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Environment Agency
Waterside House
Waterside North
Lincoln LN2 5HA

For the attention of Annette Hewitson

Your Ref: AN/2012/113982/01-L12

Our Ref: RC.LH.A.L12-0659

Date: 21st November 2012

Dear Sir

RESPONSES TO EA LETTER OF 9TH NOVEMBER 2012

I refer to your letter of 9th November and would respond as follows:-

1.0 EX7.8 Dredging Strategy

Noted.

2.0 EX8.7A Modelling of the Final Quay Design

2.1 The Applicant notes the EA's recommendations for monitoring, and with sight of them has prepared a monitoring proposal which is currently the subject of discussion. The monitoring which is ultimately agreed will be set out in the EMMP's; the Applicant undertakes to implement the EMMP's as finally agreed.

2.2 & 2.3
There is an error in the text in 3.3.4 of EX8.7A: the value should be 0.0005m (0.5mm) and not 0.005m (5mm). The correct value of 0.0005m is shown in the appropriate figure (Figure 3-18). As stated the model uncertainty is +/-0.01m, which means that any change to water levels within this range predicted by the model is indistinguishable from model noise. The model therefore predicts negligible change in water levels.

2.4 The assessment was performed for an incident wave height of 1m. As stated, the return period of this wave height is estimated to be approximately 1 month.

2.5 The modelling assessment includes the MR site at a level of +2.2mOD which over estimates the effects of the RTE element of the site as the tidal prism in this part of the site will be less than if full MR were undertaken over the whole site. As clarified above, the impacts to water level of the compensation site represented in this manner are predicted by the model to be negligible.

3.0 EX8.12A Water Framework Directive Assessment

3.1-3.19
A revised WFD Assessment was circulated on 19th November to address all the comments you have provided in paras 3.1 to 3.19 – you have since provided further comments on this report, which are addressed in the version circulated on 21st November. We have reviewed the record of consultation relating to the submission of the WFD Assessments for the project, and copies of all relevant correspondence are included in Annex 1 to this letter, together with a summary schedule.

cont./…

We note that the WFD Assessment was in fact signed off before submission, and this was confirmed by the EA in its Relevant Representation to the Planning Inspectorate, which sought only an additional WFD Assessment concerning the North Bank. Since then, however, the EA has asked for a further project-wide WFD Assessment to be undertaken. Commentary from the EA has been received in several stages. We must note that progress has not been helped by the changing advice we have received from the EA post-application.

4.0 EX10.8 Disposal Site Characterisation and Impact Assessment

4.2, 4.3 & 4.4

Changes to the assessment of the dispersion of gravel from disposal site HU080 have been made (set out in EX10.8a, included as Annex 2 to this letter – this is the report which was circulated by Richard Cram on 15th November, with the issue dates updated). The gravel is assessed to disperse more slowly than predicted by the modelling. It is also noted that the model results are averaged over 250m by 250m cells and hence an average layer of 8mm over a 250m by 250m cell represents a gravel volume of $500m^3$. If this gravel were mixed into an active transport layer of thickness 100mm of sandy material it would imply an 8% gravel content in such a layer. If the gravel were dispersed to a more stable area of mixed material the additional gravel could be considered as a layer of gravel – but noting that some gravel particles could be larger than 8mm in size.

5.0 EX10.9 Environmental Management and Monitoring Plan – Marine Works

Please see the revised Marine Works EMMP provided to the Planning Inspectorate as part of the Summary of Case submitted on 20th November 2012.

6.0 EX28.3, Part 1 Non technical Summary

6.1 In para 6.2.31 of EX28.3, Part 4 it is stated that the two wind powered pumps will each be 5m in diameter and stand 8-10m in height and have an output of 5m head.

7.0 EX28.3, Part 2 Baseline of North Killingholme Foreshore

7.1, 7.2, & 7.3

EX11.24, paragraphs 10-16 provide our prediction of habitat loss due to SLR <u>within the footprint of the quay</u> which has been calculated on a pro-rata approach to be 4.32 ha. This is calculated using Table 5.1 of the CHAMP which gives the intertidal area of the Middle Estuary as 2565 ha, so the 31.5 ha of direct loss due to AMEP represents 1.23 % of the Middle Estuary intertidal resource. Table 5.2 of the CHAMP states that 360 ha of intertidal area will be lost in the middle Estuary between 2000 and 2050, and 1.2% of that is 4.32 ha

This is based on the CHAMP as it is currently published. You have advised in your representations that EA current estimate of loss is 4.8 ha +/-1.8 ha as monitoring information has led to revised assessments of both sea level rise and the location of the losses. However the figure of 4.32 lies comfortably within the current projected range of 3 - 6.6 ha.

On that basis we have stated that the 4.32 ha of loss remains a robust and reasonable assessment.

8.0 EX28.3, Part 3 Development and Operation of the Intertidal Habitat Site

8.1 At the time of Detailed Design the risks of embankment and toe erosion from waves or currents will be reviewed. The strength of erosion protection required will depend on the anticipated exposure of these embankments and will be designed accordingly. We would seek to work with the EA officers to develop a solution that balances risks and cost in the same way as their own embankment design.

8.2 The volumes stored in each RTE field are 18,000 m^3 per 100mm of storage. This is in excess of the new reservoir volume limit (10,000 m^3) and around 150mm depth of storage would exceed the current reservoir volume limit of 25,000 m^3. These fields have the potential to store water more than 150 mm above the surrounding ground (2.5mAOD) outside the Compensation Site and so we expect them to qualify as reservoirs on the basis of their potential to store water. The issue is whether these storage areas should be classified as reservoirs noting that for the most of their length any failure would lead to a discharge of water into the sea. Note that only the two most northern fields actually have a boundary with the main flood defence embankment that protects the surrounding land. All embankments around the other two fields separate the fields from tidal waters.

8.3 Noted. Please see responses to section 17.

8.4 We note the concerns about the fate of eroded material from Cherry Cobb Sands Creek and its potential to be deposited in an area which causes difficulties for land drainage. While there might be greater erosion during the warping phase this will terminate after 1 – 2 years rather than continue indefinitely as anticipated in the original ES. Once the operational phase starts, erosion is anticipated to decline compared with the ES prediction (Para 6.4.3), so the long term change is likely to be less than originally anticipated. We would point the EA to the SOCG with the IDBs in which the Applicant agrees to fund any additional dredging of the drainage outfall channels that arises as a result of the proposal.

8.5 The effect on the Stone Creek outfalls is summarised in para 5.3.10 as being similar to that identified in the ES but of shorter duration (1-2 years rather than 5 years). Any effects on the effectiveness of drainage through the Stone Creek drainage outfalls including the Keyingham Drain are covered in the SOCG with the IDBs.

8.6 We have checked B&V model water level predictions for Stone Creek during the warping phase and they are identical with those presented for the 110 ha site in Table 3 and paragraph 2.2.6 of ES Annex 32.6, which showed a rise of 0.10m in low tide level and a reduction of 30 minutes in the time water levels are below 0.5 mAOD compared with the baseline. As the cross-section of Cherry Cobb Sands Creek enlarges over time in response to the increased discharges this impact on water levels will reduce.

8.7 See previous two responses in relation to para 8.1.7. In relation to para 11.5.1, the possibility of additional flows from Foul Holme Sand increasing flows in Cherry Cobb Sands creek would only arise once the creek has enlarged. This effect would have to occur in the period before the top of Foul Holme Sands becomes exposed (level of 2m OD approximately) as afterwards all drainage already must enter Cherry Cobb Sands Creek. This period is likely to be before land drainage through the Stone Creek outfalls can begin.

8.8 Assessing the sustainability of a proposal depends critically on assumptions made about what is sustainable. This compensation proposal is required to meet a legal obligation that must be satisfied to allow a development that will enhance the economic sustainability of the Humber region.

8.9 Comment noted. The RTE design is based on management of the site to develop and sustain a habitat that must be provided as a legal requirement but cannot develop naturally adjacent to the Humber estuary. The model predictions for drainage out of the RTE fields indicate a thin veneer of water remaining in the fields a few mm in depth. In reality the fields will have a perimeter drainage channel that will be permanently wet and the central field area will have some morphological form (slopes) that will in general promote drainage of the field into the perimeter channel. Some areas of the field may at times be ponded to shallow depth.

8.10 The applicant is committed to providing 101.5 ha of intertidal habitat and more than 44 ha of sustainable mudflat. If there is further evolution in the details of the design these requirements will continue to be met. For example, if in consideration of the integrity of the existing flood defence embankment (arising from your comments in section 17), it is decided at Detailed Design phase to strengthen this embankment, the necessary material will be sourced from the proposed wide embankment north of the site, while ensuring the total area of habitat provided is not reduced below 101.5 ha. We confirm that the areas quoted include those parts of the embankment bounding the open managed realignment area below 3.4 mAOD. Similarly the area of each RTE includes the sections of the surrounding embankments below 2.3mAOD. We consider that these lower sections of the embankments will over time develop as mudflat or saltmarsh as mud settles on these areas and in the managed realignment area saltmarsh plants germinate. The area in Table 8.2 includes 1.9 ha of saltmarsh removed from outside the site prior to breaching. If this area is deducted from the total it reduces to 103.5ha.

8.11 We note this advice and at detailed design stage will consider this in the development of appropriate erosion protection to ensure the long term integrity of the flood defence.

9.0 EX28.3, Part 4 Development of Wet Grassland and Roosting Site

The Applicant notes the comments made by the EA regarding the recent repair works to the Keyingham Drain tidal control structure, and the availability of sampling data from Sands Bridge – the Applicant is requesting this data as suggested, to inform the management proposals for the wet grassland site. It is considered likely that by abstraction after large rainfall events when flow in the drain is increased, it will be possible to manage abstraction to coincide with times of low salinity.

The Applicant further notes the EA's comments on, and non-objection to, the western embankment of the Keyingham Drain, and requirements for written consents, and will carry forward these comments to the stage of detailed design of levels.

10.0 EX28.3, Part 5 Assessment of Functionality

10.1 The Applicant notes the EA's comments concerning the repair works to the Keyingham Drain tidal control structure, as explained above.

10.2 The Applicant also notes the EA's comments concerning the deliverability of over-compensation at East Halton Marshes. The provision of the over-compensation would necessarily be contingent upon a condition that the flood defence wall be retained.

11.0 EX28.3, Part 6 EIA Review

11.1 The wind pumps are shown in Figure 3 of EX28.3: Part 4. They are not located on the flood defence embankment but on a small bund around the perimeter of the wet grassland.

12.0 EX 28.3, Part 7 Environmental Management and Monitoring Plan – Compensation Site

Please see the revised Marine Works EMMP provided to the Planning Inspectorate as part of the Summary of Case submitted on 20th November 2012.

13.0 EX28.3, Part 8 Over-compensation site proposal

13.1 The Applicant notes the EA's concern and responds as set out in our response to paragraph 10.2 above.

13.2 & 13.3
We note the EA's identification of two historical boreholes; if the Secretary of State determines that overcompensation is required as proposed, then the Applicant will undertake to identify and decommission these boreholes as suggested.

13.4 – 13.6
Discussions regarding the legal agreement for ALP are ongoing. We note the EA's concerns that this may impact on the deliverability of over-compensation, noting further that such delivery would be contingent upon a condition to retain the flood defence embankment.

13.7 Please see the revised WFD Assessment circulated on 19th November which addresses this comment.

14.0 EX28.3, Part 9 Land Ownership and Funding

14.1 The figure of £90 000 maintenance costs quoted is an estimate of annual costs. It would be more appropriate to use a commuted sum for current cost comparison purposes but, in time, maintenance costs would be provided for from revenue associated with AMEP.

15.0 EX28.3, Part 10 Final Compensation Proposals – Draft Legal Agreement

15.1 Noted.

16.0 EX31.5A, Factual Report on Geo-Environmental Ground Investigation, Cherry Cobb Sands (Final)

16.1 Noted. We understand that a Controlled Water Risk Assessment will be required prior to commencement of development.

16.2 & 16.3
The Applicant has passed the EA's query why certain sampling was not undertaken to the site investigation contractor, who has responded as follows:

"There were two reasons for this;

1) *The exercise at this stage was designed with the primary purpose that AUK would be able to more accurately put a quantum on the materials intended for remediation/removal, rather than their chemical signature per se; and,*
2) *It was determined that extensive sampling and testing of this material without knowledge of the chemical signature provided an unacceptable risk to Site personnel at this stage."*

The trenches listed in 16.2 of the EA's comments were additional works to aid in the visual delineation of the contamination. The samples taken and tested from TR116 were deemed representative of the material encountered within the infilled channel structure and very similar to those encountered in the Phase 1 investigation.

After consultation with the tenant farmer it was deemed that the material within the additional trenches should not be sampled unless a health and safety risk assessment and plan were put together in order to protect personal. This would form part of the remediation strategy.

The trenches deemed that the material was only present within the former channel structure and contamination not encountered outside of it (TR118, TP33, TP30, TP19 etc)

> *"16.4 Hydrocarbon contamination was identified in TR116 though we note that only a total hydrocarbon concentration was recorded in the sampling results. Ideally a full speciated Total Petroleum Hydrocarbon suite (including BTEX) should be tested for the above locations, especially for any subsequent quantitative risk assessment work where individual TPH fractions could be are required.*
>
> *16.5 TR116 has also identified very high concentrations of polychlorinated biphenyls (PCBs). It is likely that these may also be present in the above locations and should be sampled for unless there are other reasons as to why this was not /will not be done.*

As mentioned previously, TR116 is deemed representative of contaminants present within the channel structure. All material within the structure will be removed and either treated and encapsulated on the landward side of the flood defence wall or removed from site to a licenced facility.

17.0 EX36.4 Embankment Inspection and Maintenance Report

17.1 &17.2

EX36.4 on the maintenance and inspection of the existing flood defence embankment was written before this embankment was proposed as a boundary to the RTE fields. This greater reliance on its continued integrity will require the assessment to be updated in line with its new function. We accept this embankment now plays a greater role in the long term sustainability of the Compensation proposals. Assessment of a suitable standard of protection over the assumed 100 year lifetime of the RTEs will be required taking account the consequences of any overtopping of this embankment or its breaching during a major event.

In other areas, where nature conservation is the primary objective of a flood defence, a standard of protection (SOP) of 1:18 after 100 years of climate change would not be unusually low. For example for recent flood defence improvements to sustain the Minsmere SAC/SPA in Suffolk a 1 in 10 SoP after 50 years of climate change was adopted for the works as that was the minimum standard required by Natural England.

There may be a need to increase the embankment SOP if the consequences of damage are long lasting or very high, but at this stage we anticipate that the RTE fields would be resilient to short term overtopping events as that would only increase the amount of sea water in the field for a day or so. The consequences of breaching could be more severe, but would only be a major problem if the breach cut down through the saltmarsh on the seaward side of the embankment and allowed normal tidal flows to enter the RTE. Damage to the embankment that occurred as a result of a breach could be repaired rapidly, minimising the risk of a long term adverse impact on the operation of the RTE fields.

Nevertheless, the appropriate SoP and integrity of the existing flood defence embankment will be reconsidered as part of the Detailed Design in light of its new function and the greater ease of making improvements before the site is operational.

17.3 Noted. We are not aware of any recent stone protection works that have been necessary to this embankment. Our understanding is that the development of saltmarsh on the seaward side of the embankment in recent years has reduced the need for regular maintenance of the stone protection. Of course there may be deterioration in the condition of this saltmarsh in future decades that may again require the placement of stone protection.

17.4 Noted. Protection is proposed for the northern end adjacent to the RTE fields (Figure 8.2 of EX28.3 part 3). The southern end of the breach will be about 200m from the junction of the new flood defence with the existing embankment so the need for protection is less and time will be available to provide protection at a later date if it should become necessary.

18.0 EX44.2, Addendum to EX44.1

18.1 Your submissions dated 3/8/12 and 7/9/12 raised issues in relation to the evidence base used in the assessment and the sufficiency of the assessment. In response:

- Attached (Annex 3) is the list of projects considered and the information that was reasonably available to us to undertake the in-combination assessment. It has to be accepted that the in-combination assessment must first include a screening exercise by the assessor as to whether projects need to be considered at all. This is based upon the assessor's expert view using the evidence reasonably available to him, and in this regard a considerable number of ES were sourced (a complex task in itself) and distributed to the EIA Team. The tables within EX44.1 demonstrate that this exercise was undertaken by each expert in turn.

- An updated quantitative assessment of in-combination effects of marine works and impacts is included in EX8.7A, Chapter 5 with further reporting included in EX8.16: Section 8.9. This includes the revised in-combination assessment of the disposal of in-erodible deposits using revised figures agreed with MMO.

- Regarding EX10.4, this document is now further supplemented by the EX10.8 which was re-issued on Thursday 15th November.

18.2 The figure of 513 ha appears in Table 2.2 of Volume 2 (Stage 4) of the HRA that the EA (Philip Winn) provided to us on 25/3/11 (Annex 4). This is the information provided by EA in order for us to carry out the in-combination assessment.

Environment Agency
Waterside House
Waterside North
Lincoln LN2 5HA

19.0 Comments on Able's comments to responses to Examining Authority's 2nd Questions

19.1 Our response to this point is embodied in our response to 18.1, above.

Yours faithfully

[redacted]

RICHARD CRAM
Design Manager

Encl: Annexes 1 - 4

ANNEX 1 – SCHEDULE OF WFD ASSESSMENT CORRESPONDENCE

Schedule of Correspondence Regarding WFD Assessment

Date	Time	Email/Letter/ Telecon/Doc (E/L/T/D)	From	To	Reason
21/11/12	15:38	E, D	Able (JM)	EA	Able submit Project-Wide WFD Assessment (Release 5.0) to EA, together with signposting spreadsheet to assist in review.
20/11/12	17:06	E, L	EA (AH)	Able (RC)	EA provide finalised and extended version of comments provided by email earlier in the day, on Project-Wide WFD Assessment 4.0.
20/11/12	09:13	E	EA (SM)	Able (RC)	EA provide interim comments on Project-Wide WFD Assessment 4.0; comments finalised in letter later that day (only letter is reproduced here)
19/11/12	17:11	E, Dx2	Able (RC)	EA	Able submit Project-Wide WFD Assessment (Release 4.0) to EA, together with signposting spreadsheet to assist in review.
16/11/12	10:00	T	EA, Able, HRW		Telecon held to discuss EA's comments on Project-Wide WFD Assessment 3.0.
09/11/12		L	EA (AH)	Able (RC)	EA provide comments on Project-Wide WFD Assessment 3.0.
12/10/12		D	Able	PINS, cc EA, NE, MMO etc	Project-Wide WFD Assessment (Release 3.0) submitted to Planning Inspectorate as EX 8.12a and consulted widely.
05/10/12	10:01	E, L (dated 04/10)	EA (AH)	Able (RC), HRW	EA provide comments on Project-Wide WFD Assessment 2.0.
01/10/12		T	EA, Able, HRW		Telecon held to discuss Project-Wide WFD Assessment 2.0.
08/09/12	09:32	E, Dx2	Able (RC)	EA (AH)	Able submit Project-Wide WFD Assessment (Release 2.0) to EA, together with signposting spreadsheet to assist in review.
06/09/12	14:52	E	EA (SM)	HRW, Able (RC)	EA provide further comments on Project-Wide WFD Assessment 1.0, noting this is the "only outstanding issue that has not been discussed".

Date	Time	Email/Letter/ Telecon/Doc (E/L/T/D)	From	To	Reason
03/09/12	14:30	E	EA (SM)	HRW, cc Able (RC)	EA provide further comments on Project-Wide WFD Assessment, and request clarification on some points in telecon of 20th August.
20/08/12	11:00	T	EA, Able, HRW		Telecon to discuss EA's comments on Project-Wide WFD Assessment 1.0
01/08/12	10:45	E, D	EA (SM)	Able (RC)	EA provide an additional report for Able's reference when revising the WFD Assessment (Impacts of proposed dredging on benthic macro-invertebrate WFD classification: Humber Lower water body. Fitch & Phillips, July 2012)
31/07/12	11:09	E, L	EA (AH)	Able (RC)	EA provide comments on the Project-Wide WFD Assessment 1.0.
29/06/12		D	Able	PINS, cc EA, NE, MMO etc	Project-Wide WFD Assessment (Release 1.0) submitted to Planning Inspectorate as EX 8.12 and consulted widely.
29/05/12		L	EA (AH)	Able (RC)	EA provide comments on the CCS WFD Assessment 1.0 and return to comment on AMEP WFD Assessment 3.0 (previously signed off and approved). EA also request provision of WFD assessment for the total project.
03/04/12	18:12	E, D	Able (RC)	EA (AH)	Able submit CCS WFD Assessment (Release 1.0).
02/04/12		L	EA (AH)	PINS (M Harris)	EA advise PINS that "the (WFD) assessment is satisfactory for the MEP site and the dredging works. We are still awaiting submission of a WFD Assessment for the Compensation Site at CCS."
18/01/11	09:26	E, D	EA (SM)	Able (RC)	SM forwarded guidance on WFD assessments (EA R&D Technical Report FD2609/TR), explaining that its recommendations came into force on 1st Jan 2012.

Date	Time	Email/Letter/ Telecon/Doc (E/L/T/D)	From	To	Reason
16/11/11		L	EA (AH)	Able (RC)	EA "confirm that the revised assessment (AMEP WFD Assessment 3.0) has addressed the issues raised in our previous letter of 25 July 2011, and is now considered appropriate to support your application."
07/11/11	13:02	E, D	Able (RC)	EA (AH), cc NE, MMO	Able submit AMEP WFD Assessment (Release 3.0), which has been revised in light of EA comments received on 21st October.
21/10/11	14:56	E, L	EA (AH)	Able	EA provide comments on AMEP WFD Assessment 2.0.
26/09/11	11:17	E, D	Able (JM)	EA (AH)	Able submit AMEP WFD Assessment (Release 2.0), which has been revised in light of EA comments received on 25th July.
25/07/11	17:19	E, L	EA (AH)	Able, cc NE, MMO	EA provide comments on AMEP WFD Assessment 1.0
01/07/11	12:46	E, L	EA (AH)	Able (RC)	EA apologise for delay in commenting on AMEP WFD Assessment 1.0.
07/06/11	16:42	E, D	Able (JD)	EA (AH), NE, MMO	Able submit AMEP WFD Assessment (Release 1.0)

Jonathan Monk

From: Jonathan Monk [jmonk@ableuk.com]
Sent: 21 November 2012 15:38
To: 'Hewitson, Annette'; 'Susan Manson'
Cc: 'Mike Dearnaley'; 'Katherine Harris'; 'Graham Siggers'; 'Richard Cram (rcram@ableuk.com)'; 'Jenn Dawes (jdawes@ableuk.com)'
Subject: RE: WFD Assessment
Attachments: TN-DHM6835-02_Water-Framework-Directive-Assessment_R5-0.pdf.pdf; Spreadsheet_EA_comments_Nov_12_2.pdf.pdf

Annette, Sue,

Please find attached Release 5.0 of the WFD Assessment, together with an updated comments log.

Kind regards

JONATHAN MONK
AHP Marine Energy Park

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Billingham Reach Industrial Estate
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From: Graham Siggers [mailto:G.Siggers@hrwallingford.com]
Sent: 21 November 2012 15:33
To: Richard Cram (rcram@ableuk.com); Jenn Dawes (jdawes@ableuk.com); 'Jonathan Monk' (jmonk@ableuk.com)
Cc: Mike Dearnaley; Katherine Harris
Subject: WFD Assessment

Richard,
Cc Jonathan, Jenn

Revised WFD assessment and comments log from Katherine.

Best regards,
Graham

From: Richard Cram [mailto:rcram@ableuk.com]
Sent: Tuesday, November 20, 2012 5:23 PM

To: Katherine Harris
Subject: FW: AMEP Revised WFD Assessment: Version 4

Fyi and action

Kind regards

RICHARD CRAM

Design Manager

Able UK Ltd

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Billingham Reach Industrial Estate

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From: Annette Hewitson <annette.hewitson@environment-agency.gov.uk>
Date: Tue, 20 Nov 2012 17:05:45 +0000
To: Richard Cram <rcram@ableuk.com>, Susan Manson <susan.manson@environment-agency.gov.uk>
Cc: Jonathan Monk <jmonk@ableuk.com>
Subject: RE: AMEP Revised WFD Assessment: Version 4

Richard,
Please find attached, some comments on WFD revision 4.
Kind regards,
Annette

Annette Hewitson
Principal Planning Advisor

Environment Agency
*Waterside House, Waterside North, Lincoln, LN2 5HA
(01522 785896
(7 50 5896 (internal)
8annette.hewitson@environment-agency.gov.uk

Awarded to the Environment, Planning and Engagement Department, Anglian Region, Northern Area.

From: Richard Cram [mailto:rcram@ableuk.com]
Sent: 19 November 2012 17:11
To: Manson, Susan; Hewitson, Annette
Cc: Jonathan Monk
Subject: AMEP Revised WFD Assessment: Version 4

Sue, Annette

Please advise your comments so that any remaining issues can be ironed out.

I will submit a response to your letter of 9/11 on Friday and copy to the ExA. It would no doubt help if I can say the WFD is agreed.

Kind regards

RICHARD CRAM

Design Manager

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From: Katherine Harris <K.Harris@hrwallingford.com>
Date: Mon, 19 Nov 2012 16:58:18 +0000
To: "'Richard Cram' (rcram@ableuk.com)" <rcram@ableuk.com>
Cc: Graham Siggers <G.Siggers@hrwallingford.com>, Mike Dearnaley <m.dearnaley@hrwallingford.com>
Subject: Revised WFD Assessment: Version 4

Dear Richard,

Please find attached the revised WFD Assessment and a spreadsheet which sets out how the EA's comments have been addressed. I recommend that you send both documents to Sue Manson so that she can easily see that we've covered all their comments.

For information, my assessment of the WFD effects of the East Halton site is summarised in the spreadsheet under point 3.16.

Please give me a call if you need anything else.

Kind regards,
Katherine

Katherine Harris
Principal Marine Environmental Consultant, Environment

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Able Marine Energy Park and Habitat Compensation Scheme

Water Framework Directive Assessment

TN DHM6835-02 R5

November 2012

Document information

Project	Able Marine Energy Park and Habitat Compensation Scheme
Technical subject	Water Framework Directive Assessment
Client	Able UK
Client Representative	Richard Cram
Project No.	DHM6835
Technical Note No.	DHM6835-02
Project Manager	Samantha Dawson
Project Director	Katherine Harris

Document history

Date	Release	Prepared	Approved	Authorised	Notes
28/06/12	1.0	NC	KLH	NC	
07/09/12	2.0	SDA	KLH	KLH	Revised following Environment Agency comments 31/07/12
12/10/12	3.0	KLH	MPD	MPD	Revised following further Environment Agency comments 04/10/12
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Prepared

Approved

Authorised

Summary of Environment Agency comments on the Water Framework Directive Assessment (letter dated 20 November 2012) and HR Wallingford responses

Environment Agency comment	HR Wallingford Response
Page 12 Table 4 - Wave exposure has been screened out as it does not exceed the Clearing the Waters trigger for assessment ("Is the activity taking place in a shallow water body?") In addition, modelling of changes to wave height has indicated there are no predicted significant impacts (Section 3.3.11 and 4.4.1 of EX8.6 (JBA Consulting, 2012a) As advised during our telecon on 16 November 2012, 'Clearing the Waters' is guidance, and where your own evidence does indicate impacts, these should be reflected in the WFD Assessment. This also refers to a version of EX8.7 that has been superseded by EX8.7A, which does indicate some potential wave impacts as a consequence of the development. As such, we are unsure whether the decision made within the assessment is based on the most up to date evidence of impacts?	Whilst wave exposure does not exceed the Clearing the waters trigger for assessment ('Is the activity taking place in a shallow water body?'), Section 4.4 of EX8.7A predicts that the change in bathymetry resulting from disposal of dredged material at sites HU080 and HU082 will affect wave direction through changes to the refraction process. The trigger table (Table 4) has been updated to 'screen in' wave exposure and a new section has been added under 3.4.1 to assess the effects of wave exposure.
There is a similar issue in section 3.4.1 which refers to section 32.6.19 of the ES. The compensation site has undergone significant developments since the writing of Chapter 32. We would expect this assessment to reflect the material it was necessary for us to review contained in the various sections of EX28.3, but principally Part 3.	Having revisited the Clearing the waters guidance to investigate this comment, it has come to light that the two parameters 'depth variation' and 'bed' do not require assessment, on the grounds that the combined footprint of the activities (using the figures in Table 1) and their zone of effect is considerably less than the Clearing the waters trigger (5 % of the total water body area), as demonstrated by the calculations below. It is acknowledged that Clearing the waters is a guide, but as the percentage is significantly below the trigger for assessment and there does not appear to be any evidence in the ES or supplementary documentation that contradicts this view, these two parameters have been screened out from the assessment. Relevant text on the intertidal area that was contained within the 'depth variation and bed' section of the assessment has been moved to the 'intertidal zone structure' section, so no technical information has been lost from the assessment as a result of this change. Calculations: Zone of effect of dredging activities - berthing pocket, turning circle and approach channel (dredging footprint x 1.5): 938,670 m^2 Footprint of disposal activities at HU080 and HU082, and dispersal of gravel from HU080: 1,443,644 m^2 Footprint of reclamation: 450,000 m^2 **Total area affected: 2,832,314 m^2 (2.83 km^2)** **Total water body area: 247 km^2** **Percentage of water body affected: 1.15 %**

Similarly in Section 3.4.1 Intertidal Structure. There is no reference to the additional 1.8m of erosion that is predicted to take place (EX28.3 Part 3) within this assessment, it is based on the original ES in Chapter 32.	Reference to EX28.3 Part 3 and supporting text has been added to make it clear that the WFD Assessment does consider the latest scheme.
We stated during the telecom with you on 16 November 2012 that the Morphology Sensitive exemption cannot be used as a reason to negate the reaching of Good Ecological Potential (GEP). The River Basin Management Plans (RBMP) no longer represents the most up to date information available and the exemption was put in place for existing uses not future uses. The statement in 3.2 is accepted as it does not directly relate to Able proposed activities. However, current status cannot be said to be due to morphological sensitivity and future activities cannot proceed under the expectation that they will not impact on benthic invertebrates because it is difficult to disentangle effects and impacts.	It was not the intention to imply that current status is due to morphological sensitivity; only that there are no mitigation measures in the RBMP relevant to this parameter. The text has been amended to be as clear as possible on this point.
In 3.4.3. Benthic Invertebrates :- *The WFD assessment should consider whether the activities associated with the MEP development are likely to:..... b) (if benthic invertebrates are at moderate status) prevent the benthic invertebrates from achieving good status, i.e. affect the ability to deliver mitigation measures that are „in place "and „not in place "or otherwise promoted in the RBMP.* The WFD objectives are to achieve good status by 2027; we are always striving to achieve good status. The classification of Moderate is uncertain and is very close to the Good/Moderate boundary. The development should not interfere with planned or ongoing mitigation activities but this is not the only avenue through which it might prevent the achievement of Good status (or potential). Pressure exerted by the development, which may cause an impact to a biological (or other) element, has the potential to prevent a waterbody achieving Good status. Dredging and disposal can directly and indirectly impact on the benthic invertebrates biological quality element and whilst we can agree this will not cause a deterioration at the waterbody level, there needs to be a statement that it will not prevent the ability to achieve the objective to reach GEP as set out in the RBMP and as required by the WFD. We note there is a statement made in 3.4.5 indicating the development will not interfere with the waterbody objectives but this is not specific. 3.4.2 Conclusion - The meaning of this sentence is ambiguous. It does say in the RMBP that no improvement of benthic invertebrates is required due to morphological sensitivity but this is not wholly relevant here, specifically as this pertains to 2015 targets not 2027 targets. Furthermore, in reality we operate using current monitoring data (2012 data) and we aim to improve to achieve good status and the exemption in the RBMP does not affect us	The text has been amended so that it is clear that the reasons for the conclusion that the AMEP will not prevent benthic invertebrates from reaching good status is based on the evidence presented in the preceding sections and not just because it will not affect mitigation measures set out in the RBMP.

trying to achieve this. If the assessment is concluding that the Able Marine Energy Park activities will not affect planned mitigation measures, this still does not necessarily lead to the conclusion that the proposed activities will not lead to prevention of achieving Good status (see comments above).	
3.4.3 Fish Fauna - We accept the assessment made in this section on the understanding that the assessment refers to the transitional fish classification index (TFCI). The TFCI is the monitoring tool used to classify the ecological status of fish communities (including migratory species) in transitional waters under the WFD. No mention is made of the current status of this biological quality element (currently at Good), although as no impact is foreseen this does not need to be updated in the assessment. However, it is important to acknowledge that the TFCI is the monitoring tool for fish under the WFD and this is what you are referring to.	Reference to the TFCI has been added at the beginning of the fish fauna section. The current status (good) has been added for completeness.
We note that the assessment does not include any spatial cumulative considerations. This issue was highlighted to you in our telecom of 1st October 2012.	Refer to your comment on 4th October 2012 on cumulative impacts and our response: **The WFD is concerned with cumulative impacts across a waterbody and how any proposed developments may impact the ecological status or ecological potential of the given waterbody.** **Clearing the Waters states the following on cumulative impacts:** ***'Although individually a scheme may have an insignificant effect on the WFD quality elements in a water body, the combined effect of several small scale schemes may cause deterioration or otherwise prevent the water body achieving its objectives. In assessing an application, the Environment Agency as competent authority will consider the cumulative effects of existing pressures of a similar nature in a water body and the combined impacts of the proposed scheme. This assessment by the Environment Agency will be based on expert judgement informed by data from the iRBM data solution and should only include other pressures affecting the same quality elements as those potentially affected by the proposal.'*** **Based on this guidance, we have assumed that the Environment Agency will assess any cumulative impacts. We have considered the in-combination effects of the various aspects of the AMEP project.**
Finally, there is a typo in paragraph 3 of 3.4.7 (page 27); the water body is 247 km^2 not 2.52 km^2.	Corrected.

Jonathan Monk

From: Hewitson, Annette [annette.hewitson@environment-agency.gov.uk]
Sent: 20 November 2012 17:06
To: Richard Cram; Manson, Susan
Cc: Jonathan Monk
Subject: RE: AMEP Revised WFD Assessment: Version 4
Attachments: 121120 Letter to Able re WFD revision 4.pdf

Richard,
Please find attached, some comments on WFD revision 4.
Kind regards,
Annette

Annette Hewitson
Principal Planning Advisor

Environment Agency
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7 50 5896 (internal)
annette.hewitson@environment-agency.gov.uk

From: Richard Cram [mailto:rcram@ableuk.com]
Sent: 19 November 2012 17:11
To: Manson, Susan; Hewitson, Annette
Cc: Jonathan Monk
Subject: AMEP Revised WFD Assessment: Version 4

Sue, Annette

Please advise your comments so that any remaining issues can be ironed out.

I will submit a response to your letter of 9/11 on Friday and copy to the ExA. It would no doubt help if I can say the WFD is agreed.

Kind regards

RICHARD CRAM
Design Manager

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From: Katherine Harris <K.Harris@hrwallingford.com>
Date: Mon, 19 Nov 2012 16:58:18 +0000
To: "'Richard Cram' (rcram@ableuk.com)" <rcram@ableuk.com>
Cc: Graham Siggers <G.Siggers@hrwallingford.com>, Mike Dearnaley <m.dearnaley@hrwallingford.com>
Subject: Revised WFD Assessment: Version 4

Dear Richard,

Please find attached the revised WFD Assessment and a spreadsheet which sets out how the EA's comments have been addressed. I recommend that you send both documents to Sue Manson so that she can easily see that we've covered all their comments.

For information, my assessment of the WFD effects of the East Halton site is summarised in the spreadsheet under point 3.16.

Please give me a call if you need anything else.

Kind regards,
Katherine

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Principal Marine Environmental Consultant, Environment

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Mr Richard Cram
Able Uk Ltd
Able House (Billingham Reach Industrial Estate) Haverton Hill Road
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Our ref: AN/2012/113982/01-L15
Your ref: IPC-Pro-11

Date: 20 November 2012

Dear Mr Cram

Water Framework Directive Assessment – Revision 4
Marine Energy Park, Killingholme Marshes, North Lincolnshire

Thank you for forwarding the revised Water Framework Directive (WFD) assessment, which was received on 19 November 2012.

Given the time available before the end of the Examination, we have undertaken a brief review of the assessment and have the following comments to make on it:

Page 12 Table 4 - *Wave exposure has been screened out as it does not exceed the Clearing the Waters trigger for assessment ("Is the activity taking place in a shallow water body?") In addition, modelling of changes to wave height has indicated there are no predicted significant impacts (Section 3.3.11 and 4.4.1 of EX8.6 (JBA Consulting, 2012a)*

As advised during our telecon on 16 November 2012, 'Clearing the Waters' is guidance, and where your own evidence does indicate impacts, these should be reflected in the WFD Assessment. This also refers to a version of EX8.7 that has been superseded by EX8.7A, which does indicate some potential wave impacts as a consequence of the development. As such, we are unsure whether the decision made within the assessment is based on the most up to date evidence of impacts?.

There is a similar issue in section 3.4.1 which refers to section 32.6.19 of the ES. The compensation site has undergone significant developments since the writing of Chapter 32. We would expect this assessment to reflect the material it was necessary for us to review contained in the various sections of EX28.3, but principally Part 3.

Similarly in Section 3.4.1 Intertidal Structure - There is no reference to the additional 1.8m of erosion that is predicted to take place (EX28.3 Part 3) within this assessment; it is based on the original ES in Chapter 32.

We stated during the telecom with you on 16 November 2012 that the Morphology Sensitive exemption cannot be used as a reason to negate the reaching of Good Ecological Potential (GEP). The River Basin Management Plans (RBMP) no longer represents the most up to date information available and the exemption was put in place for existing uses not future uses. The statement in 3.2 is accepted as it does not directly relate to Able proposed activities. However, current status cannot be said to be due to morphological sensitivity and future activities cannot proceed under the expectation that they will not impact on benthic invertebrates because it is difficult to disentangle effects and impacts.

In 3.4.3. Benthic Invertebrates :- *The WFD assessment should consider whether the activities associated with the MEP development are likely to:..... b) (if benthic invertebrates are at moderate status) prevent the benthic invertebrates from achieving good status, i.e. affect the ability to deliver mitigation measures that are 'in place' and 'not in place' or otherwise promoted in the RBMP.*

The WFD objectives are to achieve good status by 2027; we are always striving to achieve good status. The classification of Moderate is uncertain and is very close to the Good/Moderate boundary. The development should not interfere with planned or ongoing mitigation activities but this is not the only avenue through which it might prevent the achievement of Good status (or potential). Pressure exerted by the development, which may cause an impact to a biological (or other) element, has the potential to prevent a waterbody achieving Good status. Dredging and disposal can directly and indirectly impact on the benthic invertebrates biological quality element and whilst we can agree this will not cause a deterioration at the waterbody level, there needs to be a statement that it will not prevent the ability to achieve the objective to reach GEP as set out in the RBMP and as required by the WFD.

We note there is a statement made in 3.4.5 indicating the development will not interfere with the waterbody objectives but this is not specific.

3.4.2 Conclusion - The meaning of this sentence is ambiguous. It does say in the RMBP that no improvement of benthic invertebrates is required due to morphological sensitivity but this is not wholly relevant here, specifically as this pertains to 2015 targets not 2027 targets. Furthermore, in reality we operate using current monitoring data (2012 data) and we aim to improve to achieve good status and the exemption in the RBMP does not affect us trying to achieve this.

If the assessment is concluding that the Able Marine Energy Park activities will not affect planned mitigation measures, this still does not necessarily lead to the conclusion that the proposed activities will not lead to prevention of achieving Good status (see comments above).

3.4.3 Fish Fauna - We accept the assessment made in this section on the understanding that the assessment refers to the transitional fish classification index (TFCI). The TFCI is the monitoring tool used to classify the ecological status of fish communities (including migratory species) in transitional waters under the WFD. No mention is made of the current status of this biological quality element (currently at Good), although as no impact is foreseen this does not need to be updated in the

Cont/d..

assessment. However, it is important to acknowledge that the TFCI is the monitoring tool for fish under the WFD and this is what you are referring to.

We note that the assessment does not include any spatial cumulative considerations. This issue was highlighted to you in our telecom of 1st October 2012.

Finally, there is a typo in paragraph 3 of 3.4.7 (page 27); the water body is 247km^2 not 2.52km^2.

Please note that given the time constraints within which we have had to undertake the review of this revised assessment, we cannot guarantee that the above comments are comprehensive.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson
Principal Planning Advisor

Direct dial 01522 785896
Direct fax 01522 785040
Direct e-mail annette.hewitson@environment-agency.gov.uk

End

Jonathan Monk

From: Richard Cram [rcram@ableuk.com]
Sent: 19 November 2012 17:11
To: Susan Manson; Annette Hewitson
Cc: Jonathan Monk
Subject: AMEP Revised WFD Assessment: Version 4
Attachments: Spreadsheet_EA_comments_Nov_12.pdf; TN-DHM6835-02_Water-Framework-Directive-Assessment_R4-0.pdf

Sue, Annette

Please advise your comments so that any remaining issues can be ironed out.

I will submit a response to your letter of 9/11 on Friday and copy to the ExA. It would no doubt help if I can say the WFD is agreed.

Kind regards

RICHARD CRAM
Design Manager

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From: Katherine Harris <K.Harris@hrwallingford.com>
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To: "'Richard Cram' (rcram@ableuk.com)" <rcram@ableuk.com>
Cc: Graham Siggers <G.Siggers@hrwallingford.com>, Mike Dearnaley <m.dearnaley@hrwallingford.com>
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For information, my assessment of the WFD effects of the East Halton site is summarised in the spreadsheet under point 3.16.

Please give me a call if you need anything else.

Kind regards,
Katherine

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Principal Marine Environmental Consultant, Environment

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Able Marine Energy Park and Habitat Compensation Scheme

Water Framework Directive Assessment

TN: DHM6835 02 R4

November 2012

Document information

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Client Representative	Richard Cram
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19/11/12	4.0	KLH	MPD	MPD	Revised following further Environment Agency comments 09/11/12

Prepared [redacted]

Approved

Authorised

Summary of Environment Agency comments on the Water Framework Directive Assessment (letter dated 9 November 2012) and HR Wallingford responses

Environment Agency comment	HR Wallingford Response
3.1 **Section 3.2 - morphology sensitive exemption**. We do not believe this removes the need for mitigation measures to improve the Ecological Potential. Annex B merely indicates that this exemption applies to 2015, meaning the mitigation measures do not need to be in place in advance of 2015, but the AMEP project extends beyond the 2015 date and the implications from the project may not be realised for 10 years plus. We would expect you to have assessed that the activities undertaken do not jeopardise the achievement of good ecological potential, which consists of adherence to plausible mitigation measures for the activities being undertaken.	The sections on the morphology-sensitive exemption (3.2 and 3.4.3) have been revised to clarify the status of the exemption. Section 3.4.3 concludes that no deterioration in WFD status is expected for invertebrates, and that MEP activities will not affect the 'in place' mitigation measures relevant to dredging and disposal activities in the Humber.
3.2 **Table 4 - intertidal zone structure**. The assessment indicates that the existing disposal sites are sub-tidal and are not located on the intertidal area or within 10m of MLWS. We would draw your attention to your own modelling work, as presented in EX8.7A, which indicates that impacts from the disposal of the capital dredged material extends into the intertidal zone. This should be assessed within the WFD Assessment.	The Clearing the waters guidance trigger for intertidal zone structure for the disposal of dredged material is: *is the disposal site on the inter-tidal area or is it within 10m of MLWS?* As the answer is no, we had screened out this parameter for disposal activities only (note that it has been screened in for dredging activity). However, the Environment Agency has subsequently advised (email from Sue Manson 16th November 2012) that it does require further assessment. The WFD Assessment has been updated accordingly.
We would ask you to provide an explanation to confirm that the assumption made in Specific Pollutants and Priority Substances: Cherry Cobb Sands Intertidal Compensation Site, regarding the dry weight of the chemical substances is valid.	EX31.5A clarifies that these are dry weights, so this sentence has been removed.
3.4.3 - Benthic invertebrate fauna (Pg 18) 3.4 The following statement needs to be amended. '*Analysis of the Environment Agency's the latest monitoring data (provided by Environment Agency, Pers. Comm. June 2012) indicates that the diversity and abundance of the sub tidal benthic invertebrates of the Humber Lower water body are related to a number of factors including natural factors such as particle size and the mobility of sediment in the areas as well as anthropogenic factors such as disturbance and pollution*' 3.5 The diversity and abundance of benthic invertebrates will indeed be affected by environmental factors such as sediment grain size (and mobility of sediments) but this variation is factored into the reference conditions set for classification using the Infaunal Quality Index tool. As a result of the setting of reference conditions with in-depth consideration of the influence	Paragraph has been amended accordingly. It is not considered that this amendment changes the outcome of the WFD Assessment.

of grain size (and salinity) any change in classification should only reflect changing levels of impact associated with anthropogenic pressures. 3.6 The remainder of the paragraph will also need reviewing in light of the information provided above.	
3.4.3 - Reclamation dredging and disposal (pg 21) 3.7 The assertion that ecological status close to the proposed AMEP is Poor and Moderate is not supported by the data provided in Figure 2. There are not enough data points in 'the vicinity' of the proposed development to infer the ecological status at the AMEP. 3.8 We would draw your attention to the fact that whilst the nearest monitoring station is Poor the next nearest is Good and that High and Moderate stations are approximately equidistant away. A more acceptable statement would indicate that monitoring points close to the AMEP range from Poor to High ecological status.	Sentence has been amended accordingly. It is not considered that this amendment changes the outcome of the WFD Assessment.
3.9 The assertion that 2.52 km² (or 252 ha) of sub-tidal habitat loss will occur should be studied closely. If this is the level of expected sub-tidal habitat loss then compensation (of another estuary feature) should be provided at a ratio of 1:1. The proposed mitigation site at Cherry Cobb Sands is 105 ha. 3.10 It is our understanding that CCS will mitigate for inter-tidal habitat loss at a ratio of 2:1. 3.11 The HRA (5.4.14) states that 13.5 ha of sub-tidal loss can be offset by any other estuary feature. Please clarify where habitat loss (Quay foot print and berthing pocket) which will require compensation occurs and where impacts which may be temporary will occur. 3.12 We would also direct you to 3.4.5 and 3.4.6 which contradict the overall message taken from this section of the document.	'Area lost' has been changed to 'area affected' and this section has been updated accordingly. Habitat losses have been quantified according to the ES.
3.13 Whilst there are monitoring stations 'near' to the dredge dispersal ground which are at High status there are many more at Moderate status (Figure 2). (see also point 3.4.3 - 1) above)	Sentence has been removed. It is not considered that this amendment changes the outcome of the WFD Assessment.
3.14 The classification for fish in transitional waters under WFD is carried out using the Transitional Fish Classification Tool (TFCI). This is not covered by, and is not part of, the Freshwater Fish Directive (FFD). The FFD is applicable to lakes and rivers and is not applicable to transitional water bodies, including the Humber Lower, under WFD legislation. Please	As stated in Section 3.2, Annex B of the RBMP identifies protected areas under the Freshwater Fish and Urban Waste Water Treatment (UWWT) Directives for the Humber Lower transitional water body. Based on this comment from the Environment Agency, the text has been updated to say: 'As there is no obvious mechanism for the project to affect the areas that are designated under the UWWT Directive, and as the Freshwater Fish Directive is not applicable to transitional water bodies, no further assessment of

revise this section accordingly.	these protected area characteristics is deemed necessary.' The reference in Section 3.4.3 (Fish fauna) to the Freshwater Fish Directive has been removed.
3.15 Section 3.4.5 – We would like to seek further clarification of the argument presented on the realignment site contributing to the mitigation measures on the Humber Lower Waterbody. It is our understanding that the further development of the RTE MR site design means that it will be necessary to maintain the existing flood defences in situ in order to form the back of the RTE fields. We accept that managed realignment is one of the necessary mitigation measures required, but this is being provided, whilst the defence line on the south bank is being extended, and hence is increasing the hard defences on the south bank of the Humber Lower Waterbody.	The following sentence has been removed from Section 3.4.5: '*Further managed realignment is one of the identified mitigation measures that are not yet in place and the breach in the flood defences will reduce the amount of hard defences which also directly contributes to the mitigation measures that are not in place.*' It is not considered that this amendment changes the outcome of the WFD Assessment.
3.16 A further point in Section 3.4.5 is that the paragraph referring to AMEP not affecting any actual projects the Environment Agency may have to alter its flood defences, would depend on whether Able is required to deliver its overcompensation proposal (EX28.3 Part 8). If the wet-grassland is required at the East Halton site, it has implications for the Environment Agency; these implications are outlined in paragraphs 13.1 to 13.7 below.	Annex E of the Humber RBMP states that the mitigation measures not yet in place for morphology (physical modification - flood and coastal erosion protection) are technically infeasible. It proposes an alternative objective: an extended deadline, assumed to be to 2027, on the grounds that technical solutions to address the ecological impact caused by physical modifications are under development and their effectiveness is not yet known. A programme of research is underway to improve the Environment Agency's confidence in the applicability, feasibility and success of a range of morphological improvement measures. Extending the deadline for achieving objectives will allow time to complete these investigations to confirm the effectiveness of morphological improvement measures. The development of the East Halton overcompensation site and the maintenance of the existing flood defence is not considered to compromise the Environment Agency's ability to complete its investigations into the effectiveness of morphological improvement measures. Table 7.1 of EX28.3 anticipates that the Cherry Cobb Sands Roost site, Wet Grassland site and RTE will be fully functional by the end of 2018 and as such will have fulfilled its purpose. This is well in advance of the extended deadline proposed in Annex E of the Humber RBMP (which is assumed to be 2027), and as such the East Halton overcompensation site can be considered for delivering the mitigation measures not in place (removal of hard bank flood defence or managed realignment). The MEP will not, therefore, compromise the mitigation measures 'not in place' for the Humber Estuary. Section 3.4.5 has been updated accordingly.
3.17 Section 3.4.6 - The WFD does not at present appear to adequately take account of the RTE design development in its reflection of ecological impacts on fish. The EA would advise that this should be adequately assessed in sections 3.4.3 (fish fauna), 3.4.6, and 5.0.	Section 3.4.6 has been updated and a reference to the environmental assessment of the RTE scheme has been added. Sections 3.4.6 and 5.0 have been reviewed and no changes are considered to be required in relation to fish.

3.4.7 - Assessing future maintenance dredging using the principles set out in the Clearing the Waters guidance 3.18 If the frequency of maintenance dredging does prevent the recovery of benthic invertebrates to pre-impact (baseline) levels then the impact on this biological quality element will be non-temporary. If the effect is non-temporary and recovery never occurs there is a high possibility that deterioration will be observed at the water body level and that the environmental objective of not preventing deterioration in the status of a water body is not achieved. The Examining Authority as the Competent Authority determining this application, for the purposes of the Water Framework Directive, will need to either ensure that deterioration does not occur or that the application meets the criteria set out in Article 4.7 of the Water Framework Directive. It would therefore be advisable for you to provide the Competent Authority with the necessary information in order for them to be able to make an assessment. If the final decision on this application was that development could be permitted on the basis that the conditions set out under Article 4.7 have been met, the Competent Authority would have to inform the Environment Agency that deterioration in the water body has been allowed under Article 4.7 and the reasons for doing so as the Environment Agency have the responsibility to record use of Article 4.7 and the reasons for doing so in the relevant River Basin Management Plan.	Further information has been added on the areas affected by maintenance dredging, and references have been made to the ES. Although permanent loss is predicted in the ES as a result of maintenance dredging, this is not expected to be significant at water body level.
3.19 We welcome the opportunity to feed in to the measures that will be put in place to prevent the exacerbation of the local accumulation of sediment on the estuary side of the sluice at Stone Creek, and advise these may be best placed within the Environmental Management and Monitoring Plans	No action for the WFD Assessment.

Mr Richard Cram
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Able House (Billingham Reach Industrial Estate) Haverton Hill Road
Billingham
Cleveland
TS23 1PX

Our ref: AN/2012/113982/01-L12
Your ref: IPC-Pro-11

Date: 9 November 2012

Dear Mr Cram

Able Marine Energy Park, Killingholme Marshes, North Lincolnshire Supplementary Information

Thank you for the supplementary information in respect of the above proposal, which was received on 16 October 2012.

Given the substantial amount of information received, it has been difficult to fully consider it in the time available but we have reviewed it so far as possible. We have the following comments to make on the Chapters of it that are relevant to issues within our remit:

1.0 EX 7.8 Dredging Strategy

1.1 We are satisfied with the information included within this strategy and have no comments to make on it.

2.0 EX8.7A, Modelling of the Final Quay Design (Supplement to Annex 8.1 of the ES) (Superseding Supplementary Environmental Information EX8.7)

2.1 We would like to draw your attention to the fact that we agreed to define the 1:200 year joint probability wave height/ water level storm event in 2033 for the defences to the north and south of the Able Marine Energy Park (AMEP) quay, due to our plans for this area. This agreed period (2033) did not apply estuary wide or to the north bank of the estuary. We acknowledge the potential uncertainty in the wave modelling results within this JBA report (EX8.7A), and that caution needs to be applied to any outputs showing changes in wave height between 0.05-0.1m. It is due to this potential uncertainty in model outputs, as shown in Figure 3.5 (section 3.3.1), where there are potential changes in wave height on the north bank of the estuary for storms with a northerly or easterly wave direction, that we require Able to accept a legal obligation to monitor this potential change (for a period of at least 10 years), rather than request up front

mitigation for this potential impact. (See Appendices A and B attached, which represents the Appendix that we require attaching to the legal agreement – refer to Section C & Plan 6 respectively). Able has, to date, not accepted such an obligation in the draft legal agreement which is currently passing between us.

2.2 3.3.4 - We note the insertion of the potential impacts of the Regulated Tidal Exchange (RTE) design on the estuary as a whole. The inclusion of a potential impact of 0.005m (+ /-0.01m) at High Water in the Middle Estuary is of concern to us. Firstly, there is an order of magnitude difference in the impact and the error margin associated with the model outputs. In addition, this change is over and above the change in high water, which we had previously understood to take place as a result of this development. There is a major change in our understanding of losses within the Humber Estuary since the Humber Flood Risk Management Strategy (HFRMS) was published in 2008.

2.3 The greatest concentration of losses is within the Middle and Outer South part of the estuary. At present we are undertaking work to look at how much of this change is natural change and how much is influenced by anthropogenic processes. Our understanding of the current rates of loss per sector within the estuary are summarised in Table 1. The identification and delivery of suitable managed realignment sites in the estuary is already extremely challenging and complex. For any development to exacerbate the rates of habitat loss, no matter how small, without being required to secure suitable compensation for themselves, could seriously jeopardise our ability to meet these responsibilities as well as adding to both the cost and complexity of what needs to be delivered. This additional change has not been incorporated into the agreed habitat changes as presented in the Shadow Habitats Regulation Assessment Statement of Common Ground (sHRA SoCG), Annex B. A change of 5mm in high water levels within the middle estuary would be a greater change in the intertidal area than arises from one year of change resulting from coastal squeeze (9.81 ha in the middle estuary).

Table 1: A summary of nodal trend as reported in the CHaMP, showing the 95% prediction error bands within the estuary. The large difference in the Inner estuary is reflective of the poor predictive capability of the regression equation.

Estuary Section	Statistical trend	Loss/ gain between 2000-2056 (ha)
Inner	5.9 ha yr^{-1} ± 4.7 ha yr^{-1}	330
Middle	-9.1 ha yr^{-1} ± 2.8 ha yr^{-1}	-510
Outer North	1.1 ha yr^{-1} ± 1.3 ha yr^{-1}	62
Outer South	-3.0 ha yr^{-1} ±1.4 ha yr^{-1}	-168
Whole Estuary	-5.1 ha yr^{-1} ±5.8 ha yr^{-1}	-286

2.4 We have reviewed section 4.0 of the report and we agree with the methodology applied, and acknowledge the potential uncertainty with some of the model outputs. In section 4.4.1 we note there is a potential change in wave height of 2% over a 2km stretch of the north shore of the estuary. We also note the potential change at Mean Low Water Springs (MLWS) of up to 4% in wave height. We believe the Environment Agency is being reasonable in its response to this matter, by requesting a legal agreement which would secure monitoring of these areas by Able to ensure that the Standard of Protection of these defences is not compromised by the proposed capital disposal, whilst acknowledging potential model uncertainty. We have defined our requirements in Section C

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(see Appendix A attached) and Plan 6, (see Appendix B attached). We would like to have seen an assessment of the frequency with which the wave heights that had the potential to impact on the north shore to have been included. This would have enabled an assessment of the potential impact on the intertidal area of these increases in wave height to have been assessed. As such, including the change in water level outlined in 3.3.4, we are no longer confident that the impact on the intertidal area has been adequately assessed.

2.5 We now require confirmation whether the assessment outlined in 5.3, bullet point 1 (in-combination hydrodynamic and sedimentary modelling assessment), includes the RTE and Cherry Cobb Sands (CCS) Managed Realignment (MR). As currently written, it appears this assessment has not included this element of the AMEP development. The EA has no option but to reserve comment on this matter until it is in receipt of confirmation as to whether the assessment included the RTE and MR at CCS.

3.0 EX 8.12A, Water Framework Directive Assessment

3.1 Section 3.2 - morphology sensitive exemption. We do not believe this removes the need for mitigation measures to improve the Ecological Potential. Annex B merely indicates that this exemption applies to 2015, meaning the mitigation measures do not need to be in place in advance of 2015, but the AMEP project extends beyond the 2015 date and the implications from the project may not be realised for 10 years plus. We would expect you to have assessed that the activities undertaken do not jeopardise the achievement of good ecological potential, which consists of adherence to plausible mitigation measures for the activities being undertaken.

3.2 Table 4 - intertidal zone structure. The assessment indicates that the existing disposal sites are sub-tidal and are not located on the intertidal area or within 10m of MLWS. We would draw your attention to your own modelling work, as presented in EX8.7A, which indicates that impacts from the disposal of the capital dredged material extends into the intertidal zone. This should be assessed within the WFD Assessment.

3.3 We would ask you to provide an explanation to confirm that the assumption made in Specific Pollutants and Priority Substances: Cherry Cobb Sands Intertidal Compensation Site, regarding the dry weight of the chemical substances is valid.

3.4.3 - Benthic invertebrate fauna (Pg 18)

3.4 The following statement needs to be amended.
'Analysis of the Environment Agency's the latest monitoring data (provided by Environment Agency, Pers. Comm. June 2012) indicates that the diversity and abundance of the sub tidal benthic invertebrates of the Humber Lower water body are related to a number of factors including natural factors such as particle size and the mobility of sediment in the areas as well as anthropogenic factors such as disturbance and pollution'

3.5 The diversity and abundance of benthic invertebrates will indeed be affected by environmental factors such as sediment grain size (and mobility of sediments) but this variation is factored into the reference conditions set for classification using the Infaunal Quality Index tool. As a result of the setting of reference conditions with in-depth consideration of the influence of grain size (and salinity) any change in classification should only reflect changing levels of impact associated with anthropogenic pressures.

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3.6 The remainder of the paragraph will also need reviewing in light of the information provided above.

3.4.3 - Reclamation dredging and disposal (pg 21)

3.7 1) The assertion that ecological status close to the proposed AMEP is Poor and Moderate is not supported by the data provided in Figure 2. There are not enough data points in 'the vicinity' of the proposed development to infer the ecological status at the AMEP.

3.8 We would draw your attention to the fact that whilst the nearest monitoring station is Poor the next nearest is Good and that High and Moderate stations are approximately equidistant away. A more acceptable statement would indicate that monitoring points close to the AMEP range from Poor to High ecological status.

3.9 2) The assertion that 2.52 km^2 (or 252 ha) of sub-tidal habitat loss will occur should be studied closely. If this is the level of expected sub-tidal habitat loss then compensation (of another estuary feature) should be provided at a ratio of 1:1. The proposed mitigation site at Cherry Cobb Sands is 105 ha.

3.10 It is our understanding that CCS will mitigate for inter-tidal habitat loss at a ratio of 2:1.

3.11 The HRA (5.4.14) states that 13.5 ha of sub-tidal loss can be offset by any other estuary feature. Please clarify where habitat loss (Quay foot print and berthing pocket) which will require compensation occurs and where impacts which may be temporary will occur.

3.12 We would also direct you to 3.4.5 and 3.4.6 which contradict the overall message taken from this section of the document.

3.13 3) Whilst there are monitoring stations 'near' to the dredge dispersal ground which are at High status there are many more at Moderate status (Figure 2). (see also point 3.4.3 - 1) above)

Fish Fauna

3.14 The classification for fish in transitional waters under WFD is carried out using the Transitional Fish Classification Tool (TFCI). This is not covered by, and is not part of, the Freshwater Fish Directive (FFD). The FFD is applicable to lakes and rivers and is not applicable to transitional water bodies, including the Humber Lower, under WFD legislation. Please revise this section accordingly.

3.15 Section 3.4.5 – We would like to seek further clarification of the argument presented on the realignment site contributing to the mitigation measures on the Humber Lower Waterbody. It is our understanding that the further development of the RTE MR site design means that it will be necessary to maintain the existing flood defences in situ in order to form the back of the RTE fields. We accept that managed realignment is one of the necessary mitigation measures required, but this is being provided, whilst the defence line on the south bank is being extended, and hence is increasing the hard defences on the south bank of the Humber Lower Waterbody.

3.16 A further point in Section 3.4.5 is that the paragraph referring to AMEP not affecting any actual projects the Environment Agency may have to alter its flood

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defences, would depend on whether Able is required to deliver its over-compensation proposal (EX28.3 Part 8). If the wet-grassland is required at the East Halton site, it has implications for the Environment Agency; these implications are outlined in paragraphs 13.1 to 13.7 below.

3.17 Section 3.4.6 - The WFD does not at present appear to adequately take account of the RTE design development in its reflection of ecological impacts on fish. The EA would advise that this should be adequately assessed in sections 3.4.3 (fish fauna), 3.4.6, and 5.0.

3.4.7 - Assessing future maintenance dredging using the principles set out in the Clearing the Waters guidance

3.18 If the frequency of maintenance dredging does prevent the recovery of benthic invertebrates to pre-impact (baseline) levels then the impact on this biological quality element will be non-temporary. If the effect is non-temporary and recovery never occurs there is a high possibility that deterioration will be observed at the water body level and that the environmental objective of not preventing deterioration in the status of a water body is not achieved. The Examining Authority as the Competent Authority determining this application, for the purposes of the Water Framework Directive, will need to either ensure that deterioration does not occur or that the application meets the criteria set out in Article 4.7 of the Water Framework Directive. It would therefore be advisable for you to provide the Competent Authority with the necessary information in order for them to be able to make an assessment. If the final decision on this application was that development could be permitted on the basis that the conditions set out under Article 4.7 have been met, the Competent Authority would have to inform the Environment Agency that deterioration in the water body has been allowed under Article 4.7 and the reasons for doing so as the Environment Agency have the responsibility to record use of Article 4.7 and the reasons for doing so in the relevant River Basin Management Plan.

3.19 We welcome the opportunity to feed in to the measures that will be put in place to prevent the exacerbation of the local accumulation of sediment on the estuary side of the sluice at Stone Creek, and advise these may be best placed within the Environmental Management and Monitoring Plans.

4.0 EX10.8, Disposal Site Characterisation and Impact Assessment

4.1 Changes to the benthic ecosystem will occur as a result of the disposal of gravel to HU080 and its subsequent migration up stream of the disposal site. The majority (49%) of the gravel is in the 2-6mm fraction, 29% is in the 6-20mm and 22% in the 20-60mm fraction.

4.2 2.6.2 - The gravel will persist in the sediments and will result in changes to the habitat available to invertebrate fauna. Changes to the sedimentary habitat will be patchy and this potential variability has been acknowledged. However, the assertion that the gravel fraction will be of negligible thickness (at 8mm or 0.008m) cannot be supported by the data presented. 22% of the gravel to be disposed has a larger diameter (minimum 20mm) than the estimated thickness of the gravel layer, and of the 29% in the 6-20mm fraction a large proportion can be estimated to be 8mm and larger. We appreciate that this point is raised in 2.7.1 and in Appendix A but feel some adjustment to predicted impacts may be necessary.

4.3 Deterioration of the benthic invertebrate biological quality element will not necessarily follow changes to the proportion of gravel in sediments. There is the possibility that communities will recover to pre-disposal assemblages. However, some shift in community structure and composition of benthic invertebrate communities inhabiting the impacted area is probable. Classification of the IQI is against reference conditions calculated for the specific sedimentary environment encountered. It should be noted however, that reference conditions for gravel habitats do not have the high degree of confidence associated with muddy and sandy sediments.

4.4 The summary provided within Appendix A needs to be read within the context of the material being modelled. It is not possible for the thickness of the material to be only 4mm when 22% of the material being modelled has a grain size in excess of 20mm. The final average thickness of not exceeding 0.02m as quoted within the report does not reflect that 22% area the material is distributed over will be 0.02m or higher. The Appendix acknowledges this point at the end of section 4.0, but this is not translated to paragraphs 2.8-2.8.2 of the main report. The potential uncertainty within the model outputs should be reflected in the discussion in paragraphs 2.6-2.8.2, at present this is not the case. We request that the model errors are reported within the Appendix for us to be able to determine the likely uncertainty in the results presented. If the error bands are within the same order of magnitude, it may be possible to address this point relatively quickly. If the error bands are of a different order of magnitude this needs to be explicitly reported within the interpretation of the impacts on the benthic environment (see paragraphs 4.1-4.3).

5.0 EX10.9, Environmental Management and Monitoring Plan 1. Marine Works (Draft)

5.1 We are disappointed with the format of the Marine Environmental Management and Monitoring Plan (EMMP) as it currently stands. We provided advice to you in an email of 29 August 2012 of the type of monitoring we required to be undertaken for the protection of flood risk as a consequence of the AMEP (and associated) development. We have sought to secure this monitoring via a legal agreement, but would have anticipated that you would have acknowledged this within the EMMP when referring to wave height and water levels (Section 6.3.2). At present, the indication of appropriate monitoring that should be undertaken does not reflect the work that either party have undertaken to try to reach agreement on this matter.

5.2 Section 2 of the EMMP does not, in all places, reflect our latest understanding of the development. For example, Section 2.4.2.1 refers to the negligible impact of the development when compared to natural change. We have worked with you to reach an agreement on what compensation will be delivered for this longer-term impact, and we are still working with you with respect to the WFD. The Marine EMMP also states in 2.4.2.1 that "*cumulative effects with other projects will not occur as impacts to aquatic ecology from AMEP site are localised to AMEP site*". This does not reflect our comments of 7th September regarding the in-combination assessment, nor does it reflect your own documents in EX8.7A and EX10.8 where dredge disposal from AMEP and other projects are discussed in greater detail.

5.3 We request that this document is updated to reflect the latest status of the application and all associated supplementary information as soon as possible. In addition, we believe it would have been sensible to include within this document

all Requirements, as defined within the DCO and DML, which are relevant to the Marine environment.

5.4 For example our Requirement 13 in Schedule 11 in respect of river basin management:

The monitoring and management strategy document shall in particular consider the spatial and temporal extent of the impact of the approved scheme on—
(a) those "biological elements" and "ecological potential elements" as defined in the Humber River Basin Management Plan for the Humber Middle and Humber Lower Water Bodies (GB53040269201 and GB30402609202), to include, but not limited to: macro algae, angiosperms, macrophytes, benthic/macro invertebrates, fish, and
(b) those biological and ecological elements defined as "water-dependent habitats or species for which the Protected Area was designated" as defined in Annex D of the Humber River Basin Management Plan.
(3) The authorised scheme shall be constructed and managed in accordance with the approved strategy document and the monitoring detailed in the approved strategy document shall be implemented.

5.5 At present the Marine EMMP does not make direct reference to these Requirements, or the WFD, this needs amending. Please find attached advice on monitoring in order to be compliant with the WFD (Appendix C). We would expect to agree triggers with regard to this requirement that would result in remedial action.

5.6 We need to agree the exact wording to be inserted into the EMMPs before the close of the examination.

5.7 We would draw your attention to the fact that monitoring will need to commence prior to the quay construction and dredging works, and continue for a minimum of 6 years post breach of Cherry Cobb Sand and completion of the marine works.

5.8 The WFD Monitoring Parameters to be included are:
- Fish
- Benthic invertebrates
- Vegetation (saltmarsh)

5.9 Section 2.2.2.2 – Quay Construction – Noise
The 11th bullet point states that the hours are to be restricted "within each four-week work-block". This wording is incorrect and needs amending to read "within each week-long work-block" as per the Tri-agency letter of 31st July 2012.

5.10 The 13th bullet point is similar and needs correcting to read "within each eight-week work-block".

5.11 6.3.3 - It is acknowledged that mitigation has been agreed to minimise underwater noise impacts from piling. However, we believe that it would be useful to inform future developments if underwater noise level monitoring could be undertaken during construction works.

5.12 Section 6 – Monitoring. We have previously sent advice to you (email to Mr Jonathan Monk on 12th October 2012) in respect of fish monitoring but this was

not provided in time to be incorporated into this draft of the EMMP. For completeness, the advice is repeated below:

The survey shall be undertaken in at all specified locations related to the AMEP application boundary in both Autumn and Spring, and will included data such as the type, abundance, richness, age, weight and size of the species inhabiting these intertidal areas.

The surveys should be undertaken using methods such as beam trawling or fyke netting in order to monitor demersal fish populations; and seine netting or otter trawling in order to monitor the pelagic fish populations.

There are particular and unique challenges that these surveys may encounter in the Humber estuary, such as the high amplitude of the tides, fast currents and large amounts of debris. Survey techniques should be chosen with these constraints in mind.

All survey work undertaken will be in compliance with the EA's WFD fish survey methods. Fact sheets specific to WFD monitoring in estuarine environments are attached.

In addition to the above, we would also request the inclusion of the following: *Surveys undertaken should record and specify the proportional area of creeks sampled to enable the scaling up of community data.*

5.13 It would also be helpful if the plan could include the number and location of monitoring buoys that will be used to monitor temperature and dissolved oxygen in the estuary during construction.

6.0 EX28.3, Part 1 Non-Technical Summary

6.1 Paragraph 1.6.2.4 – we request clarification of the size of the wind powered pumps that will drive the irrigation systems.

7.0 EX28.3, Part 2 Baseline of North Killingholme Foreshore

7.1 Paragraph 1.5.1–1.5.2 - We would request an explanation for the basis of the robust and reasonable assessment of coastal squeeze losses in these paragraphs. The assumption of losses in the middle estuary was based on the 2005 Coastal Habitat Management Plan (CHaMP) (paragraph 1.5.1). We have provided you with the most up to date understanding of losses within the middle estuary in our approved Habitats Regulations Assessment for the Humber Flood Risk Management Strategy (2011), which supersedes the 2005 CHaMP and reflects the change in sea level rise predictions and understanding of rates of loss in the middle estuary. Your assumptions on losses in the middle estuary should reflect this understanding and not the earlier 2005 position.

7.2 We provided you with the most up to date understanding of estuary losses in our oral submission on 11-13th September and in our written submission of 3rd August (paragraph 4.31). We are providing this advice based on the following two assumptions made by Able:

- Losses are evenly distributed within the Middle estuary;
- The foreshore at Killingholme Marshes is 1.2% of the Middle Estuary extent.

7.3 If these two assumptions are valid, it is our opinion that you should reflect this newer understanding of the estuary losses (HFRMS HRA, 2011) within your documentation, and not the earlier CHaMP (2005). As such, we do not think that your estimate in 1.5.1 "*remains robust and reasonable*" (Paragraph 1.5.2).

8.0 EX28.3, Part 3 Development and Operation of the Intertidal Habitat Site

8.1 4.5.6-7 - We strongly recommend, as we have previously, that robust erosion protection is provided along the entire length of the new flood embankment. The exposed length has actually reduced due to the introduction of the Regulated Tidal Exchange (RTE) solution. Therefore, we recommend that, to reduce uncertainty over erosion, the armorflex-type erosion protection is extended and, as suggested in paragraph 4.5.7, the toe design is given careful consideration.

8.2 4.9.1-3 - We welcome the inclusion of discussion on reservoir classification in this section. Further clarity could be provided on the likely range of volumes in the RTE fields and how this compares with the Reservoir Act provisions.

8.3 There is still no discussion of the environmental impact and contingency should the old flood embankment fail and the RTE fields flood. However, we do acknowledge that a separate document on Embankment Inspection and Maintenance has been submitted. It would have been helpful if somewhere in Part 3 there was a cross-reference to this document.

8.4 5.3.9 – We note the increase in predicted erosion in the Cherry Cobb Sands Creek as highlighted in this paragraph. This shows an increase of 20%, with up to 1.8m of erosion a year when compared to the original design. The EA considers this change quite significant to the local area and would like further explanation as to where this eroded material is likely to be deposited. This area is obviously very sensitive due to tidal flood risk, land drainage issues and sedimentation in the Stone Creek area. This information suggests that there is likely to be an impact in the Stone Creek area, particularly in the early years of operation.

8.5 We also note that the revised document does not appear to take account of the discussions at the hearings on 5th September and the 11th and 12th September regarding the potential impact of the RTE MR site on discharge from Keyingham Drain. We would be grateful if you could indicate where this work has been carried out in order that we can assess the potential impacts to our flood defence structures. It would be helpful if you can present the assessment of the potential impact to the length of time the tidal outfall at Keyingham Drain will be able to operate, in order that we can assess the potential change in head that will be applied to the doors on a regular basis.

8.6 5.3.10 – This paragraph indicates that the duration of the low tide period when discharge from the Environment Agency tidal outfall is possible is slightly shorter, but with no quantification of this period. This point requires clarification so that we can ensure the proposal does not impact on our operating regime and infrastructure.

8.7 This is further emphasised in paragraph 8.17 where there is no quantification of time or magnitude of the impact of drainage on Stone Creek, and more specifically Keyingham Drain. We would also draw your attention to paragraph 11.5.1 which implies that any enlarging of Cherry Cobb Sands Creek, as a consequence of the RTE MR, is likely to result into drainage from Foul Holme

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Sands to be via the Creek following this enlargement. We acknowledge that there is some uncertainty associated with this potential impact, but require some expert judgement to be applied as to the likely consequence of this change on to the duration to which Keyingham Drain tidal outfall will be able to discharge.

8.8 We have some general concerns regarding the information provided in this report with respect to the principles of sustainability and the delivery of this RTE. It is our opinion that sustainability needs to be at the heart of the compensation that is delivered and that work should be invested ahead of delivery to ensure that anything delivered can achieve appropriate self-management that is sustainable with limited intervention. The RTE, as presented, requires significant on-site intervention, as indicated in paragraph 6.1.4 "*in practice the site managers would adjust the sluice settings and depth of inundation to best achieve these objectives in the light of their developing operation experience*". As indicated in paragraph 4.6.9, the site is designed for a 100 year design life, and as such requiring such frequent adjustments to the sluices (which will potentially need replacing twice following initial construction [paragraph 4.6.9 "*mechanical items will be designed for a 30 year design life*"]), leaves us with serious concerns about the long-term sustainability of the site as currently presented.

8.9 The above point is further illustrated via paragraph 6.2.4 where you explain the site design in further detail. This states that the minimum depths of water within the RTE close to the inlet will be between 16-7mm on the lowest tides. This gives the impression of a very artificial habitat lacking sustainability as a core principle to deliver compensatory habitat for a SAC and SPA. We will have to draw this to the attention of the Examining Authority during next week's Hearings. The Environment Agency's core purposes are to protect and improve the environment and promote sustainable development. We have concerns at present with how the RTE meets the objective of sustainable development, requiring such active intervention in an artificial manner, whilst trying to replicate a naturally occurring habitat.

8.10 8.2.7 –We require further clarification in respect of the detailed design of the RTE fields. It is unclear from this paragraph whether the final design layout, including flood defences, as shown in Figure 8.1 is the final layout, or whether there may still be further changes to the flood defence size and gradients. In addition, it is unclear from this paragraph what the impact of the further detailed design would be on the total habitat compensation provided. As shown in Table 8.2 at present the total compensation area below 3.4 mAOD is 105.4 ha, but it is unclear whether any of this area includes the banks within and around the site that are below the 3.4 mAOD threshold. We would request further clarification as to how the 105.4ha has been derived.

8.11 As mentioned in Paragraph 8.1 above, we would also advise you that due to the increases in velocities and shear stresses within the site (paragraphs 5.3.3 (periods in excess of 2 hours where velocities are in the region of 1 $m^{-1}s^{-1}$, and 5.3.6)), it would be our advice that the Armourflex 180 be applied to the full flood defence bank that runs parallel to the creek within the site as defined on Figure 8.2.

9.0 EX28.3, Part 4 Development of Wet Grassland and Roosting Site

9.1 5.4.3 – 5.4.4 These paragraphs discuss salinity in Keyingham Drain and suggest works will be carried out to minimise saline incursion on tides.

9.2 The Environment Agency has recently carried out works to replace the canopy timbers on the existing tidal control structure. This work has reduced the amount of sea water that is able to ingress into the upstream section of Keyingham Drain. No further works are planned. This structure is primarily a flood defence asset to prevent tidal flooding of local communities rather than to regulate water chemistry. It works by allowing freshwater flows out through hinged timber pointing doors, which, on the rising limb of tides are pushed closed when the downstream tidal level exceeds the freshwater level upstream. There is inevitably a period where mixing goes on to differing extents except when the doors are fully shut.

9.3 The Environment Agency has a current water sampling point at Sands Bridge which crosses Keyingham Drain, some 4 kilometres upstream of the tidal outfall. A formal information request could be made to find out more about the sampling regime and results if required by emailing neyorkshire@environment-agency.gov.uk.

9.4 6.2.16 - This paragraph describes the widening of the existing western embankment of Keyingham Drain, using spoil generated from wetland creation. This existing embankment is not classed as a formal flood defence raised embankment by the Environment Agency, nor do we routinely access along the bank for maintenance purposes. Therefore, we have no objections to the widening of the bank in this location but would ask that the current height is maintained rather than increased (so as not to alter the characteristics of the floodplain), which is suggested in 6.2.16, albeit to a limited extent.

9.5 Those works carried out within 8 metres of the top edge of the drain bank will require the prior written Consent from the Environment Agency, under the Yorkshire Land Drainage Byelaws.

9.6 6.2.31 - Any pumps erected within 8 metres of Keyingham Drain, or encroaching in the channel or bank sides will need prior written Consent from the Environment Agency, under the Water Resources Act and Yorkshire Land Drainage Byelaws. It will need to be demonstrated at design stage that any such structures will not have any detrimental effect on wildlife or associated habitats.

10.0 EX28.3, Part 5 Assessment of Functionality

10.1 1.4.7 –The Environment Agency has already carried out works to reduce saline intrusion into Keyingham Drain. We do not intend to carry out further works. Please refer to the explanation given with reference to paragraph 5.4.3-4 from Part 4 above.

10.2 Our main concern arising from this document is the potential reliance on the over-compensation at East Halton, which is discussed in EX28.3, Part 8. We have significant concerns over the deliverability of this over-compensation as outlined in paragraphs 13.1 to 13.7 below. Should the Secretary of State deem that over-compensation is a necessary part of the compensation package in order to meet the Habitat Regulations, we will be requesting that the issues as presented in paragraphs 13.1 to 13.7 are a material consideration to the decision.

11.0 EX28.3 Part 6 EIA Review

11.1 This Chapter includes reference to two proposed wind pumps at the RTE scheme (as shown on Figure 3.3). It appears from Figure 3.3 that these could be

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sited on the flood embankment. We would request further information on these, such as the proposed location, size and potential impacts on the compensation site.

12.0 EX28.3, Part 7 Compensation Site Environmental Management & Monitoring Plan

12.1 We are disappointed that the Compensation Site EMMP has not at present been populated with baseline data, numerical objectives, or reflects our comments in relation to the Requirements we have requested within the DCO and our legal agreements, and how any remedial actions that may be required will be implemented and secured. This is essential, if the EMMP is to be completed to a state where it can be agreed before the close of the examination. At present the EMMP reflects too much of the Environmental Statement, and does not include all our relevant advice that has been provided. For example, we note in section 6.5 (paragraph 135) your views are repeated on the potential impacts to fish from the AMEP construction and associated development. We would like to remind you of our differing opinion with regard to potential impacts on fish as outlined in paragraphs 4.48 to 4.73 of our Written Representations (29 June 2012) and Paragraphs 3.1-3.16 of our submission of 3 August 2012.

12.2 Paragraph 136 – In addition to surveying around the RTE intertidal mudflat habitat and the intertidal managed realignment area, it would also be useful to survey the area around the inundation site. This should be both pre and post development, with a small beam trawl to determine if the site is having any localised effects on the neighbouring environments.

12.3 It would be helpful if the EMMP agreed baselines could be provided in tabulated format, or succinct bullet format to enable ease of comparison in the future when the Advisory Group (as defined in Schedule 3, EX28.3, Part 10) come to review the performance of the site against the baselines and agreed target objectives.

12.4 At present it is difficult for us to provide any advice on the target objectives as they are not easy to decipher from the text, they do not reflect our WFD Requirements or methods (DCO Schedule 11, Requirement 13, and Appendix C attached). Without very clearly defined targets and objectives it will be very difficult for the Advisory Group to assess the performance of the site and whether the site is meeting its extent and functional requirements (SAC and SPA) and hence whether the coherence of the Natura 2000 network has been maintained and you have met all your legal requirements (Habitat Regulations, WFD, marine licence etc).

12.5 We look forward to receiving an updated and amended version of the Compensation EMMP and we will endeavour to provide what advice is possible in the time remaining within the Examination timetable. It is our opinion that without the above improvements to the EMMP, it will not be possible for us to inform the Examining Authority that the EMMP is agreed in advance of the close of the Examination of this proposal.

13.0 EX28.3, Part 8 Over-compensation site proposal

13.1 Chapter 2 – the area for proposed grassland lies within the boundary of a site, which is currently pending planning consent from North Lincolnshire Council (PA/2009/0600) for the Able Humber Ports Facility: Northern Area (often referred to as the Able Logistics Park - ALP). The site is currently protected by a tidal flood defence. The Environment Agency does not plan to continue to maintain

this line as a flood defence, as outlined in the Humber Flood Risk Management Strategy. However, we have been in discussions with Able for several years regarding the wording of a legal agreement, which would require urgent improvements, continued monitoring and future improvements to this area, should you wish to develop it.

13.2 Chapter 3 - We have reviewed the information in respect of geology and hydrogeology, which appears to be correct. However, there is the probable presence of two historical boreholes, i.e. a well near the mouth of East Halton Beck associated with the coast guard station and a wind pump in the middle of the proposed area. Both of these locations have borehole records on British Geological Survey (BGS) Index.

13.3 We recommend that a survey is undertaken to identify these boreholes on the ground and if no longer in use they should be decommissioned if this has not already been done.

13.4 Chapter 5 - If the legal agreement in respect of tidal flood defences at ALP is signed by all parties (Associated British Ports hold a land interest where the improved defence line would encroach and therefore will need to be party to the agreement) then it is still highly unlikely that you could meet your legal obligations to improve the defence line by only working between the months of April to July. The duration of necessary works has been a point of continued discussion between our organisations for some considerable time.

13.5 If the legal agreement in relation to ALP is not concluded, then the condition and continued deterioration of this defence will necessitate the Environment Agency having to proceed with its preferred option of building a cross bank. Either way, heavy plant and construction activity are likely to impact on the site between April to the end of September. Therefore, the expected disturbance described in section 5.3 is not accurate. Evidence included at Appendix D shows some of the deterioration along the defence line in Flood Cell 23, where we were forced to undertake emergency repairs this summer, whilst trying to reach a satisfactory legal agreement with you.

13.6 If the cross bank option proceeds and the defence continues to deteriorate, it is worthy of note that the land level is generally below the Mean High Water Springs and failure of the defence would lead to saline intrusion onto the site and likely habitat adaptation to a salt marsh or inter-tidal mud. There is a potential risk, as outlined above, of the over-compensation proposal being unable to meet the Habitat Regulations requirements.

13.7 We are of the opinion that this wet grassland proposal will also need to be subject to a WFD assessment. The Humber Flood Risk Management Strategy helped to inform the River Basin Management Plan for the Humber transitional waters. We do not intend to maintain this line of defence (Appendix E), and as such the continuation of hard defences in this location would be a change to the plans. This would need to be assessed against the mitigation measures not yet in place in the Humber Lower Waterbody, especially:

- *Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution;*
- *Managed realignment of flood defence.*

14.0 EX28.3, Part 9 Land Ownership and Funding

Cont/d..

14.1 Could you please clarify what the length of time over which the £90 000 maintenance costs (paragraph 8) have been assessed. As EX28.3 Part 3 paragraph 4.6.9 refers to a design life of 100 years, with the mechanical items having a design life of 30 years, plus the requirement of a site manager for the RTE site, a budget of £90, 000 seems very small if this is spread over the lifetime of the development. If we were to assume this to be £90 000 per annum, it would equate to 9 million pounds over the 100 year lifetime, and so significantly more than the "*less than 1% of the total project costs*" as expressed in this paragraph. We look forward to receiving a full explanation as to how these costings have been derived.

15.0 EX28.3, Part 10 Final Compensation Proposals - Draft Legal Agreement

15.1 We are not currently in a position to make comment on whether or not the Environment Agency will be a party to this agreement. We hope to be able to indicate our intentions during next week's Hearing.

16.0 EX31.5A Factual Report on Geo-Environmental Ground Investigation, Cherry Cobb Sands (Final)

16.1 This report does not contain a controlled waters risk assessment. We do not require this risk assessment pre-consent as Schedule 11, Requirement 33 will ensure that this is carried out prior to the commencement of development. However, we would like to highlight the following points, which will need to be addressed in order to satisfy Requirement 33.

16.2 Evidence of contamination was encountered in the following trial pits and trial trenches, but there appears to have been no chemical sampling of the soil at these locations:

1. TP34 (TR125): Trial pit log indicates evidence of hydrocarbons and bright blue discolouration of the ground.
2. TP35 (TR126): Trial pit log indicates evidence of hydrocarbons and bright blue discolouration of the ground.
3. TR119: Trial trench log indicates presence of both demolition and pharmaceutical wastes. Oily latex smell present.
4. TR120: Trial trench log indicates presence of both demolition and pharmaceutical wastes. Oily latex smell present.
5. TR121: Trial trench log indicates presence of both demolition and pharmaceutical wastes. Oily latex smell present.
6. TR122: Trial trench log indicates presence of both demolition and pharmaceutical wastes. Oily latex smell present.
7. TR123: Trial trench log indicates presence of both demolition and pharmaceutical wastes. Oily latex smell present.
8. TR124: Trial trench log indicates presence of both possible furnace waste and pharmaceutical wastes. Oily smell present.

16.3 We request an explanation as to why these were not sampled given this is where both visual and olfactory evidence of contamination was encountered. These areas should have been tested as they possibly relate to former creeks that were infilled with potentially contaminated material, as identified in the initial preliminary risk assessment. Although it may be that you intend to remove any contaminated areas as part of a remediation programme we would still request an explanation as to why they have not been sampled to date.

Cont/d..

16.4 Hydrocarbon contamination was identified in TR116 though we note that only a total hydrocarbon concentration was recorded in the sampling results. Ideally a full speciated Total Petroleum Hydrocarbon suite (including BTEX) should be tested for the above locations, especially for any subsequent quantitative risk assessment work where individual TPH fractions could be are required.

16.5 TR116 has also identified very high concentrations of polychlorinated biphenyls (PCBs). It is likely that these may also be present in the above locations and should be sampled for unless there are other reasons as to why this was not /will not be done.

17.0 EX36.4 Embankment Inspection and Maintenance Report

17.1 We request further explanation as to how the performance of the RTE site will be impacted by the reduction in the Standard of Protection along the existing flood defence line that will occur over time. In paragraph 3.4 (b) it implies that the failure of the embankment would result in limited impacts "*any adverse impact to the compensation site and flood defence is likely to be short duration and relatively minor*". We would query this view, as you are going to considerable length and expense to design and create the RTE element of the compensation package, and yet any failure to the existing defence would result in inundation directly from the estuary to the RTE fields.

17.2 We would seek further clarification as to the impact on the RTE fields in the future as the likelihood of overtopping of the existing flood defences, providing part of the RTE structure increases in frequency. Table 3.5, section 5 indicates it would be uneconomic for the applicant to raise this embankment in the future, and hence we ask for further clarification as to the long-term future for the RTE compensation site. We have expressed concerns regarding the sustainability of the site (Paragraphs 8.8 – 8.9 above), and seek confirmation as to how the significant structures that are required for the RTE to function will be safeguarded into the longer-term future. Paragraph 4.2 provides no evidence that a Standard of Protection of 1 in 18 will be sufficient to prevent any significant adverse impact to the compensation site. We request sight of the evidence on which this judgement has been based, particularly when you have indicated that the site will be fully functioning by 2018 (Table 5.1, EX28.3, Part 5), and as such if the development had a 100 year life we would have expected to see an assessment of risk in 2118 and not 2108.

17.3 We would advise you to undertake a walkover inspection of the existing defence line in order to establish the extent and level of stone erosion protection that currently is required (section 5 (b)). We have to make a regular significant investment on our flood defences on this north shore of the estuary on erosion protection to safeguard the longer-term functioning and integrity of our defences. It is our opinion that you have not demonstrated a full-understanding of this potential investment requirement in EX36.4.

17.4 We support the conclusion that the breached embankment integrity needs to be retained. Previously, we have recommended that the ends of the breach in the bank have erosion protection. This document suggests protection as an option. We recommend it should be a certainty and should be carried out at site development stage, when access is more available.

18.0 EX44.2, Addendum to EX44.1

Cont/d..

18.1 We have reviewed EX44.2, but it appears that our points as outlined in Section 10 of our 3rd August submission and In-Combination effects section of our submission of 7th September have not been addressed. The points are reproduced below for your information:

- *Clear logical arguments to be presented with the appropriate cross referencing to alternative documents where necessary, when the justification for the view taken is not presented;*
- *Capital and maintenance dredging and dredge disposal;*
- *Hydrodynamic and morphological change.*

18.2 We wish to understand how you have arrived at the Figure of +513 ha of habitat creation in Table 4.6. The HFRMS losses and gains are set out in our HRA (2011, see paragraphs 7.1-7.3 for full definition). This table takes no account of the losses taking place within the estuary as a consequence of coastal squeeze and that these habitat creation schemes within the HFRMS are about replacement of lost habitat. The total losses arising from the HRFMS for the first 50 years, as defined in the HRA (Table B1 (as provided in our response of 29th June), are approximately 400 ha, which requires a replacement of approximately 517ha, due to the distribution of losses within the estuary. This table appears to be a misrepresentation of the HFRMS HRA, and we welcome a response from you on this matter.

19.0 Comments on Able's comments to responses to Examining Authority's 2nd Questions

19.1 5.10 and 5.12 The reports mentioned in these paragraphs should then have been used to inform the assessment in EX44.1 and have not been.

19.2 5.2 We accept your response to Table 3.1 of the sHRA SoCG. However, we would draw your attention to the fact that you did not carry an explanation forward into Table 3.2 as to why there either is, or is not, a Likely Significant Effect for the Berthing Pocket (Table 3.1, item 3).

Plainly given that the examination of this application is due to close on 24 November the information requested above is of the utmost urgency if we are to have any opportunity of considering it properly and advise the Examining Authority accordingly. I look forward to hearing from you as soon as possible.

Yours sincerely

Annette Hewitson
Principal Planning Advisor

Direct dial 01522 785896
Direct fax 01522 785040
Direct e-mail annette.hewitson@environment-agency.gov.uk

c.c. The Planning Inspectorate

End

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2) [a]
Document reference: TR030001/APP/

EX 8.12A – Water Framework Directive

(Supersedes Supplementary Environmental Information EX 8.12)

October 2012
Revision: 0
HR Wallingford

Able Marine Energy Park and Habitat Compensation Scheme

Water Framework Directive Assessment

Technical Note DHM6835-02

HR Wallingford

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Document information

Project	Able Marine Energy Park and Habitat Compensation Scheme
Technical subject	Water Framework Directive Assessment
Client	Able UK
Client Representative	Richard Cram
Project No.	DHM6835
Technical Note No.	DHM6835-02
Project Manager	Samantha Dawson
Project Director	Katherine Harris

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Date	Release	Prepared	Approved	Authorised	Notes
28/06/12	1.0	NC	KLH	NC	
07/09/12	2.0	SDA	KLH	KLH	Revised following Environment Agency comments 31/07/12
12/10/12	3.0	KLH	MPD	MPD	Revised following further Environment Agency comments 04/10/12

Prepared _____

Approved _____

Authorised _____

nathan Monk

From: Manson, Susan [susan.manson@environment-agency.gov.uk]
Sent: 05 October 2012 10:01
To: Richard Cram
Cc: Hewitson, Annette; k.harris@hrwallingford.com; G.Siggers@hrwallingford.com
Subject: WFD feedback
Attachments: WFD response 041012.rtf

Importance: High

Dear Richard

Apologies we were unable to get this to you sooner in the week. Please find attached our response to the most recent WFD assessment. We have also provided some comments in the light of the teleconferences we have held and the new draft RTE report.

I have copied these comments direct to Katherine and Graham at HR Wallingford in order to speed things up for you, as we realise the 12th October is only a week away. Should you have any queries, don't hesitate to contact me in Annette's absence. I am on my mobile today which is 07810155428. Annette is back in the office on Monday.

Kind regards

Sue

Mr Richard Cram
Able UK Ltd
Able House (Billingham Reach Industrial Estate) Haverton Hill Road
Billingham
Cleveland
TS23 1PX

Our ref: AN/2012/113982/01-L11
Your ref: IPC-Pro-11

Date: 04 October 2012

Dear Richard

Revised Water Framework Directive Assessment
Marine Energy Park, Killingholme Marshes, North Lincolnshire

Thank you for forwarding the revised Water Framework Directive (WFD) Assessment, which was received on 10 September 2012. We have reviewed the Assessment and have the following comments to make:

Page 5 – 2.1.2 North Killingholme Main Drain Within this waterbody, the classification for Ammonia did not achieve Good Status. However, the overall ecological status classification for this waterbody is Moderate.

Page 17 – 3.4.3 Benthic invertebrate fauna *There is some uncertainty about the current status of benthic invertebrates*..... This data has now been through the Quality Assurance (QA) process so it can be referenced. The current status of the benthic invertebrate biological quality element in the Humber Lower waterbody (2012) is Moderate and the classification is Uncertain.

Page 20 – 3.4.3 Dredging and Reclamation *The effects on benthic invertebrates arising from the dredging and reclamation activities are as follows*....We request the inclusion of the sea bed area of sub-tidal soft-sediment habitat that will be lost due to the capital dredging, which is to take place in the berthing pocket. This area is considered as permanent habitat loss as the natural habitat will be lost and will be replaced by hard substrata.

Further to this an amendment will need to be made to the figure of 0.001% of total sub-tidal habitat loss in the Humber Lower area. It is not sufficient to only report the area of the berthing pocket in conjunction with the reclamation area approach channel and turning area in table 3 as this pertains to morphological conditions and not to benthic invertebrates.

Page 21 – 3.4.3 Disposal of dredged material *There will therefore be a local, temporary loss of benthic invertebrates during the placement of material at the site: however the dominant species present at the site (Aphelochaeta marioni, Nephtys hombergii and Aricidea minuta) are opportunistic and will recolonise the site over a period of weeks to months.* Two of the three polychaetes referred to in this paragraph are not opportunistic taxa. *Aphelochaeta marioni,* is an opportunistic polychaete. *Nepthys hombregii* is not opportunistic, it is classified as an indifferent species (AMBI Group 2). *Aricidea minuta* is not an opportunistic species, it is a sensitive species (AMBI group 1). Could you please provide peer-reviewed evidence of these taxa being opportunistic or correct this statement.

Page 21 – 3.4.3 Conclusion *This conclusion is reinforced by the statement in the HRA that: 'The temporary loss of sub-tidal habitat is not expected to be an issue for the Humber Estuary in the longer term given the predicted effects of rising sea levels over the next 50 years (CHaMP, 2005) which will lead to the creation of several hundred hectares of new sub-tidal habitat within this site alone.'* The inclusion of this statement should be reviewed because:

1) It is accepted that climate change is happening. The assertion that predicted sea-level rises will lead to the creation of sub-tidal habitat, however, is not. There are many factors which could affect this such as sea-defences, managed retreat and the suitability of the inundated land to give rise to the sub-tidal habitat in question;
2) The CHaMP (2005) report is not included in the reference list. The original report findings are clearly based on modelling scenarios, which primarily work on the premise that sea level rises of 6mm a year will occur;
3) Overall this statement (in our opinion) is not suitable for use as supporting evidence of no deterioration in a WFD assessment.

Please also consult the Environment Agency's Representations of 3rd August 2012 (Paragraphs 4.29-4.31) in our submission to the Planning Inspector in relation to the Humber CHaMP (2005).

The following comments are provided following our discussions during the telecom on 1 October 2012 and our review of the "Assessment of impacts of disposal of AMEP capital dredge gravel fraction" note produced by JBA, which was received on 5 September 2012:

1. We agree with the assessment of the extent of the footprint which will result from the dispersal of sediments disposed in HU080.

2. We feel that describing the movement of gravel as dispersal may be misleading as the gravel will remain in the 'dispersal footprint' and will migrate up and down the estuary bed channels.

3. Background information upon which the modelling was based - clarification is required to ascertain where the particle size distribution curve used in the model originated e.g. is it derived from vibrocore samples? This may be best addressed by providing us with information on the calibration and validation undertaken to support the model results provided in file note 2010s4456 dated 28th August.

    - *Related to the above*: clarification of the composition of the gravel to be disposed is required (e.g. of the 130 000 m^3 is 80% 10mm and 20% 2mm fraction?).

4. An assessment of the ecological impact the gravel fraction will have.

5. An assessment of sediment type and benthic communities in the area the gravel will impact/settle (inform ecological impact).

6. We understand that an updated version of EX8.7 is currently being collated by Able. In light of findings in this document, which is expected to show that the capital dredge disposal to HU082 will lead to changes in the bathymetry in the region (and will therefore have localised impacts on the intertidal area (i.e. impacts outside the disposal grounds)), we request an assessment of the impacts of disposal of dredge material on morphology and ecology in the vicinity. It should be noted that this assessment will need to include areas outside of the disposal ground as expected impacts area expected to occur outside of the disposal footprint.

7. The current WFD assessment shows that the Clearing the Water guidance has already identified the need for assessment of impacts on a number of parameters (Table 3). While the dredge area and disposal have not (thus far) been shown to be >5% of the waterbody, the WFD assessment has been triggered through other consideration (e.g. removal of intertidal area). The WFD assessment should include information on the areas to be impacted and how these relate spatially to the extent of the Humber Lower waterbody.

8. The data requirements once a WFD assessment is triggered in relation to dredge characteristics, and which are always required are Dredge footprint; Dredge depth; Dredge timing and duration, Dredge methodology and Disposal site. This information should be provided for all areas to be impacted by dredging, including intertidal and subtidal areas, disposal grounds and areas surrounding the highly dispersive disposal ground of HU080.

9. Fully quantifying the area to be impacted will allow a more comprehensive estimation the impact of the activities and a more precise assessment of the temporary or non-temporary nature of any deterioration on Ecological Status, which may occur.

10. Currently the best available evidence is that dredged material falls very quickly to the sea bed and is unlikely to affect any area beyond the disposal site. The guidance says that fine sediment is likely to move as a cohesive mass to the bed and any effects are likely to be localised and temporary. There are however some exceptions and those which are applicable to the planned disposal of dredge spoil by Able UK are that there will be a significant change in the amount of material being deposited and that the site is highly dispersive.

    - Update calculations of the area to be impacted by dredge spoil disposal, taking account of the dispersive nature of HU080 and the disposal of potentially more coarse sediments than the site has previously received.

11. The WFD is concerned with cumulative impacts across a waterbody and how any proposed developments may impact the ecological status or ecological potential of the given waterbody.

12. UKTAG guidelines, which are signed off by UK Environmental Agencies, advise that if more than 5% of the total area of a waterbody, or 0.5 km^2 contiguous area is impacted then the waterbody cannot achieve High ES or EP. If more than 15%

Cont/d..

of the total area of a waterbody, or 1.5 km^2 of contiguous area is impacted then the waterbody cannot reach good ES or GEP.

13. As such, we would ask you provide this information (as part of the WFD assessment) and include the total area of the development, including all dredged areas, disposal areas and areas which will be affected by the redistribution of sediments (i.e. gravel from the HU080 disposal ground over a 20ha area as this is expected to be a non-temporary change in habitat) in this assessment.

- Assessment of the cumulative impact of the development in the context of other anthropogenic activities in the (Humber Lower) waterbody, and how this may impact on the ability to achieve Good Ecological Potential.

14. As the applicant has now revised their compensation site design at Cherry Cobb Sands, and in the light of the new Pumping Station that is to be built, we would like the advise the following:

- As these two activities affect existing WFD waterbodies, there must be some expectation that fish are present. By fitting a pumping station in place of a flap valve, depending on the pump there may be a risk of entrainment of fish when it pumps out (i.e. mincing eels). If there is no associated flap valve as well, there may be the introduction of a barrier to migration. Under the Eel Regulations 2009 there would be a requirement to prevent entrainment of eels through this pump, therefore either a fish friendly pump or a fine mesh screen and with suitable bye wash would be required depending on the fish expected in the drain.

- If there will be a requirement to move existing fish before any drains or soke dykes are filled in, it will be necessary to apply for consent from us to move any fish under the Salmon and Freshwater Fisheries Act 1975.

- The introduction of sluice gates within the Regulated Tidal Exchange (RTE) will also be required to be designed to allow the free passage of eels and fish. Once we have reviewed the "Development and Operation of the Regulated Tidal Exchange" (Draft, September 2012) we will be able to provide further advice on this matter.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson
Principal Planning Advisor

Direct dial 01522 785896
Direct fax 01522 785040
Direct e-mail annette.hewitson@environment-agency.gov.uk

End

Jonathan Monk

From: Richard Cram [rcram@ableuk.com]
Sent: 19 November 2012 16:14
To: Jonathan Monk
Subject: FW: Comments on EA's review of EX8.12 WFD Assessment
Attachments: TN-DHM6835-02_Water-Framework-Directive-Assessment_R2-0[1].pdf; Spreadsheet_EA_comments.pdf

Kind regards

RICHARD CRAM
Design Manager

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From: Richard Cram <rcram@ableuk.com>
Date: Sat, 08 Sep 2012 09:32:18 +0000
To: Annette Hewitson <annette.hewitson@environment-agency.gov.uk>
Cc: Susan Manson <susan.manson@environment-agency.gov.uk>, "Bolt, Carol" <carol.bolt@environment-agency.gov.uk>
Subject: Re: Comments on EA's review of EX8.12 WFD Assessment

Annette,

Revised WFD Assessment and comments log.

Kind regards

RICHARD CRAM
Design Manager

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From: Annette Hewitson <annette.hewitson@environment-agency.gov.uk>
Date: Tue, 31 Jul 2012 10:08:47 +0000
To: Richard Cram <rcram@ableuk.com>
Cc: Susan Manson <susan.manson@environment-agency.gov.uk>, "Bolt, Carol" <carol.bolt@environment-agency.gov.uk>
Subject: Comments on EA's review of EX8.12 WFD Assessment

Dear Richard,
Please find attached comments on the above report,
Kind regards,
Annette

Annette Hewitson
Principal Planning Advisor

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Awarded to the Environment, Planning and Engagement Department, Anglian Region, Northern Area.

HR Wallingford
Working with water

Able Marine Energy Park and Habitat Compensation Scheme

Water Framework Directive Assessment

TN DHM6835-02-R2

September 2012

Document information

Project	Able Marine Energy Park and Habitat Compensation Scheme
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Client Representative	Richard Cram
Project No.	DHM6835
Technical Note No.	DHM6835-02: Version 2
Project Manager	Samantha Dawson
Project Director	Katherine Harris

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28/06/12	1.0	NC	KLH	NC	
07/09/12	2.0	SDA	KLH	KLH	Revised following Environment Agency comments 31/07/12

Prepared [redacted]

Approved [redacted]

Authorised [redacted]

Summary of Environment Agency comments (letter dated 31 July 2012) and HR Wallingford responses

Environment Agency comment	HR Wallingford Response
1. Firstly, we would like it to be noted that we have had difficulty in assessing this, and other documents, within a reasonable time period due to the frequency with which the dredge schedule and methods have been amended. On some occasions revisions have been received before we have responded to the original document. This has made the process less than ideal.	No action.
2. We would also refer you to our responses of 29 May 2012 and 6 June 2012 where we explicitly explained the need to identify where in the Environmental Statement (ES) the data resided if it were being relied upon to demonstrate a compliant Water Framework Directive (WFD) assessment had been undertaken.	References to the ES have been added where necessary.
Method for calculating dredging area of impact 3. The information currently provided in the ES and associated documents does not sufficiently follow the guidance contained in the EA's "Clearing the Waters: Marine dredging and the Water Framework Directive" or provide the information required to judge potential ecological impacts associated with these activities. The EA has provided a more detailed response to this in respect of the spatial extent of impacts associated with dredging activities, mitigation measures and monitoring activities. This information can be found in detail in "*Impacts of proposed dredging on the benthic macro-invertebrate WFD classification: Humber Lower water body*" (section 1.1). It appears from the WFD assessment that you have not followed the guidance with regard to the area of impact of the total project. As you have not provided the dimensions of the total area of impacts for dredging in an accessible form or been clear from where in the ES this information has been taken from, we have had to conclude that, at present, this is unsatisfactory.	We do not agree that we have not followed the Clearing the waters guidance correctly. We have updated the WFD Assessment where necessary to provide dimensions of the total area of impacts for dredging in an accessible form, in order to support our assessments. It should be noted that the trigger thresholds in the screening/scoping table in the Clearing the waters guidance are merely triggers for further investigation of potential effects, not evidence of significant effects themselves. Our assessment has been undertaken on this basis: where a trigger level is exceeded, these parameters are explored in the assessment section.

Maintenance dredge 4. The supplementary information from the application on Maintenance Dredging (EX 8.6) does not seem to have been reflected in the WFD assessment. The EA is still reviewing all the supplementary information submitted by you on 29 June 2012. If this document has been used in the undertaking of this assessment, could you please be explicit within the assessment referencing the document in detail.	Section 3.4.7 (Future maintenance dredging) has been added to the WFD Assessment to address maintenance dredging. This section references EX8.6.
Berthing pocket 5. At present, it is very difficult for us to assess whether the berthing pocket has been included in the habitat loss calculations, as it is not explicit on which information this assessment is based. As the maintenance dredge requirements presented in EX6.6 suggest that dredging within the berthing pocket is to be frequent, it should be included in the habitat loss (to another marine habitat not naturally occurring in the area). If you do not intend to dredge to the chalk level that you are creating as part of the application, this needs to be explicit. If this were to be the case, we would request this be a condition of the Deemed Marine Licence (DML). Otherwise, we expect a full assessment of this impact to be undertaken.	We have updated the report where necessary to specify, in m^2, the total area of impacts for dredging (including the berthing pocket) in an accessible form. Dredging areas have been included in the habitat loss calculations on the assumption that regular maintenance dredging will be required.
Prevention of deterioration in WFD 6. We raised the potential impact of the project on the prevention of deterioration in WFD in our letter of 29 May 2012. Although the present assessment, which we presently agree with, confirms the project does not prevent a deterioration in WFD status, it is not adequate because it has not followed our published guidance in "Clearing the Waters". In addition, we require all the additional clarification outlined within this response. The overall deterioration issue will need to be re-visited upon completion of a revised assessment. We will review the conclusions that you come to, upon submission of a revised assessment.	We consider that we have followed the Clearing the waters guidance correctly. We have updated the report where necessary to include evidence to provide the dimensions of the total area of impacts for dredging in an accessible form, in order to provide evidence to support our assessments. As no particular sections are referenced here, it is not possible to be more specific in our response.

Section 1: Introduction 7. This section does not address maintenance dredging. We would expect to see this issue addressed within the assessment. In particular, how you intend to manage this aspect of the project in the longer-term to ensure no impact on the Humber Lower water body. This point is addressed in further detail in paragraph 4 above.	Section 3.4.7 (Future maintenance dredging) has been added to the WFD Assessment to address maintenance dredging.
Section 1.2 Capital Dredging 8. Could you please explain whether the volume quoted includes the overdredge of the berthing pocket or not. If it does, could you also explain the exact depth of the over-dredge and where this is detailed in the ES (if it is).	The dredge quantities are taken directly from the ES – references to the relevant sections have been added.
Section 1.3 Disposal of Dredged Material 9. The assessment explains that HU080 is to be used for non-erodible deposits and HU082 for erodible deposits. This is contrary to the ES. Could you please confirm if this is a typo and if the correct assessment for disposal grounds has indeed been undertaken within the WFD report.	Yes this is a typo, which has been corrected in Revision 2 of the report.
10. There is no mention of the potential to dispose of the material anywhere other than within the disposal grounds. The EA believes that Able is assessing disposing of some material to land. If this is the case, the assessment of this in the context of WFD needs to be explicit.	The response to question 1 of EX7.7 (Materials Management Plan) states that 'Clean naturally occurring clays are to be excavated from the Humber Estuary as part of the development works associated with the Able Marine Energy Park. The excavated clays will be used to raise the site levels to meet the required flood levels on the adjacent foreshore and be used as fill material for the construction of the park.' This has been included and assessed in the WFD Assessment.
Section 1.5: Water Bodies 11. Figure 1, the reference to the ES is missing in the first sentence, which makes cross-referencing a substantial body of work very difficult and time-consuming.	Reference added.

12. Figure 1, North Killingholme Haven Pits is absent from the map.	North Killingholme Haven Pitts has been added to Figure 1.
13. We note that the only water body mentioned in this assessment on the south of the Humber is the North Killingholme Haven Pits transitional water body. The North Killingholme Main Drain (GB10402967580) is not mentioned. This is the waterbody that receives the discharge from South Killingholme Sewerage Treatment Works (STW), the waste water treatment plant, which Anglian Water Services operate and is likely to received flows from the Marine Energy Park.	North Killingholme Main Drain has been added to Figure 1 and considered in Section 2.1.2.
14. The North Killingholme Main Drain water body will be affected both by the increased discharge from the STW and by hydromorphology changes to the system of drains (needed to accommodate surface water flows from increased impermeable areas). We would refer you to our letter of 25 July 2011 where we notified you of the additional water bodies that the WFD assessment needed to consider. All potential impacts on water bodies should be assessed, including those arising from the construction of the pumping station.	North Killingholme Main Drain has been added to Figure 1 and considered in Section 2.1.2. Surface water from the AMEP will not drain into this water body; it will drain into the Humber Lower via a newly installed outfall. This is no change to the current situation.
Table 3 15. Depth variation – the EA is unsure that the correct methodology has been applied from our "Clearing the Waters" guidance. Please see our comments in paragraph 3.0 above.	We consider that we have followed the Clearing the water guidance correctly. Further text has been added to Table 3 to provide evidence of the assessment.
16. In Table 3 under the headings of "capital dredging" and "disposal of dredged material" the assessment indicates that there is no impact directly or indirectly on the intertidal habitat and that the disposal sites are sub-tidal. We would like to draw your attention to your supplementary information provided in EX8.7 which indicates that this is not necessarily the case. This supplementary information indicates that the intertidal area is affected by the disposal of material in HU082.	The existing disposal sites are not located on the intertidal area or within 10m of MLWS (which is the Clearing the waters trigger for assessment, for the intertidal zone structure parameter), therefore no assessment is required.

17. Could you please indicate where the information is presented showing no direct or indirect impact on the intertidal zone from capital dredging. At present we cannot find sufficient information to enable us to agree with the assessment, which has screened out this potential impact.	This statement was misleading and has been removed. Effects of the reclamation and the capital dredging have been scoped in and considered in the assessment.
17. The EA, in its Written Representations, submitted information from Deltares on the potential impact of the project on the intertidal area within the Estuary. This work will be further supported by our submission to your comments on our Relevant Representations. We expect the WFD assessment to reflect these discussions and update and amend the assessment as necessary.	This section of the report states that 'the construction of the reclamation and capital dredging will result in a direct loss of intertidal habitat as well as the conversion of mudflat to saltmarsh. These effects are in a Natura 2000 site and are significant in the context of the Habitats Directive – a HRA has been prepared and it is assumed that acceptance of the HRA will satisfy the relevant requirements of the WFD. A detailed discussion of the biological function is provided in the HRA and is not repeated in this report.' Therefore, it is not considered that any changes are needed to the report.
18. Wave Exposure - It is not clear if this has been updated in light of your own supplementary information recently submitted. This refers to section 3.3.1 of Annex 8.1. However, we are now currently reviewing EX8.7 which is an update to Annex 8.1. Please can you clarify this point.	The WFD Assessment has been updated to take account of information provided in EX8.7.
Section 3.4.1: Hydromorphological conditions ***Bed*** 19. It is not clear from this section if our guidance in "Clearing the Waters" has been accurately followed. Please see paragraph 3.0 for a more detailed explanation.	The Clearing the waters guidance trigger levels screened in the bed parameter (Table 3), triggering further assessment of this parameter in the assessment which is presented in this section. As such, we consider that the guidance has been accurately followed. Volumes have been added to this section to verify the assessment.
Intertidal Zone Structure 20. This section of the assessment defers to the appropriateness of the Habitats Regulations Assessment (HRA) to secure compliance with WFD. As it is not clear at present if the shadow HRA provided with your submission is compliant with the Habitat Regulations, this will need to be revised if you provide any additional supplementary information.	No action for the WFD Assessment.

21. The assessment refers to the calculations undertaken and presented in 32.6.7 of the ES with regard to the impact of Cherry Cobb Sands (CCS) on the intertidal zone. We understand you are currently undertaking further design work on the compensation site. If the velocities and potential erosion, post breach, change at the site, following finalisation of the detailed design work, the WFD assessment may need to be revisited.	As the final design is not completed, no action required at this time.
23. The assessment discusses the biological species in the vicinity of the reclamation site and CCS, but this is not referenced to any specific section of the ES. It is, therefore, difficult for us to check the validity of the assessment.	Relevant references to the ES have been added.
Conclusion 24. We would expect the conclusion to this section to be revised, if necessary, once all the points raised above have been addressed.	Conclusions have been revised.
Section 3.4.2 Physio-chemical conditions and chemical status ***Transparency*** 25. Could you please advise where, within the ES, the full dredging programme is outlined and that it will be complete within 6 weeks. Annex 7.6 Appendix 2 suggests a programme lasting 18 months.	Reference to 6 weeks has been removed and replaced with a reference to Sections 8.6.14 – 8.6.23 of the ES, which set out the likely durations of suspended sediment increases as a result of various aspects of the dredging activity. The programme provided in Annex 7.6 Appendix 2 is an indicative programme to be used for project planning purposes and is not considered that it is intended to be representative of the modelled dredging scenarios.
Specific pollutants and priority Substances *Capital Dredging and Disposal of Dredged Material* 26. "There is no significant TBT or PCB contamination" – could you please indicate where the sample results to substantiate this statement are presented.	This paragraph has been re-worded so that it more accurately reflects the ES, and relevant section references have been added.

Cherry Cobb Sands Intertidal Compensation Site 27. Could you please revise this assessment in the light of the results presented in EX31.5. It is not clear from the evidence presented in EX31.5 what remediation will be undertaken or how this will potentially affect the WFD assessment. At present the conclusions drawn in this section are inadequate in the light of the new information.	This secion has been revised to take account of the results presented in EX31.5.
Section 3.4.3: Biological Quality Elements ***Benthic invertebrate fauna*** 28. Could you please explain why the draft 2012 data has been used as the basis for assessment (moderate) over the QA'd 2010 and 2011 data that holds the assessment as good status?	There is some uncertainty about the current status of benthic invertebrates. According to the Enviroment Agency's WfYBY site (accessed 6 September 2012), benthic invertebrates are currently at moderate status. The Environment Agency has advised that it expects benthic invertebrates to achieve good status in 2012 (letter dated 29 May 2012). However, the Environment Agency has provided more recent advice (letter dated 31 July 2012) that benthic invertebrates have been at good status since 2010 but that the draft 2012 data, which at the time of writing has not been subject to Quality Assurance checks, indicates that benthic invertebrates are at moderate status. The information presented above has been added to this section, and other relevant changes have been made.
Figure 2 Benthic Invertebrate Status 29. Could you please confirm whether this is a general status map from baseline data, or if it relates to a specific sampling year.	Figure 2 was produced using sampling data provided by Sue Manson, Environment Agency, on 26 June 2012, following a request for the most recent sampling data. The data was collected during 2008 and 2010. The WFD Assessment has been updated to clarify the data source.
Dredging and Reclamation 30. Could you please explain how the 10 ha of sub-tidal habitat has been calculated? Table 11.6 of the ES indicates a loss of 13.5 ha of direct sub-tidal losses, and 9.83 of indirect sub-tidal losses. Please refer to paragraph 3.0 regarding calculating the area of impact in our "Clearing the Waters" guidance.	The WFD Assessment has been updated to say that there will be a loss of 13.5 ha of sub tidal habitat, in line with Section 10.8.2 of the ES. This still only equates to <0.001% of the total sub tidal habitat in the Humber Lower water body (16,800 ha).so does not change our conclusions in this section.
31. The assessment indicates that the proposed compensation site at CCS	The WFD Assessment does not intend to imply that compensation site at

will negate the impact of the dredging and reclamation on benthic invertebrates. We wish to draw your attention to the fact that the WFD monitoring of benthic invertebrates is currently limited to sub-tidal sampling. Therefore, the creation of a large inter-tidal habitat, whilst supported by EA guidelines will not at present contribute to the prevention of deterioration in Ecclogical Status, or towards improving Ecological Status.	CCS will negate the impact of the dredging and reclamation on sub tidal benthic invertebrates. It highlights that this issue is identified in the HRA and therefore further consideration is expected in the HRA. In order to decouple these two statements, they have been split into separate paragraphs.
32. With regard to the comments made in this section on the berthing pocket, please see paragraph 5.0 for an explanation of the EA's view on this part of the assessment.	We have updated the report where necessary to include evidence to provide the dimensions of the total area of impacts for dredging (including the berthing pocket) in an accessible form.
33. The EA welcomes the application of the dredging mitigation measures outlined in Table 1 of the assessment. These measures should be included in the Dredging Strategy, which needs to be approved by the Marine Management Organisation (MMO) prior to commencement of dredging. This requirement will be included as a condition on the Deemed Marine Licence (as advised in the MMO's Relevant Representations, paragraph 7.28).	No action for WFD Assessment.
Disposal of Dredged Material 34. At the time of the WFD assessment review, we have not had the time to review all of the supplementary information you have provided. The assessment refers to figures within Annex 8.1; however we are aware that this has been revised to include the capital dredging and disposal (EX8.7). We may, therefore, need to comment further on the expected current changes and potential implications under WFD.	No action for WFD Assessment.
Cherry Cobb Sands 35. Could you please indicate where in the ES the design of the compensation site is discussed. We are surprised to see that the compensation site is being designed to promote deposition and we would like to review this information but we have been unable to locate it within the ES due to the lack of referencing within this assessment.	Text amended and referenced to reflect the wording used in the recent report on the further design work on the compensation site, as referred to in EA comment 22 above (Black & Veatch, 2012).

Conclusion 36. We would expect the assessment to review the conclusions of the benthic invertebrate fauna once our point in paragraph 5.0 (berthing pocket), and our point in paragraph 28 (classification of the benthic invertebrate status) against which you have undertaken this assessment, have been addressed.	Conclusions have been reviewed and updated accordingly.
Fish Fauna 37. We would again like to draw your attention to the lack of detail held within the WFD assessment and no specific references to the ES. We presume that the basis for the conclusions being drawn in the WFD assessment is derived from the information held within the ES. Without specific reference to the relevant sections of the ES it is very difficult to confirm your conclusions with regard to fish.	Text amended and references to the relevant ES sections inserted.
38. The assessment does not appear to have taken account of the potential construction on this parameter within the assessment. At present the assessment includes the following statement "The ES also states that migration routes and foraging areas are considered unlikely to be significantly affected during operation of the AMEP site". As the construction timetable for the project is in excess of 12 months, we would expect the construction impacts of the project to be considered. Please refer to our comments of 25 July 2011 where we notified you that our monitoring frequency is yearly and we currently define a non-temporary effect as an impact lasting greater than a year. As such the impacts of construction should be assessed.	The impacts of construction on fish fauna are now included in this section, with relevant references to the ES.
Section 3.4.5: Effect on mitigation measures 'not in place' 39. The Marine Energy Park will not impact on Environment Agency projects - please see our response in paragraphs 1-6 above. The assessment needs to be reviewed in this respect.	We have reviewed this assessment and do not consider that any changes are needed.

Section 3.4.6: Contributing to improvements in WFD status 40. The contribution of CCS to potential improvements will need to be reviewed once the final design is completed. At present the WFD assessment concludes that the CCS site has an ability to provide a 2:1 ratio of creation:loss. The certainty of this conclusion, especially with regard to mudflat, is questionable at present.	As the final design is not completed, no action required at this time.
Section 4.0: Little Humber Area Water Body ***4.1 Characteristics*** 41. The previous WFD assessment submitted included a map of the nitrate vulnerable zone. Could you please advise if there a reason that this map was excluded in the superseded assessment.	The previous assessment did not include a map of the nitrate vulnerable zone. The map provided by Sue Manson on 11th April 2012, has been included as Figure 2 in Revision 2 of the report.
Section 4.4: Deterioration or other effects on WFD Status ***4.4.2 Hydromorphological conditions*** 42. We agree with the assessment of the need to ensure that mitigation measures are put in place to reduce the sediment load in run-off from the construction site and to prevent accumulation of sediment on the estuary side of the sluice affecting discharge from Stone Creek.	No action for WFD Assessment.
4.4.3 Physio-chemical conditions and chemical status Oxygenation 43. We agree with the conclusions of this section, subject to the necessary mitigation measures being implemented to minimise run-off being secured in Schedule 8 (the DML) of the DCO.	No action for WFD Assessment.

Specific pollutants and priority substances 44. This section will need to be revisited in light of the new site investigation presented in EX31.5. There appears to be no reference to this within the WFD assessment, but we note the acceptance of potential contamination and elevated levels of pollutants. We also note the assumption of more site investigations and mitigation as necessary for the construction of the realigned embankment and diverted soke dyke.	This section has been reviewed in light of EX31.5.
Section 5.0: Conclusions 45. It would be helpful if the document could be clear in the conclusion section whether it is just the ES and associated technical reports that have been used in this assessment, or whether any of the additional supplementary information you supplied on 29 June 2012 has been utilised. If the supplementary information has not been used, there is a need for some sections of this assessment to be updated in the light of this information.	The technical reports used to inform the WFD Assessment have been listed in Section 1.
46. Some secondary ground assessment has been undertaken at the Cherry Cobbs Sands site and this has confirmed the presence of contamination. As a consequence the second bullet point in the WFD conclusion (confirmation of a lack of contamination from the secondary ground assessment at the Cherry Cobbs Sands site) is factually incorrect. We anticipate you will want to revise this assessment in the light of this new work.	This section has been updated to remove references to the additional site investigation work, in light of new information presented in the WFD Assessment based on EX31.5.

47. The EA will seek requirements within the DCO to ensure that: • the diverted soke dyke design meets the necessary measures to maintain or improve the water status; • the measures to manage sediment run-off and accumulation and ensure no exacerbation of accumulation of sediment on the estuary side of the sluice are implemented; • the measures to reduce saline seepage are implemented; • the measures to manage plant and equipment to avoid pollution during construction are implemented.	No action for WFD Assessment.
Requirements 48. As competent authority for the purposes of WFD, the EA will need a Requirement in the DCO to secure a Monitoring and Management Schedule to ensure that monitoring is undertaken to ascertain the spatial and temporal extent of the impacts on the Humber Lower Water Body on the following WFD parameters: a. Those "biological elements" and "ecological potential elements" as defined in the Humber River Basin Management Plan for the Humber Middle and Humber Lower Water Bodies (GB53040269201 and GB530402609202), to include, but not limited to: macro algae, angiosperms, macrophytes, benthic/macro invertebrates, fish; b. Those biological and ecological elements defined as "Water-dependent habitats or species for which the Protected Area was designated" as defined in Annex D of the Humber River Basin Management Plan.	No action for WFD Assessment.

Jonathan Monk

From: Manson, Susan [susan.manson@environment-agency.gov.uk]
Sent: 06 September 2012 14:52
To: Richard Cram; K.Harris@hrwallingford.com
Cc: Hewitson, Annette
Subject: Able MEP WFD Assessment

Importance: High

Dear Katherine

Apologies for the delay in my final part of the WFD response. Unfortunately I have not been able to get in contact with all the relevant people until today. The only outstanding issue with the WFD assessment that has not already been discussed is with regard to the prevention of achieving Good Ecological Potential. Please find below the response that will be submitted to the Examining Authority in response to this matter.

The EA would have anticipated seeing a consideration of the hydromorphological changes predicted within EX8.7 on the mitigation measures not currently in place for the Humber Lower water body. The activities undertaken should not jeopardise the achievement of good ecological potential (GEP). We would therefore have expected a discussion of the future ecological impact of these changes in EX8.12. As section 4.4 of EX8.7 clearly indicates potential impacts on the intertidal area, we would expect an analysis of the impact of this on "*preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone*" and "*removal of hard bank reinforcement/ revetment, or replacement with soft engineering solution*". From the evidence presented to date, it is not possible to determine the likely impact on the EA defences in the area affected (Figures 4.4-4.10, Figure 5.6-5.8, EX 8.7), and hence the potential need for additional hard bank reinforcement. This point is further illustrated in Table 4.2, where there is no indication of the potential impact on our flood defences from the change in wave energy.

As such, I would expect to see an expansion of Section 3.4.5 within the current EX8.12 Water Framework Directive Assessment "Effect on mitigation measures 'not in place'.

Should you have any queries on this matter I am in the office today and tomorrow and apologies that I have been unable to get this response to you sooner.

Kind regards

Sue

Sue Manson
FCRM Advisor (Humber)
Yorkshire and North East Region

Environment Agency
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Jonathan Monk

From: Manson, Susan [susan.manson@environment-agency.gov.uk]
Sent: 03 September 2012 14:30
To: K.Harris@hrwallingford.com
Cc: Hewitson, Annette; Richard Cram
Subject: WFD Update for AMEP

Hi Katherine

Sorry I was unable to join to teleconference you had regarding the MEP WFD assessment. Annette has asked me to clarify a couple of points that were not finalised during the teleconference. There are two points in our letter of 31/07/12 that I need to address. Regarding paragraph 41 – the NVZ map wasn't included in any previous assessment, is there a specific reason you want it including?

The reason I think it would be helpful to include this map is for the following:

- Page 7: Nitrate Vulnerable Zones exist within the vicinity of both the MEP site and the Cherry Cobb Sands site
- Page 11, Table 3 There is no obvious mechanism for the activities associated with the construction of the MEP development to have a non-temporary affect on nutrient conditions.

As the applicant has inferred from Page 7 that there is a NVZ in the vicinity of MEP, but has screened this element out of further assessment, it would be helpful for the applicant to give an indication of how close the NVZ is to MEP either numerically or visually within the report (hence the request for a map).

Page 21, section 4.1 This section refers to the NVZ at the rear of the compensation site as indicated on map, it would be useful for the map to be reproduced and shown in the assessment.

With regard to our comments on paragraph 34 of our letter of 31st July, I have left a message with a colleague regarding a specific issue. I am hoping I will be able to provide a full response on this matter tomorrow.

If you have any other questions in the meantime, please get in touch,

Kind regards

Sue

Sue Manson
FCRM Advisor (Humber)
Yorkshire and North East Region

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Jonathan Monk

Subject:	AMEP and WFD
Location:	telecon
Start:	Mon 20/08/2012 11:00
End:	Mon 20/08/2012 12:30
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Manson, Susan

Dear All

We have finally managed to fix a time for the teleconference to discuss AMEP and WFD. I have attached our response to the WFD assessment, which will form the basis of the discussion.

I am on leave on Monday, but Annette will chair on behalf of the Agency.

Richard- can you pass on the details to HR Wallingford please.

Telephone: 800 032 9811
Participant code: 46506447#

Any questions, I am in the office until lunchtime on Friday.

Kind regards

Sue

120731 letter to Able re EX8.1...

Jonathan Monk

From: Hewitson, Annette [annette.hewitson@environment-agency.gov.uk]
Sent: 01 August 2012 10:45
To: Richard Cram
Subject: FW: Comments on EA's review of EX8.12 WFD Assessment
Attachments: Fitch and Phillips 2012.pdf

Dear Richard,
Further to our response yesterday in respect of the WFD assessment, I omitted to append a report from our Marine Monitoring Service, which gives more information on the issues with calculating the area of impact. It may be of use to HRW.
Kind regards,
Annette

From: Hewitson, Annette
Sent: 31 July 2012 11:09
To: 'Richard Cram'
Cc: Manson, Susan; Bolt, Carol
Subject: Comments on EA's review of EX8.12 WFD Assessment

Dear Richard,
Please find attached comments on the above report,
Kind regards,
Annette

Annette Hewitson
Principal Planning Advisor

Environment Agency
Waterside House, Waterside North, Lincoln, LN2 5HA
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CUSTOMER SERVICE EXCELLENCE

Awarded to the Environment, Planning and Engagement Department, Anglian Region, Northern Area.

Impacts of proposed dredging on benthic macro-invertebrate WFD classification: Humber Lower water body

A report by Jayne E. Fitch and Graham Phillips
Environment Agency
Marine Monitoring Service
Kingfisher House
Peterborough

July 2012

Statement of Use

This document was prepared as by the Marine Monitoring Service in response to an Analysis and Reporting request from the Humber PSO/ Yorkshire and Northeast Environment Agency FCRM. The report is intended to provide background information to inform an assessment of the likely impact on benthic invertebrate populations (and WFD classification) of the capital and maintenance dredging and disposal and habitat compensation measure arising from the Able UK Ltd. Marine Energy Park application. It is not intended as a document to provide formal guidance on this or any associated issue.

The views expressed in this document are not necessarily those of the Environment Agency. Its officers, servants or agents accept no liability whatsoever for any loss or damage arising from the interpretation or use of the information, or reliance upon the views contained herein.

Jonathan Monk

From: Hewitson, Annette [annette.hewitson@environment-agency.gov.uk]
Sent: 31 July 2012 11:09
To: Richard Cram
Cc: Manson, Susan; Bolt, Carol
Subject: Comments on EA's review of EX8.12 WFD Assessment
Attachments: 120731 letter to Able re EX8.12 WFD Assessment project wide.rtf

Dear Richard,
Please find attached comments on the above report,
Kind regards,
Annette

Annette Hewitson
Principal Planning Advisor

Environment Agency
✉ Waterside House, Waterside North, Lincoln, LN2 5HA
☎ 01522 785896
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Awarded to the Environment, Planning and Engagement Department, Anglian Region, Northern Area.

Mr Richard Cram
Able UK Ltd
Able House
Billingham Reach Industrial Estate
BILLINGHAM
Teeside
TS23 1PX

Your ref: TR030001/APP/14b
Our ref: AN/2012/113982

Date: 31 July 2012

Dear Richard,

Marine Energy Park, Killingholme Marshes, North Lincolnshire
Water Framework Directive Assessment – Supplementary Report EX8.12

The Environment Agency (EA) has reviewed the Supplementary Report EX8.12, and provides the following comments in response to it:

1. Firstly, we would like it to be noted that we have had difficulty in assessing this, and other documents, within a reasonable time period due to the frequency with which the dredge schedule and methods have been amended. On some occasions revisions have been received before we have responded to the original document. This has made the process less than ideal.

2. We would also refer you to our responses of 29 May 2012 and 6 June 2012 where we explicitly explained the need to identify where in the Environmental Statement (ES) the data resided if it were being relied upon to demonstrate a compliant Water Framework Directive (WFD) assessment had been undertaken.

Method for calculating dredging area of impact

3. The information currently provided in the ES and associated documents does not sufficiently follow the guidance contained in the EA's "Clearing the Waters: Marine dredging and the Water Framework Directive" or provide the information required to judge potential ecological impacts associated with these activities. The EA has provided a more detailed response to this in respect of the spatial extent of impacts associated with dredging activities, mitigation measures and monitoring activities. This information can be found in detail in "*Impacts of proposed dredging on the benthic macro-invertebrate WFD classification: Humber Lower water body*" (section 1.1). It appears from the WFD assessment that you have not followed the guidance with regard to the area of impact of the total project. As you have not provided the dimensions of the total area of impacts for dredging in an accessible form or been clear from where in the ES this information has been taken from, we have had to conclude that, at present, this is unsatisfactory.

Maintenance dredge

4. The supplementary information from the application on Maintenance Dredging (EX 8.6) does not seem to have been reflected in the WFD assessment. The EA is still reviewing all the supplementary information submitted by you on 29 June 2012. If this document has been used in the undertaking of this assessment, could you please be explicit within the assessment referencing the document in detail.

Berthing pocket

5. At present, it is very difficult for us to assess whether the berthing pocket has been included in the habitat loss calculations, as it is not explicit on which information this assessment is based. As the maintenance dredge requirements presented in EX8.6 suggest that dredging within the berthing pocket is to be frequent, it should be included in the habitat loss (to another marine habitat not naturally occurring in the area). If you do not intend to dredge to the chalk level that you are creating as part of the application, this needs to be explicit. If this were to be the case, we would request this be a condition of the Deemed Marine Licence (DML). Otherwise, we expect a full assessment of this impact to be undertaken.

Prevention of deterioration in WFD

6. We raised the potential impact of the project on the prevention of deterioration in WFD in our letter of 29 May2012. Although the present assessment, which we presently agree with, confirms the project does not prevent a deterioration in WFD status, it is not adequate because it has not followed our published guidance in "Clearing the Waters". In addition, we require all the additional clarification outlined within this response. The overall deterioration issue will need to be re-visited upon completion of a revised assessment. We will review the conclusions that you come to, upon submission of a revised assessment.

Section 1: Introduction

7. This section does not address maintenance dredging. We would expect to see this issue addressed within the assessment. In particular, how you intend to manage this aspect of the project in the longer-term to ensure no impact on the Humber Lower water body. This point is addressed in further detail in paragraph 4 above.

Section 1.2 Capital Dredging

8. Could you please explain whether the volume quoted includes the overdredge of the berthing pocket or not. If it does, could you also explain the exact depth of the over-dredge and where this is detailed in the ES (if it is).

Section 1.3 Disposal of Dredged Material

9. The assessment explains that HU080 is to be used for non-erodible deposits and HU082 for erodible deposits. This is contrary to the ES. Could you please confirm if this is a typo and if the correct assessment for disposal grounds has indeed been undertaken within the WFD report.

10. There is no mention of the potential to dispose of the material anywhere other than within the disposal grounds. The EA believes that Able is assessing disposing of some material to land. If this is the case, the assessment of this in the context of WFD needs to be explicit.

Section 1.5: Water Bodies

11. Figure 1, the reference to the ES is missing in the first sentence, which makes cross-referencing a substantial body of work very difficult and time-consuming.

12. Figure 1, North Killingholme Haven Pits is absent from the map.

13. We note that the only water body mentioned in this assessment on the south of the Humber is the North Killingholme Haven Pits transitional water body. The North Killingholme Main Drain (GB10402967580) is not mentioned. This is the waterbody that receives the discharge from South Killingholme Sewerage Treatment Works (STW), the waste water treatment plant, which Anglian Water Services operate and is likely to received flows from the Marine Energy Park.

14. The North Killingholme Main Drain water body will be affected both by the increased discharge from the STW and by hydromorphology changes to the system of drains (needed to accommodate surface water flows from increased impermeable areas). We would refer you to our letter of 25 July 2011 where we notified you of the additional water bodies that the WFD assessment needed to consider. All potential impacts on water bodies should be assessed, including those arising from the construction of the pumping station.

Table 3

15. Depth variation – the EA is unsure that the correct methodology has been applied from our "Clearing the Waters" guidance. Please see our comments in paragraph 3.0 above.

16. In Table 3 under the headings of "capital dredging" and "disposal of dredged material" the assessment indicates that there is no impact directly or indirectly on the intertidal habitat and that the disposal sites are sub-tidal. We would like to draw your attention to your supplementary information provided in EX8.7 which indicates that this is not necessarily the case. This supplementary information indicates that the intertidal area is affected by the disposal of material in HU082.

17. Could you please indicate where the information is presented showing no direct or indirect impact on the intertidal zone from capital dredging. At present we cannot find sufficient information to enable us to agree with the assessment, which has screened out this potential impact.

18. The EA, in its Written Representations, submitted information from Deltares on the potential impact of the project on the intertidal area within the Estuary. This work will be further supported by our submission to your comments on our Relevant Representations. We expect the WFD assessment to reflect these discussions and update and amend the assessment as necessary.

19. Wave Exposure - It is not clear if this has been updated in light of your own supplementary information recently submitted. This refers to section 3.3.1 of Annex 8.1. However, we are now currently reviewing EX8.7 which is an update to Annex 8.1. Please can you clarify this point.

Section 3.4.1: Hydromorphological conditions

Bed

20. It is not clear from this section if our guidance in "Clearing the Waters" has been accurately followed. Please see paragraph 3.0 for a more detailed explanation.

Intertidal Zone Structure

21. This section of the assessment defers to the appropriateness of the Habitats Regulations Assessment (HRA) to secure compliance with WFD. As it is not clear at present if the shadow HRA provided with your submission is compliant with the Habitat Regulations, this will need to be revised if you provide any additional supplementary information.

Cont/d..

22. The assessment refers to the calculations undertaken and presented in 32.6.7 of the ES with regard to the impact of Cherry Cobb Sands (CCS) on the intertidal zone. We understand you are currently undertaking further design work on the compensation site. If the velocities and potential erosion, post breach, change at the site, following finalisation of the detailed design work, the WFD assessment may need to be revisited.

23. The assessment discusses the biological species in the vicinity of the reclamation site and CCS, but this is not referenced to any specific section of the ES. It is, therefore, difficult for us to check the validity of the assessment.

Conclusion

24. We would expect the conclusion to this section to be revised, if necessary, once all the points raised above have been addressed.

Section 3.4.2 Physio-chemical conditions and chemical status

Transparency

25. Could you please advise where, within the ES, the full dredging programme is outlined and that it will be complete within 6 weeks. Annex 7.6 Appendix 2 suggests a programme lasting 18 months.

Specific pollutants and priority Substances

Capital Dredging and Disposal of Dredged Material

26. "There is no significant TBT or PCB contamination" – could you please indicate where the sample results to substantiate this statement are presented.

Cherry Cobb Sands Intertidal Compensation Site

27. Could you please revise this assessment in the light of the results presented in EX31.5. It is not clear from the evidence presented in EX31.5 what remediation will be undertaken or how this will potentially affect the WFD assessment. At present the conclusions drawn in this section are inadequate in the light of the new information.

Section 3.4.3: Biological Quality Elements

Benthic Invertebrate fauna

28. Could you please explain why the draft 2012 data has been used as the basis for assessment (moderate) over the QA'd 2010 and 2011 data that holds the assessment as good status?

2009	2009	2009	2010	2010	2010	2011	2011	2011	**2012**	**2012**	**2012**
Status	*Conf. <Good*	*EQR*	*Status*	*Conf. <Good*	*EQR*	*Status*	*Conf. <Good*	*EQR*	***Status***	***Conf. <Good***	***EQR***
Moderate	Uncertain	0.59	Good		0.68	Good		0.67	Moderate	Uncertain	0.63

Figure 2 Benthic Invertebrate Status

29. Could you please confirm whether this is a general status map from baseline data, or if it relates to a specific sampling year.

Dredging and Reclamation

30. Could you please explain how the 10 ha of sub-tidal habitat has been calculated? Table 11.6 of the ES indicates a loss of 13.5 ha of direct sub-tidal losses, and 9.83 of indirect sub-tidal losses. Please refer to paragraph 3.0 regarding calculating the area of impact in our "Clearing the Waters" guidance.

31. The assessment indicates that the proposed compensation site at CCS will negate the impact of the dredging and reclamation on benthic invertebrates. We wish to draw your attention to the fact that the WFD monitoring of benthic invertebrates is currently limited to sub-tidal sampling. Therefore, the creation of a large inter-tidal habitat, whilst supported by EA guidelines will not at present contribute to the prevention of deterioration in Ecological Status, or towards improving Ecological Status.

32. With regard to the comments made in this section on the berthing pocket, please see paragraph 5.0 for an explanation of the EA's view on this part of the assessment.

33. The EA welcomes the application of the dredging mitigation measures outlined in Table 1 of the assessment. These measures should be included in the Dredging Strategy, which needs to be approved by the Marine Management Organisation (MMO) prior to commencement of dredging. This requirement will be included as a condition on the Deemed Marine Licence (as advised in the MMO's Relevant Representations, paragraph 7.28).

Disposal of Dredged Material

34. At the time of the WFD assessment review, we have not had the time to review all of the supplementary information you have provided. The assessment refers to figures within Annex 8.1; however we are aware that this has been revised to include the capital dredging and disposal (EX8.7). We may, therefore, need to comment further on the expected current changes and potential implications under WFD.

Cherry Cobb Sands

35. Could you please indicate where in the ES the design of the compensation site is discussed. We are surprised to see that the compensation site is being designed to promote deposition and we would like to review this information but we have been unable to locate it within the ES due to the lack of referencing within this assessment.

Conclusion

36. We would expect the assessment to review the conclusions of the benthic invertebrate fauna once our point in paragraph 5.0 (berthing pocket), and our point in paragraph 28 (classification of the benthic invertebrate status) against which you have undertaken this assessment, have been addressed.

Fish Fauna

37. We would again like to draw your attention to the lack of detail held within the WFD assessment and no specific references to the ES. We presume that the basis for the conclusions being drawn in the WFD assessment is derived from the information held within the ES. Without specific reference to the relevant sections of the ES it is very difficult to confirm your conclusions with regard to fish.

38. The assessment does not appear to have taken account of the potential construction on this parameter within the assessment. At present the assessment includes the following statement "The ES also states that migration routes and foraging areas are considered unlikely to be significantly affected during operation of the AMEP site". As the construction timetable for the project is in excess of 12 months, we would expect the construction impacts of the project to be considered. Please refer to our comments of 25 July 2011 where we notified you that our monitoring frequency is yearly and we currently define a non-temporary effect as an

Cont/d..

impact lasting greater than a year. As such the impacts of construction should be assessed.

Section 3.4.5: Effect on mitigation measures 'not in place'

39. The Marine Energy Park will not impact on Environment Agency projects - please see our response in paragraphs 1-6 above. The assessment needs to be reviewed in this respect.

Section 3.4.6: Contributing to improvements in WFD status

40. The contribution of CCS to potential improvements will need to be reviewed once the final design is completed. At present the WFD assessment concludes that the CCS site has an ability to provide a 2:1 ratio of creation:loss. The certainty of this conclusion, especially with regard to mudflat, is questionable at present.

Section 4.0: Little Humber Area Water Body

4.1 Characteristics

41. The previous WFD assessment submitted included a map of the nitrate vulnerable zone. Could you please advise if there a reason that this map was excluded in the superseded assessment.

Section 4.4: Deterioration or other effects on WFD Status

4.4.2 Hydromorphological conditions

42. We agree with the assessment of the need to ensure that mitigation measures are put in place to reduce the sediment load in run-off from the construction site and to prevent accumulation of sediment on the estuary side of the sluice affecting discharge from Stone Creek.

4.4.3 Physio-chemical conditions and chemical status

Oxygenation

43. We agree with the conclusions of this section, subject to the necessary mitigation measures being implemented to minimise run-off being secured in Schedule 8 (the DML) of the DCO.

Specific pollutants and priority substances

44. This section will need to be revisited in light of the new site investigation presented in EX31.5. There appears to be no reference to this within the WFD assessment, but we note the acceptance of potential contamination and elevated levels of pollutants. We also note the assumption of more site investigations and mitigation as necessary for the construction of the realigned embankment and diverted soke dyke.

Section 5.0: Conclusions

45. It would be helpful if the document could be clear in the conclusion section whether it is just the ES and associated technical reports that have been used in this assessment, or whether any of the additional supplementary information you supplied on 29 June 2012 has been utilised. If the supplementary information has not been used, there is a need for some sections of this assessment to be updated in the light of this information.

46. Some secondary ground assessment has been undertaken at the Cherry Cobbs Sands site and this has confirmed the presence of contamination. As a consequence the second bullet point in the WFD conclusion (confirmation of a lack of contamination from the secondary ground assessment at the Cherry Cobbs Sands site) is factually incorrect. We anticipate you will want to revise this assessment in the light of this new work.

Cont/d..

47. The EA will seek requirements within the DCO to ensure that:
    - the diverted soke dyke design meets the necessary measures to maintain or improve the water status;
    - the measures to manage sediment run-off and accumulation and ensure no exacerbation of accumulation of sediment on the estuary side of the sluice are implemented;
    - the measures to reduce saline seepage are implemented;
    - the measures to manage plant and equipment to avoid pollution during construction are implemented.

Requirements

48. As competent authority for the purposes of WFD, the EA will need a Requirement in the DCO to secure a Monitoring and Management Schedule to ensure that monitoring is undertaken to ascertain the spatial and temporal extent of the impacts on the Humber Lower Water Body on the following WFD parameters:

    i. Those "biological elements" and "ecological potential elements" as defined in the Humber River Basin Management Plan for the Humber Middle and Humber Lower Water Bodies (GB53040269201 and GB530402609202), to include, but not limited to: macro algae, angiosperms, macrophytes, benthic/macro invertebrates, fish;

    ii. Those biological and ecological elements defined as "Water-dependent habitats or species for which the Protected Area was designated" as defined in Annex D of the Humber River Basin Management Plan.

Finally, we would like to again stress that the WFD assessment will only be valid if the HRA is accepted.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson
Principal Planning Advisor

Direct dial: 01522 785896
Email: annette.hewitson@environment-agency.gov.uk

End

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2) [a]
Document reference: TR030001/APP/14b

Supplementary Environmental Information

Able Marine Energy Park & Habitat Compensation Scheme
Water Framework Directive Assessment

Supplementary Report EX 8.12

June 2012
Revision: 0
HR Wallingford

Able Marine Energy Park and Habitat Compensation Scheme

Water Framework Directive Assessment

Technical Note DHM6835-02

HR Wallingford

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Document information

Project	Able Marine Energy Park & Habitat Compensation Scheme
Technical subject	Water Framework Directive Assessment
Client	Able UK
Client Representative	Richard Cram
Project No.	DHM6835
Technical Note No.	DHM6835-02
Project Manager	Samantha Dawson
Project Director	Nicola Clay

Document history

Date	Release	Prepared	Approved	Authorised	Notes
28/06/12	1.0	NC	KLH	NC	

Prepared _____

Approved _____

Authorised _____

Mr Richard Cram

Able UK Ltd

Able House (Billingham Reach Industrial Estate) Haverton Hill Road

Billingham

Cleveland

TS23 1PX

Our ref: AN/2012/113982/01-L05

Your ref: IPC-Pro-11

Date: 29 May 2012

Dear Richard

Water Framework Directive Assessments

Marine Energy Park, Killingholme Marshes, North Lincolnshire

We have now reviewed the Water Framework Directive (WFD) Assessment for the Marine Energy Park (MEP) Habitat Compensation Scheme at Cherry Cobb Sands.

At the same time we have also revisited the original MEP WFD Assessment and the specific areas of the Environmental Statement (ES), which you directed us to within your signposting report in relation to our previous WFD related comments.

Habitat Compensation Scheme WFD Assessment (ref: TN DHM6835-01 R1)

We have the following comments to make in respect of this document:

3.2 Zinc measure. The reason behind the likely improvement in this element without any noticeable published measures is due to the closure of the point source causing the problem. The predicted improvement is based on the source being removed, rather than a 1st cycle measure.

3.4.1 page 6 – The first paragraph states that 0.1% of the saltmarsh will be lost as a result of the proposal. This appears incorrect as the loss of 2ha from 627ha is 0.3%. This part of the WFD assessment cannot be signed off as acceptable to the Environment Agency until Natural England confirm the Habitats Regulation Assessment (HRA) is acceptable.

Page 6 Benthic invertebrates. The evidence from Managed Realignment sites on the Humber to date is that the benthic invertebrate population is one of the later species to colonise the created sites. In the short-term (1-5 years) they would not contribute significantly to the benthic invertebrate population of the Lower Humber water body. In the medium-term they would make a contribution, but as the site undergoes succession from mudflat to saltmarsh the benthic invertebrate population would again become a paucity in species and density within the site. In his presentation on 16 May 2012, David Keiller said that his modelling shows the creation of only 43 ha of intertidal mudflat after 5 years (whereas the target for sustainable intertidal mudflat at the ratio of 2:1 is 76 ha) and that this is likely to be significantly less over 10 years. David Keiller's interpretation of the modelling results gave a clear indication that the compensation of intertidal mudflat after 10 years is likely to be less than a ratio of 1:1. The WFD assessment will need amending in the light of this.

Page 6 Benthic Invertebrate fauna, the second paragraph states that there will be a net improvement in the status of this currently low scoring biological element. We would request that more detail on the timing for the net improvement to take place is

provided. It is our opinion that it is unlikely to show any improvement in the first WFD monitoring cycle post breach, and possibly not in the second monitoring cycle either.

Page 7 end of first paragraph – the risk in a reduction in status may depend upon when the breach in the compensation site takes place in relation to the reclamation of the intertidal area at AMEP. This is not currently reflected in the assessment, but if the reclamation takes place ahead of the breach, this statement does not necessarily hold true. We would request that this point is addressed.

Page 7 Conclusion – As above, we will not be able to sign the WFD assessment off as acceptable until we have confirmation of HRA acceptance.

Page 8 3.4.3 Specific Pollutants and Priority Substances – We note the need for additional ground samples to confirm CEFAS Action Level 1 and to include pesticides and fertilisers and we look forward to receiving these in due course.

Page 8 Conclusion – we note the interim conclusion drawn and we are likely to request that an updated WFD assessment is secured through a condition in the DCO if this is not received before determination.

Page 9 – It would be helpful if you could provide further clarity in respect of the figures provided in the report. The site area is quoted as being 115 hectares, and the target at Cherry Cobb Sands is to create 79 hectares of sustainable mudflat, whilst removing 2 hectares of saltmarsh in its construction. It is not clear from the report what portion of the 115 hectares will be mudflat and what proportion will be saltmarsh.

Page 10 4.1. We have sent a map to HR Wallingford showing the nitrate vulnerable zones. They may need to update this section following receipt of the map.

Page 16 Paragraph 1 "The ES does confirm that advice will be sought from the EA on the measures required to maintain or improve the status of the soke dyke." We would expect to see the required measures within the Ecological Management and Maintenance Plan.

Page 16 Section 5 Conclusion – we concur with the conclusion that the following two bullet points are critical to the validity of the assessment:

The acceptability of the HRA;

Confirmation of a lack of contamination from the secondary ground assessment.

We can therefore confirm that we will not be able to give our full approval of either WFD assessment until the above points have been addressed.

AMEP WFD Assessment (Ref: DER47112-01), including responses to issues included in the Signposting Report provided on 30 January 2012

It appears from the AMEP WFD assessment that the evidence presented is purely based upon guidance for the marine environment. It would seem that in the absence of specific Transitional guidance it would be more appropriate to use a combination of both marine and fluvial guidance. Our fluvial guidance refers to the following additional considerations: critical habitat for the water body; cumulative impacts within the water body, and expert judgement. The application of a trigger is not a reason to ignore expert judgement within the assessment. From the above Technical Note it is unclear how conclusion has been derived as the assessment relies upon the ES. It would be helpful for the regulators if, where the ES is relied upon to form the basis of the WFD Assessment that as a minimum the specific section of the ES is referred to or extracts are cited. At present the assessment appears to be more of a screening exercise as it is difficult to follow the arguments presented and hence to assess the validity of them under the Directive.

In addition, at present there are two WFD assessments. Our advice would be to compile this into one WFD assessment looking at all parts of the project (reclamation, dredging, disposal, compensation site creation) in order that the different parts of the project that are interlinked are adequately assessed in terms of WFD. For example Benthic Invertebrates in both assessments (DER47112-01 and TN DHM6835-01 R1) need to cross-reference each other, but at present do not. If the benthic invertebrate improvement suggested in TN DHM6835-01 R1 is realised, it should have been assessed in terms of the impact of the remainder of the project on the benthic invertebrate community. The evidence for this is not succinctly presented at present. As a minimum the two documents should cross-reference each other, but our preference would be for the points below to be addressed whilst combining a WFD assessment for the total project.

Biological Elements

Benthic invertebrates-

We have concern with regard to the impact on the biological elements. The lowest scoring biological element for the Humber Lower water body is for benthic invertebrates. The only other classification for the biological elements in this water body is for fish, which is currently at Good status. The Benthic Invertebrate Classification for the Humber Lower is Moderate but it is borderline reaching Good

status. It is likely that the classification should actually be elevated to Good status as of this year. However, this element will be just inside the Good status boundary with Moderate status. This means with any improvements in sediment quality over the next four years that the biological element could comfortably be in the Good status classification for the benthic invertebrate element. Activities that work against this aim work against the ability to maintain and reach Good status. Our monitoring frequency is yearly and we currently define a non-temporary effect as an impact lasting greater than a year.

By achieving Good status for benthic inverts, the overall monitored biological elements will be reaching Good status. It could be viewed that any major impacts to the benthic invertebrate communities could be considered as detrimental to achieving and maintaining good status for that element and must therefore be considered carefully. With this information in mind, we would request that further consideration be given to the effects of benthic invertebrates for the water body in the WFD deterioration assessment paper - for example, highlighting areas of impact and impact assessment in the background of a water body that is on a status boundary for that element. Much of this may well be borrowed from the Environmental Statement; however it must be put in the context of the Water Framework Directive.

At present the explanation enclosed within Technical Note DER4712-01 is insufficient for the Environment Agency to accept the argument presented. Table 4.a (Disposal) indicates an impact on benthic invertebrates is unlikely, but in Table 4.b (Disposal) is scoped into the ES. There is no further evidence of the full WFD Assessment we would expect for this activity in the documents present. It appears the argument being made is that the impact on this can be screened out. The evidence to substantiate this view point is not presented. In addition Technical Note TN DHM6835-01-R1 indicates that the creation of a compensation site will ensure there is no impact on benthic invertebrates and that this risk is being mitigated. The sub-tidal element of the impact from AMEP is being compensated at a ratio of 1:1. The impact on benthic invertebrates from both non-erodible and erodible deposition is likely to extend to 18 months (based on Appendix 2 in Annex 7.6). The compensation site will not commence construction until either the DCO is granted or planning permission is sought by an alternative means. The compensation site is not going to have a rich benthic invertebrate community in the early years (years 1-5 as a minimum). This means that there is a potential impact on benthic invertebrates that would span a period from the onset of marine works in the short-term. As we stated in our letter of 25 July 2011, our monitoring frequency is yearly and we currently define a non-temporary effect as an impact lasting greater than a year.

We expect to see a detailed assessment of the impact of the entire project (reclamation, dredging, and the compensation site) on benthic invertebrates within the Lower Humber water body, explaining the reasoning behind the argument presented. It is our understanding that there are potential impacts on benthic invertebrates in the short and longer-term (as the effectiveness of the compensation

site reduces), with a potential improvement in the medium term as the colonisation of the compensation site takes place.

Other Aquatic Flora (e.g. Saltmarsh and seaweed)

At present it is not possible to understand the argument made with regard to this biological element within the WFD assessment. The assessment is summarised in the table, but with no evidence presented, and no reference to where in the ES this can be found. It is difficult, at present, to link the argument between the mitigation presented within TN DHM6835-01 R1 and DER4712-01. This needs to be improved.

Fish

At present it is not possible to understand the argument made with regard to this biological element within the WFD assessment. The assessment is summarised in the table, but with no evidence presented, and no reference to where in the ES this can be found.

Hydromorphological elements supporting biological elements

Morphological Conditions

Depth Variation

No screening or assessment of this appears to have taken place. Evidence needs to be presented as to how the disposal of both erodible and non-erodible material will affect the depth variation as a consequence of the development. There are numerous dredge specific mitigation measures within the Humber Lower water body. How are these being applied to this development? How will the footprint of the reclamation affect the depth variation in the Humber Lower water body as a consequence of changes in flow dynamics?

Bed

No screening or assessment of this appears to have taken place. Evidence needs to be presented as to how the disposal erodible and non-erodible material will affect the bed of the estuary as a consequence of the development. There are numerous dredge specific mitigation measures within the Humber Lower water body. How are these being applied to this development? How will the footprint of the reclamation affect the bed of the estuary in the Humber Lower water body as a consequence of the development?

Intertidal Zone Structure

Screening has been undertaken for this element, but concluded that the likelihood of a non-temporary effect is unlikely. At present it is not possible to understand the argument made with regard to this hydromorphological supporting biological element within the WFD assessment. The assessment is summarised in the table, but with no evidence presented, and no reference to where in the ES this can be found. It is difficult at present to link the argument between the mitigation presented within TN DHM6835-01 R1 and DER4712-01. This needs to be improved.

Tidal Regime

Wave exposure

Reference is made within the ES of the potential impact on tidal regime within Annex 8.1 specifically at the AMEP site. Is not clear within the ES of the impact on the wider estuary, and specifically the Humber Lower water body. From Tables 4.a and 4.b within the assessment it is not possible to understand the evidence being presented to conclude that it is unlikely for a non-temporary effect. If the tidal regime is permanently affected, we would expect to see the argument presented within the assessment as to why this is not significant at the water body level.

Water Dependent Features

We agree that this can be based on the outcome of the HRA, but you need to consider the Humber Lower water body in this assessment, and whether there is anything unique to the Humber Lower water body. It is worth noting that the Humber Lower water body does not coincide with the Outer part of the estuary as far as the Habitat Regulations are considered, but overlaps with the Humber Middle part of the estuary. The loss of mudflat in the Humber Lower water body does need to be considered in terms of the biological quality elements.

Not affect delivery of mitigation measures as outlined in the Humber Lower water body in Annex B.

As indicated in our response on 25 July 2011, the assessment also needs to ensure that the scheme will not compromise the mitigation measures 'not in place' for the Humber estuary. Even though, as HR Wallingford point out, the mitigation measures for this water body relate to flood protection, it is important that the impacts of this scheme will not invalidate the mitigation measures we need to put in place to achieve good ecological potential. Despite the inclusion of a section on contributing to WFD improvements, the document should ideally address whether the scheme will impact on the ability to deliver the required measures. At present we do not think that the Technical Notes sufficiently addresses the points raised above.

If your consultants would like to discuss the technical aspects of this response with us, they are advised to contact Sue Manson from our Humber Strategy Team, on 01709 312925.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson

Principal Planning Officer

Direct dial 01522 785896

Direct fax 01522 785040

Direct e-mail annette.hewitson@environment-agency.gov.uk

Jonathan Monk

From: Richard Cram [rcram@ableuk.com]
Sent: 03 April 2012 18:12
To: Annette Hewitson
Cc: Susan Manson
Subject: FW: Water Framework Directive Assessment
Attachments: TN-DHM6835-01_Able_MEP_Habitat_Compensation_Scheme_R1-0-NEW.pdf

Annette,

I have attached to WFD for the compensation site. Please advise your comments.

Kind regards

RICHARD CRAM
Design Manager

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From: Nicola Clay <N.Clay@hrwallingford.com>
Date: Wed, 28 Mar 2012 17:39:38 +0000
To: 'Richard Cram' <rcram@ableuk.com>
Subject: Water Framework Directive Assessment

Richard

Please find attached the Water Framework Directive Assessment for the habitat compensation scheme. Apologies for the slight delay in providing this report.

Kind regards
Nicola

Nicola Clay
Group Manager, Environment

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HR Wallingford
Working with water

Able MEP Habitat Compensation Scheme

Water Framework Directive Assessment

TN DHM6835-01 R1

March 2012

Document information

Project	Able MEP Habitat Compensation Scheme
Technical subject	Water Framework Directive Assessment
Client	Able UK
Client Representative	Richard Cram
Project No.	DHM6835
Technical Note No.	DHM6835-01
Project Manager	Nicola Clay
Project Director	Katherine Harris

Document history

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28/03/12	1.0	SDA	NJC	KLH	

Mike Harris

Case Manager

National Infrastructure Directorate Planning Inspectorate

Temple Quay House

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Our ref: AN/2012/113982/01-L02

Your ref: IPC-Pro-11

Date: 2 April 2012

Dear Sir/Madam

Able Marine Energy Park, Killingholme Marshes, North Lincolnshire

Relevant Representations by the Environment Agency

Introduction

The Environment Agency is an executive non-departmental public body established under the Environment Act 1995. It is an adviser to Government with principal aims to protect and improve the environment, and to promote sustainable development. It plays a central role in delivering the environmental priorities of central government and the Welsh Government through its functions and roles. It is also an adviser to local decision makers in its role as a statutory consultee in respect of particular types of development, as listed in Schedule 5 of the Development Management Procedure Order 2010. For the purposes of this Development Consent Order (DCO) application, we are a statutory interested party.

The Environment Agency takes action to conserve and secure proper use of water resources, preserve and improve the quality of rivers, estuaries and coastal waters and groundwaters through pollution control powers and regulating discharge consents. We have regulatory powers in respect of waste management and remediation of contaminated land designated as special sites. We also encourage remediation of land contamination through the planning process.

The Environment Agency is the principal flood risk management operating authority. It has the power (but not the legal obligation) to manage flood risk from designated main rivers and the sea. The Environment Agency is also responsible for increasing public awareness of flood risk, flood forecasting and warning and has a general supervisory duty for flood risk management. As of 2008[update] the Environment Agency also has a strategic overview role for all flood and coastal erosion risk management.

The Environment Agency also has statutory duties under the Salmon and Freshwater Fisheries Act 1975 to 'maintain, improve and develop migratory and freshwater fisheries in England and Wales'.

Scope of these representations

These Relevant Representations contain an overview of the project issues, which fall within our remit. They are given without prejudice to any future detailed representations that we may make throughout the examination process. We may also have further representations to make when supplementary information becomes available in relation to the project.

We have been working closely with Natural England and the Marine Management Organisation to provide advice and guidance to the applicant since June 2010. We have a schedule of meetings arranged to progress and resolve as many outstanding

issues as possible and to develop a Statement of Common Ground (SoCG) in this respect.

We have reviewed the DCO application, Environmental Statement (ES) and supporting documents submitted as part of the above mentioned application, which were received on 23 February 2012. The comments are presented under topic headings.

Flood risk – Marine Energy Park site

The Flood Risk Assessment (FRA) submitted in respect of the Marine Energy Park (MEP) site has assessed the risks to and from the project based on an earlier quay (chamfer) design. The modelling methodology used is fit for purpose. Unfortunately, the FRA does not reflect the latest amended (square edged) quay design, which only becomes apparent on reading Chapter 8 of the Environmental Statement. It will be difficult for us to advise on the definitive requirements for flood risk mitigation until the FRA is updated and we request that this further work is submitted as soon as possible.

The construction of the quay will result in a reduction of the current standard of protection provided by the adjacent defences. This occurs at both the north and south ends of the quay, the north section being the worst affected. However, Able is proposing to mitigate for this increase to the north as part of the development. It is our opinion that the project may increase sedimentation over time to the south of the quay. Able has also agreed to monitoring sediment levels and the foreshore to the south, with a view to improving defences if/when required.

The flood modelling has identified that the project will impact on overland flood flows and locally increase the flood depth to the surrounding area. This generally results in a 300mm increase in flood depths, which could affect third parties, in particular the warehousing/office buildings at Manby Road, and property on Marsh Lane, such as Hazel Dene (a residential property). The Secretary of State will need to take a view on whether or not this increase in flood depths to third parties is acceptable.

The FRA includes sufficient detail to confirm the acceptability of surface water disposal from the site. However, further details will be required to ensure a satisfactory scheme will be implemented. Currently, the proposal requires adaptation to a small but integral part of the North East Lindsey Drainage Board scheme and the relocation of the pumping station. The former will require the agreement of the Drainage Board and the latter will require consent from us under the Environment Agency Anglian Region Land Drainage and Sea Defence Byelaws 1987.

The FRA has used climate change requirements set out in Planning Policy Statement 25 'Development and Flood Risk' (PPS25), which was relevant policy in force at that time, (but is now superseded by the National Planning Policy Framework (NPPF)). This was our advice to the applicant during the pre-application consultation stages. In January 2012 the National Policy Statements for Ports was finally designated and this requires the applicants to use the latest set of UK Climate Projections. The PPS25 levels are comparable to the high emission scenario 90% estimate from UKCP09, so by having considered this degree of change, it is our opinion that Able has covered all that is required. However, if there are any safety-critical elements to the project, Able may want to revisit the high emissions scenario to ensure those elements are set at an appropriate level, above the potential flood risk.

As the MEP development will take place within the Environment Agency Anglian Region Land Drainage and Sea Defence byelaw distance of 9 metres, our consent for the works will also be required under these Byelaws.

Impact on migratory fish

The Environment Agency has statutory duties under the Salmon and Freshwater Fisheries Act 1975 to 'maintain, improve and develop migratory and freshwater fisheries in England and Wales'. The same legislation affords specific protection to any salmon, trout or freshwater fish which is either unclean (the fish is about to spawn, or has recently spawned and has not recovered from spawning) or immature; making it a criminal offence to take, kill or injure, or attempt to take kill or injure such a fish.

The Environment Agency is concerned that the noise and vibration caused by around 26 weeks of percussive piling during the construction period has the potential to damage migratory fish populations within the Humber system. The Humber estuary acts as the sole gateway for migratory fish into the Humber system, allowing fish to travel upstream from the sea, to spawn in rivers such as the Don, Aire, Ouse, Trent, Wharfe and Derwent; the last of which has SSSI and SAC status. The success of these populations relies wholly on their ability to gain safe passage through the Humber in order for them to complete their life-cycle. As such, any activity taking place in the Humber that hinders the ability of fish to make this journey, has the potential to threaten populations throughout in the river catchment.

In addition to the above, many fish populations, particularly Atlantic Salmon, are in a fragile, recovering state, following the almost total annihilation of the species within the Humber as a result of the poor water quality and physical barriers introduced by the industrial revolution. Recent work to address some of these issues has seen Salmon returning to upstream rivers for the first time in decades. Whilst the current number of fish within the system is not well known, a device to count the number of juvenile salmon on the River Ure was operated up until about 5 years ago, with its

most recent measurements suggesting around 20,000 juveniles moving downstream. This would usually result in a yield of around 2,000 adults returning upstream to spawn. These numbers are from just one of a number of tributaries, which drain into the Humber, so are likely to represent a fraction of the overall population present within the system.

Fish can be disturbed by noise and vibration in a similar way to humans or birds. The main difference is that water is much denser than air, so the noise travels much more efficiently and can therefore cover larger distances. The loudest noises may cause physiological damage to the extent that fish may be fatally injured. As noise levels decrease with distance from the source of noise, a sliding scale of behavioural responses can be expected, with higher proportions of fish close to the source noise likely to be diverted from their usual course, and lower proportions at larger distances. The Subacoustech report presented by Able (Annex 10.3) has modelled various scenarios (tide variations and pile sizes), concluding there is a potential for auditory injury, a strong avoidance reaction, and significant avoidance behaviour in all scenarios at particular distances across the estuary.

Able has considered the different species which might be present and likely to be affected by the predicted noise. Different species are more sensitive to sound than others. Atlantic salmon are the most sensitive of the main migratory species and more is known about the characteristics of their auditory system and their behavioural response than other species in the estuary.

Underwater noise levels have been estimated using a proprietary underwater sound propagation model (Inspire v3.0.7), which enables the level of noise from piling and its behaviour with range to be estimated for varying tidal conditions, water depths and piling locations. Given that noise levels can be estimated at any point across the estuary, the proportion of fish likely to be diverted can be predicted, taking into account other factors such as daily/weekly working hours, seasonal working restrictions and the migratory patterns of different fish species.

Despite the conclusions of the Subacoustec report, the conclusion recorded in the Environmental Statement, Chapter 10, Paragraph 10.8.6 is that "*Migratory fish of conservation interest passing through the area are unlikely significantly affected from prolonged exposure to piling works as their exposure is limited to a few hours, but it is not known if the piling operations act as an acoustic barrier to the spawning runs.*"

The Environment Agency is of the opinion that Able need to explore opportunities to avoid, mitigate and, where necessary, compensate for the predicted effects. We will require conditions to mitigate the impacts of piling noise on the deemed marine licence, and if necessary, an agreement to provide compensation for residual impacts (we are currently negotiating mitigation/compensation for a similar site on the north bank of the Humber, known as Green Port Hull). This position is supported

by the Marine Management Organisation and Natural England, who are raising similar issues in respect of marine mammals and lamprey respectively.

Hydrodynamic and sedimentary regime

The assessment of the hydrodynamic and sedimentary regime, contained in Chapter 8 and the associated Annexes does not fully address the impact of the MEP, the compensation site and the dredge disposal site. If they are discussed in detail elsewhere, this needs to be made much clearer in terms of referencing the relevant part of the application. There is very little assessment or discussion of the impact of waves in Chapter 8. There is no adequate assessment of the impact of capital and maintenance dredging on the long-term impact on estuary processes.

Indirect intertidal losses are not adequately assessed in terms of changes resulting from long-term morphological change caused by the MEP. Able only appear to be proposing to compensate for direct losses. Annex 8.2 refers to it taking several decades for the estuary to respond to the building of MEP and a dynamic equilibrium being reached, but no mitigation or compensation is being proposed for this impact. There is no quantification of this change in relation to natural variability. The Environment Agency has engaged independent consultants to review the modelling work and the early findings of this work are that additional compensation, to compensate for indirect, losses will be required.

There is an inadequate assessment of the in-combination and cumulative impacts within Chapter 8. If these are assessed elsewhere in terms of hydrodynamics and sedimentary regime this needs indicating. At present it is unsatisfactory. We have concerns about the disposal of dredged material in association with other development projects.

The changes in the quay design have not been adequately assessed, most notably reducing the extent into the estuary by 80m. The quay will now be closer to third party flood defences, and the chamfer design has been amended to a square edged quay. The impact of all of these changes on the interpretation of the modelling results needs explanation. There have been major changes to the erosion and deposition expected within the estuary as a result of additional modelling work undertaken, but the design has been further changed. This reduces our confidence in the modelling results and this combined with the exclusion within the modelling results of data that is within the model error bands; for sensitivity analysis it would be helpful if the impacts of these potential changes (currently excluded from further discussion) were included. Without this discussion there is likely to have to be longer-term monitoring of suggested potential impacts.

Choice of Site – Cherry Cobb Sands compensation site

In 2004 the Environment Agency produced a Coastal Habitat Management Plan (CHaMP) (Black & Veatch Consulting Ltd, March 2004). CHaMPs provide a framework for managing sites of European importance and Ramsar sites that are located on or adjacent to dynamic coastlines.

Currently flood protection in the Humber estuary is provided by approximately 235km of defences largely comprising grassed, earth embankments or heavier rock/stone protected banks with some lengths of quay walls and sheet-piled walls, mainly in the urban areas. The defences are generally in reasonable condition, but the standard of protection is low in places where insufficient height of defence could lead to damage through overtopping, or where the condition of the defence itself results in an unacceptable risk of breaching/destabilisation through wave action.

Records show that water levels in the Humber estuary have been rising historically, relative to the land levels, at a rate of c. 2mm per year. This rate is increasing as a result of climate change and, unless action is taken, will increase flood risk in many areas to unacceptable levels. In addition to the increased risk to people, property and land uses, the rising sea levels are causing loss of inter-tidal habitats within the estuary; these habitats are prevented from migrating inland by the existing flood defences (a process known as 'coastal squeeze').

The 2004 CHaMP assumed a rate of 6mm/year over the period 2000 – 2050. A recent review of the CHaMP revised this rate to 4mm/year (as recommended by Defra for use in flood risk planning). The review also allowed a revision of calculations of coastal squeeze habitat losses based on improved data sets.

The primary functions of the Humber Estuary CHaMP are to:

provide a clear and agreed record of predicted habitat losses and gains, and other potential impacts on the habitats and species of European or international importance subject to shoreline change; and

set the direction for habitat conservation measures to address net losses.

The Humber Estuary CHaMP commits the Environment Agency to compensate for the loss of inter-tidal habitat on the following basis (unless agreed otherwise on a site by site basis or as a result of future Strategy / CHaMP reviews):

1:1 replacement for coastal squeeze and temporary disturbance from Flood Risk Management schemes, and

3:1 replacement for permanent loss due to flood defence works (this is the currently agreed ratio, but may be subject to alteration in the future).

As a result of this commitment the Cherry Cobb Sands site is identified in our Humber Strategy (our long term plan for managing flood defences along the Humber estuary into the future) as a planned habitat creation site, to compensate for these losses, identified at Keyingham. Whilst we recognise that the Strategy comes with a delivery risk, by identifying sites where we do not currently own the land, this project has the potential to hinder the Environment Agency's ability to deliver habitat compensation requirements.

Flood risk – Cherry Cobb Sands compensation site

The applicant has put forward the site at Cherry Cobb Sands on the north bank of the River Humber to provide habitat compensation for the adverse effect the development will have on the internationally designated subtidal and intertidal habitat within the Humber Estuary. In order to create the new habitat the applicant proposes to construct a new flood defence behind the existing defence line. The existing defence will then be breached to enable tidal inundation to provide compensatory habitat, which will be lost from the south side of the estuary following construction of the MEP quay.

We have significant concerns about the proposed design of the compensation site's new flood defence embankment. Having reviewed the relevant Flood Risk Assessment (FRA), Chapter 36 and Annex 36.1, we are not yet assured that the design crest level for the new embankment will be to the required 1 in 200 year standard including climate change.

Different types of embankment protection are specified along the embankment length, apparently commensurate to the expected erosion forces of tidal inundation. However, we believe that greater lengths of the embankment require more robust protection than suggested. This is because the preferred breach width in the existing flood bank is likely to increase over time because the ends of the breach will not be protected from erosion. Therefore, more of the new embankment will be subjected to wave action than predicted. We note that the hydraulic model used appears to take account of existing ground levels rather than predicted ground levels following re-profiling of the site to provide embankment material.

Regarding the suitability of embankment material, we still have concerns about whether winnings from within the site will be suitable for use in a flood bank. We reserve judgement until the outcome of the proposed further Site Investigation (SI) work, including laboratory testing, which is mentioned on page 52 of the Signpost Report (which Able supplied to us following submission of the application).

The proposal also has the potential to increase the levels of siltation at Stone Creek, which lies 400m to the south-east of the site. Dredging of Stone Creek has in recent times been undertaken by the Environment Agency. The local Internal Drainage Board has recently taken over responsibility for a temporary dredging programme, part funded for 5 years by the Environment Agency and East Riding of Yorkshire Council, to alleviate the existing siltation issue. Able has acknowledged (in Chapter 36, paragraph 36.8.5) the potential for the development to exacerbate the issue. We would concur with the need for an agreed monitoring and maintenance plan for Stone Creek in order to identify circumstance in which work will be required. We request that the need for this plan is secured in the DCO.

The flood defence works will require consent from us under the Yorkshire Land Drainage Byelaws 1980 as the site is on the north bank of the Humber.

We are currently liaising with Able on this issue and hope to make further progress, which will be recorded in the SoCG.

Potential land contamination

We have considered the reports submitted in respect of potential land contamination at the Cherry Cobb Sands compensation site (Annexes 31.2 and 31.4) together with Chapter 31 of the Environmental Statement. The assessments provided have identified that previous land uses may have given rise to contamination at the site. The limited intrusive investigation work undertaken within the fields in the north west area of the site has identified metal and hydrocarbon contamination of the ground, believed to be associated with a historic landfill site at this location. In addition, the assessments have identified that creeks on the site may also have been in-filled with potentially contaminated material and that there is a potential for contamination in the area of the site associated with use as a decoy site in WWII. The recommendation of the assessments is that further intrusive investigation work is required to determine the areas of potentially contaminated ground, based on the information gathered to date.

We concur with this recommendation. The soil sample locations should be appropriately sited in relation to current and historic areas where contamination may have arisen. Following a robust intrusive investigation the risk to controlled waters should then be determined using an updated conceptual site model for the site. We note that requirements are already included in the DCO in respect of contamination but we may provide some revised wording in due course.

Hydrogeological risk

We are satisfied that the assessment in respect of controlled waters has been adequately undertaken. We agree with the conclusions of the Hydrogeological Risk

Assessment that due to the general permeable nature of the overlying superficial deposits in the proposed piling and dredging area, their removal or penetration will not significantly affect the saline interface. The proposed area is not in a Source Protection Zone and is not considered to be within the zone of influence of groundwater abstractions. The project has identified that the tidal variation may lead to some intrusion but that the net effect will be outflow to the channel. A significant mechanism of discharge which already exists.

Foul water drainage

Annex 9.5 includes a letter from Anglian Water Services confirming that they will work with Able to develop the appropriate sewage infrastructure so that foul sewage can be directed to the mains sewer.

It is disappointing that Able has not included our suggestion that details of flows for sewage and trade effluent be included in the ES, together with discussion on potential effects on the receiving water body. As a result of the project Anglian Water Services will need to upgrade its waste water treatment works. Further details on quantities and flows would enable us to know with greater certainty that the required Environmental Permit variation can be accommodated within environmental limits.

We are aware that the Customs House will not be connected to the mains system, but will be serviced by a package treatment plant. The discharge from this plant will require an Environmental Permit from us under the Environmental Permitting Regulations (England and Wales) 2010.

Waste

We are satisfied that the waste chapters cover the relevant Duty of Care aspects of the development proposal from construction to operation. They acknowledge the relevant legislation and the requirement to undertake a Site Waste Management Plan.

Water Framework Directive

The application includes a Water Framework Directive Assessment in Annex 9.4, which covers the relevant waterbodies in the area. The assessment is satisfactory for the MEP site and the dredging works. We are still awaiting submission of a Water Framework Directive Assessment for the Compensation Site at Cherry Cobb Sands. We reserve the right to advise and comment on the appropriateness of this once we are in receipt of it.

In-combination and cumulative impacts

The in-combination assessment is inadequate as presented. We recommend that a table with conclusions from all the Chapters needs to be drawn together so that it is clear what impacts arise from the development in-combination and cumulatively as a result of other developments within the estuary and if, and where, these are mitigated.

In addition we would recommend that the assessment area is expanded to include a 10km radius around the compensation site and a 10km radius around the capital and maintenance disposal sites. At present, Grimsby and the Sunk Dredge Channel are being excluded from the assessment, but may conflict with dredging works.

Environmental Permits

We note that the application includes the proposed construction of a new outfall within the quay frontage that would be used to divert existing E.ON and Centrica outfalls. The current outfalls are regulated by Environmental Permits issued to the operators. Diversion of the outfalls will require a variation to these permits and will therefore require the agreement of the operators.

Protection of Environment Agency interests

During the coming weeks we will be working with Able on these outstanding issues and giving further consideration to the draft DCO, in particular the requirements and protective provisions. We will also raise with Able any issues we think need to be covered in a side agreement etc, in order to safeguard our interests. We note that a plot of Environment Agency land has been included in the order as one which the applicant wishes to compulsorily purchase - we believe this land may be essential for operational purposes in relation to flood risk management and we are urgently looking onto that issue. We will advise further as soon as possible.

We will submit further detailed written representations on these issues in due course and we will also be working with Able and other Defra bodies in respect of a SoCG. We reserve the right to add or amend these representations during the course of the examination.

If you have any questions regarding these representations, please contact me on the number below.

Yours faithfully

Annette Hewitson

Principal Planning Officer

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Jonathan Monk

From: Manson, Susan [susan.manson@environment-agency.gov.uk]
Sent: 18 January 2012 09:26
To: Richard Cram
Cc: Thornely, Ben
Subject: WFD assessment requirements
Attachments: RandD FD2609-TR WFD Expert Assessment of Flood Management Impacts.pdf

Hi Richard

Following our meeting on Monday I had an action on me to let you know more about WFD and assessment requirements for works which require Works in Rivers Consent from the EA and/or require planning permission. As you know, guidance is in place for dredging activities and Able have already produced a dredging assessment in respect of AMEP.

Unfortunately, the guidance linked to other activities is not so well developed. Currently, the best available source is DEFRA's 'WFD Expert Assessment of Flood Management Impacts' R & D Technical Report FD2609/TR. I have attached this for your information. It does explain what needs to be included in a preliminary assessment, as well as subsequent Level 1 and 2 assessments. These changes came in to force on 1st January 2012 as part of the Flood and Water Management Act. I am still seeking confirmation under what section of the Act this change resides.

Early engagement with ourselves is recommended if you think forthcoming works may need assessment based on the guidance. We have internal processes in place to help screen proposed works for whether assessment is required. I'm also happy to attempt to answer you may have!

Kind regards

Sue

Sue Manson
Humber Strategies Technical Specialist
Yorkshire and North East Region

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Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme

WFD Expert Assessment of Flood Management Impacts

R&D Technical Report FD2609/TR

Environment Agency

defra

Department for Environment Food and Rural Affairs

Mr Richard Cram

Able Uk Ltd

Able House (Billingham Reach Industrial Estate) Haverton Hill Road

Billingham

Cleveland

TS23 1PX

Our ref: AN/2010/110109/09-L01

Your ref: RC.JD.AMEP.A.L11/0021

Date: 16 November 2011

Dear Mr Cram

Marine Energy Park

Able Humber Port, Killingholme, South Humber Bank

Thank you for consulting us on updated Chapters of the Environmental Statement and supporting assessments. We have the following comments to make in respect of these.

Revised Chapter 13, Drainage & Flood Risk

Flood Risk Assessment and Drainage Strategy, Final Report, Aug 2011 (JBA)

The Drainage and Flood Risk Chapter refers to the Hydrodynamics and Sediment Regime Chapter, which has been revised since the quay design has been amended. We have not been sent a copy of this, so the following comments are made with the caveat that they may be amended following receipt of this information. This is required to demonstrate there is no negative effect in the Humber, and being able to undertake an early review of this information will assist us in providing the assurances that the IPC will require.

The submitted information covers the majority of the requirements for the South Bank works subject to the imposition of conditions securing future detail such as surface water, flood warning and evacuation etc. The submitted technical notes provide the evidence required to support the recommendations made within the Flood Risk Assessment (FRA). This includes the impacts of the development on the flood defences and overland flood flows.

The FRA has identified that the development results in increased flood depths and flood hazard to third parties. We would recommend liaising with North Lincolnshire Council on the implications of these increases. The Council is best placed to determine if there is an overall increase in flood risk when taking into account other factors such as the comments from emergency planners.

As part of the mitigation strategy for the development additional works on the existing sea defences are required. The current proposal will require additional works on the foreshore and therefore will also be influenced by comments from Natural England. The IPC will need to collate these comments to ensure there is no conflicting guidance which will alter the proposed mitigation.

The proposed development does require mitigation works on the north bank of the Humber (the compensation site) and no further detail has been submitted to resolve the Environment Agency's outstanding issues in this respect (detailed in our letter of 14 July 2011 re: Annex 31.3 & Chapter 36). We would be pleased to review any additional information you have on this aspect at your earliest convenience.

Both the development and the proposed alterations to the sea defences together with the north bank works will require our Consent/Legal Agreement. As per your similar application at East Halton, we will require additional detail to determine this Consent. We would encourage you to advance this issue as early as possible in

order for us to be able to provide assurances to the IPC on deliverability of the project.

Water Framework Directive Assessment, Technical Note DER4712-01 (HR Wallingford)
I can confirm that the revised assessment has addressed the issues raised in our previous letter of 25 July 2011, and is now considered appropriate to support your application.

Dredging Strategy (Revision D)
The following comments made by Richard Morgan (our Groundwater Specialist) have already been emailed to you on 4 November 2011. However, they are repeated below for completeness.

"I have not seen any reference to the ESI Ltd risk assessment on piling and dredging. The Dredging strategy should ensure that the extent of proposed dredging is consistent with that outlined in the piling and dredging risk assessment and vice versa. The reason for this is to ensure that the proposals have not been revised to such an extent as to make the conclusions in the risk assessment no longer relevant to the proposed works.

I have not undertaken a close inspection of the proposed dredging and the dredging as outlined in the risk assessment. Confirmation should be sought from the applicants that the risk assessment is still relevant to the proposed works. For example the dredging strategy proposes a 300 mm over dredge. Is this accounted for in the risk assessment?

The Approach Channel and the Berthing Pocket would seem to be the two dredging areas where the most significant thickness of superficial deposits will be removed. The Piling and Dredging risk assessment must account for this work in its most recent form. For the Approach Channel this is in the north of the area when compared with the south of this dredge area. Ground level in the north is in the order of -5.4 m CD and will be dredged to -9.0 m CD plus a 0.3 m over dredge. Secondly the Berthing Pocket will be dredged to approximately -11.5 m CD and the report estimates that chalk rock head will be between -12.0 and -20.0 m CD. Again confirmation should be provided that the risk assessment has considered these proposed depths in these two areas and that these proposed dredging depths have not changed since the production of the risk assessment.

The reason for this is to ensure that the risk assessment for Piling and Dredging and the potential for saline ingress or groundwater loss to the estuary has discussed these proposed dredging depths".

Richard did not re-review the ESI Ltd report as part of this consultation.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson

Principal Planning Officer

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Jonathan Monk

From: Richard Cram [rcram@ableuk.com]
Sent: 07 November 2011 13:02
To: Hewitson, Annette
Cc: Jenn Dawes; Anna Gerring; jmonk@ableuk.com; Emma Hawthorne; Mike Quigley
Subject: Re: MEP WFD Assessment
Attachments: TN-DER4712-01_Able_Water-Framework-Directive-Assessment_R3-0[1].pdf

Annette,

Further to your e-mail below, please find attached a revised WFD taking into account your comments.

Kind regards

RICHARD CRAM
Design Manager

Able UK Ltd
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Billingham Reach Industrial Estate
Billingham
Teesside TS23 1PX

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From: Annette Hewitson <annette.hewitson@environment-agency.gov.uk>
Date: Fri, 21 Oct 2011 13:56:23 +0000
To: "jmonk@ableuk.com" <jmonk@ableuk.com>
Cc: Richard Cram <rcram@ableuk.com>, Jenn Dawes <jdawes@ableuk.com>
Subject: RE: MEP WFD Assessment

Jonathan,
Please find attached comments in respect of the revised WFD assessment.
Kind regards,
Annette

Annette Hewitson
Principal Planning Officer

Environment Agency
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annette.hewitson@environment-agency.gov.uk

From: Jonathan Monk [mailto:jmonk@ableuk.com]
Sent: 26 September 2011 11:17
To: Hewitson, Annette
Cc: jdawes@ableuk.com; Richard Cram; 'Walter Bruton'; Vicky Lutyens; 'Graham Siggers'
Subject: AHP: MEP WFD Assessment

Annette,

Please find attached the revised WFD assessment for AMEP, amended in respect of the EA's comments.

Kind regards

JONATHAN MONK
AHP Marine Energy Park

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Able Marine Energy Park

Water Framework Directive Assessment

Technical Note DER4712-01

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Document Information

Project	Able Marine Energy Park
Technical subject	Water Framework Directive Assessment
Client	Able UK Ltd
Client Representative	Richard Cram
Project No.	DER4712
Technical Note No.	DER4712-01
Project Manager	Graham Watt
Project Director	Elfed Jones

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Prepared [redacted]

Approved

Authorised

Jonathan Monk

From: Hewitson, Annette [annette.hewitson@environment-agency.gov.uk]
Sent: 21 October 2011 14:56
To: jmonk@ableuk.com
Cc: Richard Cram; jdawes@ableuk.com
Subject: RE: MEP WFD Assessment
Attachments: 111017 EA reply re revised WFD assessment.rtf

Jonathan,
Please find attached comments in respect of the revised WFD assessment.
Kind regards,
Annette

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Awarded to the Planning and Corporate Services Department, Anglian Region, Northern Area

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From: Jonathan Monk [mailto:jmonk@ableuk.com]
Sent: 26 September 2011 11:17
To: Hewitson, Annette
Cc: jdawes@ableuk.com; Richard Cram; 'Walter Bruton'; Vicky Lutyens; 'Graham Siggers'
Subject: AHP: MEP WFD Assessment

Annette,

Please find attached the revised WFD assessment for AMEP, amended in respect of the EA's comments.

Kind regards

JONATHAN MONK
AHP Marine Energy Park

Able UK Ltd
Able House
Billingham Reach Industrial Estate
Billingham
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DEVELOPING ABLE HUMBER PORT with a MARINE ENERGY PARK
www.ablehumberport.com

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Mr Richard Cram
Able Uk Ltd
Able House (Billingham Reach Industrial Estate) Haverton Hill Road
Billingham
Cleveland
TS23 1PX

Our ref: AN/2010/110109/08-L03
Your ref: RC.JD.AMEP.A.L11/0021

Date: 17 October 2011

Dear Mr Cram

Marine Energy Park
Able Humber Port, Killingholme, South Humber Bank

Thank you for submitting the revised Water Framework Directive (WFD) Assessment, which was received on 26 September 2011.

We welcome the inclusion of the additional information we requested, which is largely satisfactory with the exception of the reference to the North Killingholme Haven Pits transitional water body. In particular, there is insufficient evidence to underpin the statement in Section 1, which reads:

"Further, there does not appear to be any mechanism by which on site construction activities (including drainage) or the subsequent operation of the site would affect this water body. It was not, therefore, subject to a WFD assessment".

There is direct hydraulic connectivity between the Humber Lower and the North Killingholme Haven Pits water bodies via a sluice mechanism. Therefore, as a minimum a screening level assessment should be carried out, and potentially a detailed assessment.

We are aware that you have recently been finalising many of the Environmental Statement (ES) Chapters for submission to the Infrastructure Planning Commission (IPC). You had indicated (when you planned to submit the application to your original timetable of the end of September) that you did not plan to reconsult us on the ES.

We consider that it is important that we do have the opportunity if at all possible to see the revised Drainage and Flood Risk Chapters (13 and 26) of the ES and any further work in respect of the impact on migratory fish. This is so we are able to comment appropriately in time for any changes to the application to be made that may be necessary as a result of our comments. We reserve the right to make submissions to

the IPC about the adequacy of consultation if we do not have this opportunity.

Please confirm we will have an opportunity to comment on these chapters of the ES. We will respond as quickly as possible once we receive them.

If we can be of any further assistance on this matter please do not hesitate to contact me.

Yours sincerely

Annette Hewitson
Principal Planning Officer

Direct dial 01522 785896 Direct fax 01522 785040
Direct e-mail annette.hewitson@environment-agency.gov.uk

End

Jonathan Monk

From: Jonathan Monk [jmonk@ableuk.com]
Sent: 26 September 2011 11:17
To: 'Hewitson, Annette'
Cc: jdawes@ableuk.com; Richard Cram; 'Walter Bruton'; Vicky Lutyens; 'Graham Siggers'
Subject: AHP: MEP WFD Assessment
Attachments: TN-DER4712-01_Able_Water-Framework-Directive-Assessment_R2-0.pdf

Annette,

Please find attached the revised WFD assessment for AMEP, amended in respect of the EA's comments.

Kind regards

JONATHAN MONK
AHP Marine Energy Park

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Able Marine Energy Park

Water Framework Directive Assessment

Technical Note DER4712-01

HR Wallingford

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Document Information

Project	Able Marine Energy Park
Technical subject	Water Framework Directive Assessment
Client	Able UK Ltd
Client Representative	Richard Cram
Project No.	DER4712
Technical Note No.	DER4712-01
Project Manager	Graham Watt
Project Director	Elfed Jones

Document History

Date	Release	Prepared	Approved	Authorised	Notes
06/06/11	1.0	SDA	NJC	TEJ	
22/09/11	2.0	SDA	NJC	TEJ	

Jonathan Monk

From: Hewitson, Annette [annette.hewitson@environment-agency.gov.uk]
Sent: 25 July 2011 17:19
To: jdawes@ableuk.com; rcram@ableuk.com; jmonk@ableuk.com
Cc: Gerring, Anna (MMO); Hogg, Allyn (MMO) (Core Defra); Hawthorne, Emma (NE); Manson, Susan
Subject: RE: AMEP: Water Framework Directive Assessment - For Review
Attachments: 110725 EA reply re WFD assessment.rtf

Dear Jenn,
I attach our comments in respect of the WFD Assessment. Again, our sincere apologies for the delay in replying to you in respect of this.
Kind regards,
Annette

Annette Hewitson
Principal Planning Officer

Environment Agency
✉ Waterside House, Waterside North, Lincoln, LN2 5HA
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Awarded to the Planning and Corporate Services Department, Anglian Region, Northern Area

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From: Jenn Dawes [mailto:jdawes@ableuk.com]
Sent: 07 June 2011 16:42
To: 'Gerring, Anna (MMO)'; 'Hogg, Allyn (MMO) (Core Defra)'; Hewitson, Annette; 'Hawthorne, Emma (NE)'
Cc: rcram@ableuk.com; jmonk@ableuk.com
Subject: AMEP: Water Framework Directive Assessment - For Review

Dear all,

Please find attached the AMEP Water Framework Directive Assessment for your review. Please provide any comments by Tuesday 21st June 2011.

Kind regards

JENN DAWES
Environmental Technician

Able UK Ltd
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Billingham Reach Industrial Estate
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Mr Richard Cram
Able UK Ltd
Able House (Billingham Reach Industrial Estate) Haverton Hill Road
Billingham
Cleveland
TS23 1PX

Our ref: AN/2010/110109/08-L01
Your ref: RC.JD.AMEP.A.L11/0021

Date: 25 July 2011

Dear Mr Cram

Marine Energy Park: Water Framework Directive Assessment
Able Humber Port, Killingholme, South Humber Bank

Thank you for consulting us in respect of the Water Framework Directive (WFD) Assessment, which was received on 7 June 2011. We have reviewed the document and have the following comments to make on it.

The document (Technical Note DER4712-01) title does not reflect the contents of the document, which are restricted to an assessment of the impact of dredging, reclamation and disposal on the Humber Lower transitional waterbody. The assessment should also consider the effects of the proposal on other waterbodies, such as the North Killingholme Haven Pitts (saline lagoon and artificial) waterbody, which is situated directly adjacent to the site and any other river waterbodies in the vicinity (such as the Humber Middle, South Killingholme Drain etc).

We have considered the assessment of deterioration for the Humber Lower and we can confirm that all of the guidelines from the Environment Agency available to developers appear to have been followed correctly.

However, the assessment also needs to ensure that the scheme will not compromise the mitigation measures 'not in place' for the Humber estuary. Even though, as HR Wallingford point out, the mitigation measures for this water body relate to flood protection, it is important that the impacts of this scheme will not invalidate the mitigation measures we need to put in place to achieve good ecological potential. Despite the inclusion of a section on contributing to WFD improvements, the document should ideally address whether the scheme will impact on the ability to deliver the required measures.

We have concern with regard to the impact on the biological elements. The lowest scoring biological element for the Humber Lower waterbody is for benthic invertebrates. The only other classification for the biological elements in this waterbody is for fish, which is currently at Good status. The Benthic Invertebrate Classification for the Humber Lower is Moderate but it is borderline reaching Good status.

It is likely that the classification should actually be elevated to Good status as of this year. However, this element will be just inside the Good status boundary with Moderate status. This means with any improvements in sediment quality over the next four years that the biological element could comfortably be in the Good status classification for the benthic invertebrate element. Activities that work against this aim work against the ability to maintain and reach Good status. Our monitoring frequency is yearly and we currently define a non-temporary effect as an impact lasting greater than a year.

By achieving Good status for benthic inverts, the overall monitored biological elements will be reaching Good status. It could be viewed that any major impacts to the benthic invertebrate communities could be considered as detrimental to achieving and maintaining good status for that element and must therefore be considered carefully. With this information in mind, we would request that further consideration be given to the effects of benthic invertebrates for the waterbody in the WFD deterioration assessment paper - for example, highlighting areas of impact and impact assessment in the background of a waterbody that is on a status boundary for that element. Much of this may well be borrowed from the Environmental Statement; however it must be put in the context of the Water Framework Directive.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson
Planning Liaison Officer

Direct dial 01522 785896
Direct fax 01522 785040
Direct e-mail annette.hewitson@environment-agency.gov.uk

End

Jonathan Monk

From: Hewitson, Annette [annette.hewitson@environment-agency.gov.uk]
Sent: 01 July 2011 12:46
To: rcram@ableuk.com; jmonk@ableuk.com; jdawes@ableuk.com
Subject: Able MEP - WFD Assessment
Attachments: dps1.rtf

Please find attached letter.
Kind regards,

Annette Hewitson
Principal Planning Officer

Environment Agency
✉ Waterside House, Waterside North, Lincoln, LN2 5HA
☎ 01522 785896
☎ 7 50 5896 (internal)
annette.hewitson@environment-agency.gov.uk

Awarded to the Planning and Corporate Services Department, Anglian Region, Northern Area

Mr Richard Cram
Able UK Ltd
Able House (Billingham Reach Industrial Estate) Haverton Hill Road
Billingham
Cleveland
TS23 1PX

Our ref: AN/2010/110109/07-L01
Your ref: RC.JD.AMEP.A.L11/0021

Date: 01 July 2011

Dear Mr Cram

Marine Energy Park: Water Framework Directive Assessment
Able Humber Port, Killingholme, South Humber Bank

I write with reference to the Water Framework Directive (WFD) Assessment received for consultation on 7 June 2011.

I am aware that under Section 45 of the Planning Act 2008, we are given a statutory timetable in which to provide consultation comments. I believe the due date for our response to this document is 5 July 2011. Unfortunately, due to staff illness we will be unable to provide a response by this deadline.

However, in the interim period we have received your draft Environmental Statement (ES), which I assume includes the WFD assessment information. In order to expedite our response, we propose to review and provide WFD comments on the draft ES and we will endeavour to provide these to your requested date if possible.

Please accept my sincere apologies for not being able to provide comments on this element of assessment within the required timescale.

Should you wish to discuss this matter further, please do not hesitate to contact me on the number below.

Yours sincerely

Annette Hewitson
Planning Liaison Officer

Direct dial 01522 785896 Direct fax 01522 785040
Direct e-mail annette.hewitson@environment-agency.gov.uk

ANNEX 2 – EX 10.8A CHARACTERISATION OF DISPOSAL SITE AND IMPACT OF GRAVEL DISPOSAL

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2) [a]
Document reference: TR030001/APP/

EX 10.8A – Disposal Site Characterisation and Impact Assessment

November 2012
Revision: 2
ERM / GOBE

DISPOSAL SITE CHARACTERISATION AND IMPACT ASSESSMENT

15/11/2012

ABLE MARINE ENERGY PARK
CHARACTERISATION OF DISPOSAL SITE AND IMPACT ASSESSMENT OF GRAVEL DISPOSAL

ERM

GoBe consultants

GoBe Consultants Ltd			
Prepared by	Sean Leake	**Date**	15/11/12
Authorised by	Steve Bellew	**Date**	15/11/12
Signed	[redacted]		

Client			
Client approval		**Date**	

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EXECUTIVE SUMMARY

The capital dredge material arising from the AMEP development is recognised as containing both erodible and inerodible material and is assessed in Supplementary Environmental Information report EX 10.4. The former is expected to be disposed of at Humber disposal site HU080, whilst the latter is expected to be disposed of at HU082.

Site investigations reveal that the erodible material contains a fraction of gravel. The purpose of this document is to assess the impact of the gravel fraction of the erodible material on the HU080 disposal site and any other areas that may be subject to receiving the gravel as a result of dispersion of the material away from the disposal site over time.

The disposal site HU080 is recognised as having a fine to coarse sandy sediment with an impoverished faunal community of robust crustaceans and polychaete worms associated with it. There will be high rates of transport of sand fractions back and forth across the disposal site. The wider area is characterised by areas of mixed sediments from fine sand and mud to coarse gravel.

The disposal activity will take place over a period of a few months. Individual placements of erodible material placed at the site will be worked by the strong tidal currents and the different size fractions of material will disperse away from and back and forth across the site. The coarser material will disperse more slowly and will be subject to burial and exposure by the finer fractions of sandy material moving across the site. Within and close to the disposal site small scale gravel features may temporarily persist on the seabed.

Over time the gravel is expected to be transported away from the disposal site by the considerable tidal currents present in the Humber. The simulated pathway of dispersion from the site indicates that the gravel is likely to move to a naturally deep area in the estuary which appears to have received coarse material historically. This area is characterised as containing mixed sediments with a limited range, both in terms of individuals and taxonomic richness, of infaunal and epifaunal species.

As a result of the short period of disposal activity and release of gravel sized material from the site, the robust impoverished nature of the faunal community, and the expectation that the material will then be transported away from HU080, the impact of smothering and change of substrate on HU080 is considered to be of negligible significance.

In the longer term the gravel will disperse widely into the area around HU080 with an indication of preferential accumulation in the deep water areas downstream of IOTA. Where gravel disperses to areas of the bed where the sediment type presently has only a few percent or less of gravel the dispersed gravel will not all

reside on the surface of the seabed but will be mixed into the active transport layer of the bed.

As a result of the longer term impact, the robust impoverished community which will undergo some short term loss, and the expectation that the overall thickness of the gravel material is considered to be negligible after dispersal, the impact of smothering and change of substrate on the depression is considered to be of minor adverse significance.

1. Disposal Site/s Regional Characterisation

1.1. Introduction

1.1.1. GoBe Consultants Ltd has been appointed by Environmental Resources Management (ERM) on behalf of ABLE Ltd to undertake a characterisation of the sites that are proposed to be used for capital dredge disposal as part of the ABLE Marine Energy Park (AMEP) development.

1.1.2. The AMEP construction in South Killingholme in the Humber Estuary requires a capital dredge operation. The material that will be dredged contains a significant quantity (130,000m^3) of material that is classed as gravel and cobbles, characterised by grain sizes in excess of 2mm. Table 1-1 provides a breakdown of the potential percentage and volume of each grain size category of gravel material found at the AMEP site that will require disposal.

Material	Gravel		
	Fine (2-6mm)	**Medium (6-20mm)**	**Coarse (20-60mm)**
Average percentage PSD across all sample stations	49%	29%	22%
Potential Volume m^3	63700	37700	28600

Table 1-1 Gravel size fractions present at North Killingholme Marshes

1.1.3. The figures presented within the table are considered a maximum and it is proposed that in line with received MMO guidance some of the material will be recovered and reused for beneficial purposes. After analysis ABLE Ltd propose to reduce the overall amount of gravel to be disposed of by between 10% and 15% by recovering part of the gravel fraction from the northern section of the approach channel as highlighted in Figure 1. Recovery is possible from this area as the concentration of gravel is higher.

1.1.4. This will have the impact of reducing the concentration of gravel within any loads of capital dredge material and the overall sediments to be disposed of will therefore be mixed with few loads of concentrated gravel.

1.1.5. The subtidal habitats (and associated benthic communities) of the Humber Estuary form an important sub-feature of the estuary (the primary interest feature of the Special Area of Conservation (SAC)) particularly with regard to function. The habitats sub-feature includes subtidal sandbanks (which are an interest feature in their own right under the Habitats Directive), subtidal gravels and mixed sediments and subtidal muds, clays and glacial till.

1.1.6. The subtidal environment makes up approximately 55% of the total area of the Humber (16,800 ha) and is highly variable and dynamic both spatially and

temporally with regard environmental parameters such as salinity, sediment type, hydrodynamic regime, sediment load, turbidity and dissolved oxygen/organic load.

1.1.7. With the above information in mind it is a necessary requirement of a marine licence under part 4 of the MCAA to conduct an assessment of the potential impacts associated with the disposal of the gravel fraction within the Humber Estuary disposal sites. The following aims and objectives outline the purpose of this document in greater detail.

Aims and objectives

1.1.8. The purpose of this document is twofold:

- To demonstrate that an adequate characterisation of the disposal site HU080 and Sunk Dredge Channel A, B, and C (Figure 1) for EIA purposes, and to satisfy the requirements of a marine licence, can be achieved based on an analysis of the available benthic and sedimentary data; and
- To conduct an assessment of the potential impact of disposal of the gravel fraction in the capital dredge material at dredge disposal site HU080 using the best available evidence and detailed sediment transport modelling.

1.1.9. Impacts other than those directly or indirectly caused by the gravel fraction of the dredged material disposal are not discussed. For the full assessment of impacts on geomorphology and aquatic ecology see the AMEP Environmental Statement (ES).

Key documents

1.1.10. Key documents used in the preparation of this report are:

- Water Framework Directive Monitoring data 2008 and 2010, provided by the Environment Agency;
- Annex 10.1 - South Humber Channel Marine Studies: Intertidal and Subtidal Benthic & Fish Surveys 2010;
- Explanatory Note EX 10.4 - Impact of Dredging and Dredged Material Disposal on 1) Subtidal and Intertidal Features and 2) Aquatic Ecology; June 2012;
- Supplementary Report EX 11.14; Biotopes of the Intertidal and Subtidal Sediments around the AMEP site, in the Humber Estuary; Final Report to Able UK Ltd; Institute of Estuarine and Coastal Studies; University of Hull; 27th April 2012;

- Supplementary Report EX 34.2 - An Assessment of Temporal Variation of Benthic Invertebrate Communities in the Humber Estuary; Final Report to Able UK Ltd; Institute of Estuarine and Coastal Studies; University of Hull; 2012;
- Supplementary Report EX44.1 Supplementary Environmental Information Cumulative & In-combination Effects;
- Immingham Oil Terminal Approach Channel Dredging Environmental Statement, prepared by ABPmer on behalf of Associated British Ports and Total Lindsey Oil Refinery (January, 2009);
- Grimsby RoRo Berth Environmental Statement, prepared by ABPmer on behalf of Associated British Ports (September, 2009);
- Assessment of impacts of disposal of AMEP capital dredge gravel fraction, prepared on behalf of ABLE UK Ltd by JBA Group (August 2012);
- Allen, J., Boyes, S., Burdon, D., Cutts, N., Hawthorne, E., Hemingway, K., Jarvis, S., Jennings, K., Mander, L., Murby, P., Proctor, N., Thomson, S. & R Waters, 2003. The Humber Estuary: A comprehensive review of its nature conservation interest, English Nature Research Reports Number 547; Institute of Estuarine & Coastal Studies (IECS); and
- Hemingway, K.L., Cutts, N.D., Allen, J.H. & S. Thomson, 2008. Habitat Status of the Humber Estuary, UK. Institute of Estuarine & Coastal Studies (IECS), University of Hull, UK. Report produced as part of the European Interreg IIIB HARBASINS project.

Methodology

1.1.11. All available data and literature as outlined above have been compiled to provide a comprehensive characterisation of the disposal sites.

1.1.12. PSD data from borehole site investigations of the AMEP site have been utilised to inform the quantity and size distribution of the gravel fraction that is to be placed at HU080.

1.1.13. The results of dispersion modelling for gravel sized material released at HU080 are used to inform the footprint of dispersion of gravel from HU080 and the expected longer term locations for accumulation of this material.

1.1.14. The combination of the desk-based characterisation, PSD data and modelled sediment dispersal has been utilised to assess the potential impact of the disposal of the material primarily at HU080. Additional information is provided regarding the characterisation of the benthos at Sunk Dredge Channel (SDC) disposal sites and the potential impact of gravel disposal on the benthic ecology at these sites.

1.2. Available Data

Survey data coverage

1.2.1. Figure 1 provides the locations of the AMEP samples used to identify the gravel fraction present that will form a component of the capital dredge material. It also provides the spatial distribution of the gravel fractions within the North Killingholme Marsh site derived from the characterisation survey.

1.2.2. Figure 2 and Figure 3 provide the overall benthic sample data coverage for the Sunk Dredge Channel and HU080 area. As can be seen there are a considerable number of available data points presented as part of EIA (Environmental Impact Assessment) for projects including maintenance dredging and other developments within the Humber, annual monitoring post development, and routine monitoring conducted by the Environment Agency which can be drawn on to inform this characterisation.

1.2.3. Table 1-2 presents information from the surveys, together with the years in which the surveys took place, to demonstrate the volume of data available and how recent they are.

Year	Survey Title	Surveyor	Survey method/s	No. sites
1980 to 1995	Environment Agency Quinquennial survey	Environment Agency	0.1m^2 grab	72
1979 to 2004	Environment Agency Routine	Environment Agency	0.1m^2 grab	14
2007	Immingham Oil Terminal Approach (IOTA) characterisation	ABPmer	0.1m^2 grab	46
2006	ABP/Environmental Monitoring Management Plan Monitoring:	ABPmer	0.1m^2 grab	32
2006	IOTA characterisation	Pelorus	0.1m^2 grab for geochemical analysis	20
2008 and 2010	Environment	Environment	0.1m^2 grab	42

	Agency Water Framework Directive monitoring	Agency		

Table 1-2 Surveys used to inform the characterisation

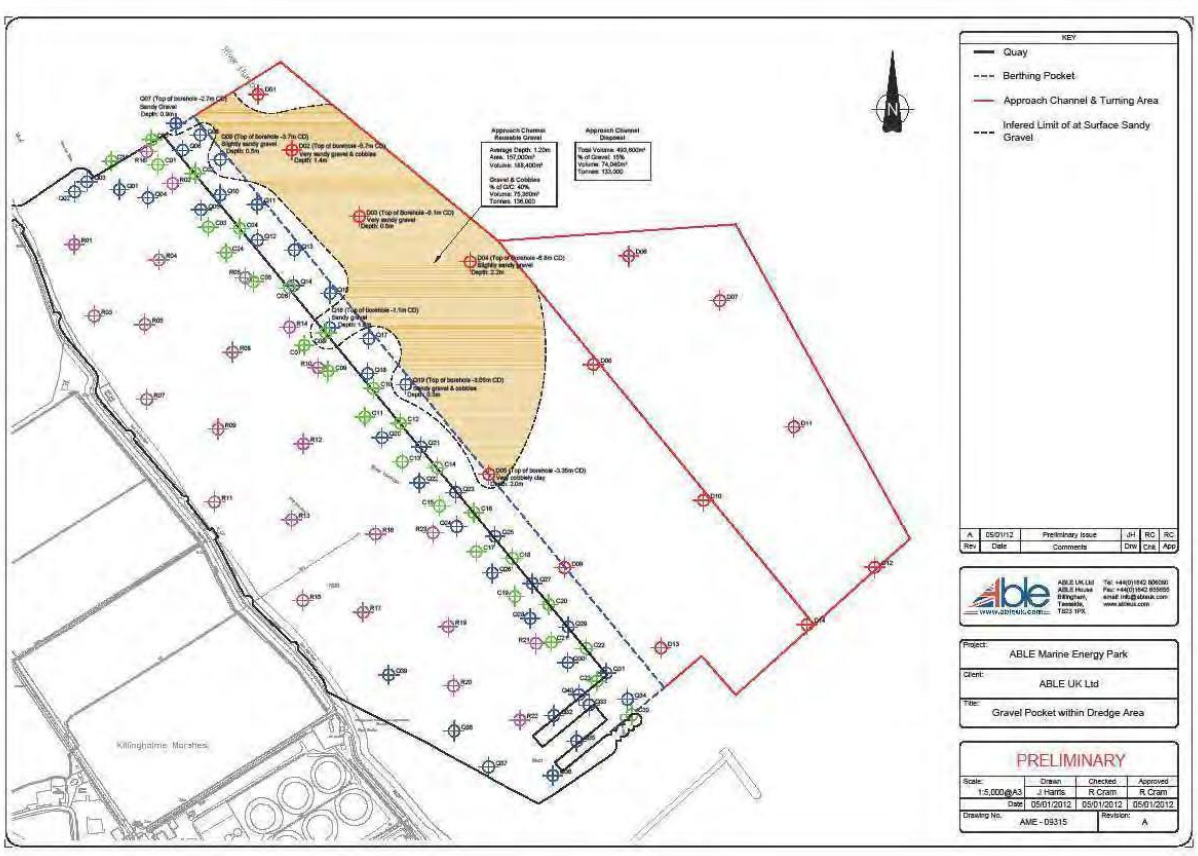


Figure 1 Location of areas of gravel at the AMEP development site

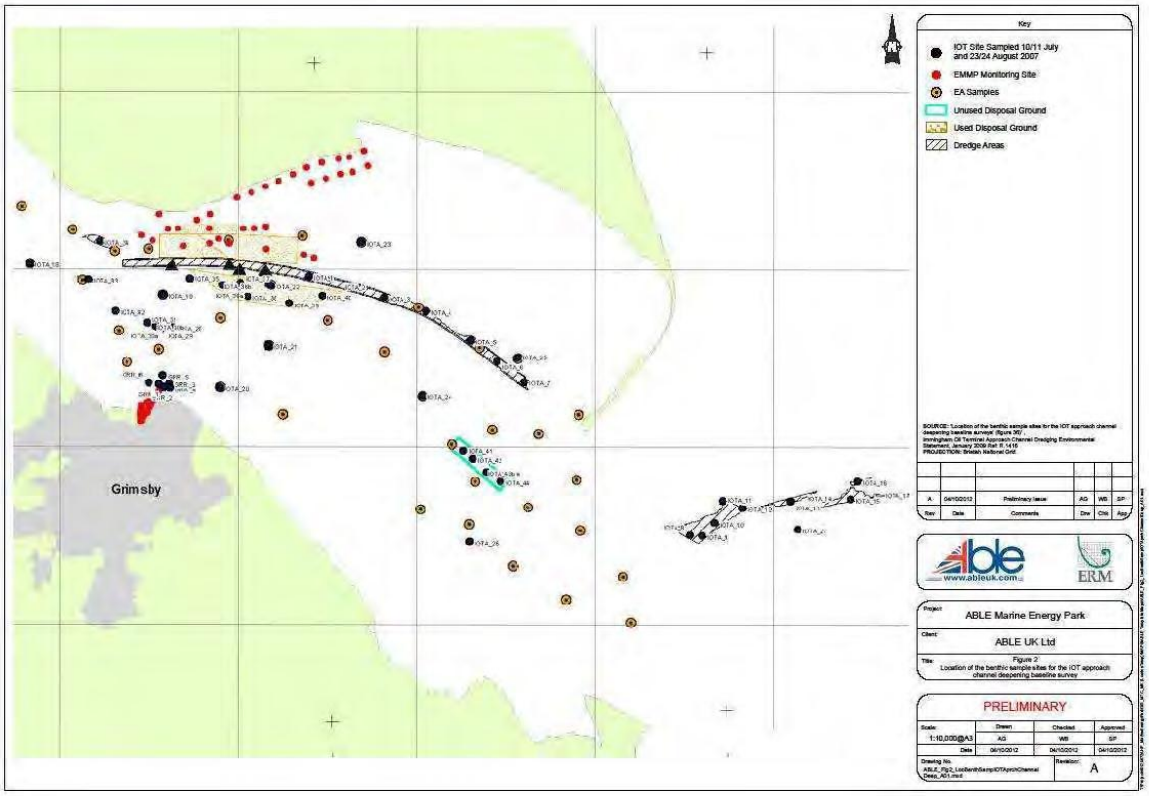


Figure 2 Benthic sample stations for Immingham IOTA ES

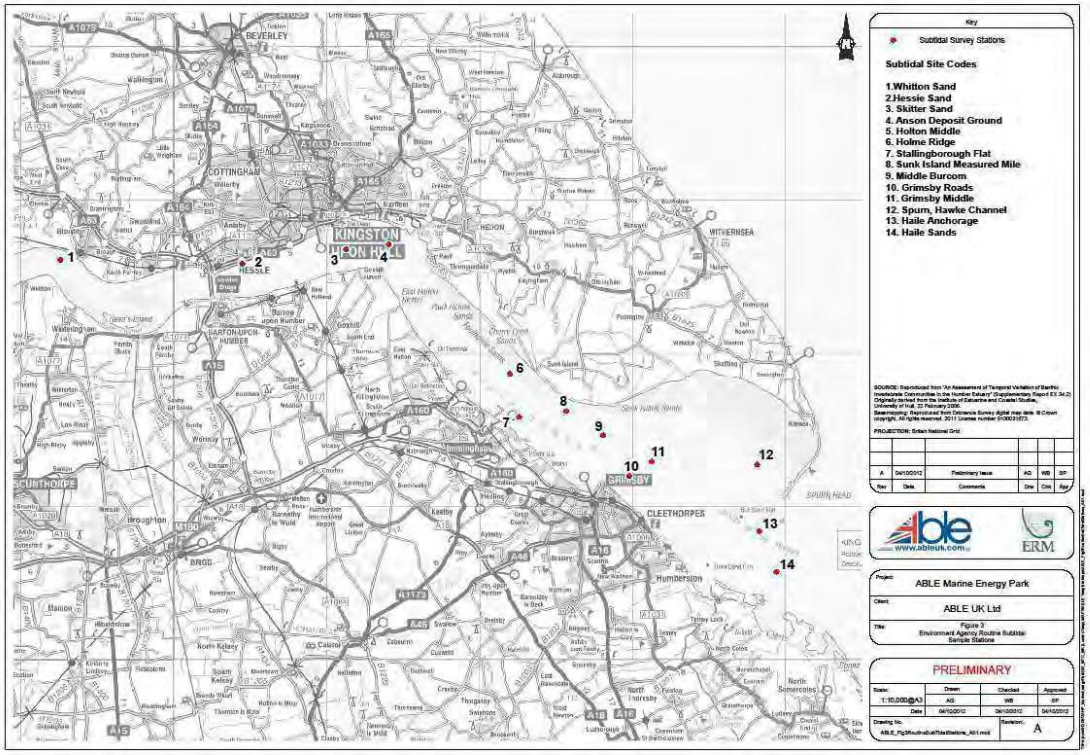


Figure 3 Environment Agency Routine Subtidal sample stations

Biotope and habitat data

1.2.4. As outlined in numerous documents within the public domain, and as demonstrated in the preceding sections there has been significant benthic sampling in the Humber, as a result of the Environment Agency quinquennial subtidal monitoring (analysed by the Institute for Estuarine and Coastal Studies on behalf of ABLE) and sampling strategies such as the Environmental Management and Monitoring Plan conducted by Associated British Ports (ABP). Additional Environment Agency data provides contemporaneous (2008 and 2010) characterisation of the area of interest and the Humber more widely.

1.2.5. The faunal community data presented in the preceding documents have been analysed and presented within each of these documents in terms of faunal groups, often defined by Bray-Curtis similarity.

1.2.6. In order to provide a more accessible characterisation, the various outputs from each of the studies referenced above have been standardised by ascribing biotopes from the sample data. For the EA quinquennial and routine sampling data, biotopes

have been derived from the temporal variation analysis conducted by IECS on behalf of ABLE UK, with IOTA and Grimsby RoRo ES data have been drawn primarily from documentation in the public domain. Analysis of the Environment Agency infaunal benthic data for 2008 and 2010 have been analysed using univariate and multivariate analysis with appropriate analysis of the particle size distribution also presented.

1.2.7. With respect to benthic communities, the Immingham Oil Terminal Approach (IOTA) ES (2009) highlights that in 2005 the Sunk Dredge Channel Sites (SDC) A, B, and C were characterised by very few species, typified by species such as nematodes, the polychaete worm *Nephtys hombergii* and the bivalve *Macoma balthica*, all of which are common in the mid and outer Humber estuary.

1.2.8. Hemmingway *et al* (2008) describe the Humber in general terms with areas of sands and gravels and muddy sands. The descriptions broadly correspond with other studies in describing the middle estuary as containing fine and medium sands which support robust species such as polychaetes (*Capitella capitata*, *Nephtys cirrosa*) and amphipod (*Bathyporeia*) species. Moving further down the estuary, the middle to outer estuary areas support communities of polychaetes, crustaceans and bivalves commonly found on very poorly sorted sandy shell gravel.

1.2.9. Areas of subtidal muddy sands are found predominantly in the middle and outer estuary supporting 'transitional' muddy sand communities with species such as *N. hombergii* and *M. balthica*.

1.2.10. Further to these descriptions Allen *et al*. (2003) describe the sublittoral biotopes found within the Humber estuary as being of five main types, as laid out in Table 1-3.

	Biotope	Location
Sublittoral sediments	Sublittoral sandy mud with *Scoloplos armiger* and *Phoronis muelleri*	Middle-Outer Estuary
	Sublittoral mud with dense *Nephtys hombergii* and *Phoronis muelleri*	Outer Estuary
	Nearshore mud with *Macoma balthica*	Middle and Outer Estuary
	Sublittoral mud/clay and sandy mud with *Polydora* sp., *Aphelochaeta* sp., *Pygospio elegans*, *Corophium* and *Tubificoides* spp.	Outer Estuary
	Sublittoral mixed muddy substrata with polychaetes, crustaceans and ascidians	Middle and Outer Estuary

Table 1-3 Sublittoral biotopes within the Humber Estuary (Allen *et al*, 2003)

EA Routine subtidal samples

1.2.11. The Environment Agency provided monitoring data from a routine subtidal and a quinquennial survey for inclusion within studies carried out on behalf of ABLE. Whilst the data for the whole estuary were assessed, certain stations (and the associated faunal groups, presented within Supplementary Environmental Information report EX.34.2) have relevance for the characterisation of the disposal grounds at SDC A, B, C and HU080.

1.2.12. EA Routine Subtidal Stations (Figure 4) 7, 8, 9, 10 and 11 are in close proximity to either the disposal sites themselves or the location defined within the JBA modelling (***Annex A***) assessing the impacts of the gravel fraction being disposed of at HU080.

1.2.13. Through the analysis conducted by IECS using the PRIMER software package 4 faunal communities were described for the sample stations (groups 9, 11, 12 and 14). Through the use of Bioscribe[1] and the Marine Nature Conservation Review classification scheme (Connor et al, 2004) it is possible to provide indicative biotopes for the faunal communities and use this to describe the biotopes present at the relevant sample stations.

1.2.14. Station 7, identified as faunal group 9, was characterised by the polychaete *Polydora* spp. and the crustacean Corophium volutator. Given the characterising species and the apparent silt/clay content identified at this station the most closely matching biotope is SS.SMu.SMuVS.PolCvol (*Polydora ciliata* and *Corophium volutator* in variable salinity infralittoral firm mud or clay).

1.2.15. Stations 8 and 11 were identified as faunal group 14, which is characterised by the polychaete worms *Nephtys cirrosa*, *Capitella capitata*, *Spio* spp and the crustacean Eurydice sp. Whilst lacking in a key species (*Macoma balthica*) the closest fit in terms of biotope is SS.SSa.SSaVS.NcirMac (*Nephtys cirrosa* and *Macoma balthica* in variable salinity infralittoral mobile sand).

1.2.16. Station 9 was identified as faunal group 11, which given the dominating species (*Nephtys hombergii*. and *Macoma balthica*), also appears to be a variant of SS.SMu.ISaMu.NhomMac.

1.2.17. Station 10 was identified as faunal group 12, which is characterised by *Aphelochaeta marioni*, *Polydora* sp. and Tubificoides spp. and matches closely with the mixed sediment biotope SS.SMx.SMxVS.AphPol (*Aphelochaeta* spp. and *Polydora* spp. in variable salinity infralittoral mixed sediment).

[1] *Bioscribe* tool is intended as a decision support tool for biotope classification and is disseminated by the JNCC.

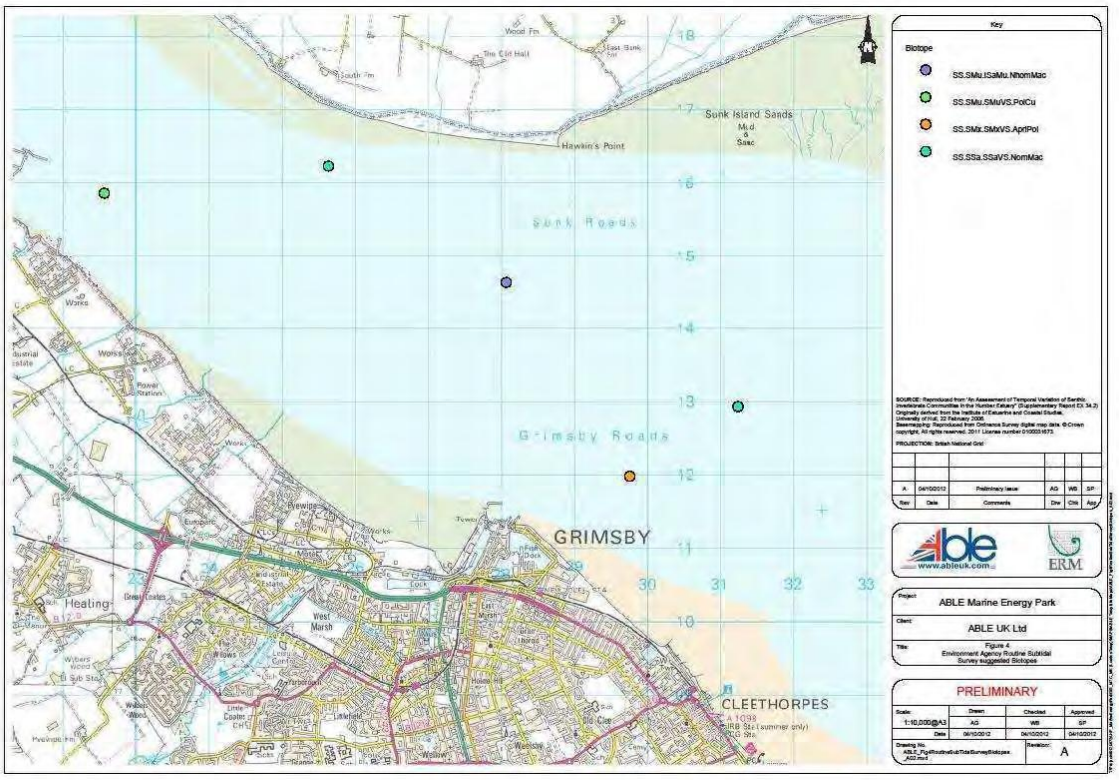


Figure 4 Environment Agency Routine Subtidal Survey suggested Biotopes

Quinquennial Samples

1.2.18. The faunal groups identified within EX 34.2 also provide detail for each of the quinquennial surveys from 1980-1995. The results have been processed to provide indicative biotope codes, however; it should be noted that only the area of interest has been analysed. The locations of stations with suggested biotopes are provided in Figure 5.

1.2.19. For 1980 there appear to be four faunal groups present in the area (2, 3.1, 3.2, and 3.3). Of these faunal groups group two most closely resemble the biotopes SS.SMu.SMuVS.CapTubi (*Capitella capitata* and *Tubificoides* spp. in reduced salinity infralittoral muddy sediment) being dominated by Arenicola marina, *Capitella capitata* and *Tubificoides*. Faunal group 3.1, 3.2 and 3.3 show a close resemblance to the biotope SS.SMu.SMuVS.AphTubi.

1.2.20. In the results from 1985 there appeared to be an increased homogeneity across the area of interest with two faunal groups being identified (5.1 and 5.2). Faunal group 5.1 was characterised by *Polydora*, *Magelona*, *Glycera* and *Eteone* for which the most closely resembling biotope is either SS.SMx.CMx.MysThyMx (*Mysella*

bidentata and *Thyasira* spp. in circalittoral muddy mixed sediment) or SS.SSa.IMuSa.FfabMag (*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand). Whilst the former matches closely to predictions of the sediment type, the latter matches more closely in terms of depth and the higher presence of the polychaete *Magelona mirabilis*. Faunal group 5.2 is characterised by the polychaete *Nephtys longosetosa*, bivalves, and other polychaetes such as *Glycera* and *Magelona*. Again there is not an immediately close match in terms of the predicted depth range but the closest matching biotope is SS.SMx.CMx.MysThyMx suggesting that during 1985 the area had a range of mixed sediments but increased homogeneity when compared to 1980 or for 1990.

1.2.21. In the 1990 results there appears to have been a return to more heterogeneous faunal groupings, with four faunal groups (4, 5, 6, 8) being identified for the area of interest. Group 4 closely resembles LS.LMu.Mest.HedMacScr (*Hediste diversicolor*, *Macoma balthica* and *Scrobicularia plana* in littoral sandy mud) which corresponds with the stations being closer to the shore. Group 5 closely matches the mixed sediment biotope identified previously for the area SS.SMx.CMx.MysThyMx but also the SS.SMu.SMuVS.AphTubi in terms of characterising species. Group 8 was also characterised by mixed sediments and the species *Nephtys cirrosa*, *Spio martinensis* and *Scoloplos armiger* indicating that it closely matches both SS.SMx.CMx.MysThyMx and to a lesser degree SS.SSa.IMuSa.FfabMag. Finally group 6 also closely matches with the biotope LS.LMu.Mest.HedMacScr.

1.2.22. In 1995 the area was identified as having 3 primary faunal groups (6, 8, 9.2) Group 6 matches most closely with SS.SMx.SMxVS.AphPol being characterised by Polydora, Corophium volutator and Pygospio. Group 8 matches most closely with SS.SSa.IMuSa.FfabMag. Group 9.2 matches most closely with SS.SMu.ISaMu.NhomMac (*Nephtys hombergii* and *Macoma balthica* in infralittoral sandy mud) being characterised by *Nephtys hombergii* and *Macoma balthica*.

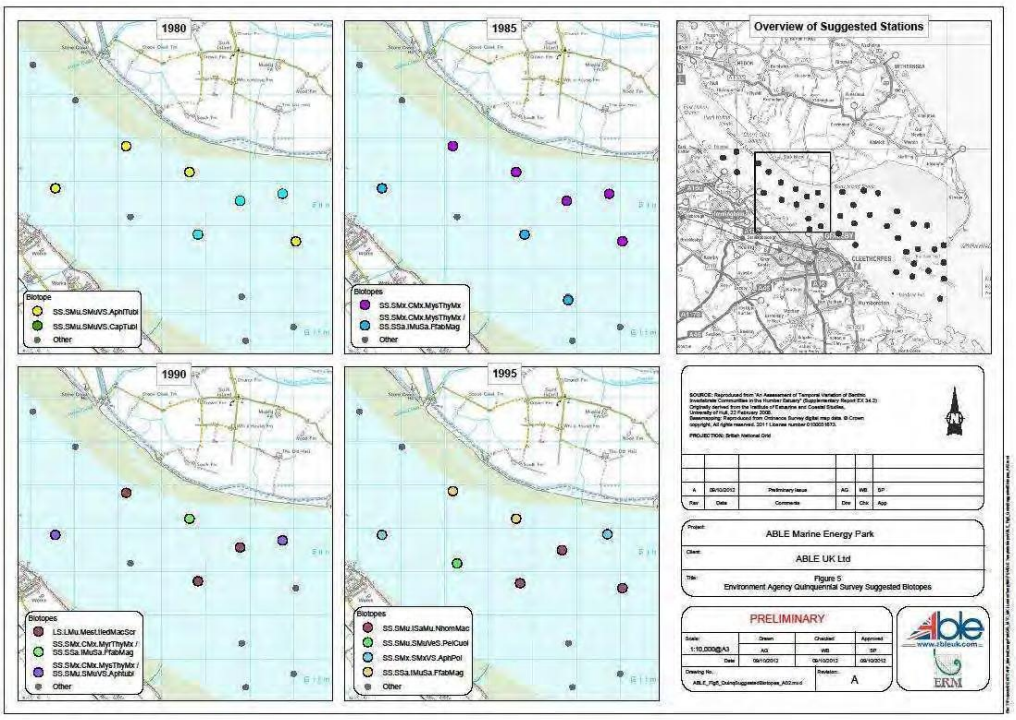


Figure 5 EA Quinquennial survey stations with suggested biotopes

Immingham Oil Terminal Approach

1.2.23. The IOTA and Grimsby RoRo ES provide specific data regarding HU082 (termed by ABPmer as SDC Area A). Both reports highlight that there was a drop in abundance (number of individuals) from between 17 and 2,566/m2 individuals in 2004 to between 0 and 733/m2 in 2005 (average 2004 973/m2 average 2005 219/m2). The most common taxa recorded was the oligochaete *Tubificoides swirencoides* with aggregations of *Aphelochaeta marioni* and juvenile *Arenicola* sp. also being important.

1.2.24. The same pattern was observed for SDC Area B, with the abundance of individuals being between 0 and 5,083/m^2 in 2004 and between 17 and 650/m^2 in 2005 (average 2004 1,914/m^2 average 2005 346/m^2). It was of note that most sites in 2004, despite the apparent range, had almost no organisms or <130/m^2, the areas of high abundance resulting from two sites with aggregations of *Polydora cornuta*.

1.2.25. Again the inter-annual variation was different for SDC Area C with abundance being broadly similar across 2004 and 2005 (266 and 3,883/m^2 in 2004 and between 33 and 7,650/m^2 in 2005). Again the results indicate significant inter-station variation with an area of high abundance reflecting a distinct location with high numbers of

Macoma balthica, *Hydrobia ulvae*, *Nephtys hombergi*i (average 2004 1,783/m^2 average 2005 1,328/m^2).

1.2.26. HU080, also known as Middle Shoal, is an open expanse of mobile sand with strong tidal currents. The area has been identified during the Grimsby RoRo EIA as being characterized by a relatively impoverished community which reflects the dynamic nature of the sandy sediments in the area. Sites were specifically characterized by low abundance and diversity and were dominated by polychaetes such as *Nephtys cirrosa* and *Scoloplos armiger*, and the isopod *Eurydice pulchra*; all of which are considered robust species adapted to challenging estuarine conditions. As a result of the disposal of volumes of gravel during the capital dredge of the Grimsby RoRo some areas at HU080 are also likely to contain "mixed gravel" (P.174, Grimsby RoRo ES, 2009).

1.2.27. Analysis of the IOTA ES specific sampling (Figure 43 IOTA ES, 2009) found that six communities were present in the outer Humber estuary. Two were specifically found within the HU080site (community 1 and community 2). Other communities to the West of the disposal site that may be affected by sediment transport are Community 4, 5 and potentially community 3. Community 3 conforms with the biotope description for SS.SMx.SMxVS.AphPol(*Aphelochaeta* spp. and *Polydora* spp. in variable salinity infralittoral mixed sediment) which Tyler-Walters (2008) indicates is dominated by fast growing opportunistic polychaete and ascidian species and the community most likely reaches maturity within one year of space becoming available. The six communities maybe summarised as follows:

- Community Type 1 - *Nephtys cirrosa* and *Gastrosaccus spinifer* dominated community in mobile clean fine/medium sand.
- Community Type 2 - *Scoloplos armiger* and *Nephtys* spp. dominated community in muddy sand.
- Community Type 3 - *Polydora cornuta* and *Aphelochaeta marioni* dominated community in mud.
- Community Type 4 - *Nephtys hombergii* and *Scoloplos armiger* dominated community in sandy mud.
- Community Type 5 - *Nephtys hombergii* dominated community in sandy mud.
- Community Type 6 - *Barnea candida* and *Nereis longissima* dominated community in sandy mud.

1.2.28. The IOTA ES as discussed previously presents a number of faunal groups for the area of interest (Figure 6). Those specifically falling within the HU080 disposal ground are characterised by "*Nephtys cirrosa* and *Gastrosaccus spinifer*" (in fine sand) which characterise 5 out of 6 stations within the site and "*Scoloplos armiger* and *Nephtys* spp." (in muddy sand) characterising the remaining station. An

additional station (IOTA_35) which falls slightly to the West of HU080 is characterised as "*Nephtys hombergii* and *Scoloplos armiger*" (in sandy mud). Whilst there are different abundances evident from the samples, and the area generally appears to be impoverished, it is likely that they form a single biotope with some areas more impoverished than others. The suggested biotope is therefore SS.SSa.SSaVS.NcirMac, but lacking in significant numbers of the bivalve *Macoma balthica*.

1.2.29. Areas further to the west which may be affected by the movement of sediment from within HU080 are IOTA_33 (considered to also be NcirMac) and IOTA_18 which corresponds with station 7 of the EA routine subtidal stations. The station is characterised as "*Polydora cornuta* and *Aphelochaeta marioni*" which translates to SS.SMx.SMxVS.AphPol. This corresponds with the description provided within the Grimsby RoRo ES and the IOTA ES and suggests that the area contains mixed sediment which has remained broadly similar in terms of biota for a number of years despite significant anthropogenic activity and the disposal of a range of material at HU080.

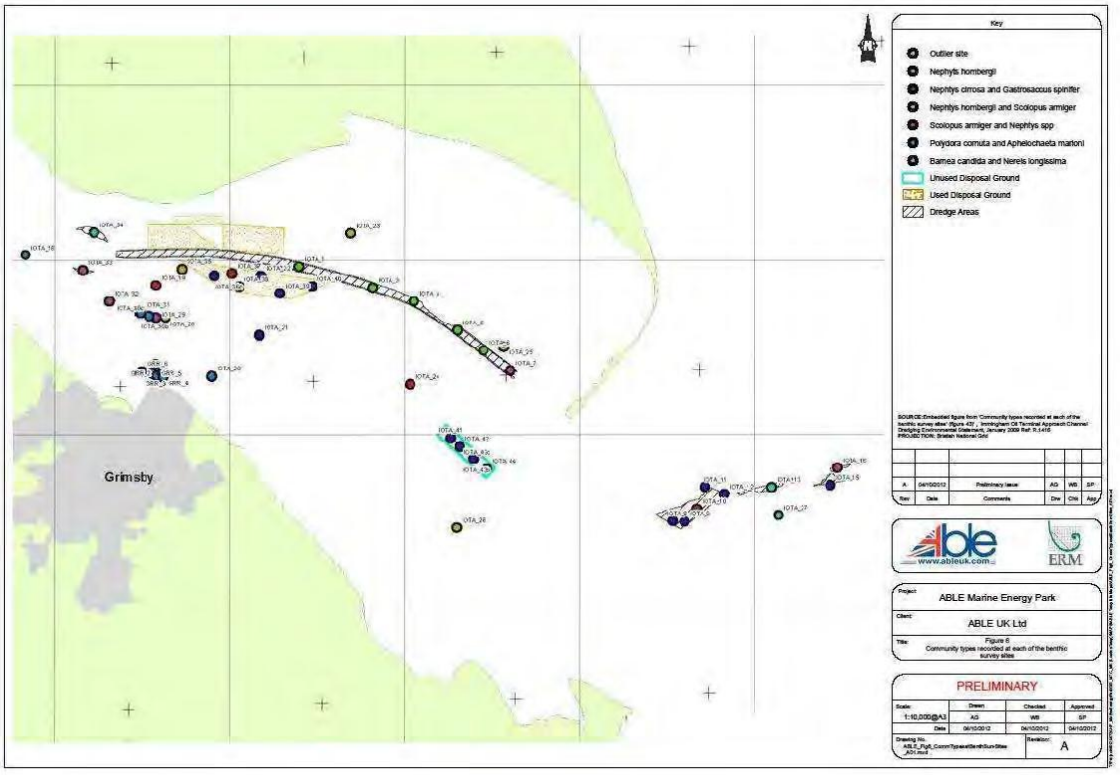


Figure 6 Community types according to IOTA ES

Humber EMMP

1.2.30. Sites within the Sunk Dredge Channel (SDC) sampled as part of ABP's environmental management and monitoring plan and analysed within the IOTA ES are presented in Figure 7. The data suggest that SDC A is dominated by the oligochaete worm *Tubificoides swirencoides*, whilst SDC B and SDC C are dominated by the polychaete Polydora cornuta and juvenile Pelecypoda. It should be noted that Pelecypoda is an out of date and unaccepted synonym of the class Bivalvia, and such a broad classification does not allow detailed biotope classification.

1.2.31. For stations within SDC A whilst it is not possible to provide a robust classification with the available data given the dominance of Tubificoides swirencoides and historical biotope presence the most likely biotope code would be SS.SMu.SMuVS.AphTubi.

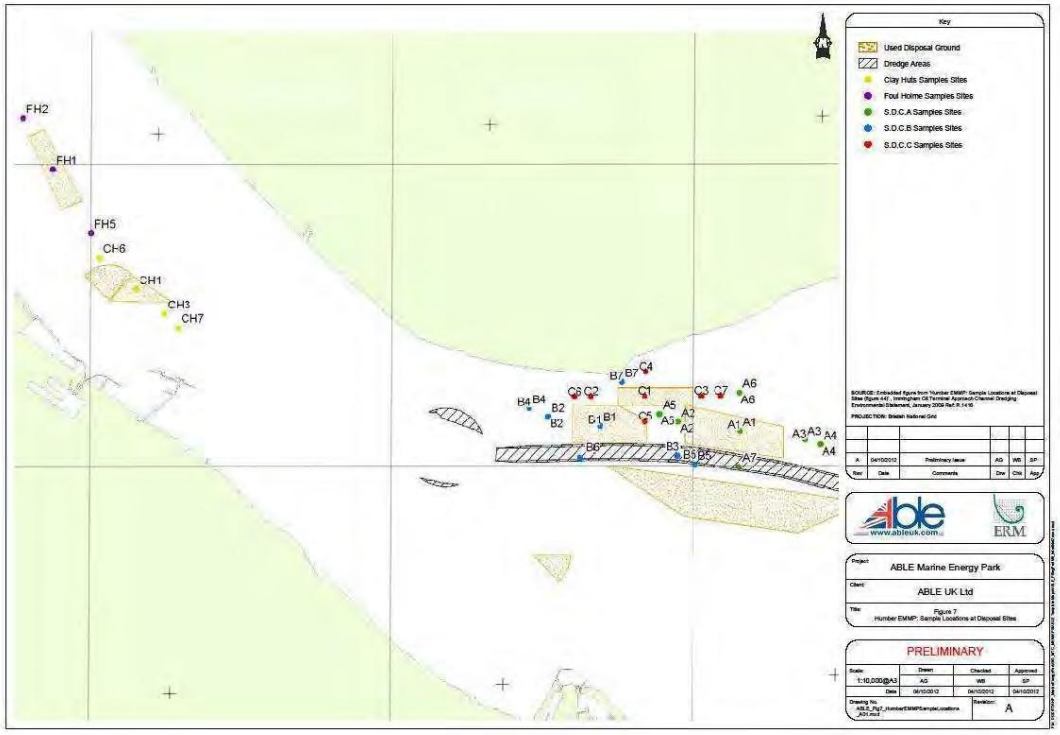


Figure 7 Humber EMMP stations for Sunk Dredge Channel

Environment Agency Water Framework Directive Monitoring

1.2.32. Data collected by the Environment Agency to fulifill monitoring requirements within the Water Framework Directive for the years 2008 and 2010 have been provided to further evidence the characterisation of the zone of influence that will arise as a result of capital dredge disposal.

1.2.33. The data provides both key sediment characteristics of the area and thedat a pertaining to the benthic faunal community present within the area. As can be seen in figure 7a and Diagram 1 the sediment within the Humber during the 2008 and 2010 surveys is of a mixed nature, from has a range from muddy sand to gravelly sand. Specifically within the lower Humber in the region of interest it is apparent that there are areas of fine sediments and areas of gravels and sands.

Diagram 1 Mud:Sand:Gravel ratios for the EA stations on the lower Humber

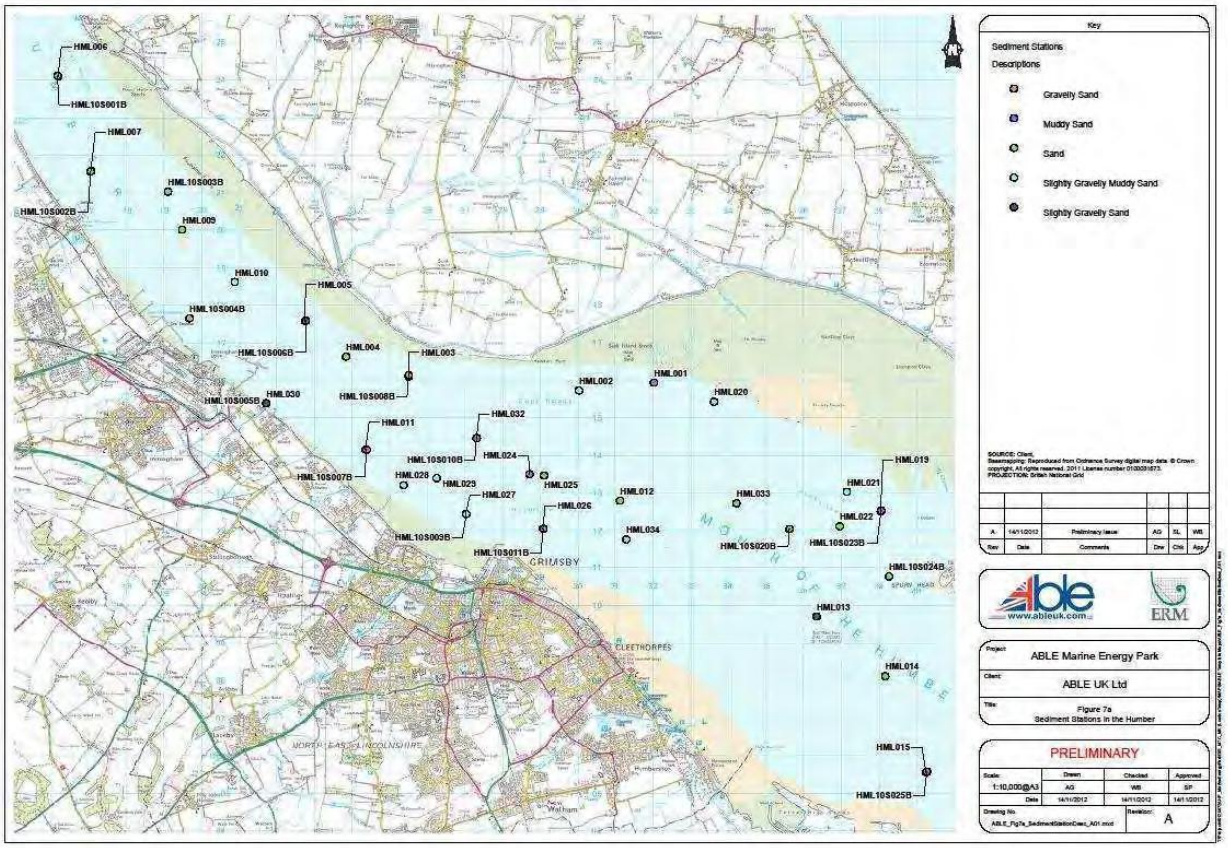


Figure 7a Textural sediment type within the EA WFD Humber survey 2008 and 2010

1.2.34. In terms of the biological communities the EA data provides detail characterising stations within the zone of influence. As can be seen from Figures 7b, 7c and 7d the communities within the region are characterised by low faunal abundance and species richness with low levels of diversity, as described by the Shannon-Weiner diversity index, also generally being low.

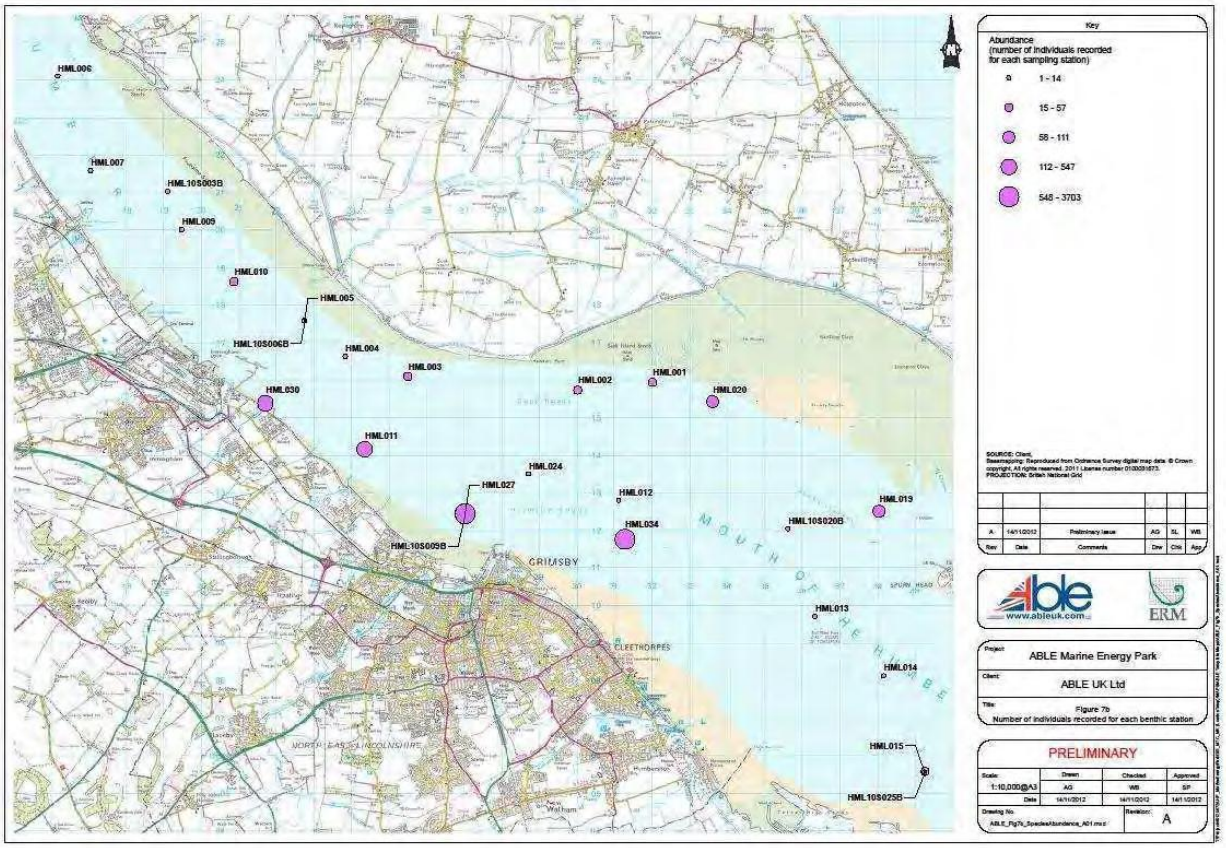


Figure 7b Benthic abundance (EA WFD data 2008 and 2010 combined)

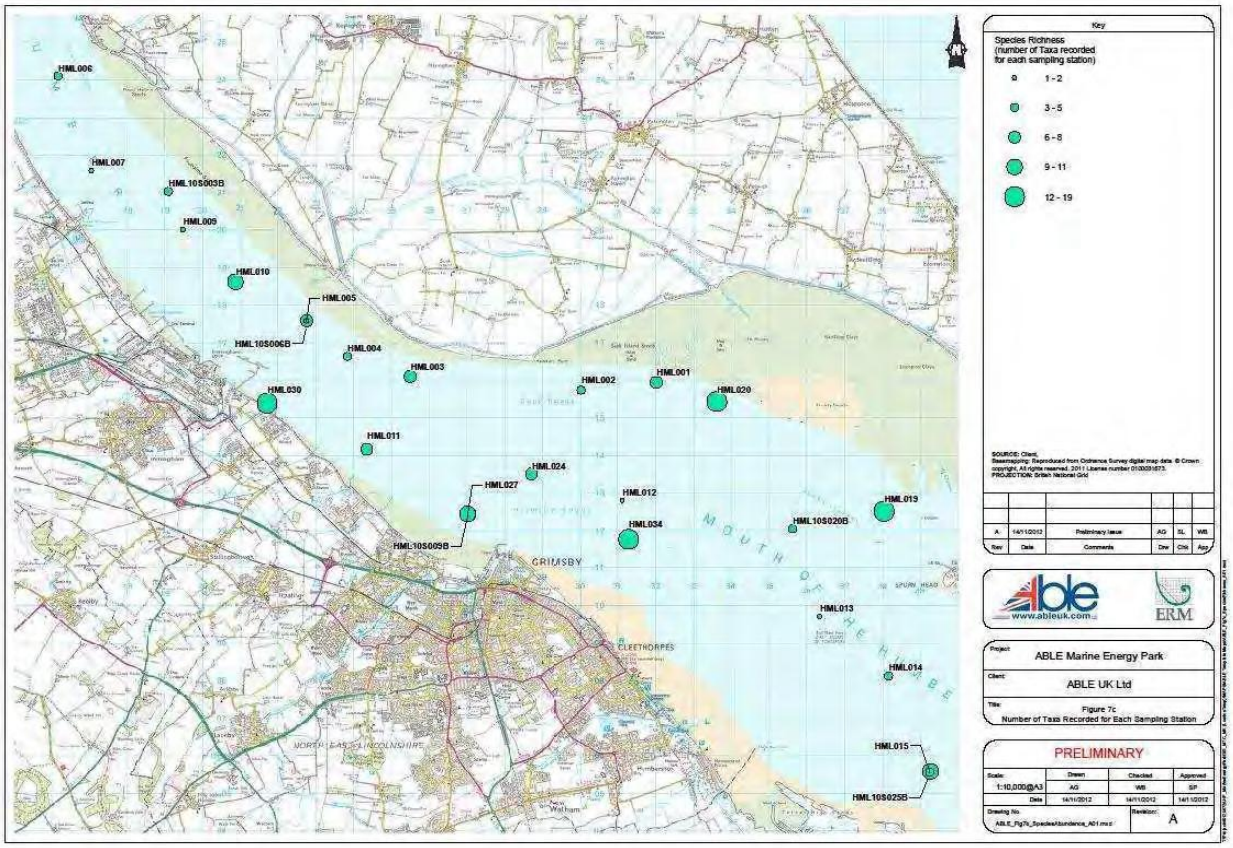


Figure 7c Benthic species richness (EA WFD data 2008 and 2010 combined)

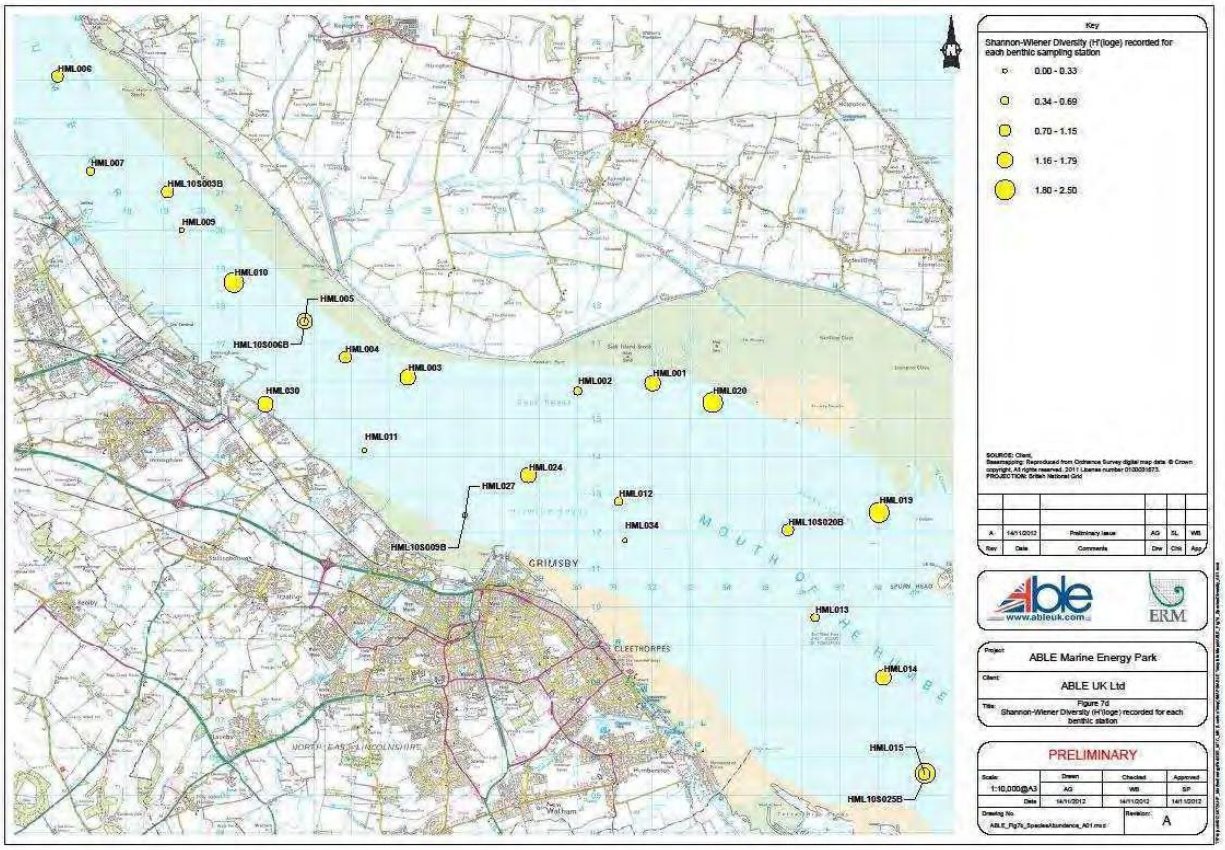


Figure 7d Benthic diversity (H') (EA WFD data 2008 and 2010 combined)

1.2.35. In terms of abundance (Figure 7b) It is possible to see that HML024 is characterised by very few individuals, as is HML012 further to the East and the three stations within the Sunk Dredge Channel (HML002, HML001, and HML020. Towards the eastern extent of the area HML034 has a higher number of individuals as does HML027 to the North of Grimsby.

1.2.36. In terms of species richness (the number of different species/taxa) as illustrated by figure 7c HML034 has a relatively high number of species when compared to the sparse HML012, HML002 and HML001. Whilst sites such as HML024, HML027, HML10s009B and HML003 have a higher number of species there is generally a low species richness across the area, which relates directly to the diversity.

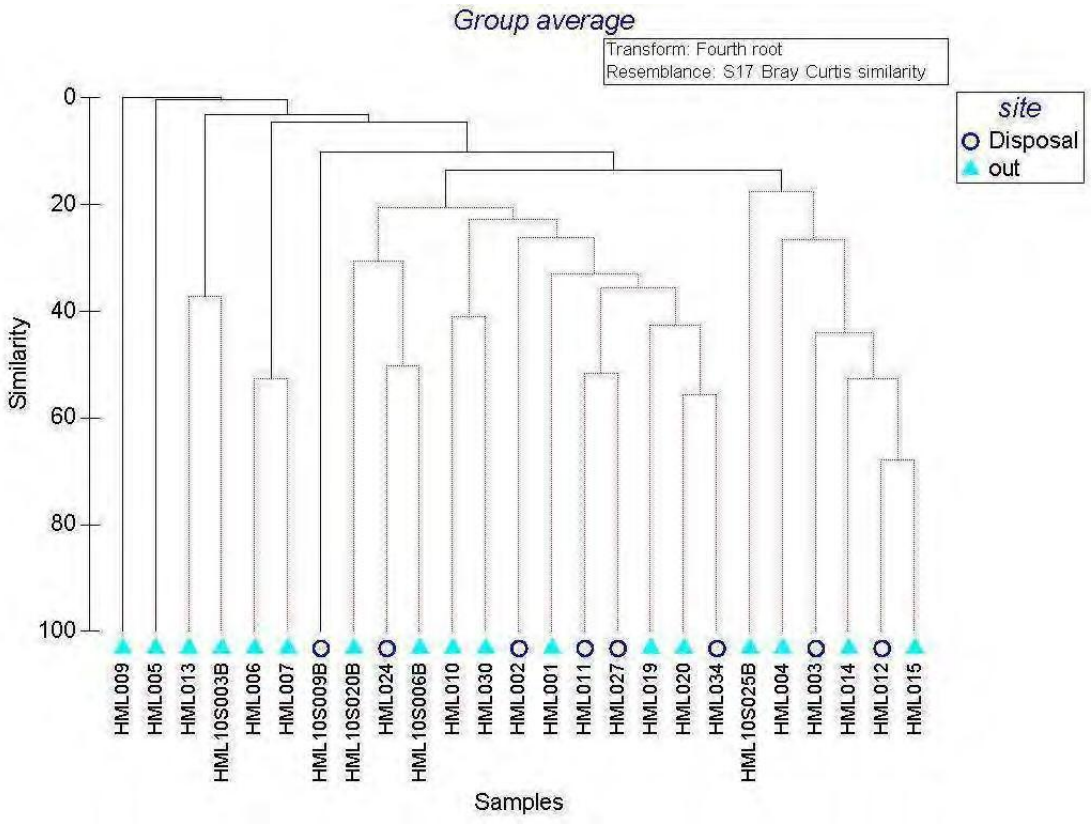
1.2.37. Figure 7d directly illustrates this low level of diversity by presenting the Shannon-Weiner diversity index. As can be seen HML024 has the highest diversity n the area of influence but the majority of stations (HML012, HML034, HML011, HML002, HML027, HML102009B) have very low diversity, often being characterised by less than ten individuals of 2 or 3 species.

1.2.38. Of the stations within the immediate area the top 5 species according to abundance are presented in Table 1-4. As can be seen the most dominant species in the area are polychaete worms, specifically the tube building polychaete *Aphelochaeta marioni* and the polychaete *Scoloplos armiger*. Other notable species are the polychaetes *Nephtys cirrosa* and *Nephtys* spp., *Tubificoides swirencoides*, *Tharyx* and a single bivalve *Abra* sp. As is apparent three of the sites are dominated numerically by the polychaete worm *Aphelochaeta marioni* whilst two others are dominated numerically by the worm *Scoloplos armiger.*

Table 1-4 Abundance of species at key stations of interest

HML002 (abundance)	HML003(abundance)	HML011(abundance)	HML012(abundance)	HML024(abundance)	HML10s009B(abundance)
Aphelochaeta marioni (19)	*Eteone longa (6)*	*Aphelochaeta marioni (527)*	*Scoloplos armiger (6)*	*Scoloplos armiger (3)*	*Aphelochaeta marioni (1621)*
Nephtys hombergii (1)	*Scoloplos armiger (6)*	*Tubificoides swirencoides (11)*	*Nephtys cirrosa (3)*	*Nephtys hombergii (1)*	*Tubificoides pseudogaster (54)*
Aricidea minuta (1)	*Capitella (6)*	*Streblospio shrubsolii (4)*		*Pygospio elegans (1)*	*Tharyx 18*
Mytilus edulis (1)	*Nephtys (2)*	*Scoloplos armiger (2)*		*Streblospio shrubsolii (1)*	*Ampharete lindstroemi (12)*
	Nephtys cirrosa (1)	*Nephtys hombergii (1)*		*Abra (1)*	*Nephtys (10)*

1.2.39. Multivariate analysis of the entire Humber region data set allows further analysis of the faunal community patterns in the region. Diagram XX provides a cluster analysis of the entire dataset (4^{th} root transformed to reduce the impact of very high numbers of single species). As can be seen there is some similarity between the groups within the area of focus, indicating some similarity in the communities present but at a low level, and the same level of similarity is apparent throughout much of the Humber. Broadly speaking there is a divide in communities between the mid and outer Humber, but the communities present within the area of focus appear to be widespread and depauperate.



1.2.40. The groups within the area of interest are broadly split into 3 groups with HML10S009B being characterised by high numbers of *A.marioni* and *Tubificoides* in slightly gravelly muddy sand (17% mud). This is a close fit with the biotope SS.SMu.SMuVS.AphTubi (*Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud).

1.2.41. HML002, 011, 024, 027 and 034 are all considered to be SMS.SMx.SMxVS.AphPol as they are characterised by apparent patches of muddy sand and slightly gravelly muddy sand. The dominant fauna at these sites are *Scoloplos armiger*, *A.marioni*, *Tubificoides* spp, *Nephtys hombergii*, *Streblospio shrubsolii* and *Tharyx* sp.

1.2.42. HML003 and HML012 do not fit as closely as the other stations with SS.SMx.SMxVS.AphPol/SS.SMu.SMuVS.AphTubi as they are both characterised low numbers of species within sand, with *Nephtys* spp being the dominant species with *Capitella* also featuring. As such it is considered an impoverished variant of SS.SMx.SMxVS.AphTubi.

1.3. Summary

1.3.1. There appears to be some variation over the years between biotopes but biological parameters and communities are relatively consistent over time. The variation evident in community structure between years is in most cases likely to be within

the natural limits of variation and most changes over time likely to be related to changes in the physical environment such as sediment type.

1.3.2. Current data within the public domain limit the degree of confidence in the characterization of the area to biotope level. In combination with historical monitoring data the disposal sites and surrounding area can however be characterized to a sufficient level for the purposes of EIA and it is possible to suggest likely biotopes as a result.

1.3.3. Figure provides the EUNIS level 3 habitat distribution map used to inform the distribution of biotopes in parallel with observed distributional data.

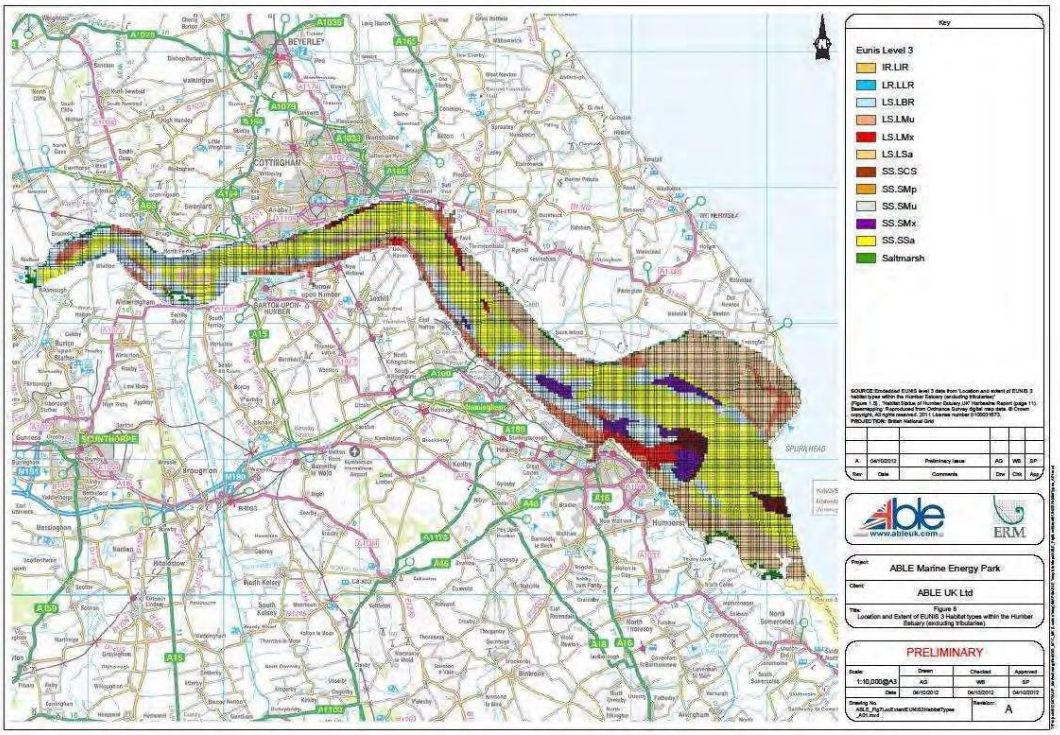


Figure 8 EUNIS Level 3 habitat type distributions

1.3.4. Figure 13 provides the suggested biotope map of the area which forms the basis of the characterization on which the subsequent assessment in Section 2 is made.

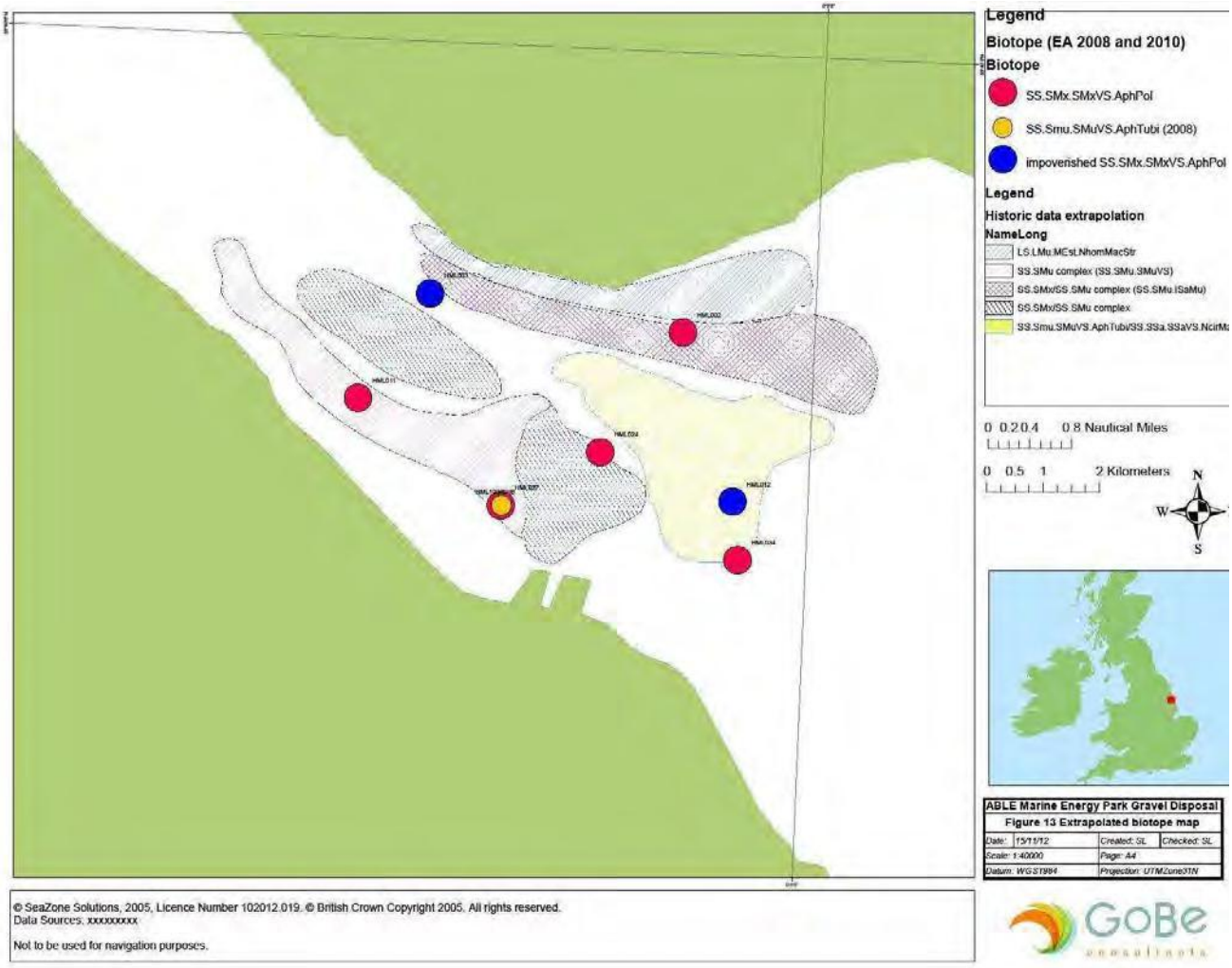


Figure 9 Indicative biotope characterisation of HU080 and the surrounding area of interest

2. Assessment of impacts to sub-tidal ecology

2.4. Introduction

2.4.1. The primary impacts associated with the disposal of the capital dredge material are assessed within Explanatory Note EX.10.2. The addition of a gravel fraction to the disposal sites was not considered at the time; this report therefore only provides an assessment of the potential impacts associated with the disposal of the gravel fraction of the capital dredge.

2.4.2. The impacts associated with the deposit of material containing relatively higher proportion of coarser sediment (i.e. gravel fraction) can be considered in two phases; initially the deposition of sediment (including the coarse fraction) resulting in smothering of the community; and the potential change in habitat type as a result of the introduction of a different coarser, grain size, in this instance, gravel. Given the recognised highly mobile state of the sand and coarse sediment at HU080, and therefore the adaptation of the faunal community character to a high level of natural and anthropogenic disturbance, of primary concern is the potential for a long term change in habitat. The change in habitat may result in changes to the associated benthic community, which may be seen as either positive or negative in terms of changes in biodiversity and community characteristics. The assessment is informed primarily by sediment dispersal models followed by a sensitivity assessment of the benthic communities, discussed here as biotopes. The sensitivity of a biotope is a function of tolerance to an impact and the recoverability of the community post impact. The methodology and benchmarks utilized within this assessment are as outlined by Tyler-Walters et al (2001). A number of assumptions are made in the assessment, as follows:

- Tolerance, and hence sensitivity, depends on the magnitude, duration, or frequency of change in a specific pressure.
- The tolerance of a hypothetical 'average' species population is assessed, representing a population in the middle of its range or habitat preferences. Populations at the limits of their environmental preferences are likely to be more intolerant of environmental perturbation.
- Recoverability assumes that the impacting factor has been removed or stopped and the habitat returned to a state capable of supporting the species or biotope in question.

2.4.3. The value of a species or biotope is a function of their conservation value.

2.4.4. The impact of a change in sediment type and the associated benchmark considered within this assessment are presented in Table 2-5:

Impact	Benchmark	Notes
Deposition of sediments/Smothering	The addition of 5 cm (low) and 10-20 cm (high) of sediment in a single event. This is considered appropriate given the uncertainty in the precise thickness of sediment at locations smaller than the 250m x 250m cell.	The duration of smothering is taken into account in the assessment of recoverability, where possible. For example, in high energy environments the smothering sediment is likely to be removed within a few tidal cycles.
Change in sediment type	A change in Folk class for 1-2 years (medium impact).	The assessment is based upon the Folk class triangles, compiled by Connor et al. (2004) as part of the National Marine Habitat Classification and available on the JNCC website . These Folk diagrams indicate the sediment type in which individual biotopes are most likely to occur.

Table 2-5 Impact and benchmark for assessment (from Tyler-Walters *et al*, 2001)

2.5. Impact significance

2.5.1. Impact significance is derived utilising the methodology outlined in Supplementary report EX 10.4.

2.6. Modelling assessment

2.6.1. Modelling conducted by JBA Consulting has aimed to assess the fate of gravel from the AMEP capital dredge if disposed of at the HU080 disposal site (Figure 10).

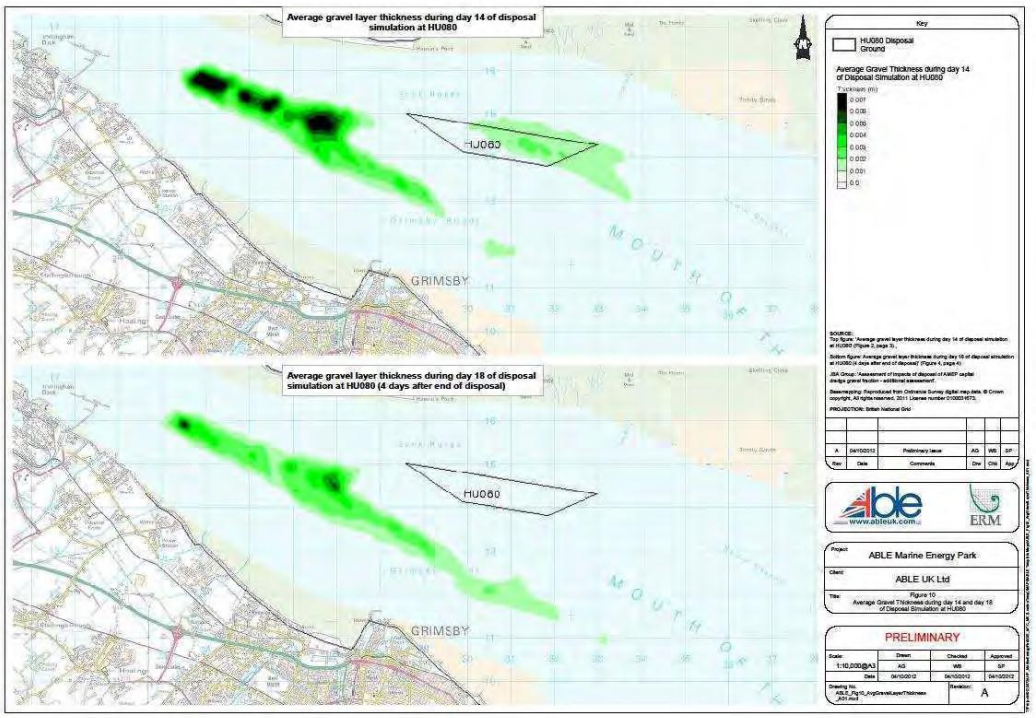


Figure 10 Indicative gravel thickness during (top) and after (bottom) placement of material at HU080

2.6.2. The assessment was performed using the Particle Tracking Model developed and maintained by the US Army Corps of Engineers' Coastal Inlets Research Programme. The model simulation was performed for 18 days of Spring-Neap estuary tidal flow (supplied by a 2D hydrodynamic model). For the first 14 days, particles were placed into the top of the water column at a specified rate at the HU080 site.

2.6.3. Three fractions of gravel were included in the simulation. All fractions are predicted to behave in a similar manner with dispersion away from the disposal site and accumulation in the deeper water areas upstream towards IOTA. Specific detail regarding the modelling parameters is contained in *Annex A*.

2.6.4. The results indicate that after 14 days of simulation the thickness of material on the estuary bed reached 0.008m over an area of approximately 20 hectares to the south east of the Immingham Oil Terminal (Figure a). After simulation of a further 4 days with no disposal, the gravel continues to disperse so that the average layer thickness over a 250m by 250m cell reduced to less than 0.004m in this area, with localised areas of up to 0.006m thickness. The rates of dispersion are likely to be over-estimated by the model given that the gravel fraction will be moving in combination with a sand fraction. At times the gravel will be buried by sand and

will only move again once the sand has been picked up. Additionally the total transport will be comprised of both sand and gravel in proportion to their relative abundance and ease with which they can be transported.

2.6.5. The simulation indicates that even if the gravel fraction were dispersed rapidly it represents a negligible impact on current maintenance dredging requirements in the Outer Humber Estuary. The dispersed gravel remains within the sub-tidal area and there will therefore be no impact upon inter-tidal areas and habitats. The impact on the sub-tidal areas and habitats is assessed within the following sections.

2.7. Disposal of dredged material at HU080

2.7.1. The model outputs provide a description of the spatial dispersion of the sediment and an approximate depth of sediment (in terms of a uniform layer) after disposal activities have finished. This layer will in reality be mixed into the active transport layer of the bed. Where the bed is sandy this transport layer may be tens of centimetres in thickness with gravel mixed throughout the layer. Over a 250m by 250m model cell an active transport layer of 0.1 to 0.2m thickness represents a volume of 6,250m^3 to 12,500m^3. A model average layer thickness of gravel of 0.004m to 0.01m thickness over a model cell represents a gravel volume of 250m^3 to 625m^3 of varying size fractions (2mm to 60mm). Over sandy areas of the model domain the simulated depths of dispersion of gravel represent changes in gravel content in an active transport layer of 0.1 to 0.2m thickness of between 2% to 10%.

2.7.2. Where the bed is more mixed and more stable, such as in the deeper water areas in the approaches to IOTA, the layer thickness of the gravel fraction can be considered as representing a surficial deposit of coarse material.

Deposition of sediment/Smothering

2.7.3. The disposal of the erodible material is likely to be focused on the western side of HU080 where the greatest water depths occur. In this area, order 10-20% of the footprint of HU080, there will, therefore, be a temporary smothering of the benthic community present in areas. Such smothering effects will occur in cycles as the proposed strategy for sediment disposal comprises a deposition phase of some 15 minutes, with a gap of approximately eight hours until the next deposit of sediment occurs. The lower benchmark (smothering with 5 cm of sediment) would temporarily halt feeding and respiration and result in the infauna having to relocate to their preferred depth. At the high benchmark of smothering with 10-20 cm of sediment, burrowing to a preferred depth in the sediment will take longer and at a higher energetic cost.

2.7.4. Whilst the few species present will tolerate smothering, loss of a proportion of the population suggests a tolerance of high/intermediate. However, the baseline levels of abundance are likely to return rapidly, so recoverability is recorded as high. Species such as *Nephtys* sp. are large burrowing polychaetes and considered

capable of surviving in disposal areas (Maurer *et al.,* 1986). The tolerance is therefore considered high.

2.7.5. Overall the magnitude of change relative to previous deposits at the disposal ground (HU080) is small; however the change in character of the material may have an ecological effect. The generally impoverished community, large natural variability indicates the area has a low sensitivity, the benthic community has a low importance and high recoverability from the comparatively short duration of the effect and the impact is therefore of **negligible significance.**

Change in sediment type

2.7.6. The model simulations indicate rapid dispersion of the gravel fraction to the west of HU080. Our conservative interpretation suggests that this dispersion will be slower than that simulated but will still occur over the same envelope. It is presumed that for a duration of order 1-2 years there may be a detectable increase in the proportion of gravel fraction sized material at the location of disposal within HU080 with the percentage gravel fraction in the upper active transport layer of the bed being up to that in the placed material. Away from the placement site the proportions of gravel sized fraction from the disposal site will reduce to a fraction of a percent except in the mixed sediment zones where some of the placed gravel is simulated to accumulate.

2.7.7. A 1-2 year change in sediment type at the location of the disposal in HU080 will probably result in a change to the abundance in some species temporarily. As a result of the dynamic hydrographic environments in which the biotopes are found, the infauna may experience some change in the composition of the sediment as a result of natural variation, through either exposure of lower sorted sediments or as a result of the influx of sediment from further afield. Therefore, tolerance is assessed as high.

2.7.8. The mobile sand biotopes included in this sensitivity assessment are characterised by relatively high energy conditions and experience regular episodes of natural disturbance and disruption by the prevailing hydrographic regime. In addition, the fauna from mobile sand habitats is typically characterized by mobile opportunistic species including polychaetes and crustaceans with high capacity for recruitment and recolonisation (Bellew and Drabble, 2004).

2.7.9. Summarising the effect of aggregate dredging on mobile sand communities and their subsequent recovery, Bellew & Drabble *ibid* indicate that recovery is generally rapid, ranging from a few months to two to four years for full recovery.

2.7.10. As described in EX10.4 of the supplementary environmental information for AMEP, full recovery at the disposal sites is considered unlikely given the regular use of the sites by this and other projects and a recovery time of more than 1.5 years (Borja *et al*., 2010). The disturbed areas are therefore likely to become dominated by

opportunistic species, and this has been observed to be the current baseline conditions as a result of dredge material disposal.

2.7.11. Therefore the experience from this past disposal and associated survey work is that the impacts of disposal cannot be separated from natural variability. The conditions after the disposal are likely to be indistinguishable from the baseline conditions (in the context of the naturally high spatial variability and frequently low abundances that are prevalent in this area) after one year.

2.7.12. Overall the magnitude of change relative to previous deposits at the disposal ground (HU080) is small; however the character of the material may have an ecological effect at the site. The generally impoverished community and the large natural variability indicates the area has a low sensitivity, the benthic community has a low importance and high recoverability, the duration is relatively short (<60 days) and the impact is therefore of **negligible significance.**

2.8. Impact of gravel fraction during dispersion

2.8.1. As indicated in the modeling, much of the gravel fraction is considered likely to disperse in a westerly direction into the deeper waters approximately 1km south of the Immingham Oil Terminal. If the gravel were to disperse rapidly the average layer thickness in this area is likely to not exceed 0.02m. The model shows that initial accumulations of material reduce over time. With lower rates of dispersion from the disposal ground the thickness of accumulated material is likely to be less than 0.02m.

2.8.2. Unlike the initial disposal of the material, the transportation of the material away from HU080 is unlikely to result in any smothering because the transport occurs in a zone where there is an abundant supply of sediment moving back and forth with the tide. The additional material placed at HU080 will have a negligible impact on the transport rates already happening. However, the transport of gravel fractions away from HU080 could result in a potential change in habitat type if a significant proportion of the gravel fraction were to mix into the active transport layer in an area which had very low abundance of coarser particles.

Accumulation in deep water areas to south of IOTA

Smothering

2.8.3. The biotope complex present in the deeper basin to the South of the IOTA have been described differently in terms of sediment type in a number of monitoring and EIA outputs.

2.8.4. The use of the EUNIS physiotype data and a number of community descriptions from 1980 to present day appear to indicate the presence of a mixed sediment community characterized by species acclimatized to the challenging estuarine

conditions including *Capitella capitata*, *Polydora cornuta*, *Aphelochaeta marioni* and *Corophium volutator*.

2.8.5. *Polydora sp.* is a short lived species that reaches maturity within a few months and has three or four spawnings during a breeding season. For example, in colonization experiments in Helgoland (Harms & Anger, 1983) *Polydora ciliata* settled on panels within one month in the spring.

2.8.6. The tubes of polychaetes, including *Polydora sp.,* would be covered and the population would have to build new tubes at the new sediment surface, with some energetic cost. *Polydora sp.*, are moderately fecund, the planktonic larvae are capable of dispersal over long distances and the reproductive period is of several months duration. Recovery and establishment of a mature community is likely to occur within 5 years and so recoverability is assessed as high.

2.8.7. Overall, a tolerance of intermediate is suggested at both benchmark levels. While recoverability is likely to take longer at the 10-20cm benchmark than the 5 cm as recoverability is likely to involve complete recolonisation the surface sediment. Therefore, recoverability is probably very high at the low benchmark and high at the high benchmark.

2.8.8. The generally impoverished community and the large natural variability indicates the area has a low sensitivity, the benthic community has a low importance and a high or very high recoverability, the duration is slightly longer than the impact at HU080 and the impact is therefore of **minor adverse significance.**

Change of sediment type

2.8.9. The mixed sediment biotope complex present in the area of the deeper basin are characteristic of a range of Folk classes and whilst a change in sediment type in the long term is likely to result in a loss of one variant of the biotope complex and its replacement with another community it appears that the community composition will remain. A six month change in sediment type will probably result in a reduced abundance in some species temporarily. Therefore, tolerance is assessed as high.

2.8.10. The infaunal polychaetes such as *Aphelochaeta marioni* have high fecundity and the eggs develop lecithotrophically[2] within the sediment or at the sediment surface. There is no pelagic larval phase and the juveniles disperse by burrowing. Recruitment must occur from local populations or by longer distance dispersal during periods of bedload transport. Recruitment is therefore likely to be predictable if local populations exist.

[2] Lecithotrophic refers to the larval nutrition coming from an egg sac

2.8.11. A change of over 1-2 years may result in loss of the abundance of some species, but given the mixed sediments present and the associated communities an intolerance of intermediate has been suggested. Once the sediment has returned to type, recovery will be high.

2.8.12. The life history characteristics of the polychaete and crustacean species that characterize the biotopes suggest that the biotopes would recover from major perturbations within five years. Polychaetes present in the biotope are likely to recover quickly due to relatively high reproductive output and early maturity, e.g. *Nephtys* spp. Dittman *et al.* (1999) observed that *Nephtys hombergii* was included amongst the macrofauna that colonized experimentally disturbed tidal flats within two weeks of the disturbance that caused defaunation of the sediment.

2.8.13. As biotope recoverability is largely dependent on larval recruitment, recoverability is assessed as high.

2.8.14. The generally impoverished community and the large natural variability in level indicates the area has a low sensitivity, the benthic community has a low importance and high recoverability, and the duration is slightly longer than at HU080 and the impact is therefore of **minor adverse significance**.

2.9. Summary

2.9.1. The volume of gravel when dispersed widely within the estuary away from HU080 represents negligible impact on current maintenance dredging requirements in the Outer Humber Estuary.

2.9.2. Current speeds at the disposal site can reach 2m/s during Spring tides, which is sufficient to mobilise all gravel fractions placed at the site. The placed gravel will disperse away from the site as part of the high natural transport loads carried back and forth across the site by the strong tidal currents. Over time the tidal flow will transport the gravel fractions away from the disposal site along the estuary bed. It will travel back and forth along the deepest channels of the Outer Humber Estuary, travelling no farther upstream than the Immingham Oil Terminal (IOTA).

2.9.3. A depression in the estuary bed approximately 3.5km downstream of the IOT is simulated to be the upstream location for accumulation of a large proportion of the gravel, making it unlikely that gravel will travel to the berths of the IOT.

2.9.4. The impact of *smothering* on the disposal site HU080 is of ***negligible significance*** as a result of the low value, high recoverability and tolerance of the faunal community.

2.9.5. The impact of *change in sediment* on the disposal site HU080 is of ***minor adverse significance*** as a result of the relatively short period of time (1-2 years) the gravel fraction is unlikely to be present in anything like its placed concentrations, and the low value, high recoverability and tolerance of the faunal community.

2.9.6. The impact of *smothering* on the mixed sediment faunal community associated with the depression 3.5km South of the IOT is of ***minor adverse significance.*** This is as a result of the longer duration of the impact in an area which contains mixed sediment as recorded within the EA data and subsequent gravel disposal as a result of the Grimsby RoRo development, and the low value, high recoverability and tolerance of the faunal community.

2.9.7. The impact of *change in sediment type* on the mixed sediment faunal community associated with the depression 3.5km South of the IOT is of ***minor adverse significance*** as a result of the longer term duration (<6 months) and the low value, high recoverability and tolerance of the faunal community. It should be noted that the benchmark of 6 months is more than the anticipated duration of impact and the impact may therefore be expected to be less

2.10. In-combination impacts

2.10.1. The in-combination impacts of the fine sediments associated with the disposal of the AMEP capital dredge material and other capital and maintenance dredging projects have been addressed in *Supplementary Report EX44.1 Supplementary Environmental Information Cumulative & In-combination Effects*.

2.10.2. The impacts of gravel and coarse sediments associated with the disposal of the AMEP capital dredge material have the potential to act in-combination with other projects in the Mid-Humber Estuary.

2.10.3. The Grimsby RoRo project ES describes the addition of volumes of coarse sediment and gravels at the HU080 disposal site and as such this material has the potential to act in-combination with the AMEP capital dredge operations.

2.10.4. The project is due for commencement and completion in 2012/2013 and as such will have an impact on the seabed prior to that of the AMEP project. Whilst the volumes of coarse material are not specified it is assumed that the material will disperse in the same manner as that of the AMEP material, with the majority of the material dispersing to a depression 3.5km south of the IOT. The rates of accumulation in this area are low and the simulation indicates that there is, over time, some depletion of accumulated material from this area. As such it is unlikely that the material from the AMEP development will have an additive effect in terms of additional smothering or gravel thickness.

2.10.5. The in-combination impacts may however result in an extended duration of impact on the benthic communities and biotope complexes present. The precautionary assessment in the preceding sections indicates that a change in sediment of 6 months would result in an impact of minor adverse significance. Given that the AMEP activities are likely to commence significantly later than the 1 month post dredge material disposal presented in the models, or indeed the precautionary

6months post-dredge assessment presented in this document, it is unlikely that the in-combination impact will be greater than of negligible significance.

2.10.6. In light of the uncertainty surrounding the site specific gravel thickness, at higher resolution than the 250m x 250m cell, a precautionary assessment of ***minor adverse significance*** is considered appropriate.

3. References

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APPENDIX A

Assessment of impacts of disposal of AMEP capital dredge gravel fraction – additional assessment

NOTE TO FILE

JBA Project Code	2010s4456
Contract	Humber Estuary Quay Design Modelling
Client	Able UK Ltd
Day, Date and Time	9 October 2012
Author	C Batstone
Reviewed	Mark Lawless (9 October 2012)
Subject	Assessment of impacts of disposal of AMEP capital dredge gravel fraction – additional assessment

1 Synopsis

This file note reports the results of an additional modelling assessment of the impacts of the disposal of gravel material associated with the AMEP capital dredge operation, based in South Killingholme in the Humber Estuary. The file note accompanies a previous one[1] that investigates the impacts of a gravel plume characterised by grain sizes in the range 2-10mm. An additional assessment is provided here, which investigates the fate of disposed gravel with the distribution of grain sizes being 49% (2-6mm), 29% (6-20mm) and 22% (20-60mm). The same assessment methodology is used as for the previous file note.

The assessment finds that the gravel fraction of the capital dredge disposed at HU080 will fall to the estuary bed upon disposal. Current speeds at the disposal site can reach 2m/s during Spring tides, which is sufficient to mobilise the majority of sediment including the larger grain sizes. The tidal flow will transport the gravel away from the disposal site and along the estuary bed. It will travel back and forth along the deepest channels of the Outer Humber Estuary, travelling no farther upstream than the Immingham Oil Terminal (IOT). A depression in the estuary bed approximately 3.5km downstream of the IOT traps a large proportion of the gravel, making it unlikely that gravel will travel to the berths of the IOT. After 14 days of the disposal programme the thickness of material on the estuary bed reached 0.008m over an area of approximately 20 hectares to the south east of the IOT. The layer thickness was in the range 0.004-0.008m over an approximate area of 330 hectares, 1km to the south of the Immingham Oil Terminal, being less than this elsewhere. After 4 days with no further disposal, the gravel dispersed so that the layer reduced to less than 0.004m in this area, with localised areas of up to 0.006m thickness. For the full disposal programme of 42 days, the average[2] layer thickness in this area is likely to not exceed 0.02m, and reduce to negligible thickness within a month of the cessation of the disposal programme.

The relatively small amount of gravel, when dispersed, represents a negligible impact on current maintenance dredging requirements in the Outer Humber Estuary. The dispersed gravel remains within the sub-tidal area and there is therefore no expected impact upon inter-tidal areas and habitats.

This assessment finds that the gravel material with grain size distribution as stated above will behave very similarly to material with the grain size distribution of 2-10mm, reported in the previous file note.

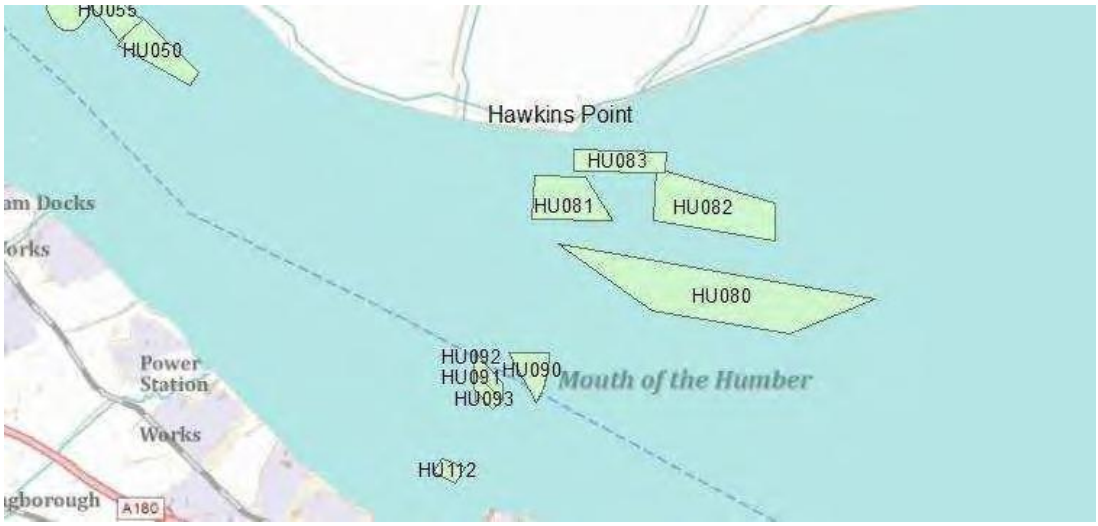
2 Context

The AMEP construction in South Killingholme in the Humber Estuary requires a capital dredge operation. The material that will be dredged contains a significant quantity (130 000m^3) of material that is classed as gravel. The AMEP site investigation revealed that this gravel material is characterised by the following proportions of grain sizes: 49% (2-6mm), 29% (6-20mm) and 22% (20-60mm). This material is proposed to be disposed at the HU080 disposal site (Figure 1).

[1] Assessment of impacts of disposal of AMEP capital dredge gravel fraction, 28 August 2012, JBA Consulting (2010s4456_AMEP_Gravel_plume_assessment.pdf)

[2] Thicknesses are calculated by dividing the total particle volume in a 250m by 250m cell by the area of that cell. Individual grain sizes can be greater than the average thickness within a cell.

Figure 1 isposal sites in the Outer um er Estuary



3 Methodology

The capital dredge operation proposed will use the Barent Zanen (8000m^3 capacity), a Trailing Suction Hopper Dredger, to dispose of material at the disposal site. The round trip time between disposals (from the disposal site to the AMEP site, dredge, and return to the disposal site) is expected to be approximately 8 hours. The disposal time of the material is expected to be approximately 15 minutes. From the AMEP site investigation, it is estimated that approximately 13% of the material disposed of during each disposal will constitute gravel. This represents 1,040m^3 of the capacity of the dredger. Therefore, it will take approximately 42 days at this rate to dispose of the gravel.

A plume modelling assessment was performed to investigate the behaviour and dispersal of gravel-sized sediment at the HU080 disposal site due to the Humber Estuary tidal flow currents. The assessment was performed using the particle-tracking methodology described in JBA Consulting (2011)[3] (see Appendix below for a description of the model). Though this modelling methodology assessed the impacts due to the disposal of silt-sized grains, it is also applicable for investigating the fate of material with the larger grain sizes that characterise gravel. The model simulation was performed for 18 days of Spring-Neap estuary tidal flow (supplied by the 2D hydrodynamic model described in JBA Consulting (2011)). For the first 14 days, particles were placed into the top of the water column at a specified rate (1,040m^3 over 15 minutes, followed by 8 hours until the next disposal) at the HU080 site. In order to best simulate the disposal of the observed distribution of gravel, the 15 minute disposal time was divided so that for 49% of the time disposal of the fine gravel (2-6mm) was simulated, 29% of the time disposal of the medium gravel (6-20mm) was simulated, and 22% of the time disposal of the coarse gravel (20mm-60mm) was simulated.

For the final 4 days, the simulated disposal operation was stopped in order to examine how the particles would disperse upon completion of the actual dredge disposal programme. This length of simulation, one third of the actual proposed programme, was performed due to computational restrictions. The impacts of the full disposal programme were extrapolated from the results of this shorter simulation.

Layer thicknesses were calculated by dividing the total particle volume in a 250m by 250m cell by the area of that cell. Therefore, layer thicknesses reported are averages over this area. Individual grain sizes

[3] JBA Consulting (2011) Able Marine Energy Park Estuary Modelling Studies. Report for Able UK Ltd

described by particles[4] by the plume model within a cell can be greater than the average thickness within that cell.

4 Results

For each period of disposal during the first 14 days of the simulation the grain-sized particles dropped to the bed of the estuary upon disposal. Current speeds in this area reached 2m/s during Spring tide, which was sufficient to mobilise the larger grain sizes and transport the majority of sediment away from the disposal site. The average particle height above the bed outside of the disposal location remained below 0.01m throughout the simulation, even during peak Spring tide flows. The flows transported the particles along the bed of the estuary upstream during the rising tide and downstream during the ebbing tide. The average thickness of gravel material on the estuary bed, derived from the particle representation, during the last 24 hours of disposal on day 14 of the simulation is shown in Figure 2. The largest increase in bed elevation after 14 days of the gravel disposal programme was approximately 0.008m over an area of 20 hectares to the south east of the IOT. The gravel-sized sediment was transported into the deepest channels of the estuary bed, as can be seen by comparing the pattern of dispersed sediment with the bathymetry (Figure 3). A depression in the estuary bed approximately 3.5km south east of the IOT captured the sediment, preventing the gravel from being transported to the IOT berths. The layer thickness was in the range 0.004-0.008m for an area of approximately 330 hectares of the sub-tidal zone, extending from 1km downstream of the IOT to the south east. The thickness of the layer elsewhere in the Outer Humber Estuary is significantly less than this. After 4 more days of tidal flow with no more added sediment at the disposal site, the simulated layer thickness reduced to approximately 0.006m at highly localised points, and significantly less than this everywhere due to continued dispersion of the particles (Figure 4).

In reality, the layer thickness will exhibit considerable variation due to the fact that the grain sizes involved are greater than the spatially-averaged thicknesses reported.

[4] Each particle in the plume model represents a given mass of sediment, not an individual sediment particle or grain. See the appendix for more detail.

Figure 2 A erage gra el layer thickness during day 14 o disposal simulation at

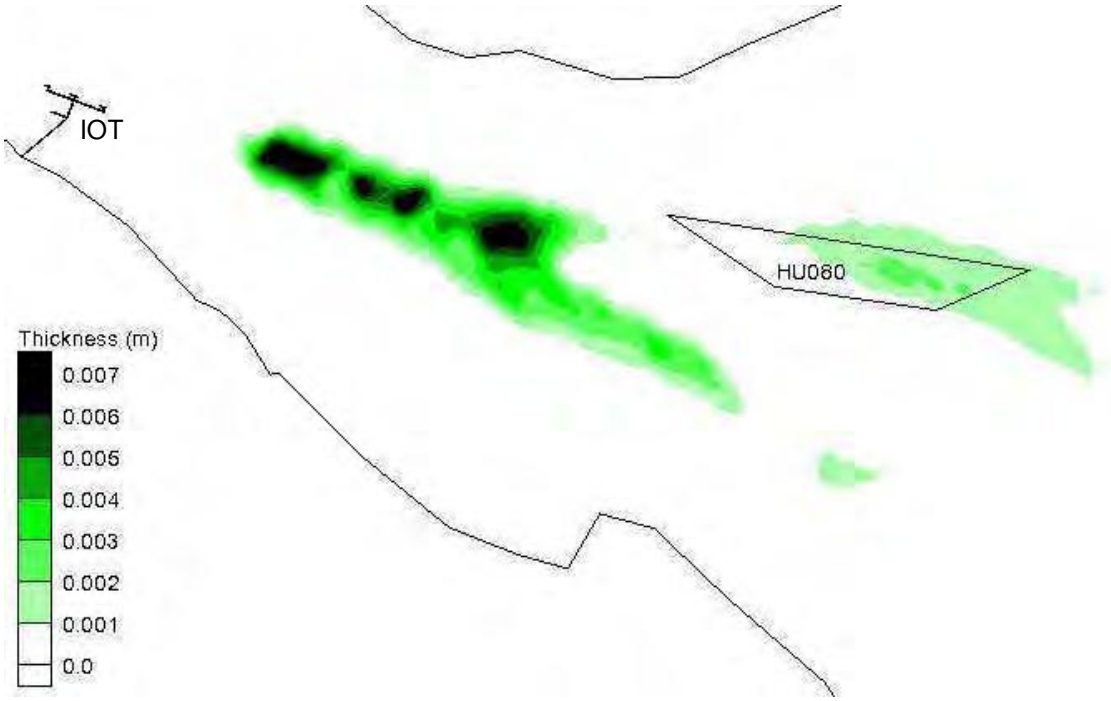


Figure 3 athymetry o Outer um er Estuary metres elo Ordnance atum

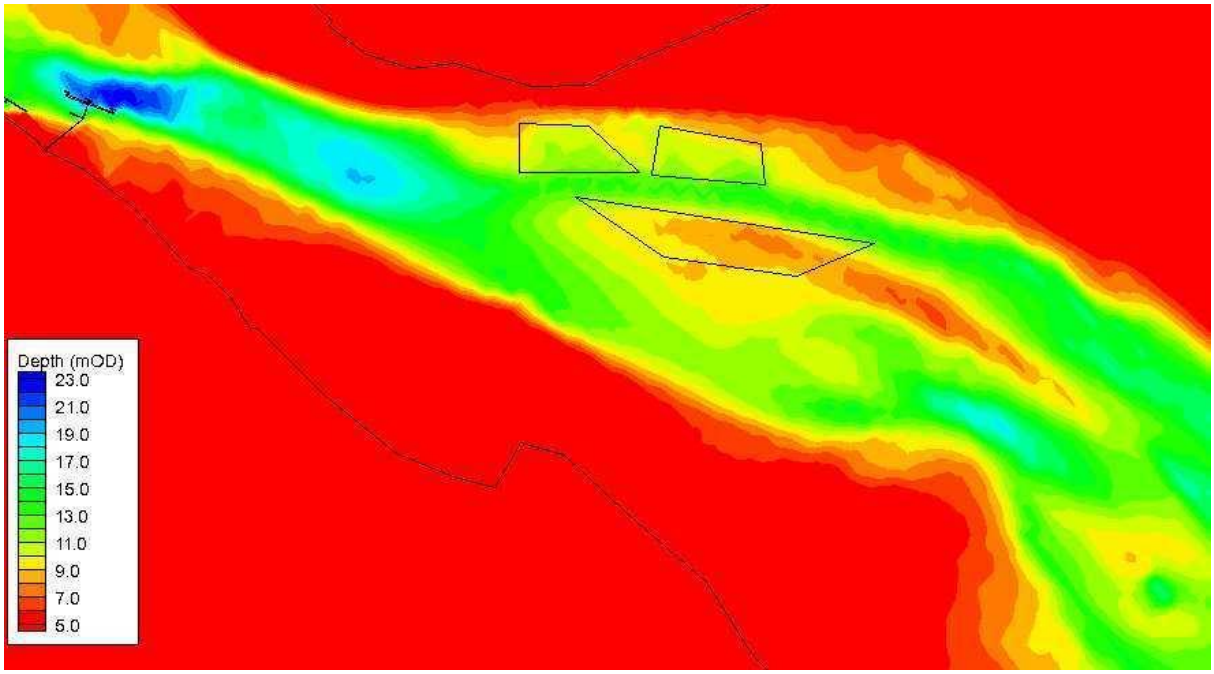
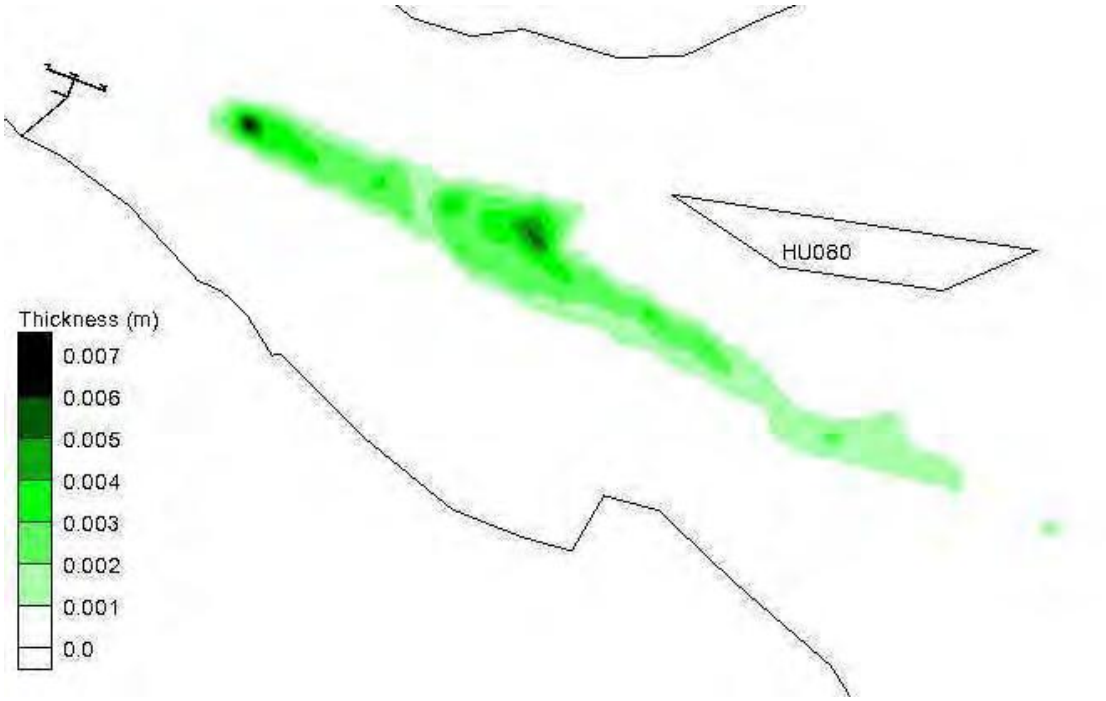


Figure 4 A erage gra el layer thickness during day 1 o disposal simulation at 4 days a ter end o disposal



5 Impacts

The gravel fraction of the capital dredge disposed at HU080 will fall to the estuary bed upon disposal. The tidal flow will transport the gravel away from the disposal site and along the estuary bed. It will travel back and forth along the deepest channels of the Outer Humber Estuary, travelling no farther upstream than the Immingham Oil Terminal. After 14 days of the disposal programme the thickness of material on the estuary bed reached 0.008m in the simulation over an area of approximately 20 hectares to the south east of the IOT. The layer thickness was in the range 0.004-0.008m over an approximate area of 330 hectares, 1km to the south of the Immingham Oil Terminal, being less than this elsewhere. After 4 days with no further disposal, the gravel disperses so that the layer reduced to less than 0.004m in this area, with localised areas of up to 0.006m thickness. For the full disposal programme of 42 days, the average layer thickness in this area is likely to not exceed 0.02m, and reduce to negligible thickness within a month of the cessation of the disposal programme.

The relatively small amount of gravel, when dispersed, represents a negligible impact on current maintenance dredging requirements in the Outer Humber Estuary. The dispersed gravel remains within the sub-tidal area and there will therefore be no impact upon inter-tidal areas and habitats.

6 Appendix – Particle Tracking Model

An assessment of the fate of the gravel sediment plume at the disposal site has been performed using the Particle Tracking Model (PTM), developed and maintained by the US Army Corps of Engineers' Coastal

Inlets Research Program[5]. The PTM uses a Lagrangian framework in which the sediment being modelled is discretised into a finite number of particles that are followed as they are transported by a specified flow field. Each particle in the PTM represents a given mass of sediment (not an individual sediment particle or grain), and each particle has its own unique set of characteristics. Particles from sources being modelled (as opposed to the local, or native, bed sediment) are introduced, or released, into the domain from specified source locations. These sources are designed to permit modelling of a wide range of natural or anthropogenic processes in coastal and environmental studies.

In the PTM the 2D depth-averaged flow field is specified from the hydrodynamic model. Lagrangian calculations are carried out for each particle active in the domain and include:

- Flow calculations: interpolate the local flow and wave conditions at the particle's location. Vertical flow velocity is estimated using the continuity equation if the input hydrodynamics are two-dimensional;
- Mobility calculations: determine the mobility of the particle and, if deposited, the likelihood of its entrainment in the flow using the flow conditions at the particle's location;
- Trajectory calculation: determine the position of the particle at the end of the time-step using an advection-diffusion routine with consideration of settling, deposition, and erosion. Particle inertia is not considered;
- Boundary condition check: check that the particle's predicted path does not violate boundary conditions.

Limitations of the model include:

- Sediments specified at the source do not have an initial momentum;
- The model assumes no background SSC (clear water) and therefore there is no representation of the effect that such background SSCs may have on hindering the fall velocity of particles;
- Particles that leave the domain of the hydrodynamic model at the ocean boundary are lost and cannot re-enter the domain. Therefore, SSCs may be slightly under-predicted throughout the Estuary. This effect is partially mitigated by the fact that a proportion of sediment leaving the Estuary will not re-enter, being dispersed along the coastline.

[5] Coastal and Hydraulics Laboratory (2006) PTM: Particle Tracking Model. ERDC/CHL TR-06-20. US Army Corps of Engineers, Engineer Research and Development Center

ANNEX 3 – SCHEDULE OF PROJECT DOCUMENTS CONSIDERED IN IN-COMBINATION ASSESSMENT

PROJECT	DEVELOPER	PLANNING REFERENCE	SITE TYPE	STAGE					BRIEF DESCRIPTION OF WORKS	COMMENTS
				Pre-Planning	*Submitted*	*Approved*	*Under Construction*	*Operational*		
Able UK Area F	Able UK	PA/2008/1463	Greenfield			√	0%	0%	Port-related storage	Not EIA development.
Able UK Area C	Able UK	PA/2007/0101	Brownfield			√	75%	50%	Port-related storage	ES available
Able UK Area E	Able UK	PA/2006/0039	Brownfield			√	50%	0%	Port-related storage	ES available
Able UK Northern Area	Able UK	PA/2009/0600	Greenfield		√		0%	0%	Northern Area Port Related Storage, Conservation areas and Office park	ES available
PROJECTS IN THE HUMBER ESTUARY										
Donna Nook Managed Realignment Scheme	EA	N/132/02687/09	Estuary			√	0%	0%	Realignment of existing flood banks to create new intertidal habitat.	Refused 8th July 2010. Resubmitted and approved 23rd June 2011 ES available, AA available.
Maintenance Dredging	ABP		Estuary			√	n/a	100%	In accordance with the Humber Estuary dredging protocol.	Maintenance Dredging Protocol
Immingham Oil Terminal Approach Channel Deepening	ABP		Estuary			√	0%	0%	Dredging works	ES available, AA available
Green Port Hull	ABP		Estuary			√	0%	0%	Quay and industrial facilities	ES available
Grimsby Ro Ro	ABP		Estuary			√	0%	0%	New Ro-Ro	ES available
Hull Riverside Bulk Terminal	ABP	HRO	Estuary		√		0%	0%	New bulk terminal	ES available
Humber Flood Risk Management Strategy	EA		Estuary			√	n/a	n/a	Strategic flood risk management plan including managed realignment sites	AA available
PROJECTS IN NORTH LINCOLNSHIRE COUNCIL AREA										
North Lincolnshire Core Strategy	NLC		n/a			√			Strategic local planning document	http://www.northlincs.gov.uk/environment/planning/spatial-planning/local-development-framework/
Land East of Falkland Way, North Lincolnshire	nport Investments	PA/2001/1556	Brownfield			√	n/a	100%	Single road junction for existing development	This development exists - part of baseline.
Ursa Glass Wool Factory	Ursa	PA/2008/0988	Greenfield			√	0%	0%	Glass Wool Factory, resubmitted	Paper copy of ES available. Electronic not available - has been requested from applicant.
Bioethanol Plant	Bioethanol Ltd.	PA/2006/1880	Greenfield			√	0%	0%	Bioethanol plant	ES available, AA available.
North Killingholma Power Project	C.Gen	IPC Application	Mixed	√			0%	0%	Integrated Gasification Combined Cycle Power Station (output up to 430MW). Land West of HST	PEIR available
DRAX Heron Renewable Energy Plant	Drax	DECC Application	Brownfield			√	0%	0%	Land to the north of, Humber Road, South Killingholme. Biomass power station. 290MW Biomass Power Station	ES available
PROJECTS IN NORTH EAST LINCOLNSHIRE COUNCIL AREA										
North East Lincolnshire Core Strategy	NELC		n/a	√					Strategic local planning document - draft only	http://www.nelincs.gov.uk/council/planning-policy/core-strategy-development-plan-document/
Aeolian Wind Turbines		DC/827/08/IMM			√		0%	0%	Two wind turbines and ancillary development	ES available online.
Bio Power / Fuel	Helius	DC/303/07/IMM	Mixed			√	0%	0%		AA available
Bioethanol Plant	Abengoa Bioenergy	DC/1147/10/IMM	Greenfield			√	0%	0%		ES available.
Bioethanol Plant	Vireol PLC	DC/202/08/WOL	Brownfield			√	0%	0%		ES available.
Europarc	Wykeland Group	DC/1119/10/WOL	Mixed		√			100%	Application to replace extant application DC/1492/04/WOL	This development exists - part of baseline.
Industrial Park	Magna Holdings	DC/730/07/IMM				√			Land at Queens Road North of Europa Way Immingham N E Lincolnshire. B1, B2 & B8 Industrial Development	ES available
PROJECTS IN CITY OF KINGSTON UPON HULL										
Hull City Council Core Strategy	HCC		n/a		√				Strategic local planning document	HRA available
Tidal Stream Generator	Neptune RE Ltd.	24778				√	0%	100%	DECC Application	Under construction Q1 2012, but at time of ES was still in planning stage. Comprises 2no. Piles in estuary.
PROJECTS IN EAST LINDSEY DISTRICT COUNCIL AREA										
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)										
PROJECTS IN WEST LINDSEY DISTRICT COUNCIL AREA										
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)										
PROJECTS IN THE EAST RIDING OF YORKSHIRE										
ERYC Core Strategy	ERYC		n/a	√					Strategic local planning document - draft only	http://consult.eastriding.gov.uk/portal/forward_planning/core/
Farmarsh Farm	ERYC	11-05896-STPLFE			√				3no. Turbines	ES available
Thorngumbald Windfarm									We understand this to have been withdrawn from planning.No information available.	
Country Park Inn		11/01633/STPLF	Mixed		√				Extension to hotel and ancilliary works	Consultation on HRA available.
Bioethanol facility, Saltend Lane, Preston	Vivergo Fuels	07/07450/STPLFE				√			Construction of a bioethanol facility consisting of three separate areas, main process area, ethanol storage area and a tanker loading area with associated works.	ES available
Energy from Waste facility	BP	06/05284/STPLFE				√			Energy from Waste facility with associated buildings/works. Joint application with Hull CC. Work Commenced.	No ES available.
Humber Gateway on-shore installation	Eon	08/01993/STPLFE				√			Under ground cables from Easington to Saltend	http://www.eastriding.gov.uk/publicaccessdocuments/default.aspx?folder1_ref=08/01993/STPLFE
Mixed use south of Brough	Horncastle Group				√		0%	0%	Leisure, retail and residential development.	http://www.eastriding.gov.uk/publicaccessdocuments/default.aspx?folder1_ref=11/04104/STOUTE
Biomass power station	GB-BIO Ltd	10/04639/STREM				√			Biomass powered electricity generating station	No ES available.
OTHER PROJECTS										
Humber Gateway Wind Farm	Eon (Humber Wind Ltd)	Approved by DECC 09 02 11				√	0%	0%	8km off the Holderness coast, East Riding of Yorkshire. 300MW , 42 to 83 turbines	AA available. Remote from estuary.

ANNEX 4 – EXTRACT FROM HUMBER FRMS HRA VOLUME 2 (Stage 4)

Table 2.2 Summary of Habitat Compensation Requirements, Habitat Creation Programme and Balance over the 50 year Strategy

Estuary Sector	Compensation Requirement (ha) (expressed as habitat changes)*	Habitat Creation Programme (ha)	Balance (ha)	Balance after Compensation Reallocation (ha)	Comments
Inner	250	192	442	442	In the inner estuary we are currently predicting that the Strategy will provide significant environmental benefit to the Estuary and the SAC/SPA/Ramsar site in terms of increased intertidal habitat.
Middle	- 625	256	- 369	102	Paull Holme Strays and Goxhill provide insufficient habitat creation to meet the current prediction for losses. The deficit created can (at this time) only be met by creation of appropriate intertidal habitat in the inner part of the Outer (N) sector where we have significant habitat creation opportunities (e.g. Welwick and Skeffling). Management of the risks associated with this is discussed on page 9.
Outer (N)	44	471	515	44	Here we are predicting a significant habitat gain which we propose is used to contribute to meeting the predicted deficit in the Middle estuary. Surplus habitat would provide further environmental benefit to the estuary in terms of excess habitat provision in the sector.
Outer (S)	-185	110	-75	-75	We currently have only a single habitat creation site (Donna Nook) in the Outer (S) sector of the estuary and will need to identify a further site for delivery post 2020-30 when a deficit in this sector is predicted. This will be addressed in the next Strategy review.
Whole Estuary	**- 516**	**1029**	**513**	**513**	After 50 years our overall habitat loss/creation balance will leave the Estuary c. 500 ha better off than required by compensation under the Habitats Regulations. This is considered a significant environmental benefit from the Strategy
*Compensation Requirement: this is a summary of the losses/gains from predicting coastal squeeze (including changes in morphology through estuary evolution) combined with direct scheme footprint losses and allowances for temporary disturbance multiplied by agreed replacement ratios. Timing of losses and habitat creation are shown over the life of the Strategy in the tables in Appendix B.					