

Dear Sirs,

On behalf of Centrica Plc (Unique Reference Number: [REDACTED]), I attach a response to Able's comments on Centrica's relevant representations, as well as copies of the accompanying reports referred to in the letter.

I would be grateful if you could confirm receipt of these documents by return email.

Kind Regards

Paul

**Paul Forshaw BA (Hons), Mplan, MRTPI**  
**Planner - Consulting**

**BNP Paribas Real Estate UK**  
1<sup>st</sup> Floor, Fountain Precinct, Balm Green, Sheffield, S1 2JA  
Tel : +44 (0) 114 263 9207  
Fax : +44 (0) 114 263 9244

**Follow us on Twitter @BNPPRE**

[realestate.bnpparibas.co.uk](http://realestate.bnpparibas.co.uk)

This email is subject to our [disclaimer](#). Corporate details can be found [here](#)

**Do not print this document unless it is necessary, consider the environment**

This email was received from the INTERNET and scanned by the Government Secure Intranet anti-virus service supplied by Cable&Wireless Worldwide in partnership with MessageLabs. (CCTM Certificate Number 2009/09/0052.) In case of problems, please call your organisation's IT Helpdesk.

Communications via the GSi may be automatically logged, monitored and/or recorded for legal purposes.

\*\*\*\*\*

Correspondents should note that all communications to Department for Communities and Local Government may be automatically logged, monitored and/or recorded for lawful purposes.

\*\*\*\*\*



# BNP PARIBAS REAL ESTATE

The Planning Inspectorate  
National Infrastructure Directorate  
Temple Quay House  
2 The Square  
Temple Quay  
Bristol  
BS1 6PN

BNP Paribas Real Estate  
1st Floor, Fountain Precinct  
Balm Green  
Sheffield S1 2JA

Tel: +44 (0)114 263 9207  
Switchboard: +44 (0)870 700 2233  
Fax: +44 (0)144 263 9244  
Email: [REDACTED]

Your ref: TRA030001  
Our ref: 082541 PBF L120803

03 August 2012

Dear Sirs

## APPLICATION FOR PROPOSED ABLE MARINE ENERGY PARK

**CENTRICA PLC (UNIQUE REFERENCE NUMBER: [REDACTED]), KILLINGHOLME POWER STATION AND ASSOCIATED INFRASTRUCTURE, CHASE HILL ROAD, NORTH KILLINGHOLME AND CENTRICA STORAGE LIMITED, STATION ROAD, NORTH KILLINGHOLME**

## COMMENTS ON ABLE'S RESPONSE TO CENTRICA'S RELEVANT REPRESENTATIONS

We refer to relevant representations submitted on Centrica's behalf by BNP Paribas Real Estate in March 2012, and Able's response to these representations, dated 28 June 2012 and set out below Centrica's comments on this response.

### Highways and Access

Centrica's relevant representations highlighted Centrica's concerns over the potential transport impacts of the proposals. In particular, Centrica is concerned that the large volume of traffic which will be generated by the proposed development and will restrict access to the Killingholme Power Station, the power station's pumping station and the Centrica Storage (CSL) site on Station Road.

Able's response states that the application was accompanied by a Transport Assessment and Framework Travel Plan and refers to the proposed junction improvements set out in the Transport Assessment. Notwithstanding this, Centrica remains concerned as to the likely impacts of the proposed development on the surrounding highway network. Centrica has therefore requested, in its letter of 23 July 2012 to the Planning Inspectorate, that Schedule 11 of the Development Consent Order (DCO) is amended so that Centrica and other neighbouring land owners are consulted on any Travel Plan or design of proposed road alterations submitted to the relevant local planning authority prior to their approval as a Requirement. We enclose a copy of this letter for your information.

Centrica's relevant representations also raised concerns that Centrica's existing access rights to the pumping station and to the CSL site would be removed as a result of Able seeking to compulsorily purchase a large area of land to the east of Rosper Road / Chase Hill Road. Land Plan 3 submitted with the Development Consent Order application shown existing easements and rights of way would be extinguished over this area. Centrica requires unrestricted access to this

**BNP Paribas Real Estate Advisory & Property Management UK Limited**

Registered office: 5 Aldermanbury Square, London EC2V 7BP

Registered in England No. 4176965

[www.realestate.bnpparibas.co.uk](http://www.realestate.bnpparibas.co.uk)

ISO 9001  
ISO 14001  
OHSAS 18001  
BUREAU VERITAS  
Certification



N° UK4578228/1 / UK4578228/E / UK4578228/OHSAS



008

Regulated by RICS



infrastructure at all times for maintenance and repair. Any access restrictions would seriously impact on the operation of the power station and on Centrica's gas operations in the North Sea and in the East Riding of Yorkshire.

Able's response states that Centrica's access rights to the pumping station and to the CSL site will not be removed. However, there is nothing in any of the documents submitted with the DCO application which state this. Centrica is therefore seeking to enter into a separate legal agreement with Able to ensure that its rights of access are not removed or altered without its prior agreement, and Heads of Terms have been sent to Able for agreement. Centrica is still awaiting comments from Able on these Heads of Terms.

Notwithstanding this, Centrica's letter of 23 July 2012, requested that a protective provision is added to Schedule 9 of the DCO that restricts the commencement of development of the Marine Energy Park until Able and Centrica have entered into such legal agreement.

## **Flooding**

Centrica's relevant representations highlighted Centrica's concerns regarding the potential impact of flooding to surrounding land due to the proposed development being located within Flood Zones 3a and 3b. Centrica's particular concerns, which were explained in more detail in its Written Representations, relate to the risk of its pumping station being inundated in the event of a breach or overtopping of existing flood defences, due to the raised ground levels and impermeable surfaces of the proposed development.

Able's response to these representations stated that the pumping station is already located on low lying ground and is currently at risk of flooding, and therefore Able should not be required to provide any flood mitigation measures.

Whilst Centrica acknowledge the current situation with the location of the pumping station, it remains concerned that the proposed development will increase flood risk to its pumping station. It is noted that at the recent DCO Hearing Session the Environment Agency also voiced its concerns over potential flood risk issues.

Centrica therefore requests that a DCO is only granted if satisfactory flood defences and surface water drainage are incorporated into the proposed development and are required by the DCO. This is vital to ensure that the risk of flooding of the pumping station is not increased as a result of the proposed development.

In light of the above, Centrica requested in its letter of 23 July 2012 to the Planning Inspectorate, that it is consulted as part of the approval of the Surface Water Drainage, Flood Warning and Evacuation Plan and Flood and Sea Defences documents required under Schedule 11 of the DCO.

## **Centrica's Existing Rights and Easements**

As stated above, no reference is made in any of the application documents that Centrica's existing rights and easements will not be removed or altered as a result of Able compulsory purchasing the land to the east of Rosper Road / Chase Hill Road. Centrica's relevant representations therefore expressed concern that Centrica's existing rights and easements would be extinguished.

Centrica's existing rights and easements include the following:

- Use of the access road to the pumping station;
- Use of the access road to the CSL site;
- Access to existing pipelines and associated services passing through the application site, including the condensate pipeline and the power station's cooling water pipeline; and



- The right of free passage of services through conducting media across part of the application site.

Access to the pipelines and associated infrastructure which cross the application site is essential to Centrica for inspection, maintenance, service and renewal purposes. Any restrictions or removal of these rights would therefore severely impact on Centrica's operations.

Able's has responded by stating that none of these rights or easements will be removed. However, given that none of the application documents or the draft DCO currently state this, Centrica is seeking to enter into a separate legal agreement with Able to secure protection of these rights and easements. As stated above, draft Heads of Terms have been sent to Able which seek to protect these rights, and Centrica is currently awaiting a response from Able. In addition, Centrica has also requested that the DCO contains a protective provision which prevents development commencing until this legal agreement has been signed.

Of particular concern to Centrica is the easement requirements in relation to its cooling water pipeline which runs across the site. Centrica needs to ensure that it has an easement of sufficient width to allow it use, repair, maintain, replace and where necessary, add to this pipeline. Centrica has commissioned Capita Symonds to undertake a study to identify the width of any easement required across the site for this purpose. The report (a copy of which is enclosed for your information) concludes that Centrica would require an easement with a minimum width of 31.7 m. This would provide sufficient space for Centrica to undertake repairs to the pipeline, including its replacement if required, whilst meeting Health and Safety requirements.

E.ON has undertaken a similar assessment of the width of an easement corridor it requires. This assessment identified that the 12.5 m wide easement corridor proposed by Able would not be wide enough for E.ON to undertake any future intrusive works on its pipelines and an easement width of 32.5 m would be required.

## **Cooling Inlet and Outfall**

Centrica's relevant representations raised concerns over the potential impacts of the proposed quay on its cooling inlet and outfall in the River Humber. In particular, Centrica was concerned that the construction of the proposed quay would result in increased water temperatures close to its inlet and outfall by reducing the speed by which warm water discharged from the outfall can disperse from the area. The implications of this increase in water temperature would be that the water extracted by the power station through the cooling inlet would be warmer than that currently extracted and would significantly reduce the thermal efficiency of the power station. Increased temperatures at the outfall could result in Centrica exceeding the requirements of its discharge licence. This could potentially result in shut downs of the power station.

Centrica was also concerned the proposed quay would alter the hydrodynamic and sedimentary regimes of the River Humber and result in increased levels of silt being deposited close to its cooling inlet and outfall. Increases in sediment deposition could potentially result in a reduced ability to extract water, as well as the increased likelihood of sediment-laden water entering the cooling inlet. The inlet filtering systems and the silt removal plan are only designed to filter the current level of suspended sediment experienced during the natural ebb and flow of the tide. Any additional suspended sediment would enter the power station's cooling water systems and would significantly reduce the efficiency of the power station.

To mitigate against sediment deposition close to Centrica's inlet and outfall, Able proposed daily dredging close to the inlet and outfall to remove the build-up of sediment. Centrica raised concerns over this proposed mitigation as it is likely to increase the amount of suspended sediment in the water column.



Able's response to Centrica's relevant representations states that Able has considered numerous quay alignments and hydrodynamic modelling was undertaken in order to understand the likely impacts. It states that hydrodynamic modelling is no an exact science however, but the scheme submitted for consent was that which shown the least risk of significant sedimentation at the intake. It did however show a potential risk of sedimentation at Centrica's outfall.

Able also provided copies of the following documents with its response to Centrica's relevant representations:

- HR Wallingford (March 2012); Update to Longer Term Morphology Predictions in the Region of the Centrica and E.ON Intakes and Outfalls;
- HR Wallingford (June 2012); Assessment of Maintenance Dredging Requirements; and
- HR Wallingford (June 2012); Assessment of the Effects of Relocation of the E.ON and Centrica outfalls on Thermal Re-Circulation.

The contents of these reports are summarised below:

#### Update to Longer Term Morphology Predictions in the Region of the Centrica and E.ON Intakes and Outfalls

This report predicts that there is the potential for 0.6 m of erosion of the sea bed in the region of the Centrica intake. However, actual erosion levels are unknown as this is dependant on the composition of the sea bed, which is unknown.

It states that Centrica's outfall is located at a pivot point, with accretion predicted inshore of the outfall and erosion predicted seawards. The report predicts that up to 2.3 m of deposition may occur inshore of the outfall. However, wave action and the effect of gravity may result in deposits moving down slope to the outfall.

The above assumptions are based on spring neap conditions.

#### Assessment of Maintenance Dredging Requirements

This report states that sedimentation to the northwest of the proposed quay has a high risk of burying Centrica's outfall. It therefore proposes that the outfall (and E.ON's outfall) be relocated to the front of the quay, and therefore no maintenance dredging will be required in the vicinity of the outfalls current location.

#### Assessment of the Effects of Relocation of the E.ON and Centrica Outfalls on Thermal Re-Circulation

This report refers to the potential for significant sedimentation at Centrica's outfall and the proposals to relocate both Centrica's and E.ON's outfalls to the front face of the quay. It states that the relocated outfalls will be located 5 m apart and will be -5 m ODN. However, as dredging will take place in this location to a depth of -14.9 ODN, the outfalls will no longer be located on the sea bed.

The report states that excess temperatures above 0.5 °C are expected close to the relocated outfalls and the two outfalls will create a single, combined plume due to their proximity to one another. It predicts that these excess temperatures will disperse rapidly.

With the outfalls relocated, the report predicts that excess temperatures at the intakes will be lower. At the Centrica intake, temperatures are expected to be between 0.1 °C and 0.2 °C above ambient for two periods per tide of no more than one hour each.



Centrica considers that there are inconsistencies and assumptions between the reports supplied by Able and the response to Centrica's Relevant Representations. In particular, there are conflicts in the above reports relating to the amount of sediment deposition that may occur at Centrica's outfall. The "Longer Term Morphology Predictions" report states that there will be a limited amount of deposition at the outfall, whereas the "Assessment of the Effects of Relocation of the E.ON and Centrica Outfalls on Thermal Re-Circulation" report refers to significant sedimentation at the outfall, and the "Assessment of Maintenance Dredging Requirements" report states that there is a high risk of the outfall being buried due to sediment deposition.

Able's response to Centrica's Relevant Representations states that mitigation against sediment deposition will be in the form of maintenance dredging. However, the Maintenance Dredging report referred to above states that Centrica's outfall will be relocated and that there will be no dredging necessary at the current location of Centrica's intake and outfall.

A number of assumptions have been made in the reports and the modelling work. In particular, morphology predictions are based on spring neap conditions. No modelling or assessment has been made of conditions outside of this period. During the winter months or storm events, when wave action is higher than the spring neap, it is considered that erosion and the amount of suspended sediment in the water column could potentially be significantly higher than predicted in the reports. Increased erosion could have a significant impact on the integrity of Centrica's cooling inlet and increased suspended sediment in the water column could increase the amount of sediment entering the power stations cooling water systems.

Assumptions are also made as to the level of erosion which may take place at Centrica's cooling inlet due to the uncertainties over the composition of the river bed and assumptions are made as to the potential impact of wave action and gravity on the level of sediment deposition at Centrica's outfall.

In addition, Centrica has instructed Royal HaskoningDHV (RHDHV) to review the above reports, as well as Able's Environmental Statement (ES) to identify any further inconsistencies or assumptions made in modelling. RHDHV has identified a number of potentially incorrect assumptions, conflicts and inconsistencies between the findings of these reports and the ES. These include, but are not limited to, the following:

- There is a discrepancy between the ES chapter and the supporting HR Wallingford report relating to the increased suspended sediment concentrations above ambient conditions at the Centrica intake. This may be due to the HR Wallingford report incorrectly switching the values for the E.ON intake with Centrica's intake;
- It is unclear which quay designs have been assessed using different models. In particular, it appears that the final quay design has not been assessed precisely in all modelling tools. Instead results have sometimes been inferred from modelling of earlier quay designs;
- The ES states that the final design is smaller than all previous designs and therefore assumes that impacts will be less. Whilst this assumption may potentially be valid, there is still a danger that the intake / outfall could be more affected by subtle changes in flow or sediment transport which could be potentially worse under one design than another, and not necessarily always associated with the largest quay design;
- An assumption has been made regarding the volume of disposed dredged sediment that will become advected as a plume from the disposal site. Although sensitivity tests have been used for one alternative assumption it does not explore the full range of potential outcomes;
- An assumption has been made regarding the order of increase in suspended sediment concentration arising from the capital dredge of 730,000 cubic metres based on modelling the effect of the preliminary dredge of 250,000 cubic metres;



- An assumption has been made regarding the none-use of over wash during the dredging of alluvium;
- It is considered that the plume model underestimates suspended sediment concentrations;
- It is unclear how results from the 3D mud model correlate with those from the hydrodynamic and wave models;
- It is considered that the 3D mud transport overestimates sediment deposition.
- Able's statement concludes that there is likely to be little risk of sedimentation at the Centrica intake. This suggests that there is still likely to be some sedimentation, but no indication is given to the amount of sedimentation that could occur; and
- It is unclear how the assumption that "25% of total disposed load at the disposal site will form a plume" has been made.

The work presented does show significant potential impact on Centrica's cooling water infrastructure. Given the assumptions and uncertainties associated with the modelling, the actual magnitude of effect could potentially be greater than those presented. For further information on the above and other considered inconsistencies and assumptions, please see the enclosed report by RHDHV.

In its response to Centrica's Relevant Representations, Able has acknowledged that there are some uncertainties in its modelling:

*"Hydrodynamic modelling is not an exact science, estuarine systems are complex and modelling of them is, necessarily, a simplification of the "real" world. Accurate computer modelling of sedimentation patterns is particularly challenging and the results have a degree of uncertainty, both in terms of the area likely to be affected and also with regard to the quantum and rate of any change."*

As a result of the uncertainties and inconsistencies in the above reports, Centrica is uncertain as to the full implications of the proposed development on its activities and the effectiveness of any proposed mitigation measures. As a result, Centrica remains extremely concerned over the potential impacts on the operation of the power station.

In particular, Centrica remains concerned that the proposed quay could compromise the integrity of its cooling water inlet through increased erosion of the sea bed, increase the amount of sediment laden water entering the cooling inlet due to increases in suspended sediment in the water column and reduce the efficiency of the power stations and impact on Centrica's ability to meet the requirements of its Environmental Permit due to increases in the temperature of water at its inlet and outlet. Furthermore, it is of great concern to Centrica that the actual magnitude of effect on Centrica's operations may actually be greater than those presented in the ES and in the subsequent reports commissioned by Able due to the assumptions and uncertainties in these reports and in the modelling.

In addition, Centrica is concerned that the proposed mitigation measures would also negatively impact on the operation of its power station. These measures only seek to offset the impacts of the development and do not prevent them occurring. As stated in Centrica's Relevant Representations, daily dredging in the current vicinity of Centrica's cooling inlet and outfall could increase the level of suspended sediment in the water column and therefore result in increased levels of sediment-laden water entering the cooling water inlet.





The proposal to relocate Centrica's outfall also raises concerns. There would be significant costs associated with any proposed relocation of the power station's outfall from its existing position. It is likely that this would require temporary shut downs of the power station will be required whilst this infrastructure is relocated. In addition, relocation of the outfall is likely to result in Centrica requiring a variation to the Power Station Environmental Permit. There would be costs, risks and potentially additional regulatory requirements associated with obtaining a variation (e.g. changes required associated with compliance with other environmental regulations such as the Fish and Eels Regulations, which may have additional costs). Centrica cannot currently agree to this option as it is still uncertain of the potential implications on its operations, and further assessment of the potential implications of the relocation of the outfall on the operation of the power station would need to be provided by Able before Centrica gives consideration to this option. However, if this option was to be pursued, Centrica would require Able to mitigate Centrica against the full costs, losses and risks associated with the relocation of the outfall, as well as ensuring that the outfall remains fully functional at all times and that Centrica has unrestricted access to its pipeline and outfall for maintenance purposes.

In addition to the above, as part of recent discussions, Able has advised Centrica that an Anglian Water pipe will have to be moved and has suggested that this outlet will be moved so it discharges between the Centrica and E.ON inlets. It is understood that the pipe will discharge sludge / brine from Elsham Water Treatment Works. Centrica has major concerns regarding the proposed positioning of this pipe on water quality, as the contents will be entrained by the power station's cooling water inlet and will cause deposition on the cooling towers, significantly increasing the legionella risk.

As a result of the uncertainties and conflicts in the reports commissioned by Able, Centrica is still concerned over the potential impacts of the proposed development on the operation of the power station, and is unsure as to whether the proposed mitigation measures would be acceptable.

It is therefore requested that the Examining Panel takes into consideration the potential impacts on the power station's cooling water infrastructure and the current uncertainties and conflicts in the documents produced by Able. It is considered that it is not possible to grant a DCO whilst these uncertainties remain, and therefore Able should be required to provide additional assessments which provide more conclusive findings than those currently available. Further details of the additional assessments that are considered necessary for Centrica to be able to make a more informed judgement on the effects on its cooling water infrastructure are set out in the Recommendations Chapter of the enclosed RHDHV report.

In addition, Centrica has requested that the DCO be amended to include a protective provision at Schedule 9 which would restrict the commencement of development until the Heads of Terms, which have been sent to Able have been agreed and signed. These Heads of Terms will seek to secure appropriate monitoring and remedial works to ensure the current operation of Centrica's cooling water inlet and outfall is secured. However, as stated above, there is still a level of uncertainty to what mitigation and remedial actions would be appropriate.

## **Condensate Pipeline**

Centrica is concerned that the altered sedimentary regime in the Humber Estuary as a result of the proposed quay and dredging operations may expose the condensate pipeline, which is located on the river bed, and subject it to spanning. At the worst case scenario, this could result in a catastrophic failure of the pipeline.

Centrica's lease of the river bed for the condensate pipeline is governed by the port authority and any exposure of the pipeline could also create a danger to shipping.





## Conclusion

Centrica is grateful for the response Able has provided to its Relevant Representations. However, the information provided by Able does not provide assurances to Centrica that the proposed development would not have a detrimental impact on the operation of its power station and other assets at Killingholme. In particular, Centrica's concerns include the following:

- Centrica is concerned that its existing access rights and easements will be extinguished. Whilst Able has acknowledged in its response to Centrica's Relevant Representations that this will not be the case, there are no provisions within the DCO to secure this. Centrica is therefore seeking to enter into a separate legal agreement with Able to secure their existing access rights and easements and Heads of Terms are currently being agreed with Able. It is requested that the DCO contains a protective provision in regard to Centrica to prevent the commencement of development until such legal agreement has been signed, as set out in our letter of 23 July 2012;
- Centrica is concerned that the proposed development would increase the risk of flooding to its pumping station and requests that the DCO contains provisions that ensure that neighbouring land owners are consulted as part of the approval process of Surface Water Drainage, Flood Warning and Evacuation Plan, and Sea Defence documents required under Schedule 11 of the DCO, as set out in our letter of 23 July 2012;
- Despite the reports provided by Able in respect of thermal plume assessments, dredging and morphology, Centrica remain concerned that the development of the proposed quay into the River Humber would have significant negative impacts on the operation of its power station. Due to a number of inconsistencies and assumptions made in the reports, Centrica remains concerned over potential levels of erosion, sediment deposition, suspended sediment and water temperatures. Furthermore, Centrica remains concerned that the proposed mitigation techniques (maintenance dredging or the relocation of its outfall have both been proposed by the applicant) could also have negative impacts on the operation of the power station. Centrica therefore requests that Able undertakes further assessments to specifically identify the potential impacts on the power station and its associated infrastructure. Centrica has also sought to protect its infrastructure by including provisions within a separate legal agreement, currently being agreed with Able, which would secure monitoring of its cooling water inlet and outfall and mitigation / remedial action where necessary. It is requested that a protective provision is included in the DCO preventing the commencement of development until this legal agreement has been signed, as set out in our letter of 23 July 2012;
- Centrica is concerned that the relocation of the Anglian water pipeline could result in sludge / brine entering its cooling water system and potentially causing deposition on the power station's cooling towers, significantly increasing the legionella risk as a result; and
- Centrica is also concerned that dredging activities in the River Humber could result in exposure and the possible spanning of the condensate pipeline. In a worst case scenario this could cause catastrophic failure of the pipeline and could also create a danger to shipping.

Cont.....



## **BNP PARIBAS REAL ESTATE**

We trust the above is clear and satisfactory; however, if you require further information or would like to discuss the above please do not hesitate to contact either Paul Forshaw or Alex Willis at the above office.

Yours faithfully

*BNP Paribas Real Estate*

**BNP Paribas Real Estate**

CC Mr N Warwick – Centrica

Enc 23 July 2012 Letter to Planning Inspectorate  
Capita Symonds, CW Pipelines – Permanent Easement Report  
Royal HaskoningDHV Report



# **CW PIPELINES - PERMANENT EASEMENT REPORT**

**FOR**

**KILLINGHOLME POWER STATION**

**JULY 2012**

**Capita Symonds  
6, Bowood Court  
Calver Road  
Warrington  
WA2 8QZ  
Tel: 01925 418333**

**CAPITA SYMONDS**

successful people, projects and performance

## Contents

<b>SECTION 1:</b>	<b>Introduction</b>
<b>SECTION 2:</b>	<b>Scope</b>
<b>SECTION 3:</b>	<b>Existing Pipeline Corridor</b>
<b>SECTION 4:</b>	<b>Future Access requirements</b>
<b>SECTION 5:</b>	<b>Proposed Easement Assessment</b>
<b>SECTION 6:</b>	<b>Conclusions</b>

## APPENDICES

<b>APPENDIX 1:</b>	<b>Indicative Masterplan – AME-02006 – Marked up</b>
--------------------	--

Date:	Prepared by:	Checked by:	Approved by:
July 2012	Dave Morgan	Karl Johnson	Karl Johnson

## **1. Introduction**

Centrica plc have a 'permanent easement' agreement over the CW pipelines and associated cables that are routed to the east of Killingholme Power Station to the River Humber.

A Developer wishes to build on the land to the east of the Power Station and in doing so requests the 'permanent easement' to be reduced to 12.5m.

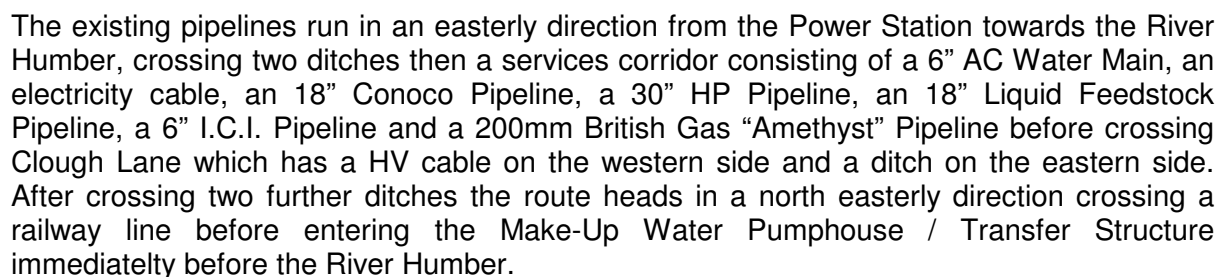
Capita Symonds is a leading consultancy in managing pipeline construction projects on behalf of utility based clients. Centrica plc has therefore requested that Capita Symonds compile a report to determine the minimum width of Permanent Easement required and if the proposed reduction of Permanent Easement to 12.5m is acceptable on the grounds of safety and practicability.

## **2 Scope of Works**

Capita Symonds have been instructed to review the request by the Developer to reduce the 'permanent easement' to 12.5m and advise if this is acceptable. In doing so Capita Symonds will assess the proposal based on current and recent knowledge and experience of pipeline construction projects and the principles of Health and Safety Regulations / Guidelines including the Working at Heights Regulations 2005.

Capita Symonds will make recommendations to Centrica plc within this report if the 12.5m proposed corridor is deemed to be insufficient. These recommendations will be based on any future access requirements Centrica plc will need to safely maintain the existing plant and equipment.

The corridor contains two large bore pipes (Nb 700mm and 500mm) offset by approximately 500mm. These pipes are laid with an original cover of approximately 1.8m to 2.0m. However Centrica plc are aware that the original ground level has been raised by up to a further 2m along large sections of the route. Immediately above the pipelines there are 21 no. electrical/earthing/fibre optic cables. (See below – Drg No: CSL/CEN/01/001 – Typical Section Through Pipeline Route)



#### 4 Future access requirements

Centrica plc will need to ensure that adequate space is available for any future event that will require access over or down to the buried services. The space requirement will differ depending on the circumstance.

- a) **Visual Inspection / Non-intrusive Surveys** – There are a number of manholes along the route which Centrica plc will need to regularly inspect. These inspections may require vehicular access to be available. Centrica plc may also need to undertake non-intrusive surveys which generally involve “walkover” surveys along the route.
- b) **Localised repairs** - Centrica plc may be required to under take localised repairs to the buried services. In this instance suitable and adequate space will be required for both labour and equipment to facilitate excavation works including equipment storage, excavated material storage, safe access and egress to and from the excavations as well as suitable and adequate working areas both in and around the excavations.
- c) **Full length replacement of part or all of the existing buried services** – Centrica plc may need to replace completely one or all of the buried services in the future. In this case an adequate working area will be required along the full length of the corridor in order for the existing plant to be exposed and removed, for the new pipe / cables to be made above ground and placed within the excavation. Again safe access and egress to and from the excavations, equipment and excavated material storage areas as well as adequate working areas in and around the excavations must be available.

When assessing the space requirements for the above, the need to be able to establish safe systems of work must be considered at all times.



## 5 Proposed Easement Assessment

In order to determine if the proposed 12.5m corridor is adequate it is necessary to establish the potential future work scope. Section 4 above outlines the different scenarios that may arise. The sections below aim to assess the minimum requirements for each of the scenarios.

Option a) above – **Visual Inspection / Non-intrusive surveys** – would require minimal space as this operation is generally limited to above ground activities (with the exception for gaining access in to the manholes). Therefore 12.5m would be sufficient.

Option b) above – **Localised repairs** – would require excavation works to be undertaken over a relatively short linear length of the buried plant. Drawings CSL/CEN/002/001 & CSL/CEN/002/002 below show the required area to allow all safety factors (access/egress, storage, working area in and around the excavation) to be addressed.

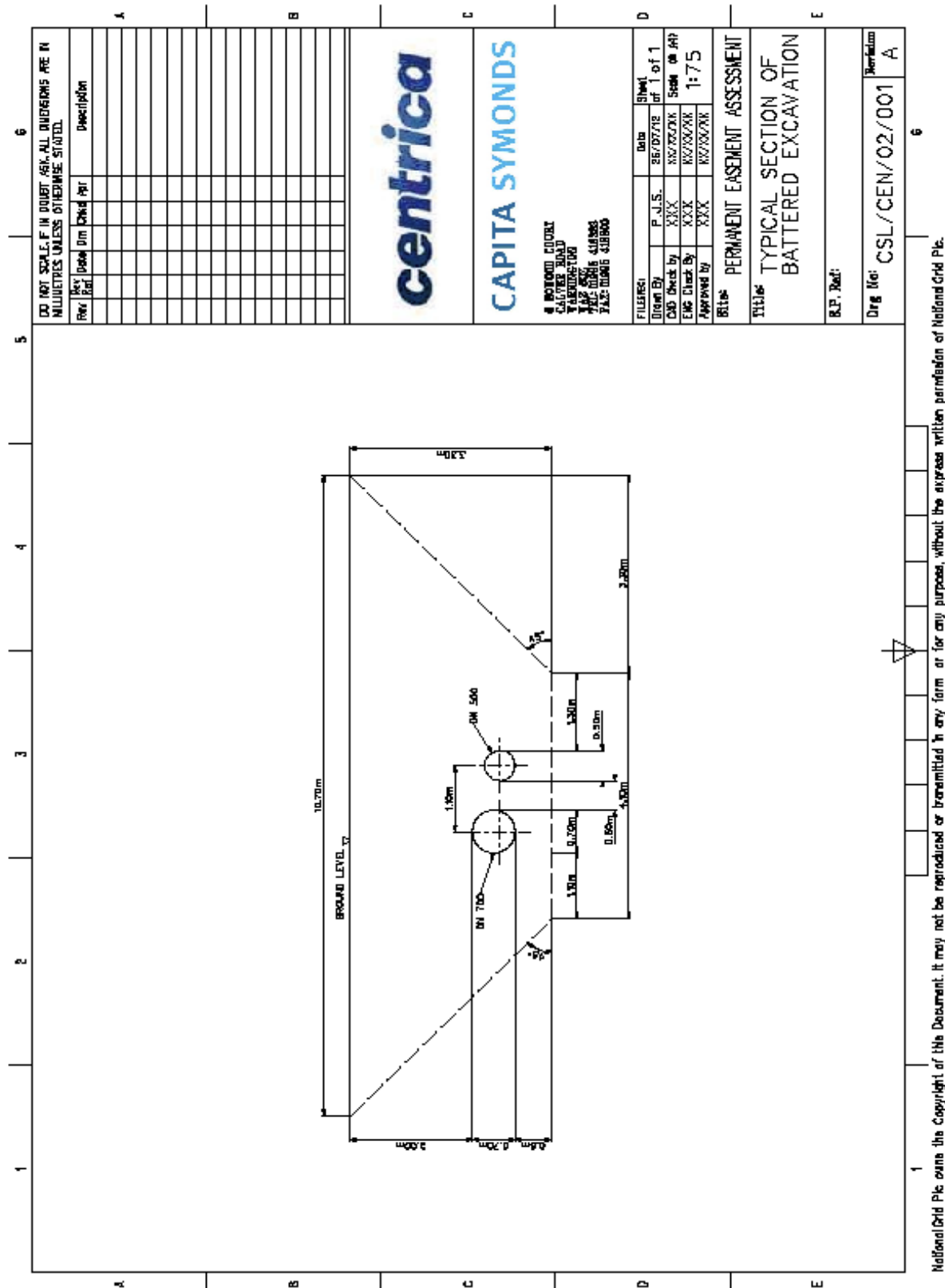
**Note: The cables have been removed for clarity. The worst case scenario would involve the deeper large bore pipes and therefore these have been assessed.**

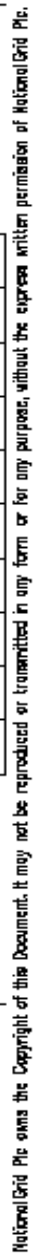
Due to the close proximity of the two pipes – 500mm face to face and the depth of excavation – approximately 3.3m it will be necessary to expose both pipes. In order to allow for safe working within the excavation an allowance of 1.2m has been made to the outside of both pipes. This is necessary given the minimal distance between the two pipes (500mm).

Drawing No. CSL/CEN/002/001 shows a depth to the invert from ground level of 3.3m. This is based on an original cover to crown (700mm pipe) of 2m plus pipe of 700mm plus clearance below pipe for working of 600mm. Using a safe angle of repose of 45 degrees the plan size at ground level of the battered excavation would be - width at bottom of excavation (4.1m) plus 2 x depth (2 x 3.3m) – **10.7m**.

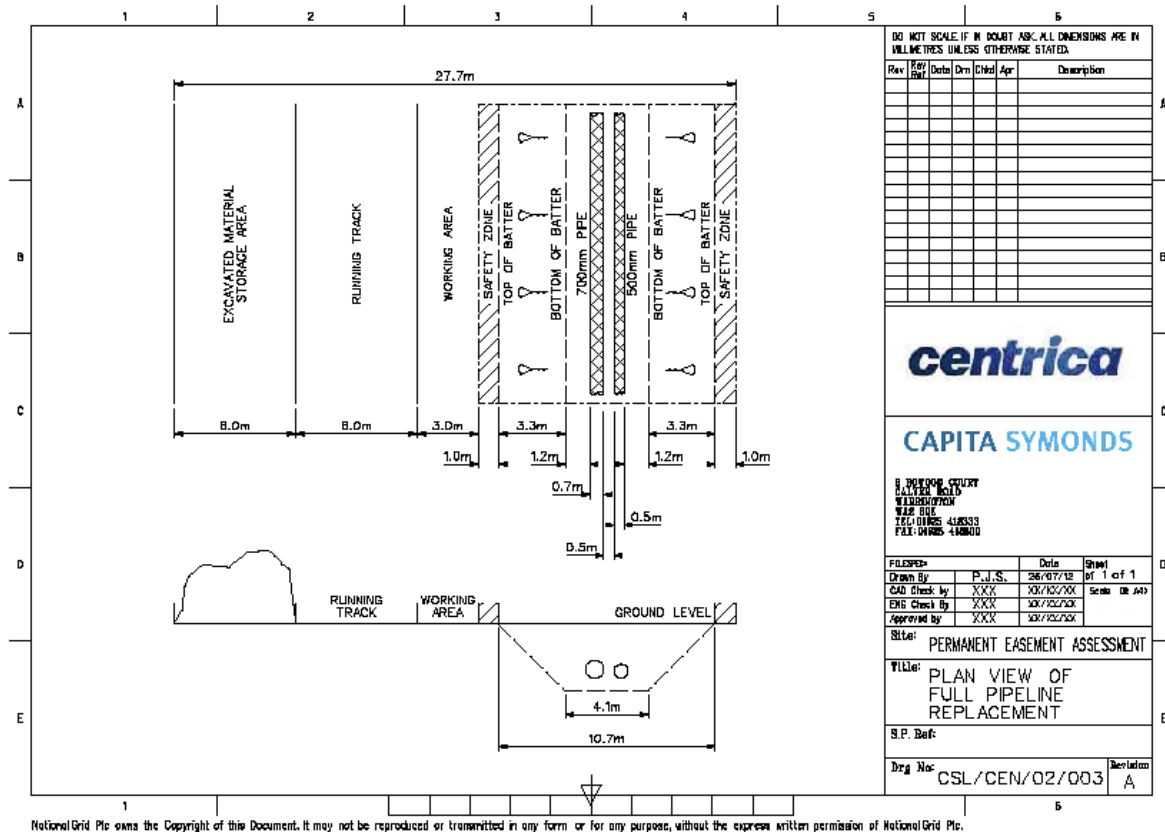
In order to comply with the Working at Heights Regulations 2005 as amended by the Work at Height (Amendment) Regulations 2007 and to prevent overloading of the excavation a “safety zone” of 1m around the excavation should be included. A working area of 4m either side of the excavation would be required to allow for movement of plant, storage of equipment (including pumps) and maximising works above ground rather than in the excavation (this should be undertaken where ever possible to avoid the risks associated with working in an excavation – Working at Height Regs Section 6 (2)). Excavated material storage would need to be considered. The drawing below – CSL/CEN/02/002 shows the plan view of the required easement. As can be seen the preferred plan dimension for the easement would be **24.7m**.

It may be possible to work from 3 sides only. This could be achieved by removing the working area / running track of 4m from one side but still retain the 1m “safety zone” . However it would be necessary to increase the working area / running track on the other side to a minimum of 7m to allow plant and vehicles to pass. This would result in reducing the plan size to **23.7m** however this would result in increasing the difficulty of the excavation operation due to the plant being restricted to working from three sides only.



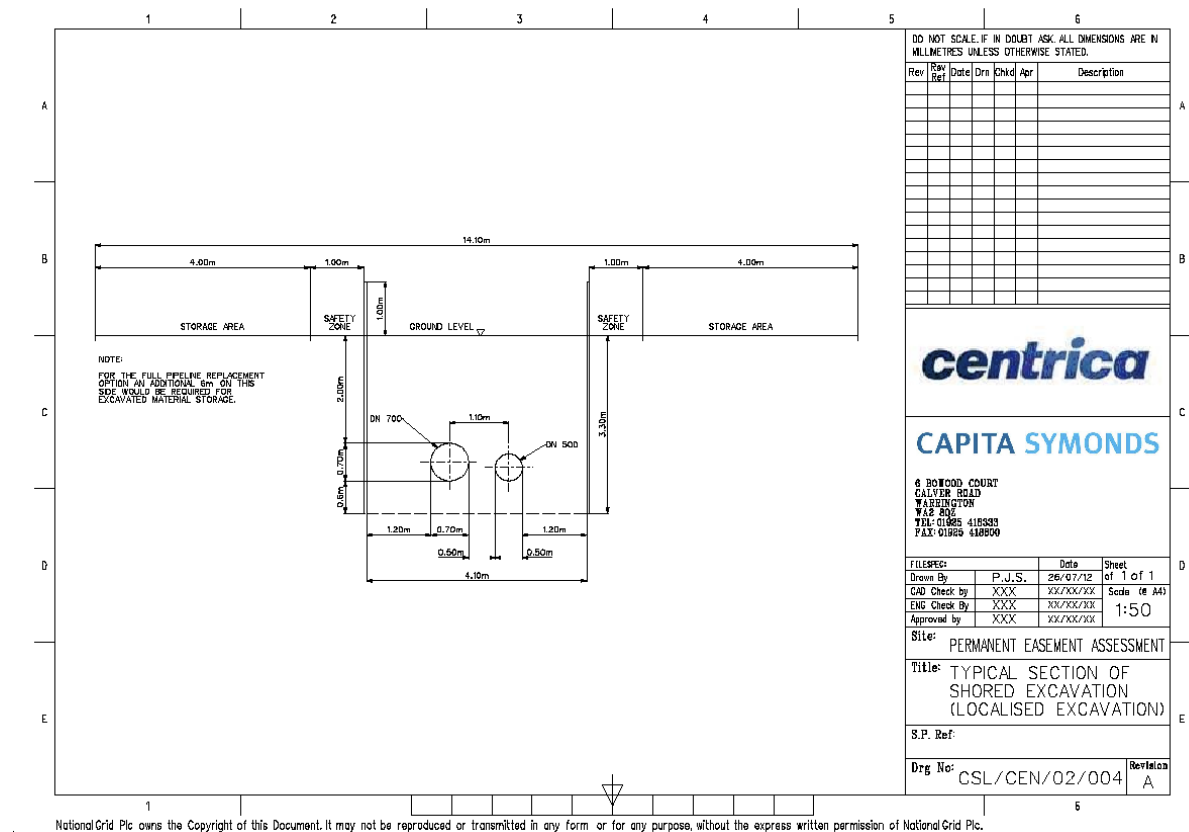


Option c) above – **Full length replacement of part or all of the existing buried services** - would require excavation works to be undertaken over the full length of the buried services. The preferred option would be a full working area as per Drawing No. CSL/CEN/002/003 below. This would take in to account the requirement for storage of excavated material along the full length of the corridor as well as having a safe working area for jointing of the new pipes above ground. This would result in an easement of **27.7m**.



### **Ground support / Shoring Option**

The use of shoring could be considered to reduce the plan size of the excavation. This would be a more expensive option (upwards of 40 – 50% increase in excavation costs) and would require a greater temporary works design but one that would lend itself to “localised” excavations. The “safety zone” and storage areas would still need to be considered. The use of shoring would result in reducing the easement area to **14.1m** for “localised” excavations. However for a full pipeline replacement option, additional storage areas for excavated material would need to be available. This would result in an easement of **20.1m**. Drawing CSL/CEN/02/004 below shows the typical section using trench shoring.



The shored trench solution would require horizontal beams/struts across the excavation to support the shoring. This creates an obstruction when considering the movement of labour, plant, equipment and materials within the excavation. For localised repairs it may be possible to design / plan for the positioning of these cross excavation supports such that they do not present an hazard or hinder the works. However with the full length replacement scenario these supports will present a problem to the workforce that will need careful consideration. Factors such as movement of workforce along the excavation, the lifting of plant and equipment in / out of the excavation and the lifting in / out of materials such as new sections of pipe will need to be factored. The risk of striking the cross excavation supports and therefore affecting the stability of the shoring system will need to be carefully managed.

Section 111 of the ACOP for the CDM Regulations 2007 requires that “ *Designers’ responsibilities extend beyond the construction phase of a project. They also need to consider the health and safety of those who will maintain, repair, clean, refurbish and eventually remove or demolish all or part of a structure....*”

## 6 Conclusions

The above assessments are based on the practical working areas to access the pipes having a cover to ground level of 2m (to top of the 700mm pipe from the as-built information provided to CSL).

However, Centrica plc have noted that sections of ground have been built up since the installation of the pipelines by up to 2m along large sections. Where this is the case it would be reasonable to extend the easement by a further 4m on each of the battered excavation options above.

This would result in

- the localised repair option increasing from 24.7m to **28.7m**
- the localised repair option with access to 3 sides only, increasing from 23.7m to **27.7m**
- the full replacement option increasing from 27.7m to **31.7m**

CSL would confirm that the proposed 12.5m easement corridor is insufficient for any future intrusive works on the deeper large bore pipelines.

Based on the above and considering the Health and Safety requirements for any future works, CSL would recommend a minimum easement of **31.7m**. This is above normal easement agreements for most pipelines, however the prescence of two pipelines in close proximity as well as the cables results in a larger easement being required.

Due to the potential for introducing hazards (cross excavation supports) and the increased time for undertaking the works within a shored trench (therefore increasing the exposure to hazards for the workforce), the shoring option should be considered only if the conditions for a battered excavation are not deemed to be suitable.

## APPENDIX 1

**Indicative Masterplan – AME-02006 – Marked up**





# **Able Marine Energy Park**

## Critique of Selected Studies

Centrica

August 2012  
Technical Note  
9X5820





**HASKONING UK LTD.**

Marlborough House  
Marlborough Crescent  
Newcastle upon Tyne NE1 4EE  
United Kingdom  
+44 191 211 1300 Telephone  
0191 211 1313 Fax  
info@newcastle.royalhaskoning.com E-mail  
www.royalhaskoning.com Internet

Document title Able Marine Energy Park  
Critique of Selected Studies  
Document short title AMEP Critique  
Status Technical Note  
Date August 2012  
Project name Able Marine Energy Park  
Project number 9X5820  
Client Centrica  
Reference 9X5820/R1/303294/Newc

Drafted by Nick Cooper  
Checked by Dave Brew  
Date/initials check 03/08/2012 D.S.B.  
Approved by Dave Brew  
Date/initials approval 03/08/2012 D.S.B.



## CONTENTS

	Page
1 BACKGROUND	1
2 SCOPE OF WORK	1
3 STRUCTURE OF TECHNICAL NOTE	2
4 CRITIQUE	2
4.1 Summary of Conclusions from the Technical Work	2
4.2 Critique of the Technical Work	3
5 CONCLUSIONS AND RECOMMENDATIONS	5
APPENDIX - REVIEWS OF INDIVIDUAL REPORTS	





## **1 BACKGROUND**

Able UK (the developer) is proposing to build a Marine Energy Park on the southern bank of the Humber Estuary, near Immingham. The Able Marine Energy Park (AMEP) will require a significant land reclamation that will extend offshore and potentially cause changes to the prevailing hydrodynamics and sediment transport characteristics, and hence potentially alter the morphology of parts of the estuary.

The AMEP is located close to the cooling water intake and outfall points for one of Centrica's power stations. Centrica presently experiences no problems associated with sedimentation, siltation or erosion at these points, but has concerns that the proposed development could alter the present situation and introduce problems.

## **2 SCOPE OF WORK**

The developer has provided Centrica with copies of seven reports (prepared by HR Wallingford and Environmental Resources Management) on assessments of changes to hydrodynamics and sediment transport and the potential impact on the cooling water infrastructure of Centrica's power station. Also provided by the developer was their comment on the relevant representations.

Centrica has requested that Royal HaskoningDHV undertakes a critique of these reports to provide an expert review on the work that has been done, whether this has been comprehensive and whether the conclusions drawn are realistic. This critique particularly focuses on the following questions posed by Centrica:

- Are the modelling approaches correct and comprehensive, and do they represent current practices?
- Do the models cover the assessment of cumulative impacts in an appropriate way (e.g. does the thermal plume modelling take into consideration the predicted sediment/deposition changes or does it just model the impact of the new structure alone)?
- What are the error margins or uncertainties associated with the modelled predictions (i.e. how much comfort can be drawn from the results; how likely are they to reflect what will actually happen)?

At this stage, the critique is not intended to present an interpretation of the likely outcomes, nor is the commission presently intended to undertake its own modelling assessments; rather it presently is intended to focus on the comprehensiveness, accuracy and robustness of the work that has been done on behalf of the developer to date.

### 3 STRUCTURE OF TECHNICAL NOTE

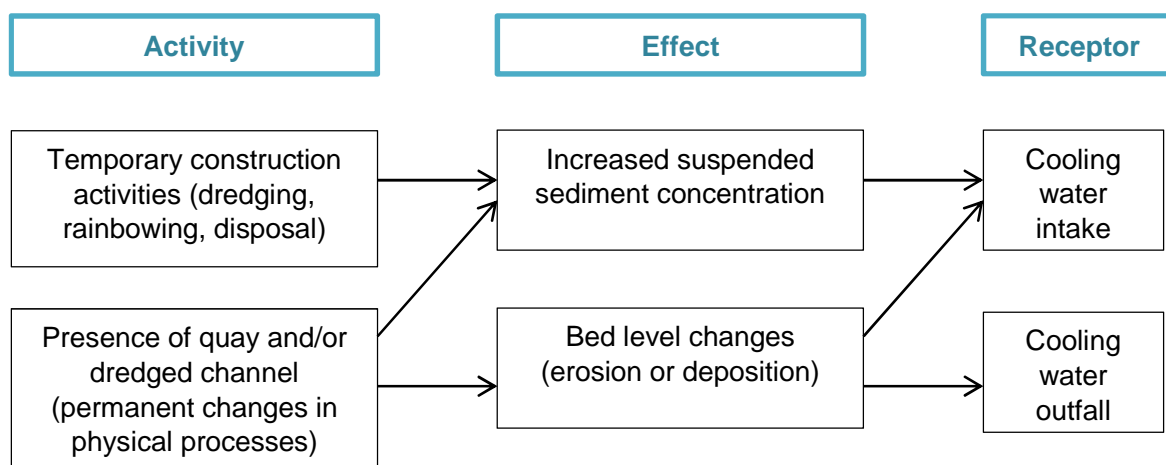
This Technical Note presents a summary of the conclusions arising from the technical work reported in the seven reports (Section 4.1) and then an overall critique (section 4.2). It concludes with a series of conclusions and recommendations (Section 5).

A detailed review of each of the seven reports is provided in Appendix A. This comprises a summary of key points and findings arising from each report (in black text) and comments from the author of this critique (in red text).

### 4 CRITIQUE

#### 4.1 Summary of Conclusions from the Technical Work

The principal potential effects associated with the proposed development on Centrica's cooling water infrastructure are summarised below:



In summary, the technical work undertaken on behalf of the developer does identify the potential for:

#### Construction phase impacts:

- From dredging of alluvium (assuming no overflow), there will be increases in suspended sediment concentrations at the Centrica intake of up to 60mg/l (near bed) for a period of 3 weeks.
- If overflow occurs for 10 minutes within each 150 minute cycle, then concentrations would peak at 800mg/l above ambient (based on the ES values, which differ from the HR Wallingford report which states 1,600mg/l).
- From dredging of sands and gravels (unclear whether or not this includes overflow), there will be increases in suspended sediment concentrations at the Centrica intake of up to 200mg/l (near bed) for a period of 1 week (based on the ES values, which differ from the HR Wallingford report which states 400mg/l).

#### Operation phase impacts:

- Significant reduction in flow speeds and bed shear stresses either side of the proposed development during both peak of the flood tide and peak of the ebb tide – our expectation from these reductions is that there will be an associated increase in deposition of sediment within areas where flow speed and bed shear stress has been reduced.
- Increases in flow speed and bed shear stresses in the proposed dredged area - our expectation from these changes is that there may be an associated increase in erosion of materials from the bed and hence increases in suspended sediment concentrations due to this during the operation phase.
- Under some wave approach directions, there will be a wave shadow effect created by the proposed development - our expectation from these reductions is that there may be less stirring of newly deposited sediment from the bed (in the areas where flow speeds and bed shear stresses have reduced), hence contributing to the increased accretion rates.
- There will be increased deposition in the vicinity of the Centrica and E.ON intakes/outfalls (188,000 – 468,000m<sup>3</sup> per year inshore of the intakes).
- 3D mud modelling has been used to infer that there is little risk of sedimentation at the intakes, but there is sedimentation of 1-2m (over a timescale of 6 weeks) at the Centrica outfall.

Mitigation for these impacts is proposed in the ES as follows:

#### Construction phase mitigation:

- Monitor suspended sediment concentrations and warnings / stop orders issued when thresholds reached.

#### Operation phase mitigation:

- Monitor accumulation of sediments and when necessary undertake dredging to keep infrastructure operational.
- If this maintenance proves unduly onerous, then divert outfalls into the new quay.

## **4.2 Critique of the Technical Work**

Review of the ES chapter alone raises a number of queries. Upon review of all seven reports, most of these are adequately addressed in those supporting reports. However, the ES chapter alone does, in our opinion, report poorly or confusingly in places some of the key outputs.

There is also one area where there is discrepancy between the ES chapter and the supporting HR Wallingford report. This relates to the reporting in increased suspended sediment concentrations above ambient conditions at the Centrica and E.ON intakes. We believe that the ES chapter correctly reports these and the HR Wallingford chapter has in places in its text mistakenly switched the values at each intake, but clarification on this from the developer would ease understanding.

Notwithstanding the above points, overall the technical work does seem to use appropriate models and approaches.

The modelling reports that we have reviewed as part of this critique are by HR Wallingford, and represent good quality and present open and honest assessments.

The approach of using a range of different models and geomorphological interpretation approaches is in line with industry practice.

Whilst the approach of using the modelling outputs in parallel with the design development is, in our view, good practice, it has resulted in the ES being a little unclear in exactly which layouts have been assessed using different models and has necessitated, in some instances, inferences to be made in interpretation of results. This means that the final layout has not been assessed precisely in every modelling application. The ES states that in general the final layout is smaller than all previous layouts and therefore the impacts of the final layout will always be less than presented if an earlier layout was modelled. However, this gives some concern because whilst in general this is valid, the intakes/outfalls could be more affected by subtle changes in flow or sediment transport which could potentially be worse under one layout than another, and not necessarily always associated with the largest layout.

Another critical factor is that clearly (and understandably) several assumptions have been made in places which, although reasonable, would result in much different values if alternative assumptions were used. This particularly relates to the fate of disposed dredged material, where initially it is assumed that only 25% of the material deposited is advected as a plume. If this value was greater, then the suspended sediment concentrations would be likely to be greater. Although this is later assessed in a sensitivity test assuming 40% of deposited material is advected, it does not explore the full range of potential outcomes.

That said, elevated suspended sediment concentrations from the disposal activities do not appear to adversely affect the cooling water infrastructure, which is more susceptible to: (i) suspended sediment concentrations during dredging activities; and (ii) effects on existing physical processes induced by changes in shoreline configuration due to new quay development and/or bed level changes due to capital dredging.

With respect to the first point, highly sophisticated modelling has been undertaken using industry-leading approaches developed by HR Wallingford. However, the outputs do vary greatly according to assumptions made about whether or not screening is to be used during the dredging process. The report states that screening is unlikely to be used during the dredging of alluvium, but if it is used then the suspended sediment concentrations at the intake will be higher.

The second point has been addressed using a range of approaches, including hydrodynamic, wave and sediment transport models. Generally, there is greatest confidence in hydrodynamic models, then wave models and least in sediment transport models, and the modelling results tend to support this.

There is one matter which does appear a little unclear in interpretation. The hydrodynamic and wave models show that under all hydrodynamic conditions and some wave conditions, the marine environment either side of the proposed development will be less energetic. Our inference from that is that there would therefore tend to be a net deposition of sediment in these areas. This does seem to be supported by statements

made in the ES. However, the 3D mud modelling, using an updated bed at five intervals during its run, suggests that whilst there will be accretion at the outfall, there will be erosion at the intake. It is unclear how results from the 3D mud model correlate with those from the hydrodynamic and wave models in this context. This may be due to different scheme layouts being used in each model type, but further clarification from the developer would aid understanding.

Importantly, although the individual modelling approaches seem generally good quality, there does seem to be one notable gap in the interpretation as some potential interconnectivities between results are not fully explored. Increase in flows / waves across the dredged area will potentially mobilise more sediment from the bed across these areas during the operational phase, which will potentially become deposited in the more sheltered areas in the vicinity of the intakes / outfalls. Once deposited, these sediments will in turn be less likely to become re-suspended by wave stirring due to the reduced wave climate under some conditions, and hence the actual sedimentation rate in the vicinity of the cooling water infrastructure may increase above that modelled since, presumably, the model does not include these processes and interconnectivities.

One specific question raised by Centrica is whether the thermal plume modelling takes into consideration the predicted sediment/deposition changes. It does not appear to do this (although the accompanying report is very brief and cites reference to other, earlier, thermal plume modelling reports which have not been reviewed as part of this critique. We believe that the model simply assesses the impact of the new structure alone, with a fixed bathymetric representation of the bed.

## **5 CONCLUSIONS AND RECOMMENDATIONS**

Overall, we felt that good technical work has been undertaken to support the application, but there are acknowledged limitations associated with the following uncertainties or assumptions:

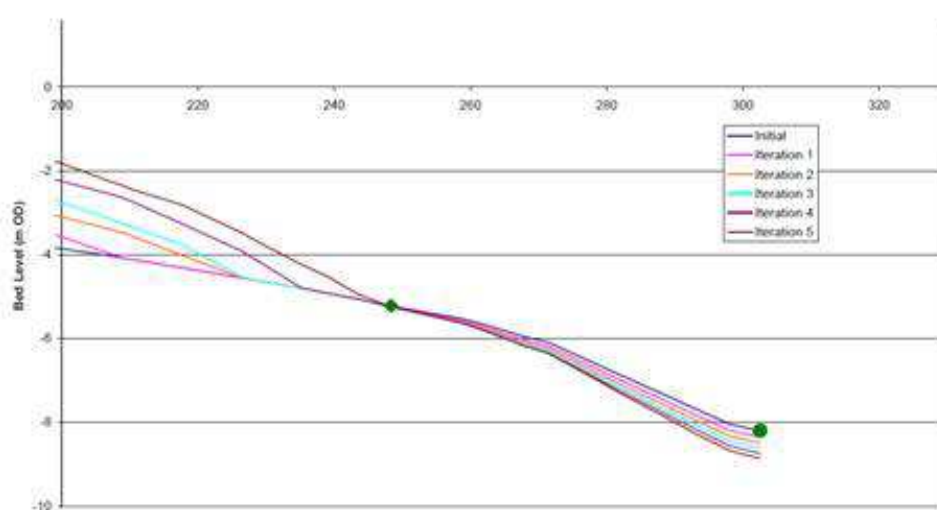
- The final model layout has not been assessed precisely in all modelling tools – instead results have sometimes been inferred from modelling of earlier scheme layouts.
- An assumption has been made regarding the volume of disposed dredged sediment that will become advected as a plume from the disposal site – sensitivity tests have been used for one alternative assumption but not the full range of potential outcomes (e.g. 100% of the material being advected).
- An assumption has been made regarding the order of increase in suspended sediment concentration (presumably arising from the disposal site plume) from the capital dredge of 730,000m<sup>3</sup>, based on modelling the effect of the preliminary dredge of 250,000m<sup>3</sup>.
- An assumption has been made regarding the none-use of overwash during the dredging of alluvium – although tests have been undertaken to assess the implications should overwash be used.
- It is stated that the plume model underestimates suspended sediment concentrations.
- It is stated that the 3D mud transport overestimates sediment deposition.

**The work presented does show significant potential impact on Centrica's cooling water infrastructure. Given the assumptions and uncertainties associated with the modelling, the actual magnitude of effect could potentially be greater than those presented in the ES.**

On some schemes of a similar nature, regulators or stakeholders have requested that Computational Fluid Dynamic (CFD) modelling of changes in flows around intakes/outfalls is undertaken by developers. This is a matter that could be further discussed, but we certainly would recommend that the following aspects are further considered to enable a more informed assessment to be made by Centrica of effects on its cooling water infrastructure:

Recommendations:

- There needs to be better geomorphological interpretation of potential interconnectivities between each suite of modelling results. In particular this relates to the predicted changes (both increases and reductions, in various parts of the estuary) in flow speed and wave energy (under certain approach directions) and their effects on the mobilisation or deposition of sediments and how this may affect the predicted results from the 3D morphological modelling of bed level changes in the vicinity of the cooling water infrastructure.
- There needs to be better explanation in the ES chapter of the physical basis for the results of the 3D morphological modelling. This predicts bed level erosion in the vicinity of the intake and accretion in the vicinity of the outfall (see image below). How does this correlate with the predicted changes to tidal and wave regimes from earlier hydrodynamic and wave modelling results, and the statements in the ES regarding accretion inshore of the intake? This may be due to different layouts being used in each model type and to be clearer (and more robust) in terms of potential effects it may be best to assess the final layout using all models.



**Figure 10a** Model predicted changes to morphology along a transect through the Centrica outfall (245 m chainage) and extending to the intake (about 300 m chainage) (each iteration corresponds to approximately six weeks duration)

- If the 3D morphological modelling results are accepted then a range of questions arise that need addressing, including:
  - What are the full implications of erosion at the intake – ultimately there will come a point where the integrity of the infrastructure or its foundations are threatened.
  - What are the full implications of accretion at the outfall – ultimately there will come a point where the structure is buried and unable to discharge.
  - What are the predicted consequences over timescales beyond the 30 weeks modelled? Will erosion/accretion patterns continue since the presence of the quay will be permanent or will the changes tend towards an equilibrium and, if so, over what timescales and with what accompanying bed level changes?
- In our view, the morphological model has the greatest associated uncertainty of all modelling undertaken. We feel that this uncertainty (and the range of potential associated outcomes) has not been fully explored in the ES in terms of consequence on the cooling water infrastructure. There should be more ‘what if ...?’ assessments to reflect the uncertainty associated with the 3D morphological modelling and changes over timescales longer than those which have been modelled. For example:
  - What if ... there is accretion, rather than erosion, at the intake?
  - What if ... the accretion rates are greater than predicted by the model?
  - What if ... accretion / erosion continues beyond the 30 weeks modelled?

We believe that the ES takes the 3D modelling output in quite an authoritative manner (and proposes mitigation accordingly) but does not identify that the balance between the point of erosion/accretion is finely tuned and the model could not be expected to simulate this precisely.

- The developer needs to clarify whether or not screening will be used in the dredging of alluvium as the suspended sediment concentrations are an order of magnitude different between these scenarios.
- The developer needs to clarify whether or not screening has been considered in the assessments of suspended sediment concentration increases during the dredging of sands and gravels.
- The developer needs to justify why an assumption of 25% of the disposed material being advected as a plume is valid.
- The developer needs to better clarify how the dredging and disposal assessments have been undertaken. The ES is poorly worded in this respect and causes confusion. In particular we need to better understand whether the modelling covers all dredging / disposal activities or whether it is for the preliminary dredge (250,000m<sup>3</sup>) only, with inferences then ‘scaled-up’ to reflect the remaining 730,000m<sup>3</sup> dredge.



- Greater understanding needs to be provided in the ES of the consequence of the predicted increase in suspended sediment concentration at the intake, and the wider range of potential outcomes to reflect the uncertainties and assumptions in the modelling. At present, the silt removal plant is operating near to capacity and therefore any increase in suspended sediment concentration above ambient levels will present a problem to Centrica.
- Linked to the above comment, the construction phase impacts are proposed to be mitigated through monitoring of turbidity in the vicinity of the intake and issuing of warnings and stop orders to the construction plant. Given that any increase in suspended sediment concentration at the intake will be problematic to Centrica, what thresholds will be proposed for these mitigation activities to prevent operational issues to the power station?
- Whilst it is acknowledged that the design layout has been altered to an extent to reduce impact, the proposed mitigation for the bed level changes in the vicinity of the outfalls is re-active (monitoring and removing deposited sediment) rather than pro-active (preventing the deposition from occurring). The developer should consider whether more be done to reduce the predicted rates of accretion through further changes to the design layout.
- Mitigation should be proposed for the erosion in bed level that is predicted in the vicinity of the intake. At present, Centrica experiences no problems due to deposition or erosion at either the intake or outfall and therefore the proposed scheme will undoubtedly cause this situation to change.
- In the event that dredging of sediment deposited in the vicinity of the cooling water infrastructure becomes onerous, the developer proposes to re-route the outfall. The developer needs to fully address all issues associated with this proposal, such as (not exhaustive):
  - Regulatory issues
  - Capacity issues
  - Environmental issues
  - Access to outfall for maintenance and inspections
  - Responsibilities for maintenance and inspections
  - Implications of outfall discharging at a different location and vertical position on the wider estuary
- The developer proposes no alternative mitigation for the intake in the event that either the erosion (predicted by the 3D morphological model) becomes problematic or that the model projections are inaccurate and in fact accretion occurs. If the intake is considered to be re-routed then again there will be a raft of associated issues, including abstraction licenses, to address.

# **APPENDIX**

## **REVIEW OF INDIVIDUAL REPORTS**

<b>Able UK Letter to BNP Paribas Real Estate / Applicant's Comments on the Relevant Representations</b>
---

- One of the six points covered in this letter relates to BNP Paribas Real Estate's comment (on behalf of Centrica) seeking to ensure that neither the construction of the quay nor any dredging activity had any effect on Centrica's cooling water infrastructure. Pages 166-167 of the Applicant's Comments on the Relevant Responses also duplicates most of this response from the applicant.
  - Able UK's response stated that the developer has endeavoured to mitigate the impacts of the proposals on the cooling water infrastructure by the following means:
    - No buildings are located over pipeline routes
    - Following an iterative design approach involving hydrodynamic modelling of numerous quay arrangements, the quay has been configured so as to avoid suspended sediment settling onto the estuary bed in the vicinity of the cooling water infrastructure (reference is made to a summary of the iterative design approach in Annex 4.4 of the Environmental Statement).

[The second bullet is in line with current approaches on development proposals of a similar nature, where modelling (and environmental assessment) is undertaken to help inform the final design configurations, rather than simply to model/assess the effect of a single preferred design]
  - Able UK acknowledge, however, that:
    - Hydrodynamic modelling is not an exact science
    - Estuary systems are complex
    - Modelling is, necessarily, a simplification of the real world
    - Accurate computer modelling of sedimentation patterns is particularly challenging
    - Results have high degrees of uncertainty both in terms of the area likely to be affected and with regard to the quantum and rate of any change
    - Deposition of suspended sediment within the estuary is controlled by the speed of the currents and the particle size of the sediments
    - The velocity of the water column at the site is in a state of flux, being influenced by the tidal cycle
    - A range of sedimentary particles (gravels, sands and muds) may be eroded, transported and deposited

[I accord with all of the above points]
  - Able UK continues that in order to address the above points as comprehensively as possible, both cohesive (HR Wallingford) and non-cohesive (JBA Consulting) models were commissioned to cover the behaviour of the full range of sediments that might be in the water column and would be available for deposition
- [It is odd practice to commission these aspects separately and by different consultants – I would have major concerns if the model software / grids / bathymetry / input hydrodynamics to each sediment transport model were not common]

- Able UK states that the cohesive transport modelling gave the most adverse results with respect to the rate of accretion to the north of the proposed quay. However, they state that their consultant has compared modelled sedimentation rates within existing berths to actual maintenance dredge volumes and this indicates that the modelling is over-estimating the average rate of sedimentation by a factor of around 2

[I would expect in this estuary environment that the effects from the proposals on accretion of cohesive sediments would be greater than effects on accretion of non-cohesive sediments, so this finding is consistent with my expectations. However, Able UK then appear to try and dismiss this effect (or at least lessen its significance) by stating that the model is over-predicting average effect by a factor of around 2. Also, presumably maintenance dredge volumes only account for the volume of material that settles long-term on the bed. There will probably be greater volumes reaching the bed, but then perhaps becoming re-suspended. In terms of effect on cooling water infrastructure, any sediment deposited (even temporarily) has the potential to have an effect. The reliance on maintenance dredge volumes for 'calibration' of the cohesive model results may therefore not be truly representative of effect at the intake/outfall. Furthermore, the statement regarding over-estimation of rates clearly raises issues over the absolute accuracy of the cohesive sediment modelling]

- Able UK state that in the scheme that has been submitted for consent, the cohesive modelling indicates that there is little risk of significant sedimentation at Centrica's intake but that there is potentially a risk of sedimentation at the outfall. It is proposed that the risk is managed through observation and intervention if necessary.

[Do these conclusions arise from the actual modelled results or the 'scaled-down' modelled results following the 'calibration' of outputs against the maintenance dredging volumes?]

[What about the effects of increased suspended sediment concentrations in the water column at the intakes in addition to the sedimentation at the bed?]

[The statement that there is little risk of significant sedimentation at the intake suggests that there is likely to be some sedimentation, but they have assessed it to be so small as to be classed as not 'significant'. Does this mean 'moderate' or 'low' sedimentation, or indeed erosion, and is any change in bed level at the intake acceptable to Centrica given that there are currently no problems experienced?]

[The statement is made that that there is potentially a risk of sedimentation at the outfall. Is this a significant rate of sedimentation and is any change at the outfall acceptable to Centrica given that there are currently no problems experienced?]

[If the risk of sedimentation at the outfall is such that it required observation and intervention if necessary it suggests that there is some concern. Who is responsible for the mitigation that is proposed and how can this be ensured at

appropriate timescales, especially given that the development will be a permanent change to the estuary configuration?]

## Chapter 8: Hydrodynamic and Sedimentary Regime

- Environmental Statement Chapter prepared by ERM based on results from:
  - AEMP Estuary Modelling Studies (JBA Consulting)
  - Review of Geomorphological Dynamics of the Humber Estuary (JBA Consulting)
  - Able Marine Energy Park - 3D Mud Modelling (HR Wallingford)
  - Able Marine Energy Park – Dredging Plume Dispersion Arising From the Capital Works (HR Wallingford)

- The ES chapter summarises the detailed technical modelling and geomorphological assessment work.

[In addition to the reclamation and dredging, there is mention of a Compensation Site. Depending on its location, this could also potentially affect hydrodynamics, sediment transport (including mobilisation of materials from the site and from creeks cut across the inter-tidal) and hence affect suspended sediment or deposited sediment at the intakes/outfalls.]

- During the studies to inform the ES, the design of the scheme evolved. The impacts are informed by modelling of different iterations of the scheme – in all cases where the impacts are based on an earlier layout, these relate to a larger scheme set further forward in the estuary

[Whilst in most cases it is valid to say that a larger footprint has the greatest impact, the intakes/outfalls could be more influenced by subtle changes in flow / sediment patterns therefore it is of concern that the final layout has not necessarily been modelled in the context of the intake/outfall assessments. Indeed it is rather confusing to determine which has been assessed in which context, despite Fig 8.1 (which labels 2 layouts) and Table 8.1 (which refers to 3 layouts). For example Table 8.1 says that fine sediment transport is based on final layout, but tidal currents were based on original layout. I would have thought that the sediment transport model runs off the core hydrodynamic base output files. Can this be clarified?]

[Section 8.2 makes reference to suitable guidance documents for QC of modelling and guidance on morphological change in estuaries]

- 8.3.3 suggests that the Particle Tracking Model was assessed to determine the fate of any sediment plumes resulting from dredging, reclamation and disposal. It then says that the model was used to assess the effects of disposal of dredged materials at the disposal ground.

[It is initially unclear in the ES whether the model includes the disturbance of material from the sea bed during the dredging or rainbowing operations (e.g. any locally introduced sediments during dredging/reclamation, rather than the bulk loading of sediments at the disposal site. Section 8.3.6 suggests that the plume modelling does account for this.]

- Construction impacts on flow speeds and water levels will be less than when the AMEP is operational and so no further assessment is required.

[Again whilst in general this is true, construction activity may temporarily affect flows locally in the vicinity of the outfalls/intakes leading to increased sedimentation (or erosion) at these locations – e.g. due to obstructions caused by plant, temporary works or vessels]

- The models/approaches used have included:
  - 2D and 3D hydrodynamic models
  - 2D wave spectral transformation models
  - Sediment transport – non-cohesive (original layout)
  - Sediment transport – cohesive (mud) (final layout) – 3D model
  - Expert geomorphological assessment of results

[This combination of modelling tools/assessment approaches is consistent with other practice across the industry for similar developments]

- Baseline

[Concise but cites relevant literature sources and defines the key processes]

- Construction Phase Impacts – The dredging programme will lead to a temporary increase in sediment in the water column, which may travel from the dredging site to other areas of the estuary

[Agreed, but it then is initially unclear whether or not it quantifies or assesses this effect from the dredging activity per se; it is clear at this stage that the effect of dispersion of material from the disposal site is assessed]

- Construction Phase Impacts – Assumption that 25% of total disposed load at disposal site will form a plume. Model probably underestimates SSCs and therefore peak increase after 44 days of disposal was estimated using judgement to be 80-100mg/l above ambient (north of Sunk Dredged Channel) reducing elsewhere in the estuary.

[How was this 25% assumption made? If the grain size of the material deposited at the 'erodible' disposal site is of a suitably small size relative to the bed shear stresses acting across the site, then it will be mobilised. Why not test sensitivity of 100% of material forming a plume if it is a dispersive (or 'erodible' in their terms) disposal site?]

[The statement about underestimating SSC reduces confidence in the model output and if judgement is used to factor-up the outputs, on what basis are these judgements made and how reliable are they?]

[What are the concentrations 1 day after disposal, or at the time of greatest concentration? Why was 44 days selected?]

- Construction Phase Impacts – Sensitivity testing was done with the assumption that 40% of total disposed load at disposal site will form a plume.

[Short lived peaks above ambient concentrations were much higher under this assumption, but still generally confined to the deeper water channel areas. However, are the values of 300-400mg/l above ambient that are quoted based on model results and therefore in need of factoring-up to reflect the underestimates of the model?]

- Construction Phase Impacts – After the preliminary dredge of 250,000m<sup>3</sup>, the remaining ~730,000m<sup>3</sup> will be dredged with a large trailer suction hopper dredger ... no quantitative assessment has been undertaken of dispersal from the disposal site ... elevations in ambient concentrations of 5-6 times those reported in para 8.6.13.

[Do we therefore assume that peak increases north of Sunk Dredged Channel are up to 600mg/l above ambient – this must be considered as significant? It will also increase further if a 40% assumption is used. Using the same basis a peak of 400mg/l x 6 = 2,400mg/l above ambient is a huge peak]

- Construction Phase Impacts – Although earlier being unclear, it appears that the effects of the dredging activity itself were also modelled. From dredging of alluvium, there will be increases in suspended sediment concentrations at the Centrica intake of up to 60mg/l near bed for a period of around 3 weeks assuming overflow from the hopper does not occur. Should overflowing be utilised for 10 minutes within each 150 minute load, then concentrations would peak at 800mg/l. From dredging of sand/gravel, there will be increases in suspended sediment concentrations at the Centrica intake of up to 200mg/l near bed for a period of 1 week

[This must be considered a significant outcome for Centrica – **note:** the HR Wallingford report states in its text values of 1,600mg/l (not 800mg/l) and 400mg/l (not 200mg/l) at the Centrica intake]

- Operation Phase Impacts – Significant reduction in flow speeds either side of development during peak of flood tides and peak of ebb flows, including >0.5m/s reductions in the vicinity of the outfalls. These translate into reductions in bed shear stresses.

[Reductions in flow speeds in the vicinity of the outfalls have potential consequences in terms of increased siltation at the outfalls]

- Operation Phase Impacts – Increases in flow and bed shear stresses in the proposed dredged area.

[Will these increases mobilise more sediment from the estuary bed, which could locally increase SSC or deposition at the intakes/outfalls?]

- Operation Phase Impacts – Wave shadow effect in Fig 8.10 in the vicinity of the intakes and outfalls created by the newly reclaimed area. Wave height reductions >0.4m

[Reduced wave heights will result in less natural re-mobilisation of deposited sediments from the bed – could therefore have more deposition / SSC due to flow changes and less remobilisation/dispersion due to wave changes both leading to more deposition/SSC at intakes/outfalls]

- Operation Phase Impacts – Increased deposition in vicinity of outfalls/intakes from mud transport modelling, leading to predicted increase in deposition of 188,000 – 468,000m<sup>3</sup> per year inshore of E.on and Centrica intakes

[This must be considered a significant outcome for Centrica]

- Operation Phase Impacts – 3D mud modelling predicted annual infill in the berths some 2-3 times greater than is observed ... modelled predicted infill rate within 2-5 times observed is not unreasonable

[Agreed, but Centrica has to ensure that the developer adequately deals with the uncertainty associated with this. Also, some of the reasons for the differences in the berths are not applicable to all estuary areas (i.e. ship motion is relevant to berths and not some other areas)]

- Operation Phase Impacts – 3D mud model run for an extended period of time with updating bed using Layout 1b and results used to infer effects of final layout. Estimated sedimentation of 1-2m predicted at the Centrica outfall but little risk of sedimentation at the intakes. Uncertainty of inferences is stated in the ES.

[Assessment of effects of final layout through inference from modelled layout (i.e. final layout not directly modelled in this manner) and therefore uncertainty exists. Over what timescale is the 1-2m sedimentation predicted? If different assumptions were used in the model, would we then see sedimentation at the intake too?]

- Construction phase mitigation measures – SSC monitored at intakes during construction and warnings issued / activities cease when caution / stop thresholds exceeded

[Given modelling results showing increased SSC this is essential]

- Operation phase mitigation measures – Monitor accumulation of sediments and dredging at intakes/outfalls. New outfall built into quay to allow for diversion if maintenance dredging proves unduly onerous.

[Thermal plume modelling of new outfall included – no effect on operation of existing intakes/ outfalls]



#### Annex 8.4: Able Marine Energy Park Dredging Plume Dispersion

- Capital dredging using TSHD to dredge alluvium/clay and sand/gravel and backhoe to dredge glacial till.
- Modelling assumes no overflow for alluvium clay but overflow for sand/gravel.
- Temporary and significant rises in background concentrations are likely during the dredging of sand/gravel over the course of 1 week (or less). At Centrica intake elevations ~ 400mg/l (near bed)  
[note: the ES says 200mg/l increase at the Centrica intake]
- For alluvium up to 60mg/l (near bed) for a period of ~ 3 weeks – not considered to be unduly onerous for the operation of the intakes.  
If overflowing be utilised in the dredging of alluvium, the increases at Centrica intake ~1,600mg/l  
[note: the ES says 800mg/l increase at the Centrica intake]
- SEDPLUME-RW – 3D lagrangian plume dispersion model – advection calculated using 3D flow model results
- SEDTRAIL-RW version of SEDPLUME-RW specific to TSHD
- Considers effects of draghead disturbance, passive (surface) plume, re-entrainment from dynamic plume, propeller jet erosion.  
[I am not wholly familiar with this specific model – it appears to be a bespoke programme written by Jeremy Spearman of HRW – but it does cover relevant processes and is based within a three-dimensional domain]

**FIG 15 sand/gravel SSC 200mg/l at Centrica (as stated in ES) but in HRW text says Centrica 400mg/l (which according to Fig 15 is E.on)**

#### Able Marine Energy Park: Assessment of Maintenance Dredging Requirements

- Sedimentation northwest of the development is likely to lead to burial of the E.ON outfall and has a high risk of burying the Centrica outfall, which is further to the north.
- Assumed that these outfalls will be re-routed so there is no requirement for maintenance dredging in the vicinity of the outfalls.
- Present infill estimates in vicinity of Centrica and E.ON intake/outfall lines = 0 dry tonnes/year
- Predicted post-development = 94,000 – 234,000 dry tonnes/year

<b>Able Marine Energy Park: Assessment of the Effects of Relocation of the E.ON and Centrica Outfalls on Thermal Recirculation</b>
--

- Considered both Centrica and E.ON intakes/outfalls.
- Previous thermal dispersion modelling undertaken of the cooling water discharges following quay construction and the predicted effects of the development on thermal recirculation to the intakes.
- One option to overcome the predicted siltation at both outfalls is to relocate both outfalls to the front face of the new quay. This was assessed in terms of thermal recirculation to the intakes in this report.
- Results showed that moving the outfalls would lead to temperatures at the intakes that are lower than those with the outfalls in their present positions (with the development included).  
[However is this situation still worse than with no development included]
- Peak temperatures at the Centrica intake are expected to be 0.1°C to 0.2°C above the ambient value for no more than 1 hour **twice** per tide.  
[Under what scenarios?]  
  
[The summary incorrectly stated no more than 1 hour per tide – it is no more than 1 hour twice per tide, just after HW and just after LW]
- Influence of tidal conditions and wind effects considered in thermal plume model. Spring tide calm conditions, spring tide constant wind conditions (7m/s), neap tide calm conditions, neap tide constant wind (7m/s) conditions.
- Ambient temperature ~18°C in summer and 10°C in winter
- Centrica's outfall was assumed to have excess temperatures above ambient of 10°C and a flow rate of 0.3m<sup>3</sup>/s. The intake was assumed to have a flow rate of 0.4m<sup>3</sup>/s.
- Previous modelling showed the presence of the quay was predicted to increase the peak excess temperature at the Centrica intake from an existing value of <0.1°C to around 0.25°C.
- With the outfalls relocated to the front face of the quay, the peak excess temperature at the Centrica intake was predicted to increase by between 0.1 and 0.2°C above ambient for two periods per tide of no more than 1 hour each, after both high and low water. Near bed values are predicted to be <0.1°C at all times.

## **Annex 7.6: Able Marine Energy Park Dredging Strategy**

- No comments

### **Assessment of Changes to Morphology (Particularly Intertidal) between the Humber International Terminal (HIT) and the Humber Sea Terminal (HST)**

- LiDAR data (2001, 2002, 2003, 2004, 2005, 2006, 2007, 2010) and local ABP collector charts (1991, 1996, 2000, 2004, 2008) used to assess changes in morphology subsequent to construction of HIT.
- Overall 660,000m<sup>3</sup> of sediment was deposited onto the inter-tidal upriver of HIT between 2001 and 2010
- Rate of accretion continuing, even 9 years after construction
- Subtidal levels are highly variable
- Implication for AMEP is that a stable form northwest of the development would not be achieved for many years.

### **Update to Longer Term Morphology Predictions in the Region of the Centrica and E.ON Intakes and Outfalls**

- 0.6m potential erosion (after 30 weeks) in the region of the Centrica intake
- 2.3m deposition after 30 weeks inshore of the outfall
- Slight risk of erosion and deposition at the outfall

[I think it is dangerous to draw conclusions from this modelling when there is so much uncertainty associated with sediment transport models and, particularly, bed-updating processes]

[I do not see how these conclusions have been drawn – Figs 4 - 8 show progressive accretion between timesteps – none show any erosion so why does Fig 10a show erosion at the intake?]

[What is the physical basis for erosion at the intake when tidal flows and wave climate has reduced in this location?]

[Does this finding contradict the earlier report which says that increase in deposition of 188,000 – 468,000m<sup>3</sup> per year inshore of E.on and Centrica intakes?]



# BNP PARIBAS REAL ESTATE

The Planning Inspectorate  
National Infrastructure Directorate  
Temple Quay House  
2 The Square  
Temple Quay  
Bristol  
BS1 6PN  
**FAO Robert Upton**

BNP Paribas Real Estate  
1st Floor, Fountain Precinct  
Balm Green  
Sheffield S1 2JA

Tel: +44 (0)114 263 9207  
Switchboard: +44 (0)870 700 2233  
Fax: +44 (0)144 263 9244  
Email: [REDACTED]

Your ref: TRA030001  
Our ref: 082541 ADW / PBF L120723

23 July 2012

Dear Robert

## APPLICATION FOR PROPOSED ABLE MARINE ENERGY PARK

**CENTRICA PLC (UNIQUE REFERENCE NUMBER: [REDACTED]), KILLINGHOLME POWER STATION AND ASSOCIATED INFRASTRUCTURE, CHASE HILL ROAD, NORTH KILLINGHOLME AND CENTRICA STORAGE LIMITED, STATION ROAD, NORTH KILLINGHOLME**

## PROPOSED AMENDMENTS TO THE DRAFT DEVELOPMENT CONSENT ORDER FOLLOWING THE ISSUE SPECIFIC HEARING ON THE DRAFT DEVELOPMENT CONSENT ORDER

We refer to our previous Written Representations on behalf of Centrica dated June 2012 and Alex Willis' attendance at the recent Hearing on 12 July 2012. Further to this, we have set out below Centrica's proposed amendments to the draft Development Consent Order (DCO) as part of a written summary of the oral submissions made at the hearing

### Background

Centrica owns and operates a number of assets in the North Killingholme area which will be affected by the proposed Able Marine Energy Park (AMEP). These include:

- Killingholme Power Station on Chase Hill Road, North Killingholme;
- The Power Station's associated infrastructure, including its Cooling Inlet and Outfall in the River Humber, pumping station and other associated cables and pipelines which run across the AMEP site;
- The Centrica Storage Limited (CSL) site on Station Road, North Killingholme; and
- The Condensate Pipeline running north to south through the AMEP site between the CSL onshore gas processing terminal at Easington and the Port of Immingham.

**BNP Paribas Real Estate Advisory & Property Management UK Limited**

Registered office: 5 Aldermanbury Square, London EC2V 7BP

Registered in England No. 4176965

[www.realestate.bnpparibas.co.uk](http://www.realestate.bnpparibas.co.uk)

ISO 9001  
ISO 14001  
OHSAS 18001  
BUREAU VERITAS  
Certification



N° UK4578228/1 / UK4578228/E / UK4578228/OHSAS



008

Regulated by RICS



All of these assets are essential to the continued future operation of either Centrica's Killingholme Power Station or the company's national gas storage business (CSL). These assets play a vital role in power generation, gas storage and distribution and job creation in the local area and across the wider region.

Centrica has operated from the North Killingholme since approximately 2004 and has major concerns regarding the likely impact of the proposed development on the continuation of these operations, based on the DCO as currently drafted. These concerns are set out in detail in Centrica's previous Written Representations and summarised below:

## ■ Water Temperature

Centrica is extremely concerned that the construction of a large quay close to its cooling inlet and outfall will have a detrimental impact on the efficient operation of these essential pieces of the power station infrastructure. In particular, Centrica is concerned that the proposed quay will result in increased water temperatures close to its inlet and outfall by reducing the speed by which warm water discharged from the outfall can disperse from the area.

The implications of this are that the temperature of the water extracted by the cooling inlet would be increased, thereby reducing the thermal efficiency of the power station. The increased concentrations of warmer water in the immediate surrounding area would have implications for Centrica under its existing discharge licence from the Environment Agency, and potentially result in shut downs of the power station.

## ■ Sediment / Silt Deposition

Centrica has major concerns that the proposed quay would interfere with hydrodynamic and sedimentary regime of the Humber Estuary and would result in increased levels of silt being deposited close to the cooling inlet and outfall.

Increases in sediment deposition could potentially result in a reduced ability to extract and discharge water, as well as the increased likelihood of sediment-laden water entering the cooling inlet. The inlet filtering systems and the existing silt removal plant are only designed to filter the current level of suspended sediment experienced during the natural ebb and flow of the river, and would not be able to cope with increased levels of sedimentation. Accordingly, if increased levels of sedimentation enter the power station's cooling water systems it would significantly reduce the efficiency of the power station, and potentially result in shut downs.

Changes to the sediment regime in the Humber Estuary, including increased levels of erosion could result in the potential exposure of the Condensate Pipeline buried under the river bed. If sediment shifts it could result in spanning, with a worst possible case being the consequential catastrophic failure of the pipeline.

## ■ Dredging

Centrica's concerns outlined above in respect of increased sediment-laden water as result of the proposed AMEP development, relate equally to the daily mitigation dredging proposed by Able. Dredging the river bed close to the cooling inlet will increase the level of sediment in the water column and will result in increased levels of sediment-laden water entering the power station's cooling water systems.

As stated above, the power station's existing filtration equipment is not capable of filtering levels of silt / sediment above what is experienced during the normal ebb and flow of the river. Accordingly, increased silt / sediment concentrations will significantly reduce the efficiency of the power station, and potentially result in shut downs and increased costs.



## ■ Existing Rights and Easements

As currently drafted, the DCO allows for the compulsory purchase of Centrica's existing rights and easements over the AMEP site and for these to be altered or extinguished without Centrica's consent or even prior consultation. These rights and easements include:

- 1 The access road to the CSL site on Station Road;
- 2 The access road to the pumping station;
- 3 Access to existing pipelines and associated services passing through the AMEP site, including the condensate pipeline and cooling water pipelines; and
- 4 The current right of free passage of services through conducting media across the AMEP site.

Access to the pipelines and associated services which cross the AMEP site, as well as the pumping station, is essential to Centrica for inspection, maintenance, service and renewal purposes. Any access restrictions to these pipelines and services, as well as the pumping station, would detrimentally impact Centrica's operations in the area. Similarly, any restrictions on access to the CSL site on Station Road would reduce Centrica's ability to deliver cargo to its offshore platform.

## ■ Highways / Traffic

Centrica is concerned that the increases in traffic that would result from the proposed development would create delays and queuing traffic on local roads, particularly as some roads in the area are already at capacity. This would potentially delay or restrict access to the power station and Centrica's other assets in the area, including delaying the delivery of cargo from the CSL site on Station Road.

Centrica requires unrestricted access to these assets at all times in case of emergency or the need for urgent repair / maintenance work, and the AMEP should not impact on this.

## ■ Killingholme Power Station Access Road

Centrica is also concerned that Able will utilise the access road to the power station to access the proposed development. This could potentially create delays and restrict Centrica's access to the power station. It could also damage services and pipelines running under the road, including the fibreglass pipeline to the E.ON power station.

The DCO for the AMEP should therefore not allow for the use of the power station access road.

## ■ Flooding

Centrica is concerned that the proposed development, and the proposed flood defences would increase the risk of inundation of the pumping station by flood waters in the event of a breach or overtopping of defences. There is also a risk that the proposed development will reduce the ability for water to drain away in the event of a flood event.

The DCO for the AMEP should therefore ensure flood risk resulting from the development is fully mitigated.



## ■ Future Expansion

Given the large area of land that Able UK proposes for development as part of the AMEP, there is the potential for this to restrict Centrica's ability to expand its operations in the area in the future. In particular, the AMEP site and the land proposed to be acquired by compulsory purchase completely surrounds the CSL site on Station Road, and includes land immediately adjacent to the power station's pumping station. The proposed development may therefore restrict Centrica's ability to expand these sites if necessary for operational purposes in future. The development therefore may limit the extent to which Centrica can increase cargo deliveries to its offshore platforms or the extent to which the power station can be extended or upgraded in the future.

In addition, the significant volume of traffic generated by the proposed development may prejudice future development in the area, including the expansion of Centrica's assets, as local roads may not have sufficient capacity to cope with any cumulative impacts of traffic from the proposed development and any future developments combined.

## Able Response

As part of Able's response to Centrica's Written Representations in June 2012, and as part of further meetings and discussions between Able, Centrica and Centrica's neighbouring power station operator E.ON, the following points have been noted in respect of Centrica's concerns.

## ■ Water Temperature, Sediment / Silt Deposition and Dredging

Able's latest assessment of the potential impacts of the proposed AMEP on the above is set out in the following documents:

- (i) HR Wallingford, Update to Longer Term Morphology Predictions in the Region of the Centrica and E.ON Intakes and Outfalls, dated March 2012
- (ii) HR Wallingford, Assessment of the effects of relocation of the E.ON and Centrica outfalls on Thermal Re-circulations, dated June 2012
- (iii) HR Wallingford, Assessment of Maintenance Dredging Requirements, dated June 2012

These documents propose to relocate the Centrica outfall to the front face of the AMEP quay in an attempt to address the impacts on the Power Station of the water temperature and sediment / silt deposition increases that will result from the AMEP development. Able's comments on the Relevant Representations in June 2012 also propose the future management of this risk by observation and intervention if necessary.

Centrica remain extremely concerned regarding the likely impacts of the proposed AMEP on their power station at Killingholme in terms of water temperature, sediment / silt deposition and dredging. These concerns relate to the following:

- (i) Accuracy of the modelling work

Centrica is extremely concerned about the conflicting reports and proposals produced to date by Able regarding the potential impacts of the proposed development in terms of water temperature, sediment / silt deposition, erosion and dredging. These illustrate the true uncertainty as to the future impact of the AMEP development on the power station, as this simply cannot be modelled accurately. This point is acknowledged by Able in their comments on Centrica's Relevant Representations as follows:

*"Hydrodynamic modelling is not an exact science, estuarine systems are complex and modelling of them is, necessarily, a simplification of the 'real'*



*world. Accurate computer modelling of sedimentation patterns is particularly challenging and the results have a degree of uncertainty, both in terms of the area likely to be affected and also with regard to the quantum and rate of any change”.*

(ii) Potential significant impacts on the power station

As set out in more detail above and in Centrica's Written Representations dated June 2012, the potential impacts of the proposed AMEP development on Centrica's power station in terms of water temperature, sediment / silt deposition, erosion and dredging are significant. More specifically, these could ultimately result in the need for shut downs of the power station and / or significant and expensive upgrades / replacement of the existing power station infrastructure.

(iii) Potential impacts on the condensate pipeline

Centrica is concerned that the altered sedimentary regime in the Humber Estuary as a result of the proposed quay and dredging operations may expose the pipeline and subject it to spanning. At the worst case scenario this could result in a catastrophic failure of the pipeline.

Centrica's lease of the river bed for the Condensate Pipeline is governed by the port authority and any exposure of the pipeline could also create a danger to shipping.

(iv) Proposed relocation of inlet / outfall

There will be significant costs associated with any proposed relocation of the power station inlet or outfall from their existing position in the River Humber and this is also likely to result in the need for the approval of major changes to Centrica's existing IPPC permit and / or abstraction licence. If Centrica's inlet is relocated, Centrica's existing abstraction licence will need to be modified. If the outfall is relocated Centrica will need to obtain a new IPPC Permit. There would be costs, risks and potentially additional requirements associated with obtaining a new IPPC permit. In particular, a time limit could be placed on any permit granted and / or Centrica could be required to comply with additional legislation required by the Environment Agency, such as the Fish and Eel Regulations, which would have additional costs. Accordingly, relocation is only an option if the necessary changes to the IPPC permit and abstraction license and any other requirements can be successfully obtained, and Able mitigates Centrica against the costs, losses and risks associated with this, as well as ensuring the power station's inlet and outfall remain fully functional at all times.

(v) Proposed relocation of Anglian Water outfall

As part of recent discussions, Able has advised Centrica that an Anglian Water pipe will have to be moved and has suggested that this outlet will be moved so it discharges between Centrica and E.ON's inlet / outlet culverts in the River Humber. It is understood that the pipe will discharge sludge / brine from Elsham Water Treatment works.

Centrica has major concerns regarding the proposed positioning of this pipe on water quality as the contents will be entrained by the power station cooling water inlet and cause deposition on the cooling towers, significantly increasing the legionella risk.

The potential for significant and unacceptable impacts to the power station and the condensate pipeline resulting from the proposed AMEP development, as well as the uncertainty of the





effectiveness of any mitigation solutions must be noted. Accordingly, there is a need to find an acceptable and long term solution.

The DCO as currently drafted does not require this and it is therefore vital that specific Protective Provisions for Centrica are set out at Schedule 9 of the DCO to ensure this, including further detailed investigation, a mitigation solution(s) and commitment to long term monitoring and further remedial measures to address future impacts (see below for more detail).

## ■ Existing Rights and Easements

As part of Able's comments on the Relevant Representations in June 2012, the following was confirmed:

- 1 "Centrica's rights of access to maintain their pumping station, pipelines and other services currently passing through the site will not be removed".
- 2 "Centrica's rights to pass services through the application site and surrounding land will not be removed".

Pursuant to this, further discussions have been held between Able, Centrica and E.ON regarding the existing rights and easements, including the easement requirements for the underground pipes and services crossing the AMEP site. E.ON has used a third party (Capita Symonds) to develop an easement assessment requirement. This identifies that 12.5m easement corridor proposed by Able is insufficient for any future intrusive works on the deeper large bore pipelines and a need for an easement width of 32.5 metres to meet future requirements, including Health and Safety.

Centrica would also require a similar easement to allow the Company to use, maintain, repair, replace and add to its cooling pipelines

Notwithstanding this and as set out above, the DCO as currently drafted would allow for Centrica's existing rights and easements to be altered or extinguish without Centrica's consent or even prior consultation. This is contrary to the current position and could result in a significant detrimental impact on the future operation of the Power Station and the CSL site on Station Road as set out in more detail above. Potentially this could result in shut downs of the CSL site, with knock on consequences for its ability to safely and reliably operate its offshore gas storage facility, and shut downs of the power station, resulting in a significant loss of revenue for Centrica.

In light of this and the fact that Able does not need to extinguish Centrica's current rights and easements across the AMEP site, it is requested that these are safeguarded against alteration and extinguishment by specific Protective Provisions for Centrica at Schedule 9 of the DCO (see below for more detail).

In addition, the proposed layout of the AMEP incorporates a number of crossings of the underground pipes and services belonging to Centrica and E.ON. It is vital that that any crossings should be kept to an absolute minimum to allow access to the pipes and services, as well as avoiding damage to their integrity.

Where crossings are unavoidable Able must be required to ensure the integrity of the pipes and services is maintained, as well as access for inspection, maintenance, service and renewal purposes, to avoid significant and unacceptable impacts on the power station resulting. The DCO as currently drafted does not require the safeguarding of Centrica underground pipes. Accordingly, it is requested that these are safeguarded by specific Protective Provisions for Centrica at Schedule 9 of the DCO (see below for more detail).



## ■ Highways / Traffic and Killingholme Power Station Access Road

Notwithstanding Able's comments on Centrica's Relevant Representations in June 2012 in respect of highways / access, Centrica remains concerned as to the likely impacts of the proposed AMEP development on the surrounding highway network. More specifically, Centrica requires unrestricted vehicular access to their assets in the North Killingholme at all times in case of emergency or the need for urgent repair / maintenance work, and the AMEP should not impact on this.

In light of this, it is requested that should the DCO be granted, Centrica is consulted as part of the approval of the proposed Requirements set out at Schedule 11 in relation to the Design of Roads, Construction Traffic and the Travel Plan (see below for more detail).

In addition, as part of Able's comments on the Relevant Representations in June 2012, it was confirmed that "The application does not include any use of Centrica's private access road".

In light of this and Centrica's concerns set out above, it is requested that this is confirmed in specific Protective Provision for Centrica at Schedule 9 of the DCO (see below for more detail).

## ■ Flooding

Despite Able's comments on Centrica's Relevant Representations in June 2012 in respect of flooding, the Environment Agency's concerns raised at the Hearing regarding flood risk associated with the proposed AMEP development are noted.

Centrica remain concerned that the proposed development will increase the risk of flooding of Centrica's pumping station, both from flood waters in the event of a breach or overtopping of defences and from surface water run off. Any flooding of the pumping station would have a detrimental impact on Centrica's power station operations.

Accordingly, it is requested that the DCO is only granted where satisfactory flood defences and surface water drainage are provided. This is vital to ensure the risk of flooding of the pumping station is not increased as a result of the proposed AMEP development.

In light of this, it is requested that should the DCO be granted, Centrica is consulted as part of the approval of the proposed Requirements set out at Schedule 11 in relation to Surface Water Drainage, the Flood Warning and Evacuation Plan and Flood and Sea Defences (see below for more detail).

## **Proposed Amendments to the DCO**

The proposed amendments to the draft DCO have been discussed above and relate to the addition of specific Protective Provisions for Centrica at Schedule 9 and amendments to the proposed Requirements set out at Schedule 11. These are set out in more detail below.

## **Protective Provisions**

It is requested that the following is added to Schedule 9.

### FOR THE PROTECTION OF CENTRICA PLC

1. For the protection of Centrica plc the following provisions shall, unless otherwise agreed in writing between the undertaker and Centrica plc, have effect.



2. The development shall not be commenced until a separate legal agreement has been entered into between the undertaker and Centrica plc to:
  - (i) Deliver remedial works, as well as a scheme for regular long term monitoring and further remedial works to address future impacts, to ensure the current operation of Centrica's power station's inlet and outfall in the River Humber is secured, including maintaining existing water quality, temperature and silt levels, with all costs to be met by the undertaker. Or, if remedial works are not possible, relocate Centrica's inlet and / or outfall to a more suitable location, with the undertaker covering all costs associated with relocation of infrastructure, modifications to licenses and / or permits, compliance with regulatory requirements, and compensation for loss of revenue as a result of relocation.
  - (ii) Deliver remedial works, as well as a scheme for regular long term monitoring and further remedial work to address future impacts, to protect the Condensate Pipeline buried in the river bed, including preventing exposure of the pipeline or any spanning of the pipeline.
  - (iii) Secure and prevent alteration (without Centrica's prior approval) or extinguishment of Centrica's existing rights and easements across the site.
  - (iv) Prevent the build over of Centrica's cooling pipes, alter the ground level above them, or otherwise interfere with rights granted
3. The development shall not use the existing access road between Chase Hill Road Centrica's Killingholme power station

Further amendments may be required to the DCO to facilitate the mitigation works required as part of the protective provision requested above, particularly in relation to the inlet and outfall and the condensate pipeline. For example these may need to be specified in the description of authorised development at Schedule 1 e.g. "mitigation works in relation to the Centrica inlet and outfall", plus amendments to the Deemed Marine Licence at Schedule 8. It is therefore requested that these are incorporated within the revised draft DCO.

## Requirements

It is requested that the following amendments are made to Schedule 11 (see bold typeface).

**"neighbouring landowners" means the owners of the land surrounding the development including, for the avoidance of doubt Centrica plc"**

### *Highway access*

8.—(1) No stage of the authorised development shall commence until for that stage, written details of the siting, design and layout of any new permanent or temporary means of access to a public highway to be used by vehicular traffic, or any alteration to an existing means of access to a public highway used by vehicular traffic, has, after consultation with the relevant highway authority **and neighbouring landowners**, been submitted to and approved by the relevant planning authority.

(2) The public highway accesses must be constructed, or, as the case may be, altered, in accordance with the approved details.

(3) No stage of the authorised development shall commence until for that stage, a written scheme (the "Access Management Scheme") has, after consultation with the relevant highway authority **and neighbouring landowners**, been submitted to and approved by the relevant planning authority.



(4) The Access Management Scheme must be carried out in accordance with the approved details.

#### *Surface water drainage*

11.—(1) No stage of the authorised development shall commence until, for that stage, written details of the surface and foul water drainage system (including means of pollution control and funding arrangements) have, after consultation with the sewerage and drainage authority **and neighbouring landowners**, been submitted to and approved by the relevant planning authority.

(2) The surface and foul water drainage system must be constructed in accordance with the approved details.

#### *Design of roads*

16.—(1) No stage of the authorised development consisting of the construction or alteration of a street which is a trunk road, including any traffic management and control measures, shall commence until written details of the design of the street have been submitted to and approved by the Highways Agency, after consultation with the **neighbouring landowners**.

(2) The authorised development construction or alteration of the street or the taking of traffic management and control measures shall be carried out in accordance with the approved design.

#### *Construction traffic*

18.—(1) No stage of the authorised development shall commence until written details of the preferred route for that stage to be used by construction traffic on public highways, after consultation with the highway authority **and neighbouring landowners**, is submitted to and approved by the relevant planning authority.

(2) Notices shall be erected and maintained throughout the period of construction at every construction site exit to a public highway, indicating to drivers the route agreed by the relevant planning authority for traffic entering and leaving the site.

#### *Travel plan*

21.—(1) No stage of the of the authorised development shall commence until, for that stage, after consultation with the highway authority **and neighbouring landowners**, a travel plan, which must include details of the expected means of travel to and from the authorised development and any parking to be provided, has been submitted to and approved by the relevant planning authority.

(2) No part of the authorised development shall be brought into use until, after consultation with the highway authority **and neighbouring landowners**, a travel plan, which must include details of the expected means of travel to and from the authorised development and any parking to be provided, has been submitted to and approved by the relevant planning authority.

(3) The plan approved under paragraph (1) must be implemented during the construction of the authorised development and the plan approved under paragraph (2) must be implemented within one month of the authorised development being brought into use and shall continue to be implemented for as long as the authorised development is used.

#### *Flood warning and evacuation plan*

26. No building of the authorised development shall be occupied until, after consultation with the relevant planning authority **and neighbouring landowners**, written details of a flood warning and evacuation plan, which must include details of expected means of evacuation or safe refuge during a tidal flood event, has been submitted to and approved by the relevant planning authority.



## *Flood and sea defences*

**29.** No stage of the authorised development shall commence until a written scheme applicable to that stage, to deal with the design and construction of tidal defences, has been submitted to and approved by the relevant planning authority after consultation with the Environment Agency **and neighbouring landowners**.

## **Conclusion**

Centrica has operated from the North Killingholme since approximately 2004 and has major concerns regarding the likely impact of the proposed development on the continuation of these operations, based on the DCO as currently drafted. These concerns are set out in detail in Centrica's previous Written Representations and summarised above, and relate to the likely impacts of the proposed development on their power station and gas storage operations, particularly in relation to the cooling water inlet and outfall, existing rights and easements, highways, access, flooding and future expansion.

Accordingly, amendments to the draft DCO are requested relating to the addition of specific Protective Provisions for Centrica at Schedule 9 and amendments to the proposed Requirements set out at Schedule 11 (see above). It is requested that Able and the Examining Panel incorporate these amendments and the necessary mitigation measures in the DCO, as without these it is likely that the proposed development would severely impact on Centrica's assets and operations in the area. Should the requested amendments and mitigation measures not be agreed, it is requested that the Examining Panel considers not granting the DCO.

If the DCO is granted and results in a detrimental impact on Centrica's assets and operations in the area, Centrica would seek compensation from Able UK for any resulting loss of business. In respect of the power station not being able to operate as a result of the proposed development, Centrica would seek in the region of £100,000 to £200,000 per day that the power station remains un-operational. If damage occurs to the Condensate Pipeline, or the pipeline is put out of action, the implications could be that CSL would be required to move condensate by road tankers. This would reduce the value of the Condensate, and CSL's losses as a result could be as much as £1 million per month. If the worst case scenario occurs and Condensate production at York and Rough is required to cease, Centrica's losses could be as much as £3 million per day. In addition, if CSL is prevented from moving equipment from the Station Road site it would prevent CSL from undertaking offshore repairs and could amount to losses as much as £500,000 per day.

In addition to the above, Centrica also requests that the Examining Panel takes into consideration the potential highways and flood risk impacts of the proposed development, as well as potential restrictions that the development may pose on Centrica's ability to expand its operations in the area in the future. It is therefore requested that the Examining Panel considers not granting a DCO unless these issues can satisfactorily be overcome and Centrica is involved in approval of the relevant Requirements should the DCO be granted.

*Cont.....*



## **BNP PARIBAS REAL ESTATE**

Finally, we trust the above is clear and satisfactory; however, if you have any queries or would like to discuss the above please do not hesitate to contact either Paul Forshaw or Alex Willis at the above office.

Yours faithfully

*BNP Paribas Real Estate*

**BNP Paribas Real Estate**

Enclosures

Copy to: Mr R Cram and Mr I Whitfield, Able

This message and any attachments (the "message") is intended solely for the intended addressees and is confidential. If you receive this message in error, or are not the intended recipient(s), please delete it and any copies from your systems and immediately notify the sender. Any unauthorized view, use that does not comply with its purpose, dissemination or disclosure, either whole or partial, is prohibited. Since the internet cannot guarantee the integrity of this message which may not be reliable, BNP PARIBAS (and its subsidiaries) shall not be liable for the message if modified, changed or falsified. Do not print this message unless it is necessary, consider the environment.

-----  
-----

Ce message et toutes les pièces jointes (ci-après le "message") sont établis à l'intention exclusive de ses destinataires et sont confidentiels. Si vous recevez ce message par erreur ou s'il ne vous est pas destiné, merci de le détruire ainsi que toute copie de votre système et d'en avvertir immédiatement l'expéditeur. Toute lecture non autorisée, toute utilisation de ce message qui n'est pas conforme à sa destination, toute diffusion ou toute publication, totale ou partielle, est interdite. L'Internet ne permettant pas d'assurer l'intégrité de ce message électronique susceptible d'altération, BNP Paribas (et ses filiales) décline(nt) toute responsabilité au titre de ce message dans l'hypothèse où il aurait été modifié, déformé ou falsifié. N'imprimez ce message que si nécessaire, pensez à l'environnement.