CCS Creek is predicted with increases predominantly in the depth of the creek and also its width closer to the breach, although it will remain unchanged at the *"downstream"* location (Black & Veatch, 2012[1]).	No LSE
	A channel will be initiated by dredging a short section of intertidal habitat seaward of the pumping station (see *Tables 12.2* and *12.3* of the SoCG for the ES), so there will be no significant erosion effects.	No LSE

Potential Effect	Significance of Effect on SAC Qualifying Interest Features (Full AMEP DCO)	Outfall Channel
	Increased wave heights due to the new quay will be small and localised and any erosion resulting will be offset by accretion resulting from the sheltering effect of the quay as described in *Supplementary Information EX 8.7 Modelling of Final Quay Design*.	No LSE
Indirect effects on saltmarsh (H1330 / H1310)	**Likely Significant Effect** due to the transformation of existing habitat types into saltmarsh (see *Annex B*). AA required.	LSE
Disturbance to grey seal and river lamprey (S1364 and S1099)	**Likely Significant Effect** as piling for the new quay construction will create underwater noise which could affect grey seal and migratory movements of river lamprey. AA required.	LSE

Appendix 4. Shadow Appropriate Assessment for the Humber Estuary SPA for the outfall channel construction

Issue	Assessment (ES, SoCG), MC2	Assessment (Outfall Channel)
Effects on estuarine habitat (H1130)	Adverse effect concluded on internationally important populations of regularly occurring *Annex I* species,migratory species and the waterfowl assemblage, due to the reduction in extent and distribution of the habitat supporting birds. No mitigation is possible	Outfall channel works represent change rather than loss of estuarine habitat. 1.94 ha. intertidal within footprint of outfall channel works but will result in habitat change not loss (and reversion to previous state prior to anthropogenic accretion). No adverse effect on integrity.
Effects on intertidal mudflat (H1140)	Adverse effect concluded on internationally important populations of regularly occurring *Annex I* species, migratory species and the waterfowl assemblage, due to the reduction in extent and distribution of thehabitat supporting birds. No mitigation is possible	No adverse effect on integrity.
	Cannot confirm the continued use of NKHP as a roost site by waders from KMFS, particularly black-tailedgodwit, once mudflats at KMFS lost. The effect cannot be mitigated. Therefore, as scientific doubt remains as to the absence of adverse effects, the competent authority cannot be certain that the scheme will not adversely affect the integrity of the European site.	No adverse effect on integrity (no effect of Outfall Channel on NKHP).
Loss of terrestrial habitat	No adverse effect due to the provision of replacement foraging and roosting habitat at Halton Marshes Wet Grassland.	No adverse effect on integrity. Any possible disturbance effects mitigated by provision at Halton Marshes Wet Grassland
Disturbance effects on birds	No adverse effect on birds within NKHP based on a commitment to achieve 55 dB(A) L_{Amax} at site boundary.	No adverse effect on integrity (no effect of Outfall Channel on NKHP)
	No adverse effects on birds using Mitigation Area A based on commitments to the same noise limit described above for NKHP, and to distance limits and storage heights within the operational buffer.	No adverse effect on integrity (no effect on this area from Outfall Channel)
	No adverse effects on birds at NKHP from lighting within the AMEP site as described in *Supplementary Information EX19.1 - Lighting Lux Plans.*	No adverse effect on integrity (no effect of Outfall Channel on NKHP)
	No adverse effects from piling based on adoption of measures agreed in the piling methods statement, which are set out in *Section 8*.	No adverse effect on integrity

Appendix 5. Shadow Appropriate Assessment for the Humber Estuary SAC for the outfall channel construction.

Issue	Assessment (ES, SoCG, MC2)	Assessment (Outfall Channel)
Effects on estuarine habitat (H1130)	Permanent direct loss amended to 43.6 ha (31.3 ha of intertidal mudflat and 10.4 ha of sub-tidal habitat, plus an additional loss of 1.9ha of colonising saltmarsh). The effects result in an adverse effect due to a reduction in the extent and distribution of habitat for which no mitigation is possible. The effects of capital and maintenance dredging and disposal on sub-tidal habitat and benthic communitiesare subject to ongoing discussions. The effects on the wider estuary have been assessed (Deltares, 2012). EA has indicated that an allowanceshould be made for the change of 5 ha of intertidal habitat to sub-tidal. AHPL's has therefore, taken a precautionary approach and accepted this view and included 10 ha of intertidal mudflat in the habitat provided as compensation taking account of the 2:1 ratio for compensatory mudflat (see *ES Table 5.1* and *Annex B*). Migratory movements of lamprey will not be affected by the presence of the new quay as described in *Annex 10.2* of the ES	Outfall channel works represent change rather than loss of estuarine habitat. 1.94 ha. intertidal within footprint of outfall channel works but will result in habitat change not loss (and reversion to previous state prior to anthropogenic accretion). No adverse effect on integrity.
Effects on intertidal mudflat (H1140)	Adverse effect concluded because of permanent direct loss for the new quay (31.3 ha), and in the longer term the indirect effects of the quay will result in the transformation of intertidal mudflat to saltmarsh (*ES Annex B*). These effects result in a reduction in the extent and distribution of intertidal mudflat, for which no mitigation is possible.	Outfall channel works will affect 0.43 ha. mudflat but will lead to a net increase through change of saltmarsh to mudflat. No adverse effect on integrity.
Effects on saltmarsh (H1330 / H1310)	Adverse effect concluded as a reduction in the extent of saltmarsh (2 ha) occurs for which no mitigation is possible.	Outfall channel works will affect 0.77 ha. dense saltmarsh and 0.74 ha. scattered colonising saltmarsh resulting in change of these areas to mudflat. No adverse effect on integrity.
Disturbance to grey seals and river lampreys (S1364, S1095 and S1099)	No adverse effect concluded with the implementation of the mitigation measures listed in *ES Section 4.4*.	No adverse effect on integrity (impact zone not important for either of these species).