



**National  
Trust**

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24<sup>th</sup> June 2021

By email: [sizewellc@planninginspectorate.gov.uk](mailto:sizewellc@planninginspectorate.gov.uk)

Your Ref: EN010012

Our Ref: 20026265

Dear Sir/Madam

**Application by NNB Generation Company (SZC) Limited for an Order Granting  
Development Consent for The Sizewell C Project**

**Procedural Deadline 3 Submission**

Please find attached our Deadline 3 Submission in respect of the application for a  
Development Consent Order for the proposed Sizewell C Nuclear Power Station.

Yours faithfully

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## **1. Scope of this response**

- 1.1. The National Trust has compiled this Procedural Deadline 3 Submission to set out its views on the following matters and recently submitted documents;
- Attendance at Issue Specific Hearings
  - The Monitoring and Mitigation Plan for Minsmere - Walberswick European site and Sandlings (North) European site which covers our property at Dunwich Heath and Beach.
  - The Shadow HRA Second Addendum
  - The Suffolk Coast & Heaths AONB Partnership Written Representation
  - The Sizewell C Coastal Defences Design Report and the One dimensional modelling of the soft coastal defence
  - Draft DCO & Draft 111 Deed of Obligation
  - Initial Statement of Common Ground with NT

## **2. Issue Specific Hearings**

- 2.1. The Trust would like to register to participate in the following Issue Specific Hearings;
- Issue Specific Hearing 5 (Landscape and Visual Impact and Design) Tuesday 13 July 2021
  - Issue Specific Hearing 6 (Coastal Geomorphology) Wednesday 14 July 2021
  - Issue Specific Hearing 7 (Biodiversity and Ecology) Thursday 15, Friday 16 July 2021

## **3. The Monitoring and Mitigation Plan for Minsmere - Walberswick European site and Sandlings (North) European site which covers our property at Dunwich Heath and Beach.**

- 3.1. The National Trust notes the submission of the [Monitoring and Mitigation Plan](#) for Minsmere - Walberswick European site and Sandlings (North) European site. This is the plan referred to in 7.72 of our written representation. We note that the document is titled on its front page as the Minsmere Monitoring and Mitigation Plan but footnoted as the Monitoring and Mitigation Plan for Minsmere - Walberswick European site and Sandlings (North) European site. Whilst the National Trust considers the draft plan is a step in the right direction with many positive elements, we have a number of concerns relating to its content which we have detailed below.
- 3.2. There seems to be some variation in the naming and referencing of this document as we note that Schedule 11 (Natural Environment) of the Draft Deed of Obligation (1 June 2021) defines the plan as the “Minsmere and Sandlings (north) Recreational Monitoring Plan” and its associated funds as the “Minsmere and Sandlings (north) Mitigation Measures” and “Minsmere and Sandlings (north) Contingency Fund. For clarity and ease of reference it is important that the naming of such documents is consistent between those which are sent to stakeholders for comment and those which are submitted to the Examining Authority.
- 3.3. The National Trust notes the scope of the plan (as set out in para 1.1.1 pdf page 4) is to ensure that adverse effect on the integrity of the referenced European sites does not arise as a consequence of recreational disturbance. Whilst we agree with this purpose it remains

unclear what the plans response to impacts on non-European designated and protected features would be. As set out below we welcome the inclusion of certain species/habitats as sensitive features in the plan but are concerned that the plan needs to acknowledge the protection of these sensitive features as a primary purpose of the plan.

- 3.4. We note reference in para 1.1.3 to EDF's view that the Shadow HRA Report (Doc Ref. 5.10 [APP-145 to APP149]) has identified that, with suitable monitoring and mitigation measures in place, adverse effect on the integrity of European sites due to this effect pathway can be excluded for all European sites. As stated within our written representation the National Trust does not agree with the conclusions of the Shadow HRA.
- 3.5. We note the reference in para 1.1.4, (pdf pages 4 & 5) regarding measures (including Aldhurst Farm) that have already been proposed through the DCO process to mitigate potential recreational displacement to European sites. As set out in our Written Representation para 8.3 numbered page 21 we remain concerned regarding the adequacy of this provision.
- 3.6. The National Trust believes this draft provides greater detail of the survey and mitigation proposals than previous drafts. We welcome the recognition in para 1.1.5 (pdf page 5) of the potential for additional users to our site as well as the need to provide initial mitigation measures and additional mitigation measure triggered by monitoring.
- 3.7. The National Trust welcomes the recognition in para 2.1.4 (pdf page 6) of Stone curlew and Dartford Warbler (plus other heathland bird species) as sensitive features.
- 3.8. The National Trust notes the proposal set out regarding the Governance of the plan and the provisions for financial contributions to be made for Initial Mitigation Measures and Monitoring and Additional Mitigation Measures (see 3.1.1 pdf page 8 Link to document). We acknowledge that discussions about the scope of these funds is ongoing between us, the applicant and other stakeholders and that further detail will follow in subsequent versions of the Draft Deed of Obligation which will be submitted by the applicant.
- 3.9. The Trust welcomes the mention in para 3.2.2 (pdf page 9) that where the Ecology Working Group identifies that Additional Mitigation Measures are required in accordance with the plan, the Group shall agree, in consultation with land managers, including the National Trust (amongst others) how and when Additional Mitigation Measures shall be implemented. Whilst we welcome this approach we feel the governance arrangements set out in the plan need further clarification as they involve the agreement of trigger levels that are associated with features under our management and the potential need for monitoring and works to be undertaken on land under our control. It is not clear in the current proposals how this arrangement would work in practice.
- 3.10. Of particular concern is the speed at which delivery under the current governance arrangements can be affected. For example, if triggers levels were reached on a feature on our site it is unlikely that our management controls would comfortably allow impacts to continue whilst awaiting a decision by a third-party group to mobilise third party resources. It is more likely that management interventions on site would be affected thereby masking the real impacts that were arising as a consequence of the development.

- 3.11. The National Trust notes that para 4.1.1, (pdf page 11) of the Monitoring and Mitigation Plan proposes a monitoring programme that would determine the scale and nature of the recreational use of the SAC/SPA prior to construction and then any net change that occurs during the construction and operational phases. This suggests that there are gaps within the baseline established and used to support the Shadow HRA, which supports our concerns raised previously regarding the robustness of the initial assessment as set out in our written representation.
- 3.12. We note the key principle underpinning the monitoring approach as set out in para 4.1.2 (pdf page 11) is to identify and measure potential changes in recreational use and behaviour arising from the Sizewell C Project as soon as possible so that action can be taken (via additional mitigation) before negative effects on qualifying interest features of European sites arise. As articulated previously we have concerns regarding how the sensitive features acknowledged within this plan fit into the scope, prioritisation and triggers associated with this plan. We also have concerns that whilst this is acknowledged key principle of the plan it remains unclear how achievable this aim is given there is little mention in the plan of the practicalities involved in realising such an outcome.
- 3.13. Para 4.1.3. (pdf page 11) states ecological monitoring is proposed in parallel with monitoring of recreational use and behaviour in order that the ecological conditions at the time of implementation (commencement of construction) can be established and the effect of any changes in recreational user numbers and/or behaviour can be detected. Whilst this is welcomed it is unclear how this will treat features that are currently in unfavourable condition where monitoring may show no change in condition, but the reality is that additional disturbance could be preventing recovery of the feature. The National Trust would like this issue to be clarified.
- 3.14. The National Trust notes that in para 4.2.9 (pdf page 14) and Tables 4.2 and 4.3 (pdf pages 15 to 18) that there is no specific mention of Dunwich Heath despite its importance and it is unclear if our site would be covered by some or all of the provisions. This is extremely disappointing given our engagement to date in previous drafts of this plan (that were originally scoped around Dunwich Heath specifically) and should be rectified in the next draft of the plan. The ecological importance of Dunwich Heath is set out in our Written Representation.
- 3.15. We are concerned by the statement in para 4.3.3 that trigger levels would need to be able to identify whether the net increase or changes in behaviour and pattern of use relates solely to the Sizewell C Project. It is unclear as how this level or certainty would be arrived at and no detail is provided as to the realism or otherwise of this requirement. Given the interpretation and practicability of such a statement is central to the ability of the plan to deliver any of its proposed additional mitigation measures this feels an important issue to resolve through the DCO process rather than leave to be determined at the requirement stage.
- 3.16. The Trust welcomes the mention in para 4.3.4 that whilst trigger levels will be defined by the Environment Review Group, they will be agreed in consultation with the relevant land managers, including National Trust.

- 3.17. The Trust acknowledges the statement in para 5.1.3 (pdf page 23) that the mitigation measures identified in Tables 5.1 and 5.2 are still to be developed in detail. We also welcome the statement in para 5.1.4 that mitigation measures required directly as a result of Sizewell C impacts will be additional to those currently used and maintained by the landowners and managers, or that arise from causes other than Sizewell C. However, it is not clear how will these impact will separated out and we remain concerned that the in combination effects on features will be overlooked.
- 3.18. The Trust welcomes the alignment of mitigation and monitoring proposals with the Suffolk Coast Recreational Disturbance Avoidance and Mitigation Strategy (RAMS) as set out in para 5.1.8 (pdf page 24). We also welcome the alignment of mitigation and monitoring proposals with National Trust, RSPB, Natural England access management measures as set out in para 5.1.9.
- 3.19. The Trust notes the mention of open access provision for off-lead dog walking at Aldhurst Farm as set out in 5.2.1 (pdf page 25). As stated in our written representation whilst we acknowledge this provision (including the enhancement of Kenton Hills) we have not seen any evidence of the assessment of the capacity and adequacy of these sites. The National Trust believes that recreational displacement arising from the development should not all be directed to designated sites and as such would wish to see adequate Suitable Alternative Natural Green Space (SANG) provision included as mitigation.
- 3.20. We welcome the proposed enhancement of local Public Right of Way network as set out in 5.2.1 to allow focussed recreational usage away from sensitive areas of sites.
- 3.21. The National Trust welcomes the headline detail provided on the Initial Mitigation Measures (Table 5.1, pdf pages 26-29) and the Additional Mitigation Measures (Table 5.2, pdf pages 29-30). The Trust notes the inclusion of Dunwich Heath in a number of measures set out in Table 5.1. We have interpreted 'All sites' to include Dunwich Heath and would welcome clarity from the applicant that this is the case. We believe the measure in Table 5.1 listed as "Signage to educate visitors re importance of vegetated shingle and beach nesting birds and requesting avoidance" should include Dunwich Heath's Beach as a location.
- 3.22. The Wardening provision proposed in the Initial Mitigation Measures table and set out in further detail in section 5.3 of the plan (pdf page 31) is welcomed however it appears to be a pitifully small provision given the significance of the scope of work assigned to it. The alignment to provisions in other funds (such as the Dunwich Heath and Coastguard Cottages Resilience Fund) also remains unclear as does the working relationship these wardens would have to existing site managers such as ourselves.
- 3.23. It is of note that the measures set out in Tables 5.1 and 5.2 are very general in scope. Without trigger levels it is difficult to determine how these measures will benefit specific sensitive species and features namechecked in Section 2 of the report. For example, whilst Dartford Warbler mitigation may be captured by proposed Nightjar and Woodlark measures although this is not clear, proposals for Stone Curlew are not specifically suggested and there are no proposed mitigation measures for beach nesting birds such as Little tern.

- 3.24. We note the provision of maps accompanying the plan, which are welcomed, however the maps simply highlight the coverage of the designated sites and indicate a number of the monitoring locations. They do not provide detail on the areas in which ecologically important features/receptors are located or indicate how the monitoring will be used and interpreted to identify hot spots where impacts have the potential to occur.
- 3.25. Overall, the National Trust is concerned that there is a general lack of recognition in the plan of Dunwich Heath's importance for heathland, vegetated shingle and breeding Nightjar. This follows on from our concerns as set out in our Written Representation that the Shadow HRA (and Environmental Statement) do not recognise any potential impact on Dunwich Heath's habitats or species. We are concerned inaccuracies in the Shadow HRA appear to feed through to the current iteration of the Monitoring and Mitigation proposed.

#### **4. Shadow HRA Second Addendum**

- 4.1. The National Trust notes the submission of the Shadow Habitat Regulations Assessment (HRA) Second Addendum ([link to document](#)) and that this has been prepared to report an update to the calculations of potential change in recreational use of European sites by displaced visitors and construction workers and to assess the implications of this change on the assessment of recreational displacement in the Shadow HRA report.
- 4.2. We note that the Second addendum points to alternative numbers provided in response to [ExA Q1 AR 1.12](#) (pdf page 221) and its accompanying [Appendix 6A](#). (pdf page 543). We note the detail of the calculation set out on pdf page 565 regarding additional visits to Dunwich Heath. We note the use of the 500,000 figure of estimated visits/year in the Sizewell area to support the calculation and that as stated in 6.9 of our Written representation this is a rounding down of the estimated annual levels of use (517,246) set out in EDFs documentation (see para 3.2.27, pdf page 438 of the [Recreational Disturbance Evidence Base](#)). Again, we have not yet seen an explanation as to why this rounded down figure is deemed precautionary.
- 4.3. Whilst we appreciate there are a number of ways to approach the calculation of additional visits to European sites (as set out in our Written Representation) we note even EDF's revised figures provide an uplift of approximately 58% on the previously quoted precautionary numbers for Dunwich Heath (see Table 3.5 at pdf page 439 of the [Recreational Disturbance Evidence Base](#)). We note reference in para 6.2.8 of Appendix 6A - Response to AR.1.12 (pdf page 565) to our quoted figure of 26,000 and EDFs acknowledgement that they do not know the basis of the calculation from which this figure derives. We have set out how we would approach this calculation in our written representation and are happy to apprise EDF of the approach undertaken.
- 4.4. The National Trust notes the reference in para 2.3.6 (pdf page 8) to EDFs view that the alternative numbers do not change the conclusions of the Shadow HRA report with regards to the Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick Ramsar site. We welcome the revisions provided by EDF and appreciate they will not yet had chance to review the comments contained within our Written Representation regarding

figures however we remain concerned that clarity is still required on a number of figures quoted in reports as highlighted within our Written Representation.

## **5. National Trust comments on Suffolk Coast & Heaths AONB Partnership Written Representation**

- 5.1. The National Trust believe the development both in construction and operation will have a significant impact on viewpoints from Dunwich Heath as we have set out in our Written Representation. We note the Suffolk Coast & Heaths AONB Partnerships response ([link to Written Representation](#)) that states on pdf page 2 that the AONB partnership consider the proposals do not conserve or enhance landscape quality and do not contribute to scenic quality, relative wildness, relative tranquillity, natural or cultural heritage features. The National Trust supports this view. The Trust further supports the AONB partnership's statement that impacts of this magnitude on one part of the AONB damage the designated landscape as a whole, rather than simply locally, as EDF suggests (see pdf page 3 of the AONB Written Representation).
- 5.2. The Trust concurs with the AONB that the introduction of such a large new operational site, new pylons, a new access road, and Beach Landing Facility, following a 9-12 year construction phase with a construction site that will cut the AONB in half at its narrowest point, as well as introduce associated developments within the setting of the AONB, all just south of Dunwich Heath, will impact on the statutory purpose of the AONB to conserve and enhance natural beauty. The National Trust agrees that insufficient weight has been given in this application to the AONB designation and that a design simply copied from Hinkley C is not only inappropriate in this nationally designated landscape, but will also negate the mitigation of the carefully designed Sizewell B.

## **6. Additional Coastal documents**

- 6.1. The National Trust welcomes the submission of additional information provided by the applicant, specifically the Sizewell C Coastal Defences Design Report and the one dimensional modelling of the soft coastal defence. We have set out technical comments on these documents as Appendices to this document. (See page 9 of this document for Appendix A: National Trust technical comments on design details and plans for the Hard Coastal Defence Feature, page 15 for Appendix B – National Trust technical comments on the Sizewell C One dimensional modelling of the Soft Coastal Defence Feature (SCDF)).
- 6.2. The Trust have also reviewed a number of the other Written Representations made by other organisations is so far as they relate to coastal processes and geomorphology. We have set out some comments on these as an appendix to this document on page 33 (Appendix C – National Trust Comments on other parties Written Representations).
- 6.3. The Trust does not feel any of the work contained in the recently submitted documents referred to in 6.1 above answer or mitigate any of the concerns we set out previously in our Written Representation. We further note the Environment Agency's view as set out in their Written Representation (p.3) that "The sustainability of the Hard and Soft Coastal Defence

Features (HCDF and SCDF) has not been demonstrated, and insufficient evidence has been provided to allow the impact on geomorphology and coastal processes to be understood." We support this view and believe these issues need to be heard and discussed within the examination process.

## **7. Draft DCO & Draft 111 Deed of Obligation**

- 7.1. The National Trust notes that Requirement 7A of the [draft DCO](#) refers to the Main Development Site Coastal Processes Monitoring and Mitigation Plan (CPMMP). This requirement states that construction of the hard and soft coastal defence must not commence until the CPMMP has been submitted to and approved by East Suffolk Council, following consultation with the relevant Statutory Nature Conservation Body, the Environment Agency and the Marine Management Organisation (MMO). The National Trust strongly believes that the extent of monitoring under the CPMMP should be determined at the examination stage and not left to a requirement. Our reasoning for this is set out in detail in our Written Representation but also in the Appendices to this document.
- 7.2. The National Trust notes that the draft s.106 Agreement has been changed to a draft Deed of Obligation (dated 1<sup>st</sup> June 2021 and submitted at Deadline 2) pursuant to s.111 of the Local Government Act 1972. We note that Schedule 11 (Natural Environment) of the Draft Deed of Obligation ([link to document](#)) (pdf page 60) includes reference to the "Minsmere and Sandlings (north) Recreational Monitoring Plan" and its associated funds - the "Minsmere and Sandlings (north) Mitigation Measures" and "Minsmere and Sandlings (north) Contingency Fund. As stated above in paragraph 3.2 there seems to be some variation in the naming of the monitoring and mitigation plan that covers Dunwich Heath and Beach and the Trust would welcome some consistency when referring to the plan in submission documentation.
- 7.3. We note the inclusion of the National Trust Dunwich Heath and Coastguard Cottages Resilience Fund in Schedule 13 (Third Party Resilience Funds) of the Draft Deed of Obligation (pdf page 71). We note and welcome the footnote that states the scope of the Resilience Fund is subject to ongoing discussion.

## **8. Initial Statement of Common Ground with NT**

- 8.1. As set out in paragraph 3.5 of our Written Representation a number of matters the Trust have raised in this document are the subject of discussions with the applicant and form part of the draft Statement of Common Ground. The National Trust is currently reviewing the second draft submitted by the applicant at Deadline 2 and we have not yet had the opportunity to respond in writing to this. Therefore we can confirm to the examiner(s) that all matters of concern remain not agreed and that we are hopeful of more engagement following the submission of this submission.



## Appendix A: National Trust technical comments on design details and plans for the Hard Coastal Defence Feature (HCDF)

1. The National Trust notes the submission at Deadline 2 of the Sizewell C Coastal Defences Design Report ([link to document](#)).
2. Whilst we welcome the submission of further information on the design of the HCDF we remain concerned (as set out in our written representation) that the examination is progressing without key information. Statements within the HCDF report highlight that certain matters remain under investigation and are the subject to further study. As such we are concerned that the approach adopted by the developer is impacting the ability of the Marine Technical Forum to consider the proposals and would request that sufficient time is provided to regulators and stakeholders who will be affected by the proposed HCDF and SCDF to review the detail of the final design. Our initial comments on the Coastal Defences Design report are set out below;
3. Advancing of the line of development seaward - As set out in our Written Representation we note that the provision of the coastal defence (HCDF and SCDF) advances the line of the development seaward. There seems little attention within the submitted design report to avoiding this advancement despite it being possible to limit the extent seawards by some degree through design.
4. The SCDF proposes to introduce pebbles and large cobbles to the environment and has plans for the on-going nourishment of larger sized material (skewing the sediment size from what presently exists). As such it could be viewed at best as a semi-soft coastal defence. In practice, it will perform similarly to a hard and fixed coastal defence most of the time. The National Trust is concerned that both the HCDF and SCDF will form a permanent promontory on the coast for the duration of the development with the potential to interrupt the coastal processes and alter sediment transport directions.
5. The report introduces (firstly at Point 3.4.4 but also other places e.g. 3.7.15) that the design is only in outline and more detailed work is required to determine the profile; this and the need for other modelling work would seem to suggest the design is in early stages and it would have been anticipated to be more developed by this point in the process. If the toe level needs to be lowered (and retaining the relevant slope angle) then this can only mean further extension of the hard defence seawards; the maximum possible extent to seawards should be clarified for the HCDF (and including the use of cobbles if that is to be the case). It is apparent that the overlapping of the HCDF with the SZB defence lifts it further seawards than would otherwise be the case.
6. When considering the minimisation of the eastwards extent, it is stated by the developer in para 3.9.5 (pdf page 25) that "It is also not considered feasible to relocate the entire SZC platform further west as this would further increase land take from Sizewell Marshes Site of Special Scientific Interest (SSSI) which would not be appropriate." This does recognise that impacts are made there already but it does not present any real evaluation of how the balance between where impacts might be felt and how they might be mitigated is addressed; it may be more feasible to mitigate the landward impacts elsewhere than to mitigate the direct loss of foreshore and upper beach and disturbance to natural processes and alteration of the sedimentary distribution of the coastal system? It is unclear why a sensitivity of such matters is not presented?
7. The National Trust believes there also appears to be little effort to alter the HCDF design to

achieve a more landward position of it, for example, on a cursory look there is around 30m from the crest to the landward toe of the HCDF which might be engaged in this design process; bearing in mind that this is presented as only an outline design it is unclear why landward slopes cannot be considered in detail to utilise all or some of this 30m space: it could be possible to have a vertical face to landwards (at the landward side of the crest) with a green wall facing and not have a slope at all; this might reduce the seawards extent by around 20m. Such considerations do not seem to have been made but should have been in even an outline design process if such environment consideration were within the design parameters.

8. Figure 3-1 shows both the temporary sheetpile sea defence and the permanent HCDF, both are seawards of the shoreline thus forming a hard promontory on the coast. Within the HCDF there is also a shallow bay in the design along this frontage (the SZC frontage declared at around 750m in length) with promontories at each end; it is possible the shallow bay form aims to retain sediment between the created headlands which might be beneficial in reduction of losses of the SCDF sediments but these headlands are likely to be more disruptive to longshore sediment movement and so have a greater impact to the adjacent coastline (both north and south of it) and this is likely to become more pronounced in the long term (which is now extended to 2140) as a result of the fixed nature of the HCDF whilst the surrounding coastline is soft in nature.
9. Table 3-4 summarises the changes made from the previous submission and shows a higher crest level (it is unclear the visual implications of this have been presented by the developer). It also shows a lower toe level (so the structure is further seawards than previously, apparently by around 8-10m).
10. Specific design detail – the Trust has reviewed the report and offers the following comments;
11. Figure 2-3 shows an indicative beach profile, this will not be the reality (which will vary from this) so how will the toe stability be guaranteed?
12. It is noted that the design life is for 120 years, to 2140. Previous assessments seem to cover a 97-year period for their impacts; the full lifespan of the development including its operation and decommissioning (whole life) would be applied to all assessments.
13. It is noted that the HCDF (2.1.1) is identified as “earthquake-resistant (seismic design)” it is unclear if this addressed only vibration or potential impacts on tidal waters as well?
14. It is noted there is (2.2.3) “Up to 2m thickness of landscaping over the revetment on the seaward slope giving a maximum total height of +14.6m OD”; this would appear to have no structural or coastal defence integrity and so it is unclear why this thickness is required or could not be reduced to reduce the height and related impact of the structure?
15. It is noted (2.2.3) the developer includes for “An adaptive sea defence height of +16.4m OD excluding landscaping, with a maximum height of +18.0m OD including landscaping.” This is a significant increase in height compared to previous proposal and would have impacts to landscape and visual amenity if/when implemented; this should be evaluated as part of the impacts of the development.
16. When discussing the slope (3.9.9) on which to have vegetation (grass) it is untrue to say that motorised machinery can not cut >1:3 slopes; NT has such equipment bought on the open market for cutting banks of 1:2 slopes, however, having a steeper seawards slope may be undesirable for any runoff or runoff/backwash processes.

17. It is noted that it is asserted (e.g. 2.2.3) that the SCDF is stated here as including both pebbles (that is sediment between 4 and 64 mm) but in the SCDF report this is limited to 32mm to 64mm only) and cobbles (sediment between 64 and 256mm, in the SCDF indicated s towards the coarser end of the range, but not specified exactly). The SCDF report has cobbles added as “Option B” without indication of preference; it should be clarified what the developer intends with regards the placement of pebbles and cobbles (and definitive size range) and why this is necessary.
18. In this report there are various references to shingle (for coastal locations this normally applies to sediment of 2mm to 200mm in size) and hence a wider grainsize distribution is introduced. this includes in 3.7.1 and Figure 3-7 and A.4. There is reference inn 3.7.1 to this (shingle) being the upper beach. In other places (such as 3.9.12 with reference to forming ramps to the beach, 4.1.3 and 4.2.2 as fill between the SZC defences and SZB defences, and in 4.2.12 as dredged imported shingle. Clarity is needed over where the shingle material is sourced from (as this is identified as sediment of the upper beach) and/or how much shingle sized sediment will be imported.
19. There is also reference (3.9.12) to a “sheetpile abutment” rather than an open end span to the permanent BLF; this change could alter processes in the vicinity of that abutment and being (presumably) vertical will behave very differently to the sloped face that would otherwise have been presented; where are these impacts presented ?
20. For the Adaptive Design (and indeed the HCDF in general) it appears that there is no intent to remove the whole structure even after decommissioning of SZC; it is unclear who then takes responsibility for maintaining and managing the structure or any risks and impacts arising from its decay?
21. In the Adaptive design (para 3.8.1 pdf page 22) it is commented that 10% was added to wave heights and periods; it is unclear how this has been calculated, is it simply multiplying a calculated wave height or period by 1.1? If this is the case it would seem an approach that does not consider the sensitivity of the combination of wave height and periods that might exist and how such might impact factors such as wave steepness; this should be clarified. It is best practice for adaptation of design to involve stakeholders.
22. It is noted (4.3.2) that the core and foundations for the adaptive HCDF would all be placed in constructing the permanent HCDF; and not require any further intrusive work; this should be explicitly conditioned.
23. The geology of the placed rock may be relevant in respect of its visual appearance (aside from the impact of the structure itself), for example, should it contain mica it could present an unnatural and distracting sparkling appearance or if dark in nature this could be a highly distinct and different type of sediment than that occurring naturally. The visual appearance should be presented for assessment.
24. It is mentioned that rock armour and under rock would be imported; it should be clarified if this is intended by land or sea and where any stockpiling might take place and how long this may remain prior to completion of construction of the HCDF.
25. The Trust is pleased to see in Table 3-1 that RCP8.5 95<sup>th</sup> percentile has been used to consider

future climate change and recognises that potential risk level. The assumption for a reasonably foreseeable situation that offshore banks maintain the existing protection should be reconsidered as there have been historic examples of the banks lowering and erosion rates increasing (so it is foreseeable within the existing envelopes); this could cause beyond the 20m of long term erosion identified. There is also no assumption about the nearshore bars that can modify their form and hence degree of protection to the shoreline. For the storminess there is a measure of assumed increase in storminess, but this does not reflect frequency of storms which, where more frequent, will alter the processes and increase dynamics.

26. Coastal path – The Trust note that Figure 3-1 shows the coastal path but it is unclear where the coastal path will move to should the “adaptive” measures be applied; in that case it would be to address higher sea levels and so it is unclear this path position would be sustainable in such a circumstance?
27. Being on the seaward face of the HCDF (permanent) it is unclear how accessible the coastal path would be under storm conditions allowing for any spray effects etc; what alternative would there be to landwards? Also, it is noted (Figure 3-5) the coastal path sits 1.2m below the crest (located to seawards of the path) and hence as configured would obscure the view of the sea and lower beach (at low tide) for some.
28. The reference to ramps (3.9.12) for diverting the coastal path are unclear; is the intention to divert people along the seawards toe of the SCDF when the developer has deliveries being made? It is unclear what sort of window of access this would provide now or in the future.
29. Temporary defence - The developer states (3.2.1) “A temporary sea defence is proposed to protect the existing SZB nuclear power station and the proposed Sizewell C Main Construction Area (MCA) from coastal flooding during the construction phase.”. It is shown in appendix A3 that these 'temporary piles' are not removed but become part of the permanent defence. It is unclear if this is integral to the permanent defence design or simply convenience and cost driven? If they serve no functional purpose they should be removed if they are only temporary during construction and at least the metal recycled. This should be made clear so that the implications of this impact can be considered and addressed as part of the environmental impacts of the development.
30. Figure 3-2 and Appendix A.2 show cross section of the Temporary HCDF that appears to be in place for around 12 years (during construction of SZC). There is no indication of the distance in the 'indicative beach' between predicted Mean High Water Spring tide and the dune crest nor the Highest Astronomical tide shown (which is already predicted to arise) nor indication of how a surge tide level might sit with this profile. As the diagram is showing a dune crest it is assumed that this sandy feature remains in place until buried beneath revetment or cobbles/pebbles when further coastal defence work happens – this should be confirmed. It is unclear what the risk of removal (e.g. by natural processes) of this beach in the intervening period could be; the piling is vertical and this would set up reflection (if exposed) that would interfere with the ability of the beach to naturally re-build - has this eventuality been considered and assessments made of the requirement for additional material to replace that lost in such a way? It is identified (3.2.4) that “It may be possible to reduce the northern extent...” of the piling. The configuration could be important as creating this high vertical wall on a soft coastline will also have visual consequences from the seawards side (seascape) or elevated positions and that should be represented by montage. There is also no indication of lighting in this area or other devices such as for emergency flood warning that might be employed (bearing in mind the excavation is below the level of the defences in the MCA) or signage.

31. It is clarified (4.2.1) that the permanent HCDF will be constructed towards then end of SZC construction phase; this suggest the vertical steel sheet pile wall will be in place for more than a decade. It is unclear if the developer believes this sheet piling will be exposed to any tidal action/wave run up in this period - bearing in mind there is no SCDF until the hard HCDF is in place, this would mean any reflection from this vertical wall would be to the beach fronting and around the structure; there is no information presented on these impacts.
32. In other places including drawings of the permanent HCDF it shows the steel piled wall remaining within the structure but in 4.2.4 it is stated that “As the Permanent Sea Defence is constructed, the Temporary Sea Defences would be removed or cut down to permit the construction of Permanent Sea Defence.” There should be clarity if they are removed, cut down, or form an integral part of the permanent defence.
33. The developer states (4.2.9) “With the erosion protection in place, the Northern Mound will provide effective protection to the MCA excavation. The sheet pile wall would be breached to allow access to construct the land-side piles for the Permanent BLF. At this stage, the sheet pile wall would still be the primary defence against attack/degradation by wave energy in severe storm conditions.” This sequencing is unclear; for example, if the sheet pile wall is breached for construction purposes how can it still provide a primary defence?
34. Relationship to SCDF
35. Further comments on the SCDF have been made against the SCDF modelling report. The text refers to Figure 3-3 and Appendix A3 but the relationship to beach profiles is not clear on those; does the text mean to refer to Figure 3-7? Also, section a) et seq is referred to but it is unclear where that is? The Figure 3-7 shown an ‘indicative’ beach profile, it is unclear if the volumes of sediment required are calculated in relation to this or not? It also highlights that the profile could be different to this at the time of placement of SCDF materials and thus could involve higher or lower volumes and thus a greater or lesser amount of coarser material introduced: There is not a upper and lower bound for such volume presented. Is the reference to numerical modelling (e.g. 3.4.4) the 1D approach that has been reported or has some other modelling results not been presented here?
36. Whilst the developer states (3.7.6) that “The introduction of beach replenishment material (pebbles and cobbles) on the shoreface and backshore (beach crest) as proposed would ensure that a protective beach is maintained seaward of the HCDF” as this includes cobbles that assumes that all the pebble material would have been removed exposing the cobbles that lie immediately adjacent to the HCDF and as it is assumed the cobbles could move then it is unclear how such protection is envisaged to remain?
37. The design of the SCDF should consider the proposition that the interstitial spaces of pebbles and cobbles could be in-filled prior to exposure of the sediments by storm action and thus would behave very differently than the originally placed material. Although not provided explicitly (which it should be), the drawings for the SCDF suggest it could be around 35 to 45 m wide, of less mobile material than most native sediment and at a steeper angle of repose; this presents a protrusion or advance of the shoreline into the existing physical processes and would likely interrupt those processes to some extent (of unknown magnitude and direction under different tidal and wave conditions and water levels tidally, seasonally and accounting for future sea level rise and climate change).

38. The uncertainty around recharge and the statement (3.7.15) that “These matters are currently under investigation and subject to further study.” does not give confidence that they have been thought through: It is unclear why they have not been fully studied to allow proper assessment of them as they can fundamentally alter the coastal processes operating on the coast here, particularly when consider the long term cumulative consequences.
39. The developer states (4.2.12) the following which raises a number of questions (in italics)  
“Following construction of HCDF, the SCDF profile would be formed using dredged imported shingle material <*the material identified is pebbles and cobbles not shingle, or is this something different ?*> and any suitable site won material <*it is unclear what this means?*>. A trailer suction hopper dredger would dredge material from a licenced offshore site, and then moor off SZC. The shingle would then be pumped ashore using a pipeline <*it is unclear if this is a floating or sunk pipeline? and if this is appropriate for cobble sized material ?*> and moved into the profile < *this suggests there is a profile rather than a straight slope, what is the profile?*> using bulldozers.

## **Appendix B – National Trust technical comments on the Sizewell C One dimensional modelling of the Soft Coastal Defence Feature (SCDF)**

The National Trust notes the submission at Deadline 2 of the Sizewell C One dimensional modelling of the Soft Coastal Defence Feature (SCDF) as set out in the [Preliminary design and maintenance requirements report for the Sizewell C Coastal Defence Feature](#). We welcome further detail on the proposals impacting the coast and have undertaken a review of this document. We have provided some technical comments on each section of the report and these are set out in the text below.

### **1. Comments on the Executive Summary**

- 1.1. The SCDF sediment placement referred to in the Executive Summary will involve different vessels and movements to those associated with the temporary and permanent Beach Landing Facilities (which as we highlighted in our Written Representation have yet to be assessed by the developer with regards to the impacts of ship movements). For the initial SCDF placement there could be anywhere in the region of 7 to 60 vessel movements (to and from an as yet undefined mooring location) dependent on the Trailer Suction Hopper Dredger (TSHD) sizing. The impact of these ship movements on the seabed and geomorphological features is not assessed. In addition, the vessel sizing is relevant to the assessment of impact to the bed or the need for modification of the nearshore bed features (banks and bars). There would also be the need to evaluate the impact of the dredger at mooring as well as from the pipeline type and route. The on-going vessel movements for future recharge campaigns would also need to be assessed including any cumulative or in combination impacts.
- 1.2. We note the developer claims in the Executive Summary that the sedimentary mass placed is designed 'to avoid disruptions to longshore transport' (see pdf page 9); this ignores the disruption caused by advancing the line of the coast by placement of the sediment (and the associated HCDF structure). It is assumed by the developer that any placed sediment feeds only to the beaches adjacent to the development as a 'recharge' of sediment to those beaches yet there is no design related to the requirement for recharge as a consequence of the impacts of the development. In short either this is needed as a mitigation against the impact caused or it is an addition of material to the environment that is not required and so the impact of that should be evaluated. The focus of the developer's approach (as set out in our Written Representation) is to SZC frontage and the shoreline and beach processes rather than including the subtidal and geomorphic features such as bars and banks and interplay there. As the (SCDF) sediment will be replaced once it has fed out (been transported away from the headland formed by the SCDF) the recharge will be an on-going artificial import of sediment to this coastline for many decades to come. There is little assessment of the impact that this will have over the period to 2140 (which is longer than in previous documents) referred to for the development and should include the impacts of re-orientation of the shoreline as a result of the development, the impact caused by building seawards, and how this will disrupt the longshore transport of sediment along beaches, foreshore and sub tidally. In effect this is creating a ness on this coastline and those have well known processes that divert sediments offshore.
- 1.3. The design recognises that sediment will be liberated from the sacrificial component of the beach, this is the most seawards component of the SCDF and hence will liberate to the natural sediment fronting it (especially in draw-down from storms). The sediment it will mix with immediately is considerably finer in size than that placed (the developer has only used sand sized sediments in previous modelling of this lower zone and subtidal area); the behaviour of

any liberated sediment will thus not be the same as placing a unimodal narrow sized range of pebble sediment but will be introduced to sand and hence behave as a mixed sand and pebble sediment as soon as liberated. This will alter its behaviour and could include transport to locations that the upper beach material does not naturally reach (the existing beaches are more landward and have the added dissipation of waves before being reached whereas the SCDF is deliberately constructed seawards of that and so to a (comparatively) more energetic environment.

- 1.4. It is of concern that the design of the buffer (and option B of placing cobbles along the HCDF) is more akin to hard engineering than soft; the intention is for the buffer (and/or cobbles) to remain in situ and not be eroded away; the recharge of lost material to seawards happening in advance of this being eroded. In effect that means this additional width (advance offshore) is conceptually part of the hard defence and not a soft defence. The introduction of a cobble layer suggest the designer is, however, not confident that this buffer will work (remain in situ) and hence the toe of the HCDF could be exposed so to counter that much larger sediment is placed like rip-rap to the toe. The cobbles are not intended to be mobile, but it seems the designer recognises forces could be such that they might. In the presented design, the assumption is the HCDF does not become exposed as there is such a massive placement of volume advancing the shoreline seawards. The fixed nature of this created headland will deflect the normally north-south running longshore transport processes and so it is difficult to see how this is not disrupting longshore processes.
- 1.5. It is unclear why a fundamental matter of design such as whether to place large cobbles along the toe of the HCDF has not yet been concluded. It is stated in the Executive Summary as being considered.
- 1.6. The Trust notes the sediment to be placed is coarse (only 3.2 to 6.4cm diameter) and includes no fines so will form a steeper angle of repose (once worked by the tides) than the native material. This is likely to alter the visual appearance of the coast compared to the present SZC frontage beach; not only will it be located seawards of it by tens of meters but also be steeper in angle. Assuming some of the SCDF material erodes away and does arrive on adjacent beaches, it will be altering the sediment distribution by making it proportionately coarser than present and hence also altering the properties of those beaches. There does not appear to be any recognition or assessment of these changes to geomorphology.
- 1.7. The assessment does not appear to consider anything larger than a 1:12 storm event (footnote 1 of the Executive Summary). Bearing in mind this will be in place for possibly 120 years (as the developer has already identified that it will do nothing in the last ten irrespective of how uncertainty in coastal change pans out in the intervening years) this would seem unnecessarily limited. It may be the case that one larger event exercises considerably more work than 2 or three 1:12 sized events so it is unclear why this has not been done. Notwithstanding this, the developer makes severe claims that the design is 'conservative' but if the assessment were assumed correct then it is unclear how it is justified to place 4 times the material required, causing greater impacts at both the source and placement sites and leading to a more pronounced promontory on the coast that is actually required. There seems to be no sensitivity analysis just coarse measures and hence we believe this is not suitable to determine the genuine impacts that this activity of the development will have on the coast. The additional work that is required should be presented within the DCO process and not allowed to drift into isolated assessment through other mechanisms at a later date; this is particularly relevant to long term change and the interruption to the existing processes that



this SCDF will pose to the coast (on a wider frontage than the immediate SZC one and those adjacent).

- 1.8. The Trust notes and welcomes the developer's inclusion in the report of the RCP 8.5 95th percentile for predicted sea level rise; it is also noted this has not appeared in previous assessments where it is equally relevant. It is unclear how the developer can assert that this scenario (in a range of scenarios identified by UKCIP) is 'very unlikely'; and hence more or less likely than any other scenario modelled in a range presented. The support for their ('very unlikely') statement is not presented although it has been used and so included to the design process to present the worst case for sea level rise. The Trust agrees the worst case for sea level rise is appropriate.
- 1.9. The applicant makes reference in the Executive Summary (see pdf page 10) to the Southern North Sea licensed aggregate sites providing a nearby source of suitable sediment (pebble sizes) for the SCDF once local supplies from HCDF excavation have been exhausted. However, in earlier documents the developer referred to using material from general excavation related to the main construction site. The Trust would ask that the source of any material that would be placed to the SCDF be clearly stated in regards of any excavated material from within the development site. Also, can it be clarified what processing of sediment would be undertaken (if excavated including in the HCDF footprint) on site to attain the specification stated in the design with regards to pebble sized sediment only being placed.
- 1.10. The Executive Summary seems to ignore other statements made by the developer that there is little change happening on this coast. It is noted that the design presents a relatively large volume related to net rates of drift for example and also ignores the repeat nature of the placement that means, cumulatively there would seem to be over 1.3Mm<sup>3</sup> of sediment placed (including the initial sediment placement). This is more comparable to the volumes for other one-off placements that are referenced, and the cumulative affects should not be ignored in this manner. The affects are particularly relevant if restricted to only pebble sized sediment that is intended to be less mobile. If restricted to only the pebble sized sediment it will still be mobile (hence requiring recharge) but introduce a higher percentage of coarser material to the native sediments. This may be less mobile when it arrives at the nearshore bed compared to the adjacent beaches; this warrants more than 1D modelling to assess the source, pathways, and sinks of this sediment and accounting for their mixing (once mobilised) with the finer native sediment so that careful evaluation of how features such as nearshore banks and bars as well as beach accumulations over the long term will occur. The Trust would like to ensure that this assessment is undertaken in full and that the impacts of the developer's approach can be fully considered as part of the examination process.
- 1.11. There seem some inconsistencies in the total volume envisaged for the initial placement; in the Executive Summary 270,550m<sup>3</sup> and 203,250m<sup>3</sup> are referred to and elsewhere (e.g., Section 1. Introduction) c. 200,000 is referred to; this is around a 35% difference in volume and makes following statements on volumes and relevance overly complicated.
- 1.12. The developer identifies in the Executive Summary that the interval of recharge '...will not be constant...' but nor can the total amount be assumed to be correct as there remains uncertainty in the future. It is possible that sequences of events could deplete (lead to recharge) then deplete again in relatively close time periods and this will thus introduce higher volumes in such periods than are being presented here (and potentially overall). In a similar vein much less could be required for recharge purposes but this would not remove the interference of coastal processes resulting from the presence of the promontory created by

the HCDF/SCDF. How such impacts affect the environment and the geomorphological features that run along this coast and nearshore area all need assessment but are recognised as uncertain. The Trust believes this again supports the need for monitoring along the extent of those features such as nearshore bars. Monitoring should not just occur within the area where coarser sediment may accumulate but also along the coast as the features may be altered or function differently as a result of these interventions. Whilst the Trust agrees that this uncertainty can be addressed by monitoring the developer has so far steadfastly refused to recognise and take responsibility for the possible impacts that can arise from the development (including the HCDF, SCDF, Temporary BLF, Permanent BLF, intakes outfalls and mooring points) that will all interact in a combined way to alter the processes that presently operate.

- 1.13. It is identified in the Executive Summary that more recharge may be necessary in proximity to the permanent BLF yet there is no explanation as to cause and effect here. We note it is identified by the applicant (in the BLF reporting) that the BLFs have no impact to sediment transport processes due their open and permeable (to sediment) structure.
- 1.14. The developer states their report "...indicate that the SCDF is viable for at least the operation phase of the station" but again there is inconsistency in what length of time the operational phase is. We note the design details and plans for the Hard Coastal Defence Feature (HCDF) state in para 2.2.1 (pdf page 9, [link to document](#)) that 'The design life of the structure is 110 years (up to 2140 – extended to accommodate change in spent fuel storage strategy).' As previous documents have indicated different timelines clarity is needed on the timespan associated with the SCDF.
- 1.15. Whatever timeframe is meant, repeat recharges are likely to become more frequent under future sea level rise scenarios (unless the recharge is altering the conditions generally) but it may appear viable (sustainable) to do. There is no indication of what situation (should it arise in the future) would make the proposed approach unviable and what course of action might be required in that eventuality (aside from option B to have cobbles along the HCDF that could be exposed if the 'viable' SCDF buffer and sacrificial pebble beach approach were to fail).
- 1.16. The Trust note mention in the Executive Summary that the applicant views the SCDF as set out in the report (Option A and/or B) can be adapted easily in the future if needed. The ability to alter management practice can be applied but this does not account for uncertainties in impacts to the physical processes and geomorphology of the beach and nearshore zone and any interaction to offshore bank system; particularly over the long term and over spatial scales larger than in close proximity to the immediate SZC frontage. There is not a mechanism presented in the report to re-assess impacts, to monitor in advance such impacts that might occur and can plausibly affect the NT frontage. It should be noted that the beach and nearshore system cannot be considered strictly cellularised but is a continuous system where one part can alter another. Given the uncertainty and lack of clarity on the approach to be applied over a period (potentially) to 2140 it is not unreasonable that the beach, cliff and subtidal area fronting the NT property is monitored to allow assessment of coastal change in the context of the development; if this is not applied at the outset the ability to retrospectively garner such data will be limited and so would warrant a precautionary approach to be taken to any of the impacts of the development.
- 1.17. It is noted the developer identifies the need to undertake more than 1D modelling and that the present modelling does not incorporate longshore sediment transport (despite making assertions that this approach is designed to have no effect on longshore sediment transport).

It is considered unacceptable to the National Trust that this exercise has not been carried out so that effects on longshore sediment transport (to beaches and nearshore) and impacts to the geomorphology can be evaluated within this (DCO) process. It is unclear why the need to undertake such studies were not foreseeable and why such significant aspects of design for the coastal processes and geomorphology of the area have not been properly assessed by this stage in the development; instead a limited modelling extent has been presented with caveats and limitations for changes to design and evaluation out-with this DCO process and potentially ignoring the in combination environmental impacts from within the development itself.

- 1.18. Furthermore, it is unclear why a simplistic volume measure is deemed a suitable management approach to apply in this instance. The design is based on an indicative beach profile and it appears any evaluation to this point has been based on that profile form and its function; even under a 1D approach volume alone would seem a coarse measure and miss cross-shore and alongshore variability and how this may affect both the performance of the SCDF and the SCDF in turn affect them. Given that 'many different beach profile shapes' may emerge it is unclear how the identified lack of exposure (of the HCDF) can be guaranteed; indeed the green line on figure i (pdf page 11) shows an indicative profile lower than the SCDF buffer layer and SCDF sacrificial layer showing processes can achieve such forms and thus it has little meaning as such. It is thus unclear how it is not possible for exposure through to the HCDF (under certain conditions or combinations of conditions) over the whole life of the development.
- 1.19. The Trust believes the declared fixity of the profile (or parts of it like the buffer layer) are relevant to impacts from the development and must be properly evaluated within the context of this DCO process, rather than being isolated for separate review under different processes at a later date. These later reviews might be more focused on the flood risk and coastal defence aspects of this part of the development rather than on its long term impacts to the surrounding environment in concert with all other parts of the development (including matters such as BLFs, intakes outfalls, ship movements, dredging, mooring etc).
- 1.20. The Trust remains concerned that much more detailed information is required to properly evaluate the impacts of the development on coastal processes and geomorphology. It remains unclear how the developer can claim that the SCDF is 'designed to avoid disruptions to longshore transport' when they have not modelled this and when they are introducing a large volume of material to the system and making the distribution of sediments coarser than those naturally occurring. We are concerned there is uncertainty as to how and where the sediment will move to. Whether it may become a static feature or ephemeral sediment supply has not been defined.

## **2. Comments on Section 1 of the report**

- 2.1. The section of the report mentions issues we have highlight above such the introduction of over 1.3M m<sup>3</sup> of coarse sediment to the frontage which may yield different impacts to local beaches but also different impacts to bar and bank systems seawards of the recharge. The placement is further seawards that the previous consideration of SCDF and interacting with other new features such as BLFs; it is unclear that this has been designed to meet the design criteria identified as there is clearly a substantial amount of work on the design to yet be implemented by the developer.

- 2.2. The Trust believes the report contains a number of shortcomings that we identified in previous reports on coastal processes as set out in our Written Representation. We believe the report presents assumptions and broad statements with little supporting evidence in an overly complex and somewhat confusing mash of numbers, hard statements around topics that have not been evaluated and selective statements where they have. As stated previously the matters presented focus on the SZC frontage only; as previous concerns of NT the focus is to the developers own needs rather than to the interaction of this with the surrounding environment.
- 2.3. In the introduction (pdf page 12) the report acknowledges the SCDF involves the placement of 'large volumes' of sediment and that this is designed to withstand storms thus maintaining the promontory effect of the development in such situation. This advance seawards of both hard and soft parts of the defence design gives potential for interference to processes that operate moving sediments to north and south both along beaches but also with the intertidal and sub-tidal areas too and alters the interplay of sediment exchange between the shoreline and offshore. The erosion resistance of the selected material will also tend to maintain this affect but if /when mobilised will introduce (artificially) a higher volume of less mobile sediment size(s) to the system. The higher crest than naturally occurring on the SCDF will alter wave runup and backwash processes as it will be potentially above any washover and to maintain a steeper angle (than native materials). Even on a basic level it is unclear how this is not disrupting longshore processes and will not impact local beaches.
- 2.4. The Trust can only assume (as there is no evidence in the report) that the developer believes any eroded material is immediately transported to adjacent beaches. However, if this is not the case the placement of large volumes of sediment may lead to coarser sediments accreting, alteration to the plan form of the beach and the shallow bay forms that exist within the (developer defined) GSB area and affecting the known interaction to sediment transport processes that happens from Thorpness. Indeed, the developer makes reference of the hard point created by the Minsmere Sluice and how this influences processes but fails to recognize any interference of advancing seawards further (offshore) than that structure along at least a 750m frontage. Against this context it is not considered defensible to make such a sweeping statement in the introduction such as "...to avoid disruptions to longshore transport..." based on such limited assessment and design methods.
- 2.5. In the second paragraph of the introduction the developer states "As the SCDF is designed to avoid impacts of HCDF exposure during the construction and decommissioning phases, it is embedded (primary) mitigation..." However, it also sets up impacts of its own that are beyond the HCDF; so, this may solve some aspects of the HCDF impacts whilst introducing new impacts of its own. This matter highlights the applicants continued approach to dis-joint components of design and the failure to draw them back together in an integrated way. The HCDF impacts have not been re-evaluated following the further design information presented nor has the SCDF. Both have not been evaluated together for the conditions that may prevail over the whole life of the development. To claim that the SCDF is 'embedded mitigation' is also unclear in that it is not certain that it will (aside for the immediate SZC frontage that the placed sediment will add sediment volume to adjacent beaches); the volume could be transported in an offshore direction by processes such as draw-down and serve no such purpose. The assertion that the sediment of this size is not present apart from in the storm beach could reflect sampling technique but also ignores that this SCDF beach is being built seawards of the naturally occurring beaches (and so could behave very differently). This is further exacerbated by the fact that it also relies on previous assessment work (we have

commented upon) where no amendment in method or update has been made related to any issues raised.

- 2.6. The developer states in the introduction that “Optimisation will consider present day conditions as well as future pressures on the frontage, such as sea level rise (SLR) and receded adjacent shorelines, both of which are likely to increase erosional tendencies on the Sizewell C frontage over time”. Again the emphasis remains to the SZC frontage rather than its impacts on the surrounding coast but what this does highlight is the promontory affect for the HCDF/SCDF approach presented will become more pronounced over time and so will its interference with the coastal processes as a result.
- 2.7. Footnote 6 (pdf page 12) states clearly that there is no intent to maintain the SCDF for at least the last ten years of the operation. It is unclear how, with uncertainty in so many aspects, that such a decision can or should be taken or asserted at this point in time or why avoiding the impacts of exposure of the HCDF suddenly becomes irrelevant ten years before the end of the operation.
- 2.8. Footnote 7 (pdf page 13) refers to other beach recharge schemes, but it is unclear the particular sets of processes operating on this coast are the same as those cited. For SZC there is strong linkage between the beach and supratidal area to the nearshore and subtidal area; sediment interchange and movements between these and alterations to geomorphology of either can feed-back change to the other aspect; this is thus more complex than some linear beach systems where impacts have been seen alongshore including spit development, for example or retaining fixed beach positions by recharge or mechanical interventions. This is a complex matter, but the assessment of impacts should not be passed over just because the generic method of beach recharge has been applied successfully (or not so successfully) elsewhere.
- 2.9. The developer states in 1.1 Background (pdf page 13) that ‘Soft shoreline engineering... locally reduce erosion’; as an approach it may or may not reduce erosion per se but it may provide some reduction to the impacts of erosion on the coast (particularly as conceived here to provide sacrificial material to protect the HCDF). However, most of the SCDF appears to be about retaining a fixed buffer of sediment rather than all being sacrificial; the developer states “Unlike hard defences, which are immobile ....soft defences work with nature, dissipate energy, supply additional sediment to coastal systems (in the case of the SCDF and beach recharge in general) and therefore benefit local shorelines.” this is only applicable to the sacrificial sediment part of the SCDF and not the whole system (as presented) and then only to the extent that the sacrificial sediment becomes mobile (being coarser); the remainder is intended to be immobile and not feed to the system but remain in situ as a buffer and so the impacts the developer identifies of “...tend to reflect wave energy during storms (causing enhanced scour and sediment loss)...” could be realized. This would be particularly the case where cobbles are used and also the approach seems to assume that the interstitial spaces of the (initially) placed sediment will not be in-filled by wind and water borne finer sediments (over a period of possibly many years) which would tend also to lead to greater cliffing in the sediment and even more wave reflection.
- 2.10. Although the developer has not modelled alongshore processes it identifies in 1.1 Background (pdf page 13) that “SCDF sediments may also contribute to reducing erosion rates and promoting an increase in supratidal shingle on the immediate neighbouring frontages” without stating they may not contribute in such a way. If we accept this proposition, then all this is stating is that the promontory effect of the SCDF/HCDF would be spread further

alongshore without consideration of what this means to the plan form of the coast or the processes operating. Also it should be noted that if such a process can arise with redistribution of the SCDF sediments then it can also arise with the present sediment; that is the accumulation areas (at either end of the development) may trap sediment presently on the beach which would be reducing the longshore availability of sediment thus disrupting this process until the in-filling has stabilised (if indeed it does stabilise - this could be an ephemeral and difficult to predict storage and release of sediment that might impact under certain conditions or combinations of conditions). Clearly this needs full and proper assessment but if the developers statement held true it would mean that there would be a change in the morphology influenced either side of the development and those changes (in turn) could affect the adjacent beaches and so on; this is how impacts that might appear localised can start to (over time) have influence across a much wider section of coastline (taking the whole extent of the beach and the nearshore into account) than just the immediate few hundred meters around a 750 m long coastal defence.

- 2.11. The Trust is concerned regarding the consideration of vegetation within the report. It is unclear how the step forward to suggesting only positive outcomes for vegetation is made on pages 13 and 14. It seems incongruous within a 1D model report for beach recharge and should be at least addressed under a separate heading with the evidence supporting the statements presented. Some statements also seem of little value – for example it is unclear what relevance stating a “...c.1.6 x factor of safety (erosion resistance) over bare sand” has when this is not bare sand beach it is a pebble beach and so clearly not a sand dune system. However, the placement of an open pebble beach is likely to intercept (and potentially prevent) aeolian transport to landwards as it will present a greater roughness element than a sand or mixed sand and gravel beach and allow void spaces for the sand to fall into and become trapped (both contributing to filling the void space and reducing the natural process of sand transport landwards that would otherwise have occurred). Furthermore, the developer identifies “Natural England condition surveys show that the annual vegetated drift lines were degrading in the early 2000’s and were lost by 2010 (DEFRA MAGIC, 2021). This was due to natural coastal squeeze between the relatively static shingle ridge and the landward recession of the intertidal zone”; if more (up to 1.3M m<sup>3</sup>) of coarser sediment is introduced to the coastal system then this can only exacerbate this process identified by Natural England, leading to a more fixed upper beach and a narrowing and recessing lower foreshore; this leads to a situation where the coast is more vulnerable to sudden change.
- 2.12. On pdf page 14, the developer states “SCDF sediments are expected to be sourced initially from earth works on the main development site (assuming appropriate sediment properties) and then from already licenced aggregate extraction sites” this infers the excavation hole to landwards of the defence line, this is different to the inferred extraction of beach sediment in the footprint of the HCDF – clarity on this is sought. Either way, it is unclear if processing of sediment is proposed (it is unclear that pure pebble seams with no fines exist and so removal of finer or coarser material than that specified would be necessary) and how such an operation would be undertaken and any residual material handled requires clarity.

### **3. Comments on Section 2 of the report**

- 3.1. The design principles set out on pdf page 15 states “The purpose of the SCDF is to avoid disruptions to longshore transport and the impacts to local beaches that are likely to arise if the HCDF were exposed...”, this report has not evaluated the disruptions that the SCDF and HCDF combined can set up. We believe that, as presented, the SCDF presents a further

seawards position to the HCDF (although variable in absolute amount further seawards) including a buffer zone (volume) that will not be allowed to erode; this will sit to some degree above the natural beach and so it will set up similar impacts to the HCDF. As this connects into the wider sedimentary system of this coastline (protruding into it) and will be instigated further offshore than the previous assessments have looked, it is likely this will affect a wider area of the coast than previously identified and is in closer proximity to the nearshore and beach bars and bank system (and hence interaction with them is more likely). This is coupled with the crossing of these features by the two BLFs, as such the in-combination consequences must be carefully looked at. It seems as if the developer is relying on (yet unmodelled) behaviour of the placed sediment to counter all the (yet) unassessed impacts. It is difficult to see how such a design principle can be achieved without undertaking at least 2D modelling with the structures (HCDF and BLFs and other infrastructure not assessed or presented) across an area of the GSB where the processes are identified to interact; this would suggest that this assessment is simply insufficient for this assessment purpose.

- 3.2. The developer refers to Minsmere Sluice when referring to the HCDF impacts on pdf page 15 of the report. It is stated "The best local analogy for these impacts is the nearby Minsmere Sluice Outfall. The concrete outfall passes underneath the shingle ridge and through the active beach face to a position well beyond the low tide mark (Figure 1), thereby acting as a blockage across the entire longshore shingle transport corridor. However, its elevation around the Mean High Water Neap contour allows some shingle to pass over the outfall during high waves and water levels, equating to a partial blockage." It is unclear how something set at a low level on a point of the coast is a good analogy to something set well above present day predicted Highest Astronomical Tide (HAT) levels in the upper beach where the developer is suggesting the coarse material all goes. The acknowledgement of only partial blockage, identifies that processes can operate over and past it in both north and south directions and also seems to ignore finer sediment that will move over it under suspension in turbulent conditions (although the proposition is being made that no shingle may pass it apart from on the upper beach).
- 3.3. The HCDF and the buffer and /or cobbles of the SCDF are devised to be fixed and not eroded away, presenting an impermeable face to the alongshore processes; this could present a blockage to longshore processes in its footprint, potentially. Also, it is unclear why these assertions are being made about Minsmere Sluice but there is no assessment of the in-combination effect of this "blockage across the entire longshore" particularly to shingle when the developer is placing (coarser than this) pebble sized sediment. This interaction should be assessed. If such a structure is exerting some control over the longshore processes it seems unlikely that the massive structure of the HCDF and fronting (seawards) SCDF which is designed deliberately to be less mobile than the native sediment would have no effect on the intertidal physical processes and how they operate and so also have the potential to alter morphology in addition to the direct impact to the shape of the coast from the footprint of the promontory so created by the developer.
- 3.4. The SCDF is designed (by the sediment size and recharge process) to be immobile under most incident wave and tide conditions, becoming mobile only in larger storm conditions. This being the case it can be considered as a fixed feature compared to the native mixed sand and gravel sediments. There is no consideration made of how those sediments will accumulate or be transported away from the headland or diverted offshore by advancing the line seawards of the existing with the HCDF and SCDF together; and in this report the SCDF, alone, as it sits to seawards of the HCDF. The mobility under storm conditions has been determined to happen in at least a 1:12 storm event but there is no assessment of a single larger event that

could alter the coast more significantly than a single or even multiple 1:12 year events. It is unclear how, sitting out into the processes and receiving more energy than the natural beach, the SCDF might not be removed entirely in a large storm event somewhere over the next 97 to 120 years. As such it remains unclear why larger events have not been considered even under a 1D exercise given the developer identifies it will take a storm to move the pebbles. It is unclear what mechanisms might cause gradual erosion; it would seem likely that erosion would be storm driven and episodic in nature rather than gradual unless there is a mechanism for movement under more everyday conditions. As there can be storm events that arise quickly and continue for some period on this coast, it is unclear how it can be guaranteed that a storm event (or series in quick combination) would not be of sufficient scale to erode away more than the 'trigger level' of volume or that conditions would allow for recharge to happen before another event takes place. Guaranteeing this would seem fundamental to the developers declared design objectives.

- 3.5. The impact of "...drawdown onto the beach face by backwash" as highlighted on pdf page 15 would be to place coarser sediment to the lower part of the beach profile; potentially this could bleed sediment to seawards of the low tide mark and hence move such sediment into the subtidal area. Alternatively it could accumulate on the lower part of the intertidal profile and build elevation there; altering the wave action and further impact the shoreline but this would be localised and hence diffraction/refraction around such deposition could also alter the incident processes to adjacent shorelines. It is unclear how only the potential to feed sediment to adjacent beaches has been identified rather than the potential to alter wave conditions, raise the bed (having similar blocking affects to those identified for Minsmere Sluice by the developer), or altering the plan form of the coast and hence how the response of the coast (including longshore transport and interplay of the beach with the nearshore) is altered by the development.
- 3.6. The Trust is concerned the developer does not seem to be presenting a balanced view across all potential outcomes across the lifespan of the development but focusing only to the potential to protect adjacent areas by the addition of coarser sediment to the upper beach (once it has been drawn-down, mobilized, re-transported landwards and then accumulated to the upper beach only on beaches adjacent to the development). This does not, however, identify the impacts that such change will have in the interim before any redistribution to this final resting place happens. (It is assumed that all the eroded material from the SCDF arrives to neighbouring beaches and adds to volume there); it could require a storm of larger magnitude to re-entrain larger sediment from the (relatively) deeper water conditions (lower foreshore under the tide) to return it to the beach where it eroded from.
- 3.7. As the SCDF is seawards in a more energetic location to start with it is possible that large volumes of SCDF sediment could be trapped to the lower foreshore for some period of time (even years) interfering or even blocking longshore sediment transport. Over time, it is also possible that the presence of coarser material could lead to increased mobilization and winnowing of finer sediment in those adjacent areas (leading to depletion of finer sediment until coarse armouring of the surface takes place). This could possibly increase erosion for some time to the lower profile and leave the upper profile more exposed to the next storm event. As a result it is possible that the beach profiles change in their geomorphology leading to steeper, narrower beaches that have less fine sediment in their appearance.
- 3.8. As this design has only been modelled in 1D such processes are not accounted for in the modelling applied in this report. It is unclear why more extensive modelling has not been presented for assessment as it is a basic matter to consider and evaluate and can be modelled



(although the developer does recognise that modelling mixed sand and gravel, or in this case mixed sand and gravel and pebble, beaches is more of a challenge than a unimodal sediment approach). The National Trust consider it unacceptable that 2D modelling (to account for different sizes of sediment) has not been applied as a part of this (DCO) process and that the statements made do not reflect the range of outcomes that could arise; all of which need assessment to consider their impacts on coastal processes and geomorphology (not just beach profile but also planform and nearshore interactions, wave reflections, sediment interactions etc including how the bar system responds under storms naturally and how this might alter were more coarser sediment available of beach form to landwards different to what it might naturally be. Such modelling must also integrate the HCDF/SCDF with other aspects of the development including the (temporary and permanent) BLFs.

- 3.9. The developer states on pdf page 17 that “The three primary design parameters used to increase the longevity of the soft defences are volume, crest elevation and particle size. The SCDF design seeks to optimise both parameters...” (noting that three parameters have just been identified it is unclear which one become irrelevant) “...to maintain the SCDF and avoid HCDF exposure whilst minimising intervention across the life of the station.” These design principles all lead to the retention (for most of the time) of a headland made by the combination of the HCDF and SCDF. The SCDF is thus much less mobile in intent and design to both the natural beach but also potentially compared to other beach recharges; this is inevitable in this case as the beach being formed is seawards of the natural beach making its own promontory and hence somewhat detached from the adjacent beaches and their processes; bearing in mind the bay form the SCDF sits in (identified by the developer as the GSB) this has potential to alter that bay form and hence impact on a much longer section of coastline than the focus to only the immediately adjacent beaches. Again this supports the call from the National Trust for monitoring along a much wider frontage including the National Trust frontage of beach and cliff to the north and the call from others for monitoring to Thorpness to the south.
- 3.10. The developer states on pdf page 17 “The SCDF respects Pye and Blott’s (2018) guidance that management of shingle features for FCERM purposes does not disrupt regional coastal processes and does not have negative impacts on other shingle feature interests such as vegetation, fauna, geomorphology, landscape quality and visitor appeal.” It is unclear how this assertion can be made given the current design as articulated (and it is notable the desirable outcomes here are not expressed in the design principles). It may be the case that the guidance is highlighted as forming some of the measures to assess acceptability of the SCDF as presented but it is far from clear that it meets them or that sufficient assessment has been presented and/or made to support that it respects such matters.
- 3.11. The developer states on pdf page 17 “That is, SCDF recharge would occur in areas where vegetation is naturally lost” it is unclear how this can be asserted when the SCDF is an unnatural intervention, located seawards of the natural beach position, formed of coarser sediment and thus is an artificial feature placed on the coast rather than a natural beach. The natural loss of vegetation on this section of coast will not arise as the HCDF and SCDF are constructed in the location they might naturally arise. Were natural roll-over of sediment to be applied they may have a more sustainable future bearing in mind the nature of them is to be ‘lost’ to erosion and then re-establish in more quiescent conditions. This element of dynamics is important to many driftline species and shingle species and by the developers own admissions the SCDF will be more static than natural conditions and the adjacent beaches may be impacted by coarser sediment making the upper profiles there more fixed. Furthermore Figure 3, (pdf page 18) for example, shows the situation of the fixed hard

defence landward of a mobile beach but does not provide comparison to natural roll-over and evolution.

- 3.12. The developer states on pdf page 18 that "...SCDF reprofiling is not intended"; it is unclear if this logic is also applied to the recharge of the SCDF or if it will always be replaced by recharge to the originally defined profile (an unnatural linear slope) which will then require re-working.
- 3.13. The developer asserts on pdf page 18 that the "The relative volume of sand in the SCDF would be kept low, to increase permeability and erosion resistance. This avoids cliffing that can occur in recharge sediments where the sand volumes in mixed sediments are too high. Any cliffing that does occur would be the result of the natural mixing of sand volumes being exchanged between the subtidal and intertidal beach rather than a result of the SCDF. Review of experience on the UK's south coast (McFarland et al, 1994) found that finer material in the sediments used on gravel beaches leads to a more compact and less permeable beach, and a hard, vertical face." The Trust is unclear exactly what the point of this statement is; whilst the SCDF (as presented) has no sand and is a unimodal pebble material this does not guarantee the introduction of finer sediment to the (when placed) open matrix and so it seems unclear what the developer is trying to identify here. The retention of an open matrix of just pebbles would seem implausible to be guaranteed in a system where sand particles are in motion (accepting that plumes have not been modelled by the developer) in suspension and so can be deposited by tidal action (and so may mobilise and in-fill the interstitial spaces of placed pebbles and hence remove this 'erosion resistance' and leading to cliffing in the future under a large enough event). It is also possible that aeolian transport (which form dunes along this coastline) could transport sand to the SCDF and become deposited in the interstitial spaces that way. It is illogical to say that trapping of any such sediment in the interstitial spaces is not a produce of having placed large sediment with an open matrix to the beach in the first place; it is also the case that sediment locked into the interstitial spaces would be removed from the naturally available sediment and only released under more extreme conditions than would otherwise (naturally) be the case.
- 3.14. The developer identifies on pdf page 18 the shoreline south of the SCDF is stable and that to the north retreating and presents a "...mode of retreat..." which identifies the "...shingle barrier is presently too high and large for overwashing and barrier roll-back to occur. However, with time and sea level rise, infrequent overtopping can be expected to become more regular..." As this is being identified as a known change process it should form part of the assessment of the interaction of the development with the coast particularly as the introduced sediment has the design qualities to be liberated to such beaches, and the developer believes they will add further to the "too high and too large" barrier and hence cause impacts to the natural coastal processes and geomorphology in this way. The addition of coarser material to the upper part of the beach will tend to steepen it and (when mixed with the native sediment) may lead to an increase steepness in profile and/or more wave reflection. As the developer identifies the fact that shingle sediment can simply by-pass the Minsmere Sluice there is potential for such sediments to be redistributed along the GSB. Over the period to 2140 identified in this report, the change to what is identified to naturally arise and hence could cause consequences (impacts) to frontages to the north including to the National Trust, means further assessment should have been made by this stage of the process.
- 3.15. Footnote 15, (pdf page 18) identifies that the SCDF sediment will only be liberated "...onto the southern few hundred meters of the Minsmere frontage, where it may be retained." If this were the case then over time this would alter the alignment of the coast and thus lead to a

different evolution than would have naturally occurred; this should be assessed including in the context of the wider GSB and in terms of the potential impacts to sediment movement.

- 3.16. Figure 4 (pdf page 20) shows an irrelevant line for the V recharge. Given the fact that different profiles could evolve for the SCDF (after placement/after recharge) it is unclear why only a volumetric approach is proposed. The exposure of the HCDF is relevant at higher elevations as much as at lower elevations so it is possible that a flattening of the profile could meet the volumetric approach identified but still expose the HCDF and hence fail the design performance intended by the developer.
- 3.17. We are unclear whether the developer's statement on pdf page 19 that "a 6.4 m (ODN) crest, which is similar to the present-day shingle ridge, albeit 1 – 2.4 m higher" can hold true. If it is 1-2.4m higher it is significantly different to the present-day shingle ridge. It is also unclear how there will be no interaction of the "active beach face" and the portion above such a defined face; as that alters so will the profile above it potentially (particularly as this is designed to only be mobile under storm conditions when draw-down of sediment to seawards is the most likely process identified).
- 3.18. The developer adds that "The northern side of the SCDF was modelled following a similar contouring process but respecting the SZC Main Development Site boundary; therefore, the slope of the SCDF was adjusted to gradually meet the natural topography before the property boundary." It is unclear why this limitation is a necessary constraint on the design and functioning (meeting a boundary) rather than being designed to the processes.
- 3.19. Option B in Figure 4 (pdf page 20) "features a relatively narrow band of coarser sediments (cobbles) at the SCDFs landward extent" it is unclear the width of this band. This is applied to be much less mobile than the pebbles but might be more mobile than the boulders placed; it presents a rip-rap layer and so should more reasonably be shown as part of the hard coastal defence measures.
- 3.20. The developer has (self-imposed) limited the storm impact to a 1:12 year storm for the sea level rise to 2069. It is unclear why this limitation has been set by them for the long term of this development and they themselves state on pdf page 21 that "...further modelling work is required to refine and establish volumetric losses associated with more severe storms". Why has this not been done to establish the impacts of more severe situations than a 1:12 and +50year SLR. Evaluation of the envelope of forces that could arise over the 120 year period (so to 2140, almost a century further in time than currently assessed) should be made at the outset if this is important mitigation of the developments impacts and to prove the concept is sustainable across the lifetime of the development. It also draws into question the assessment made of the volumes presented as sacrificial and as a buffer.
- 3.21. It appears that the interaction of the permanent BLF does set up difference along the frontage and how the SCDF interacts with it; even on a 1D approach. The statement that nearly 3.5x more sediment is needed to the north of the permanent BLF than near it suggest significant differences being set up here; any further modelling (more than 1D modelling) must include the permanent BLF in it; and also evaluate the situation with and without the temporary BLF.
- 3.22. It is unclear why the consequence of "...shoreline curvature around the north face" of the SCDF (as stated on pdf page 21) is not incorporated to the design of both the SCDF and potentially the HCDF as this could impact the interaction of longshore processes and on-off-

shore sediment mobility. The approach the developer is taking is to simply place more sediment there rather than address the impacts being caused through design.

- 3.23. The developer is adding a note that the natural ridges will be overtopped before the SCDF is but this does not present what impacts might be caused by the SCDF not being overtopped; there could be reflection and/or backwash and lowering of beaches to seawards as a result and steepening of the beach profile fronting the SCDF as a result and destabilizing its toe. The lack of adjustment (as the crest remains and the seawards extent does too, could also alter the coastal processes and hence impact on sediment transport processes compared to that naturally occurring. The approach could lead to the release of large volumes of the SCDF in a short timespan to seawards which could take a considerable time (potentially until a large storm arose again) to be re-worked elsewhere (as re-profiling has been ruled out by the developer already): This could also set up changes to the coastal processes that have impacts to the coastal geomorphology. The developer remains focused to the SCDF and its role towards the HCDF rather than considering the impacts that might arise of the interaction of the SCDF itself with the environment.
- 3.24. Footnote 19, pdf page 24, refers to "...predictions early in SZC's decommissioning phase (2099)"; it is unclear why this is an important point in time. It would be pertinent to consider the whole of the development lifespan to the end of decommissioning.
- 3.25. Although the SCDF pebbles may sit within the identified sediment sizes found within the natural system it precludes all finer sized sediments (at least at placement and before interstitial spaces become in-filled) so does not present a natural sediment or even similar but slightly coarser grain size distributions as used on other soft coastal defence schemes. It is unimodal and coarse and this is deliberate in the design to make it more stable and less erodible as a sediment; the consequence of this it will form steeper slopes than natural sediment (looking different and behaving differently with coastal processes) and maintain a promontory of the sediment on the coast that will interrupt coastal processes and impact on the geomorphology.
- 3.26. It is unclear that the 3.2 to 6.4cm grain size distribution would be available (naturally arising) either within the development site or from a licenced aggregate site. This suggests processing shall be needed leading to overflows at dredging sites or washing from land sources; nothing has been presented on the impacts of such matters.
- 3.27. The developer states on pdf page 25 that "The SCDF sacrificial layer is effectively a 'real-time' recharge method for sediment losses that occur during storms." It is unclear what proposition is trying to be presented here. The recharge of the SCDF does not happen in real time, it happens in advance of an event and may be re-worked prior to such event and during it, the ability to provide "recharge" (which the developer might mean to areas that are impacted by the development) will depend on the nature and scale of the event which will need to be sufficiently large to mobilise the artificially skewed (coarse) distribution of the sediment; this cannot be a guaranteed process to happen in "real time". The storms are eating away (potentially) sediment volume and thus it is probably best to call this a sacrificial placement of sediment as it will be eroded away but where it will move to is less certain (based on the information provided). As it is intended to replace the sacrificial amount to the original volume each and every time such a storm impacts the coast this may be replacing the SCDF before sediment has moved elsewhere, fully re-establishing the impacts from the SCDF promontory it forms and leaving eroded SCDF sediment elsewhere.

- 3.28. The developer states on pdf page 25 that “The cobble-sized sediments would have a degree of mobility (albeit less than coarse pebbles)...”, this is an obvious statement in the same way that the 10T rock of the HCDF could have a degree of mobility but this will be less than cobbles, potentially. This is further rather irrelevant as these are buried to the back of the buffer zone of the SCDF that is not intended to be exposed or mobilized and hence why would these cobbles be mobile. This could be the case in an storm (probably greater than 1:12) that removes all the SCDF sediment but the design presented suggest that the inner part of the SCDF is never exposed and is recharged before such a situation would ever arise - it cannot be both ways so it is unclear why this is being presented in this way. The National Trust would support clarification on this matter,
- 3.29. It is more realistic to present these cobbles as an alteration of the hard defence design but if the designer believes cobbles can be mobilised then they could also cause damage (abrasion, impact etc) to the hard defence and be abraded/ chattered themselves and also transported elsewhere to potentially accumulate. It is noted this is not claimed to be within the natural sediment distribution of the beach. The developer further states that “Dynamic cobble berms are an effective form of soft coastal defence...” it is unclear that this is what is being proposed here.
- 3.30. Figure 4, pdf page 20, shows the cobbles at the toe of the HCDF and buried beneath the SCDF recharge beach on the same profile as the HCDF and not as part of the beach profile form. It is hard to see how this would not have a large percentage of the void spaces in-filled by smaller sediments (including those blown in by wind or washed in by rainfall). Also, it is unclear with no re-profiling whether more cobbles would be introduced if the starting ones were moved. The developer should clearly state the intent for cobbles or that the SCDF cannot be sustained and cobbles are needed; (even during the latter stages of decommissioning) in which case their impacts should be fully evaluated. As these are being presented for stability reasons the impacts of promontory formed by them is closer to the HCDF than the SCDF and thus can be considered an extension of the HCDF.
- 3.31. To suggest that “Were the SCDF’s cobble sediment layer to be exposed, it would still function as mitigation, allowing native pebbles to pass over it and to dissipate wave energy into its porous matrix.” assumes it remains in situ and is not in-filled with sediment in advance of exposure. As exposure will be in a large storm event (having removed all the sacrificial and buffer SCDF) it is unlikely they will function in the way being presented and hence not form mitigation to the exposure of the HCDF but could set up impacts of their own, further seawards, as ‘volume loss is not expected’. In short what is being presented is that the cobbles do not move very much and so remain a fixed position on the shoreline and (effectively) an extension of the HCDF. The impacts of this have not been presented.
- 3.32. The developer states on pdf page 26 that “The use of a cobble berm would facilitate longshore transport of shingle (compared to an exposed HCDF)” It is unclear how this facilitates such movement longshore of sediment except that it forms a promontory of relatively fixed nature that would be exposed further offshore than the natural beach and hence (like any headland) act to transport sediment away from it to either side and potentially to be transported in an offshore direction. In short this would accelerate the transport processes above those which might naturally occur on the beach (which would naturally be landwards of this position and with a wider foreshore seaward of it (to remain in situ).

#### 4. Comments on Section 3 of the report

- 4.1. It is unclear why consideration of the profile to place sediment (aside from a single 1:7 slope) or recognition that it may alter to physical events is not considered as part of the recharge process. It is also unclear why there is no seismic assessment for the SCDF that (in the lack of re-profiling) could also demand recharge. Although less active than the natural beach (due to size) it is envisaged for it to be altered by physical processes and that should be relevant for future management and recharge decisions.
- 4.2. The frequency of recharge is uncertain. We note the developer has limited the consideration of this to 'parameters available in this report' which do not reflect the full span of the development; it is unclear why that is the case. It is also difficult to assess how unlikely three sequential; 'Beast from the East' (BfE) style events will be in over a hundred years' time but it is likely that larger events than the quoted 1:12 year BfE storm will arise. We could have 1:100 or 1:120 year storms. These larger events are particularly important for long term coastal change and large-scale coastal evolution and how the development may both cope with such events and interact and hence cause impacts with such events is not presented. It is not clear why the developer is limiting their assessment in this way. The National Trust remains convinced that for long term coastal process and geomorphological consideration it is necessary mitigation to both regularly monitor the NT beach and cliff frontage and the nearshore banks and bars to seawards (at minimum) through the life of the development.
- 4.3. It is unclear why the developer has applied only a 60 year operational phase to the assessment.
- 4.4. The developer claims on pdf page 27 to have applied "Several layers of conservatism..." but it is unclear that this is the case (as parameters are limited by them) or that these do address uncertainty in any reasonable way. It would (on the other hand) be an unnecessary impact of the development to place more coarser sediment than is needed; thus expanding the footprint of the works further seawards than needed, introducing more coarse sediment to the coast that needed, and consuming more resources than needed. It is unclear from the approach presented that it is a sustainable one (noting option B has a back-stop of a cobble berm) or that there are no other solutions to mitigation of the HCDF impacts that could be applied than the SCDF; consideration of approaches that are more in-keeping with the natural coastal processes and geomorphology and not (of themselves) leading to potential impacts.
- 4.5. Whilst the developer has applied UKCP18 predictions, it is known that these assume there is no change to the offshore Dunwich Bank; it is known that this has altered historically and when it has done so the nearshore bars also alter and so do the beaches. The potential for such change should form part of a proportionate assessment of the interaction of the development with coastal processes and geomorphology.
- 4.6. The developer asserts on pdf page 26 that "The model results used to set  $V_{sac, min}$  is highly conservative – the model set up over predicts erosion and shows losses several times greater than observed." It is unclear what 'observed' is referring to noting that the interaction of the SCDF has not yet happened and there are no observations of it, it is unnatural and of different sediment distribution than the natural sediment distribution; it is unclear what point is being put forward here.
- 4.7. The developer states on pdf page 28 in respect of Figure 8 "The histogram of volumetric changes between surveys (expressed per year) for all bins (Figure 8) shows that erosion and

accretion are fairly balanced across the survey area i.e., the distribution is near symmetrical.” It is unclear how this then ties to “...This reflects the results of previous studies that show no net seaward loss of shingle, cross-shore exchange of sand in and out of the subaerial beach (subtidal sand is abundant), low longshore transport rates, and very low longshore shingle loss in the Minsmere to Thorpness embayment (BEEMS Technical Reports TR107, TR403 and TR420)”.

- 4.8. It is wholly possible for sediment volume to remain around a mean (in a data set taken over a relatively short period of time and at distinct intervals of the beach profile cycle between storm and swell conditions that simply means the beaches change in profile on a seasonal basis (it will also alter in sediment composition, slope etc as a result). Such change does not infer sediment is only retained within the length of cross shore (exposed) beach; it is entirely feasible that sediment exchange happens with the subtidal for some distance offshore as the profile is effectively an extension of the beach until a point of closure or separation (e.g. by a geomorphic features or bedform formed by marine processes); indeed when sediment is lost from the profile exposed beach profile it must go somewhere and when it gains volume it must come from somewhere.
- 4.9. It is also feasible for beaches to appear the same (when exposed at low tide) but they undergo significant changes when underwater leading to a depth of disturbance to the sediment (which can alter its properties), thus it is possible that sandy sediment is disturbed, mobilised, exchanged and redeposited to leave a similar volume (averaged across an exposed beach profile) before and after. It is acknowledged that the existing processes are relatively low in magnitude compared to some more dynamic coastlines, but this should not infer they are any less sensitive to change. If the developer believes this is an entirely closed sedimentary system, then it is unclear why they believe that introducing over 1.3Mm<sup>3</sup> of pebbles to it (or a similar volume of pebbles and cobbles) will not impact upon it.
- 4.10. The National Trust believes the figures presented in section 3 of the report should have their statistical significance presented and other meta data related to the presented information; only one set of data in Figure 11 has provided a statistical significance. The same is true for matters such as the “rate of volume loss or gain (between 2 and 4 m<sup>3</sup>/m)”. The SCDF recharge requirements are also being set in a context of beach profiles that sit landwards of the SCDF face (such as S1B5) so assessment might consider how different parts of the profile behave / how the SCDF will behave when it is seawards and so more exposed (in process terms) than locations landwards of it. To apply the volumes of change observed historically on the beach is probably understating what the processes at the face of the SCDF will be and hence it is unclear that the recharge volumes identified are conservative or not. Applying 0.4m of sea level only would seem unnecessarily limited and it is not clear that the assessment approach has encompassed the “envelope <of> the possible recharge requirements over SZCs operational life”. None the less the emphasis on a low erosion rate of the natural beaches is identified so it is the case that interruption to the processes does not have to be of a high magnitude to potentially impact upon these balances and lead to significant change across a wide geographical area.
- 4.11. It is noted that the developer acknowledges (on pdf page 33) that the assessment is “approximate” and furthermore “The estimates in this report will be refined and incorporated into the CPMMP following more detailed modelling (including more sea level rise cases) and model improvements once additional calibration datasets have been secured”. It is considered by the National Trust as necessary to undertake this modelling, beyond a simple 1D approach, to allow a reasonable design to be formed and to test the principles of its

sustainability and impacts on the coastal processes and geomorphology (and other coastal receptors) as a part of this (DCO) process. We strongly believe this should not be set back to a later point in time under another process. The assessment of the design and behaviour (at minimum in the short term) should be made and should provide additional information that addresses the long term evolution and changes that might arise from it (which should be a combined assessment of the SCDF, HCDF, BLFs and other intertidal infrastructure) being implemented across the full lifetime of the development.

- 4.12. It remains the National Trust's contention that limited monitoring in close proximity to the development does not reflect the interplay the development will have with the processes and geomorphology of the area. The approach proposed sets up a promontory on this soft coastline that is intended to be maintained in position for all but the shortest possible time (when eroded) and the approach to the CPMMP needs to encompass a wider coast to reflect the GSB (at least). This need is rather supported by the assessments of beach changes over some kilometres of shoreline and the contention of a rather closed sedimentary system made in this and other reports. These show the importance of long term data, particularly when considering long term change.
- 4.13. The National Trust repeat again the need for monitoring to include the National Trust's frontage, the Dunwich cliffs and the nearshore bank and bar system seawards of the National Trust's frontage and for that monitoring to be continuous to that proposed by the developer in a limited area along the SZC frontage and immediately adjacent to it.



## Appendix C – National Trust Comments on other parties Written Representations

### 1. Environment Agency (EA) Written Representation

2. We note the EA's summary of their position on coastal processes as set out in the executive summary of their [written representation](#) (p.3) that "The sustainability of the Hard and Soft Coastal Defence Features (HCDF and SCDF) has not been demonstrated, and insufficient evidence has been provided to allow the impact on geomorphology and coastal processes to be understood." We support this view.
3. We note para 6.0 of the EA's written representation where they state they have revised their view on geomorphology and coastal process following the acceptance of changes to the DCO application. They now question the data applied and the plausible future scenarios with regards to the impacts of climate change. We support this view and note it accords with the comments contained within our written representation.
4. We note the EA view as set out in their written representation (para 6.2) that the SCDF now seems to be an integral element of the functioning of the sea defences. We agree with this interpretation.
5. We further note the EA view as set out in para 6.3 of their written representation that they are awaiting further accompanying reports and that there remain significant areas of clarification required to give them confidence that the approach being taken is appropriate and fit for purpose. We support this view and are disappointed that all accompanying reports to support the submission in its current form have not been provided to the EA as a regulator.

### 6. Marine Management Organisation (MMO) Written Representation

7. We note the MMO's concerns and recommendation contained within para 1.14 of their [written representation](#) "that there could be geomorphic impacts from the capital and maintenance dredging required at the permanent Beach Landing Facility ("BLF") and recommends that this is monitored via the CPMMP. The MMO advises that additional surveys are undertaken 3 months and 6 months after the initial capital dredge to monitor this." We support this view but suggest such monitoring should be required following each dredging campaign as the prevailing conditions could alter and responses alter accordingly.
8. We note the MMO's request as set out in their written representation (para 1.15) "that the overall bathymetry of the banks are surveyed annually for the duration of the construction phase to monitor any changes to the outer longshore bar." The NT support this view and note that the longshore extent of this surveying should reflect that of the outer longshore bar and include the banks.
9. We note the MMO's reference to Harbour Powers within the DCO and specifically para 2.2.21 of their written representation that "queries the inclusion in 65(1)(a) "routes or channels in the harbour and the approaches to the harbour" as general directions can be used only within the specified limits over which the harbour authority is to have jurisdiction. The above may be outside of that area" The NT would want to understand the extent of the seabed and intertidal area over which the developer seeks to have control as a harbour authority as this is being sought because of the development. It is also unclear the extent of

powers sought; where these relate to dredging and placement of sediment such powers could legally give the developer (as harbour authority) the ability to dredge or place (as yet unspecified) amounts of material.

10. The NT notes the MMO's position in para 2.3.3 (p.15) of their written representation on the removal of the HCDF from the DML as the MMO believe it will be located above MHWS which is outside of the MMO's jurisdiction. However, the NT believes it is unclear that this is the case as parts of the HCDF are below MHWS level and it seems may be exposed to tidal conditions dependant on the beach profile prevailing at the time. However, as these are limitations in the design they should remain within the DCO process until fully designed and assessed. We also note in the same paragraph that there is reference to ongoing discussions with East Suffolk Council, the MMO and the Applicant to determine how the SCDF should be placed in the DCO and DML. Again, the NT believes this should be consistent with the HCDF as they are integral to one another as works.
11. We support the MMO statement in para 2.3.11 (p.16) of their written representation re licensable activities where they state all disposal activity must be assessed against the Waste Hierarchy. NT support this view.
12. The NT note that para 2.3.18 (p.18) of the MMO's written representation refers to discussions with stakeholders. The NT will provide our comments on the HCDF and SCDF to the MMO as a stakeholder and will request that we are consulted on any further matters that might arise
13. The NT notes mention by the MMO in para 2.3.23 (p.19) of their written representation to navigation lighting and would like to know to what extent these would be visible from NT property.
14. The NT supports the concern of the MMO regarding impact (degradation) to the longshore bar as articulated in para 2.4.1 (p.21) of their written representation and note this feature extends along the NT frontage. We further note their concerns in the same paragraph regarding coarser sediment and note that coarser material is located in the dredged areas; it is thus conceivable for there to be an interchange with SCDF sediments. We note the MMO's recommendations regarding monitoring but would seek the adoption of a precautionary approach given the conditions will vary when dredging is carried out. We believe it is reasonable for such monitoring to be applied to each dredging operation as accumulation could arise in a different circumstance. For example if the conditions at the initial capital dredge are dispersive then this would risk allowing impacts to arise at a later date under another set of conditions for dredging. As a Harbour Authority it would be normal to monitor such activity but such information should be available for scrutiny.
15. The NT agrees with the MMO statement in para 2.4.4 of their written representation (p.22) that the evidence and information relied on by the applicant regarding sediment plumes is not clear; The NT has concerns that the behaviours of plumes from a range of construction activities have not been clearly determined.
16. We note and support the MMO's comments on Coastal Geomorphology set out in para 3.1.1 of their written representation (p.23). We support the MMO's view on the risk of scour associated with barges and tugs operating at low water depths close to the outer bar (see para 3.1.2). We believe that general deliveries (as they have now largely moved to marine

transport from road) also require an assessment to address their potential environmental impacts properly.

17. The NT supports the MMO's comments in para 3.1.7 & 3.1.8 of their written representation (p.25) regarding underwater noise related to piling. We also agree with the MMO's statement under para 3.1.9 that a broader consideration should be made for fauna and a wider group of cetaceans.
18. Whilst we agree with the MMO's view in para 3.3.1 of their written representation that dredging the BLF will cause impacts to coastal processes, the alterations to HCDF and SCDF combined could also have significant impacts. We are equally unclear why there has been no modelling of these impacts (nor to the HCDF/SCDF) but would urge that a wide range of conditions are encompassed in respect of the dredging activities identified here by MMO to reflect the range of conditions that may arise and variability in magnitude, direction, or nature of changes that arise.
19. The NT supports the MMO's view as set out in 3.3.3 (p.27) of their written representation regarding the need for annual surveys of the outer longshore bar. We believe any such monitoring should extend along the length of this feature so that should any deterioration of it arise locally to the development that the impact of this migrating away can be tracked over time. NT would encourage this to at least include as far as the north of its frontage.
20. The NT would concur with the MMO's view as set out in 5.1.1 (p.29) of their written representation that the focus of the impact assessment is to the shoreline and not subtidal area and the geomorphic features of bars and banks. We agree this remains a gap in the assessment and support further assessment of these matters as well as monitoring to capture data for such assessment. The NT is concerned that impacts that start locally to the BLFs or dredging activities could migrate along the bar length over time or cause changes that impact along the bar length over time; we would therefore support their monitoring and the inclusion of the NT frontage in this.
21. The NT notes the MMO's response to CG 1.9 (as set out in p.52 of their written representation) that states "the MMO maintain the view that there remains a risk of effects around the interaction of the permanent BLF dredged area and the outer longshore bar which has not been considered because the applicant does not predict any significant effect from this. It is unclear what might be done to mitigate any unexpected effects there, we therefore recommend further surveys in the period following the completion of the dredged berth area for the permanent BLF." We note the MMO shares our views around impact to bars and uncertainty.
22. The NT notes in the MMO's response to CG 1.10 (as set out in p.53 of their written representation) that the MMO believes other interested parties will be a part of the Marine Technical Forum; this is not what the CMMMP states and NT consider that this latter document should be changed to incorporate the NT as an interested party and near neighbour.
23. The NT notes and supports the MMO's view as set out in its response to CG 1.11 (p.53 of their written representation) that it would expect to see an assessment of the expected impacts on the WCS associated with the HCDF presented through the examination process. We also note that parts of the HCDF sit below MHWS level.

24. The NT notes and supports the MMO's view as set out in its response to CG 1.13 (p.54 of their written representation) regarding its recommendations for additional surveying to a) confirm the low sedimentation rate in the dredged area and b) confirm the early response of the outer longshore bar to the dredged area.

**25. Written Representation of Dr Thérèse Coffey MP for Suffolk Coastal**

26. The National Trust notes the comments by Dr Thérèse Coffey MP in her [written representation](#) urging the examining authority to ensure that the environmental regulators are satisfied, and that all the issues related to this are heard and discussed within the examination process itself, requesting an extension of time from the Secretary of State for this to occur if necessary, so as not to leave these matters to further conditions or conclusion outside this process. The National Trust welcome and strongly support this view.