Summary of my papers REP2-393, REP5-253 and REP7-xxx.

The Sizewell Dunwich banks

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I have prepared three main papers as a response to the DCO on the geomorphology and the Applicants Flood Risk and shoreline change assessments. These are REP2-393 REP5-253 and REP7-xxx.

What follows is a summary of part of those papers that uses contracted document references. Full references and attribution of all quotations are in the documents noted above.

The Notes section in my main document REP2-393 applies to all my written work.

SDBC is a natural offshore breakwater approximately 1.5km offshore and 8km in length that reduces the inshore wave climate at Sizewell thereby providing flood and erosion protection.
How does the Applicant address these offshore banks?

1. Consider the *applicant's own research* pre-DCO.

1.1 EDF: Sizewell C Scoping Report, April 2014, Page, 150. "The Sizewell Dunwich bank forms an integral component of the shore defence and provides stability for the Sizewell coastal system".

1.2 EDF BEEMS TR139, Page 5 "…*The size, depth and position of this 'saddle' [of the Dunwich bank] is therefore* ***of critical importance*** *with regard to the risk of erosion and flooding between the proposed Sizewell 'C' site and Minsmere Sluice."*

1.3 What does the Dunwich bank consist of?

EDF: DCO Coastal Geomorphology Appendix 20A –Page 135. *"…the Dunwich Bank has no inherited stabilising hard geology (i.e., no headland no underpinning crag).*

1.4 What would happen if the banks were compromised or lost? We are still pre-DCO.

EDF: BEEMS TR500 Page 11. "*With continued lowering and reduction in the northern extent of Dunwich Bank, the section of shoreline subject to the impacts of storm waves from the northeast sector would be expected to migrate south accordingly."* i.e., towards Sizewell C.

EDF: BEEMS TR058, Page 45. *"Rapid changes in bank form are thought to be linked to downstream bank-to bank interactions in a sand bank complex …and could result in large scale reconfiguration of the bank"*

1.5 What is the current state of the Dunwich bank?

EDF DCO: Coastal Geomorphology Appendix 20A, Page 21. *"Records over the last decade show…Dunwich Bank exhibited greater variability in both its morphology and position with:*

- *erosion north of 267000N, (that is the Northern half) resulting in bank lowering of -0.5 – -1.5 m,*
- *a decrease in its northern extent of approximately 250 m,*

EDF: BEEMS TR500, Page 32. *"Dunwich Bank exhibited large-scale erosion across its northern third."*
DCO: Marine Management Org. Responses ExQ PINs. The Marine Management Association has stated that the Dunwich bank has dropped 2m in the last 10 years.

1.6 The Dunwich bank is depleting; are there 'mitigative measures' to restore the volume and size of the offshore geomorphology?

Section 7.5.1 to 7.5.3 of the '*Coastal Processes Monitoring and Mitigation Plan'* (CPMMP): The Applicant's CPMMP Coastal Processes Mitigation plan is seemingly limited to moving pebbles along the Sizewell foreshore and adding pebbles to the Sizewell foreshore. It has no manner or means to address the offshore banks themselves, the control of which is outside human agency.

2. We now move to the DCO application where we might reasonably expect much examination and regard for the Sizewell-Dunwich banks.

In the DCO flood risk assessment (FRA) I was struck by a conspicuous incuriosity towards the Sizewell-Dunwich banks. In the twenty-two DCO main Flood Risk Assessment and fourteen FRA Addendum documents the 'critically important' Sizewell-Dunwich banks do not appear to explicitly named by EDF.

2.1 I then noticed an unsupportable premise in the DCO Geomorphology documents where the banks are mentioned:

Unsupportable premise 1: The offshore banks will be maintained by sediment delivery from Northern cliff erosion:

> EDF: DCO: Coastal Geomorphology Appendix 20A, Page 135. *"Reductions in Dunwich Bank are not considered to be a worst-case scenario for Sizewell C as they would eventually lead to cliff erosion and increased sediment supply, minimising the chance or degree of exposure of the HCDF (or the amount of mitigation required to prevent this)."*
>
> EDF further explains how climate change sea level rise will *benefit* the Sizewell shoreline and Dunwich bank:
>
> EDF: DCO: Geomorphology Appendix 20A, Page 52 The Easton-Benacre cliffs are "*likely to remain unprotected*" and therefore *"cliff exposure will rise with rising sea levels. The likely consequence is a rise in, or maintenance of, sediment supply [to Sizewell and] will slow rates of shoreline retreat and potentially increase accretion rates… it could counter shoreline retreat."*

Why is this unsupportable? - sediment supply cannot be relied upon to specifically relocate. Something confirmed again by EDF's own research:

- BEEMS TR223 Table 12 *"The last 2 to 3 decades of strong erosion at Dunwich were not matched by ongoing accretion in the south"*

2.2 We now move back to the Flood Risk Assessment in the DCO.
Although the banks are not named in the DCO FRA they can be obliquely referred to as 'sandbar'

Unsupportable premise 2:

EDF: DCO Main Flood Risk Assessment, Section 5.3.17. Note here that the word 'sandbar' refers to the Sizewell-Dunwich bank (unlike its use in the immediately preceding paragraph). *"…The derived nearshore wave conditions for the baseline (with sand bar) and lowered sand bar scenarios were compared showing that the baseline scenario predicted higher nearshore waves than the lowered bar scenario. Therefore, the baseline scenario was taken forward for wave overtopping assessment for the Sizewell C FRA, as it is more* ***conservative.****"*

The Applicant and its advisor Haskoning, supported by wave data and recommendation from Cefas, *with no concerns raised by the Environment Agency that I am aware of*, are therefore affirming what I consider to be the most 'perplexing' aspect of the FRA—that the *'baseline scenario*' (i.e., with the Sizewell-Dunwich banks in situ) *"predicted higher nearshore waves" and is consequentially more conservative and precautionary. i.e., the presence of the Sizewell-Dunwich banks results in 'conservative' precautionary modelling.*

Why is this unsupportable?

1. It is like saying that the wave climate inside Dover harbour is greater than the wave climate outside.

2. The Applicant in a later modelling exercise, TR545 (REP5-149), which is a limited exercise to study the 'cut and fill' response of the soft coastal defence feature, *makes the obverse case strongly that absence of the Sizewell Dunwich banks in the modelling results in precautionary 'conservative' modelling.*

   Each of the two directly opposing geomorphological scenarios are being suggested by the Applicant as the premise for justifying conservative (precautionary) modelling.

   These two modelling scenarios, one from the recent modelling in TR545 and the other from the FRA, appear to me therefore, to be mutually incompatible in their claims.

This unsupportable premise (2) that the inshore wave climate is more conservative (precautionary) with the Sizewell-Dunwich banks in situ *underpins the FRA and the shoreline change assessment* modelling. In my view this represents an inadmissible approach. This subject is covered in my main document REP2-393 Section 7.

2.3 The same paragraph indicates that Applicant is treating the Sizewell Dunwich banks and nearshore alongshore bars as immutable wave relief features for wave modelling.

Unsupportable premise 3:

The Sizewell Dunwich banks, and the inner and outer longshore bars can not be regarded as unchanging (immutable) geomorphological features.

Historical precedent is clear and unequivocal, there are major mobile sections of the Sizewell-Dunwich banks, the Dunwich bank has no stabilising hard geology at all and EDF makes clear that the inner and outer longshore bars will change such as in: TR545: "*…in reality storm conditions will alter the inner and outer longshore bars along the Sizewell frontage over time"*

This unsupportable premise (3) of offshore geomorphological stasis *underpins the FRA and the shoreline change assessments.* In my view again, this represents an inadmissible approach. This subject is covered in my main document REP2-393.

3. During the DCO question/response process.

The Dunwich bank is simply *no longer important* according to the Applicant, the following is EDF's response to the MMO, 'First Written Questions' during the DCO:

In (ExQ1) Volume 1 - SZC Co., Page 40 the Applicant states
"…the more mobile section of the bank does not significantly affect inshore wave climate. Thus, despite recent lowering and reduction in the extent of Dunwich Bank, historical erosion of Dunwich Cliffs is not recurring"

The Applicant has confirmed previously, however, that all parts of the Dunwich bank are potentially mobile – it has no 'hard geology'. Also, Dunwich bank does not control, and has never controlled, erosion of Dunwich cliffs from N NE storms – they are too far to the North.

The Applicant has responded so far to my detailed concerns of the incompleteness, in my view, of its existing Flood Risk and Shoreline Change Assessments including the EGA, with one paragraph, as follows:

"The CPMMP (Doc Ref. 6.14(A)) addresses impacts from Sizewell C to the environment, and not the reverse, hence it is tailored to the scale of outward impacts, not the external forcing. ***It is an adaptive plan*** *and will remain a live document throughout the operational and decommissioning period, allowing for the recognition of possible expansion or contraction of effects due to the localised impacts over time."* Page 31, ExQ1 referenced above.

The Applicant's reply and approach is then to essentially subjugate offshore geomorphological concerns of erosion and flood risk to its 'adaptive' CPMMP 'pebbles on the beach' approach.

We have therefore seen overall a shift in regard by the Applicant for the Sizewell Dunwich banks from 1) critical importance to shoreline protection pre-DCO to 2) conspicuous incuriosity in the DCO to 3) manifest dismissal in post-DCO questions and reliance on the 'adaptive' CPMMP proposals.

4. My opinion and conclusion.

The Institute of Oceanographic Sciences Topic Report 6, Carr, King, Page 15 reports that there is: *"…a concentration of wave energy in the Sizewell area, [they mean offshore of the Sizewell-Dunwich banks] especially for wave headings between 230 and 300 degrees."*

This is supported by historical precedent — there was a period of acute erosion that occurred 1736-1836. *Note that this occurred at Sizewell itself before the development of the SDBC Northwards (what we now call the Dunwich bank.* (Accredited source: Pye and Blott).

The Applicant's CPMMP, page 56, which defines its 'mitigative measures' against coastal change (summarised by moving and adding pebbles to the beach), states that it is relying on the fact that erosion is localised, short lived, and not more than 2.2m per year however the 1736-1836 erosion stretched most of the way from Sizewell to Minsmere sluice and eroded at least 350m in a century.

This acute erosion period is not studied or acknowledged by the Applicant in the DCO and ties in with the above wave energy concerns. See REP2-393 section 2.

In my view also, these localised and increased wave energy coefficients are consistent with the present-day extreme erosion experienced at Thorpeness point.

It is important to note that there are no 'mitigative measures' for the Sizewell Dunwich banks or even the nearshore longshore bars themselves – they are outside the control of human agency.

As can be seen from the Applicant's reply to my detailed studies (section 3 above) it appears to be subjugating offshore geomorphological concerns of erosion and flood risk to its shoreline pebble distribution and pebble recharge shoreline approach as defined in its CPMMP.

If the Dunwich bank is lost, there is a reasonably case that the shoreline may then return to a period of acute erosion that has historical precedent. That acute erosion in my view, will start with a depletion of the alongshore bars and erode the shoreline from Sizewell C towards the Minsmere sluice and may overcome the mitigative measures of the Applicant. This scenario would result in the flooding of the Minsmere levels and Sizewell marsh with consequential flood risk to the landward side of the main nuclear platform.

In my view these scenarios are not considered in the DCO Flood Risk assessment and shoreline change assessment as the Applicant's DCO studies are founded on the assumption of low erosional stress—itself a direct result of the unsupportable premise of regarding the offshore geomorphology (the Sizewell-Dunwich banks and the nearshore, alongshore bars) as an overall immutable wave relief feature.

Addendum 1

From: Nick Scarr [redacted]

Sent: 22 August 2021 11:41

To: SizewellC <sizewellc@planninginspectorate.gov.uk>

Subject: CPMMP Coastal Processes Monitoring and Mitigation Plan - Interested Party number 20025524

Dear Sizewell C Team

Interested Party number 20025524

The Applicant has stated in its CPMMP document 6.14 Revision: 2.0 PINS Reference Number: REP5-059 Coastal Processes Monitoring and Mitigation Plan that they are using monitoring techniques that are 'targeted to the coastal geomorphology'.

I suggest that the results so far from these techniques would be extremely useful such that we can examine the bathymetric changes or 'fluctuations' that have occurred in the last decade or more to the Sizewell Dunwich banks.

Although there are reasonably detailed bathymetric data of the nearshore, longshore bars in the DCO—see document, "APP-312 Coastal Geomorphology and hydrodynamics, Appendix 20A, Paragraph 7.2.1 Page 45/46", I have not been able to locate any detailed bathymetry of the Sizewell-Dunwich banks in the DCO.

I would be most grateful if the ExA could ask this of the Applicant.

Kind regards Nick Scarr

Mon, 23 Aug, 10:48 (1 day ago)

to me, SizewellC

Dear Mr Scarr

Thank you for your email. We will publish this as a submission for Deadline 7 so that the Applicant has an opportunity to respond.

Kind regards

Siân Evans

Case Manager

National Infrastructure Planning

The Planning Inspectorate

[redacted] / Helpline: 0303 444 5000

[redacted]

Addendum 2

Nick Scarr [redacted]

to: SizewellCNNB@environment-agency.gov.uk,

"Barlow, Simon" [redacted]

cc: SizewellC <sizewellc@planninginspectorate.gov.uk>

date: 24 Aug 2021, 08:52

subject: Fwd: The Environment Agency Deadline 5 (DL5) comments on TR544 and TR545 [REP5-149]

Dear Environment Agency,

cc The Planning Inspectorate (Ref: Nick Scarr Interested party: 20025524)

Re: Your ref: 20026727 - 23rd July - Your document Planning reference: REP5-149.

In my view, the Applicant is regarding two directly opposing and mutually incompatible geomorphological scenarios to claim conservative, precautionary modelling:
1) The Applicant's DCO premise that the *presence* of the Sizewell-Dunwich banks results in conservative, precautionary modelling and
2) The Applicant's TR5454 premise that the *absence* of the Sizewell-Dunwich banks results in conservative, precautionary modelling.
In my view also, this compromises the validity of major aspects of the flood risk and shoreline change assessments in the DCO.

I noticed your following comments in your deadline 5 REP5-149 document that you also have raised concerns about the Applicant's claim to conservative (precautionary) modelling as presented in the DCO:

Reference	Comment	Suggestion / recommendation
2.2.1, p.19	*'However, to ensure the model domain was of a size that could be feasibly managed in XBeach, the offshore boundary was actually placed landward of the Sizewell-Dunwich sandbank, at the equivalent water depth. Some frictional dissipation and even breaking of the largest waves would occur over the sandbank (-5.8 m ODN crest elevation), but is not accounted for in this study as the sandbank is not present in the model domain. Therefore, the beach response predicted by the model is considered to be conservative (i.e. more erosive than in reality), as the cumulative wave energy reaching the shore is likely to be larger than in reality under storm wave conditions.'* The model effectively discounts the influence of the Sizewell – Dunwich bank entirely. This addresses concerns relating to the possibility for future evolution (namely reduction in height) of the bank.	This is a welcome clarification on the previously asserted conservatism of the modelling work, which we had initially questioned.

I would be most grateful if you could clarify the extent and detail of these concerns.

Kind regards
Nick Scarr, Interested party ref:20025524.