PINS – TR030001
(24 September 2012)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Able - Proposed MEP, Killingholme

Associated British Ports (10015525)

Representations in relation to Supplementary Environmental Information and Applicant's Comments on Written Representations

Hydrodynamics and Sedimentation

Part 1 – Review of Supplementary Reports

Part 2 - Response to Able Comment on Written Representation

(Paras 22.62 to 22.218 of Able Response)

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Part 1. Review of Supplementary Reports

1 Key Issues – Hydrodynamics and Sediments

1.1. Overview

1. The new documents provided by Able fill some 'gaps' in the original ES but the models and analysis methods have not been improved and as a consequence, **the ES remains unsound.** In particular, the modelling of the final quay design[1] shows that the original ES modelling was incorrect. The new modelling indicates that as a general overview the conclusions are similar to those written in the original ES, although the quantitative detail has changed.

1.2. Modelling Assessment

2. Modelling of the final quay design[2] shows the new non-cohesive modelling to predict small increases rather than the large increases in the original ES, whilst the cohesive mud modelling indicates decreases in sedimentation at adjacent port facilities.

3. The supplementary information modelling results show that the hydrodynamics potentially coupled with changes to the sediment input parameters have been changed/improved (Figure 7 in Report EX 8.5) from those used in the ES. **This would confirm my view that fine sediment modelling and the interpretation of sedimentary impacts presented in the ES are unreliable for assessing sedimentary effects of the Able development and therefore the predicted effects at the Port of Immingham and other facilities.**

[1] Supplementary Report EX8.7 - Modelling of Final Quay Design (supplement to Annex 8.1 of the ES)

[2] Supplementary Report EX8.7 - Modelling of Final Quay Design (supplement to Annex 8.1 of the ES)

4. **The new reports show that the ES has under reported[3] a number of impacts that have the potential to impact to the detriment of operations at the Port of Immingham and other facilities.** For example:

   I. The area of sediment accumulation in the intertidal and subtidal upstream and downstream of the reclamation reported in the ES is now shown to have been an under representation in extent of impact. The significance of this change is not acknowledged as it **could lead to substantial navigation and environmental impacts**, particularly in years following the completion of development;

   II. EX 8.6 also reports that **the ES under predicted the existing maintenance dredge requirements at Immingham Outer Harbour (IOH) (Section 5.1), however the original ES made no specific reference to IOH.** Subsequent information provide in Able's response to Written Representations indicates IOH was not included as part of the baseline for some of the modelling. Comparison of Table 1 from EX 8.6 with Tables 22.3 – 22.5 show IOH was not in the baseline model for either the information presented in the ES or the supplementary modelling in EX 8.6. A new data set has been provided for the comment on Written Representations This new report (EX 8.6) now suggests that there will be a 5% reduction in maintenance dredging at IOH following the AMEP development.

   III. Taking the information provided in response to the Written Representation into account, however, it is hard to see how this new information in the supplementary documents was arrived at. This is particularly true when the figures for IOH quoted in EX 8.6 do not correspond with those given in the Able comments on the Written Representation. Furthermore the comments on the Written Representation gives tables comparing sedimentation results at various berth receptors, with and without IOH in the model. **The results, however, are identical, which is hard to believe given the size of the harbour.**

   IV. **The lack of transparency in the documents and that IOH was not included in the baseline throws the validity/ certainty of the original ES into doubt.**

[3] This under-reporting is indicated by comparing paragraph 1.1 of EX 8.6 HR Wallingford Supplementary Report – Assessment of Maintenance Dredge Requirements, with the original ES.

5. The increase in cohesive material sedimentation along the intertidal is also reflected in the subsequent morphological assessment[4]. This infers that deposition effects will extend to the HST/C.RO jetty over a number of years and possibly beyond the jetty depending on the operational requirements of the terminal. This differs from the original ES where no sedimentation impacts were predicted to reach HST/C.RO. **Protective provisions should be sought by ABP and others to address both the uncertainty and the increased navigational risk this will pose.**

6. Furthermore the scheme modelling only reports the impacts on peak spring flows but this may not be the period where effects/impacts are greatest and other significant effects may result. For example, changes to flow speeds and directions that may affect mooring at the South Killingholme Oil Jetty (SKOJ). **The potential for such effects is not analysed or reported.** This is still needed if we are to know the full environmental effects of the project.

7. **There is still limited assessment of the dredge disposal location for erodible (capital and maintenance dredged) material. This remains an omission and concern with respect to navigation and environmental impact[5].** There is no assessment of the potential for significant increases in maintenance dredging of the SDC at the peak of its sedimentation cycle, due to the large increase in local sediment supply arising from the maintenance dredging disposal. Where assessment has been made for the disposal plumes this is based upon poor science, using background suspended sediment concentration (SSC) levels at the dredge site and NOT the disposal site for justification for no impact (paragraph 1.3.16). The modelling also significantly underestimates both the quantities of silt/sand that will be dispersed and the initial rate of dispersal from a realistic dredge disposal scenario for the majority of the material to be deposited. This is because only a portion of the deposited sediment is allowed to disperse, when it is likely that all will disperse. The rate of disposal from each dredger load will (for maintenance dredging and some of the capital disposal) be larger than for the small dredger scenario modelled, due to the likelihood that larger dredgers will be used.

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[4] EX8.9 - Assessment of Changes to Morphology (particularly intertidal) between Humber International Terminal (HIT) and Humber Sea Terminal (HST/C.RO). Paragraph 6.3

[5] EX10.4 – Impact of Dredging and Dredged Material Disposal on 1) Subtidal and Intertidal Features and 2) Aquatic Ecology Paragraph 1.3.13

8. **There is also predicted accretion around the APT outfall and SKOJ mooring dolphins[6] and these areas should be subject to agreed monitoring proposals prior to consent.**

1.3. Model Validation

9. The latest reports produced by Able further underline my concern that **the modelling in the ES is deficient and the conclusions of the ES are therefore unsound** as evidenced below[7]:

   I. The report shows improved validation of the 3D model but over a different simulation period, i.e. the model has been validated over a different time period to the previous report. It cannot be ascertained if the model is in fact 'better' than that used for the ES or if it is the same with a time chosen that provides a better match (with the same or greater differences throughout the remaining tidal cycle). **The supplementary information therefore does little to improve the confidence in the model results**;

   II. The hydrodynamic validation was also for depth average flows only, i.e. a single flow speed to represent the flows over the whole water column, therefore is not validated as a 3D model. **The hydrodynamic modelling sophistication of the 3D model has not been used to inform the assessment;**

   III. The hydrodynamic 3D model is still only validated against the JBA model and a single set of flow measurements, and is, therefore, **built on data with inherent uncertainties**, particularly estuary-wide. Moreover the model will not perform as well as a 3D modelling investigation would suggest;

   IV. **The sediment model validation is based upon insufficient data**. The turbidity meters deployed didn't record (if the data used was sufficient then the turbidity meters would not have been deployed in the first place) and local data held by ABP was not requested;

   V. The validation of SSC against the water sampling data (not reported in the original ES) shows that **the original sediment distribution in the model was wrong. This means the ES conclusions are not adequately supported, therefore are unreliable. Furthermore,**

[6] EX 8.10 Morphological Assessment of Changes south-east of the Development

[7] Supplementary Report EX8.5 Variation in 3D Flow and Sediment models used for the Assessment of AMEP on Fine Sediment Transport (HRW, 2012)

this indicates that the ES hydrodynamics (used to drive all the models) are also unreliable – leading to potential for uncertainty in the conclusions of the ES;

VI. References to "excellent" (which is over stated) sediment validation is only made for Grimsby. No reference to the quality of validation at the AMEP site is given. **This infers the modelling is not so good around the development site**;

VII. **The validation of the sediment model therefore remains questionable.**

10. **The new supplementary reports do little to answer questions raised on the reliability of the assessment of impacts made in the original ES**, particularly through the area of the south bank port facilities.

Appendix A: Specific Document Review Comments

This appendix presents a review of the supplementary environmental information, providing more detail with respect to the key issues presented above and some of the deficiencies identified.

A1. Supplementary Report EX8.5 - Variation in 3D Flow and Sediment models used for the Assessment of AMEP on Fine Sediment Transport

1.1 This report describes the modelling process used to determine the assessment of fine sediment transport in the original ES and reiterates the calibration carried out by HR Wallingford.

1.2 The sediment transport model (DELWAQ-3D) was driven by the TELEMAC-3D hydrodynamic model which was supplied with set up boundary conditions for a spring-reap cycle from the JBA baseline hydrodynamic model used to assess the impacts of the AMEP development on estuary-wide hydrodynamics.

1.3 **Modelling uncertainty remains:** The report shows improved validation of the 3D model against the JBA model than shown in the ES but over a different simulation period, i.e. the model has been validated over a different time period to the previous report. It cannot be ascertained if the model is in fact 'better' than for the ES or if it is the same, with a time period chosen that provides a better match (with the same or greater differences throughout the remaining tidal cycle). The hydrodynamic validation was also for depth average flows only, i.e. a single flow speed to represent flows over the whole water column, therefore has not been validated as a 3D model. **Therefore uncertainty still remains on the robustness of the model and the conclusions of the ES**. An improvement against field measurements at the Centrica/ E.ON intakes and outfalls is shown.

1.4 **Modelling uncertainty remains:** The TELEMAC-3D model is still only validated against the JBA model for the estuary as a whole, therefore is only a 2nd order (lower form) validation which will have inherited inadequacies from the JBA model. Therefore **the 3D model is built on data with inherent uncertainties** and will therefore not perform as well as a 3D modelling investigation would suggest. This again leads to uncertainties in the ES conclusions.

1.5 **Modelling based upon insufficient data:** Para 2.1.2 states turbidity meters were deployed (in the estuary) but measurement was unsuccessful (i.e. No data recorded). Validation of the DELWAQ-3D mud/fine sediment model is limited to comparison with water samples taken in the vicinity of the HST (C.RO). **The model is therefore based upon insufficient data** (if the data used was sufficient then the turbidity meters would not have been deployed in the first place).

1.6 **Modelling based upon insufficient data:** Para 2.1.2 also states that additional suspended sediment concentration (SSC) data was sought but only data taken from the Grimsby Ro/Ro ES was used. **This indicates the investigation was limited** and only used a small amount of information in the public domain. No information was requested from ABPmer. My Written Representation indicated some of the data that could have been sourced local to the development.

1.7 **Modelling uncertainty remains:** Para 2.1.4 states the model figures "show excellent validation.....against observations at Grimsby" but do not include other locations nearer the development site, thus inferring that the validation was not as good around the AMEP development site. **This raises questions over robustness of the model.**

1.8 **Evidence of incorrect modelling in ES:** Turning to the AMEP development site Paras 2.1.5 and 2.1.6 discuss the neap and spring tide validation which was not presented in the original report, i.e. new information. The justification for acceptability of the validation is based on the numerical calculation (adjustment) founded on the difference in tidal range between the observations and that used in the model. The justification for applying this adjustment to the data in the Humber Estuary is not substantiated. This adjustment is used to explain the differences in peak SSC against the water sample information. **There is still no comment**

concerning the incorrect tidal distribution, particularly on spring tides which I commented on in my Written Representation therefore the validation still remains deficient. Furthermore, in the ES document the water sample information was considered anomalous without clear justification.

1.9 **Evidence of incorrect modelling in ES:** Figure 7 shows validation of SSC against a range of tide equivalent to that on which the water sampling was undertaken is new information produced since the ES. It is stated that JBA produced new boundary conditions encompassing the large tidal range of the spring tide water sample measurements. It is interesting to note that the new modelling now produces the correct tidal sediment distribution compared to that shown in the ES. As indicated in my Written Representation this distribution is also apparent on smaller spring tide ranges at HST (C.RO). This information and the new modelling confirms that the original fine sediment modelling used in the ES, particularly on spring tides was in error as indicated in my written representation. It also indicates that the local baseline hydrodynamics in the original JBA model was likely to be in error because I can see no realistic reason why the sediment distribution relative to the tidal state would substantially change due to the relatively small change in spring tide range hydrodynamics. Further field evidence suggests this is not the case. This hydrodynamic data was transferred to the TELEMAC-3D model, through the supplied boundary conditions and therefore would have influenced the fine sediment modelling presented in the ES, i.e. **perpetuating the error.**

1.10 **Evidence of incorrect modelling in ES:** Post the ES, Figure 7 suggests the hydrodynamics (potentially coupled with changes to the sediment input parameters) have been changed/improved. This would confirm my view that **fine sediment modelling and the interpretation of sedimentary impacts presented in the ES is unreliable** for assessing sedimentary effects of the Able development and therefore the predicted effects at the Port of Immingham and other facilities. The conclusions of the ES are therefore questionable.

A2. EX 8.6 - HR Wallingford Supplementary Report - Assessment of Maintenance Dredging Requirements

2.1 **The ES has under-reported impacts:** Para 1.1 states the ES modelling predicted significant accumulation of sediment in the intertidal and subtidal upstream and downstream of the reclamation as well as in the berth pocket. The ES report, however, concentrated predominantly on the area of the E.ON/Centrica intake and outfalls, particularly the prediction of future maintenance dredging requirements. Little if any consideration was given to the intertidal and shallow subtidal sediment accumulations down estuary, towards the Port of Immingham **which could result in significant adverse navigation and environmental impacts.**

2.2 **The ES has under-reported impacts:** I note that maintenance dredge requirements were presented in the AMEP ES documents which indicated changes would occur from HST (C.RO) to the Immingham Bulk Terminal. These predictions were made with the proposed (DCO) reclamation design and indicated that maintenance dredging at all existing port facilities would be reduced by the AMEP development. The only new maintenance dredging would be from the new AMEP Dock, berth and the area of the Centrica/E.ON intakes and outfalls. Exactly the same data/predictions have been made in the current document as in the ES. This indicates that no new modelling has been undertaken, new predictions made or the previous results validated. However, at the bottom of page 2 discussion of a 5% reduction in the prediction of the maintenance dredging for Immingham Outer Harbour (IOH) following completion of the AMEP development is made. **This was not presented in the original ES. – What other impacts have not been reported/identified? This increases uncertainty and further undermines the conclusions of the ES.**

2.3 **The ES has under-reported impacts:** Further information has been included with respect to the comparison of the model results against observed dredging figures to identify the variability year on year and to also justify the range in model predictions. In addition, **observed data is included for IOH for the first time** (Table 8). In addition, Section 5.1 at the bottom of page 7 states "Note that the numerical modelling *previously undertaken* for IOH led to an under

prediction of the initial maintenance requirements incurred in 2007 and 2008" [emphasis added]. **This again questions the validity of the ES and the statement infers that:**

I. **IOH was modelled for the ES, so why was the data not included in the ES? However, the under representation of the maintenance requirement would indicate that IOH was not in the original model. This is therefore a contradiction;** or

II. New modelling has been undertaken. If this is the case leading to the newly presented predictions for IOH, then **it is not credible that the model predictions would not change elsewhere, particularly between AMEP and IOH.**

2.4 Taking this into account, **there is a lack of transparency and a lack of confidence** that the modelling and the interpretation correctly reflect the impacts of the AMEP development. The validity of the ES is further thrown into doubt.

2.5 As noted above I also have reservations over the ability of the original sediment model to correctly represent the sediment dynamics. Given the new information in EX8.6 I still have concerns (originally expressed in my written representation) over whether **the impacts of the AMEP development on the sediment dynamics (hence change to the maintenance dredging requirements at ABP and other facilities) can be relied upon. The ES therefore remains questionable.**

2.6 **The same doubts would also extend to the maintenance dredge prediction,** therefore the future disposal requirement for the AMEP development itself thus affecting the scale of impact on the maintenance disposal site.

A3. Supplementary Report EX8.7 - Modelling of Final Quay Design (supplement to Annex 8.1 of the ES)

3.1 I and others have noted **deficiencies in the original ES with respect to the assessment of marine matters.** This supplementary report now provides new information as an update of the

hydrodynamic assessment presented in the ES. The report provides new modelling results/assessment for**:**

I. The final proposed quay design;
II. The Impact of disposal of non erodible material at HU082 on the hydrodynamics and potential change to the non-cohesive sedimentary regime; and
III. In-combination impacts.

Assessment of Final Quay Design

3.2 Para 3.2 states that the same models have been used for the final quay design as for that presented in the ES. In this respect **problems highlighted in my Written Representation concerning the validation and calibration are still relevant.** With comparison to the original ES assessment, I have the following concerns:

I. The pattern of most significant hydrodynamic changes in the new modelling remain close to the AMEP development. They do, however, vary significantly in the detail from the original modelling **which indicates that incorrect modelling results were used in the original ES;**
II. Small changes in water levels are now presented which indicate some effect over the width of the estuary, albeit very small. **Similar small changes to the flow speed distribution below 0.1m/s change have not been presented;**
III. The new modelling no longer indicates effects from the Compensation Site. This is **surprising/questionable** given that Section 3.2.4 notes that the interchange of flow between the estuary and Cherry Cobb Sand (the Compensation Site) will be larger and will start to flood at a lower level in the tide. **This is therefore mis-leading for determining the impact of the development (project) as a whole.** It is noted however that effects are shown for the in-combination modelling;
IV. Section 3.3.2 states that the large circulation zone (in the vicinity of the CPK jetty (HST/C.RO in our documents)) predicted in the original ES modelling has now disappeared due to the set back of the face of the reclamation. This is not the whole reason as the flow regime shown in the original ES is **considered to be in error, as it shows an unrealistic flow direction immediately up estuary of the reclamation** (Figure 17 in the ES report). The new

modelling indicates a more realistic flow regime with an eddy immediately up estuary of the reclamation. **This comparison suggests there was some error in the original hydrodynamic modelling around the development, therefore those results were unreliable**;

V. The report notes that the final quay design (80m set back from to ES presented design) reduces the impact on flows in the centre of the estuary compared to the ES design which increased current speeds. It is not clear whether the new reduction refers to a reduction in magnitude of the previously reported increase in flows, or whether the actual flow speeds are reduced. I suspect the former, which would mean flow speeds would still be increased. **These changes are not shown diagrammatically**;

VI. In Section 3.3.3 the new morphological modelling simulation is said to be similar to that predicted for the preliminary quay design. This is predominantly true immediately adjacent to the reclamation and dredge areas, but there are significant differences up and down estuary near the intertidal/subtidal interface and particularly at the head of the HST (C.RO) jetty. These differences would give rise to a different assessment of the detailed effects at the latter facility in particular, compared to that presented in the ES. **Therefore effects on HST could be much greater than those presented in the ES.**

VII. The table of predictions of maintenance dredging (Table 3.1) comprises the same facilities as the original ES; however the new values are substantially lower. **Furthermore a paragraph has now been inserted which for the first time in all the documents refers to IOH, Humber Work Boats and SDC, albeit it is said that the modelling showed no changes;**

VIII. The new non-cohesive modelling suggests small increases in sedimentation will occur at HST/C.RO, IGT and HIT, with a small reduction at IBT. This is generally the reverse of the HR Wallingford, cohesive fine sediment modelling. **This gives rise to uncertainty in the assessment of the sedimentary effects at the neighbouring facilities**, therefore protective provisions should be sought. This is an issue for navigation on the Humber and port managers may require take action to manage this issue;

IX. The modelling assessment on the hydrodynamics only considers the impacts of the AMEP development at the time of peak spring flows. There is no indication as to whether the impact changes at different states of the tide. The most likely effect at different water levels would be changes to flow directions and speeds as the tide rises and falls, due to flows passing on and off of the intertidal around the reclamation. Such changes, even if relatively small could

impact on ship operations at neighbouring jetties, particularly the SKOJ, just down estuary of the reclamation. The amount and resolution of the data shown does not allow this potential for impact to be assessed. **This remains a significant risk to adjacent port facilities without appropriate transparent assessment.**

Assessment of Inerodible Disposal Impacts

3.3 Section 4.1 notes that to place all inerodible material at HU082 would raise the entire site to -5.3m CD, filling the depression, without consideration that the material will not be able to be uniformly 'packed' into the site (therefore the level could be significantly higher). This realisation has partly led to the consideration of an alternative, whereby only half the material is deposited at HU082 and the remainder is deposited to land. New modelling (not carried out for the original ES) of two scenarios; a) disposal of all inerodible material and b) half the volume with a sloping bed has been undertaken.

3.4 Further, for the first time in all ES and Supplementary Documents the possible physical impacts, previously noted in my Written Representation, on the estuary hydrodynamics, morphology and consequences for existing uses and users has been recognised.

3.5 The new modelling presented provides logical results for waves, flows and morphological change and now confirms the original hypothesis put forward many years ago for in filling these areas. The modelling results now provide transparency in the assessment for the area of the SDC and lower Humber Estuary from a physical perspective.

3.6 The half volume scenario restricts any changes to the deposit ground and minimises impacts from a nature conservation perspective and hydrodynamic and sedimentary effects on SDC, whereas some effect in these areas (possibly significant) is likely for the complete infill scenario.

3.7 Overall, the impact on the inerodible deposit ground has now been assessed indicating little/no risk to the Sunk Dredged Channel, nor the EU designated areas for the half volume scenario. **A greater risk is however indicated for the full disposal scenario simulated. Clarity will**

be required as to the exact dredge disposal strategy proposed, therefore determining the monitoring/ mitigation requirement.

In-combination Assessment

3.8 The new in-combination assessment relative to that in the original ES now provides transparency in the assessment with respect to the receptors, therefore overcomes the initial inadequacy with respect to marine physical process matters.

3.9 Some results are said to vary from the analysis undertaken for GPH, HRBT and IOTA, ES's, however the differences in modelling terms are negligible. Furthermore the short term estuary wide predicted changes from the combination of all developments are negligible/minor. A small difference between the various assessments would also be logical because for the ABP studies, undertaken a few years earlier, dredging was required within Halton Middle. For the later bathymetry for AMEP, no such dredging was required in this area, as it had naturally deepened.

3.10 The modelling of the in combination impacts now provides suitable data for assessment in the ES and shadow HRA for the AMEP development. We are now comfortable with the results and conclusions.

A4. EX 8.8 - Update to longer term morphology predictions in the regions of Centrica and E.ON intakes and outfalls

4.1 This report updates modelling predictions up estuary of the currently proposed reclamation layout. Previous predictions presented in the ES were for a preliminary layout.

4.2 The morphological modelling is said to represent a 30 week period following reclamation construction. The general pattern of the results in the way the intertidal is shown to build out, over time is reasonable and generally conforms to what occurred following the construction of

the Humber International Terminal (HIT). This impact has now been presented in detail in EX. 8.9.

4.3 Significant differences, however, occur in the rate of deposition predicted by the AMEP modelling compared to what has occurred following the HIT development. For example Para 2. 2.1 predicts 2.3m deposition in 30 weeks inshore of the Centrica outfall and Para 2.2.2 predicts up to 3.8m inshore of the E.ON outfall and 2.3m at the outfall itself. Supplementary report EX 8.9 indicates the maximum accumulation arising from HIT was about 4m in 9 years, with 3m in 9 years over a wide area. The rates concur with ABPmer profile surveys undertaken annually since 2005 where maximum rates have been of the order of 2m in this period. This indicates the predicted rate of deposition from modelling up estuary of the AMEP development is high by up to an order of magnitude. **Therefore further investigation and analysis is required to provide a more accurate picture of deposition in this area.**

A5. EX8.9 - Assessment of Changes to Morphology (particularly intertidal) between Humber International Terminal (HIT) and Humber Sea Terminal (HST/C.RO)

5.1 This report provides a factual description of change in the intertidal since the construction of HIT and indicates the natural variability in subtidal changes at periods since 1991.

5.2 The intertidal change (deposition) covers a triangular area from the outer edge of the reclamation, narrowing and thinning with distance up estuary over a distance of about 2km, with maximum depths of accumulation of around 3m closest to the reclamation. The data indicates an increase in intertidal area at about Mean Low Water of up to 20ha, but little change above Chart Datum (CD).

5.3 The report states that after 9 years the deposition rate does not appear to have decreased however, annual field monitoring of profiles between 2005 and 2010 indicate a slowing towards a new equilibrium.

5.4 In Para 6.3 it is inferred that deposition effects will extend to the HST/C.RO jetty over a number of years and possibly beyond the jetty depending on the operational requirements of the terminal. This infers that, although the short term prediction indicates no change in maintenance dredging at HST/C.RO (EX8.6), an increase could occur longer term. **I note this is a considerably greater area of sedimentation than predicted in the original ES, which now potentially affects the Humber Work Boat and HST/C.RO facilities. This was not predicted in the original ES.**

A6. EX 8.10 - Morphological Assessment of Changes south-east of the Development

6.1 This new modelling assessment was undertaken to predict the sedimentary effects of the AMEP development at the APT outfall and in the vicinity of the SKOJ mooring dolphins (old and newly constructed).

6.2 The existing APT outfall is in an area that has accreted significantly since the construction of HIT, however, the discharges have been sufficient to keep it operational.

6.3 The same morphological modelling method has been used as for up estuary of the development (EX8.8) and again the rates of sedimentation over a 30 week period would appear high compared with actual impacts from previous developments, even though an empirical check on the volume of sedimentation is said to confirm the model rates, although no calculations are presented. **These differences give rise to increased uncertainty in the modelling predictions and therefore the conclusions remain questionable.**

6.4 Following interpretation of the modelling data accretion at the outfall structures is predicted as around 1m/yr. It is stated that the current intertidal in these areas is still increasing at 0.4 m/yr as a result of HIT, with no indication of reducing. ABPmer annual profile monitoring from 2007 to 2010 indicates the rate of build up has slowed near this location. **Due to the uncertainty in the modelling predictions a monitoring and mitigation agreement should be implemented.**

6.5 Sedimentation is predicted to occur in the vicinity of the SKOJ mooring dolphins, in the order of 1 - 2m over the 30 week modelling period, however this is not presented in the summary. I agree sedimentation is likely but at a lower rate than the model predicts and should be subject to a monitoring agreement and protective provisions. **There is a need to define these agreements prior to consent.**

A7. EX10.4 - Impact of Dredging and Dredged Material Disposal on 1) Subtidal and Intertidal Features and 2) Aquatic Ecology

7.1 This document is provided as an explanatory note and re-presents the original information concerning the impacts of the dredging works and the subsequent disposal of the material, on intertidal and subtidal features and the aquatic ecology.

7.2 Para 1.1.3 infers that dredging and dredge disposal impacts were combined with others to form the assessment for the Project as a whole in the ES and should therefore not be compared with respect to significance of the dredging and disposal impacts alone, as presented in the report. It is good practice, however, to determine the magnitude of each impact before making a combined assessment to provide transparency in the ES.

7.3 The pathways of potential impact from the dredge and disposal activities are now presented along with a better presentation of the development effects. The activities to be undertaken are better presented than in the ES.

7.4 **Some concerns, however, are still not adequately or transparently assessed,** for example:

I. Para 1.3.13 correctly notes that sediment plumes from the dredge activity will be smaller than from the disposal, then appears to use this as justification for only presenting the prediction of the disposal effects. During the dredging the plumes will be in a different section of the estuary and are likely to pass through other neighbouring facilities and the local intertidal and subtidal, therefore **there could be significant, albeit temporary impacts, e.g. increased**

sedimentation in existing dredged pockets during the construction phase. Further, as the dredging will be into different bed material to that generally mobile in the estuary, therefore the material being moved within the plumes will be different. If this settles then a habitat change could result. **The impacts of the construction phase of the development have therefore not been transparently assessed.** This does not ensure all impacts of significance or mitigation requirements that may be necessary have been identified. **This remains a serious omission** and more information is needed.

II. In Para 1.3.16 the impact of the deposit of erodible material at the HU080 deposit ground is discussed. Predicted changes in SSC as a result of disposal are said to be "quickly dwarfed by background levels". This is justified by quoting the range in background sedimentation SSC measured at the dredge site. **This is mis-leading as it does not take account of the fact that SSC are generally considerably lower in the area of the disposal ground, therefore the impact will be of a greater magnitude than inferred. Again conclusions are based upon a poor scientific understanding.**

III. Figure 1.3 indicates the predicted extent and average concentrations within the dispersal plume. However, I note from the additional detail given in Annex 8.1 of the ES and the PEIR document that:

- The distribution shown only represents about 20% of each dredge load being allowed to disperse, the rest is inferred to settle at the site. The majority of material to be deposited at HU080 will be finer grained than the sediment which is currently mobile at the site. Whilst it is agreed a large proportion will initially go to the bed it is likely that most will be re-eroded and dispersed. **The magnitude of increases in SSC is therefore likely to be significantly higher, as indicated by the sensitivity test undertaken when 40% of the sediment was allowed to disperse** (Para 5.56 of Annex 8.1);
- The modelling was undertaken using a small dredger, as used for dredging in the shallow intertidal. In reality a dredger of 4 to 6 times larger is likely to be used for the bulk of the erodible *capital* dredging material and for the maintenance. **The initial sediment input rates to the model are therefore significantly under represented.** The modelling of the dispersion of the plume with respect to the local SSC is

considered unreliable and the impact on SSC in the water column (water quality) will be greater than indicated. The effects on habitats and fauna are also likely to be larger. **The realistic worst case scenario has therefore not been assessed.**

7.5 Para 1.3.18 states "the Project will not result in a significant net loss of sediment from the estuary". **It is not transparent where this has been evaluated.** However, I note that Able concede sediment will be lost outside the estuary. This is consistent with previous modelling undertaken by ABPmer from the deposit ground. The actual amount, however, will be larger than indicated. For the capital dredged material the quoted statement above is essentially true with respect to the sediment balance as the newly disposed material creates an initial supply. For the maintenance material, however there will be a continuous net loss, which will be greater than if it were disposed further up estuary. **This would have a long term consequence to the estuary SAC designations and potentially the estuary integrity.**

7.6 **These under representations of the impacts therefore affect the level (scale) of significance, which has not been established throughout the ES and ultimately determines the scale of significance to the aquatic ecology, hence the requirement and scale of mitigation and compensation.**

7.7 Paras 1.3.21 to 1.3.24 provide a description of the morphologic evolution of the estuary, particularly around the AMEP site. This is logical, however, as noted earlier the scale of change has considerable uncertainty. It is noted however, that the following conclusion is given:

"Given the long term local loss of subtidal area to intertidal area and the conservation objectives of the estuary the impact to the subtidal area is considered to be significant."

This does not seem to have been taken account of within the shadow HRA.

7.8 Even with the under estimations in the likely impacts noted above, from an aquatic ecology perspective Paras 1.4.29 and 1.4.30 state there will be a significant loss of benthic

communities (from dredging and disposal activities) as a result of habitat loss, as well as from the project as a whole, however **no scale of this significance is given.**

7.9 Further Para 1.4.31 concedes that “changes to the wider ecosystem structure and functioning in terms of intertidal and subtidal habitat availability and complexity may occur". A loss of nursery area for commercial fisheries is predicted as a permanent impact. **In general, however, no quantification is provided for the scale of impact but generally 'sweeping statements' are made** that infer that these impacts will be compensated for by the Cherry Cobb Sands Compensation site, for example:

"the Compensation Site at Cherry Cobb Sands will provide an additional area of intertidal habitat to compensate for the loss caused by the Project."

Such statements have not been substantiated.

7.10 The document ends by listing mitigation measures for the dredge and disposal activities. These are all good practice but unless enforced will do little to mitigate the actual impacts. Furthermore many impacts cannot be mitigated in this way.

7.11 Overall, the re-formatting of the assessment is easier to follow, however, it remains very basic with no scaling of the level of significance. Some of the most important impacts have not been assessed for a realistic worse case, therefore the impact presented is under estimated. There is little quantitative justification for specific assessments. Significant impacts are identified, but for the most part are just considered to be compensated for by the Cherry Cobb Sands Compensation site with little or no justification. Often assessment statements are not substantiated by the limited information presented.

7.12 With respect to the assessments made there is little if any improvement on the transparency from the original ES, except for being better laid out and easier to understand.

A8. EX 10.6 - Impact of Berthing Pocket Construction

8.1 This explanatory note quantifies the change in habitat type as a result of the construction of the berth pocket (only) with respect to the estuary as a whole. A small change in physiotope at the base of the berth pocket will occur. The new habitat will be frequently disturbed by the need for maintenance dredging.

8.2 The note compares the berth pocket assessment with the assessments made on subtidal habitat/benthos for the three proposed ABP developments at HRBT, IOTA and GPH (quoted from the ES's). This shows similar assessments.

8.3 However, there are two main differences between the AMEP and ABP assessments:

I. The ABP assessments include consideration of impact on all subtidal areas affected by the developments, e.g. all areas dredged and the areas of the deposit grounds used. **The AMEP assessment only considers the footprint of the dredge pocket and does not include reference to any changes that might occur for the deepening of the approaches, turning area or at the deposit grounds;** and

II. In each ABP ES, although impacts are considered minor adverse **they occur in EU designated areas.** To comply with the precautionary approach of the Habitats Regulations monitoring programmes have been included to confirm the assessments. **No monitoring programme has been offered in EX 10.6 for the changes resulting from the AMEP development.**

A9. EX 11.14 - "Biotopes of the Intertidal and Subtidal Sediments around the AMEP site, in the Humber Estuary"

9.1 This rote provides baseline data from bed sampling of the intertidal and local subtidal between the Humber International Terminal and just up estuary of HST/C.RO.

9.2 Section 3, attempts to explain the benthic distributions recorded. For the most part this is attributed to maintenance dredging in the area. **This, however, is an incorrect interpretation as nearly all the sampling locations points were not located in areas that are dredged.**

The benthic distribution recorded is therefore a function of natural bed dynamics and not the dredging as is concluded.

9.3 **This shows an incorrect conceptual understanding of the baseline of against which the environmental impact of the AMEP development is assessed.**

Part 2 Response to Able Comment on Written Representation – Paras 22.62 to 22.218 of Able Response

2 Overview of Able Comments on Written Representation

1. Our representation was based on the information presented in the PEIR process and particularly that presented in the ES documentation. A large proportion of the comments/answers to our queries rely on the supplementary documentation rather than the original ES, i.e. information not available or produced so near the deadline for Written Representations that it could not be reviewed in time and used. **It disingenuously implies that comments made on the original ES were wrong by reference to the supplementary environmental information that superseded the ES.**

2. **In a number of questions, the summarisation of the point being made is wrongly interpreted and then the inferred question is answered, i.e. a different one to that being made, therefore the question being posed is not actually answered. Unless cross referencing in detail with the Written Representation is undertaken this is not apparent. In another area the wording of the Written Representation is changed in the Able summary of the issue, for example the words South Killingholme and the Immingham Jetty infrastructure is changed to South Killingholme Oil Jetty and Immingham Gas Jetty, which are not the same and are very different in scale of structural effect on flows. The answer provided concentrates on these two jetties 'trivialises' the point being made and does not answer the question.**

3. Wherever possible Able have answered a comment in the Written Representation by quoting back the final assessment we (ABPmer) made for Grimsby Ro/Ro and Immingham Oil Terminal Approach (IOTA) projects, or saying that this was not an issue in those studies. I note it mainly occurs with respect to assessment of fish/noise/ habitats etc. In all these areas EA/NE have raised the bar since Grimsby and IOTA, i.e. as we found for GPH and HRBT projects. I note they do not

quote back to the work done and assessment etc. undertaken for these more recent and more involved projects despite this information also being in the public domain.

4. **Able have now conceded that Immingham Outer Harbour (IOH) was not in some of the ES modelling, but do not specifically indicate at what point it was introduced. A whole set of new unconvincing (to me) tables are presented in the Able Written Representation response to indicate whether IOH is incorporated or not in the model,** it has no difference whatsoever to the predicted dredge commitment (to a rounding of 1000 dry tonnes/ year). Intuitively and from experience **this is not correct** and leads to doubt in the model results, particularly the quantification of the effect of the AMEP Development.

5. The presented modelling indicates that at all existing maintained berths AMEP will reduce the need for dredging by a small amount. Small differences, however, occur between the tables presented in the supplementary documents and those in the response to Written Representations which should not have changed. **The transparency of the results presented does not give confidence that the trend for reduced maintenance dredging at all existing berths is reliable. Due to this unreliability in the results a monitoring and mitigation obligation is required to account for the uncertainty.**

6. In our questioning of the validation of the sediment model and therefore the reliability of the results, Able answer by re-iterating the comments that maintenance dredging has been higher in IOH than ABPmer predicted in the ES and that their values are closer to the actual requirement, rather than answering the question posed. The IOH experience merely reinforces the importance for great care and caution in the interpretation of modelling results.

Summary Comment

7. In Para 22.219 of the Able response they state that my written representation is ill informed. The comments on the original ES are not ill informed; they are based on a long experience of monitoring the estuary and the level of detail required by regulators for other developments. A number of our questions are answered, or partially answered, by reference to the considerable volume of supplementary documents produced very close to the deadline for submission of

comments in Written Representation. If these had been included and taken account of in the original ES then the amount of comment would have been less.

8. Many of our points are answered by effectively saying that ABPmer did not consider in their ES's of previous projects. I note here that the most recent ES's, for GPH and HRBT which are also in the public domain, were not referred to. The level of assessment in these documents is higher and reflects the greater detail required by regulators with time and the different issues identified.

9. **The fact that so many of my questions were addressed, or partially addressed, by the applicant's supplementary environmental information does underline the criticisms that have been made by myself, and indeed other parties, of both the application exercise undertaken by Able and the integrity and soundness of the original environmental statement**

3 Specific Comment

3.1 Introduction

10. Comment is only made where the response has not supplied the additional clarity where a question is asked or the answer has raised further questions. No response is made on areas that have been clarified either through the comment and/or the supplementary information now supplied. In these further comments the reference is to the paragraph number in the Able document "Applicant's comments on the Written Representations", August 2012 (specifically Paras 22.62 – 22.218) which gives a response to my Written Representation of July 2012.

3.2 Detail

3.2.1 Source of Fill

11. **Para 22.68.** Agreed there are licensed aggregate sites where material would be available, but this information was not presented at the time. The point was that a reference was made to using arisings from the IOTA dredge which I wished to note were required as part of the GPH proposal.

The point also being made in my para 38 is that in my opinion **the environmental impacts of the sourcing of the material and its transport had not been sufficiently assessed.**

12. **Para 22.69**. The material to be used for GPH is the fine to medium sand from Chequer Shoal and the Eastern Approaches which would have been deposited at Bull Sand Fort and not the finer sand from Sunk Dredged Channel. The in-combination effect of all three projects will be reduced for the estuary as a whole but not the combined effects at site HU080.

3.2.2 Baseline Modelling of IOH and Jetty Structures

13. **Paras 22.71 to 22.78.** In general terms I have commented on these paragraphs in para 1.4 above. Immingham Outer Harbour was dredged in 2006, creating a harbour with a capital dredge depth of 10m below CD from an area that was predominantly intertidal. The average depth of removal was in the order of 12m. This has created a large pocket with a considerable change to the local flow and sediment dynamics. The section from the ABPHES (2008) report refers to the maintained depths within that harbour pocket. The minimum depth maintained has been around 8m below CD, and hence there has been a significant change throughout the period post the capital dredge. **The harbour introduced a significant change to the local hydro- and sediment dynamics since its construction and therefore should have been a significant part of all baseline modelling scenarios, as well as being a major sensitive receptor.**

14. Tables 22.3 to 22.5 in the document are new although they incorporate data from previous documents. There are differences in some of the numbers from the earlier ES and Supplementary Reports. The main concern is that in Table 22.3 the new modelling has indicated a range of sedimentation of 824,000 to 2,060,000 dry tonnes per year whilst there has been no change at any of the other sites. **This is not logical,** particularly due to the large size of the harbour and the effects it has on the flows to fill and drain it. Also, if the large amount of sediment is taken out of the water column in the harbour then the table indicates a large supply of extra material passing through the area. This surely would have made some change to the sedimentation in other areas, particularly at the adjacent IBT. **The data presented does not provide confidence that the effects of IOH are adequately represented, therefore the results provided are still unreliable.**

15. I do not assert that the ranges of sedimentation quantity given are likely to be of the wrong order of magnitude, however it is unlikely that all non AMEP areas will have reduced maintenance dredge commitments. This is because the baseline flow and sedimentary dynamics in the local area are unlikely to be correctly reproduced in the various models.

16. **The quantification of the maintenance dredging therefore remains unreliable.** This area is difficult to model, particularly for sediments as we (ABPmer) have experienced in the past, therefore it is even more important that the baseline configuration of the model and the new developments are as accurately represented as possible which does not appear to be the case. **From experience after any modelling study it would always be prudent to incorporate a monitoring and mitigation plan into any consent.**

17. **Para 22.79.** The summary provided does not reflect the point being made due the subtle change in wording of the structures described and the omission of consideration of the first part of the paragraph. This is highlighted in para 1.2 of the general overview above.

18. The point being made was that there is a considerable amount of jetty infrastructure in the Immingham area, much more than the two jetties stated in the summary, including the circa 500+m piled structures that form the berthing face to Humber International Terminal (HIT) (in front of the reclamation) and the Immingham Bulk Terminal (IBT) and the predominantly timber/steel structures forming the Immingham bellmouth. These together effectively create a 'flow vein' to the estuary flows at the edge of the main channel, where flow is split either side. **The effect on the flow streamlines is significant in these jetties and the blockage factor (albeit in a narrow section) is considerably greater than the photo in Figure 22.3 conveys.**

19. **Para 22.80.** The effects on the baseline flow regime are those stated but with the addition of the effects described above to provide the local subtlety in the flows that could interact with the AMEP or any other development. Validation was only undertaken at one location in the local area of primary interest and little information was provided on the flow lines through the area. **This, in my view, is insufficient to ensure the correct flow regime is being achieved over the area of the Immingham and South Killingholme facilities, and therefore the validation is considered inadequate for this study.**

20. **Paras 22.81 to 22.84.** Given my reservations on the Able comments and additional information provided in response to my Written Representation there is, in my opinion, **insufficient certainty in the evidence provided to make the definitive statements in these paragraphs.**

3.2.3 Modelled Scenarios

21. **Paras 22.85 to 22.90.** The table presented indicating the modelling layouts reported on in the ES and those that are now available through the supplementary reporting is welcomed. We note that modelling results have now been presented for the final proposed AMEP design. With the addition of this further modelling the fundamental deficiency in the studies presented in the original ES have been removed, subject to considered re-assessment.

22. **Paras 22.91 to 22.100.** Our comment was made because the proposed layout had not been modelled and the new berthing line would be behind the extension of that for the existing port infrastructure, therefore the berth and approaches dredged into shallower areas. This would increase the dredge volumes and have a different local effect on the flow patterns compared to the larger reclamation scheme modelled. For environmental assessment purposes we could not be sure that a worst case had been assessed. The proposed AMEP design has now been modelled, therefore these considerations will be taken account of in the modelling results, subject to IOH being included in that model.

3.2.4 Model Calibration

23. **Paras 22.101 to 22.110.** These paragraphs refer to the level of calibration/validation. In general the accuracy/fit for purpose is a matter of opinion/judgment between ourselves and Able and their modellers. For such a large development we would have hoped to see more information and discussion on the calibration/validation process. We accept that what happened in practice following the IOH development did not correspond to the modelling predictions although the modelling exercise was carried out as accurately as possible at that time, hence the need for better information/calibration and representation of the processes both in the area of the development and local areas that could be impacted, in an area which has proved difficult to model in the past.

3.2.5 Fine Sediment Model

24. **Paras 22.111 to 22.128.** These paragraphs are all concerned with my questions regarding the fine sediment model calibration. It should be noted firstly that the Able comments draw heavily on the new Supplementary reports which were not available for the initial review. Whilst further information/discussion of the calibration is provided, uncertainty in the modelling calibration remains. This is discussed in detail in my review of Supplementary reports. It is noted that Figure 7 in the Supplementary Report EX 8.5 now shows a plot with the high flood tide concentrations which was not shown in the original reports on which my comments were made. I note however this is only for an increased range model run and the distribution remains the same for the lower range tides. **This, from a conceptual view, is odd and there is no explanation on why the distribution should change. The data we have and presented in the Written Representations indicates that the same flood ebb general distribution occurs on all range tides. The new model calibration plot does seem to fit the additional field measurements well for a large tide, but the discrepancy still exists for lower range tides.**

25. In para 22.120 it is stated that the modelling "appears to correlate very well with the suspended sediment concentrations (SSC) shown in Figure 5 of the Written Representation" however this is only true for the modelling of the larger tide which was not presented in the original modelling report against which the comment was made. The point being made in the ABPmer Written Representation is not contrary to the point we wish to make. This statement was based on the new information which was not available at the time of the Written Representation and even now can only be said for the large tide additionally modelled given the data presented.

26. Para 22.121 confirms what I am saying about the modelling above, for the area of Killingholme. Figure 4 in my WR however is taken at North Killingholme and represents data from several spring range tides. The overall pattern indicates that for all ranges the peak flood tide concentrations are always substantially higher than the ebb, as they are off the bellmouth at Immingham (Figure 5), in the bellmouth (Figure 6), at the entrance to the bellmouth and at the Gas Jetty (East Jetty and Gas Jetty on Figure 7).

27. Figure 7 is taken from a monitoring report, however, there is a significant section at the beginning when no dredging activity was taking place.

28. From the above **I remain unconvinced that the modelling that produced the sedimentation rates correctly models the sediment distribution throughout the Immingham to North Killingholme area, this is without my reservation on the baseline hydrodynamic flow regime as discussed with reference to IOH being in or out of the model.**

3.2.6 Disposal Ground Ecology

29. **Para 22.130 – 22.134.** The point here is that the ES did not discuss the possibility of an ecological effect and then make an assessment, like that undertaken for previous developments which are now been quoted. Whilst the capital dredge is smaller than for IOTA a significant on-going additional supply of sediment to the HU080 will result from the AMEP development. This material will be of a different character to that from the local area and therefore a separate assessment should have been undertaken and reported in the ES. **It is insufficient just to rely on previous assessments alone, particularly as the AMEP development provides a significant change to the disposal regime at the deposit ground from those previously assessed.** The assessment may come to the same conclusion as earlier studies but it should be made for transparency in the ES.

3.2.7 Estuary Morphology Understanding

30. **Para 22.135 – 22.138.** With reference to the understanding of the estuary morphology, I remain of the view that is deficient. In Para 22.138, my quote was taken from the summary diagram rather than from the paragraph quoted in the latest AMEP comments. I still maintain the text as quoted in para 22.138 gives the impression of a stable reach from about South Killingholme through to the Humber Bridge, yet this is an area of considerable change in bathymetric levels, although I accept the main channel general alignment has stayed relatively consistent. I do not accept my Written Representation was mis-leading.

31. **Paras 22.139 – 22.140.** The information and analysis provided in the supplementary report is welcome and to a certain degree confirms the instability of the bed of the main estuary and the accumulation of sediment that has occurred on the intertidal up estuary of HIT following its construction.

32. **Paras 22.141 – 22.149.** The comments originally made were with respect to little or no consideration of the potential for long term effects arising from the AMEP development. These questions are answered with reference to new Supplementary information not available at the time of the Written Representation and by reference to Environment Agency studies with respect to Sea Level Rise.

3.2.8 Modelling of Proposed Design

33. **Paras 22.150 – 22.157.** These paragraphs relate to my concern that the finally proposed development design was not modelled. This has now been done and reported in the Supplementary reports. The results do show changes in the flows local to the development from the scheme and differences from that originally reported in the ES. This has now provided greater certainty on the scale and distribution of the effects of AMEP on the local hydrodynamic and sedimentary effects arising from the development design. **Reservations still exists on the quantification of the sedimentary effects due to the issues with the baseline hydrodynamics and sediment calibration, noted earlier, along with what the long term effects might be. These changes are potentially important as cumulative impacts over time.**

34. **Paras 22.158 – 22.163.** The spatial presentation of smaller changes to the hydrodynamics as a result of AMEP is welcomed in the supplementary reports as well as the modelling of the proposed design. This helps provide greater transparency in the results and for the assessments made. In my view temporal detail is still lacking for the areas where greatest change is shown in the spatial plots, particularly in the vicinity of the existing structures. This data would confirm whether the spatial plots correctly reflect the local impact at all states of tide. **This is still uncertain even from the new data presented.**

3.2.9 Humber International Terminal Intertidal Analogue

35. **Para 22.165 – 22.171.** The new supplementary report for the whole intertidal up estuary of HIT confirms our understanding of the effects of the HIT development with one exception regarding whether equilibrium has been achieved with respect to build up of sediment on the intertidal. I agree that between 2007 and 2010 accretion is evident, however, cross sectional data from the annual monitoring of the HIT development, where data is available for 2007/8/9 and 2010 indicates nearly all the change occurred between 2007 and 2008 and there have been considerably smaller changes since. **The difference in interpretation is a result of the different datasets available.**

36. **Para 22.172 – 22.175.** No further comment required following the provision of the supplementary documents.

3.2.10 Deposit Site Locations and Modelling

37. **Paras 22.176 – 22.184.** The point I was making has been misinterpreted in the response. My question relates to whether the most appropriate site for the disposal of the various types of material (capital and maintenance) has been made to provide the least environmental impact on the estuary and the current uses and users to ensure sustainability as was required for acceptance of the dredging strategy for previous developments. It is noted that half of the capital non erodible sediment will now be beneficially used, which will lessen the overall impact on the estuary. I also note the supplementary modelling of this scenario significantly reduces the potential flow regime changes in the area of the Sunk Dredged Channel.

38. **Paras 22.185 – 22.192.** The point is about whether sufficient consideration of the characterisation of the site and appropriate assessment has been made for three main reasons:

    I. Whilst it is agreed some soft silts have been deposited at the site, it is predominantly characterised for the sediments which arise from dredging the Sunk Dredged Channel (when required) which contains a considerable proportion of fine sand similar to the local bed

material. This change could affect the marine ecology in a designated SAC in and around the deposit area;

II. During the maintenance dredging a large quantity of material will be transferred from a different section of the estuary, increasing the local supply, therefore increasing the 'pool' of sediment available to settle in the Sunk Dredged Channel during the next sedimentation phase in the cyclic pattern. **This will lead to the potential for an increased maintenance dredge commitment for the channel**; and

III. The transfer of material to the lower estuary means a larger proportion of the deposited sediment will be lost seaward of the estuary system, therefore affecting the sediment balance of the estuary by depletion of the supply in the longer term.

39. **Paras 22.193 - 22.194.** Apologies, I made a typo error here, which led to a misunderstanding. The words "tidal cycle" should have read "material". My concern was not the length of the modelling run, but that only a relatively small proportion of the deposited material was allowed to disperse. The hydrodynamics in the area of the deposit ground will mean that virtually all of the maintenance material will be dispersed in a manner as indicated by the modelling. **Taking this into account the suspended sediment concentrations and potential sedimentation where the material settles will be larger than the modelling indicates.**

40. **Paras 22.195 – 22.196.** I agree an assessment was made, however, **no sedimentation distribution and thickness maps or time series information was provided from the modelling to back up the statements.** In the IOTA project several plots were produced for different scenarios which indicated where changes in sedimentation would take place and the magnitude to give transparency to the assessment statements made.

41. **Paras 22.197 – 22.198.** I accept modelling results were scaled up for larger dredgers, however, **the difference in material type between the capital and maintenance deposits does not seem to be accounted for.** In addition the significant increase in the deposit rate arising from the larger dredgers does not appear to have been assessed nor the timing of deposits as a larger dredger would potentially be restricted with respect to access to the deposit ground.

42. **Paras 22.199 – 22.200.** The physical assessment of the effects of disposal of non erodible material at HU082 has now been assessed with reference to Supplementary Report EX 8.7.

3.2.11 Navigation/Maintenance Dredge Requirements

43. **Paras 22.201 – 22.202.** The Able response to my Written Representation with respect to navigation/maintenance dredge requirements misses the point. The point I made results from the various deficiencies identified in the modelling/data which mean the assessment made in the ES is unreliable. **When these are resolved then similar statements to those made by ABPmer in their previous project ES's *may* be justified.**

3.2.12 Aquatic Ecology - Fish

44. **Paras 22.203 – 22.204.** The paragraphs referred to in the Aquatic Ecology section with respect to water quality do describe the possible implications to fish. The point we make is that there is no attempt to quantify the effects to back up the assessment of not significant.

45. In the IOTA ES water quality effects on fish were identified as a key pathway but after assessment were concluded as insignificant. For the Grimsby Ro-Ro ES an assessment was made even though it had not been identified as a key issue.

46. **Paras 22.205 – 22.210.** Our general comments on the adequacy of the assessment made in the ES with respect to impacts on fish were as a result of the level of assessment that the regulatory authorities required for the more recent and more involved projects at HRBT and GPH, the ES's of which are in the public domain. For the earlier and smaller projects of IOTA and Grimsby Ro-Ro, which Able have chosen as comparators, the degree of assessment required by the regulators was lower.

3.2.13 Designated Habitats

47. **Paras 22.211 – 22.216.** Able's response is based almost entirely on the supplementary environmental information (which superseded the ES) and not the original ES on which the

comments were made. **The new documents still do not assess the potential for ecological effects as a result of the deposits in the area of Sunk Dredged Channel**, although physical effects have been assessed for the capital deposits at HU082.

3.2.14 Cumulative/In Combination Assessment

48. **Para 22.217.** A welcomed comprehensive in-combination/cumulative assessment has now been provided in the supplementary documents (EX 44.1) with respect to the number of projects. The scale of impact has been extracted from the various ES's but the data has been reported in different ways which are not directly comparable. **The overall cumulative effect is not easy to determine quantitatively, particularly with respect to the habitat disturbance over time.**