Cyfoeth Naturiol Cymru
Natural Resources Wales

Ein cyf/Our ref: 20011606
Eich cyf/Your ref: EN10007

Maes y Ffynnon,
Penrhosgarnedd,
Bangor,
Gwynedd,
LL57 2DW

WylfaNewyddDCO@cyfoethnaturiolcymru.gov.uk
03000 655 238

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

12 Chwefror / February 2019

Er sylw / For the attention of: Ms Kay Sully

Annwyl / Dear Madam,

GORSAF BŴER NIWCLEAR ARFAETHEDIG WYLFA NEWYDD / PROPOSED WYLFA NEWYDD NUCLEAR POWER STATION

CYFEIRNOD YR AROLYGIAETH GYNLLUNIO / PLANNING INSPECTORATE REFERENCE: EN10007

EIN CYFEIRNOD / OUR REFERENCE: 20011606

PARTHED: CYFLWYNIAD YSGRIFENEDIG CYFOETH NATURIOL CYMRU AR GYFER DYDDIAD CAU 5

RE: NATURAL RESOURCES WALES' WRITTEN SUBMISSION FOR DEADLINE 5

Thank you for your Rule 8(3) letter, dated 18 December 2018, requesting Natural Resources Wales' ("NRW") written submissions for Deadline 5.

This letter comprises the following submission from NRW:

- NRW's responses to actions set in the Issue Specific Hearings on 9th, 10th and 11th January 2019 – see Annex A;
- NRW's responses to the second round of questions from the Examining Authority – see Annex B.

The comments provided in this submission comprise NRW's response as a Statutory Party under the Planning Act 2008 and Infrastructure Planning (Interested Parties) Regulations 2015 and as an 'interested party' under s102(1) of the Planning Act 2008.

Our comments are made without prejudice to any further comments we may wish to make in relation to this application and examination whether in relation to the Environmental Statement ("ES"), provisions of the draft Development Consent Order ("DCO") and its Requirements, Statements of Common Ground or other evidence and documents provided by Horizon Nuclear Power (the "Applicant"), the Examining Body or other interested parties.

In addition to being an interested party under the Planning Act 2008, NRW exercises functions under legislation as detailed in the cover letter of NRW's Deadline 2 Written Representations [REP2-325]. For the purpose of clarity, comments from NRW Permitting Service in Annex A are titled as such and are produced in section 1.1; all other comments in Annex A pertain to NRW's advisory role. The Examining Authority's questions in Annex B are directed to both NRW advisory and NRW's Permitting Services; responses to questions are therefore from both NRW's functions.

Please do not hesitate to contact Bryn Griffiths should you require further advice or information regarding these representations.

Yn gywir / Yours sincerely

Rhian Jardine
Head of Development Planning and Marine Services
Natural Resources Wales

[CONTINUED]

ANNEX A

NATURAL RESOURCES WALES' DEADLINE 5 RESPONSE TO ACTIONS SET AT THE ISSUE SPECIFIC HEARINGS (ISH) ON 9TH, 10TH AND 11TH JANUARY 2019

CONTENTS

1. SECOND DRAFT DCO ISH

1.1. Marine Requirements (NRW Permitting Service comments)

1.1.1. At the DCO Issue Specific Hearing on 9 January 2019, NRW stated that it was undertaking a detailed review of the DCO in light of the potential discharging authority role. Following this review there are amendments we would seek to the DCO, which focus on ensuring clarity regarding the discharging authority roles, requirements that we consider relevant to the marine works, and procedural matters arising from Schedule 19. We have not had the opportunity to discuss our proposals with the Applicant or IACC and would welcome further dialogue with all parties on these matters.

- *Discharging Authority and definitions*

1.1.2. Should NRW act as discharging authority under the DCO for work and requirements that are seaward of Mean High Water Springs (MHWS), it is

essential that the roles and responsibilities between IACC and NRW are clear. We have no objection to the identification of the IACC as discharging authority of works and requirements down to Mean Low Water; we note that this leads to an overlap in DCO discharging authority jurisdiction between NRW and IACC in the intertidal area (Mean Low Water to Mean High Water Springs). We also note that, notwithstanding the DCO requirements, this overlap does exist between the Marine Licence jurisdiction and DCO jurisdiction. To ensure that both authorities are able to undertake their functions in a manner that is unfettered and legally compliant it is important that ways of working are established between NRW, IACC and Welsh Government. Discussions on these ways of working are ongoing.

1.1.3. It is essential that the Marine Works are clear within the DCO, and NRW consider that the current definitions of "discharging authority" and "Marine Works" be amended as follows. Within the DCO the discharging authority is currently defined as: '"*IACC" in respect of any Requirements in Schedule 3 (Requirements) of this Order relating to land above the MHWS, and NRW in respect of any Requirements relating to land below the MHWS and the Marine Works;*' We recommend that this is amended to state land seaward of MHWS to avoid confusion that this only works under the sea/sea bed.

1.1.4. In addition, we consider that the definition of "Marine Works" is amended to ensure that NRW's discharging authority role is restricted to those Seaward of MHWS, noting that some structures currently identified as Marine Works also continue landward of MHWS, for example the MOLF.

1.1.5. We therefore propose the following amendment to read: '"Marine Works" means works or any part of works authorised by this order that are seaward of MHWS, including, but not limited to Work No.s 1E, 1F, 1G, 1H described in Schedule 1 (Authorised development) in so far as they fall seaward of MWHS, and any intertidal works unless otherwise agreed with NRW'. In addition, this should be reflected in the title s. 6 of Schedule 3.

1.1.6. In addition, we note that the DCO Part 6 is entitled "Marine Works", which may reduce clarity. Whilst we note that this is only an administrative heading we suggest Part 6 should be retitled.

1.1.7. We note that the DCO defines NRW as: '"NRW" means the Permitting Service of Natural Resources Wales;' Whilst we note that NRW's Permitting Service will be undertaking the role of discharging authority under the DCO, NRW would also perform other functions under the DCO. In addition, the Permitting Service of Natural Resources Wales is not a statutory designation and should not therefore be used. We recommend this is amended to: "NRW" means the Natural Resources Body for Wales;

- *Requirements and Work numbers*

1.1.8. For all requirements under which NRW is identified as the discharging authority we would consider it appropriate to consult with NRW regarding these requirements.

1.1.9. As stated in our response to Q2.4.42 of the second round of written questions, we support, subject to a minor amendment, the inclusion of the Welsh Government recommended provision to ensure that the requirements and jurisdiction of the Marine Licensing regime under the Marine and Coastal Access Act are clear.

1.1.10. In undertaking our review, we note that there are requirements in Schedule 3 that are pertinent to works seaward of MHWS. Therefore, NRW consider that we should be a discharging authority in addition to IACC where they are pertinent to works that are to be undertaken seaward of MHWS.

a) PW2 Phasing of the authorised development
b) PW3 Construction Method Statement
c) PW4 Notice of completion and operational use

For these requirements, we recommend these are amended with an additional approval role to NRW, where the works are seaward of MHWS. For example; "PW2 Phasing of the authorised development. The delivery of Key Mitigation must be in accordance with the sequencing set out in the Phasing Strategy, unless otherwise approved by IACC and, where associated with works seaward of MHWS, by NRW."

1.1.11. The current requirement WN25 Marine Works detailed design approval, includes a potential drafting error. We note that Requirement WN25(1) relates to "*building, works, or other structure identified in Requirement WN27*"; a requirement that relates to the operation of the marine off-loading facility. We believe that it should instead refer to WN26, "*Marine Works parameter plans and maximum finished dimension of buildings and other structures*" which sets out the Marine Works structures.

1.1.12. In addition, it is not clear why subparagraph (3) refers to the "Marine Works" whereas subparagraph (1) cross-refers to works identified in a Requirement. This should be clarified. We request consistency to ensure that NRW's discharging role cover the breadth of the Marine Works permitted by the DCO.

1.1.13. We note the current requirement WN28. For clarity we recommend including the code assigned to Holyhead North disposal site: ISO43.

1.1.14. In undertaking our review NRW has requested clarification and confirmation from the Applicant on the description of Marine Works as listed in the DCO and how they relate to the description of Marine works as applied for in the Marine Licence Application CML1832 (document submissions ML-APP-01-MW Rev 01 and ML-APP-02-DD Rev 01) to NRW. We are now reviewing the Applicant's response and if necessary, will provide further comments

regarding the clarity and consistency of work numbers and their associated parameters between the Marine Licence and DCO.

Schedule 19

1.1.15. Considering schedule 19, there are a number of procedural issues that are of concern. In our response the second round of Examiners Questions, Q2.4.45 we have recommended a requirement for inclusion within the DCO to ensure that the cost incurred by NRW in undertaking its function as discharging authority under the DCO are met. The inclusion of this requirement has been agreed in principle with the Applicant, pending further review by their legal team.

1.1.16. The timescales for discharging requirements or requesting further information are challenging and may not provide discharging authorities and consultees with enough time to appropriately scrutinise the submitted material. We would recommend that the WN24 Marine Works Sub-CoCP is added to the list of major requirements and that the time periods for both discharge of requirements and requests for further information are extended. In addition, there is currently no service level for determining a marine licence discharge of condition for a Band 3 project, such as Wylfa Newydd.

1.1.17. We note in schedule 19, that in the event an appeal is made regarding the discharge of requirements that this would be made to the Secretary of State. For awareness, there is no mechanism for appeal against a discharge of Marine Licence condition, unless remedy is sought by Judicial Review.

2. FIRST BIODIVERSITY ISH

2.1. Morwenoliaid Ynys Môn / Anglesey Terns SPA - Mitigation

2.1.1. At the first Biodiversity ISH hearing on 10th January, under the agenda item discussing the Anglesey Terns Special Protection Area (SPA), NRW made a number of comments in relation to the mitigation measures proposed by the Applicant. These included comments on the technical note submitted by the Applicant at Deadline 3 titled '*Technical Note indicating how Horizon would meet committed noise levels'* [REP3-048]. NRW has provided written summaries of its oral representations at the hearing at Deadline 4 [REP4-039], however, NRW took an action to provide its detailed comments on the mitigation in writing (action no. 3 from the Planning Inspectorate's Hearing Action Points).

2.1.2. As a result of the potential disturbance to terns, the Applicant has proposed mitigation in section 11.4 of the Main Site Power Station Sub-Code of Construction Practice (CoCP) and section 11.5 of the Marine Works Sub-CoCP (Revisions 2.0 submitted at Deadline 2). However, as outlined in our Written Representations, NRW has significant concerns regarding the effectiveness and deliverability of the mitigation proposed. We note that the

Applicant proposes to update the Sub-CoCPs with the information from the technical note [REP3-048].

2.1.3. NRW has reviewed the technical note [REP3-048] and can confirm that NRW's position as provided in its Written Representations remains unchanged. As detailed in paragraph 7.8.31 of its Written Representations, NRW still has significant concerns regarding the effectiveness and deliverability of the mitigation proposed. We have the following detailed comments to provide on the technical note:

a) NRW is unclear as to the basis for the Applicant's proposed Red and Amber thresholds or indeed, how those thresholds would be developed. It is also unclear as to why the Applicant considers it appropriate to use hourly averages to determine whether thresholds have been exceeded. The approach of considering hourly averages does not take into account the unique, impulsive noises which could lead to abandonment and increased fly ups.

b) Section 11.4.2 of the technical note states (5th bullet point) that once thresholds have been exceeded, the decision-making process on mitigation measures will be guided by a number of criteria. These criteria include safety considerations, the availability of equipment and impacts on the overall construction programme. None of these criteria are defined within the technical note. As a result, there is the possibility that a disturbing activity could be allowed to continue without mitigation being implemented..

c) We also note in the 6th bullet point of section 11.4.2 that, for any construction activities to be halted (where thresholds are exceeded), that "*an assessment first needs to be undertaken regarding whether the works are stable, and it is safe to do so (i.e. some works may need to be completed before they can be stopped); this will affect the time taken to alter working practices".* Again, the mitigation cannot be relied upon to reduce possible disturbance to the colony.

d) In section 11.4.4 – 11.4.5 of the technical note, the Applicant proposes additional noise controls during the 'establishment period'. The controls propose a limit of 55dB, at the colony, on the noise caused by blasting and day-time construction works. The Main Power Station Site Sub-CoCP states that in order to achieve 55db, "*works would avoid the most adverse (light downwind) wind conditions for noise transfer to the colony*" NRW require further detail on how noise-generating construction activity will be managed in accordance with the highly variable wind and weather conditions at Wylfa Newydd.

e) NRW also has concerns with respect to the Applicant's proposed 'reactive monitoring' in section 11.4.6. For instance, the Applicant does not explain how observed 'fly-ups' will be attributed to construction activities by 'matching acoustic signatures to site activities'. We consider that this will be particularly challenging given the scale of the construction site and the range of construction activities likely to be occurring simultaneously. Even if the Applicant can identify the activity responsible for disturbance, alternatives will only be adopted if 'safe and practicable' – no definitions of safe or

practicable are provided. As a result, NRW advise that the proposed mitigation will not sufficiently address the risks of disturbance at the Cemlyn tern colony.

2.1.4. In view of the concerns raised, NRW's clear advice is that there is significant scientific doubt regarding whether there will be adverse effects on the Sandwich, Common and Arctic terns of the Anglesey Terns SPA. Stage 3 and 4 of the Habitats Regulations Assessment process would therefore be required and compensation measures be secured. NRW has been advising the Applicant with regard to possible compensation measures elsewhere on Anglesey and in north Wales to attract in and provide breeding sites for the three terns species in appropriate locations away from potential disturbance.

2.2. Bae Cemlyn / Cemlyn Bay SAC – Mound E

2.2.1. NRW notes the bulk earthworks and landscape mounding proposed within the Cemlyn area at Mound E. Drainage from Mound E will flow into Nant Cemlyn, which then flows into the Cemlyn lagoon, one of the special features of the Cemlyn Bay Special Area of Conservation (SAC). Cemlyn lagoon is particularly sensitive to water quality impacts, and NRW has concerns that drainage from Mound E during the construction period, before Mound E is fully re-vegetated, could contain a greater concentration of suspended sediments and impact on water quality in the lagoon.

2.2.2. NRW has reviewed the latest Main Power Station Site Sub-CoCP [REP2-032] that was submitted for Deadline 2 which details (section 10.2.10) mitigation measures to avoid adverse effects on lagoon.

2.2.3. We note the mitigation arrangements proposed for surface water runoff from Mound E into Nant Cemlyn and the lagoon. In particular, we welcome the proposal to pump the run-off to Afon Cafnan, until the risk of pollution has been reduced, and we also welcome the design of the swales and siltation lagoon across Mound E.

2.2.4. We also accept the proposal to combine an assessment of the state of the vegetation covering Mound E, with an assessment of the sediment load arising from the mound over a period of time, and then the proposal to compare that with the sediment load arising from the wider catchment. NRW is satisfied that this provides a robust basis for restoring a state of natural drainage from Mound E to the lagoon (which is a feature of Cemlyn Bay Site of Special Scientific Interest (SSSI) / SAC).

2.2.5. There is also additional mitigation detail provided in section 7.39.10 of the Applicant's response to NRW's Written Representations [REP3-035], which we advise is included in the Sub-CoCP.

2.2.6. The third bullet point in 7.39.10 [REP3-035] states "*when comparing data collected for Mound E and Nant Cemlyn, the relative performance of the two*

systems will need to be compared for both specific events and across the wider flow regime (seasonal variations in performance may also need to be considered)". NRW advise that events which lead to high total suspended solids spikes unrelated to ambient conditions (e.g. incidents such as ploughed fields, cattle crossing, road runoff etc) will need to be discounted. The proposals should deliver water which does not mimic such breaches of good land management and such event peaks should be excluded from consideration as background levels.

2.2.7. In summary, NRW is satisfied that, with detailed mitigation measures, impacts on the Cemlyn Bay SSSI/SAC as a result of Mound E can be appropriately mitigated. Section 10.2.10 of the Applicant's response to NRW states that baseline monitoring, and trigger thresholds, will be agreed with NRW. NRW advise that the detailed mitigation (including monitoring proposals) should be set out in the detailed Sub-CoCP, to be approved by the discharging authority (in consultation with NRW).

2.3. Marine Mammals (as features of Welsh SACs and European Protected Species)

2.3.1. At the 1st ISH on 10th January, NRW requested clarification on the underwater noise criteria used to assess marine mammal injury and disturbance (see paragraph 3.6.4 of NRW's oral representations submitted at Deadline 4 [REP4-039]). At Deadline 4, the Applicant submitted additional information as part of the report titled *Marine Works Noise Modelling based on US National Marine Fisheries Services (NMFS)*, which is located within Appendix 1-3 of the document titled *Horizon Deadline 4 responses to actions set in Issue Specific Hearing on 10 January 2019* [REP4-005].

2.3.2. Appendix 1-3 of [REP4-005] also referred to Appendix 2-1 *Underwater Noise Assessment – Additional NMFS Modelling Results* however this Appendix was not included in the formal submission at Deadline 4. This Appendix includes the important information that NRW requested at the hearing.

2.3.3. However, the Applicant has since shared Appendix 2-1 informally with NRW. We advise the Applicant submits the information to the Examination Authority at the earliest opportunity. To assist the Applicant and the Examining Authority, NRW provides the following comments (2.3.4 – 2.3.19) on the Appendix 2-1 shared informally. As detailed below, NRW advise that clarification is required on the underwater noise modelling undertaken.

- *European Protected Species: Injury and mitigation – Choice of metrics*

2.3.4. Appendix 2-1 presents the results of new noise modelling against the NMFS injury criteria. The loudest noise source is rock breaking and we believe this has been modelled as impulsive noise using the following source levels: unweighted/peak = 208.6 dB re 1uPa (RMS) @1m; weighted SEL = 148.7 dB re 1uPa^{2}s @1m. Typically, impulsive noise is characterised by high peak

sound pressures, rapid rise times and rapid decay, which makes this type of sound more injurious than non-impulsive sound sources. Rock breaking clearly has an impulsive component to it, but as rock breaking uses multiple pulses (43 'strikes' per minute; see section 8.3 of ES Appendix D13-9: Underwater noise baseline and modelling [APP-227]), there is unlikely to be as much decay between strikes than for a single strike, and therefore could be considered under the non-impulsive category.

2.3.5. Nevertheless, rock breaking has not been modelled using non-impulsive criteria and therefore NMFS' 2018 dual metrics for impulsive sounds have been presented: these are the unweighted peak Sound Pressure Level (SPL_{peak}) and the weighted cumulative Sound Exposure Level (SEL_{cum}). NMFS (2018) recommends using whichever criteria results in the largest 'isopleth' (i.e. radius) for calculating Permanent Threshold Shift (PTS: hearing injury) onset. As such, the worst case of these metrics (unweighted SPL_{peak}) predicts PTS in harbour porpoise out to distances of 2km (Table 13). This is significantly greater than the PTS distances calculated using the weighted SEL metric (SEL_{cum}) of 380m (Table 12), which in turn is greater than the distance calculated using the Southall et al (2007) criteria (M-weighted SEL) at 25m, as presented in previous modelling results (Table 8-16 of the Shadow HRA). It should be noted, however, that in the previous modelling, unweighted SPL_{peak} metrics (representing impulsive peak noise) were not calculated, yet may have resulted in large PTS zones, perhaps approaching the 2km radii of more recent calculations.

2.3.6. Clearly the choice of metric in drawing a conclusion here is important - in the worst-case scenario using SPL_{peak}, there is the potential for the peak component of the noise to injure (PTS) harbour porpoise out to the 2km. This distance is larger than the standard mitigation zone/watch area radii proposed in the JNCC piling (500m), seismic (500m) and explosives (1km) noise mitigation protocols, which are designed to mitigate injury of European Protected Species (EPS: all cetaceans). Standard mitigation uses marine mammal observers and passive acoustic monitoring, but these may not be effective at distances beyond 1km since it is generally accepted that animals, in particular small elusive species such as harbour porpoise, become difficult to detect beyond that distance.

2.3.7. In this scenario, NRW would advise implementing additional mitigation that goes beyond the standard JNCC noise mitigation protocols. This might include the reduction of noise at source by utilising lower breaking/hammer energies, using noise screens (e.g. bubble curtains), using alternative methods or managing construction planning/timing. Additionally, the use of Acoustic Deterrent Devices (ADDs) might be suitable to clear the area (likely PTS zones) of marine mammals. However, ADDs introduce additional noise into the marine environment and would need to be assessed and carefully managed, particularly in combination with other noisy activities which might create undue disturbance to marine mammals.

2.3.8. Alternatively, choosing SEL_{cum} metric would reduce the PTS distance to 380m – nearly an order of magnitude different to that derived using SPL_{peak}. In this scenario, standard JNCC mitigation would be appropriate for minimizing hearing injury in harbour porpoise.

2.3.9. In choosing the SEL_{cum} metric, however, the modelling data presented in Appendix 2-1 suggests that for low frequency cetaceans (e.g. Minke Whale), rock breaking may produce PTS out to 790m (Table 12). As before, this distance is larger than the standard mitigation zone/watch area radii proposed in the JNCC piling (500m) and seismic (500m) (but not explosives, 1km) noise mitigation protocols. For avoidance of risk of committing an offence of injury to EPS, here, NRW would advise widening the mitigation/search zone and/or additional mitigation as described above.

2.3.10. Appendix 2-1 states "*the Marine Mammal Mitigation Scheme will ensure that no marine mammals are within the PTS range of rock-breaking prior to commencement*". Some assurances are therefore required to ensure this is the case, especially if PTS in harbour porpoise is predicted to occur out to 2km when adopting the SPL_{peak} metric, noting this relates only to hearing injury (PTS).

2.3.11. NRW therefore request clarification on the metric intended to be used in order to understand the mitigation that would be appropriate.

- *Modelling accuracy*

2.3.12. As described above, the choice of metric determines the interpretation and route of action/mitigation and therefore NRW request clarification on which metric the applicant is proposing to be used. Before NRW can provide its complete advice on the information presented, we request assurance on the accuracy and correctness of the modelling in the Appendix because there appears to be issues with propagation calculations that estimate how quickly source sound levels attenuate in shallow water.

2.3.13. For example, for low frequency cetaceans (e.g. Minke Whale) the weighted source level used in the calculations was 183.2 dB re $1uPa^2S$ @1m (Table 4) whilst the threshold of injury for low frequency cetaceans is 183 dB re $1uPa^2s$ (weighted SEL_{cum}) (Table 2). It is unclear how that source level has to propagate for 790m before reducing by 0.2 dB to 183 dB re $1uPa^2s$ – this appears overestimated. Similarly, we would question the modelling presented in Table 13 for unweighted SPL_{peak} metrics for harbour porpoise (and potentially other marine mammals) because it is our understanding that the source sound levels used for rock breaking was 208.6 dB re 1uPa (peak) @1m (unweighted) yet the threshold of injury for harbour porpoise (high frequency) is 202 dB re 1uPa unweighted SPL_{peak}. Again, a reduction of 6.6 dB over 2km of sea, seems overestimated.

- *Habitats Regulations Assessment: Disturbance of harbour porpoise within North Anglesey Marine Site of Community Importance (SCI)*

2.3.14. One conservation objective of North Anglesey Marine Site of Community Interest (SCI) is that 'there is no significant disturbance of the species'. The Statutory Nature Conservation Bodies have developed guidance recommending that an area of disturbance that exceeds 20% of the SCI area at any time, or 10% on average during the relevant season (summer), would be potentially considered an adverse effect on site integrity.

2.3.15. NMFS 2018 does not present criteria for disturbance from noise and older/different criteria are typically used. The predicted disturbance radius from rock breaking of 490m for harbour porpoise is presented in the previous modelling in the shadow HRA documentation and is calculated using unweighted criteria (145dB re 1uPa^{2}s @1m $SEL_{single\ strike}$) from Lucke et al (2009). However, if the choice of metric for injury (see above) is considered to be the weighted SEL_{cum}, we propose that the use of Temporary Threshold Shift (TTS) in high frequency cetaceans – 140dB re 1uPa^{2}s weighted SEL_{cum} (Table 2) – might be an appropriate proxy for disturbance in this case, and although TTS typically results from louder sounds than that causing behavioural disturbance, this metric is potentially more precautious than the unweighted 145dB re 1uPa^{2}s @1m $SEL_{single\ strike}$ metric used by Lucke et al (2009). Using the weighted SEL_{cum} metric in relation to rock breaking predicts TTS (proxy for disturbance in this case) in harbour porpoise to occur out to 3.3km (Table 12).

2.3.16. This radius of disturbance has an area of 34km^2, which is approximately 1% of the SCI area (the SCI is 3249 km^2). If the weighted SEL_{cum} TTS metric is used as a proxy for disturbance in this case, we would conclude that there would not be significant disturbance of harbour porpoise in this SCI.

- *Concurrent noise sources*

2.3.17. An assessment of concurrent noise sources is presented in the new noise modelling document (Appendix 2-1) (Table 16) and models combined noise using non-impulsive criteria from rotary drilling, percussive drilling, cutter-suction dredging and rock breaking operations occurring simultaneously. The results presented in this table imply that PTS onset in cetaceans would occur at distances of less than 160m but it is not clear how the activities were spatially arranged during the modelling or whether they represent the distances between activities likely to occur on site. Nor is it clear how rock breaking was incorporated in the modelling when this has only been modelled using impulsive criteria.

2.3.18. NMFS (2018, page 22) states: "*The recommended application of the weighted SEL_{cum} metric [as used in Table 16] is for individual activities/sources. It is not intended for accumulating sound exposure from multiple activities occurring within the same area or over the same time or to estimate the impacts of those exposures to an animal occurring over various spatial or temporal scales. Current data available for deriving thresholds using this metric are based on exposure to only a single source and may not*

be appropriate for situations where exposure to multiple sources is occurring." NRW therefore seeks further clarity on how this 'cumulative assessment' has been carried out and seeks information on its interpretation.

- *Percussive piling*

2.3.19. The Request for Non-Material Change – Working Hours [REP4-012] states in Table 2-1 that all marine piling is proposed between 07:00-18:00 hours (DCO application), whilst Table 2-2 outlines the change that percussive piling specifically is proposed to be conducted between 07:00-19:00 hours. However, it was NRW's understanding that percussive piing was not going to be utilised. The technical report [REP4-012] assumes that percussive piling was part of the DCO application however we request confirmation as to whether that is the case and that those impacts have been assessed in the ES and Shadow HRA. The use of percussive piling, if it hasn't already been assessed, may generate new or different significant environmental effects. NRW request confirmation on whether this construction method will be used and whether it has been modelled and assessed.

- *References*

Lucke K, Lepper P A, Blanchet M (2009). Temporary shift in masked hearing thresholds in a harbour porpoise (Phocoena phocoena) after exposure to seismic airgun stimuli. Journal of the Acoustical Society of America 125(6) 4060-4070.

National Marine Fisheries Service. (2018). 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

Southall B L, Bowles A E, Ellison W T, Finneran J J, Gentry L, Green C R, Kastak D, Ketten D, Miller J H, Nachtigall P E, Richardson W J, Thomas J A, Tyack P L (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals, Vol. 33, No. 4, 411-521.

2.4. Benthic Habitats

2.4.1. NRW took an action at the 1st Biodiversity ISH hearing to provide comments on the Ecological Enhancements Mitigation Report [REP4-023], which has now been formally submitted at Deadline 4. We provide our main comments in this section (2.4) below. We also provide detailed comments in Appendix A-1 below.

2.4.2. NRW welcomes the fact that the Applicant has re-examined its marine ecological enhancement proposals. We note that the level and number of measures that can be undertaken as part of the marine works has increased

from the previous proposals set out in Appendix A of the Applicant's Deadline 2 submission [REP2-049]. The report allows a better understanding of the constraints around the design of marine structures, and the ecological enhancement measures that can be put in place. However, NRW still considers that the extent of measures proposed does not adequately offset the loss and degradation of marine habitats of conservation importance, and that establishment of benthic communities of diverse ecological structure and function akin to those currently present is unlikely, given the stated constraints on the project.

2.4.3. The Applicant acknowledges that "*it is not physically possible to fully offset the area of habitat loss under the footprint of the Marine Works*" (section 11.4.1) and that "*it is not possible to reliably quantify the contribution of the proposed ecological enhancement measures to improving quality and therefore overall ability to offset the impacts*" (section 10.1.4). The lack of ability to quantify the potential value of the marine structures, as well as any ecological enhancement measures, means a residual risk remains in the ability of the project to be able to adequately offset the losses of marine habitats of conservation importance. NRW acknowledge that no additional information, or additional measures (in view of possible engineering constraints) can be provided by the Applicant to address this uncertainty.

2.4.4. In view of the above, NRW do not agree that the residual effects on benthic habitats of conservation importance can be reduced from a 'Moderate Adverse' to a 'Minor Adverse' effect. NRW advise that the Secretary of State will need to consider the scheme in the context of the impacts identified on benthic habitats. NRW advise that the marine enhancement measures be appropriately secured to demonstrate that the impacts on benthic habitats are being mitigated as far as reasonably possible.

2.5. Water Framework Directive

- *The Skerries Coastal Water Body*

2.5.1. As detailed in section 3.7.4 of NRW's written submissions of oral cases [REP4-039], further information was required to demonstrate whether the benthic invertebrates element of the Skerries coastal water body would not deteriorate as a result of the project. Additional information was provided in the Applicant's response to NRW's Written Representations [REP3-035] which NRW has now reviewed.

2.5.2. Paragraph 7.17.3 of [REP3-035] states "*Horizon acknowledges that there may be a requirement, following the completion of the Examining Authority/Secretary of State's WFD Compliance Assessment, to review the Water Framework Directive Compliance Assessment. Changes to the understanding of effects on waterbodies and/or receptors may require consideration through this process*". NRW agree that changes to the understanding of effects on waterbodies and/or receptors may require consideration through this process. Furthermore, this has the potential to

draw additional receptors within the scope of information to support a derogation under Article 4(7) of the Water Framework Directive. NRW advise that the scope of the 4(7) derogation is agreed as soon as possible to allow the Applicant to collate the necessary information and for NRW to provide an assessment of that supporting information in a timely manner.

2.5.3. As detailed in NRW's Written Representations [REP2-325], NRW agree with the Applicant that the hydromorphology status of the WFD Skerries coastal water body may deteriorate from High to Good status as a result of the marine works associated with Wylfa Newydd Project and that the hydromorphology quality element will as a result, be considered for derogation under Article 4(7).

2.5.4. NRW note the additional information provided in section 7.10 of [REP3-035], however, as highlighted in NRWs Written Representations (7.4.8a) an assessment of deterioration in the benthic invertebrate element should not just be considered on the basis of scale but also by consideration of all requirements of the Directive, including the relationship between hydromorphology and biological quality and by comparison to normative definitions. The Applicant has not considered the link between the hydromorphology as a supporting element to the biology in the WFD compliance assessment.

2.5.5. We note the further analysis provided by the applicant (paragraph 7.10.9 of [REP3-035]). However, we would highlight that Table A1a of UKTAG (2007) is not a comparison to the normative definitions themselves but guidance on a spatial interpretation of the normative definitions, and that a descriptive comparison should also be considered. It is also of note that there has been significant case law since the publication of UKTAG (2007) that supports a more precautionary approach.

2.5.6. In summary, NRW advise that the benthic invertebrates element in the Skerries Coastal water body should be considered for derogation under Article 4(7) in addition to the hydromorphology on the basis that the hydromorpholgy is a supporting element to the biology, and that benthic invertebrates are the primary receptor to changes in the hydromorphology.

3. SECOND BIODIVERSITY ISH (INCLUDING COASTAL CHANGE, CLIMATE CHANGE)

3.1. Bae Cemlyn / Cemlyn Bay SAC - Coastal Processes

3.1.1. In paragraph 7.10.10 – 7.10.20 of its Written Representations, NRW explain that further information is required to demonstrate whether there will be adverse effects on Cemlyn Bay SAC as a result of changes to coastal processes. At Deadline 2, the Applicant submitted the document titled *'Supplementary Information on Coastal Processes to Support Wylfa Newydd EIA and Shadow HRA*' ("Supplementary Information") [REP2-007].

3.1.2. At the Biodiversity ISHs on 10th and 11th January, NRW provided its updated position based on the Supplementary Information received. NRW also took an action to provide its detailed written advice on the Supplementary Information.

3.1.3. As explained in our Written Representations, Bae Cemlyn / Cemlyn Bay SAC consists of two features: the coastal lagoon and the perennial vegetation on the shingle ridge known as Esgair Gemlyn. The lagoon and shingle ridge vegetation could both be affected by the proposed marine works as a result of changes to coastal processes in the area. The marine structures, including the breakwater and marine off-loading facility, are permanent structures and may cause changes in coastal processes in the vicinity of the shingle ridge.

3.1.4. NRW provides its detailed comments on the Supplementary Information in Annex A-2 however, in summary, NRW advise that there is still an unacceptable degree of uncertainty regarding the ongoing impact of the western breakwater on the integrity of the shingle ridge during storm events from the north-west. We welcome the additional modelling undertaken, however that work has shown material effects, including an increase in wave height over a particular area of the ridge due to a reflected wave. These material effects result in there being significant uncertainty about how the ridge, and the lagoon, will be affected over the long-term by these changes in the hydrodynamic conditions.

3.1.5. As a result of this significant uncertainty, and the fact that a model can only aid our understanding of such a complex natural process to a certain extent, our clear advice is that it cannot be concluded, beyond reasonable scientific doubt, that the proposals would not have adverse effects on the Bae Cemlyn / Cemlyn Bay SAC.

3.1.6. We advise that the Applicant implements a programme of monitoring of the ridge to test the prediction in the ES that the breakwater would not cause material effects to the ridge. If effects on the ridge are detected through monitoring, there should be provision for adaptive management to help maintain the integrity of the ridge. The Applicant should explain how such monitoring and mitigation is secured in the DCO. We would welcome continued discussions with the Applicant in its preparation of a robust monitoring and mitigation strategy.

3.2. Flood Risk

- *Dalar Hir*

3.2.1. At the 2nd Biodiversity ISH on 11th January, NRW took an action to confirm in writing its advice on flood risks at the Dalar Hir Park and Ride (see paragraph 4.6.6 of NRW's written submissions of oral cases [REP4-039]). The Applicant submitted the Dalar Hir Flood Consequence Assessment (FCA) Addendum [REP2-372] at Deadline 2.

3.2.2. As explained below, NRW advise that additional information is required in order to confirm whether the Dalar Hir Park and Ride development is acceptable in terms of flood risk.

3.2.3. The additional modelling presented in the Dalar Hir FCA Addendum [REP2-372] has identified a reduction in flood risk as compared to the previous FCA submitted as part of the DCO application [APP-281]. The hydrological baseline information and methodology used to inform the FCA Addendum is different to that used for the FCA submitted at application. NRW has reviewed the hydrological information which was received informally from the applicant on 7/2/2019. In relation to this hydrological information, we advise that confirmation is provided that the correct flows (1% Annual Exceedance Probability + climate change = 5.29 m^3/s) have been used to inform the FCA Addendum.

3.2.4. The Applicant, in its response to NRW's Written Representations [REP3-035] refers to a parking space remaining at flood risk (i.e. not "dry") during the design flood event. This is contrary to TAN15. We advise that no part of the development should flood on events more frequent than the 1% Annual Exceedance event. It is unclear what area this is (and if it is an area of parking or a single parking space). Site plans are required showing the areas affected. We note that the Applicant proposes to submit this information at Deadline 5 (see Table 1-1 of *Horizon Deadline 4 responses to actions set in Issue Specific Hearing on 11 January 2019* [REP4-006]).

3.2.5. In the FCA Addendum, the modelled inflows (i.e. the volumes of water modelled in the watercourse) have been reduced thus making the flood risk smaller, but flood mitigation measures are still required to manage the risk. We note that the Applicant intends to lower field levels to 15.03m AOD, however there is no information presented on what are the existing field levels (the difference will need to be known). We note that the Applicant also proposes to submit this information at Deadline 5 (see Table 1-1 of [REP4-006]).

3.2.6. We note that no blockages of culverts have been included. The risk of blockage relates more to debris entering the watercourse as a result of the people using the park and ride facility (i.e. rubbish), rather than from woody debris upstream of the site. It is clear in our published guidance[1] that where culverts have been identified as being sensitive to blockages, a blockage scenario will need to be modelled. We note that the Applicant also proposes to submit this information at Deadline 5.

[1] Operational Guidance Note 100. Flood Risk Management: Modelling blockage and breach scenarios; Feb 2015

3.2.7. NRW will review the additional information (as requested in 3.2.3 – 3.2.6 above) when submitted, and will provide its updated advice on the acceptability of the Dalar Hir Park and Ride in terms of flood risk.

- *A5025 Offline Highway Improvements*

3.2.8. As detailed in section 10.1 of NRW's Written Representation, NRW advised that a failure (breach) of the defence embankment at Valley be considered. This information was shared with NRW informally on 20/12/2018 and NRW, following a preliminary review, provided its initial views on the report at the 2nd Biodiversity ISH on 11th January (see section 4.7 of NRW's written summaries of its oral representations [REP4-039])

3.2.9. The breach modelling at Valley has now been submitted by the Applicant at Deadline 4 (see Appendix 1-4 within the document titled '*Horizon responses to actions set in Issue Specific Hearing on 11 January 2019'* [REP4-006]).

3.2.10. We note that there are two Technical Note papers associated with Appendix 1-4. The Technical note titled '*Valley Breach 2D Model files package*' (207672-0013-AA40-TLN-0003) relates to the input and output files used in the hydraulic modelling exercise to determine the flooding predictions associated with the failure (breach) of the tidal defence pre and post the A5025 bypass at Valley. The note advises that the files have been packaged up for transmittal to NRW however, we have yet to receive the electronic model files. For completeness, we request that the model files associated with the tidal breach assessment, and also the files for the Valley hydraulic modelling report (used in support of ES Appendix G8-1 [APP-323])), be submitted to NRW as proposed.

3.2.11. In relation to the second Technical Note within Appendix 1-4, titled Hydraulic modelling of tidal defence breach at Valley (207672-0013-AA40-TLN-0001), NRW is generally satisfied with the content of this Technical Note and its structure. The introduction, breach locations, length of breaches and tidal events are acceptable and in line with NRW requirements for modelling such failures in defences. It is noted that the breach is not that of a dynamic breach through 3 tidal cycles but that the breach is at the beginning of the 1st tidal cycle which gives conservative volumes of flow through the breach; this is considered to be a precautionary approach when assessing flood risk.

3.2.12. The data used in the modelling is considered appropriate and reflects current climate change allowance requirements for tidal events albeit it to the epoch in 2115. The Flood Consequence Assessment (ES Appendix G8-1 [APP-323]) for the A5025 considered 100 years as that of the lifetime of development, however NRW is satisfied that the climate change allowances

are appropriate in this instance and in line with Welsh Government guidance (CL-03-16 *Climate change allowances for Planning purposes*[2]).

3.2.13. The modelling approach is acceptable, and it is noted that the update is in 2D only. The model results and maps generated in Appendix A and B are welcomed, and the outputs illustrate the flood difference/extent clearly. This enables all parties to understand the impact that the A5025 Valley bypass would have on flood risk in the area. Table 4.1 generally shows a reduction in peak water levels on the 40 reference points analysed with bypass (and associated mitigation) for the 50m wide breach event (Table 4.2 for the 20m breach reductions). The flood mitigation (lowering ground levels/ compensatory storage area) as identified in the Flood Consequence Assessment (ES Appendix G8-1 [APP-323]) is therefore critical in ensuring that there are no adverse flood risk impacts during the tidal breach flood scenario. We note the comment regarding temporal variations due to timing of the events (3cm) and that the authors consider this to be negligible. NRW can confirm that the modelling has been carried out in line with our Guidance Note (Operational Guidance Note 100 *Modelling blockage and breach scenarios*).

3.2.14. In summary, NRW consider that through implementation of the flood risk mitigation and compensation measures that the works at Section 1 Valley to be compliant with TAN15.

- *Main Site*

3.2.15. Action no. 22 from the 2nd biodiversity ISH on 11th January is for the Applicant and refers to the "*Submission on Wylfa Newydd Development Area (WNDA) Site flood risk in relation to Afon Cafnan*". For the avoidance of doubt, this requirement for provision of flood risk mitigation also applies to Nant Cemaes and Nant Cemlyn as well as Afon Cafnan. We have informed the Applicant of the information that NRW would expect to be provided. We note this information is to be provided by Deadline 6. NRW will provide its advice on the information submitted in due course.

4. ANNEX A1 – NRW SPECIALIST COMMENTS ON MARINE ENHANCEMENTS [REP4-023]

4.1.1. It should be noted that whilst the Applicant acknowledges the direct loss of benthic (intertidal and subtidal) habitat of conservation importance under the

[2] https://gov.wales/docs/desh/publications/160823-cl-03-16-climate-change-allowances-for-planning-en.pdf

footprint of the proposed marine works, there are a number of other cumulative impacts and losses associated with the development that are not considered in the report. As detailed in NRW's written summaries of its oral representations [REP4-039], the ES did not include a cumulative impact assessment of the effects of the marine works, changes in coastal processes, and the cooling water discharge on benthic habitats of conservation importance. The Applicant acknowledged this in its response to our Written Representations (7.73.3), and an additional 5.6ha of cumulative habitat loss and / or degradation has now been identified around the cooling water discharge, in addition to that identified under the footprint of marine works (revised total of 36.1ha). NRW is awaiting additional information on the effect of the cooling water discharge on coastal process (proposed for submission by the Applicant at Deadline 5). This area of impact may therefore be larger. NRW request that all of these elements are considered as part of the marine ecological enhancement measures proposed by the Applicant.

4.1.2. Section 6.3.8 of [REP4-023] states "*Subtidal habitats of conservation importance which fall within the dredged area represent approximately 6.7ha. Although the assessment presented in the Environmental Statement is worst case as it assumes permanent loss of the dredged area. In reality, a degree of recovery would be expected within this area following completion of Main Construction. Considering the area of subtidal habitats of conservation importance which fall within the dredged area (6.7ha), the total loss of subtidal habitats under the footprint of the Marine Works would be reduced to 6.6ha, resulting in a net loss of 4.7ha*". NRW agree that some degree of recoverability will occur, but it is unlikely that the same communities will recolonise the area due to changes in hydrodynamics (exposure to wave and tidal energy), substrate type, water quality and levels of disturbance e.g. from any maintenance dredging and other activities required in Porth y Pistyll.

4.1.3. Section 7.2.11 states "*Marine restoration will be integrated into the removal or decommissioning process for the Temporary Marine Works; this will be subject to detailed design with further information provided in subsequent iterations of the shoreline protection and restoration method statement*". In relation to this further design and additional information proposed, clarity is required as to what will be the mechanism for securing agreement, delivery and compliance.

4.1.4. Section 7.2.16 states "*Monitoring of the progress and success of the shoreline protection and restoration method statement against a set of pre-defined objectives will be delivered as part of Horizon's current commitment to marine monitoring for non-native species and ecological enhancement mitigation which is secured in the Marine Works sub-CoCP (APP-416)*". NRW welcome the commitment to monitor the effectiveness of the ecological enhancement measures. NRW believe a robust monitoring and adaptive management plan is needed specifically for marine ecological enhancements and should be separate to that proposed for Invasive Non-

Native Species due to the fact that both will have different objectives, monitoring criteria and methodologies. Clarity is required as to what will be the mechanism for securing agreement, delivery and compliance in relation to the monitoring proposals.

4.1.5. Section 7.2.17 states "*Furthermore, an adaptive management protocol would be developed as part of the wider ecological and landscape management strategy (which is again secured in the Marine Works sub-CoCP (APP-416)) and implemented to deliver remedial action in the event that the shoreline protection and restoration method statement fails to deliver against one or more of its pre-defined aims and objectives. This would include active measures such as reseeding with seaweed species (e.g. kelp) if for example, it is found that the establishment and development of marine flora known to be important ecosystem engineers is not being achieved within a reasonable period of time*". NRW welcome the approach to habitat restoration in the area under the temporary causeway. Any restoration works and adaptive management measures will need to be underpinned by an assessment of the hydrodynamical conditions that exist in the restoration area following construction of the breakwaters and cooling water intake. It may not be possible to re-establish the same communities due to changes in current flow and wave regime. Further consideration of the technical aspects and feasibility of the proposed restoration work will need to be undertaken and appropriately secured through the relevant consent.

4.1.6. Section 7.2.19 states "*In the context of the EIA, the presence of the breakwater structures and marine restoration would offset approximately 38% and 36% of the intertidal and subtidal habitat loss predicted to occur under the footprint of the Marine Works, respectively*". With reference to Horizon's responses to NRW's Written Representations [REP3-035] (section 7.73.2 - 7.73.4), the revised area of loss and / or degradation of benthic habitats from the cooling water outfall has been calculated as 5.6ha, some of which will be Annex 1 reef. This revised area of habitat loss should be included within any offsetting calculations.

4.1.7. Many of the examples used in sections 8.1 - 8.3 to show recolonization of flora and fauna are cases where in-situ rock substrate has been cleared either artificially or via natural processes, and the area of disruption to the wider community is low. Whilst appreciating that the amount of available studies for recolonization is limited, these should be treated with caution as conditions in the studies are unlikely to mirror those that will occur at Wylfa Newydd.

4.1.8. With regard to paragraph 8.3.7, the example of kelp recolonization should be treated with caution here since the proximity and extent of remaining kelp stands will be lower than in the study in question. Also, changes in hydrodynamics may influence colonisation of species.

4.1.9. Section 8.4.1 states "*Implementation of a monitoring programme for non-native species (this additional mitigation is already secured in the DCO)*

reduced this to a small magnitude of change and a minor adverse effect but nevertheless, invasive non-native species (INNS) are known to be a key concern for statutory and non-statutory stakeholders. In particular, the carpet sea squirt, Didemnum vexillum which is classified as a high impact species under the WFD and proliferates on shallow artificial structures occurring in sheltered environments (e.g. marinas)". NRW does not agree with this statement on the basis that a monitoring programme, whilst welcomed by NRW, is not in itself considered mitigation, due to the fact it is not reducing the risks posed by potential introduction of invasive non-native species, and will not offset or compensate for any losses of native flora and fauna should they become established. The risks posed by the potential introduction of invasive non-native species can only be reduced by effective biosecurity measures. We refer you to NRW's comments on marine invasive non-native species in section 7.18 of its Written Representations [REP2-325].

4.1.10. Table 8.1 O1 states that a large extent of the subtidal environment is expected to recover following completion of the marine works. Clarity is required on the definition of "*recovery*" as return to pre-construction communities is likely to be limited given the changes in hydromorphology, water quality, substrate conditions and ongoing levels of disturbance from dredging and other maintenance operations.

4.1.11. Table 8.1 O2 states "*as the derogation being sought by Horizon with respect to The Skerries water body principally relates to effects on intertidal habitats, in the context of WFD, ecological enhancement mitigation should be focused within the intertidal zone*". NRW advise that subtidal habitats also need to be included in the derogation.

4.1.12. In relation to Table 8.1 O7, clarification is required on the stated loss of 5 rockpools of >1m^2. ES Appendix D13-3 [APP-221] states that 20 rockpools of >1m^2 are within the footprint of marine works.

4.1.13. In relation to Table 8.1 O8 and 09, clarification is required on how re-establishment of LR.FLR.Eph.EntPor and IR.MIR.KR.Lhyp will occur.

4.1.14. Section 9.2.5 states "*Through the detailed design process, it was identified that a proportion of the western breakwater on the harbour side was not critical to the overall stability of the structure. As such, it was considered feasible to seed this area with natural rock units weighing 3-6 tonnes each at negligible additional cost to the Project. This armour rock (Figure 9-1) would cover a total area of 0.3ha; of this 0.2ha would occur within the intertidal zone whilst the remaining 0.1ha would occur subtidally*". NRW welcome the use of natural rock within the breakwater structure, but consider this small area is not adequate to offset the loss of benthic habitats of conservation importance, and reduce the risk of colonisation by non-native species over the wider artificial breakwater structure.

4.1.15. Section 9.2.7 states "*The DCO design of the MOLF (bulk berthing platforms and Ro-Ro quay) would be constructed of pre-cast concrete blockwork*

structures (Table 5-1) which would be manufactured onsite at the concrete batching plant. It is not considered practical (financially or logistically) to import block work made of more ecologically favourably construction material". NRW have asked the Applicant (at a review meeting held on 4th February 2019) to further explore options for additional enhancement measures within this structure, such as other post-construction surface modifications that could be added under a "deploy and monitor" scenario.

4.1.16. In relation to Section 9.4.5 – EEO3a, we advise clarity be provided on why increasing surface heterogeneity may pose a risk to the structural integrity and engineering stability of the MOLF wall.

4.1.17. In relation to section 9.8, NRW welcomes the inclusion of options to re-seed the area with kelp in an attempt to assist recovery in the subtidal environment. Clarity is required on this measure and the locations and extents to which this method could be used (accepting that the proposal is to develop this mitigation measure in conjunction with an academic institution as part of a collaborative research project).

4.1.18. Section 10.1.4 states "*In the absence of any standardised marine biodiversity calculators, it is not possible to reliably quantify the contribution of the proposed ecological enhancement measures to improving quality and therefore overall ability to offset the impacts (i.e. equivalence = area x quality)*". The lack of ability to quantify the potential value of the marine structures, as well as any ecological enhancement measures, means a residual risk remains in the ability of the project to be able to adequately offset the losses of marine habitats of conservation importance. NRW acknowledge that no additional information can be provided by the Applicant to address this uncertainty. NRW therefore do not agree that the residual effects can be reduced from a 'Moderate Adverse' to a 'Minor Adverse' effect.

4.1.19. In relation to section 10.6, NRW welcomes the Applicant's commitment to monitor for marine invasive non-native species, and to monitor the ecological enhancement measures. However, it is unclear at present how the proposed integrated monitoring programme for invasive non-native species will also deliver the required outcomes for assessing the effectiveness of the marine enhancement measures. NRW would expect to see independent monitoring programmes developed for invasive non-native species and the effectiveness of the ecological enhancement measures, given that both will have different objectives and survey method requirements.

4.1.20. Section 11.1.4 states "*Within the constraint of the WNDA Order limits, it is not physically possible to fully offset the area of habitat loss under the footprint of the Marine Works. Therefore, to achieve no net-loss and potential biodiversity gain, the enhanced ecological enhancement mitigation proposal has been focused on improving quality as well as maximising the spatial extent of enhancements over the greatest practical (i.e. logistically and financially) extent*". NRW have considered the information provided in the report and acknowledge that the constraints of the project mean that limited

levels of enhancement and therefore offsetting are possible. However, given the scope of the mitigation that is feasible and the uncertainty over the effectiveness of the measures, NRW do not consider that the residual effects on benthic habitat can be reduced from 'Moderate Adverse' to 'Minor Adverse'.

4.1.21. In relation to potential development timescales, further research and information on ecological enhancements may be available at the time of commencement of construction. NRW would recommend reviewing any new information, evidence and best practice again prior to commencement of marine works to see where additional measures could be implemented.

5. ANNEX A2 – NRW SPECIALIST COMMENTS ON COASTAL PROCESSES [REP2-007]

5.1.1. These comments comprise NRW's comments on the document titled *Supplementary Information on Coastal Processes to Support Wylfa Newydd EIA and Shadow HRA* ("Supplementary Information") [REP2-007] submitted by the Applicant at Deadline 2.

- *North westerly reflected wave*

5.1.2. NRW highlighted a number of concerns on north west reflected waves in its Deadline 2 Written Representations (see comments 7.10.12, 7.10.13, 7.10.14 and 7.10.15)

5.1.3. Section 3.2.1 of the Supplementary Information has shown that the north west reflected wave does not change the wave heights or increase the bed shear stresses substantially above baseline north easterly storm conditions (using the 99%ile). However, the conclusion that north westerly storm waves will not cause a substantial alteration to the Esgair Gemlyn ridge or an associated breach over the lifetime of the operation of the breakwater still carries an unacceptable degree of uncertainty. LiDAR Imagery presented in Figure 3 shows the Esgair Gemlyn ridge topography to be lowest in elevation at the location of the Ebb tide delta and coincides with the area of wave focussing under north westerly extreme wave conditions from reflection off the western breakwater. NRW consider the increase of 0.2m wave height to be a materially significant effect that may be sufficient to cause a breach of Esgair Gemlyn and thus result in adverse effects on the SAC features.

5.1.4. The additional modelling depicts that the longshore currents in front of Esgair Gemlyn increase during spring ebb 99%ile conditions (see Figure 12). It is not possible to be certain from the evidence provided how much more sediment in the lower intertidal can be mobilised to the east due to the small increase in bed shear stress at the western end. There is a capacity for this sediment to move offshore. Figure 6 (bottom right figure) shows a band of increased shear stress (5.7 – 12.2Nm^{-2}) although the conclusion in the Supplementary Information is that the sediment will stay in the bay. NRW advise that there is uncertainty as to where the sediment will end up and

whether it will be re-mobilised in deeper water under the same extreme conditions and be able to return to the intertidal. If there is a net loss of sediment (following the description above) over time as a result of north westerly storms impacting on the western end, the beach may lower and destabilise the ridge at the western end.

5.1.5. NRW consider that there is insufficient baseline evidence to show the response of the ridge to different storm events from different directions. However, we do acknowledge that the Applicant cannot collect or present any further data to inform baseline understanding other than that which has already been presented. As a result, there is uncertainty associated with ridge behaviour during such storms.

- *Sediment data*

5.1.6. NRW would have liked to have seen more sediment data within Cemlyn Bay to aid confidence in interpretation and understanding of what sediment is available to be mobilised under certain bed shear stress conditions. However, having considered the additional information provided in section 4 of the Supplementary Information, we agree that additional sediment data in Cemlyn Bay will not change the outcome of the results in terms of impact assessment.

- *Sediment discharge and plumes*

5.1.7. The sediment discharge and plumes were modelled for summer conditions with no waves (worst case scenario) and showed that the area of deposition was localised and that sediments were reworked rapidly and dispersed offshore with the high currents.

5.1.8. It is agreed that the deposition of fine sediments from the dredging activities and drainage discharges discussed in section 2.5.1 of the Supplementary Information, will not be of a significant enough volume to alter the sediment composition on the seabed to then cause a change to the morphodynamics of the Esgair Gemlyn even if fine sediment is deposited on the ridge during storms.

- *Cooling water discharge*

5.1.9. NRW highlighted the need for additional information with regard to the effects of the operational cooling water discharge on coastal process in its Deadline 2 Written Representations (see comments 7.4.8, 7.4.14, 7.10.16).

5.1.10. It is noted in section 2.4 of the Supplementary Information that there will be increased bed shear stresses in the vicinity of the cooling water outfall but as stated by the Applicant, the seabed is generally rocky with no fine sediments. From the bed shear stress plots with cooling water and power station against baseline conditions without cooling water discharge, NRW

are satisfied that the cooling water discharge will not cause an appreciable increase in bed shear stresses in front of Esgair Gemlyn ridge.

5.1.11. However, the cooling water discharge will alter the hydrodynamics by causing a potential increase in current velocity, thermal stratification of the water column within the zone of influence of the plume. As a result, there is still uncertainty in relation to the alteration to the hydrodynamics caused by the cooling water outflow which needs to be considered in the determination of both the Skerries and Anglesey North coastal water body status under WFD and Esgair Gemlyn under HRA. NRW advises that further information is still required in relation to this matter. We note (Table 1-1 of '*Horizon Deadline 4 responses to actions set in Issue Specific Hearing on 10th January* 2019') that the Applicant proposes to submit this information at Deadline 5.

- *Zone of Influence*

5.1.12. In paragraph 7.10.18 of its Written Representations, NRW commented on the approach undertaken to assess the coastal process impacts. NRW recommended that the TAN 14 (1998) sediment sub-cell (Trwyn Maen Dylan to the Great Orme) be the starting point of the assessment. Clear outputs showing the full extent of the potential zone of influence of the proposed works in relation to the sediment sub-cell were not presented in the Environmental Statement or supporting appendices.

5.1.13. However, it can be seen from Figures 15 and 16 in the Supplementary Information that any changes to hydrogeomorphology are localised to the development. Therefore, NRW are content that this concern has now been addressed.

- *Temporary Waste Water Outfall*

5.1.14. In paragraph 7.10.17 of its Written Representations, NRW highlighted that "*there is a construction waste water outfall structure, which will be in place for the whole construction phase, which has not been considered in the modelling and/or assessments which inform the Shadow HRA. The outfall pipe will be routed around the west of the west breakwater, and will end at a discharge point slightly beyond the northern end of the west breakwater (see drawing WN0907-HZCON-LAP-DRG-00023 Rev 2.0). There are protective structures (rock foundation overlain by concrete mats) surrounding the waste water outfall pipe which appear to be approximately 4m in height. This structure has the potential to alter coastal processes in the locality*".

5.1.15. The Applicant, in its response to NRW's Written Representations [REP3-035], states that the protective structures will be no more than 1m in height. NRW advise that, for the avoidance of doubt, that this is clarified in the Applicant's drawings. Based on this information, NRW is satisfied that there will be no material effects, greater than that presented for the western

breakwater during construction, on coastal processes as a result of the temporary waste water outfall structure.

- *Monitoring and mitigation*

5.1.16. In NRW's view there remains a degree of uncertainty as to the ongoing impact caused by the permanent presence of a 400m breakwater on the morphological integrity of Esgair Gemlyn ridge and Cemlyn Lagoon, particularly as it does cause a wave focussing effect on the western side of the ridge where it is at its lowest.

5.1.17. We welcome the additional modelling that has been undertaken, which has helped to reduce the uncertainty regarding the effect of extreme north westerly wave events. However, material effects are still noted (increase in wave height over a focussed area of the ridge due to a reflected wave), and there remains uncertainty as to how the ridge, and therefore the lagoon will be affected, over the long term by these changes in hydrodynamic conditions.

5.1.18. Given the uncertainty that remains and that a model can only aid our understanding and predictions to a certain degree, NRW advise that the applicant considers monitoring the ridge to test the prediction in the ES that the breakwater would not cause material effects to the ridge. If effects on the ridge are detected through monitoring, there should be provision for adaptive management to help maintain the integrity of the ridge. We would welcome continued discussion with the Applicant to advise on an robust monitoring and mitigation package.

ANNEX B

NATURAL RESOURCES WALES' RESPONSES TO EXAMINING AUTHORITY'S QUESTIONS

Please find below NRW's responses (right hand column) to the second round of Examining Authority's questions:

Reference	Respondent:	Location:	Question:	NRW Response
1. Air Quality including Dust				
Q2.1.1	NRW	WB	With reference to the NRW response to ExA First Written Question Q1.0.5, is the information in relation to permit application(s) still correct? If not, please provide an update.	Our original response to Q1.0.5 remains valid. We have no additional update to provide.
2. Biodiversity				
Q2.2.3	The Applicant, NRW and RSPB	WA	While accepting the Applicant's response in [REP2-375] that they do not consider water level management at Cemlyn Lagoon as a required mitigation measure, the ExA would welcome the Applicant and NRW, the RSPB and other IPs views on the importance of such management to support conservation of the site.	As detailed in section 7.10.7 – 7.10.9 of NRW's written representations [REP2-325], NRW considers that the quantitative changes in surface water and groundwater flows predicted in the Shadow HRA are not significant and are unlikely to affect the lagoon water levels, the functioning of the lagoon, or the interest that it supports. NRW therefore do not consider that effects attributable to the Wylfa Newydd project require water level management as a mitigation measure.

3. Climate Change and Resilience				
Q2.3.4	The Applicant		The Applicant submitted a note [REP4-004] providing additional details regarding impacts on the tidal embankment, as part of the Off-line Highway Improvements at Valley, with additional compensation for any breach. Are IACC and NRW content with the outcomes? If not, why not?	We refer you to section 3.2.8 – 3.2.14 of NRW's Deadline 5 submission. In summary, following review of the additional information (breach modelling submitted by the Applicant at Deadline 4), NRW consider that, through implementation of the flood risk mitigation/compensation measures, that the works at Section 1 Valley to be compliant with TAN15.
Q2.3.5	The Applicant		Is NRW in agreement with the Applicant's additional modelling in its Flood Consequence Assessment (FCA) Addendum [REP2-371] for Dalar Hir? If not, what additional information would it require?	We refer you to section 3.2.1 – 3.2.8 of NRW's Deadline 5 submission. NRW advise that additional information is required to confirm whether the Dalar Hir Park and Ride development is acceptable in terms of flood risk. The additional information required is explained in full in section 3.2.1 – 3.2.8 above.
Q2.3.6	The Applicant		Can the Applicant and NRW provide an update on the position with the legal agreement with the relevant land owner at Llanfachraeth to "allow" additional flooding on its land, and NRW's position?	As detailed in NRW's Deadline 4 submission [REP4-039] (written summaries of its oral representations at the hearing), the proposal is contrary to TAN15 in that the development will lead to an increase in flood risk elsewhere (increase in flood levels by 0.09m to agricultural land). The Applicant has acknowledged that compliance with TAN15 will be difficult at Llanfachraeth and the Applicant has dismissed compensatory flood storage as a means of effectively offsetting the observed impacts. We understand the Applicant is exploring a legal

				agreement with the relevant land owner to “allow” additional flooding on their land. NRW has not received any updated information on the status of the landowner agreement. The Secretary of State will need to consider the scheme in the context of non-compliance with TAN15 at this specific location, with or without landowner agreement.
4. Development Consent Order				
Q2.4.12	The Applicant, IACC, WG, NRW and NWP		**PW2 – Wylfa Newydd CoCP** Many IPs have raised concerns that should the detail of the CoCP not be agreed prior to the end of examination, than existing CoCPS and sub codes are treated as statements of principle/parameters and that further detail would need to be approved by IACC using pre-commencement requirements. 1) Could this approach create the possibility of an uncertain scheme which hasn’t been properly assessed? 2) Would this approach to requirements be lawful, given Rochdale principles, and is reasonably intended to fix	In its Written Representations [REP2-325] and at the January hearings, NRW highlighted several aspects of the CoCP, Sub-CoCPs and CoOP where insufficient detail had been provided. NRW advised that further detail would need to be approved by the relevant discharging authority. NRW does not consider that the concerns raised over subsequent approval of the detailed CoCP, Sub-CoCPs and CoOP would give rise to any material risk of the scheme being uncertain and/or not having been properly assessed. The present content of the CoCPs plus any further amendment to them during examination would remain as the basis of the certified documents in the DCO. That content would act as a series of parameters against which the original scheme has been assessed. Approval of further details could not widen those

			‘finalised aspects’ at a later date? In responding to this question, attention is drawn to paras 103 and 104 or pre-application guidance.	parameters without separate environmental assessment. The additional detail that NRW has advised is required would serve only to narrow the range of possible impacts within those parameters and therefore would not require additional environmental assessment. NRW consider such an approach would be consistent with the legal principles in the Rochdale decision. As detailed in our Written Representations, NRW therefore requests that the DCO be amended so that the detailed Sub-CoCPs and CoOP are approved by a discharging authority.
Q2.4.14	The Applicant, IACC, WG and NRW		IPs have expressed concern in relation to their ability to keep track of progress with the proposed development and any changes. Should a Register of Requirements be included in the DCO as for example, was included in the A14 Cambridge to Huntingdon Improvement Scheme Development Consent Order as per text below: *Register of requirements 22.—* *(1) The undertaker must, as soon as practicable following the making of this Order, establish and maintain in*	NRW consider a Register of Requirements would be an useful tool to demonstrate progress with the proposed development and any changes made.

			an electronic form suitable for inspection by members of the public a register of those requirements contained in Part 1 of this Schedule that provide for further approvals to be given by the Secretary of State. *(2) The register must set out in relation to each such requirement the status of the requirement, in terms of whether any approval to be given by the Secretary of State has been applied for or given, providing an electronic link to any document containing any approved details.* *(3) The register must be maintained by the undertaker for a period of 3 years following completion of the authorised development.*	
Q2.4.42	The Applicant and WG		**Application of Marine and Coastal Access Act 2009** WG propose a new article as below. *"Application of Marine and Coastal Access Act 2009* *[43].—(1) This Order is subject to the provisions of Part 4 of the 2009 Act and any licence granted pursuant to that Part and is without*	NRW supports this article as it adds clarity to the requirements and jurisdiction of the Marine Licence. We would however, recommend one minor amendment to ensure that the enforcement powers referred to are clearly specified: *[43].—…. (2) No provision of this Order obviates the need to obtain a marine licence under Part 4 of the 2009 Act or to comply with the conditions of any marine licence and nothing in this Order in any way limits the enforcement powers* ***under that part.***

			prejudice to the powers of the Welsh Ministers under that Part. *(2) No provision of this Order obviates the need to obtain a marine licence under Part 4 of the 2009 Act or to comply with the conditions of any marine licence and nothing in this Order in any way limits the enforcement powers in respect of a marine licence* *(3) In the event of any inconsistency between the provisions of this Order and a marine licence, then the terms of the marine licence shall take precedence."* This goes further than the Swansea Bay DCO because it doesn't specifically identify the articles/powers/requirements relating to marine works and it deals with inconsistencies. **Swansea Bay DCO** **Application of Marine and Coastal Access Act 2009** ***16.***—*(1) Articles 17 to 19 are subject to the provisions of Part 4 of the 2009 Act and any licence granted pursuant to that Part and are without*	

			prejudice to the powers of the Welsh Ministers under that Part. *(2) No provision of this Order obviates the need to obtain a marine licence under Part 4 of the 2009 Act or to comply with the conditions of any marine licence.* What are the Applicant's views regarding inclusion of this Article in the DCO?	
Q2.4.45	The Applicant and NRW		Provide an update on progress re the charging of fees in relation to NRWs role as discharging authority for certain requirements; and provisions for developer contributions to NRW for monitoring and implementation during construction and operation (associated with its proposed role as discharging authority below Mean High Water Springs).	NRW considers that it is appropriate to secure appropriate cost mechanism for undertaking the role of discharging authority. We consider the appropriate hourly fee of £120 per hour, in line with the Marine Licensing (Fees) Order 2017. As such we propose an additional text for inclusion within Schedule 19. The inclusion of this text has been agreed in principle with Horizon, pending further review by their legal team. The entirety of the provision has not been reiterated for brevity. Currently 3.—(1) states "Where an application is made to the discharging authority for agreement or approval in respect of a Requirement, a fee must be paid to that authority as follows—……" NRW considers that 3.—(1, 2 and 3) is restricted to the discharging authority fees due to IACC. Therefore we recommend that 3(1) is amended to 3.—(1) "Where an

				application is made to the **IACC** for agreement or approval in respect of a Requirement, a fee must be paid to that authority as follows—……." In addition a paragraph 3 (4) should be added as follows: "3.—(4) Where an application is made to NRW as the discharging authority for agreement or approval in respect of a minor detailed requirement or a major detailed requirement, or NRW is a Requirement Consultee, a fee must be paid to NRW which reflects the following- (a) fee calculated at a rate of £120 per hour; and (b) when calculating fees by multiplying the number of hours worked by the hourly rate the total number of hours worked may be expressed as a fraction where (i) less than one hour is worked; or (ii) the total amount of time worked is more than one hour but cannot be expressed as a whole number in hours. c) A fee paid to NRW under the Marine Licensing (Fees) (Wales) Regulations (2017) for work undertaken in respect of the Marine Licence issued for the Marine Works, that is considered by NRW to meet the discharge of requirements for the Order is to be taken as a fee paid under paragraph (4)."
5. Habitats Regulation Assessment				
Q2.5.3	NRW, NT, RSPB and NWWT		During the Issue Specific Hearing on 10 January 2019, the Applicant suggested that declines in	NRW agree that the decline in productivity could be linked to density dependent effects resulting from an overall increase in tern numbers and could lead to terns

			productivity at the Cemlyn Bay Tern colony could be linked to density dependent effects resulting from the overall increase in Tern numbers, and that this might also be the reason for terns taking back several food items at once. What are your comments on these points?	bringing back several food items. However, other stresses may also be having an effect on the productivity of the population, such as the provisioning of food. NRW consider that the key point is that there is significant uncertainty about what stresses are currently impacting upon the colony, and that an increase in disturbance may lead to further decline in productivity (which is already below the conservation objective of the Anglesey Terns SPA) or abandonment of the colony. (See section 7.8 of NRW's Written Representations).
Q2.5.4	NRW, NT, RSPB and NWWT		Sandwich Tern has been described as a species which is very sensitive to disturbance. Could the parties identify the sources of evidence which support this statement?	NRW consider that the following references may be the most relevant. On the Bird Life international website on Sandwich terns, it states; "*As only a few colonies exist each year,* ***this tern is highly vulnerable to anthropogenic disturbance*** *(Garthe and Flore 2007) and is known to abandon eggs en masse (Gochfield* et al. *2018)."* In Taverner, (1965), it states that "*The Sandwich Tern Sterna sandvicensis, which is not much inclined to attack intruders to the colony, often nests amongst more pugnacious species and relies on their mobbing for the protection of its own territory;* ***furthermore, this species is very ready to desert a breeding site and move to a new area if disturbed in any way."***

				In Sharrock (1976) it states that **"***Many [traditional breeding areas] have a long history of occupation, but the species is* ***notoriously fickle and what seems to be slight disturbance can cause complete desertion,*** *sometimes when the eggs have already been laid.*" Stodart &Joyner (2005) state, in relation to what is often the largest UK colony at Blakeney Point (typically alternating with the nearby Scolt Head) in Norfolk: "*Sandwich Terns are notoriously disturbance-prone until breeding is well underway and this may partly explain their erratic breeding history on the Point*" and "*In addition to human disturbance (including egg collectors), uncertain food supplies, weather and tides the breeding terns also have to contend with a significant variety of predators*". References: http://datazone.birdlife.org/species/factsheet/sandwich-tern-thalasseus-sandvicensis/text Sharrock, J.T.R. (1976) The Atlas of Breeding Birds in Britain and Ireland' British Trust for Ornithology & Irish Wildbird Conservancy. T & AD Poyser. Sandwich Tern species account pg 228 – 229. Taverner, J. H. (1965) Observations on breeding Common and Sandwich Terns, British Birds,

Q2.5.5	NRW, NT, RSPB and NWWT		During the Issue Specific Hearing on 10 January 2019, the Applicant described how noise from construction would be attenuated over the distance between the main power station site and the Tern colony at Cemlyn Bay and would be experienced as background at the colony. If you do not agree with this characterisation of the construction noise environment please could you explain why?	As NRW has highlighted in its Written Representation, NRW consider that disturbance resulting from the combined effect of noise and visual stimuli may reduce the breeding success or lead to potential abandonment of the colony by terns. We note that blasting on site will remain below 60dB when accounting for wind factors. As NRW highlighted in 7.8.31e of its Written Representations, it is unclear how noise-generating construction activity will be managed in accordance with the highly variable wind and weather conditions at Wylfa Newydd. It should be noted that terns that fly in to and out of the colony will experience increased noise levels. These noise stimuli will be experienced by the birds cumulatively with the visual stimuli and may cause added stress to the colony, which may lead to reduced productivity or abandonment. We also note that the Technical Note proposes action thresholds where amber and red thresholds are proposed to ensure that there are no exceedances of the committed noise levels. As detailed in section 2.1 of this Deadline 5 response, NRW has raised a number of concerns regarding the deliverability of the mitigation outlined in the technical note. For example, the technical note states "*mitigation measures will be identified to reduce the noise to the acceptable specified level at the receptors*", however it also states, "*decision-making process on the mitigation measures*

				to be applied will be guided by safety considerations, amongst others, as well as the availability of equipment and potential impacts on other environmental receptors, and the overall construction programme".
Q2.5.6	Applicant, NRW, RSPB, NWWT and NT		Could the parties provide references (including copies of abstracts where relevant) for any scientific literature that deals directly with the effects of construction disturbance on Sandwich Terns or closely related species?	As far as NRW is aware, the only reference that deals directly with the effects of construction disturbance on Sandwich terns appears to be that of Harwood *et al*. (2017) in relation to the construction of an offshore wind farm. This showed unexpected sensitivity of birds in flight to construction activity, which reveals the nature of the species and reinforces the known sensitivity of the species on its breeding grounds. It should be noted that the use of closely related species as a proxy for the species of concern, particularly in relation to behavioural aspects should be treated with extreme caution as there may be considerable differences between similar species. Indeed, variability within species is to be expected, especially where this has a wide distribution and is subject to a range of environmental conditions to which a particular population is adapted.

				Thus, the use of the study by Brown (1990) who played pre-recorded aircraft noise to Crested Tern *Thalasseus bergii* (in the same genus of Sandwich Tern) in a colony in Australia is of debatable value as being representative of Sandwich Terns at Cemlyn. This is for several reasons 1) it is a different species in a different circumstance 2) because recorded aircraft noise is likely to differ in structural terms from the noises to be experienced at Cemlyn. Thus, the results should be treated with caution especially if taken as supportive evidence of a lack of disturbance at Cemlyn. In this context, the author reports that flights and an escape response were only initiated at higher levels of noise (>85 dB). However, birds were alert and scanning at all noise levels which began at 65 dB, which incidentally is broadly similar to predicted at Cemlyn. Thus, it is unknown if birds would have undertaken a similar response at much lower noise levels. In this regard, the study becomes of very limited use to the situation at Cemlyn. Moreover, with regards to exposure to high levels of noise causing the birds to take flight the author notes that this is "*quite likely to affect breeding success" …"But a more difficult question is whether repeated exposure to lower levels which result in alert and scanning behaviours does also*". In other words, no conclusion is reached. Even in this case, it is suggested that the precautionary principle would clearly apply, reinforcing a similar

				approach in relation to potential disturbance at Cemlyn. In particular, it is noted that for Sandwich Terns it is not possible to determine the threshold of disturbance at which birds will abandon a colony *en masse* and in fact it is unlikely that there will be definable warning of what will be a catastrophic event. As such, it is thought to be impossible to 'manage' the risk of abandonment through monitoring beforehand. In section 7.8.27 – 7.8.29 of NRW's Written Representations [REP2-325] we advise that there is significant uncertainty and/or insufficiency regarding the evidence used in the Shadow HRA to consider the sensitivity of terns to disturbance. As stated in paragraph 7.8.13, NRW has previously informed the applicant that it is not aware of further information that may be available or could be collected that would address the uncertainty. References: Brown, A.L. (1990) Measuring the effect of aircraft noise on sea birds. *Environment International* 16: 587-592. Harwood, A.J.P., Perrow, M.R., Berridge, R., Tomlinson, M.L. & Skeate, E.R. (2017). Unforeseen responses of a breeding seabird to the construction of an offshore wind farm. In: *Conference on Wind Energy and Wildlife Interactions Presentations from the CWW2015 conference* (ed. J. Köppel). Springer

				International Publishing. pp. 19-41. ISBN 978-3-319-51270-9.
Q2.5.8	NRW, NWWT, RSPB and NT		With regard to disturbance from visual stimuli, the Applicant has stated that there would be no construction work undertaken within 500m of the nesting islands between 15 April and 15 May with no bulk earthworks undertaken within 500m of any known active Tern nests thereafter. Does this address any of the parties concerns? If not, what additional measures would be required?	Noise and visual stimuli resulting from construction activity will occur simultaneously and therefore, they cannot be separated and need to be considered cumulatively. NRW advise that there is significant uncertainty regarding the combined effect of both visual and noise stimuli, caused by activity occurring on both land and sea, upon the tern colony. NRW advise that noise and visual stimuli could result in additional stress, decreased productivity and risk of abandonment. NRW also consider that evidence provided from the Wildlife Trust and National Trust is also relevant. Section 3.124 of the environmental NGOs' written representations [REP2-348] states that "*It is well observed that terns can fail to deliver food to chicks and brooding females as a result of disturbance close to the colony from unexpected visual or visual and noise events such as kite-surfers, jet skis or power boats ", "When disturbed it can be seen that some returning birds with prey may swallow the food item, not return to the nest and then 'U-turn' to start another foraging trip".* The 500m buffer area will not address the additional risk highlighted in the eNGOs' written representations.

Q2.5.9	NRW		The environmental NGOs have raised concerns about the potential effect of increased predation on the Tern colony as a result of predators being displaced by the main power station works [REP2-318, 2-348 and 2-360]; the RSPB has suggested that this represents an additional likely significant effect of the SPA [REP2-358]. What are NRW's views?	NRW consider that due to the Site Preparation and Clearance work west of the Cafnan taking place before the breeding season, predator displacement will take place before the return of the colony. We therefore consider the predators will have attempted to find new territories elsewhere before the breeding season. Also, if the colony was deemed as a suitable food source by existing predators in the region, then such predation incidents would have likely to have been observed to date (e.g. in a manner similar to the otter predation incident that occurred in 2017).
Q2.5.11	NRW		In response to the ExA's FWQ5.0.45, NRW provided links to the conservation objectives for the relevant European sites. Please provide the conservation objectives in full rather than as links.	Please see Annex B-1 below which provide the conservation objectives for the sites which NRW highlighted in FWQ5.0.45.
Q2.5.14	The Applicant		As part of their Deadline 4 response, the Applicant has provided updated marine works noise modelling based on US National Marine Fisheries Services criteria. Does the submitted document address NRW's concerns?	We refer you to section 2.3 of this Deadline 5 response. NRW has considered additional information submitted by the Applicant at Deadline 4 [REP4-005]. Appendix 2-1 supplied to NRW by the applicant, presents the results of new noise modelling against the NMFS injury criteria. Before NRW can provide its complete advice, we request assurance on the accuracy and correctness of the modelling in the Appendix 2-1 because there appears to be some issues with propagation calculations that estimate how quickly source sound levels attenuate in shallow water.

				The choice of metric outlined in the Appendix - these being the unweighted peak Sound Pressure Level (SPL_{peak}) and the weighted cumulative Sound Exposure Level (SEL_{cum}) - determines the interpretation and route of action/mitigation. NRW therefore seeks clarity on which metric the applicant is proposing as the appropriate choice. NMFS (2018) recommends using whichever criteria results in the largest 'isopleth' (i.e. radius) for calculating Permanent Threshold Shift (PTS: hearing injury) onset. For rock breaking - the loudest noise source - the worst case of these metrics (unweighted SPL_{peak}) predicts PTS in harbour porpoise out to distances of 2km (Table 13). This is significantly greater than the PTS distances calculated using the weighted SEL metric (SEL_{cum}) of 380m (Table 12), which in turn is greater than the distance calculated using the Southall et al (2007) criteria (M-weighted SEL) at 25m, as presented in previous modelling results (Table 8-16 Shadow HRA). Depending on the outcome from the modelling clarification sought, there is the potential that NRW would advise implementing additional mitigation that goes beyond the standard JNCC noise mitigation protocols. This might include the reduction of noise at source by utilising lower breaking/hammer energies, using noise screens (e.g. bubble curtains), using

				alternative methods, managing construction planning/timing.
8. Marine Environment				
Q2.8.1	NRW	WD	Is NRW content with the Applicant's approach to controlling marine noise impacts for operations other than piling, in the light of no guidance or best practice being available?	As stated in section 2.3 of this Deadline 5 response, and depending on the outcome from the modelling clarification sought, NRW consider that best practice piling measures may not be sufficient to mitigate injury impacts on marine mammals as a result of some activities. The proposed mitigation for marine mammals may not be effective for the distances at which some of the new modelling predicts that hearing injury in cetaceans could occur. NRW may advise implementing additional mitigation that goes beyond the standard JNCC noise mitigation protocols. This may include the reduction of noise at source by utilising lower breaking/hammer energies, using noise screens (e.g. bubble curtains), using alternative methods, managing construction planning/timing. Additionally, the use of Acoustic Deterrent Devices (ADDs) might be suitable to clear the area (likely PTS zones) of marine mammals. However, ADDs introduce additional noise into the marine environment and would need to be assessed and carefully managed, particularly in combination with other noisy activities which might create undue disturbance to marine mammals.

Q2.8.2	NRW	WD	What is NRW's view on adaptive mitigation in relation to the Water Framework Directive Article 4(7) and the certainty of delivery of appropriate mitigation?	Adaptive management and mitigation for impacts that are uncertain should not be used to obviate the need to apply Article 4(7), as the application of Article 4(7) is on the basis of an impact that may result in deterioration/ jeopardising the attainment of Good. Once an Article 4(7) has been agreed, adaptive management may be used if there are residual uncertainties on the effectiveness of mitigation in line with NRW guidance. This must be set out in detail within a document (e.g. the relevant Sub-CoCP) dealing specifically with adaptive management, approved by the discharging authority, subject to regular review and secured as a DCO Requirement. If this information is to be used to apply the Article 4 (7) tests there must be confidence in its deliverability.
Q2.8.4			The Applicant provided an Ecological Enhancements Mitigation Report at D4 which includes an options appraisal for ecological enhancement and revised measures to reduce the effects on rocky reef habitat from a moderate adverse to minor adverse effect. Is NRW and NT content that the mitigation would reduce the effects to minor adverse?	We refer you to section 2.4 of NRW's Deadline 5 response. As explained in section 2.4, the Applicant acknowledges that "*it is not physically possible to fully offset the area of habitat loss under the footprint of the Marine Works*" (section 11.4.1) and that "*it is not possible to reliably quantify the contribution of the proposed ecological enhancement measures to improving quality and therefore overall ability to offset the impacts*" (section 10.1.4). The lack of ability to quantify the potential value of the marine structures, as well as any ecological enhancement measures, means a residual risk remains in the ability of the project to be able to adequately offset the losses of marine habitats

				of conservation importance. NRW acknowledge that no additional information, or additional measures (in view of possible engineering constraints) can be provided by the Applicant to address this uncertainty. In view of the above, NRW do not agree that the residual effects on benthic habitats of conservation importance can be reduced from a 'Moderate Adverse' to a 'Minor Adverse' effect. NRW advise that the Secretary of State will need to consider the scheme in the context of the impacts identified on benthic habitats. NRW advise that the marine enhancement measures be appropriately secured to demonstrate that the impacts on benthic habitats are being mitigated as far as reasonably possible.
Q2.8.5	The Applicant		In its D4 submission [REP4-039, para3.9.3] NRW states that there are still some gaps related to invasive non-native species (INNS) that need to be addressed in the final Biosecurity Risk Assessment which should be set out in the detailed MWSCoCP and approved by the discharging authority (in consultation with NRW) as a DCO Requirement. Can NRW explain what these gaps are and how they could be filled?	In paragraph 3.9.3 of NRW's Deadline 4 submission, we highlight that there are still gaps that need to be addressed in the final Biosecurity Risk Assessment. In section 7.18.11 of NRW's Written Representations [REP2-325], we provide specific examples that should be addressed in the final biosecurity risk assessment which will need to be appropriately secured and approved by the relevant competent authority, in consultation with NRW. It should be noted that the examples specified in NRW's Written Representations are not exhaustive and are provided to assist the Applicant at this early stage in the development of the biosecurity risk assessment.

			Is the Applicant willing to update the Risk Assessment to include NRWs requirements?	
Q2.8.10	The Applicant		Is NRW content with the conclusion drawn by the Applicant that as a result of the five requests for non-material changes, the cumulative assessment for marine mammals does not change?	The noise assessment for marine mammals has changed and depending on further clarification from the applicant, NRW now believe that the cumulative assessment might change. There is the potential for injury and disturbance to marine mammals from unmitigated noisy activities which could result in an offence of injury to EPS. An assessment of concurrent noise sources is presented in the new noise modelling document (Appendix 2-1) (Table 16) (shared informally with NRW – see section 2.3 of this NRW Deadline 5 response) and models combined noise using non-impulsive criteria from rotary drilling, percussive drilling, cutter-suction dredging and rock breaking operations occurring simultaneously. The results presented in this table imply that PTS onset in cetaceans would occur at distances of less than 160m but it is not clear how the activities were spatially arranged during the modelling or whether they represent the distances between activities likely to occur on site. Nor is it clear how rock breaking was incorporated in the modelling when this has only been modelled using impulsive criteria. NRW therefore seeks further clarity on how this 'cumulative assessment' has been carried out and seeks information on its interpretation.

				The Request for Non-Material Change – Working Hours [REP4-012] states in Table 2-1 that all marine piling is proposed between 07:00-18:00 hours (DCO application), whilst Table 2-2 outlines the change that percussive piling specifically is proposed to be conducted between 07:00-19:00 hours. However, it was NRW's understanding that percussive piing was not going to be utilised. The technical note suggests that percussive piling was part of the DCO application however we request confirmation as to whether that is the case and that those impacts have been assessed in the ES and Shadow HRA. The use of percussive piling, if not already assessed, may generate new or different significant environmental effects. NRW request confirmation on whether this construction method will be used and whether it has been modelled and assessed. NRW advise further clarification from the Applicant is required on points raised above in order to conclude whether the non-material changes will affect the cumulative assessment.
9. Noise and Vibration				
Q2.9.3	IACC & NRW	All	Section 4.10 of NPS-EN-1 addresses pollution control and other environmental regulatory regimes. Would regulation during the construction and operational	NRW Permitting Service has received and is currently determining 4 Environmental Permitting Regulations applications and a Marine License application. As part of the determination process, we will consider the potential effects on those environmental factors listed in

			phases of the proposal be likely to adequately address any potential impacts associated with: waste and materials management; off-site flood risk, bathing water quality at Cemaes; dust and air quality; noise and vibration; and, on soils and geology?	the table below. Where potential effects are identified, and they can be controlled or limited by conditioning within a permit or licence, we will, as part of the determination, consider the appropriateness of doing so. If a permit or licence is issued with conditions, we will monitor compliance with those conditions where we are the regulating and enforcing authority.

In response to Q2.9.3 above:

	Waste material management	Off-site Flood risk	Bathing water quality at Cemaes	Dust and air quality	Noise and vibration	Soils and geology
EPR – Radioactive Substances	Yes	No	No	Yes	No	No
EPR – Cooling Water	No	No	Yes	No	No	No
EPR - Combustion	No	No	No	Yes	Yes	No
EPR - Construction	No	No	Yes	No	No	No
Marine Licence	Yes	No	No	Yes	Yes	No

Q2.9.4	The Applicant IACC & NRW	All	Paragraph 4.10.8 of NPS-EN-1 states that consent should not be refused on the basis of pollution impacts unless there is good reason to believe that any relevant	NRW continues to determine several EPR and marine licensing applications as previously communicated. Abstraction licence applications have yet to be submitted by the applicant. Formal information requests in relation to these applications are still outstanding.

			necessary operational pollution control permits or licences or other consents will not subsequently be granted. Is there good reason to believe that the relevant regulators would be unlikely to grant pollution control permits or licences for the construction and operation of the proposed development?	NRW will proceed to determine these applications in accordance with its legislative obligations but is currently not able to advise whether such applications are likely to be granted or refused.
Q2.9.5	The Applicant & NRW	WA	Section 2.5 of the Wylfa Newydd Code of Operational Practice Rev 2.0 [REP2-037] refers to the obtaining of an Environmental Permit for the operation of the Power Station. In relation to the Mitigation Route Map (Rev 2.0) [REP2-038], is the scope of NRW's role (and that of the ONR) in the regulation of emissions from the Power Station clearly set out?	The Mitigation Route Map has been prepared by the applicant to demonstrate that all necessary controls and mitigation for the project have been identified and secured. NRW consider the Route Map could be strengthened and further clarity provided by the applicant clearly setting out the scope of NRW's role in regulating discharges, emissions and marine licensable activities.
12. Costal Change				
Q2.12.1	The Applicant		NRW [REP4-039 para 4.2.1] still has uncertainties about the reflected wave conditions and changes to hydromorphology in relation to sediments at Cemlyn Bay which it advises needs to be considered	We refer you to section 3.1 of NRW's Deadline 5 response which explains NRW's position, as presented at the January hearings. NRW and the Applicant had a meeting on 4th February in which the Applicant took an action to provide a

			further. Can the Applicant and NRW come to an agreed position?	technical note outlining its proposed monitoring and mitigation package. NRW will review this information once received.
13. Deadline 4 Change Requests				
Worker Shift Patterns				
Q2.13.8	Interested Parties		1) Any comments with regards to the proposed change to workers shift patterns? 2) With regards to the proposed change would it result in a material or non-material change to the application? Please explain your reasoning.	We refer you to Annex A of NRW's Deadline 4 response [REP4-039] which included NRW's responses to the Applicant's proposed non-material changes consultations. NRW advises that the proposed change is unlikely to result in new or different environmental significant effects.
HGV Movements				
Q2.13.16	Interested Parties	Q	1) Any comments with regards to the proposed change to workers HGV movements? 2) With regards to the proposed change would it result in a material or non-material change to the application? Please explain your reasoning.	We refer you to Annex A of NRW's Deadline 4 response [REP4-039] which included NRW's responses to the Applicant's proposed non-material changes consultations. NRW advises that the proposed change is unlikely to result in new or different environmental significant effects.

Working Hours				
Q2.13.22	Interested Parties	Q	1) Any comments with regards to the proposed change to working hours? 2) With regards to the proposed change would it result in a material or non-material change to the application? Please explain your reasoning.	We refer you to Annex A of NRW's Deadline 4 response [REP4-039] which included NRW's responses to the Applicant's proposed non-material changes consultations. However, we also refer to you to the response to Q2.8.10 above which requests clarifications in relation to marine mammals.
14. General Questions				
Q2.14.1	The Applicant (and NRW & IACC)	All	Paragraph 1.1.1 of the Mitigation Route Map Rev. 2.0 [REP2-038] refers to the Environmental Permitting Regulations 2010. However, other parts of the Mitigation Route Map refer to the Environmental Permitting (England and Wales) Regulations 2016. Given the scope of the Environmental Permitting (England and Wales) Regulations 2016 (and the Revocations set out in Schedule	References should be to the 'The Environmental Permitting (England and Wales) Regulations 2016 (as amended).'

			28 of the 2016 Regulations), should paragraph 1.1.1 refer to the Environmental Permitting (England and Wales) Regulations 2016?	
Q2.14.10	Applicant and all Interested Parties	All	The ISHs in March will consider the proposed WNDA and its constituent spatial elements in particular what is proposed for the site; what mitigation would be required and how this would be secured through the dDCO, CoCP and subCoCPs or the S106. A second ISH on 'Other Sites' will consider the same range of issues on a similar basis for: • Off Site Power Station Facilities site; • Dalar Hir Park and Ride site; • Parc Cybi Logistics Centre; • A5025 Off-line Highways Improvements; and • Ecological Compensation sites. With reference to the emerging SoCG are there any areas/topics in relation to the WNDA or the Other Sites where you consider agreement	We note the proposal to consider the Wylfa Newydd Development Area in the ISH on 6th March, and 'Other Sites' in the ISH on 7th March, and that particular attention will be paid to the following issues: • Landscape and visual; • Historic environment; • Good design; • Lighting; • Noise and Vibration; • Air Quality and Dust; and • Waste management and radioactive waste management. In relation to the above listed issues, or related issues, there are no additional areas that NRW advise is considered in the ISHs on 6th and 7th March. However, as NRW has specified in its written submissions for Deadlines 2, 4 and 5, there are a number of outstanding matters to be addressed before the end of the Examination. These include areas where agreement may be unlikely, or where additional information is awaited at future Deadlines. In view of the topic areas of these outstanding matters, NRW

			may not be reached before the end of the examination, bearing in mind the evidence both oral and written that has been submitted to date, and which you would wish the ExA to consider at these ISHs? The ExA propose to consider the WNDA as a whole but also propose on an individual basis to address the Marine Off Loading Facility and Breakwater; the Main Power Island Site; the Site Campus/Temporary Workers Accommodation and the other on-site developments. In considering these elements particular attention will be paid to issues in relation, but not limited, to the following effects individually and in combination: • Landscape and visual; • Historic environment; • Good design; • Lighting; • Noise and Vibration; • Air Quality and Dust; and	consider that they would be most appropriately covered at the Biodiversity hearing on 8th March.

			• Waste management and radioactive waste management.	

ANNEX B-1

The information below is provided to address the Examining Authority's question Q2.5.11 which requested that the conservation objectives are provided in full rather than as links. This arises from NRW's response to the Examining Authority's first round of questions (Q5.0.45) where NRW advised that "*for the sites in/partly in Wales, NRW advise that the correct conservation objectives, where specified in the Shadow HRA, have been used with the exception of the following where the conservation objectives used are out-of-date. However, the content of the updated conservation objectives are largely the same - we provide a link to the updated versions below. Please also note that this advice is based only on those sites where conservation objectives have been specified in the Shadow HRA*".

The sites highlighted by NRW are as follows:

- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC
- Bae Ceredigion / Cardigan Bay SAC
- Afon Teifi/ River Teifi SAC
- Sir Benfro Forol / Pembrokeshire Marine SAC
- Ynys Seiriol / Puffin Island SPA

Please note, although NRW provide the conservation objectives for the above sites, we advise that the core management plans for these sites are considered in full by the Applicant and relevant competent authorities.

Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC UK0013117

Natural Resources Wales (NRW) (2017). Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017. Available from: https://naturalresources.wales/media/684531/pen-llyn-ar-sarnau-r37.pdf

Conservation objectives for the Pen Llŷn a'r Sarnau Special Area of Conservation

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

5.2.1 Habitat Features

- Reefs
- Large shallow inlets and bays
- Sandbanks which are slightly covered by seawater all the time
- Estuaries
- Coastal lagoons
- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows
- Salicornia and other annuals colonising mud and sand
- Submerged or partially submerged sea caves

5.2.2 Range

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the **reef** feature these include;

- Rocky intertidal reefs
- Rocky subtidal reefs
- Extensive boulder and cobble reefs – the sarnau
- Biogenic reefs (horse mussel Modiolus modiolus reef / green crenella Musculus discors reef and Honeycomb worm Sabellaria alveolata reef
- Carbonate reef formed by methane gas leaking from the seabed.

For the **intertidal mudflat and sandflat** feature these include:

- Mya arenaria and polychaetes in muddy gravel
- Eel grass Zostera marina beds.
- Muddy gullies in the Mawddach estuary.

For the ***Salicornia*** feature this includes:

- Communities characterised by the species Sarcocornia perennis.

For the **intertidal mudflats and sandflats** and **sandbanks** features this requires an overall stability or increase in the amount of the feature, taking into account the areas of long term stability and localised losses and additions arising from environmental processes.

For **estuaries** this includes the stability of sandy sediments in proportion to the muddy sediments.

Restoration and recovery

As part of this objective it should be noted that; for the estuaries feature additional land which should form an integral part of the estuarine ecosystem should be restored

5.2.3 Structure and function

The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;

- geology,
- sedimentology,
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations

- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the feature species populations, their abundance or range taking into account bioaccumulation and biomagnification.

For **Atlantic saltmeadows** this includes the morphology of the saltmarsh creeks and pans

Restoration and recovery

As part of this objective it should be noted that; for the estuaries feature the structure and functions of the estuaries that have been damaged/degraded by the constraints of artificial structures such as flood banks, are restored.

5.2.4 Typical Species

The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness
- population structure and dynamics,
- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature is appropriate for maintaining it in favourable condition and is secure in the long term.

Restoration and recovery

As part of this objective it should be noted that; for the reefs feature the potential for expansion of the horse mussel Modiolus modiolus community off the north Llŷn coast is not inhibited.

5.2.5 Species Features

- Grey seal Halichoerus grypus
- Bottlenose dolphin Tursiops truncatus
- Otter Lutra lutra

5.2.6 Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:

- population size
- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For **grey seal** populations should not be reduced as a consequence of human activity.

5.2.7 Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**:

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

5.2.8 Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution
- extent
- structure
- function and quality of habitat
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour

For **otter** there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.

5.2.8 Restoration and recovery

As part of this objective it should be noted that for the bottlenose dolphin and otter, populations should be increasing.

Natural Resources Wales (NRW) (2017). Cardigan Bay/ Bae Ceredigion Special Area of Conservation Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017. Available from: https://naturalresources.wales/media/684522/cardigan-bay-reg-37.pdf

5.2 Conservation objectives for the Cardigan Bay Special Area of Conservation

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

5.2.1 Habitat Features

- Sandbanks which are slightly covered by seawater all the time
- Reefs
- Submerged or partially submerged sea caves

5.2.2 Range

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the **reef** feature these include;

- Intertidal bedrock reefs
- Intertidal cobble, pebble with Sabellaria alveolata (biogenic) reefs
- Subtidal bedrock reefs
- Subtidal pebble, cobble and boulder reefs
- Sea caves

5.2.3 Structure and function

The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;

- geology,
- sedimentology
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota below levels potentially detrimental to the long-term maintenance of the feature species populations, their

abundance or range taking into account bioaccumulation and biomagnification.

5.2.4 Typical Species

The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness
- population structure and dynamics,
- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature is appropriate for maintaining it in favourable condition and is secure in the long term.

5.2.5 Species Features

- Grey Seal
- Bottlenosed dolphin
- River Lamprey
- Sea Lamprey

5.2.6 Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:

- population size
- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For **grey seal** populations should not be reduced as a consequence of human activity.

5.2.7 Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for **bottlenose dolphin** and **grey seal**:

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

5.2.8 Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution
- extent
- structure
- function and quality of habitat
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour

5.2.8 Restoration and recovery

As part of this objective it should be noted that for the bottlenose dolphin populations should be increasing.

Afon Teifi/ River Teifi SAC UK0012670

Natural Resources Wales (NRW) (2017). Core management plan including conservation objectives for Afon Teifi / River Teifi SAC (Special Area of Conservation). Available from: https://naturalresources.wales/media/682845/afon-teifi-river-teifi-management-plan.pdf

4.1 Conservation Objective for the watercourse

The ecological status of the watercourse is a major determinant of FCS for all features. The required conservation objective for the watercourse is defined below.

4.1.1 The capacity of the habitats in the SAC to support each feature at nearnatural population levels, as determined by predominantly unmodified ecological and hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary.

4.1.2 The capacity of the habitats in the SAC to support each feature at nearnatural population levels, as determined by predominantly unmodified ecological and

hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary.
4.1.3 Flow regime, water quality and physical habitat should be maintained in, or restored as far as possible to, a near-natural state, in order to support the coherence of ecosystem structure and function across the whole area of the SAC.
4.1.4 All known breeding, spawning and nursery sites of species features should be maintained as suitable habitat as far as possible, except where natural processes cause them to change.
4.1.5 Flows, water quality, substrate quality, and quantity at fish spawning sites and nursery areas will not be depleted by abstraction, discharges, engineering or gravel extraction activities or other impacts to the extent that these sites are damaged or destroyed.
4.1.6 The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC, including, but not limited to, revetments on active alluvial river banks using stone, concrete or waste materials, unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment, will be avoided.
4.1.7 River habitat SSSI features should be in favourable condition.
4.1.8 Artificial factors impacting on the capability of each species feature to occupy the full extent of its natural range should be modified where necessary to allow passage, e.g. weirs, bridge sills, acoustic barriers.
4.1.9 Natural factors such as waterfalls, which may limit the natural range of a species feature, or dispersal between naturally isolated populations, should not be modified.
4.1.10 Flows during the normal migration periods of each migratory fish species feature will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered.
4.1.11 Flow objectives for assessment points in the Teifi Catchment Abstraction Management Strategy (CAMS) as they relate to the Afon Teifi SAC will concur with the standards used by the Review of Consents process given in Appendix 3 of this document.
4.1.12 Water Quality targets follow those in the revised Common Standards Monitoring Guidance for Rivers (JNCC 2016). These are detailed in Appendix 2 with targets for organic pollution (DO, BOD and ammonia), phosphate, trophic diatom index and acidification. *All waterbodies within or overlapping a freshwater dependant protected area (or draining into a freshwater dependant protected area) have gone through a process of setting phosphorus targets which involved comparison of targets in the CSM guidance and the WFD. This is to ensure that these waterbodies have a single phosphorus target (the most stringent) for use by Natural Resources Wales for management and monitoring.*
4.1.13 Levels of suspended solids will be set by NRW for each Water Framework Directive water body in the Afon Teifi SAC. Measures including, but not limited to, the control of suspended sediment generated by agriculture, forestry and engineering works, will be taken to maintain suspended solids below these levels.
4.1.14 Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects.

4.2 Conservation Objective for Feature 1: Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (EU Habitat Code: 3260)

Vision for feature 1
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

FCS component	Supporting information / current knowledge
4.2.1 The conservation objective for the water course as defined in 4.1 above must be met	
4.2.2 The natural range of the plant communities represented within this feature should be stable or increasing in the SAC. The natural range is taken to mean those reaches where predominantly suitable habitat exists over the long term. Suitable habitat and associated plant communities may vary from reach to reach. Suitable habitat is defined in terms of nearnatural hydrological and geomorphological processes and forms e.g. depth and stability of flow, stability of bed substrate, and ecosystem structure and functions e.g. nutrient levels, shade (as described in section 2.2). Suitable habitat for the feature need not be present throughout the SAC but where present must be secured for the foreseeable future, except where natural processes cause it to decline in extent.	Stands of this feature are known to be widespread in the Afon Teifi SAC including many of the tributaries. However, further information on its natural range, distribution and variation is desirable. Sympathetic management will be promoted wherever the feature is present. Species indicative of unfavourable condition for this feature e.g. filamentous algae associated with eutrophication and invasive nonnative species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC
4.2.3 The area covered by the feature within its natural range in the SAC should be stable or increasing.	Adverse factors may include elevated nutrient levels, shading or altered flow and/or sediment regimes. It is possible that reaches with slightly elevated nutrient levels and/or regulated flows may have a higher cover of the feature than under natural conditions, though species composition may also be affected (see 4.2.4)
4.2.4 The conservation status of the feature's typical species should be favourable. The typical species are defined with reference to the species composition of the appropriate JNCC river vegetation type for the particular river reach, unless differing from this type due to natural variability when	

other typical species may be defined as appropriate.	

4.3 Conservation Objective for Features 2-6: Brook lamprey Lampetra planeri (EU Species Code:1096); River lamprey Lampetra fluviatilis (EU Species Code:1099); Sea lamprey Petromyzon marinus (EU Species Code:1095); Atlantic salmon Salmo salar (EU Species Code:1106); Bullhead Cottus gobio (EU Species Code:1163)

Vision for features 2-6

The vision for these features is for them to be in a favourable conservation status, where all of the following conditions are satisfied:

FCS component	Supporting information / current knowledge
4.3.1 The conservation objective for the water course as defined in 4.1 above must be met	
4.3.2 The population of the feature in the SAC is stable or increasing over the long term.	Refer to sections 5.2 to 5.6 for current assessments of feature populations. Entrainment in water abstractions directly impacts on population dynamics through reduced recruitment and survival rates. Fish stocking can adversely affect population dynamics through competition, predation, introduction of disease and alteration of population genetics.
4.3.3 The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as described in sections 2.2 and 5). Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future. Natural factors such as waterfalls may limit the natural range of individual species. Existing artificial influences on natural range that cause an adverse	feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. food supply (as Some reaches of the Afon Teifi SAC are more suitable for some features than others. These differences influence the management priorities for individual reaches and are used to define the site units described in section 3.2. Further details of feature habitat suitability are given in section 5. In general,

effect on site integrity, such as physical barriers to migration, will be assessed in view of 4.3.4	management for one feature is likely to be sympathetic for the other features present in the river, provided that the components of favourable conservation status for the watercourse given in section 4.1 are secured. The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the habitat requirements of the features. The close proximity of different habitats facilitates movement of fish to new preferred habitats with age. Upland coniferous forestry plantations in parts of the upper catchment, including the Groes, Berwyn and Brefi catchments, adversely affect the run-off and sediment characteristics and water quality of the river. In a few locations there are also problems with toxic run-off from abandoned metal mines. Measures should be taken to restore the hydrological characteristics of headwater areas including wetland functions. Salmon migration can be affected by acoustic barriers and by high sediment loads, which can originate from a number of sources including construction works.
4.3.4 There is, and will continue to be, a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis.	

4.4 Conservation Objective for Feature 7: European otter *Lutra lutra*

Vision for feature 7

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

FCS component	Supporting information / current knowledge
4.4.1 The population of otters in the SAC is stable or increasing over the long term and reflects the natural carrying capacity of the habitat within the SAC, as determined by natural	Refer to section 5.9 for current assessment of feature population

levels of prey abundance and associated territorial behaviour.	
4.4.2 The natural range of otters in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches that are potentially suitable to form part of a breeding territory and/or provide routes between breeding territories. The whole area of the Teifi SAC is considered to form potentially suitable breeding habitat for otters. The size of breeding territories may vary depending on prey abundance. The population size should not be limited by the availability of suitable undisturbed breeding sites. Where these are insufficient they should be created through habitat enhancement and where necessary the provision of artificial holts. No otter breeding site should be subject to a level of disturbance that could have an adverse effect on breeding success. Where necessary, potentially harmful levels of disturbance must be managed.	Survey information shows that otters are widely distributed in the Teifi catchment. While the breeding population on the Teifi is not currently considered to be limited by the availability of suitable breeding sites, there is some uncertainty over the number of breeding territories which the SAC is capable of supporting given near-natural levels of prey abundance. The decline in eel populations may be having an adverse effect on the population of otters on the Teifi.
4.4.3 The safe movement and dispersal of individuals around the SAC is facilitated by the provision, where necessary, of suitable riparian habitat, and underpasses, ledges, fencing etc at road bridges and other artificial barriers.	Road and bridge improvement schemes within the catchment should take appropriate measures towards achievement of this objective.

4.5 Conservation Objective for Feature 8: Floating water-plantain *Luronium natans* (EU Species Code: 1831)

Vision for feature 8

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

FCS component	Supporting information / current knowledge
4.5.1 The conservation objective for the water course as defined in 4.1 above must be met.	
4.5.2 The floating waterplantain populations will be viable throughout their current distribution in the SAC (maintaining themselves on a long-term basis). Each floating water-plantain population must be able to complete	Floating water-plantain populations are known to be present in the main river reaches through and downstream of Cors Caron (units 4 and 5), and in each of the Teifi Pools (unit 7).

sexual and/or vegetative reproduction successfully. Potential for genetic exchange between floating water-plantain populations, in and/or outside the SAC, must be evident in the long-term. Dispersal of floating water-plantain must be unhindered.	Vegetative reproduction is believed to be the main means of regeneration and dispersal for these populations, but they are known to flower periodically in the Teifi Pools during dry summers. Sexual reproduction is important, especially in the long-term, as this provides an alternative means of dispersal and genetic exchange over short and long distances.
4.5.3 The SAC will have sufficient suitable habitat to support floating water-plantain populations within their current distribution. There will be no contraction of the current floating water-plantain distribution in the SAC. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. water levels in Teifi Pools, water depth, stability of river flows, stability of bed substrate, ecosystem structure and functions e.g. nutrient levels, and shade (as described in section 2.2).	Adverse factors may include elevated nutrient levels, artificial regulation of water levels ('draw-down') in the reservoirs at Llyn Teifi and Llyn Egnant, altered river flow and/or sediment regimes, and shading. Species indicative of unfavourable condition for this feature e.g. filamentous algae associated with eutrophication, invasive nonnative species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC.

4.6 Conservation Objective for Feature 9: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* (EU Habitat Code:3130)

Vision for feature 9

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

FCS component	Supporting information / current knowledge
4.6.1 The conservation objective for the water course as defined in 4.1 above must be met	
4.6.2 The Littorelletea uniflorae aquatic upland lake community will be present in all five of the Teifi Pools (Llyn Hir, Llyn Teifi, Llyn Egnant, Llyn y Gorlan and Llyn Bach), and will be selfmaintaining on a long-term basis.	Stands of this upland lake plant community are present in each of the Teifi Pools. Adverse factors may include elevated nutrient levels, artificial regulation of water levels ('drawdown') in the reservoirs at Llyn Teifi and Llyn Egnant, and poaching of exposed lake shores by livestock during periods of low water levels.

	Species indicative of unfavourable condition for this feature e.g. filamentous algae associated with eutrophication, invasive nonnative species, should be maintained or restored below an acceptable threshold level, indicative of high ecological status within the SAC.
4.6.3 A fully developed Littorelletea community will be present in Llyn Hir, including all of the component species typical of the SAC feature, as represented in the Afon Teifi SAC. The typical species are defined with reference to the species composition of the JNCC standing water type for the SAC feature, unless differing from this type due to natural variability when other typical species may be defined as appropriate.	It is considered necessary to maintain a fully developed Littorelletea community in Llyn Hir only. The development of the community in Llyn Bach and Llyn y Gorlan is restricted by the small size of these lakes. The development of the community in Llyn Egnant and Llyn Teifi is restricted by the current management of these two lakes as reservoirs, since several of the key component species of the Littorelletea community are unable to cope with the effects of frequent draw-down.
4.6.4 For each of Llyn Teifi, Llyn Egnant, Llyn y Gorlan and Llyn Bach, the extent and species composition of the Littorelletea community will be stable or increasing in range. There will be no deterioration in the conservation status of the feature as represented in these lakes.	These latter four lakes, in their current condition, contribute to maintaining the feature as a whole in favourable condition, but it is not necessary for them to support a fully developed Littorelletea community.

Sir Benfro Forol / Pembrokeshire Marine SAC UK0013116

Natural Resources Wales (NRW) (2017). Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017 . Available from: https://naturalresources.wales/media/684530/pembrokeshire-marine-council-regulation-37.pdf

5.2 Conservation objectives for the Pembrokeshire Marine Special Area of Conservation

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

5.2.1 Habitat Features

- Sandbanks which are slightly covered by seawater all the time
- Estuaries

- Mudflats and sandflats not covered by seawater at low tide
- Coastal lagoons
- Large shallow inlets and bays
- Reefs
- Submerged or partially submerged sea caves
- Atlantic salt meadows

5.2.2 Range

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the **inlets and bays** feature these include;

- The embayment of St. Brides Bay
- The ria of Milford Haven
- Peripheral embayments and inlets

For the coastal lagoons feature this is subject to the requirements for maintenance of the artificial impoundment structure and maintenance of the lagoons for the original purpose or subsequent purpose that pre-dates classification of the site.

5.2.3 Structure and function

The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;

- geology,
- sedimentology,
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for:

Nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the feature species populations, their abundance or range.

<u>Restoration and recovery</u>

As part of this objective it should be noted that**; the Milford Haven waterway complex** would benefit from restorative action, for example through the removal of non-natural beach material, and the removal, replacement or improved maintenance of rock filled gabions. There is also need for some restoration of the populations of several typical species of the Milford Haven waterway complex that are severely depleted with respect to historical levels as a consequence primarily of human exploitation.

In the **Milford Haven waterways complex** inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

For the lagoons feature this is subject to the requirements for maintenance of the artificial impoundment structures of **coastal lagoons** and maintenance of the lagoons for their original purpose or subsequent purpose that pre-dates classification of the site.

5.2.4 Typical Species

The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness,
- population structure and dynamics,
- physiological health,
- reproductive capacity,
- recruitment,
- mobility,
- range.

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature is appropriate for maintaining it in favourable condition and is secure in the long term.

Restoration and recovery

For the **inlets and bays** features this includes the need for some restoration of the populations of several typical species which are severely depleted with respect to historical levels as a consequence primarily of human exploitation.

In the **Milford Haven waterways complex** inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

5.2.5 Species Features

- Grey Seal *Halichoeurus grypus*
- Otter *Lutra lutra*
- Allis shad *Alosa alosa*
- Twaite shad *Alosa fallax*
- River lamprey *Lampetra fluviatilis*

- Sea lamprey *Petromyzon marinus*
- Shore dock *Rumex rupestris*

5.2.6 Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:

- population size
- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for **otter** and **grey seal**;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For **grey seal and otter**, populations should not be reduced as a consequence of human activity.

5.2.7 Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for **otter** and **grey seal**:

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

5.2.8 Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution
- extent
- structure
- function and quality of habitat
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health. Disturbance by human activity

is below levels that suppress reproductive success, physiological health or long-term behaviour

- For otter there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.

Restoration and recovery

In the **Milford Haven waterways complex** inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

As part of this objective it should be noted that for the **otter**, populations should be increasing.

Ynys Seiriol / Puffin Island SPA UK9020285

Countryside Council for Wales (CCW) 2008. Core management plan including conservation objectives for Ynys Seiriol / Puffin Island SPA. Available from: https://naturalresources.wales/media/674189/Ynys%20Seiriol%20SPA%20%20management%20Plan%2018%20April%20%20(English).pdf

4.1 Conservation Objective for Feature 1: Breeding population of cormorant *Phalacrocorax carbo*

Vision for feature 1

The conservation objective for the Cormorant is to achieve and maintain favourable conservation status, in which all the following conditions are satisfied:

1. The number of breeding cormorants within the SPA are stable or increasing.
2. The abundance and distribution of prey species are sufficient to support this number of breeding pairs and for successful breeding.
3. The management and control of activities or operations likely to adversely affect the Cormorants, is appropriate for maintaining the feature in favourable condition and is secure in the long term."

Performance indicators for Feature 1

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Population Size	The number of breeding pairs of Cormorants within the SPA is stable or increasing. [This is not just a function of the site as a whole but also the population dynamics of the whole NW European (Atlantic) population.]	**Lower limit:** A five year mean of 556 breeding pairs **Upper limit:** Not set
A2. Reproductive success	Number of offspring successfully fledged. Within this SPA this is primarily a function of successfully occupied	**Lower limit:** To be determined **Upper limit:** Not set

	nests. Other factors that impinge on this attribute include adequate food supply for adults and fledglings, absence of human disturbance and weather related issues. The 5 yr mean number of apparently occupied nests (AON) for 1996-2000 was 556, 1.35% of the biogeographical population of around 41,000 pairs. In 2005 730 AON were counted in the SPA. The challenging terrain and access to the site make direct measurement of annual productivity difficult. Young are ringed by SCAN ringing group and such records should indicate average young/nest each year.	
Performance indicators for factors affecting the feature		
Factor	***Factor rationale and other comments***	***Operational Limits***
F1. Physical Disturbance	Breeding seabirds require secure nesting sites, free from human disturbance. Visits to the island should be controlled during the nesting season (February to July inclusive) and any visits necessary should seek to avoid disturbance to sensitive areas, particularly nesting cliffs. No dogs (except guide-dogs) or cats should be permitted at any time.	**Lower limit:** No public access **Upper limit:** To be determined
F2. Fishing	Non-sustainable exploitation of fishing stocks within the cormorants' feeding range during the breeding season can have a negative effect on breeding success and	**Lower limit:** To be determined **Upper limit:** To be determined

	adequate recruitment of fledglings. Presence of fishing nets, especially fixed nets, close to the colony carries risk to foraging birds.	
F3. Introduction of ground predators	Breeding seabirds require freedom from ground predators to thrive. Small offshore islands should be naturally ground predator-free. Rats, cats or other ground predators can decimate breeding colonies. Although cormorants appear to have thrived alongside brown rats until their eradication in 1998, other seabirds appear to have been confined to marginal habitat. Every effort should be made to avoid introduction and to eradicate any ground predators present. Avian predators such as peregrine or greater black-backed gulls should be tolerated.	**Lower limit:** To be determined **Upper limit:** Presence of any ground predators
F4. Supporting habitat	There is adequate space on the island to support the breeding colony – space for nests and normal bird behaviour. The expansion of the elderwood may be inimical to further expansion of the seabird numbers. Consideration is being given to the reintroduction of grazing animals to control the vegetation.	**Lower limit:** Adequate space to support 556 nests **Upper limit:** Not set
F5. Food Supply	There is sufficient fish stocks within the North West Europe (Atlantic) territorial waters to	**Lower limit:** Absence of signs of undernourishment / population collapse

	support the Cormorant Population	Upper limit: **Not set**
F6. Wintering territory	Many seabirds are migratory / dispersive and spend much of their lives away from the nesting colony. Actions or events likely to impinge on the sustainability of the population should be addressed through appropriate mechanisms.	**Lower limit:** To be determined (an analysis of ringing returns needs to be conducted) **Upper limit:** To be determined

4.2 Conservation Objective for Feature 2-6: Intertidal marine communities
Please refer to the Reg 33 package for Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Extent of Communities	refer to the Reg 33 package for Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	Not set
A2. Condition	refer to the Reg 33 package for Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	

Aber Afen Dyfrdwy / Dee Estuary Ramsar UK11082
14 The Dee Estuary Ramsar site conservation objectives
14.1 Interest feature 1, Criterion 5: Conservation objective for the internationally important wetland regularly supporting 20,000 or more waterbirds
The conservation objective for the "internationally important wetland regularly supporting 20,000 or more waterbirds" feature of The Dee Estuary Ramsar Site is to maintain the feature in a favourable condition, as defined below:
The interest feature **"internationally important wetland regularly supporting 20,000 or more waterbirds** will be considered to be in favourable condition when, subject to natural processes[1], each of the following conditions are met:
i. the 5 year peak mean population size for the wintering waterbird assemblage is no less than 120,726 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
ii the relative proportions[2] of waders and wildfowl comprising the wintering waterbird assemblage is maintained;
iii. the extent of intertidal flats[3] and the spatial distribution[4] of their constituent sediment community types[5] is maintained;
iv. the extent of saltmarsh[6] and the spatial distribution[4] of its constituent vegetation community types[7] is maintained;

v. the extent and spatial distribution[4] of saltmarsh vegetation less than 10 cm in height is maintained;
vi. the extent of rocky shore8 at Hilbre Island, Middle Eye, Little Eye and Tanskey Rocks is maintained;
vii. the extent and height of the shingle spit[9] at Point of Ayr is maintained;
viii. the abundance of waterbird prey species[10] are maintained at levels sufficient to support the population size in (i);
ix. greater than 25% cover of both seed bearing plants[11] and soft leaved herbs and grasses[12] is maintained during winter across the saltmarsh;
x. existing unrestricted bird sightlines of at least 200m are maintained in every direction around roosting sites[13], loafing[14] and feeding areas[15];
xi. aggregations of roosting[13], loafing[14] or feeding[15] waterbirds are not subject to significant disturbance.
Further explanatory information clarifying the meaning of terms 1-15 above is provided in **Box 1.**
NB. Additional conservation objectives are provided relating to the use by waterbirds of areas of The Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include pools and coastal fields along the Welsh shore within the Dee Estuary SSSI, at Shotton Lagoons and Reedbeds SSSI and at Inner Marsh Farm SSSI, used by waterbirds for feeding, roosting and loafing. Thus The Dee Estuary Ramsar site internationally important assemblage of regularly occurring waterbirds feature can only be in favourable condition if the conservation objectives pertaining to their use of these pools and coastal fields are also met. These objectives (a-f) are provided below for information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland and standing water including pools, ditches and channels is maintained;
d) the abundance of waterbird prey species including earthworms, leatherjackets and chironomids is maintained;
e) existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas;
f) aggregations of waterbirds roosting, loafing or feeding on the coastal fields are not subject to significant disturbance.

Box 1: Explanatory information for the "internationally important assemblage of regularly occurring waterbirds" conservation objective
[1] Natural processes:

Each interest feature is subject to both natural processes and human influences. Human influence on the interest features is acceptable provided that it is compatible with the achievement of the conditions set out under the definition of favourable condition for each interest feature. A failure to meet these conditions which is entirely a result of natural processes will not constitute unfavourable condition, but will trigger a review of the definition of favourable condition. This qualification is necessary because:

(a) the bird populations themselves are subject to natural factors, many of which arise outside the Ramsar Site, such as breeding success and winter temperatures;
(b) the supporting habitats of the birds are influenced by the evolution of the estuary. Natural adjustments within estuaries can take many forms. One important example is the tendency of estuaries to accumulate sediment, thereby changing their form from their original Holocene morphology to a state where tidal energy is dissipated by subtidal and intertidal sediment banks or features. This, with other natural processes, will therefore cause the width and depth of the estuary to change over time, moving towards a state of dynamic equilibrium or 'most probable state'. As part of this process, the location and extent of saltmarshes and mudflats may change, provided there is capacity to accommodate readjustment. However, where this process is constrained, the capacity of habitats to accommodate readjustment may be affected.

[2] Relative proportions of waders wildfowl and other waterbirds

Waders currently make up about 70% of the of the wintering waterbird assemblage, wildfowl comprise about 22% and other waterfowl the remaining 8%.

[3] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types5 is shown in Appendices V and IV respectively.

[4] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[5] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[6] Saltmarsh extent and spatial distribution:

Saltmarsh extent and spatial distribution of community types is shown in Appendices V and IV respectively.

[7] Saltmarsh vegetation community types:

The constituent vegetation community types of the Dee Estuary saltmarsh are: pioneer low marsh communities, low to mid marsh communities, mid to upper marsh communities, and transitional high marsh communities.

Explanatory information for the "internationally important assemblage of regularly occurring waterbirds" conservation objective

[8] Rocky shore extent:

Rocky shore extent and distribution is shown in Appendix V.

[9] Shingle ridge extent and height:

The location of the shingle ridge at Point of Ayr is shown in Appendix V.

[10] Waterbirds prey species:

Prey species favoured by the waterbirds of the Dee Estuary include the following:
Polychaete worms: rag worm *Hediste diversicolor*, lug worm *Arenicola marina*, Molluscs: Mud snails *Hydrobia spp*., mussels *Mytilus edulis*, cockles *Cerastoderma*

edule, Baltic tellins *Macoma balthica*; Crustaceans: amphipods Corophium spp., shore crab Carcinus maenas, brown shrimp *Crangon crangon*;

[11] Seed bearing plants:

Wildfowl feed on seed-bearing saltmarsh plants including glasswort *Salicornia spp.*, and oraches *Atriplex spp*. (Kirby et al., 2000).

[12] Soft leaved herbs and grasses:

Wildfowl feed on soft-leaved saltmarsh plants including common saltmarsh grass *Puccinellia maritima* and glasswort *Salicornia spp.* (Kirby et al., 2000).

[13] Waterbird roosting areas:

Roosting sites regularly used by waders, and other waterbirds are shown in Appendices VI and VIII.

[14] Waterbird loafing areas:

Loafing areas regularly used by wildfowl are shown in Appendix VIII

[15] Waterbird feeding areas:

Feeding areas regularly used by waders, wildfowl and other waterbirds are shown in Appendices VI and VIII.

14.2 Interest feature 2, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more redshank of the eastern Atlantic population on passage

The conservation objective for the "passage redshank" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"passage redshank"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the passage redshank population is no less than 8,795 individuals *[i.e. the 5 year mean peak between 1994/95-1998/99];*
II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained;
III. the abundance and dispersion5 of redshank prey species6 are maintained at levels sufficient to support the population size in (i);
IV. the extent and spatial distribution3 of saltmarsh vegetation less than 10cm in height is maintained;
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites7 and feeding areas8;
VI. aggregations of roosting7 or feeding8 redshank are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 2.**

NB. Additional conservation objectives are provided relating to the use by redshank of areas of The Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include the coastal fields along the Welsh shore within the Dee Estuary SSSI used by redshank for feeding and roosting. Thus The Dee Estuary Ramsar passage redshank feature can only be in favourable condition if the conservation objectives pertaining to their use of these coastal fields are also met. These objectives (a-f) are provided below for

information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland with standing water including, pools, ditches and channels is maintained;
d) the abundance of redshank prey species including earthworms and leatherjackets is maintained;
e) existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas;
f) aggregations of redshank roosting or feeding on the coastal fields are not subject to significant disturbance.

Box 2: Explanatory information for the "passage redshank" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types[4] is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Redshank prey species:

Redshank prey species include the amphipod crustaceans Corophium spp, mud snails, Hydrobia spp., tellins Macoma spp. and ragworms *Hediste diversicolor* (Kirby et al, 2000).

[7] Redshank roosting areas:

Roosting sites regularly used by redshank are shown in Appendix VI.

[8] Redshank feeding areas:

Feeding areas regularly used by redshank are shown in Appendix VI.

14.3 Interest feature 3, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering shelduck of the North-western European population

The conservation objective for the "wintering shelduck" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering shelduck"** will be considered to be in favourable condition when, subject to natural processes[1], each of the following conditions are met:

I. the 5 year peak mean population size for the wintering shelduck population is no less than 7,725 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats[2] and the spatial distribution[3] of their constituent sediment community types[4] is maintained
III. the abundance and dispersion[5] of shelduck prey species[6] are maintained at levels sufficient to support the population size in (i);
IV. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites[7] and feeding areas[8];
V. aggregations of loafing[7] or feeding[8] shelduck are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 3.**

Box 3: Explanatory information for the "wintering shelduck" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Shelduck prey species:

Shelduck prey species include the amphipod crustaceans *Corophium spp*, mud snails, *Hydrobia spp*. tellins *Macoma spp*. and ragworms *Hediste diversicolor* (Kirby et al, 2000).

[7] Shelduck loafing areas:

Loafing areas regularly used by shelduck are shown in Appendix VIII.

[8] Shelduck feeding areas:

Feeding areas regularly used by shelduck are shown in Appendix VIII.

14.4 Interest feature 4, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering teal of the Northwestern European population

The conservation objective for the "wintering teal" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering teal"** will be considered to be in favourable condition when, subject to natural processes[1], each of the following conditions are met:

I. the 5 year peak mean population size for the wintering teal population is no less than 5,251 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats[2] and the spatial distribution[3] of their constituent sediment community types[4] is maintained
III. the extent of saltmarsh[5] and the spatial distribution[3] of its constituent vegetation community types[6] is maintained;
IV. greater than 25% cover of seed bearing plants[7] is maintained during winter across the saltmarsh;
V. the extent of standing water pools or 'flashes' in the saltmarsh is maintained;
VI. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites[8] and feeding areas[9];
VII. aggregations of loafing[8] or feeding[9] teal are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms **[1-9]** above is provided in **Box 4.**

NB. Additional conservation objectives are provided relating to the use by teal of areas of The Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include the coastal fields and pools along the Welsh shore within the Dee Estuary SSSI and at Inner Marsh Farm SSSI, which are used for loafing and feeding. Thus The Dee Estuary Ramsar site wintering teal feature can only be in favourable condition if the conservation objectives pertaining to their use of these habitats are also met. These objectives (a-d) are provided below for information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland and standing water including pools, ditches and channels is maintained;
d) aggregations of teal loafing or feeding on pools and coastal fields are not subject to significant disturbance.

Box 4: Explanatory information for the "wintering teal" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Saltmarsh extent and spatial distribution:

Saltmarsh extent and distribution is shown in Appendix V.

[6] Saltmarsh community types:

The constituent vegetation community types of the Dee Estuary saltmarsh are: pioneer low marsh communities, low to mid marsh communities, mid to upper marsh communities, and transitional high marsh communities.

[7] Seed bearing plants:

Teal feed on seed-bearing saltmarsh plants including glasswort Salicornia spp., and oraches Atriplex spp. (Kirby et al., 2000).

[8] Teal loafing areas:

Loafing areas regularly used by teal are shown in Appendix VIII.

[9] Teal feeding areas:

Feeding areas regularly used by teal are shown in Appendix VIII.

14.5 Interest feature 5, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering pintail of the Northwestern Europe population

The conservation objective for the "wintering pintail" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering pintail"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering pintail population is no less than 5,407 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained;
III. the extent of saltmarsh5 and the spatial distribution3 of its constituent vegetation community types6 is maintained;
IV. the abundance and dispersion7 of pintail prey species8 is maintained at levels required to support the population size in (i);

V. greater than 25% cover of soft leaved herbs and grasses9 is maintained during winter across the saltmarsh;

VI. existing unrestricted bird sightlines of at least 200m are maintained in every direction around loafing areas10, and feeding areas11;

VII. aggregations of loafing10 or feeding11 pintail are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-11] above is provided in **Box 5.**

NB. Additional conservation objectives are provided relating to the use by pintail of areas of The Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include the coastal fields and pools at Inner Marsh Farm SSSI, which are used for loafing and feeding. Thus The Dee Estuary Ramsar site wintering pintail feature can only be in favourable condition if the conservation objectives pertaining to their use of these habitats are also met. These objectives (a-d) are provided below for information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland and standing water including pools, ditches and channels is maintained;
d) aggregations of pintail loafing or feeding on pools and coastal fields are not subject to significant disturbance.

Box 5: Explanatory information for the "wintering pintail" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Saltmarsh extent and spatial distribution:

Saltmarsh extent and distribution is shown in Appendix V.

[6] Saltmarsh community types:

The constituent vegetation community types of the Dee Estuary saltmarsh are: pioneer low marsh communities, low to mid marsh communities, mid to upper marsh communities, and transitional high marsh communities.

[7] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[8] Pintail prey species:

Pintail feed on surface and near surface invertebrates including mudsnails Hydrobia spp. (Kirby et al., 2000).

[9] Soft leaved herbs and grasses:

Pintail feed on soft-leaved saltmarsh plants including common saltmarsh grass Puccinellia maritima and glasswort Salicornia spp. (Kirby et al., 2000).

[10] Pintail loafing areas:

Low water loafing areas regularly used by pintail are shown in Appendix VIII

[11] Pintail feeding areas:

Feeding areas regularly used by pintail are shown in Appendix VIII.

14.6 Interest feature 6, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering oystercatcher of the Europe and North-western Africa population

The conservation objective for the "wintering oystercatcher" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering oystercatcher"** will be considered to be in favourable condition when, subject to natural processes[1], each of the following conditions are met:

I. the 5 year peak mean population size for the wintering oystercatcher population is no less than 22,677 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats[2] and the spatial distribution[3] of their constituent sediment community types[4] is maintained
III. the abundance and dispersion[5] of oystercatcher prey species6 are maintained at levels sufficient to support the population size in (i);
IV. the extent and spatial distribution[3] of saltmarsh vegetation less than 10cm in height is maintained;
V. the extent of rocky shore[7] at Hilbre Island, Middle Eye, Little Eye and Tanskey Rocks is maintained;
VI. the extent and height of the shingle spit[8] at Point of Ayr is maintained;
VII. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites[9] and feeding areas[10];
VIII. aggregations of roosting[9] or feeding[10] oystercatcher are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-10] above is provided in **Box 6.**

NB. Additional conservation objectives are provided relating to the use by oystercatcher of areas of the Dee Estuary Ramsar site above highest astronomical

tide, which are outside the Dee Estuary European marine site. These areas include the coastal fields along the Welsh shore within the Dee Estuary SSSI used by oystercatcher for feeding and roosting. Thus The Dee Estuary Ramsar Site wintering oystercatcher feature can only be in favourable condition if the conservation objectives pertaining to their use of these coastal fields are also met. These objectives (a-f) are provided below for information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland and standing water including pools, ditches and channels is maintained;
d) the abundance of oystercatcher prey species including earthworms and leatherjackets is maintained;
e) existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas;
f) aggregations of oystercatcher roosting or feeding on the coastal fields are not subject to significant disturbance.

Oystercatcher are known to use North Wirral Foreshore SSSI in numbers of significance. North Wirral Foreshore SSSI directly abuts The Dee Estuary Ramsar site and forms part of the area of both the Dee Estuary SAC and the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar Site. North Wirral Foreshore SSSI includes some key feeding areas for the Dee Estuary oystercatcher population and therefore the condition of North Wirral Foreshore SSSI is important in maintaining the overall wintering oystercatcher population in the wider estuary.

Box 6: Explanatory information for the "wintering oystercatcher" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each

food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Oystercatcher prey species:

Oystercatcher prey species include cockles Cerastoderma edule and mussels Mytilus edulis between 15 and 35 mm in length as well as lugworms Arenicola marina (Kirby et al, 2000).

[7] Rocky shore extent:

Rocky shore extent at Hilbre Island, Middle Eye, Little Eye and Tanskey Rocks is shown in Appendix V.

[8] Shingle ridge extent and height:

The location of the shingle ridge at Point of Ayr is shown in Appendix V.

[9] Oystercatcher roosting areas:

Roosting sites regularly used by oystercatcher are shown in Appendix VI.

[10] Oystercatcher feeding areas:

Feeding areas regularly used by oystercatcher are shown in Appendix VI.

14.7 Interest feature 7, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering grey plover of the Eastern Atlantic population

The conservation objective for the "wintering grey plover" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering grey plover"** will be considered to be in favourable condition when, subject to natural processes[1], each of the following conditions are met:

I. the 5 year peak mean population size for the wintering grey plover population is no less than 1,643 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats[2] and the spatial distribution[3] of their constituent sediment community types[4] is maintained
III. The abundance and dispersion[5] of grey plover prey species[6] are maintained at levels sufficient to support the population size in (i);
IV. the extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites[7] and feeding areas[8];
VI. aggregations of roosting[7] or feeding[8] grey plover are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 7**.

NB. Wintering grey plover are known to use North Wirral Foreshore SSSI in numbers of national significance. North Wirral Foreshore SSSI directly abuts The Dee Estuary Ramsar site and forms part of the area of both the Dee Estuary SAC and the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar Site. North Wirral Foreshore SSSI includes some key feeding areas for the Dee Estuary wintering grey plover population and therefore the condition of North Wirral Foreshore SSSI is important in maintaining the overall wintering grey plover population in the wider estuary.

Box 7: Explanatory information for the "wintering grey plover" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Grey plover prey species:

Grey plover prey species include polychaete worms, small molluscs and crustaceans (Kirby et al., 2000)

[7] Grey plover roosting areas:

Roosting sites regularly used by grey plover are shown in Appendix VI.

[8] Grey plover feeding areas:

Feeding areas regularly used by grey plover are shown in Appendix VI.

14.8 Interest feature 8, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering knot of the Northwestern Canada to North-western Europe population

The conservation objective for the "wintering knot" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering knot"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering knot population is no less than 12,394 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];

II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained

III. The abundance and dispersion5 of knot prey species6 are maintained at levels sufficient to support the population size in (i);

IV. the extent and spatial distribution3 of saltmarsh vegetation less than 10cm in height is maintained
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites7 and feeding areas8;
VI. aggregations of roosting7 or feeding8 knot are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 8.**

NB. Conservation objectives are also to be produced relating to the use of North Wirral Foreshore by wintering knot because they are a feature of the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar site, which directly abuts the Dee Estuary Ramsar site and forms part of the area of the Dee Estuary SAC. North Wirral Foreshore SSSI includes some of the key feeding areas for the Dee Estuary wintering knot population and therefore the Dee Estuary wintering knot feature can only be in favourable condition if the conservation objectives pertaining to the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar Site wintering knot feature are also met in full.

Box 8: Explanatory information for the "wintering knot" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Knot prey species:

Knot prey species include the small molluscs, Baltic tellin Macoma balthica, mussel spat Mytilus edulis and cockle spat Cerastoderma edule, and mud snails Hydrobia spp. (Kirby et al., 2000).

[7] Knot roosting areas:

Roosting sites regularly used by knot are shown in Appendix VI.

[8] Knot feeding areas:

Feeding areas regularly used by knot are shown in Appendix VI

14.9 Interest feature 9, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering dunlin of the Northern Siberia, Europe and Northern Africa population

The conservation objective for the "wintering dunlin" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering dunlin"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering dunlin population is no less than 27,769 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained;
III. The abundance and dispersion5 of dunlin prey species6 are maintained at levels sufficient to support the population size in (i);
IV. iv the extent and spatial distribution3 of saltmarsh vegetation less than 10cm in height is maintained;
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites7 and feeding areas8;
VI. aggregations of roosting7 or feeding8 dunlin are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 9.**

NB. Conservation objectives are also to be produced relating to the use of North Wirral Foreshore SSSI by dunlin because they are a feature of this SSSI, which directly abuts The Dee Estuary Ramsar site and forms part of both the area of the Dee Estuary SAC and the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar Site. North Wirral Foreshore SSSI includes some of the key feeding areas for the Dee Estuary wintering dunlin population and therefore the Dee Estuary wintering dunlin feature can only be in favourable condition if the conservation objectives pertaining to the North Wirral Foreshore SSSI dunlin feature are also met in full.

Box 9: Explanatory information for the "wintering dunlin" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does

not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Dunlin prey species:

Dunlin prey species include ragworms Hediste diversicolor, Baltic tellin Macoma balthica, mud snails Hydrobia spp., brown shrimp Crangon crangon, and small shore crabs Carcinus maenas (Kirby et al., 2000).

[7] Dunlin roosting areas:

Roosting sites regularly used by dunlin are shown in Appendix VI

[8] Dunlin feeding areas:

Feeding areas regularly used by dunlin are shown in Appendix VI.

14.10 Interest feature 10, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering black-tailed godwit of the Icelandic population

The conservation objective for the "wintering black-tailed godwit" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering black-tailed godwit"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering black-tailed godwit population is no less than 1,747 individuals [i.e. the 5 year mean peak between 1994/951998/99];
II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained;
III. The abundance and dispersion5 of black-tailed godwit prey species6 are maintained at levels sufficient to support the population size in (i);
IV. the extent and spatial distribution3 of saltmarsh vegetation less than 10cm in height is maintained;
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites7and feeding areas8;
VI. aggregations of roosting7and feeding8 black-tailed godwit are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 10.**

NB. Additional conservation objectives are provided relating to the use by black-tailed godwit of areas of The Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include

pools and coastal fields along the Welsh shore within the Dee Estuary SSSI, and at Inner Marsh Farm SSSI, used by black-tailed godwit for feeding and roosting. Thus The Dee Estuary Ramsar site wintering black-tailed godwit feature can only be in favourable condition if the conservation objectives pertaining to their use of these pools and coastal fields are also met. These objectives (a-f) are provided below for information but they do not qualify as advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland and standing water including pools, ditches and channels is maintained;
d) the abundance of black-tailed godwit prey species including earthworms, leatherjackets and chironomids is maintained;
e) existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas;
f) aggregations of black-tailed godwit feeding or roosting on the coastal fields are not subject to significant disturbance.

Box 10: Explanatory information for the "wintering black-tailed godwit" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Black-tailed godwit prey species:

Black-tailed godwit prey species include Baltic tellins Macoma balthica, cockles Cerastoderma edule and polychaete worms including ragworms Hediste diversicolor (Kirby et al, 2000).

[7] Black-tailed godwit roosting areas:

Roosting sites regularly used by black-tailed godwit are shown in Appendix VI.

[8] Black-tailed godwit feeding areas:

Feeding areas regularly used by black-tailed godwit are shown in Appendix VI.

14.11 Interest feature 11, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering bar-tailed godwit of the Western Paleartic population

The conservation objective for the "wintering bar-tailed godwit" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature "**wintering bar-tailed godwit"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering bar-tailed godwit population is no less than 1,150 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained
III. the extent and spatial distribution3 of vegetation less than 10cm in height across the saltmarsh5 is maintained;
IV. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites6 and feeding areas;
V. aggregations of bar-tailed godwit roosting6 or feeding or on the intertidal flats or saltmarsh4 are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-6] above is provided in **Box 11.**

NB. Other conservation objectives are to be produced relating to the use of North Wirral Foreshore by bar-tailed godwit because they are a feature of the Mersey Narrows and North Wirral Foreshore pSPA, which directly abuts The Dee Estuary Ramsar site and forms part of the area of the Dee Estuary SAC. North Wirral Foreshore includes key feeding areas for the Dee Estuary bar-tailed godwit population and therefore The Dee Estuary Ramsar Site wintering bar-tailed godwit feature can only be in favourable condition if the conservation objectives pertaining to the Mersey Narrows and North Wirral Foreshore pSPA bar-tailed godwit feature are also met in full.

Box 11: Explanatory information for the "wintering bar-tailed godwit" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Saltmarsh extent and spatial distribution:

Saltmarsh extent and distribution is shown in Appendix V

[6] Bar-tailed godwit roosting areas:

Roosting sites regularly used by bar-tailed godwit are shown in Appendix VI

14.12 Interest feature 12, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering curlew of the European population

The conservation objective for the "wintering curlew" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering curlew"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering curlew population is no less than 3,899 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];
II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained
III. the abundance and dispersion5 of curlew prey species6 are maintained at levels sufficient to support the population size in (i);
IV. the extent and spatial distribution3 of saltmarsh vegetation less than 10cm in height is maintained;
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites7 and feeding areas8;
VI. aggregations of roosting7 or feeding8 curlew are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 12.**

NB. Additional conservation objectives are provided relating to the use by curlew of areas of the Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include pools and coastal fields along the Welsh shore within the Dee Estuary SSSI for feeding and roosting. Thus The Dee Estuary Ramsar site wintering curlew feature can only be in favourable condition if the conservation objectives pertaining to their use of these pools and coastal fields are also met. These objectives (a-f) are provided below for information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland and standing water including pools, ditches and channels is maintained;
d) the abundance of curlew prey species including earthworms and leatherjackets is maintained;

e) existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas;
f) aggregations of curlew feeding or roosting on the coastal fields are not subject to significant disturbance.

Box 12: Explanatory information for the "wintering curlew" conservation objective

[1] Natural processes:
The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:
Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices IV and V respectively.

[3] Spatial distribution
Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:
The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:
Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Curlew prey species:
Curlew prey species include shore crab Carcinus maenas and polychaete worms including ragworms Hediste diversicolor (Kirby et al, 2000).

[7] Curlew roosting areas:
Roosting sites regularly used by curlew are shown in Appendix VI.

[8] Curlew feeding areas:
Feeding areas regularly used by curlew are shown in Appendix VI.

14.13 Interest feature 13, Criterion 6: Conservation objective for the internationally important wetland, regularly supporting 1% or more wintering redshank of the Eastern Atlantic population

The conservation objective for the "wintering redshank" feature of The Dee Estuary Ramsar site is to maintain the feature in a favourable condition, as defined below:

The interest feature **"wintering redshank"** will be considered to be in favourable condition when, subject to natural processes1, each of the following conditions are met:

I. the 5 year peak mean population size for the wintering redshank population is no less than 5,293 individuals [i.e. the 5 year mean peak between 1994/95-1998/99];

II. the extent of intertidal flats2 and the spatial distribution3 of their constituent sediment community types4 is maintained;
III. the abundance and dispersion5 of redshank prey species6 are maintained at levels sufficient to support the population size in (i);
IV. the extent and spatial distribution3 of saltmarsh vegetation less than 10 cm is maintained;
V. existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites7 and feeding areas8;
VI. aggregations of roosting7 or feeding8 redshank are not subject to significant disturbance.

Further explanatory information clarifying the meaning of terms [1-8] above is provided in **Box 13.**

NB. Additional conservation objectives are provided relating to the use by redshank of areas of the Dee Estuary Ramsar site above highest astronomical tide, which are outside the Dee Estuary European marine site. These areas include the coastal fields along the Welsh shore within the Dee Estuary SSSI used by redshank for feeding and roosting. Thus The Dee Estuary Ramsar site wintering redshank feature can only be in favourable condition if the conservation objectives pertaining to their use of these pools and coastal fields are also met. These objectives (a-f) are provided below for information but they do not qualify as Advice under Regulation 33 (2) of the Conservation (Natural Habitats & c.) Regulations, 1994:

a) the extent of coastal grazing marsh is maintained;
b) the extent of all coastal fields is maintained;
c) the extent of wet grassland with standing water including, pools, ditches and channels is maintained;
d) the abundance of redshank prey species including earthworms and leatherjackets is maintained;
e) existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas;
f) aggregations of redshank feeding or roosting on the coastal fields are not subject to significant disturbance.

Conservation objectives are also to be produced relating to the use of North Wirral Foreshore by wintering redshank because they are a feature of the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar site, which directly abuts the Dee Estuary Ramsar site and forms part of the area of the Dee Estuary SAC. North Wirral Foreshore includes some of the key feeding areas for The Dee Estuary redshank population and therefore The Dee Estuary Ramsar Site wintering redshank feature can only be in favourable condition if the conservation objectives pertaining to the Mersey Narrows and North Wirral Foreshore pSPA and pRamsar site wintering redshank feature are also met in full.

Box 13: Explanatory information for the "wintering redshank" conservation objective

[1] Natural processes:

The meaning of 'natural processes' is explained in Box 1.

[2] Intertidal flat extent:

Intertidal flat extent and the distribution of constituent sediment community types4 is shown in Appendices V and IV respectively.

[3] Spatial distribution

Spatial distribution of intertidal flat / saltmarsh communities refers to the macro spatial pattern in which communities are distributed around the estuary. For example, it concerns the zonation of clean sands being found towards the estuary mouth, muddy sands in the mid estuary and mud in the upper estuary with saltmarsh concentrated along sheltered shores in the mid-upper estuary. The statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

[4] Intertidal flat community types:

The constituent sediment community types of the Dee Estuary intertidal flats are: intertidal gravel and clean sand communities, intertidal muddy sand communities including cockle beds, and intertidal mud communities.

[5] Prey dispersion:

Dispersion of prey species refers to the degree of spreading out of food items across the intertidal flats, irrespective of location, which can affect feeding rates. Where prey species are over dispersed it may take birds a long time to find each food item, yet if prey species are confined to too small an area birds feeding rate can be reduced due to interference between birds (Goss-Custard et al., 2001).

[6] Redshank prey species:

Redshank prey species include the amphipod crustaceans Corophium spp, mud snails, Hydrobia spp. tellins Macoma spp. and ragworms Hediste diversicolor (Kirby et al, 2000).

[7] Redshank roosting areas:

Roosting sites regularly used by redshank are shown in Appendix VI.

[8] Redshank feeding areas:

Feeding sites regularly used by redshank are shown in Appendix VI.