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Subject:	Wylfa Newydd DCO Deadline 3 Submissions (Email 3 of 8) [NOT PROTECTIVELY MARKED]
Date:	17 December 2018 18:20:40
Attachments:	34 Horizon"s Response to Written Representation - Natural Resource Wales .pdf

Good Evening

This is the third in a series of 8 e-mails for the Wylfa Newydd DCO Examination Deadline 3 deliverables.

The list below provides a complete list of all documents attached to this e-mail and we will also be delivering 2x USB pen drives containing all of our Deadline 3 submission to your offices at 10:00 tomorrow (Tuesday 18th December).

- 34 Horizon's Response to Written Representation - Natural Resource Wales .pdf

Kind Regards

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HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

Horizon's Response to Written Representation – Natural Resources Wales

PINS Reference Number: EN010007

18 December 2018

Revision 1.0
Examination Deadline 3

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Horizon Internal DCRM Number: WN0902-HZDCO-PAC-REP-00086

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Contents

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1 Introduction

1.1.1 Horizon Nuclear Power Wylfa Limited ("Horizon") has reviewed the Written Representation submitted by Natural Resources Wales ("NRW") at Deadline 2 (4 December 2018) [REP-325]. This document responds to the key issues presented within that representation, with reference to the corresponding paragraph numbers in the NRW Written Representation where appropriate.

1.1.2 Key issues in this response are:

- Draft Development Consent Order
- Planning obligations
- Code of Construction Practice
- Code of Operational Practice
- Project wide effects
- Main Site (Wylfa Newydd Development Area)
- Off-Site Power Station Facilities
- Park and Ride facility
- A5025 Off-Line Highway Improvements
- Logistics Centre

1.1.3 Where appropriate, cross-reference is provided to existing application documents.

2 Draft Development Consent Order

Comments from NRW Permitting Service

2.1.1 At paragraph 2.1 of its Written Representation, NRW note that they have no objection to the NRW Permitting Service being the discharging authority in respect of the Marine Works Requirements; although it is noted that discussions are ongoing between Horizon, Welsh Government and IACC in respect of this function. However, if it were to exercise this role, the NRW Permitting Service has advised that it would expect Schedule 19 of the draft DCO to accord with the fee structure under the Marine Licencing regime.

2.1.2 Horizon notes that the fee structure set out in Schedule 19 is based on the Town and Country Planning Act (Fees for Applications, Deemed Applications, Requests and Site Visits) (England) Regulations 2017 (which apply in Wales)). These Regulations have been used to set fee charges in other development consent orders such as Hinkley, Thames Tideway, Eggborough and North London.

2.1.3 In addition, Horizon has committed to providing a significant amount of funding under the draft DCO s.106 agreement for the processing of any discharge approvals and associated monitoring under the DCO. While this currently would apply to IACC, in the event that NRW is to be the discharging authority for the Marine Requirements it would also have the benefit of this additional funding.

2.1.4 For these reasons, Horizon considers that the fee structure proposed is adequate and that alignment to the Marine Licensing regime is not required. Horizon will continue to engage with NRW in respect of the DCO drafting and arrangements for the discharge of any approvals thereunder.

Comments from NRW Advisory

2.1.5 The NRW Advisory Service sets out a number of comments at paragraphs 2.5 to 2.14. The Horizon responses to these points are set out below.

Temporary possession and "other associated development"

2.1.6 At paragraphs 2.5 and 2.6 of NRW's Written Representation, NRW seeks clarification from Horizon that it has carried out environmental assessments to justify the temporary possession powers under article 35 and the "other associated development" in Schedule 1 of the draft DCO. NRW considers that these powers or works should be circumscribed to what has been assessed.

2.1.7 Horizon wishes to make clear that the Environmental Impact Assessment does not seek to assess the 'temporary possession powers'; and nor should it, as these are not 'EIA development' within the meaning of Schedules 1 and 2 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009/2263. Horizon has assessed the works and operations that are undertaken on the land; not the rights or powers it exercises to occupy the land.

2.1.8 In respect of Schedule 1 "other associated development", the works listed in (a) to (o) (in the updated version of the draft DCO submitted at Deadline 2)

have formed part of the ES assessment and the development of "worst case" scenarios. In response to IACC's Written Representation, Horizon has made some comments in respect of the need for this "catch-all" in paragraph (q) of Schedule 1, how these works have been curtailed, and the definition of 'EIA Development'. (Please refer to section 4 and section 6 of Horizon's response to IACC's Written Representation.)

Request to be consulted

2.1.9 At paragraphs 2.7, 2.8 and 2.10 of its Written Representation NRW requests to be consulted in its statutory consultee role in respect of Requirements:

- SPC1 (Detailed Design Drawings)
- SPC3 (Main Power Station Site Sub-CoCP)
- SPC9 (Water treatment scheme)
- SPC13 (Restoration scheme)
- PW7 (Wylfa Newydd CoCP)
- WN9 (Final Landscape and Habitat Scheme)
- WN11 (Landscape and Habitat Management Schemes)
- WN14 (Great Crested Newt Receptor Site)
- WN19 (Site Campus detailed design approval)
- WN21 (Landscape Detailed Design)
- WN24 to 28 (Relating to Marine Works)
- OH9 (Water vole enhancement areas: Valley)
- OH10 (Water vole enhancement areas: Llanfachraeth)
- ECS2 (Ecological Compensation Sites – detailed design approval)
- ECS3 (Landscape and Habitat Management Scheme)
- ECS4 (Pre-commencement Monitoring.

2.1.10 Horizon is happy to amend these requirements to provide that IACC, in determining whether or not to provide its approval, may consult NRW. These amendments will be reflected in the updated draft DCO submitted at Deadline 4 (17 January 2019).

2.1.11 Horizon considers that Requirement ECS3 and the subsequent management scheme that will be prepared in accordance with that requirement, is sufficient to secure the long-term management of the Ecological Compensation Sites, rather than needing to also be secured through the s.106 agreement. These sites will, by that time, be in Horizon ownership, following it exercising its rights under the option agreement (at the time of writing three sites were still being negotiated/subject to exchange).

2.1.12 Horizon has not made any comments in respect of NRW's request to be a consultee under Requirement SPC5 as this requirement was deleted at Deadline 2 (see Horizon's response to FWQ4.0.63); however, Horizon can confirm that the Main Power Station Site sub-CoCP ("sub-CoCP") was also amended to ensure that no works west of Afon Cafnan would be undertaken between 1 March and 15 August.

2.1.13 Similarly, Requirement SPC4 and SPC10 were also deleted at Deadline 2 as the controls regarding drainage and pre-commencement surveys were already included within the sub-CoCP or the Wylfa Newydd CoCP and so to avoid duplication with those controls, the requirement was deleted. For this reason, consultation roles are not proposed. (Please refer to the DCO Amendment Table (Revision 3.0) (REP2-004) which outlined the reasons for the removal of these requirements and demonstrated where the controls remained within the sub-CoCP or Wylfa Newydd CoCP.)

Amendment to tailpiece wording

2.1.14 Horizon does not agree with NRW's suggested amendment to paragraph 1(4) of Schedule 3 to remove reference to "minor". This is standard DCO wording and the key control is the fact that any amendments to the control documents cannot be outside the scope of what has been assessed under the Environmental Statement.

2.1.15 Horizon considers that the current wording of paragraph 1(4) achieves NRW's objective that no change that is outside the scope of the ES will be approved.

Article 5 of the draft DCO

2.1.16 NRW notes that it expects that the mitigation within the DCO is sufficient to mitigate the effects associated with the authorised development and it does not rely on the mitigation that would be approved as part of the planning permission. It also states that deemed approval of documents or works under the planning permission should not negate the need for NRW approvals under the DCO requirements.

2.1.17 Horizon considers that it has provided sufficient mitigation within the DCO application to address the impacts of the authorised development. Given that Horizon had sought planning permission prior to submission of the DCO application, development of the SPC Requirements and the control documents sought to align the measures under the planning permission and the DCO through either ensuring sufficient controls are in the control documents, or replicating the planning conditions within the SPC Requirements (for example, Requirement SPC6 mirrors condition 22 of the planning permission to ensure that the Magnox alternative emergency control centre cannot be demolished until a new one is operational).

2.1.18 Horizon has provided through article 5(5) of the draft DCO that it may rely on mitigation or works approved under the planning conditions identified in Schedule 4 once it serves notice under article 5 to commence works under the DCO. The purpose of seeking "deemed approval or compliance" is largely for continuity of works and to avoid Horizon having to seek secondary

approvals for the same measures and controls it already had approval for under the planning permission.

Approval of control documents

2.1.19 Updated control documents will be submitted at Deadline 4 (17 January 2018) following comments from the Examining Authority and stakeholders, including NRW. These updates will build upon those already provided at Deadline 2. Horizon considers that the detail of the CoCPs will be sufficient by the end of Examination for them to be approved as part of the DCO and not subject to any future approval process (unless a change is proposed via the tailpiece provisions).

Concerns with "in general accordance"

2.1.20 At paragraphs 2.13 and 2.14, NRW states that control documents should be approved by the discharging authority and the requirements should be amended so that construction and operation must be in "full" accordance with the control documents.

2.1.21 Horizon notes that only Requirement PW3 (Construction Method Statement (CMS)) refers to "in general accordance"; all other requirements relating to control documents refer to compliance "in accordance" with that control document. The purpose of seeking "in general accordance with the CMS" is to provide Horizon with the necessary, but proportionate, degree of flexibility to accommodate any schedule or methodology changes during construction of the Project. This flexibility is considered appropriate given the scale and complexity of the Project and avoids the potential situation where particular construction methodologies and/or phasing identified in the CMS cannot be implemented due to unforeseen engineering, geological or scheduling reasons.

2.1.22 The use of "in general accordance" in respect of compliance with certified documents has also been approved in other DCOs such as the Hinkley Point C (Nuclear Generating Station) Order 2013/648 ("Hinkley"), the National Grid (Hinkley Point C Connection Project) Order 2016/49, the Silvertown Tunnel Order 2018/574 and the North Killingholme (Generating Station) Order 2014/2434.

2.1.23 "In general accordance" is also considered appropriate because the ability to deviate from the CMS has been clearly limited under the Requirements. Requirement PW3(2) provides that Horizon will only be acting in general accordance with the CMS where the proposed construction methodologies and phasing does not result in any materially new or materially different effects from those assessed in the ES. This effectively limits Horizon's ability to modify the construction methodologies and phasing so long as they are within the scope of the ES. To ensure that Horizon is constructing "in general accordance" with the CMS and the ES, Horizon will need to monitor its activities in accordance with the Wylfa Newydd CoCP and the Power Station Main Site sub-CoCP.

2.1.24 All other DCO Requirements require compliance to be "in accordance" with the control documents. This is a standard term used in other granted DCOs and Horizon does not consider that the reference to "full" is necessary as "in accordance" already ensures that Horizon complies with all aspects of the control documents.

3 Planning obligations

3.1.1 The initial heads of terms for the Draft DCO s.106 agreement was provided as part of the Planning Statement [APP-406]. These have since been updated and a more detailed heads of terms were provided at Deadline 1 (13 November 2018) in a Status Note [REP1-010].

3.1.2 As detailed in the Status Note, the Draft DCO s.106 [REP1-010] agreement contains a suite of planning obligations on a variety of topics, one of which is "environment and historic heritage". The proposed environment and historic heritage related planning obligations include two funds from which applications can be made for (a) ecological enhancement projects and (b) Cemlyn Lagoon resilience projects. Further funding is proposed to part-fund both a North Wales Wildlife Trust (NWWT) tern warden and an IACC ecological officer. A further payment is also proposed to the Nuclear Decommissioning Authority for it to deliver a management plan for Cestyll Gardens.

3.1.3 Horizon provided IACC and the Welsh Government with a first Draft DCO s.106 agreement on 26 October 2018 and following receipt of comments, with a second Draft DCO s.106 agreement on 30 November 2018. In accordance with the Examining Authority's direction in the Rule 8 Letter [PD-010] and confirmed in paragraph 1.5 of [REP1-010], a copy of the Draft DCO s.106 agreement has been provided to the Examining Authority at Deadline 3 (18 December 2018).

3.1.4 Horizon will continue to discuss the agreement with IACC, with Welsh government input.

4 Code of Construction Practice (CoCP)

4.1.1 Horizon notes NRW's comments at paragraph 4.1 of its Written Representation regarding the insufficiency of the detail of the Wylfa Newydd CoCP [APP-414] and sub-CoCPs [APP415 to APP-420].

4.1.2 Horizon has always acknowledged that the Wylfa Newydd CoCP [APP-414] and sub-CoCPs [APP415 to APP-420] would be further refined during Examination, in response to scrutiny and comments from the Examining Authority, stakeholders and other interested parties.

4.1.3 Horizon has already submitted pro-active revisions of the Wylfa Newydd CoCP and relevant sub-CoCPs at Deadline 2 (4 December 2018) and will provide additional revisions at Deadline 4 (17 January 2019).

4.1.4 Horizon considers that the detail of the CoCPs will be sufficient by the end of Examination for them to be approved as part of the DCO and not subject to any future approval process (unless a change is proposed via the tailpiece provisions).

4.1.5 Horizon does not consider the example provided within the Written Representation at paragraph 4.2 (Schedule 2 to the recently made Testos Junction Alteration Order 2018) to be an appropriate comparison to the Wylfa Newydd DCO Project. The A19 / A184 Testos Junction Improvement did not contain any version of a CoCP. Hence, a requirement was imposed for Highways England (as the undertaker) to provide Construction and Handover Environmental Management Plans (as is per Highways England's own guidance). In the A19 / A184 Testos Junction Improvement application, only an outline CEMP was provided and certified as part of the DCO.

4.1.6 In addition, the DCO Requirements referred to relate to detailed landscape design and decommissioning strategies. Of which, no detail has been, or can be, provided given the nature of these documents, and the current stage of the Wylfa Newydd DCO Project.

5 Code of Operational Practice (CoOP)

5.1.1 Horizon acknowledges that the Wylfa Newydd CoOP [APP-421] will be further refined during Examination, in response to scrutiny and comments from the Examining Authority, stakeholders and other interested parties.

5.1.2 Horizon has already submitted a pro-active revision of the Wylfa Newydd CoOP at Deadline 2 (4 December 2018) [D2-65] and are expecting to provide the next revision at Deadline 4 (17 January 2019).

5.1.3 Horizon considers that the detail of the CoOPs will be sufficient by the end of Examination for it to be approved as part of the DCO and not subject to any future approval process (unless a change is proposed via the tailpiece provisions).

6 Project wide effects

6.1 Waste

6.1.1 In response to NRW's WR paragraph 6.1.1; setting out mitigation measures. Horizon has committed to amending the Wylfa Newydd CoCP [APP-414] at Deadline 4 (17 January 2019) to include a commitment to produce a Site Waste Management Plan (SWMP). Horizon will update the waste and materials management strategy ("WMMS") in the Wylfa Newydd CoCP at Deadline 4 (17 January 2019).

6.1.2 In response to paragraph 6.1.2; assessment of existing waste management capacity, the proposed waste recovery and disposal routes and an assessment of the impact of waste arisings on the local and regional capacities, were described in Chapter C6 – Project-wide effects – Waste and materials management and Appendix C6-1 (local and regional waste management facilities) of the Environmental Statement [APP-117].

6.1.3 On this evidence, Horizon considered waste management practices for determining how construction and operational waste will be managed. These are set out in section 9.3 of the Wylfa Newydd CoCP [APP-414], the various site-specific sub-CoCPs [APP-415 to APP-419] and the Wylfa Newydd CoOP' [APP-421].

6.1.4 Horizon will continue to update available waste management capacity prior to and throughout the construction phase, as secured by the Wylfa Newydd CoCP, Wylfa Newydd CoOP and the various site-specific sub-CoCPs. The updated WMMS will identify how sufficient provision of essential waste infrastructure is available on-site or to service the site. Further details are included in the Local Impact Reports Response – Waste Management (LIR Waste) submitted at Deadline 3 (18 December 2018).

6.1.5 In relation to tonnage capacity for waste transfer stations, Chapter C6 – Project-wide effects – Waste and materials management of the Environmental Statement [APP-093] states that the capacity of transfer facilities has not been included in the assessment because the assessment considers final treatment/disposal points for waste. While the transfer of waste is not considered, it is acknowledged that transfer stations are commonly used for the bulking and onward transfer of waste to other regional facilities.

6.1.6 North Wales had approximately 2,462,300 tonnes per annum of transfer facility capacity in 2016; it is reasonable to assume that some of this capacity would be available should this be required to transfer some of the waste that is generated by the Wylfa Newydd DCO Project and taken off-site, where it was considered by the contractor to be the most sustainable approach.

6.1.7 In relation to permit and exemption needs above mean high water, all waste and materials arising from the Wylfa Newydd DCO Project will be managed in a responsible manner with the clear intention of applying Horizon's waste hierarchy and in line with all relevant waste legislation and regulation during the construction of the Wylfa Newydd DCO Project. As detailed in the Construction Method Statement Appendix D1-1 [APP-136] and Chapter C6 – Project-wide effects – Waste and materials management of the Environmental

Statement [APP-093], dredged bedrock would be reused for the construction of the marine facilities e.g. cores of the western and eastern breakwaters where appropriate (i.e. geotechnically suitable) and practical (i.e. available when the breakwater construction requires it), and any excess rock would be disposed of at the Disposal Site (the licenced Holyhead North (ISO43) site).

6.1.8 Horizon has prepared waste management practices for determining how marine waste will be managed, set out in section 9 of the Wylfa Newydd CoCP and Marine Works sub-CoCP [APP-D2-60]. Traditional construction and demolition waste, for example packaging, will be managed using the Main Site waste management infrastructure. Where waste management practices require permitting, these will be organised by Horizon as and where required. The Site Waste Management Plan ("SWMP") will further define the contractor requirements.

6.1.9 In response to paragraph 6.1.3, Horizon has continued to engage with key stakeholders for over 18 months at quarterly waste and materials oversight group (WaMOG) meetings, where waste management practices have been discussed including, for example, proposals for a remediation processing compound, a temporary recycling facility and appropriate use of local, regional and national waste management facilities. Horizon will continue to engage with WaMOG and report quarterly to WaMOG throughout the construction of the Wylfa Newydd Power Station to ensure that appropriate waste management processes are being followed and to ensure that lessons learned are shared between projects.

6.1.10 Horizon is developing the Supply Chain Action Plan ("SCAP") in consultation with the Welsh Government and IACC. Chapter C1 – Project-wide effects – Socio-economics of the Environmental Statement [APP-088] includes principles for engagement with the Supply Chain, including waste management services, which can actively compete for supply chain opportunities. It is proposed that the SCAP will be appended to the final draft DCO s.106 agreement to be submitted to the Examining Authority.

7 Main Site (Wylfa Newydd Development Area)

7.1 Flood risk to third party property and/or land

7.1.1 In response to paragraph 7.1.1 and 7.1.2, Horizon acknowledges that the WNDA Development FCA [APP-150 to APP-157] currently concludes that there will be a high risk of flooding from both fluvial and pluvial sources to the properties (and land) upstream of Cemaes village and small increases in flood level elsewhere.

7.1.2 The conclusion in the FCA was reached based on hydrological analysis and hydraulic modelling of both sources of flooding, without presentation of how the flood risk could be avoided, mitigated or managed. The FCA stated that mitigation for Cemaes would include modifications to the drainage design and re-modelling to show that this increased risk was mitigated. These modifications would be undertaken at the detailed design stage, as it was not possible to complete the detailed design stage prior to the time the assessment was submitted to PINS.

7.1.3 Subsequent analysis shows that the increase in flood level on Nant Cemaes is the result of a backwater effect from a small increase in discharge rate from Mound A, which reduces culvert conveyance beneath the A5025. In discussion with NRW on 14th September 2018, the causes of this small increase were presented, and a discussion was had on the criteria that must be met (no increase in flow from the site to the Nant Cemaes) to show that no increase in flood risk would occur.

7.1.4 It remains the case that a detailed drainage design is not currently available and is unlikely to be available until later in 2019. In the absence of a detailed drainage design, Horizon is committed to ensuring that there will be no increase in flood risk at this location and is confident that modifications to the proposed drainage design can achieve this outcome within the Order Limits and agreed parameters. Once further developed these options will be presented to the Examining Authority to demonstrate that increased flood risk can be managed and that the proposals are compliant with TAN15.

7.1.5 Horizon is committed to revising the preliminary drainage design at the detailed design stage and therefore will propose a requirement as part of an updated draft DCO to be submitted at Deadline 4 (17 January 2019) which will require Horizon to submit, for approval, a surface water drainage design for construction works.

7.2 Works affecting main rivers

7.2.1 In response to paragraph 7.1.3, the need for Flood Risk Activity permits under the Environmental Permitting (England and Wales) (Amendment) (No.2) Regulations 2016 from NRW is noted by Horizon for works affecting Main Rivers.

7.2.2 There are a number of Main Rivers across the project as a whole that might be affected, including the Nant Cemaes, Afon Cafnan, Nant Cemlyn within the WNDA area itself. Horizon will obtain the required permits for any works in, over, under or within Main Rivers and their floodplains as is required.

7.3 Catchment area for the Afon Cafnan watercourse

7.3.1 In response to the comments made by NRW at paragraph 7.1.7the Afon Cafnan is shown to experience an increase in flood level as a result of the proposals, principally due to changes in catchment area of approximately 6.67ha from mounds C, on Nant Caerdegog Isaf, and D and E, which will also introduce steeper topography.

7.3.2 This effect simulated by hydraulic modelling, that supports the FCA [APP-127], is primarily during the construction period: though smaller changes are still noted during the operational phase. No properties are affected, though Cemlyn Road experiences increased depths and there are small increases in depth through Cestyll Gardens.

7.3.3 The majority of the land affected will be under Horizon's control and therefore, the consequences in these areas are considered acceptable.

7.3.4 With respect to Cemlyn Road, the road is already a flood risk receptor though, as a result of the project, its use will significantly lessen as there will be no route via this road between Cafnan and Tregele. Consequently, despite the change in flood levels at this receptor, this risk from flooding is arguably lower.

7.3.5 Horizon is committed to the development of the drainage design within the WNDA site, as there is also a residual risk to properties in Cemaes on Nant Cemaes that are affected in a similar manner. Modifications to the drainage design are being developed, however, it remains the case that a detailed drainage design is not currently available and is unlikely to be available until later in 2019.

7.3.6 In the absence of a detailed drainage design, Horizon is committed to further minimising impacts on flood risk at this location and is confident that modifications to the proposed drainage design can achieve this outcome within the Order Limits.

7.3.7 Horizon is committed to revising the preliminary drainage design at the detailed design stage and therefore will propose a requirement as part of an updated draft DCO to be submitted at Deadline 4 (17 January 2019) which will require Horizon to submit, for approval, a surface water drainage design for construction works.

7.4 Increase in flood levels

7.4.1 In response to NRW's comments at paragraph 7.1.8, Chapter D8 Surface water and groundwater of the ES [APP-127] presents the maximum change in flow depth in the Afon Cafnan as a result of the temporary pumping from Mound E runoff to the Afon Cafnan for the 3.3% AEP event. This information is drawn from Table 7.21 of Appendix D8-7 Surface water and groundwater modelling results [APP-160], which also presents the results of the 1% AEP

event. The change in depth, 0.07m at cross section CAFN9, was larger for the 3.3% AEP event than for the 1% AEP event, which was only 0.03m at CAFN9.

7.5 Realignment of Nant Caerdegog

7.5.1 In response to NRW's comments at paragraph 7.1.9, the need for Flood Risk Activity permits under the Environmental Permitting (England and Wales) (Amendment) (No.2) Regulations 2016 from NRW is noted by Horizon for the potential watercourse diversion affecting the Nant Caerdegog Isaf.

7.5.2 The need for the watercourse diversion is currently being reviewed, with the aim being avoiding the need for the works. Should the need remain then Horizon will obtain the required permits for any works in, over, under or within Main Rivers and their floodplains as is required.

7.6 Nant Cemlyn stream

7.6.1 In response to NRW's comments at paragraph 7.1.10, the Nant Cemlyn is shown to experience an increase in flood level as a result of the proposals. As with effects on the Afon Cafnan and Nant Cemaes, these are principally due to changes in catchment area as a result of mound E (+1.16ha), which will also introduce steeper topography.

7.6.2 This effect simulated by hydraulic modelling that supports the FCA [APP-127] occurs during both the construction and operational period. No properties are affected, though Cemlyn Road may experience slight increases in flood depth.

7.6.3 Horizon is committed to the development of the drainage design within the WNDA site, as there is also a residual risk to properties in Cemaes on Nant Cemaes that are affected in a similar manner. Modifications to the drainage design are being developed, however, it remains the case that a detailed drainage design is not currently available and is unlikely to be available until later in 2019.

7.6.4 In the absence of a detailed drainage design, Horizon is committed to further minimising impacts on flood risk at this location and is confident that modifications to the proposed drainage design can achieve this outcome within the order limits and agreed parameters.

7.6.5 Horizon is committed to revising the preliminary drainage design at the detailed design stage and therefore will propose a requirement as part of an updated draft DCO to be submitted at Deadline 4 (17 January 2019) which will require Horizon to submit, for approval, a surface water drainage design for construction works.

7.7 Marine Works

7.7.1 In response to paragraph 7.1.12, Horizon notes NRW’s concerns regarding measures to be taken to minimise the risks to the construction personnel, plant and materials associated with the Marine Works.

7.7.2 The overarching Wylfa Newydd CoCP [APP-414] sets out in section 10.5 Horizon's commitment to ensure that flood risk is managed safely throughout

the construction period (paragraph 10.5.1) and that a documented flood mitigation plan will be developed (paragraph 10.5.2). The proposed contents of the flood mitigation plan include:

- Details of the requirements for monitoring regulatory flood warning alerts;
- Identification of safe meeting areas;
- Safe access and egress routes;
- Activities required to secure plant and equipment in the event of a flood being forecast;
- Checking of drainage systems;
- Roles and responsibilities; and
- Checking procedures.

7.7.3 Horizon notes NRW's expectations that the plan also considers astronomical tides, storm surges, wave action and wind direction, along with failure scenarios with a commitment for the provision of detailed measures to be set out in the CoCP [REP2-031] / Sub-CoCP [REP2-033]. Horizon considers the commitment in Section 10.5 of the Wylfa Newydd CoCP [REP2-031] to provide this commitment.

7.8 Pollution Controls

7.8.1 In response to NRW's concerns at paragraph 7.2.1 and 7.2.2 of its Written Representation that adequate pollution controls must be secured, Horizon is confident that sufficient pollution prevention measures from appropriate guidance have been secured through the Wylfa Newydd CoCP [REP2-031], with site specific measures where relevant in the appropriate sub-CoCPs [REP2-032 to REP2-036].

7.8.2 Throughout the Wylfa Newydd CoCP there are numerous specific references to current regulatory guidance, environmental legislation and good practice guidelines that will govern how Horizon will manage its construction sites. For example, within the Water Management Strategy at section 10 of the Wylfa Newydd CoCP, reference is made to measures and compliance being in accordance with CIRIA industry guidance and Environment Agency Pollution Prevention Guidance (being replaced by Guidance for Pollution Prevention).

7.8.3 Horizon does not consider that is appropriate to duplicate all content from within the industry guidance it cites within the Wylfa Newydd CoCP and sub-CoCPs, as this would fix the measures in terms of the DCO and prevent any updates to guidance being able to apply to the Wylfa Newydd DCO Project.

7.8.4 Horizon has developed water monitoring proposals that will apply during construction. Depending on findings, Horizon will commit additional mitigation if required and, as agreed with the regulators, as stated in (for example) section 10.4 of the Main Power Station Site sub-CoCP [APP-415]. In addition, water protection would be controlled via appropriate environmental permits as per the Environmental Permitting Regulations 2016. Therefore, Horizon considers that NRW will have the necessary approval role in respect of these controls.

7.8.5 Similarly, the Wylfa Newydd CoOP [REP2-037] contains appropriate operational pollution prevention controls in section 10.2.

7.8.6 If NRW would like to specify particular areas of industry pollution prevention guidance, it considers Horizon should commit to, Horizon will consider that request and provide a response as to whether it will be committed to as part of the Wylfa Newydd CoCP, or if not, provide good justifications why it is not appropriate to do so.

7.9 Contaminated Land

7.9.1 In respect of NRW's comments from 7.2.4 regarding Land Contamination, the Land Contamination Risk Assessment and Remediation Strategy [APP-144] provides details of all ground investigations undertaken on site up to the 2015 Ground Investigation, which was specifically targeted to address information gaps in the Areas of Potential Concern. Horizon considers that this covers point b) of the Written Response (and NRW is already satisfied in respect of point a)).

7.9.2 The Land Contamination report also presents a quantitative risk assessment of risks to all potential receptors on site, including both human health and the environment. The risk assessment was undertaken using all available contamination data from investigations completed at the site. A remediation options appraisal and remediation strategy are presented within the report. Horizon considers this covers part of point c) of the Written Response.

7.9.3 A remediation verification plan will be prepared prior to remediation works commencing. This document will be prepared by the contractor undertaking the remediation works. This requirement is secured in Section 9.4 of the Wylfa Newydd CoCP [REP2-031] which states that Horizon will assess and manage land contamination in accordance with the Model Procedures for Land Contamination.

7.9.4 In responses to NRW's comments at 7.2.6, the remediation strategy set out within the Land Contamination Risk Assessment and Remediation Strategy specifies that the remediation contractor should undertake the verification of remediation works in accordance with the Model Procedures for Land Contamination. This requirement is secured in section 9.4 of the Wylfa Newydd CoCP.

7.9.5 Mitigation measures for known land contamination are secured in section 9.3 of the Main Power Station Site sub-CoCP [REP2-032], which was issued at Deadline 2 (4 December 2018).

7.9.6 Section 9.4 of the Wylfa Newydd CoCP sets out a requirement that an unexpected contamination scheme be prepared for all sites prior to the commencement of activities that involve ground disturbance. This includes a requirement to liaise with regulators where necessary. The actions taken to address unexpected contamination will be reported in a remediation verification report, therefore Horizon do not intend to produce updates of the remediation strategy presented in the Land Contamination Risk Assessment and Remediation Strategy.

7.9.7 Horizon considers that the detail of the CoCPs will be sufficient by the end of Examination for them to be approved as part of the DCO and not subject to any future approval process (unless a change is proposed via the tailpiece provisions).

7.10 WFD: Effect on benthic invertebrates

7.10.1 The following sets out Horizon's response to paragraph 7.4.8 in NRW's representation with respect to the scale of effect on benthic invertebrates.

7.10.2 In section 7 of the WFD Compliance Assessment [APP-444], Horizon shows that 23.2ha of subtidal (i.e. coastal bed) and 7.3ha of intertidal invertebrate habitat would be lost under the footprint of the Marine Works in Porth-y-pistyll (including both permanent and temporary structures). This represents 0.51% and 3.6% respectively of the subtidal and intertidal areas, which comprise The Skerries waterbody.

7.10.3 Assuming a worst-case cooling water discharge (as set out in Chapter D13 [APP-132] of the Environmental Statement) Horizon estimates that within The Skerries waterbody, a total of 27ha (0.6%) of subtidal area would be affected cumulatively by the Wylfa Newydd DCO Project. Potential thermal and TRO effects to intertidal areas within The Skerries waterbody due to Cooling Water discharge are expected to be highly localised, being limited to less than 200m to the west of the Cooling Water outfall. Consequently, there is a limited cumulative impact to invertebrates found intertidally.

7.10.4 The Wylfa Newydd DCO Project would also cumulatively impact 4.1ha of invertebrate habitat within the Anglesey North waterbody; the majority of which would occur subtidally. In total, this area equates to 0.03% of the total area of the Anglesey North waterbody.

7.10.5 In reality, it is not anticipated that all invertebrates within the total area of The Skerries and Anglesey North waterbodies potentially affected by the Wylfa Newydd DCO Project would be at risk of deterioration. Outfall surveys at the Existing Power Station have shown that acute effects such as reduced species diversity and abundance, as well as the loss of key characterising species would only likely occur within a couple of hundred metres of the outfall. Beyond 300m, no significant differences in the subtidal communities were observed during Cooling Water outfall surveys of the Existing Power Station (appendix Chapter D13-5 Subtidal Dive Surveys at the Cooling Water Outfall for the Existing Power Station), [APP-223]. Although the Wylfa Newydd Power Station will discharge Cooling Water at a greater rate, the Cooling Water outfall has been designed to direct the plume away from the seabed thereby reducing effects to benthic invertebrates further.

7.10.6 As set out in section 13.6 of Chapter D13-5 Subtidal Dive Surveys at the Cooling Water Outfall for the Existing Power Station [APP-223], Horizon considers that most benthic invertebrate species would not experience lethal effects from TRO at the highest concentrations (i.e. 0.1mg/L) modelled close to the outfall. In addition, Horizon considers there to be no impact to invertebrate species from additional chemical changes associated with Cooling Water and other construction or operational water discharges (e.g.

metal concentrations, dissolved oxygen, pH and ratio of ionised to unionised ammonia).

7.10.7 Therefore, while deterioration of habitat and sessile invertebrate species is likely to occur in Porth-y-pistyll, under the footprint of the Marine Works and within the immediate vicinity of the Cooling Water outfall (i.e. a couple of hundred metres), significant deterioration is not anticipated outside this area. Furthermore, mobile benthic invertebrates would be able to move away from areas of disturbance or unfavourable conditions, and so while habitat may be lost, fatalities may not occur. Subtidal and intertidal habitats along the north Anglesey coastline are not considered to be a limited resource for marine invertebrates known to be present within the area potentially affected.

7.10.8 Based on the worst-case assessment outlined above, the proportion of The Skerries waterbody potential at risk of deterioration for marine invertebrates does not exceed 5% of its surface area, nor does it cover a contiguous surface area which exceeds 0.5km2. This conclusion remains valid when intertidal and subtidal areas are considered in combination and isolation.

7.10.9 Therefore, in accordance with the normative definition outlined in Table A1a of the UK Technical Advisory Group Recommendations on Surface Water Classification Schemes for the purposes of the Water Framework Directive (UK TAG, 2007), the predicted cumulative effect to marine invertebrates as a biological quality element of The Skerries does not represent [a failure – it is not clear what this means] which is inconsistent with classification as high ecological status. The same conclusion can be reached for the Anglesey North waterbody when considering the normative definition for waterbodies of "moderate ecological status".

7.10.10 With respect to point (c), Horizon is liaising with NRW with respect to the Schedule 5 responses for the operational water discharge Environmental Permit application. These responses will provide the areal extent for absolute temperature mixing zone with increased background temperatures. Despite this, Horizon considers that a slight increase in base temperature (as NRW notes in point (c)) would not change the conclusions of the cumulative assessment presented above.

7.10.11 With respect to point (d), Horizon has produced a technical note which was submitted at Deadline 2 (4 December 2018): Supplementary information on coastal processes to support Wylfa Newydd EIA and Shadow HRA. [REP2-007]. This note provides information regarding the effect of the cooling water discharge on coastal processes.

7.10.12 With respect to point (e), when assessing the loss of habitat from the Marine Works, Horizon took a precautionary approach. Figure D13-27 in Chapter D – WNDA Development Figure Booklet – Volume D (Part 2 of 2) [APP-238] shows the permanent lost area used in the calculations and highlights how the area extends outside of the Marine Works. Horizon therefore considers that the areas presented in the assessment of habitat loss account for the potential loss from the temporary waste water outfall.

7.11 WFD: Compliance Assessment

7.11.1 In response to paragraph 7.4.9, Horizon acknowledges that information on physico-chemical (transparency) and specific pollutant quality elements for activity was omitted from the WFD Compliance Assessment [APP-444] but agrees that NRW's conclusion that that these specific quality elements are not at risk of deterioration from this activity alone.

7.11.2 Horizon will address this omission and other required changes, by updating the assessment. This will be provided at Deadline 6 (19 February 2019).

7.12 WFD: Additional and concentrated mercury

7.12.1 In response to paragraph 7.4.13, further assessment of potential impacts of load and distribution of additional and concentrated mercury due to the cooling water discharge is being undertaken to address an issue raised by NRW in relation to the Wylfa Newydd Operational Water Discharge Environmental Permit Application.

7.12.2 The issue of Mercury is also the subject of ongoing discussions to finalise the Statement of Common Ground between Horizon and NRW [REP2-049].

7.12.3 The output of further works for the EP Application (see above) will inform these discussions and further supporting information will be provided at Deadline 6 (19 February 2019).

7.13 WFD: Effect of cooling water discharge on coastal processes

7.13.1 In response to paragraph 7.4.14, with respect to the effect of cooling water discharge upon coastal processes, a technical report Supplementary information on coastal processes to support Wylfa Newydd EIA and Shadow HRA (REP2-007). has been produced and was entered into Examination at Deadline 2 (4 December 2018) This report provides information regarding the effect of the cooling water discharge on coastal processes.

7.13.2 This report demonstrates that sediment transport related to resuspension of bottom silts/sand/gravels, swash processes potentially affecting/modifying gravel ridge morphology, and cross shore sediment transport processes would be effectively the same for the operational power station (i.e. during cooling water discharge) as they are for the current baseline situation.

7.13.3 Therefore, there are no changes to the conclusions presented in Chapter D12 – Coastal Processes and Coastal Geomorphology [APP-131], and the Shadow Habitats Regulations Assessment Report [APP-050 / 051] and Addendum [AS-010] with respect to bed shear stress and the potential effects of coastal processes on Esgair Gemlyn in that there are no significant differences from baseline conditions.

7.14 WFD: Conceptual Site Model

7.14.1 In response to 7.4.23, Horizon has produced a conceptual groundwater model, upon which the Water Framework Directive Compliance Assessment and Water Framework Directive Information to support Article 4(7) Derogation was based. This has identified activities and pathways to effect (directly and indirectly) that may arise from construction, operation and decommission of the Wylfa Newydd Project.

7.14.2 The conceptual groundwater model, affecting the Ynys Môn Secondary groundwater body and Tre'r Gôf SSSI, is currently part of an ongoing review as part of the Statement of Common Ground discussions between Horizon and NRW(NRW18). In support of this, Horizon is undertaking additional study to determine the implications to changes in the conceptual groundwater understanding and how this may affect the Ynys Mon Groundwater body.

7.14.3 Once completed, these findings will be reviewed within the context of Water Framework Directive Compliance Assessment and, as required, changes made to both this assessment and the Water Framework Directive Information to support Article 4(7) Derogation case making.

7.14.4 Horizon will address any changes required to the Water Framework Directive by updating the report. This will be provided at Deadline 6 (19 February 2019).

7.15 WFD: Article 4(7) derogation

7.15.1 In response to paragraph 7.4.26, Horizon, in the Water Framework Directive Information to support Article 4(7) Derogation, has identified the mitigation secured to avoid, reduce and minimise effect on WFD waterbody status. Horizon considers this to represent all practicable steps (based upon feasibility, cost and environmental benefits).

7.15.2 The conceptual groundwater model, affecting the Ynys Môn Secondary groundwater body and Tre'r Gôf SSSI, are currently part of ongoing assessments as part of the Statement of Common Ground discussions between Horizon and Natural Resources Wales (NRW18).

7.15.3 On completion of this study, the effects of dewatering on all construction and operational activities will be reviewed in the context of Water Framework Directive Compliance Assessment and Water Framework Directive Information to support Article 4(7) Derogation case making.

7.15.4 Should the outcome of the study require further receptors to be drawn through into the Article 4(7), then this assessment of technical feasibility, environmental consequences and cost of mitigation measures will be considered in the context of the reviewed conceptual model.

7.15.5 Current work being undertaken will be provided by Deadline 6 (19 February 2019).

7.16 WFD: Cemlyn Lagoon

7.16.1 The issues raised by NRW at paragraph 7.4.28 in their Written Response with respect to Cemlyn Lagoon are the subject of ongoing discussions between Horizon and NRW through the Statement of Common Ground ("SOCG") process.

7.16.2 With respect to surface water run-off from Mound E, Horizon provided an amendment to the main site sub-CoCP at Deadline 2 (4 December 2018) [REP2-032] which clarifies Horizon's plans to use monitoring data to establish thresholds for reverting from pumped drainage from Mound E to the Afon Cafnan to 'natural' drainage to the Nant Cemlyn.

7.16.3 With respect to changes in coastal processes due to the presence of the marine structures, Horizon has conducted further coastal modelling, specifically coupled hydrodynamics and 99th percentile wave condition. These materials were submitted for Deadline 2 (4 December 2018) [Please also see Horizon's response to FWQ12.0.5 of the Examining Authority's first Written Questions, submitted at Deadline 2 (4 December 2018)

7.17 WFD: Water bodies and elements that require derogation

7.17.1 In response to paragraph 7.4.30, Horizon has completed a WFD Compliance Assessment and Information to support Article 4(7) Derogation report using the latest understanding of the design of the Proposed Scheme. This has identified activities and pathways to effect (directly and indirectly) that may arise from construction, operation and decommission of the Wylfa Newydd Project.

7.17.2 Horizon considers that the documents produced in support of Water Framework Directive meet the requirement of the Directive, and continue to provide NRW with the necessary information to support this position.

7.17.3 Horizon acknowledges that there may be a requirement, following the completion of the Examining Authority/Secretary of State 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. 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.

7.18 WFD: Mitigation for activities driving non-compliance

7.18.1 In response to paragraph 7.4.31, the materials provided to demonstrate that all practicable steps have been taken to mitigate predicted activities driving non-compliance with the WFD are currently being updated. In addition, the consideration of significantly better environmental options (in terms of Article 4(7)(d)) is being updated. This work is considering technical feasibility, WFD and wider environmental consequences and cost. Its aim is to address discussions in the Statement of Common Ground between Horizon and Natural Resources Wales (150, 160)

7.18.2 Quantitative information of the assessment of significantly better environmental options will be provided to support the materials presented to date in Information to support a derogation under Article 4(7) of the WFD

7.18.3 Work being undertaken will be provided to the Examining Authority by Deadline 6 (19 February 2019).

7.19 WFD: Article 4(7) tests C and D of the WFD

7.19.1 In response to paragraphs 7.4.32 to 7.4.34, Horizon acknowledges that NRW intends to advise on limb 1 (overriding public interest) on test C only, as has been discussed during previous Steering Group Meetings.

7.19.2 Horizon has submitted evidence to support the first limb of test C and is confident of the provision of a compelling case that satisfies the requirements of this test.

7.19.3 The provision of quantitative evidence relating to technical feasibility and cost, are part of ongoing assessment work to address discussions in the Statement of Common Ground between Horizon and NRW [REP2-049].

7.19.4 Where appropriate, details of the assessment of costs will be provided to support tests under article 4(7). This will include reference to raw data/models used in the calculations of cost. Current assessment work being undertaken will be provided by Deadline 6 (19 February 2019).

7.20 WFD: Adaptive Monitoring and Management

7.20.1 In response to paragraph 7.4.35, the provision of further detail on Adaptive Monitoring and Management is currently part of ongoing work to address discussion in the Statement of Common Ground between Horizon and NRW. Details will be made available at Deadline 4 (17 January 2019).

7.20.2 Should an adaptive management approach be identified as appropriate, the Water Framework Directive Information to support Article 4(7) will include this additional mitigation with test a. This is on the provision that confidence in its ability to function as mitigation against deterioration of receptors can be assured through the current study.

7.20.3 Further work is also underway to develop monitoring and adaptive management with respect to abstraction licensing. Horizon assumes that this will be progressed via the abstraction licence application determination, with controls enforced via this process. If these materials are required for the DCO determination, they could be submitted for deadline 6 (19 February 2018).

7.21 WFD: The Skerries water body

7.21.1 In response to paragraph 7.4.36, Horizon acknowledges that the information on the potential impacts to the hydromorphology of The Skerries water body arising during the operational phase was omitted from the Water Framework Directive Information to support Article 4(7) Derogation, paragraph 3.4.2.

7.21.2 Horizon will address this omission and any further requested changes, by updating the report. This will be provided at Deadline 6 (19 February 2019).

7.22 WFD: Shoreline Structures Assessment

7.22.1 In response to paragraph 7.4.36, The Shoreline Structures Assessment (Environment Agency. 2006) paper describes the methodology used in the assessment of risk posed to transitional and coastal (TRaC) waters by the presence of shoreline reinforcements and other structures. In the absence of monitoring data all available knowledge needs to be used in classifying waterbodies.

7.22.2 The activities under assessment include flood and coastal defence and port and harbour operations. Such activities involve the modification of transitional and coastal shorelines through the construction of reinforcements and breakwaters and infrastructure such as wharves, docks, jetties and piers to support maritime industries (source pressure). Modification of shorelines results in the alteration of sediment transport and hydrodynamics (exposure pressure). The impact of these activities is the direct loss or change of intertidal and subtidal habitats with the consequent loss of benthic communities (receptor), which are often a vital resource for higher trophic levels such as fish and birds (receptors).

7.22.3 This risk assessment method gives equal importance to both the absolute length of shoreline structures and the proportion of shoreline occupied by shoreline structures to give a more rounded ranking of water bodies at risk of failing to meet good ecological status.

7.22.4 In the absence of monitoring data all available knowledge needs to be used in classifying waterbodies; the Shoreline Structures Assessment can be used to provide an assessment of hydromorphology. A reporting category of 2a denotes ‘not at risk’ and therefore of at least good status (low confidence).

7.23 WFD: Use of normative definition

7.23.1 In response to paragraph 7.4.38, Horizon acknowledges the requirement to use the normative definition “very minor” in paragraph 3.4.8. This will not affect the overall assessment.

7.23.2 Text will be added to the Water Framework Directive Information to support Article 4(7) Derogation.

7.23.3 In response to paragraph 7.4.39, Horizon acknowledges that the information on the changes brought about by the project to The Skerries water body that are inconsistent with the normative definition for High hydromorphological status were omitted from the Water Framework Directive Information to support Article 4(7) Derogation, but concurs with NRW’s conclusion that this does not alter the requirement for the waterbody /receptor to be carried forward to derogation.

7.23.4 Horizon acknowledges that further explanatory text is required in the Water Framework Directive Information to support Article 4(7) Derogation case paragraph 3.4.8 around the use of normative definitions in relation to hydromorphological status.

7.23.5 Horizon will address this omission and any further requested changes, by updating the report. This will be provided at Deadline 6 (19 February 2019).

7.24 WFD: First limb consideration

7.24.1 In response to paragraph 7.4.41, Horizon considers that the compelling case in respect of limb 1 of test c is sufficient to meet test c (noting that limbs 1 and 2 are similar, and only one limb needs to be met). Furthermore, NRW has acknowledged that its own advice will be made in respect of information to support limb 1 (overriding public interest) for test c only.

7.24.2 If required, Horizon will include additional text to the Water Framework Directive Information to support Article 4(7) Derogation to clarify the reasoning for submission of a text c limb 1 case only. This can be provided to the Examining Authority by Deadline 6 (19 February 2019).

7.25 WFD: Welsh Policy Context for Nuclear Power

7.25.1 In response to paragraph 7.4.42, Energy Wales: A Low Carbon Transition (2012) provides unambiguous support for the Wylfa Newydd Power Station1. It states that ”The Welsh Government supports the development of a new nuclear power station on Anglesey. This development also offers significant long-term economic benefits to Anglesey and North Wales in general. The development of the Horizon nuclear new build (Wylfa B) [Wylfa Newydd DCO Project] is a vital component of not just the Anglesey Energy Island programme but of our wider energy future in providing a constant energy source to complement the intermittency of renewable sources. There are undoubtedly risks associated with nuclear power, but the risks posed by climate change are now so serious that we cannot dispense with a key proven low-carbon technology”

7.25.2 Further text will be drawn from the Welsh Government energy policies as required to support the test c case. This material can be provided for Deadline 6 (19 February 2019).

7.26 WFD: Assessment of disproportionate cost

7.26.1 In response to paragraph 7.4.44, work is underway to collate information with respect to the consideration of ‘significantly better environmental options’ and ‘all practicable mitigation measures’. This work was initiated to address discussions in the Statement of Common Ground between Horizon and NRW.

7.26.2 Where appropriate, quantitative information of the assessment of cost will be provided to support tests under Article 4(7). This will include reference to raw data/models used in the determination of cost. This material will be provided for Deadline 6 (19 February 2019).

[1] Welsh Government. 2012. Energy Wales: A Low Carbon Transition. https://gov.wales/docs/desh/publications/120314energywalesen.pdf

7.27 WFD: Marine ecological enhancement measures

7.27.1 In response to paragraph 7.4.45, further assessment work has been undertaken in relation to Marine Ecological Enhancements to address ongoing discussion in the Statement of Common Ground between Horizon and NRW.

7.27.2 Further information relating to Marine Ecological Enhancements will be provided at Deadline 4 (17 January 2019). The findings of this assessment work will be reflected in the WFD Compliance Assessment.

7.28 WFD: Impact assessment

7.28.1 In response to paragraph 7.4.46, additional evidence to support test (d) under Article 4(7), is ongoing work to address discussions in the Statement of Common Ground between Horizon and NRW (150, 160).

7.28.2 This will include updating Table 6-2 within the Water Framework Directive information to support Article 4(7) Derogation report. Work currently being undertaken will be provided by Deadline 6 (19 February 2019).

7.28.3 In response to paragraph 7.4.47, Horizon acknowledges the omission of this information from relevant section of Table 6-2 of the Water Framework Directive Information to support Article 4(7) Derogation. Marine invasive non-native species have been considered during the assessment of better environmental alternatives.

7.28.4 Horizon will address this omission and reference to marine invasive non-native species and the Biosecurity Risk Assessment Strategy will be included by updating the report. This will be provided to the Examining Authority at Deadline 6 (19 February 2019).

7.28.5 In response to paragraph 7.4.48, use of the existing Cooling Water intake has not been included in the consideration of design alternatives to the Skerries waterbody for a number of reasons. These include not meeting Project requirements as an option; being unable to provide sufficient capacity, the current design not utilising an intake channel and not being included with NPS EN-6.

7.28.6 The assessment of significantly better environmental options is currently being updated. This work is considering technical feasibility, WFD and wider environmental consequences and cost. Its aim is to address ongoing matters in the draft Statement of Common Ground between Horizon and Natural Resources Wales submitted at Deadline 2 (APP-D2-4).

7.28.7 In response to the suggestion proposed, the ongoing study will be expanded to include information on why the option for utilising existing infrastructure was not selected.

7.28.8 Current assessment work being undertaken will be provided to the Examining Authority by Deadline 6 (19 February 2019).

7.29 Horizontal Guidance (H1)

7.29.1 In response to paragraphs 7.5.1 and 7.5.2, Horizon has used the H1 risk assessment tool on the chemical discharges expected to arise from the Cooling Water System (CWS) and only sodium nitrite was screened in for further assessment.

7.29.2 In chapter D13 (the marine environment) of the Environmental Statement [APP-132], Horizon presents scientific evidence on the toxicity of sodium nitrite and assesses its effects on marine receptors based on a duration and concentration of exposure in the laboratory rather than the modelled extent of a mixing zone (in this case the extent of the 6µg/L contour which is the predicted no-effect concentration). The concentration of sodium nitrite discharged from the CWS would be over six times lower than that considered lethal (LC50) to the most sensitive receptor and therefore Horizon concludes that the effect of sodium nitrite discharge would be negligible.

7.29.3 Furthermore, following discharge, concentrations of sodium nitrite will diminish through dilution (mixing from waves and wind) and oxidisation (of nitrite to nitrate; the latter being less toxic to marine organisms). The greater the water temperature the faster oxidation is expected to occur. The effects from sodium nitrite on marine receptors based on laboratory conditions is therefore considered to represent worst case compared to actual CWS discharge effects.

7.29.4 Detailed sodium nitrite modelling has been undertaken and presented within Horizon's operational water discharge permit application. NRW has exercised its powers under Paragraph 4 of Part 1 of Schedule 5 of the Environmental Permitting (England and Wales) Regulations 2016 to request further information. The requested information is listed in paragraph 7.5.2 (a) and (b) of NRW's Written Representation.

7.29.5 Horizon will respond to NRW's request in early 2019 with revised modelling using the autumn base case and present the extent of sodium nitrite above 6 µg/L, the predicted no-effect concentration value.

7.29.6 In response to paragraph 7.5.3, Horizon acknowledges a small rounding error in the calculation of ammonia concentration using maximum baseline water temperatures.

7.29.7 For construction assessments, referred to in paragraph 13.6.38 of chapter D13 [APP-132], this rounding error is 0.14 ºC. A value of 16.7 ºC was used instead of 16.84 ºC, which was the maximum temperature recorded.

7.29.8 For operation, referred to in table D13-45 of chapter D13, a value of 16.00ºC was used for maximum ambient temperature when the maximum temperature recorded was 16.84ºC. Consequently, a value of 28.00ºC was used to calculate the scenario 'maximum ambient temperature + 12 ºC' instead of 28.84ºC.

7.29.9 This difference of 0.84ºC does not change the assessment of effects within chapter D13. The revised unionised ammonia concentration increases from 0.81 to 0.86 µg/l in the scenario 'max ambient' and from 1.91 to 2.03 µg/l in the scenario 'max ambient +12 ºC'.

7.29.10 The Environmental Quality Standard (EQS) for unionised ammonia is 21 µg/l and therefore concentrations remain well below the EQS and the assessment of negligible remains the same.

7.29.11 Table D13-45 of chapter D13 has been reproduced below with the corrected values underlined.

Condition	Temperature (°C)	Ratio	Unionised ammonia (µg/L)
Average ambient	11.78	0.020	0.60
Average + 12°C	23.78	0.048	1.42
Max ambient	<u>16.84</u>	<u>0.029</u>	<u>0.86</u>
Max ambient + 12°C	<u>28.84</u>	<u>0.069</u>	<u>2.03</u>

7.29.12 In response to paragraph 7.5.4 Horizon has made an application to NRW for operation water discharge activity under the Environmental Permitting Regulation 2016. This application includes the discharge of power station cooling water. NRW has exercised its powers under Paragraph 4 of Part 1 of Schedule 5 of the Environmental Permitting (England and Wales) Regulations 2016 to request further information. The requested information is listed in paragraph 7.5.4 (a) and (b) of NRW's Written Representation.

7.29.13 Horizon will provide the below information requested by NRW in its response to further information early in 2019.

7.29.14 (a) the raw data files based on the results at each sample location for the sampling period (that make up the annual average data presented in appendix D13-1 – Water Quality and Plankton Surveys Report [APP-219] for the water quality suite with the maximum and minimum concentration values shown; and

7.29.15 (b) details of the state of tide (spring/neap and flood/ebb) for the sampling period.

7.30 Bathing water at Cemaes

7.30.1 In response to paragraph 7.6.4 Horizon has considered the potential impacts on bathing water quality from a variety of perspectives including modelling of discharges of treated foul effluent, and modelling of sediment from construction discharges. In addition, Horizon has assessed the effects on the Cemaes bathing water cumulatively with other discharges operated by Dŵr Cymru Welsh Water (DCWW). These are summarised in sections 13.6.52 – 13.6.53 of chapter D13 - The Marine Environment [APP-132].

7.30.2 Modelling has shown that sewage discharged in the north of Porth-y-pistyll would be quickly dispersed and the concentrations of faecal coliforms reaching the bathing water are low; in a worst-case scenario, the modelled concentrations reaching the bathing water at Cemaes would result in an increase in 29.3CFU/100ml. Under the Bathing Water Directive, the concentration of intestinal enterococci must not exceed 200CFU/100ml in 80% of samples to achieve good status. The predicted concentrations reaching

Cemaes are well below the maximum concentrations required to achieve good classification and therefore Horizon concludes that there would be no predicted effect on bathing water at Cemaes as a result of the Wylfa Newydd DCO Project.

7.30.3 Furthermore, as presented in the Water Framework Directive Compliance Assessment [APP-444], the Wylfa Newydd DCO Project is not considered to risk further deterioration in bathing water quality in that the modelled concentrations are not sufficient enough to result in a change in quality based on the levels within the Bating Water Directive. Horizon considers that its assessment is conservative due to the assumptions incorporated into the modelling and assessment work.

7.30.4 Horizon has made an application to NRW for construction water discharge activity under the Environmental Permitting Regulations 2016. This application includes the discharge of treated foul effluent. NRW has exercised its powers under Paragraph 4 of Part 1 of Schedule 5 of the Environmental Permitting (England and Wales) Regulations 2016 to request further information. The requested information is listed in paragraph 7.6.5 of NRW's Written Representation.

7.30.5 At a meeting with NRW's Permitting team on 1 October 2018, it was agreed that further modelling would be undertaken using a different modelling approach to expand on the existing bacteria modelling to support the current conclusions contained in the Environmental Statement.

7.30.6 The modelling being completed will examine the effect of using advection dispersion modelling rather than particle tracking (the existing modelling presented in the DCO application) and will include the output from existing DCWW asset. The modelling is due to be completed early 2019.

7.30.7 In response to paragraph 7.6.5 Horizon considers that the modelling and assessment that it has carried out relating to discharges of elevated suspended solids and sewage discharges into the marine environment, as set out in chapter D13 of the ES [APP-132], is appropriate for the DCO application.

7.30.8 That modelling considers the potential impacts on Cemaes Bathing Water from a variety of perspectives including modelling of discharges of treated foul effluent, and modelling of sediment from construction discharges from the Wylfa Newydd DCO Project.

7.30.9 Horizon has also undertaken a qualitative assessment of the effects on the Cemaes Bathing Water cumulatively with other discharges operated by Dŵr Cymru Welsh Water (DCWW) by comparing the modelled discharge against existing bacti levels in Cemaes bay. These assessments are summarised in sections 13.6.52 – 13.6.53 of chapter D13 of the Environmental Statement.

7.30.10 Through the Schedule 5 requests NRW have raised concern over the modelling outputs and the cumulative effect of the sewage discharge with other DCWW assets. Horizon are currently drawing up a scope for the additional modelling elements and is working with DCWW and consulting with NRW to agree a set of input parameters and model these cumulative effects in the project area. The outcome of the modelling will be to further understand

the risk of the project in combination with existing assets to result in failures of the Cemaes Bathing Water against the Bathing Waters Directive.

7.30.11 In response to paragraph 7.6.6, Horizon has made an application to NRW for construction water discharge activity under the Environmental Permitting Regulations 2016. This application includes the discharge of sewage effluent during construction of the Power Station. NRW has exercised its powers under Paragraph 4 of Part 1 of Schedule 5 of the Environmental Permitting (England and Wales) Regulations 2016 to request further information. The requested information is listed in paragraph 7.6.6 (a) to (d) of NRW's Written Representation.

7.30.12 Horizon will provide the below information requested by NRW in its Schedule 5 response early in 2019.

7.30.13 The modelling presented in chapter D13 [APP-132] and used for the assessment of effect in the DCO application is based on input parameters that are further defined below and is considered worst case.

7.30.14 In response to point a), modelling was based on a continuous flow of 18.5 l/s to encapsulate the estimated Population Equivalent (equivalent to 11.5 l/s) and was also aligned with the Dŵr Cymru Welsh Water consented discharge flow rate at Wylfa Head.

7.30.15 In response to point b), the sewage effluent discharge has been modelled as a continuous release over a 24-hour period, again providing a worst case for assessment purposes.

7.30.16 In response to point c), the modelling values used (18.5 l/s) represents worst case Population Equivalent flows as it exceeds the Population Equivalents calculated for the project.

7.30.17 In relation to point d), Horizon is liaising with NRW for the Environmental Permit on revised T90 values for the purposes of undertaking additional advection dispersion modelling, so comparisons can be made with existing results.

7.30.18 In response to paragraph 7.6.7Chapter D13 of the Environmental Statement [APP-132] presents particle tracking modelling results against the bathing beach standard for Intestinal enterococci (IE) as a worst-case scenario. The standard for achieving good classification for IE is <200 CFU/100ml compared to <500 CFU/100ml for E.Coli.

7.30.19 Horizon is currently undertaking additional modelling to examine the effect of sewage effluent. The model outputs for both E.Coli and Intestinal Enterococci will be compared against their respective standards under the EU Bathing Waters Directive (2006).

7.30.20 In response to paragraph 7.6.8, Horizon has made an application to NRW for construction water discharge activity under the Environmental Permitting Regulation 2016. This application includes the discharge of water from land drainage, dewatering and sewage during construction of the Power Station. NRW has exercised its powers under Paragraph 4 of Part 1 of Schedule 5 of the Environmental Permitting (England and Wales) Regulations 2016 to

request further information. The requested information is listed in paragraph 7.6.8 of NRW's Written Representation.

7.30.21 As agreed with NRW in the context of discussions regarding the Environmental Permit application, Horizon has prepared revised figures and recalculated the areal extent of change above a 10% background (0.61mg/L total suspended solids loading) as agreed. This data is provided in Appendix A to this document. The total suspended solid plots presented in figures 164; 165; 166; 169 & 170 in appendix D13.08 [APP-226] show the increase in suspended solid concentrations for the Wylfa Newydd DCO Project. These plots have been updated in Appendix A to show suspended solid increases above 10% of background (i.e. >0.61 mg/L total suspended solids) and areal extent.

7.30.22 These recalculated figures and areal extents make it clearer where change above background is occurring as a result of the Wylfa Newydd DCO Project. Horizon's assessment of effects remains as reported in chapter D13 [APP-132] of the Environmental Statement.

7.30.23 In response to paragraph 7.6.9Horizon has modelled the dispersion of total suspended sediment in the coastal waters following land drainage, sewage discharge and dredging activities individually and these are presented in chapter D13 [APP-132] and its supporting figures [APP-238].

7.30.24 Horizon provides further results below on the cumulative assessment of total suspended solids from the above activities.

7.30.25 The concentrations at mid-depth following dredging, land drainage and sewage results in a total area of approximately 47.7ha (41.8ha in Porth-y-pistyll, 3.7ha in Porth Wylfa and 2.2ha in Cemaes Bay) which has an increment in concentration of up to 0.61mg/L (which would not be discernible above background) (see figure in Appendix B).

7.30.26 The higher concentrations of total suspended solids are localised around the discharge locations and the area that would be classified as intermediate water (10-100mg/L) under WFD criteria is restricted to a total area of 1.9ha (1.3ha in Porth-y-pistyll, 0.05ha in Porth Wylfa, and 0.4ha in Cemaes Bay).

7.30.27 For the majority of the time during the construction of the Wylfa Newydd DCO Project, it is likely that the suspended solids concentrations will be broadly similar to baseline conditions, with peaks occurring during rainfall events in line with existing conditions.

7.30.28 In summary, the updated cumulative modelling reflecting the modified land drainage design and dredging operations shows that the increased suspended solids quickly disperse within the marine environment and reach levels that would be detectible above background within 47.7ha.

7.31 HRA: Anglesey Terns SPA (Introduction and overview)

7.31.1 In response to NRW's background information on Anglesey Terns SPA in relation to paragraphs 7.8.1 to 7.8.11 of NRW's written representation, there are several points that should be noted:

- Although the number of breeding pairs of Sandwich tern at the Cemlyn Bay colony in 2018 was estimated as 519, the maximum count of individual birds recorded during the Horizon baseline disturbance surveys was approximately 2,300. This maximum count was recorded over a period from 2 to 13 July, with at least 1,800 individuals present between 18 June and 13 July. A high proportion of the birds that attended the colony in 2018 arrived late in the season, and it seems likely that only a proportion of these late arriving birds attempted to breed (so accounting for the discrepancy between numbers of breeding pairs and individuals present). The presence of a much larger number of birds attending the colony in 2018 (than actually bred) is important context when considering the scale and extent of decline since the abandonment of the colony in 2017.
- Years of very low or zero productivity of Sandwich terns (2007 and 2008), and associated colony abandonment (2007), have been recorded previously at Cemlyn Bay. As in 2017, this was associated with predation of nests and chicks (but by grey herons in 2007 and 2008, as opposed to otters in 2017). Following these earlier instances of breeding failure, the colony recovered, and numbers subsequently increased to levels above those recorded prior to the years of breeding failure.
- Sandwich tern breeding success at the Cemlyn Bay colony is currently lower than for much of the period over which records are available (as shown in Figure 7 of NRW's Written Representation). However, the five-year mean estimate of the number of chicks fledged per pair quoted by NRW (i.e. 0.452) includes 2017, when there was complete breeding failure due to predation by otters. With the 2017 data excluded, the most recent five-year mean estimate (2012 – 2016) is approximately 0.55 chicks per pair. Importantly, despite the low breeding success (relative to historical levels) at the colony since 2012, the population size was continuing to increase year on year up until 2015/2016.
- The Sandwich tern population at Cemlyn Bay has declined in the two years since 2016 but the numbers in 2015 and 2016 were the highest recorded, with the colony having undergone a very rapid increase from 2007 to 2015/2016 (as shown in Figure 6 of NRW's Written Representation). As described in the Shadow HRA (APP-050, paragraph 6.5.8), marked fluctuations in colony population sizes are a characteristic of Sandwich tern, which is considered to exhibit the most erratic population trends and distribution of any seabird species breeding in the UK (APP-050, reference RD215). Such fluctuations arise from a combination of large variations in the proportion of mature birds attempting to breed in any year and mass inter-year movements between colonies, and they are often associated with predation events at colonies (APP-050, reference RD215). In many ways, the 'behaviour' of the Cemlyn Bay colony is typical for this species, with the overall long-term

increase in population size punctuated by fluctuations that are the result of occasional years of heavy predation.

7.31.2 Therefore, the extent to which the Cemlyn Bay Sandwich tern colony is currently vulnerable seems to be unclear, and the evidence that is available suggests that (as is typical for the species) the main vulnerability of the colony is in relation to exposure to heavy predation. Notwithstanding this, the effects of the Project on the colony are predicted to be, at most, minimal and the conclusion in the Shadow HRA of no adverse effects on the integrity of the Anglesey Terns SPA is considered to be valid irrespective of the current status of the Cemlyn Bay colony.

7.31.3 Horizon considers that the evidence relating to the potential effects of noise and visual disturbance from the planned construction activities on the Sandwich, Arctic and common tern populations at the Cemlyn Bay colony is robust and provides sufficient certainty to enable a conclusion of no adverse effects on site integrity to be drawn. This evidence derives from both the published scientific literature and the findings of the site-specific surveys of the terns at the Cemlyn Bay colony.

7.31.4 Horizon has provided detailed responses herein to the full set of comments and concerns raised by NRW in their WR in relation to the assessment for the Anglesey Terns SPA that is presented in the Shadow HRA [APP-050].

7.31.5 With regard to NRW's advice that it is not aware of any further information that could address this uncertainty (paragraph 7.8.13 of NRW's Written Representation), such evidence could have been provided by Horizon's proposed 2018 survey to monitor the response of terns and black-headed gulls at the Cemlyn Bay colony to a controlled noise stimulus used to simulate construction and blast-type noise[2] (if a Schedule 1 licence and Site of Special Scientific Interest (SSSI) assent could be obtained). However, NRW determined to reject the application because "there is uncertainty as to the response of Arctic [common and Sandwich] terns to the artificial noise, and therefore remains a risk that birds disturbed by the noise trial could abandon nests with eggs and/or chicks, which could lead to predation and a decrease in productivity, adversely affecting site integrity. There is a potential that nest abandonment could further reduce the range of Arctic [common and Sandwich] terns within the 'Anglesey Terns/Morwenoliaid Ynys Mon SPA' which has already decreased since 2017".

7.31.6 Regarding NRW's advice on mitigation, this is addressed in detail in response to paragraph 7.8.31 of NRW's Written Representation, but by way of a summary please refer to Horizon's response to FWQ.5.0.27 [REP2-002].

[2] The proposed noise-stimulus trials would have been performed under very stringent conditions in relation to the potential effects on the nesting terns. The trial was to be limited to three short time periods over each of three consecutive days in each of three stages of the breeding season. During each trial period, the generated noise level would have been increased gradually, up to a maximum of 85dB. Bird response would have been continuously monitored and the trial ceased if the noise stimulus was associated with 'fly up' responses by the terns. Thus, the trials could have led to a maximum of 27 additional 'fly up' responses by terns over the course of the full breeding season (which would be equivalent to approximately one additional 'fly up' per day based on the 2017 baseline survey data).

Horizon is confident that the mitigation proposed can be applied successfully and believes it to be sufficient, particularly given the marginal effects predicted on the tern colony.

7.31.7 NRW's Written Representation [REP2-235] states that a reduction in tern breeding success could be caused by 'fly up' responses to noise and visual disturbance which would leave eggs or chicks temporarily unattended, making them more vulnerable to predation and chilling, and disturbance could also result in stress (manifested as changes in hormone levels). Furthermore, NRW's Written Representation suggests that such stress responses may not be associated with a visual response by the bird, implying that such visual responses are unlikely to be associated with certain types of disturbance stimuli. It is proposed by NRW that colony abandonment could occur because of breeding failure or high levels of disturbance, whilst visual and noise disturbance associated with the planned construction activities could act cumulatively to cause stress.

7.31.8 As detailed in Horizon's response to FWQ.5.0.35 submitted at Deadline 2 (4 December 2018) [REP2-002], these possibilities have been considered within the Shadow HRA [APP-050 and 051] and dismissed on the basis that the available evidence from both the scientific literature and site-specific surveys demonstrates that:

7.31.9 'Fly up' responses by the terns at the Cemlyn Bay colony are highly unlikely to occur in relation to the predicted noise and visual disturbance from construction activities.

7.31.10 Under baseline conditions 'fly up' responses by terns at the colony are frequent (estimated to average c.25 per day) and are typically of 35 to 45 seconds in duration. Therefore, as few, if any, 'fly ups' are expected to occur due to noise or visual disturbance from the construction activities, any additional effect on breeding success would be very small.

7.31.11 More subtle, stress effects, are unlikely to be important, with the evidence for such effects in birds arising from studies of disturbance from the direct presence of people which are likely to be perceived as potential predators (and hence more likely to cause such responses than are noise and visual disturbance from construction activities).

7.32 HRA: Tern Disturbance

7.32.1 In response to paragraphs 7.8.20 to 7.8.24, Horizon considers that the available evidence demonstrates that noise and visual disturbance from construction activities will not result in adverse effects on the integrity of the Anglesey Terns SPA via direct effects on the Sandwich, Arctic and common populations. During the baseline disturbance surveys undertaken by Horizon in 2017 and 2018 (results of 2018 baseline disturbance surveys will be submitted at Deadline 3 (18 December)), the black-headed gulls at the Cemlyn Bay colony showed lower levels of, and less frequent, response to potential disturbance events than the terns did. Therefore, Horizon consider that noise and visual disturbance from construction activities will not detrimentally affect the black-headed gull population at the Cemlyn Bay colony, so that adverse

effects on the integrity of the Anglesey Terns SPA are similarly not predicted as a consequence of effects on black-headed gulls.

7.32.2 Paragraphs 7.8.26 and 7.8.27 of NRW's Written Representation contest parts of the evidence-base that is used within the Shadow HRA [APP-050 and APP-051] to reach the conclusions summarised above and set out a number of specific points concerning "significant uncertainty and/or insufficiency" in this regard. These are addressed in turn below (with the letter used below corresponding to the specific points raised by NRW in paragraph 7.8.27 of their WR):

7.32.3 (a) Horizon undertook baseline noise surveys at Cemlyn in 2018. Results of this work will be submitted at Deadline 4 (17 January 2019).

7.32.4 In relation to NRW's concerns over the possibility that there may be a minority of unconstrained blasts that would remain above 80 dB LAF, max at the colony, only confined blasts will be undertaken during the tern breeding season. Further details of the blasting methods and expected resultant noise levels are provided in Horizon's response to FWQ.5.0.28 submitted at Deadline 2 (4 December 2018) [REP2-002], whilst the measures that will be used to control, constrain and monitor noise levels (including from blasting) are detailed in Horizon's response to FWQ.5.0.27 submitted at Deadline 2 (4 December 2018).

7.32.5 (b) Horizon considers that the literature cited is the most relevant literature available, and that it is certainly highly relevant to the situation in question. It considers the effects of anthropogenic noise and visual disturbance on birds associated with coastal and marine habitats, and on terns specifically (including, in some instances, close relatives of Sandwich tern, and also including common tern which is one of the SPA species). The Shadow HRA text is clear about the species and situations considered by the literature that has been used to provide this evidence base.

7.32.6 The fact that some of the evidence from the literature relates to wintering waterbirds and not to breeding terns, and that some studies on breeding terns are in the tropics (and not the UK or other temperate zones), does mean that in these respects the evidence is not directly comparable to the situation at Cemlyn, but it is nonetheless relevant to informing the assessment. Within the spheres of both scientific study and impact assessment, it is common (and widely accepted) practice to use evidence derived from similar species groups and close relatives to aid the understanding of a species' ecology, behaviour and likely response to different effects or stimuli (including from disturbance). Horizon consider that it would be remiss to fail to make use of such evidence in reaching conclusions on the likely responses to such effects when undertaking its assessment.

7.32.7 Most importantly, the evidence derived from the literature is not used in isolation. Rather, it is set out to provide the existing knowledge base on the topic (as it relates most closely to the species of interest), and then it is considered in conjunction with site-specific survey data on tern responses to anthropogenic disturbance at the Cemlyn Bay colony. As such, the evidence base in its entirety is very clearly directly comparable to the situation with which the assessment is concerned. The evidence that is relied upon from the

literature should not be viewed in isolation from the evidence from the site-specific survey, because the conclusions reached in the assessment derive from this overall evidence base.

7.32.8 (c) NRW's Written Representation misrepresents the Shadow HRA in stating that it argues that anthropogenic disturbance causing abandonment "does not withstand scientific scrutiny". By way of providing introductory and general context to the assessment, the Shadow HRA undertakes a broad-based review of the topic of "Anthropogenic disturbance and nesting terns". Within this section, the Shadow HRA briefly sets out evidence from studies that have demonstrated negative effects of disturbance on tern populations and also refers to more general statements on the putative role of disturbance in causing reduced breeding success and colony abandonment. This is qualified by the statement that "much of the evidence for such effects does not withstand scientific scrutiny, with effects of anthropogenic disturbance often difficult to disentangle from other effects…", and the conclusions set out by Nisbet (2000) in his review of the topic are used as an example to support this contention. This statement is not meant to suggest or imply that there is no scientifically sound evidence for anthropogenic disturbance causing colony failure in terns.

7.32.9 (d) NRW's Written Representation misrepresents the Garthe & Huppop (2004) and Furness et al. (2013) papers and how they are used within the Shadow HRA [APP-050].

7.32.10 First, these papers do not assess sensitivity to noise at sea. They assess sensitivity to anthropogenic disturbance involving both visual and noise stimuli. It is stated clearly in the Shadow HRA that these papers refer to responses to anthropogenic disturbance and that they do not separate out effects from noise or visual stimuli (paragraph 10.3.83).

7.32.11 Second, these papers do not explicitly compare the sensitivity of Sandwich (or indeed Arctic or common) tern to anthropogenic disturbance with that of divers and seaducks. Rather, the papers produce an index of sensitivity (scored as 1 – 5), with each score defined in terms of the response of the species in question. For each species, the index is derived independently, and it is not scored relative to any reference species (although it is qualitative). The main body of information used to generate these indices is derived from experience of bird responses during boat-based and aerial surveys at sea, with the scores produced on this basis sent to 10 independent experts for evaluation and (if necessary) modulation. Although the papers do include consideration of divers and sea ducks, the majority of the species considered are seabirds.

7.32.12 Third, the papers are referenced within the Shadow HRA only in the context of terns commuting and foraging in the offshore environment (and not in the context of terns when present at the colony (albeit in close proximity to the colony when exposed to potential disturbance stimuli), which it is assumed the statement in NRW's Written Representation "terns at the colony will behave quite differently" is referring to). Given this, it is not clear why it should be assumed that birds undertaking these activities are any more sensitive (in a behavioural sense) than birds that are also at sea but further from their

colonies. Horizon would ask what evidence is available to support this contention?

7.32.13 Finally, in relation to the evidence presented in the Shadow HRA on the effects of noise disturbance on terns during piling at the Teesside wind farm, it is not correct that this evidence relates solely to passage birds. As stated in the Shadow HRA (paragraph 10.3.85), the Sandwich terns in this study were likely to be passage birds, but the common terns (which are also a species considered in the current assessment) were likely to be locally breeding birds.

7.32.14 (e) NRW's Written Representation is incorrect in stating that the Shadow HRA uses the broad-based (but widely applicable) study of Diershke et al. (2016) but fails to cite the more detailed study of Harwood et al. (2017). In fact, both studies are referenced in paragraph 10.3.108 of the Shadow HRA, where an account is given of the reduction in the percentage of birds entering the wind farm site during the construction period recorded by the Harwood et al. (2017) study. The Shadow HRA also notes that the extent to which the response recorded in the Harwood et al. (2017) study is attributable entirely to visual disturbance as opposed to other effects (e.g. possible reductions in prey densities during construction due to impacts from piling noise) is unclear.

7.32.15 The statement in NRW's Written Representation that "activities near the colony may generate greater behavioural responses than those in an offshore environment" is unsubstantiated and Horizon would seek to determine the supporting evidence for this, or to understand the biological mechanism that may operate to cause such a difference. In this regard, Horizon would also point to the highly precautionary assumptions that have been made within the Shadow HRA concerning the offshore noise and visual disturbance ZOIs, with the assessment being based on a scenario which assumes the complete avoidance of these areas by Sandwich terns for the purposes of foraging and commuting.

7.32.16 (f) It is unclear to Horizon why the contextual information provided in the Shadow HRA on terns breeding in industrial areas is invalid in the context of the Cemlyn Bay colony, as stated in NRW's Written Representation. This information is provided in the early parts of the section on 'Effects on Sandwich tern' but is also used and referenced in the sections on the other tern species. Given the potential effects with which the assessment is concerned, Horizon consider that it is useful to provide the reader with such an overview and to indicate that at least some species of tern do sometimes nest in industrial environments. As indicated in this part of the Shadow HRA, this is perhaps most notable amongst common tern, which are a qualifying feature of the Anglesey Terns SPA and one of the species that breed at the Cemlyn Bay colony.

7.32.17 NRW's WR also points out that the only example referred to of a Sandwich tern breeding colony in an industrial environment is at Zeebrugge harbour in Belgium, and that this colony eventually abandoned the site. This is true but it is worth noting that the current absence of Sandwich terns from Zeebrugge is attributed to the continued presence of foxes as (See appendix C; Review of the conclusions of the HRA Wylfa Newydd Power Station with respect to terns and noise effect).

7.32.18 In addition, although not referred to in the Shadow HRA, the Sandwich tern colony on Texel in the Netherlands is approximately 300m from a road and during the breeding season is frequented by groups of tourists and birdwatchers as presented in Appendix C; Review of the conclusions of the HRA Wylfa Newydd Power Station with respect to terns and noise effect.

7.32.19 (g) NRW's Written Representation states that the disturbance caused by researchers entering a Sandwich tern colony for the purposes of undertaking their investigations cannot be compared with the scale of the construction works proposed for the Project (as per reference to the studies of Fijn et al. (2017) in paragraph 10.3.13 of the Shadow HRA). The Shadow HRA does not attempt to suggest that this is the case, but simply presents the evidence that under certain circumstances this species can be subjected to relatively intrusive disturbance within the colony without resultant major detrimental effects (e.g. high rates of nest failure or colony abandonment).

7.32.20 Paragraph 7.8.28 of NRW's Written Representation states that the observations of the responses of roosting black-headed gulls at Cemlyn Bay to the blasting trial in March 2017 cannot be used to inform the assessment of the effects of blasting on breeding terns and gulls. In this context it is noteworthy the data collected on black-headed gull response during those trials does not form the main strand of evidence on which the assessment of noise disturbance on the SPA terns is based. Instead, this information contributes to the overall evidence-base which is used, in a similar way to some of the evidence from the scientific literature on noise-disturbance thresholds in wintering waterbirds. However, the data from the blasting trials do have site-specific context, relate to black-headed gulls whose establishment and presence is important to the terns and relate specifically to their response to blasting. Importantly, the array of evidence that is used in the assessment of noise disturbance to the breeding terns at Cemlyn Bay should be considered in its entirety and not in isolation.

7.32.21 Paragraph 7.8.29 of NRW's Written Representation contests much of the evidence that has been derived from the baseline disturbance surveys undertaken at the Cemlyn Bay colony, providing a number of specific comments. These are addressed in turn below (with the letter used below corresponding to the points raised by NRW in paragraph 7.8.29).

7.32.22 NRW's Written Representation highlights the high proportion of tern 'fly up' responses recorded during the baseline disturbance surveys in 2017 which were attributed to unidentified sources and suggests that it cannot be concluded with reasonable certainty that a 'significant' proportion of these were not due to disturbance events. It is, of course, possible that some of these responses were due to 'disturbance events' of some form or other (e.g. unobserved predators) but, as stated in the Shadow HRA, it is not plausible that a significant proportion were associated with undetected anthropogenic activities. This is because the potential anthropogenic disturbance sources were by their nature readily apparent (e.g. aircraft, loud noises, people, dogs, vehicles etc.) and the work was undertaken by experienced and skilled bird observers. Furthermore, the baseline disturbance surveys were repeated in

2018 with a similarly high proportion of 'fly up' responses being attributed to unidentified causes.

7.32.23 As proposed in the Shadow HRA, it seems entirely possible that many of these responses to unidentified sources arise from conspecific territorial or other social interactions, which are expected to be frequent in a 'busy', high density, colony. Other researchers working at Sandwich tern colonies consider that such 'fly ups' occur frequently in relation to territorial disputes and also kleptoparasitism by black-headed gulls (Mark Collier and Ruben Fijn, Bureau Waardenburg, pers. comm.). Similarly, studies of disturbance responses for breeding common tern recorded many instances of observations of behaviours characteristic of responses to disturbance but with unapparent causes, with these believed to be due to interactions between neighbours (Jennings 2012).

7.32.24 NRW's Written Representation also questions the basis for the assumption in the baseline disturbance survey work that it is only those disturbance responses apparent to the observers which are important. They then go on to hypothesise that increased stress (manifested as changes in hormone levels and not apparent through observational studies) could be important, whilst 'fly up' responses would be of little adaptive value as a response to noise. This could imply that 'fly up' responses are of little consequence in the context of the assessment of noise disturbance on nesting terns at the Cemlyn Bay colony, whilst subtler, unrecorded, responses are important.

7.32.25 This line of argument is contrary to a body of scientific literature on noise disturbance and behavioural response in birds, which ranks the strength of the 'effect' according to the visible response by the bird(s), with flight or movements away from the disturbance source being at the higher end of the 'effect' spectrum (Cutts et al. 2009, 2013; Wright et al. 2010). In these studies, flight response is consistently associated with higher noise levels. This same trend is apparent in the studies on nesting crested terns and noise, where scan and alert behaviours occurred at lower noise levels and flight responses only at the highest noise levels (Brown 1990). Similarly, noise disturbance events during the baseline disturbance surveys were associated with 'fly up' responses only when noise levels were relatively high. Other studies of disturbance responses in terns (including in relation to noise) give consideration to flight responses only (Jennings 2012). Given this evidence, any suggestion that 'fly up' responses are of little consequence in relation to noise disturbance would seem spurious and it would seem logical to conclude that 'fly ups' are indicative of greater disturbance than sub-flight responses are.

7.32.26 As detailed in response [A-WR-1-86] above, stress responses were considered in the Shadow HRA, but it was concluded that they were unlikely to be important because the evidence for such effects in birds derives from studies of disturbance from the direct presence of people which are likely to be perceived as potential predators; and the predicted magnitude of any effects on the colony are predicted to be marginal.

7.32.27 NRW's Written Representation suggests that the tern colony may have a degree of habituation to some types of disturbance sources that were

recorded during the baseline disturbance surveys. This is difficult to test or confirm with certainty, but it is also the case that this would not apply to other recorded disturbance sources (e.g. the slamming of tractor door or grain door associated with noise levels above 65 dB, people with dogs off the leash and vehicle movements on nearby roads). For some of the more frequent types of potential disturbance events (e.g. overhead aircraft), the findings obtained from the surveys are consistent with those from other studies (in terms of the noise levels required to elicit responses) suggesting habituation has not been an important effect. Therefore, the overall findings and conclusions of the baseline disturbance surveys are unlikely to be affected in any major way by habituation.

7.32.28 The 2017 baseline disturbance surveys were repeated in 2018, shown in the Addendum to Seabird Baseline Report: Disturbance Monitoring at Cemlyn Lagoon, submitted at Deadline 3, with the results obtained being very similar to those from 2017. Therefore, the suggestion that the findings from 2017 were atypical as a result of the colony abandonment in 2017 is not supported. Furthermore, the findings obtained from the surveys in both 2017 and 2018 in relation to responses to both potential noise and visual disturbance are broadly consistent with what would be expected from the evidence that is available from the scientific literature on the responses of terns and other waterbirds to noise and visual disturbance.

7.32.29 For the reasons outlined above (in response to paragraphs 7.8.1 to 7.8.11 of NRW's Written Representation), Horizon considers that the evidence for the colony being particularly vulnerable is equivocal, and that the main vulnerability is in relation to exposure to heavy predation. NRW's Written Representation appears to imply that the colony abandonment in 2017 was associated with disturbance and predation, but Horizon is unaware of any evidence for disturbance being involved. It is well established that Sandwich tern colonies are vulnerable to predation and that abandonment is often associated with predation events. Persistent predation by otters (as occurred in 2017) would be sufficient to lead to colony abandonment without additional effects of disturbance.

7.32.30 Horizon does not agree with the conclusions reached in paragraph 7.8.30 of NRW's Written Representation. For the reasons outlined above, Horizon considers that NRW's Written Representation fails to take sufficient account of the full evidence-base that has been used to inform conclusions of the Shadow HRA, whilst presenting incorrect interpretations of some key issues.

7.33 HRA Terns: Disturbance mitigation

7.33.1 Paragraph 7.8.31 of NRW's Written Representation expresses concerns about the effectiveness and deliverability of the mitigation proposed by Horizon in relation to potential noise disturbance from construction activities to terns breeding at the Cemlyn Bay colony.

7.33.2 In this regard, it should be noted that Horizon have not proposed this mitigation as a result of predicted disturbance to terns, but rather to ensure that noise levels at the colony from construction works (including blasts) remain below

those considered likely to elicit flight responses by the terns at the Cemlyn Bay colony.

7.33.3 Further, following discussions between Horizon and NRW regarding the proposed mitigation, the mitigation measures proposed for noise disturbance at the colony have been revised. Details of the measures that are proposed to control, constrain and monitor noise levels (including from blasting) are detailed in the Technical Note indicating how Horizon would meet committed noise levels as submitted at Deadline 3 (18 December); these details address NRW's points a), b), c), e) and g). These will be set out in the Main Power Station Site sub-CoCP and Marine Works sub-CoCP to be submitted at Deadline 4 (17 January 2018). The measures proposed now include:

- real time monitoring of noise levels at the colony;
- definition of noise thresholds (below impact levels) at which a response would be triggered;
- when an action level is about to be exceeded the appropriate site managers will review the works in the areas likely to be causing the breach and consider viable mitigation actions;
- mitigation measures may include plant/equipment substitution, adjusting the scheduling or intensity of the works, adopting alternative construction methodologies and temporary relocation of certain activities.

7.33.4 Horizon is happy to undertake further work with NRW to try to resolve the specific issues raised in paragraph 7.8.31 of NRW's Written Representation (for example, in order to agree what "significant nest establishment" equates to; see point f).

7.33.5 In relation to point f), as stated within Main Power Station Site sub-CoCP [REP2-032], noise level commitments will apply from April 15th to August 15th (unless otherwise stated). The 15th April date will be guided by information from the North Wales Wildlife Trust on when the first terns/Black-headed Gulls typically arrive to set up a colony.

7.33.6 In relation to NRW point h), concerning a threshold of 3 fly-ups per hour, it should be noted that the proposed noise mitigation has now been revised so that the reactive monitoring is no longer based on a certain number of fly-ups per hour, but is rather based upon the observers determining that any 'fly-up' responses appear to be associated with Project activities, this is presented in the Technical Note indicating how Horizon would meet committed noise levels as submitted at Deadline 3 (18 December 2018).

7.33.7 With regard to the 'biological' points made in paragraph 7.8.31 (e.g. g), i) and j)), Horizon is of the opinion that NRW's Written Representation has failed to take full account of the full evidence-base used to determine a conclusion of no adverse effect on the terns breeding at the Cemlyn Bay colony as a result of noise and visual disturbance from construction activities. Horizon considers that the evidence from both the site-specific surveys and the available scientific literature provide a strong basis for concluding that the colony would not be disturbed by noise below the proposed limits of 60dB and 59dB.

7.33.8 For the reasons given in responses to paragraphs 7.8.20 to 7.8.24 and paragraphs 7.8.26 to 7.8.30 of NRW's written representation, Horizon considers the suggestion that adverse effects on the colony could result from stress (manifested as changes in hormone levels but without there being any evidence of increased levels of 'fly up' response) to be without sound foundation. Potential effects on breeding productivity as a result of noise disturbance are considered to be highly unlikely to arise because noise levels from construction activities are likely to remain well below those predicted to elicit 'fly up' responses. However, should any such effects arise they are expected to be small, particularly in relation to the effects of other factors that may govern variation in breeding productivity (notably predation, food availability and weather effects). Furthermore, should any effects arise that do result in 'fly-up' responses connected to Project activities, the proposed mitigation would take effect and the works adjusted, as far as possible, to reduce noise levels to an acceptable level.

7.34 HRA Terns: Entrapment of prey fish

7.34.1 At paragraph 7.8.43 of its Written Representation, NRW requests that the Wylfa Newydd Code of Operation Practice (CoOP) [APP-421] includes detailed monitoring proposals for the entrapment of fish and that a requirement should be imposed requiring this document to be approved by the discharging authority, in consultation with NRW.

7.34.2 As identified by NRW, the Wylfa Newydd CoOP [APP-421] (at paragraph 14.2.1) commits Horizon to implementing a monitoring programme for entrapment (impingement and entrainment) associated with the Cooling Water System, with the detailed monitoring programme to be agreed with NRW. It is anticipated that this programme will be agreed with NRW as part of Horizon's operational water discharge Environmental Permit. As NRW will have an approval role in respect of this programme, Horizon does not consider that this needs to be secured through a separate requirement.

7.35 HRA Terns: Coastal processes

7.35.1 In respect of NRW's comments, that further information is required to demonstrate that changes in coastal processes due to the presence of the marine structures will not affect the shingle ridge, in response to consultation with NRW through 2018 additional modelling and assessment work in relation to coastal processes was commissioned by Horizon to address issues raised by NRW.

7.35.2 Horizon provided the details of this additional modelling and assessment work at Deadline 2 (4 December 2018) following a request from the Examining Authority FWQs (Supplementary information on coastal processes to support Wylfa Newydd EIA and Shadow HRA [REP2-007]. This work provides further evidence to support the assessments made within chapter D12 of the Environmental Statement [APP-131]. The key modelling results presented in [REP2-007] were presented to NRW in a meeting on 11 October 2018.

7.35.3 Horizon also refers the response provided to NRWs paragraphs 7.10.10 to 7.10.15 below.

7.36 HRA Terns: Conclusion

7.36.1 Horizon considers that the evidence-base used within the Shadow HRA [APP-050] is sufficiently robust to lead to a conclusion of no adverse effects on the integrity of the Anglesey Terns SPA as a result of the Project. As such, Horizon does not agree with the conclusions set out in NRW's Written Representation. Horizon considers that NRW's Written Representation fails to take full account of the evidence-base on which the assessment is based, whilst the interpretation of certain key issues is flawed.

7.36.2 In relation to the effects of noise and visual disturbance from construction activities on the breeding tern colony at Cemlyn Bay, the Shadow HRA draws upon evidence from both site-specific surveys and the available scientific literature. This evidence provides a strong basis for concluding that the colony will not be disturbed by noise below the proposed limits of 60dB and 59dB, whilst the proposed mitigation further ensures that noise levels at the colony from construction works (including blasts) remain below those considered likely to elicit flight responses by the terns at the Cemlyn Bay colony. The available evidence also provides a strong basis for concluding that the construction activities are sufficiently far from the colony to ensure that birds attending the colony are not affected by the associated visual disturbance. Further precaution is added via the proposed mitigation, which would ensure that during the establishment period (15th April to 15th May) no works occur within 500m of the nesting islands plus the areas of the shingle ridge that are known to be occasionally used by nesting terns, as stated in the Main Power Station Site sub-CoCP [REP2-032].

7.36.3 Using site-specific survey data, a precautionary approach has been taken to assessing the potential effects of noise and visual disturbance to the terns from the Cemlyn Bay colony when they are foraging and commuting in the offshore environment. This assumes complete avoidance of defined offshore noise and visual disturbance ZOIs and demonstrates that even under this extreme assumption, the loss of the foraging resource and the additional energy expenditure incurred in circumventing the ZOIs during commuting flights to and from the colony will be of little significance.

7.36.4 For these reasons Horizon remains of the view that there is no need to proceed to a further assessment of alternative solutions, or IROPI.

7.37 HRA: Terns compensation package

7.37.1 Given conclusion set out in response to paragraphs 7.8.45 to 7.8.46 of NRW's Written Representation, Horizon's position remains that there is no need to progress to a Stage 3 Assessment of Alterative Solutions and a Stage 4 demonstration of Imperative Reasons of Overriding Public Interest and the provision of compensatory habitat.

7.38 HRA: Dee Estuary SPA

7.38.1 Horizon does not agree with NRW's Written Representation in relation to the potential for adverse effects to arise on the Dee Estuary SPA. For the reasons outlined in response to paragraphs 7.8.45 and 7.8.46, Horizon considers that the Project will not have an adverse effect on the integrity of the Anglesey Terns SPA and there is no potential for any consequential effects on the Sandwich tern passage population which is a qualifying feature of the Dee Estuary SPA.

7.39 HRA: Cemlyn Lagoon SAC

7.39.1 Further discussions were held with NRW on this point in October 2018 and the following provides further clarification of Horizon's proposals.

7.39.2 The next paragraph and bullets in italics have been submitted at Deadline 2 through an amendment to paragraph 10.2.10 of the Main Power Station Site sub-CoCP [REP2-032]. Horizon will submit a further amendment into Examination at Deadline 4 as part of the revision of the sub-CoCP.

7.39.3 The mitigation measures proposed for drainage on and from Mound E during the earthworks phase are:

7.39.4 From the point of commencement of earthworks on the west of Mound E onwards, no water will be discharged into Nant Cemlyn via discharge E1 until vegetation has re-established and risk of sediment runoff is agreed with NRW to be low.

7.39.5 A written scheme of baseline water quality monitoring in Nant Cemlyn would be agreed with NRW. This would commence at an appropriate time prior to the works commencing to better understand the background variability in suspended sediment concentrations and, therefore, to inform agreement on the state of the water quality it would be appropriate to discharge into Nant Cemlyn from the western face of Mound E. Discharge would only be returned to the Nant Cemlyn when an agreed water quality threshold has been met, which would be agreed in writing between Horizon and NRW.

7.39.6 After establishment of vegetation, if there are any additional bulk earthworks on the west of Mound E resulting in a risk of sediment discharge, no water will be discharged into Nant Cemlyn via discharge E1 until re-establishment has been again been agreed in writing with NRW.

7.39.7 No polyelectrolyte dosing will be employed for discharge E1 into Nant Cemlyn.

7.39.8 During the above period(s), all water to be diverted and discharged into the Afon Cafnan via discharge E2.

7.39.9 Further explanation of the expected scheme of baseline water quality monitoring (as outlined in the second bullet point above), to be delivered post DCO grant, is set out in Horizon's response to FWQ5.0.6 as submitted at Deadline 2 (4 December 2018), provided below. That is, Horizon intends to produce a baseline water quality data set that is representative of the full flow regime for both Mound E and Nant Cemlyn before and during the earthworks

to define the point in time or threshold at which it is appropriate to return water to the Nant Cemlyn.

7.39.10 As stated above, the decision to return flow to the Nant Cemlyn will be taken with NRW. If possible, this will be agreed before the start of earthworks on Mound E. To define the point in time or threshold at which it is appropriate to return water to the Nant Cemlyn the following will be considered:

- the suspended sediment load value should demonstrate that the risk of sediment run-off is low;
- the threshold should match, or better, ambient levels of suspended sediment start;
- 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); and
- ultimately a qualitative assessment may need to be made, taking into account water quality data and the extent and development of re-established vegetation on the Mound.

7.39.11 Regarding the clarification sought by NRW on the frequency and nature of runoff likely to enter Nant Cemlyn in extreme events, particularly during the period of earthworks when it is proposed that no water would be discharged into Nant Cemlyn, the Mound E drainage network has been designed to cope with a 1 in 30-year flood event (including +20% allowance for climate change). In addition, the topography of Mound E and the land surrounding would also be 'shaped' (designed) to manage exceedance event storms in a controlled manner.

7.39.12 That is, surface water runoff from the earthworks would be intercepted and attenuated by a series of swales, ditches and ponds. These Sustainable Drainage System (SuDS) features would also provide water quality treatment. The Mound E swale (designed for a 1 in 30-year event +20%) would route storm water runoff to a pond that drains to Afon Cafnan. This pond has been designed to accommodate a 1 in 100-year flood event (+20% for climate change).

7.39.13 For flood events with a greater magnitude than the 1 in 30-year event (with an annual probability of less than 3.4%), the drainage system could overtop and water flow down to the 15m buffer zone next to the Nant Cemlyn before entering the watercourse (which would be in spate). During such an event, the pumps would continue to run at full capacity, until they clear any standing water, and the buffer zone between the area stripped of topsoil and the Nant Cemlyn would provide some protection to the river (reducing velocities and encouraging the deposition of sediment).

7.39.14 When the Nant Cemlyn is in spate it will be silty (see [APP-167]) and any overtopping could compound this, but during these conditions there would also be more throughput (higher velocities and/or lower salinity) in the lagoon, carrying silty water out to the sea, although there would still be some settlement of heavier portions (as currently occurs during storm events).

7.40 HRA: Esgair Gemlyn coastal processes

7.40.1 In response to consultation with NRW throughout 2018, additional modelling and assessment work in relation to coastal processes was commissioned by Horizon to address issues raised by NRW.

7.40.2 Horizon provided the details of this additional modelling and assessment work at Deadline 2 (4 December 2018) following a request from the Examining Authority's First Written Questions (Supplementary information on coastal processes to support Wylfa Newydd EIA and Shadow HRA [REP2-007]). This work provides further evidence to support the assessments made within Chapter D12 of the Environmental Statement [APP-131].

7.40.3 In response to paragraph 7.10.12, coupled wave-bed shear stress modelling of a north-west 99th percentile winter storm event has been undertaken and the results were presented to NRW on 27 September 2018 and in [REP2-007], submitted into examination at Deadline 2 (4 December 2018).

7.40.4 The results show that the resuspension of bottom sediments, swash processes (that could modify gravel ridge morphology) and cross-shore sediment transport associated with the north-west 99th percentile winter storm event during and following the construction of the marine structures would not change significantly from the baseline situation.

7.40.5 That is, for Esgair Gemlyn, any changes to bed shear stress and coastal processes compared to the baseline would be negligible and therefore there would be no long-term changes in coastal processes as result of the marine infrastructure.

7.40.6 The SWAN wave modelling results (Appendix D12-3) [APP-218] showed that there would be a potential increase of ~0.1 m (on wave heights of 0.4-1.2m) in the vicinity of the Cemlyn Lagoon ebb tide delta (the western end as referred to by NRW). This localised difference in wave height is not anticipated to give rise to substantially different sediment resuspension rates on the seabed, nor to changes to local sediment transport patterns in the short or long-term.

7.40.7 Furthermore, the modelling showed that bed shear stress is predicted to increase by up to 0.5 N/m2 (under a spring tide with a north wave 98th percentile) in a small area to the west of Cemlyn Bay. This increase would result in a bed shear stress of between 3.2 to 6.2 N/m2, compared with a baseline of 2.7 to 5.7 N/m2. It is concluded that the predicted effects are not substantially different to the baseline situation, and hence it is predicted that no significant morphological or compositional changes would occur at the ridge as a result in the short or long-term.

7.40.8 Modelling of worst case scenarios, such as rare (99th percentile) winter waves arising from north-westerly directions during construction activities, showed that there could be a potential increase in wave height up to approximately +4%. However, this is lower than that of baseline storm waves arising from the northeast, consequently this change is considered within the range of natural variation.

7.40.9 The localised increase of up to 0.2m in extreme wave heights in the vicinity of Cemlyn Lagoon ebb tidal delta is not considered significant when compared to the present baseline conditions, given that the ridge already experiences overtopping during extreme conditions.

7.40.10 As outlined above, the predicted changes to bed shear stress and associated coastal processes resulting from the worst case north west waves reflecting of marine infrastructure were predicted to have no significant morphological or compositional changes at the ridge.

7.40.11 In response to paragraph 7.10.13, it is likely that there will be a higher frequency of smaller waves reflected off the western breakwater towards Esgair Gemyln. The wave heights and bed shear associated with these events will be less than that of the extreme reflected wave events. As outlined above, the changes in bed shear energetics associated with the extreme events are not considered significant in terms of changes to coastal processes, and as such, changes associated with the more frequent, smaller wave events, are assessed as being even less significant in terms of changes to erosional and overtopping events over the life time of the project

7.40.12 In response to paragraph 7.10.14, within Chapter D12 – Coastal processes and coastal geomorphology of the Environmental Statement [APP-131] and its associated appendices Horizon provides baseline data pre- and post-large-scale waves events as well as anecdotal accounts of changes in Esgair Gemlyn over time. The current shape, profile and position of the ridge is the result of these past wave events (i.e. without the project). Esgair Gemlyn will continue to be influenced by extreme waves event over time with or without the Wylfa Newydd DCO Project. It is shown through detailed modelling that the marine infrastructure will not significantly change the wave climate or coastal processes and therefore the dominating factors governing changes to the ridge will continue to be from wave events focussing waves directly on to Esgair Gemlyn.

7.40.13 In response to paragraph 7.10.15, the reported changes in wave heights off Esgair Gemlyn result as a consequence of both waves being reflected off the western breakwater and shoaling effects from the ebb delta of the lagoon. These changes in wave height do not result in waves heights greater than already experienced within the current baseline, and as such are not considered significant in terms of coastal processes.

7.41 HRA: Impact of cooling water discharge on coastal processes

7.41.1 Further modelling and assessment of the effect of the cooling water discharge on coastal processes has been undertaken since the DCO application and is presented in Supplementary information on coastal processes to support Wylfa Newydd EIA and Shadow HRA [REP2-007] which was provided into examination at Deadline 2 (4 December 2018).

7.41.2 This report demonstrates that sediment transport related to resuspension of bottom silts/sand/gravels, swash processes potentially affecting/modifying gravel ridge morphology, and cross shore sediment transport processes would

be effectively the same for the operational power station (i.e. during cooling water discharge) as they are for the current baseline situation.

7.41.3 Therefore, there are no changes to the conclusions presented in chapter D12 [APP-131], and the Shadow HRA [APP-050 / 051] with respect to bed shear stress and the potential effects of coastal processes on Esgair Gemlyn in that there are no significant differences from baseline conditions.

7.42 HRA: Waste water outfall pipe

7.42.1 The design and location of the protective structure proposed to surround the waste water outfall pipe during the construction phase (in the Marine Licence application) is still under consideration. However, it is a minor structure, no more than 1m in height, adjacent to the breakwater and of a scale that the coastal process model grid resolution cannot pick up. To this end, its influence on coastal processes in Cemlyn Bay and Esgair Gemlyn is expected to be insignificant in comparison to the breakwater (the effects of which have been modelled and found to be negligible).

7.43 HRA: Zone of Influence with respect to the impact of the development on hydrodynamics

7.43.1 The Zone of Influence (ZOI) for coastal hydrodynamics defined at the Shadow HRA scoping and LSE screening stages is the Morfa Dinlle to Great Orme Head coastal sub-cell (see Figure 7.10.18; reproduced from Figure 4-1 and Figure 4-2 of the Shadow HRA [APP-050]). Note that Figure 7.10.18 identifies the length of relevant coastline and does not have a seaward extent.

7.43.2 It should be noted that that the hydrodynamic / coastal processes studies subsequently enabled refinement of the ZOI defined at the scoping and LSE screening stages to focus on the actual area predicted to experience any change due to the Wylfa Newydd Project. The extent of this area is shown in Figures 15 and 16 of the Supplementary Information on Coastal Processes to Support Wylfa Newydd EIA and Shadow HRA [REP2-007] submitted at Deadline 2 (4 December 2018). Stage 2 of the Shadow HRA (Appropriate Assessment) was informed by the findings of the hydrodynamic / coastal processes studies.

7.44 HRA: Esgair Gemlyn dredged fine material

7.44.1 Horizon can confirm that any dredged material from the marine environment will either be re-used in the marine infrastructure or will be disposed of under licence at the Holyhead North disposal site and therefore retained in the marine system subject to the sediment complying to contamination guidelines. This is secured by Requirement WN28 Disposal of Dredged Material, which states any surplus dredged material arising from the authorised development that cannot be re-used must be disposed of at Holyhead North, unless otherwise agreed with NRW.

7.45 HRA: Marine mammals Vessel Management

7.45.1 A Vessel Management Plan (VMP) will be produced to mitigate the possible risk of collision with marine mammals. The overall aim of the VMP is to provide detail on vessel activity associated with the Wylfa Newydd Project, and to describe the vessel management measures that will be put in place in respect of disturbance of marine mammals. The plan will cover the following:

- The location of home/working ports and an indication of how often vessels will transit to and from these ports;
- Indicative corridors for vessels transiting to and from the WNDA;
- The number, types and specification of vessels;
- Vessel coordination; and
- Working practices to minimise interaction with marine mammals including specific measures for vessel management. Specific measures for vessel management will include these principles:
  - Vessels used for the Wylfa Newydd Project will travel to set routes (in accordance with their passage plan) for transit between home ports and their working areas and/or berth point.
  - Vessels used for the works will maintain constant speed and direction when transiting between home ports and their working areas and/or berth point, unless otherwise required for reasons of navigational safety.
  - Vessels used for the works will follow the general principles in the NRW 'Sea Wise Code, 2013' and the Isle of Anglesey County Council 'Anglesey Marine Code'.
  - Monitoring and reporting processes will be implemented in the event of a cetacean collision with a vessel.

7.45.2 The principles of the VMP will be set out (as above) in the Marine Works Sub-CoCP to be submitted at Deadline 4 (17January 2019).

7.45.3 The full VMP will be subject to consultation with NRW and become a condition of the Marine Licence.

7.46 HRA: Marine mammals underwater noise

7.46.1 The mitigation measures set out in table 11-1 of the Shadow HRA [APP-050] for underwater noise are included in section 8.2 of the Marine Works sub-CoCP [APP-416] (as updated). The Wylfa Newydd CoCP [REP2-031] and the sub-CoCPs are certified documents that will be approved under article 76 of the Draft DCO. The Requirements in Schedule 3 of the Draft DCO state that the construction of the Project must be carried out in accordance with the Wylfa Newydd CoCP and relevant sub-CoCPs, unless otherwise agreed by the IACC. Therefore, mitigation secured within the CoCPs will be secured by way of DCO Requirement.

7.46.2 In response to paragraph 7.11.11, a Technical Note on Marine Mammal Shadow HRA PTS Noise Modelling – NMFS (2018) Update has been prepared which describes the implications of using the National Marine Fisheries Service criteria (2018) for the conclusions of the Shadow HRA [APP-050] with respect to marine mammals. This is provided as Appendix D to this response and demonstrates that the conclusions of the Shadow HRA do not change based on the use of the new criteria.

7.47 Tre'r Gof SSSI: mitigation measures

7.47.1 In response to paragraphs 7.13.1-4, in respect of whether there is adequate consideration of all reasonable alternatives and direct mitigation measures in the Environmental Statement (before compensation) to reduce and avoid negative effects on Tre'r Gof SSSI, please see Horizon's responses to questions 2.0.15, 2.0.16, 2.0.18 and 2.0.19 of the Examining Authority's First Written Questions, submitted at Deadline 2 (4 December 2018) [REP2-002]

7.47.2 These reference a list of embedded measures, implemented to protect the Tre'r Gof SSSI, the documents that secure them, and the chapters which considers alternatives regarding effects on the Tre'r Gof SSSI. The responses confirm that Horizon is proposing to take all reasonable steps to mitigate adverse effects on Tre'r Gof SSSI as part of an adaptive water management mitigation strategy, which will include the effects of the Site Campus on the surface and groundwater inflows from the west of Tre'r Gof.

7.47.3 Horizon note NRWs FWQ 2.0.19 response and FWQ 7.3.19 which identifies possible further direct mitigation measures for consideration by Horizon in relation to Tre'r Gôf SSSI, namely controlling water loss from the site by installing a weir via the outflow culvert at VN5 during critical periods to avoid the drying and oxidation of the peat body, and recharging groundwater should there be areas affected by de-watering during the construction period.

7.47.4 Horizon will further consider these further direct mitigation measures at Tre'r Gof as part of the ongoing engagement relating to the Water Abstraction Licence application and the SOCG [REP2-49]] between Horizon and NRW.

7.47.5 NRW 20 of the SOCG [REP2-49] identifies that a hydrogeological impact assessment (HyIA) which will govern dewatering is under preparation for the water abstraction licence application(s). A dewatering monitoring and mitigation strategy is under preparation as a key part of the HyIA and is a requirement of the water abstraction licence application. This will include the potential for direct and indirect impact upon Tre'r Gof of dewatering of bedrock groundwater. The water abstraction licence is expected to be submitted to NRW in February.

7.48 Tre'r Gof SSSI: Discharges

7.48.1 In response to paragraph 7.13.5, ES Volume D - WNDA Development App D8-8 - Summary of preliminary design for construction surface water drainage [APP-167] does not provide reference to discharge points WA1 or WB1. Horizon assumes that these references are equivalent to Discharge A1, identified in Figure 2.3, which drains the eastern side of Tre'r Gof via a leat system, and Discharge B1, identified in Figure 2.5, which also drains to Tre'r Gof.

7.48.2 The alkalinity is unlikely to derive from the surface run off which would be collected in the drainage ditch. It is more likely to derive from hydrogeochemical contact of groundwater which has infiltrated up slope into the underlying geological superficial deposits and bedrock before emerging as springs or seepages or as direct inflow to the side of Tre'r Gof SSSI. This will continue to be the case as groundwater will be collected in the drainage ditch or beyond the drainage system in springs and seepages from upward rising groundwater.

7.48.3 Horizon agrees that the point discharges will not allow water to flow, as at present, through the superficial deposits into the SSSI, however, Horizon disagrees that there will be no flow into the superficial deposits. As described in section 2.2.1.1, the ditch that drains to Discharge A1 will incorporate a series of suitable connections at 50m intervals, set just above or at ditch bed level. The upstream end of each connection would be designed to incorporate stop logs to manage flows (and sediment) into the pipe; the number of stop logs could be adjusted during operation, as required, to suit site conditions and/or TSS related risks.

7.48.4 Horizon currently has no detailed information on the condition or capacity of the stone-built culvert through which the outfall from Tre'r Gof discharges to the sea, however additional information will be obtained as to the condition and capacity of this culvert.

7.49 Tre'r Gof SSSI: Dewatering due to deep excavations

7.49.1 In response to NRW's comments regarding dewatering, due to deep excavations, (paragraphs 7.13.6 to 7.13.16) (as itemised in NRW 19 of the SOCG between NRW and Horizon) the key area where interpretation of significant impact differs between Horizon and NRW is the importance of direct bedrock groundwater influence on the qualifying interests of Tre'r Gof SSSI.

7.49.2 In this respect, Horizon note that in para 7.13.11 of their Deadline 2 (4 December 2018) Written submission that NRW acknowledge that Horizon in ES Volume D App D8-5 – Tre'r Gof Hydroecological Assessment [APP-158] had identified that inflow groundwater from the top of the bedrock as well as from soils and superficial deposits could bring mineral enriched water into the SSSI via a series of small springs, seeps and flushes.

7.49.3 Item NRW 20 of the SOCG states that a HyIA which will govern dewatering is under preparation for the forthcoming Water Abstraction Licence permit application(s) by Horizon under the Water Resources Act 1991 and that a dewatering monitoring and mitigation strategy is under preparation as a key

part of the HyIA and is a requirement of the abstraction licence permit application. The abstraction licence is expected to be submitted to NRW in February 2019.

7.49.4 The HyIA will include consideration of the points raised in 7.13.6 and as further detailed in Annex A1 of NRWs Written Submission for Deadline 2 (4 December 2018), NRW Specialist Comments on ES Appendix D8-05 [APP-158], Tre'r Gôf SSSI Hydroecological Assessment. This will be done through further consideration of the Tre'r Gof conceptual model and site-specific data. Specifically, the HyIA will review the potential for direct and indirect impact of dewatering of the main excavation and the cooling water tunnel of bedrock groundwater effects on the qualifying interests of Tre'r Gof SSSI. This will include consideration of the groundwater chemical regime. water quality.

7.49.5 The HyIA will be further informed by the ongoing engagement with NRW on the SOCG and Water Abstraction Licence application(s) regarding the conceptual groundwater model, affecting the Ynys Môn Secondary groundwater body and Tre'r Gôf SSSI.

7.49.6 In respect of NRW's comments at paragraph 7.13.8, by its nature flows at this end of the flow duration curve are not a high proportion of the baseline as stated. Assuming the point at which the flows is lower than baseline is Q85, rather than Q90, this means that for 85% of the time the flows are higher than the baseline and for 15% of the time they are lower than the baseline. Based on the scale presented in Figure 5.9, the difference in daily flow in these periods is approximately 20m3/day, equivalent to 0.22l/s, which is extremely low.

7.49.7 In respect NRW's comments at paragraphs 7.13.9 and 7.13.10, Horizon accepts that presentation of the mean change in flow per day could prevent a clear picture of the effect on flows across a range of scenarios from being clearly apparent. Nonetheless, such an oversight does not affect the outcomes of the assessment, as the assessment is based on their being an impact on flows to Tre'r Gof and allows for the uncertainty that it can be effectively mitigated.

7.50 Tre'r Gof SSSI: Drainage design

7.50.1 In response to paragraph 7.13.12, Horizon would refer NRW to the response above relating to paragraph 7.13.5, which discusses discharges A1 and B1, both of which discharge to Tre'r Gof.

7.50.2 ES Volume D - WNDA Development App D8-8 - Summary of preliminary design for construction surface water drainage [APP-167] presents a conceptual drainage design. A detailed drainage design is not currently available and is unlikely to be available until later in 2019.

7.50.3 In response to paragraph 7.13.13, as indicated in section 5.2.1 paragraph 47 of the Wylfa Newydd Project Construction Water Discharge Activity – Environmental Permit Application, there is no established EQS for TSS for freshwaters and no clearly defined methodology to follow in assessing the effects of sediment load on receiving watercourses.

7.50.4 In light of this fact the WNDA surface water drainage system is being designed to achieve discharged TSS concentrations – i.e. concentrations at the point of discharge from the sediment treatment systems – which are at the lower end of background values measured within the WNDA watercourses.

7.50.5 Measurements were obtained for locations on the Afon Cafnan, for Nant Cemaes and for Tre'r Gof drains and analysis of the results were used to inform the proposed TSS limits, along with information on the source of potential contaminants and the likely flow paths and mechanisms that might affect settlement. In the case of Discharge B1, the discharge point is approximately 500m upstream of Tre'r Gof, providing some degree of settlement and the flow path is through the SSSI is via drainage channels, meaning that there is minimal interaction with the fen and therefore minimal opportunity for sediment that reaches the SSSI to affect its key characteristics.

7.50.6 Horizon considers that the 40 mg/l concentration could be achieved, however this would require polyelectrolyte dosing, and it is Horizon's aim to minimise discharges of polyelectrolyte into a SSSI with unknown effects. Horizon would rather seek to control sediment levels to achieve concentrations consistent with the range of background values found across the WNDA (i.e. 70 mg/l).

7.51 Tre'r Gof SSSI: Treatment of surface water run-off

7.51.1 In response to paragraph 7.13.14, elevated pH was identified as a potential contaminant in the runoff from the concrete batching plant, rather than from surface water drainage that may reach Tre'r Gof drains. The concrete batching plant and the immediately surrounding process areas will be covered by hard surfacing which will drain rainfall to collection tanks for containment. Water from the collection tanks will not be discharged to surface water drainage systems.

7.51.2 The treatment of surface water run-off from the site is secured in paragraph 10.2.5 of the Main Power Station Site sub-CoCP [APP-415]. The specific mitigation is stated as follows: 'Appropriate drainage will be installed prior to Main Construction. This will include settlement ponds, appropriate treatment to manage flows and meet agreed water quality thresholds (Environmental Quality Standards). An application will be made for an Environmental Permit which will set limits on the concentration of substances which could be discharged to protect the receiving surface water'. As such, control of effluent discharge will be secured through the Environmental Permits.

7.51.3 Section 6 of the Environmental Permit (EP) Application Non-Technical Summary indicates that monitoring and sampling will be undertaken to ensure compliance with EP limits and conditions. Assuming that a pH range is conditioned as part of the EP, then this will be monitored, and action taken to ensure compliance with the conditions of the EP. It is anticipated that this would be achieved through appropriate dosing via the operation of the sediment treatment systems.

7.52 Tre'r Gof SSSI: Effect of mounding

7.52.1 In response to the issues raised in paragraph 7.13.15 the effect of mounding is described in ES Volume D - WNDA Development App D8-8 - Summary of preliminary design for construction surface water drainage [APP-167].

7.52.2 Catchments A1 and B1 are the only catchments draining to Tre'r Gof, though A1 arguably drains to a drain downstream of Tre'r Gof, so doesn't represent a change in catchment area.

7.52.3 Changes in catchment area are presented in Table 1.2 of [APP-167], which indicates that the catchment to A1 increases by 0.85ha, whilst the catchment draining to B1 increases by 31.5ha.

7.52.4 The effect on flows during construction is presented in section 8.5 of the ES Volume D - WNDA Development Chapter D8 Surface water and groundwater [APP-127]. Mean changes in flow of approximately +129m^3 at the outflow from Tre'r Gof are predicted, however, flows into the west compartment are predicted to reduce by approximately 59m^3/da, indicating higher increase of approximately 188m^3 day elsewhere.

7.52.5 A plot of the flow duration curve for Tre'r Gof as a whole is presented in Figure 5.9 of Appendix D8-7 [APP-166] which can be taken as representative of Tre'r Gof as a whole. The managed drainage system in Reference Point 4 includes capture of runoff from the mound to the south east which is discharged onto Tre'r Gof as well as a piped connection from sediment lagoon B1 which slightly increases the overall catchment area modelled to the wetland. As a result, the construction period flow duration curve impacts indicate that flows would be generally higher than in the Baseline, except when flows drop below approximately Q85, where they are indicated to be negative.

7.53 Tre'r Gof SSSI: Significance of impacts

7.53.1 In response to NRW's comments at 7.13.6, as itemised at row NRW 19 of the SOCG between NRW and Horizon submitted at Deadline 2 (4 December 2018), the key area where interpretation of significant impact differs between Horizon and NRW is the importance of direct bedrock groundwater influence on the qualifying interests of Tre'r Gof SSSI.

7.53.2 In this respect we note that in para 7.13.11 of their Deadline 2 Written Representation that NRW acknowledge that Horizon in ES Volume D App D8-5 – Tre'r Gof Hydroecological Assessment (APP 158) had identified that inflow groundwater from the top of the bedrock as well as from soils and superficial deposits could bring mineral enriched water into the SSSI via a series of small springs, seeps and flushes.

7.53.3 Item NRW 20 of the SOCG states that a HyIA which will govern dewatering is under preparation for the forthcoming Water Abstraction Licence permit application(s) by Horizon under the Water Resources Act 1991 and that a dewatering monitoring and mitigation strategy is under preparation as a key part of the HyIA and is a requirement of the abstraction licence permit application. The abstraction licence is expected to be submitted to NRW in February.

7.53.4 The HyIA will include consideration of the points raised in 7.13.6 and as further detailed in Annex A1 of NRWs Written Submission for deadline 2, NRW Specialist Comments on ES Appendix D8-05 (APP-158), Tre'r Gôf SSSI Hydroecological Assessment. This will be done through further consideration of the Tre'r Gof conceptual model and site-specific data. Specifically, the HIA will review the potential for direct and indirect impact of dewatering of the main excavation and the cooling water tunnel of bedrock groundwater effects on the qualifying interests of Tre'r Gof SSSI. This will include consideration of the groundwater chemical regime. water quality.

7.53.5 The HyIA will be further informed by the ongoing engagement with NRW on the SOCG and Water Abstraction Licence application(s).

7.53.6 In response to NRW's comments at paragraph 7.13.8, by its nature flows at this end of the flow duration curve are not a high proportion of the baseline as stated. Assuming the point at which the flows is lower than baseline is Q85, rather than Q90, this means that for 85% of the time the flows are higher than the baseline and for 15% of the time they are lower than the baseline. Based on the scale presented in Figure 5.9, the difference in daily flow in these periods is approximately 20m^3/day, equivalent to 0.22l/s, which is extremely low.

7.53.7 In response to NRW's comments at paragraphs 7.13.9 and 7.3.10, Horizon accept that presentation of the mean change in flow per day could prevent a clear picture of the effect on flows across a range of scenarios from being clearly apparent. Nonetheless, such an oversight does not affect the outcomes of the assessment, as the assessment is based on their being an impact on flows to Tre'r Gof and allows for the uncertainty that it can be effectively mitigated.

7.54 Tre'r Gof SSSI: Drainage blanket

7.54.1 In response to NRW's comments at paragraph 7.13.17, the drainage blanket is part of the embedded mitigation for Tre'r Gof SSSI. It is described in 6.4.33 ES Volume D - App D8-8 - Summary of preliminary design for construction surface water drainage [APP-167] as a crushed rock drainage blanket constructed below Mound A using either imported fill or material generated from the deep excavation operations. Material used to form the blanket would be inert and is not expected to have any impact on surface water quality.

7.54.2 Further, as secured by section 11.18 of the Main Power Station Site sub-CoCP [REP2-032], a buffer zone around Tre'r Gof SSSI would be put in place. This zone would be a 50m buffer around the south of the SSSI, with approx. 100m on the SSSI's SE and E sides where the most sensitive areas of the SSSI have been identified.

7.54.3 Drainage blankets are typically free-draining material such as gravel installed at the base of an excavation prior to earthwork cover for cuttings, dams and embankments. Typically, they are sub horizontal and located under the downstream or downgradient slopes. Their purpose is to control pore pressure and control or collect vertical seepage. An example of their use can be found in Bardon Quarry in Leicestershire where, in a quarrying context,

drainage blankets underlie spoil mounds and facilitate the drainage of those mounds into the site's surface water drainage system.

7.54.4 Appendix D8-8 [APP-167] notes that the function of the drainage blanket is to enable flows from springs and seeps to make their way into the Tre'r Gof SSSI catchment. It is expected that this drainage blanket will be the primary contributor of water into the SSSI. However, deeper groundwater which may be discharging via a vertically upward gradient into the sides of Tre'r Gof and/or contributing to the springs and seeps and which is not captured by the drainage blanket and delivered to the SSI, would discharge within the buffer strips as currently and support the SSSI.

7.54.5 The schematic diagram presented in figure 2-4 (reproduced below) illustrates how, as far as practicable, the existing flow regime will be maintained.

7.54.6 The bulk earthworks for Mound A including thickness and location of the blanket will be designed in detail and executed in conjunction with other processes including, but not limited to, surface and subsurface drainage works and environmental control measures. Current thinking is that the drainage blanket would be continued beneath the drainage ditch so that water can seep from the base of the drainage ditch into the drainage blanket and move towards the Tre'r Gof SSSI. Horizon acknowledges that the drainage blanket will not be fully flexible once emplaced under the mound. However, within the constraints of the current and future topography, there will be some flexibility on the relationship of the drainage blanket to the surface drainage system close to Tre'r Gof as part of the adaptive mitigation system being developed to avoid and reduce negative effects on the SSSI.

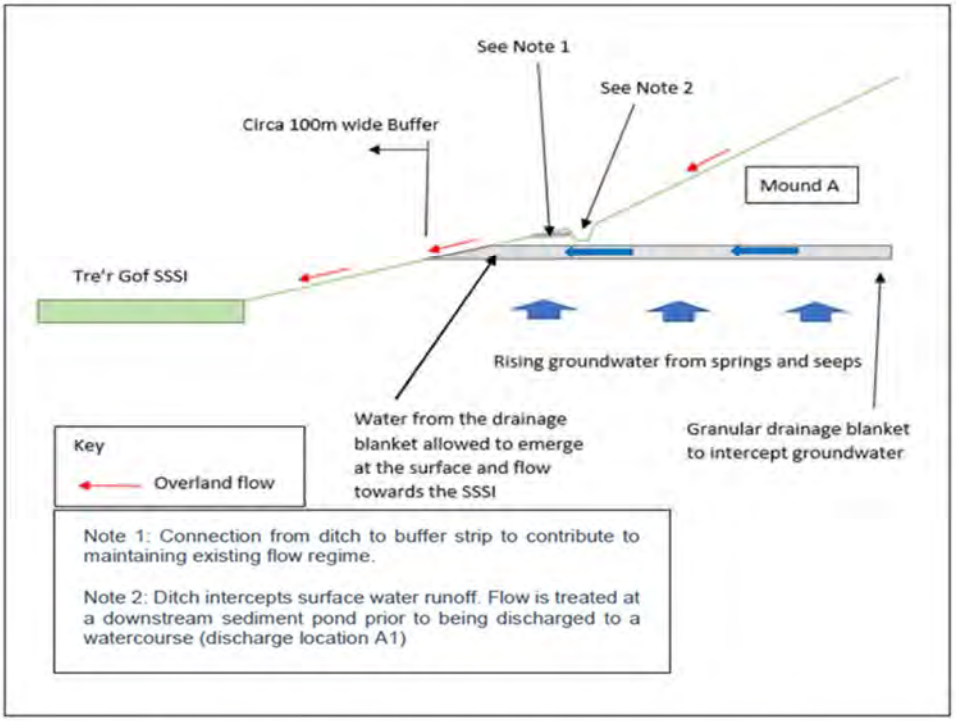

Figure 2-4 Mound A (Western Side): Drainage Schematic Diagram

7.54.7 In response to paragraph 7.13.18, ES chapter D9 Terrestrial and freshwater ecology [APP-128] notes that there is uncertainty relating to the potential effectiveness of the embedded drainage design in maintaining the quality and quantity of water sources that feed the SSSI. Monitoring would be undertaken to assess the efficacy of the Surface Water and Groundwater Management Strategy (via the Main Power Station Site sub-CoCP [APP-415]) and to identify any changes compared to baseline levels. Botanical monitoring would also be undertaken as part of the Landscape and Habitat Management Strategy [APP-424]. The combined results of the monitoring studies would inform the requirement for adjustments to the design/implementation of mitigation measures.

7.54.8 Horizon in its response to FWQ2.0.16 of the Examining Authority's first Written Questions, submitted at Deadline 2 (4 December 2018) [REP2-002], also identified that there are uncertainties in the water balance and water quality analysis which were used to inform the assessments and to develop the proposed drainage system. Accordingly, the proposed mitigation will be part of an adaptive water management mitigation strategy (which is described further in Horizon's response to FWQ2.0.16). This will be built around the monitoring of flows and water quality, the use of control weirs in the overflow pipes to control the flow to the SSSI, optimising discharge rates, leaky swales, infiltration ponds and the option for the implementation of additional adaptive mitigation measures. The drainage system will be designed to be as flexible as possible within the constraints of the current and future topography (i.e. the open, rolling, drumlin landscape character as established under the overarching landscape design and mitigation principles of the Landscape and Habitat Management Strategy [APP-424 and APP-425]). It will have to interact with sediment and flood control and will be based on water level management plan targets set for SSSI units. This will allow changes to be made relatively easily and increase the potential for baseline conditions to be matched.

7.55 Long term monitoring

7.55.1 In response to 7.13.20, the long-term botanical and water quality and quantity monitoring proposed relates to operational monitoring. Its objective as described in ES Chapter D9 - WNDA Development D9 - Terrestrial and freshwater ecology [APP-128] is to identify any changes to baseline conditions so that appropriate additional mitigation can be implemented to restore groundwater levels and surface water flows to baseline conditions, where practicable.

7.55.2 Monitoring will also continue pre-construction and during construction. The Main Power Station Site sub-CoCP [REP2-032],10.4.2, states that monitoring of the water environment will continue across the Wylfa Newydd Development Area up to the start of construction to improve the robustness of the baseline data.

7.55.3 The results of all monitoring would inform reviews of the conceptual site model which would be shared with NRW. The results would be incorporated into the adaptive mitigation system being developed to avoid and reduce negative effects on the SSSI.

7.56 Drainage mitigation measures

7.56.1 In response on paragraphs 7.13.18-23, the WN CoCP [APP-414], the Main Site Power Station sub-CoCP [APP-415] and the WN CoOP [APP-421] - secure Horizon's commitment to mitigating construction and operation related environmental effects, including means to provide drainage mitigation measures. It is Horizon's view that the WN CoOP, WN CoCP and the sub-CoCPs 'management strategies' contain sufficient detail to demonstrate that the mitigation described in the Environmental Statement and other assessments will be secured.

7.56.2 The Main Power Station Site Sub-CoCP [APP-415] states that appropriate drainage will be installed prior to main construction and then provides a generic description of the principal components of the drainage system, including sediment management elements and ditches, and links these to the Environmental Permit that will set limits on the suspended sediment content of water discharged to watercourses.

7.56.3 With respect to the drainage design, it remains the case that a detailed drainage design is not currently available and is unlikely to be available until later in 2019. In the absence of a detailed drainage design, Horizon is committed to ensuring that the detailed design will mimic the baseline hydrological regime as closely as practicable, including with respect to flood risk, water quality and water quantity. Adaptive management, based on monitoring of the hydrological regime, is proposed throughout construction and operation to ensure that modifications can be made if necessary to improve the performance of the system in this regard. Horizon is confident that any modifications to the proposed drainage design can be achieved within the order limits and agreed parameters. Once further developed these options will be presented to the Examining Authority.

7.56.4 As stated in response to FWQ2.0.11, Horizon is committed to including a requirement for a construction drainage design to be provided. This will be included in the updated Draft DCO submitted at Deadline 4 (17 January 2019). Further details of the preliminary drainage design are set out in Chapter D-8 Summary of the preliminary design for construction surface water drainage [APP-167] of the ES.

7.57 Tre'r Gof SSSI Compensation

7.57.1 In respect of NRW's comments at paragraph 7.14.4 regarding Tŷ Du, Requirement ECS3 of the draft DCO [REP2-020] requires that management schemes relating to the management and maintenance of each Ecological Compensation Site must be submitted to IACC for approval. The management scheme must be prepared in accordance with the management principles in Chapter 7 of the Landscape and Habitat Management Strategy [APP-424]. A number of principles in Chapter 7 secure long-term management. While IACC is the discharging authority, there is no impediment to IACC's decision being in consultation with NRW.

7.57.2 Horizon notes the factors referred to by NRW that will need to be considered when assessing the sufficiency of the proposed compensation. These align with the objectives described in section 2.3 of ES Volume D - WNDA Development App D9-23 - SSSI Compensation Strategy - Volume I [APP-190], which were used to guide site selection and development of the compensation proposals described in ES Volume D - WNDA Development App D9-24 - SSSI Compensation Strategy - Volume II [APP-191].

7.57.3 It is acknowledged that more detailed soil and hydrology data are required to validate the conclusions of Appendix D9-23 [APP-190] and enable development of detailed compensation designs. To this end, Horizon has undertaken further soil surveys at Cors Gwawr and Cae Canol-dydd in January and August 2018, the results of which have been shared with NRW and will be submitted to the Examining Authority at Deadline 6 (19 February 2019). Horizon also commenced 12 months of hydrological and hydrogeological monitoring at these sites in September 2018. The scope of the hydrological and hydrogeological monitoring is defined (with some minor differences) in Appendix D9-24 [APP-191]. Four months of hydrological and hydrogeological monitoring data will have been collected by mid-January 2019. Horizon is planning to prepare an interim monitoring report at this stage, which will be available, alongside the soil survey reports, to refine the compensation proposals (including the topsoil stripping proposals) and inform the DCO examination. The interim hydrological monitoring report and refined compensation proposals will be submitted to the Examining Authority at Deadline 6 (19 February 2019). Horizon will continue to liaise with NRW throughout the refinement of the compensation proposals during and beyond the DCO examination period as further monitoring data become available.

7.57.4 The refined compensation proposals will contain additional information on the adaptive management approach which will be employed to mitigate uncertainty regarding the feasibility of the proposed quantity and quality of rich-fen habitat creation. Together with the soil survey and hydrological/hydrogeological monitoring data (submitted at Deadline 6 (19 February 2019)), it is considered that the adaptive management approach will enable adequate assurance to be provided during the DCO examination period that sufficient compensation will be delivered.

7.58 Tre'r Gof SSSI Compensation sites: Flood risk

7.58.1 In response to NRW's comments at paragraph 7.14.11 regarding flood risk at the Ecological Compensation Sites, Qualitative Flood Consequence Assessment (FCA) for the Ecological Compensation Sites was included in Annex 2 of App D1-2 Ecological Compensation Sites Assessment [APP-137]. Horizon agrees that the FCA will need to be updated as hydrological monitoring data becomes available and the compensation proposals are refined. The level of assessment will be proportionate to likely flood risk and locations/sensitivity of potential receptors. Rather than including a requirement for an updated FCA in the Main Power Station Site Sub-CoCP [APP-415], this will be required to inform the detailed design and associated Landscape and Habitat Management Schemes. These documents will need

to be approved by IACC prior to commencement of the compensation works, in accordance with DCO Requirements ECS2 and ECS3 respectively.

7.58.2 Pollution prevention measures for the Ecological Compensation Sites are described in section 10 of the overarching Wylfa Newydd Code of Construction Practice [APP-414]. These include a commitment to comply with industry guidance, such as Environment Agency PPGs/GPPs and relevant CIRIA guidance publications. The construction environmental management plans prepared by the contractor(s) delivering the compensation works will demonstrate to Horizon how works will comply with the guidance secured in the Wylfa Newydd Code of Construction Practice [APP-414], sufficient to ensure that nearby designated sites would not be adversely affected by the proposed compensation works.

7.58.3 Horizon will engage with NRW in respect of any permits needed that need to be obtained to enable the necessary works for the Ecological Compensation Sites.

7.59 Tre'r Gof SSSI Compensation sites: European protected species

7.59.1 In response so paragraph 7.14.13, subsequent to preparation of ES Volume D - WNDA Development App D1-2 - Ecological Compensation Sites: Assessment of Environmental Effects [APP-137], Horizon has undertaken extended Phase 1 Habitat Survey (including great crested newt eDNA survey, ground level tree assessment for bat roosts, riparian mammal survey and red squirrel survey) to assess suitability of habitats for protected species and determine presence / likely absence, where possible. The survey reports will be submitted to the DCO examination at Deadline 4 (18 January 2018) and the Main Power Station Site Sub-CoCP [APP-415] will be updated in accordance with the survey findings.

7.60 Tre'r Gof SSSI Compensation sites: Biosecurity Risk Assessment

7.60.1 In response to paragraph 7.14.14; in paragraph 11.2.42 of the overarching WN Code of Construction Practice [REP-031], Horizon has committed to the preparation of biosecurity risk assessments to cover all its activities. As noted in other responses, Horizon does not consider it is necessary or justified for detailed sub-CoCPs to be submitted to the discharging authority for approval.

7.61 Tre'r Gof SSSI Compensation sites: Topsoil

7.61.1 In response to paragraph 7.14.15, consideration of the potential uses of the topsoil within the Wylfa Newydd DCO Project is ongoing and will be included in a materials management plan (MMP) in accordance with the WN Code of Construction Practice [APP-414]. Horizon is actively seeking to identify opportunities to minimise the need for topsoil stripping and maximise the re-use of any topsoil that is stripped on site, as part of the refinement of the compensation proposals to be submitted for Deadline 6 (19 February 2019).

7.62 Cae Gwynn SSSI

7.62.1 In response to paragraph 7.15.3, Horizon accepts that monitoring to date at Cae Gwynn has not been ideal. This was due to access difficulties, both for drilling rigs due to the difficult peat terrain but mostly due to landowner access issues. Nonetheless, Horizon agrees with NRW that the risk of impact to Cae Gwyn is low.

7.62.2 Monitoring is secured in the Main Power Station Site sub-CoCP [REP2-032]. This states at paragraph 10.4.6 that appropriate monitoring will be undertaken to determine if there is an effect on Cae Gwyn SSSI. The monitoring will include continuous water level monitoring at selected groundwater monitoring boreholes with monthly or quarterly water level dips at others. Where practicable, existing boreholes would be used, although it is recognised that many of these will be lost during the construction works and some replacements may be required. The monitoring would include continuous monitoring of existing piezometers in Cae Gwyn if land access is granted. It goes on to state that if the monitoring identifies an effect, which we believe is unlikely, additional mitigation options could include grouting major inflow fractures; and artificial recharge.

7.62.3 Paragraph 10.4.8 of the Main Power Station Site sub-CoCP [APP-415] also states that appropriate monitoring will be undertaken to determine if there is a significant departure from baseline conditions regarding rainfall/runoff response in watercourses. The monitoring will include continuous flow monitoring at existing surface water monitoring locations with weekly, monthly or quarterly spot flow measurements at other locations.

7.62.4 Horizon also acknowledge that flow monitoring at a point 800m downstream of Cae Gwyn is also not ideal. It is standard hydrological practice to draw on observed data where it is available and, as flow has been continuously monitored at that site at 15-minute intervals, it made sense to try and use this information within the Cae Gwyn assessment. Also. It is standard hydrological practice to scale flows from hydrologically similar sites where the response is not expected to be significantly different. In the case of Cae Gwyn, the catchment area at Location A, which was used as the source of information, is 0.64km^2 in size and will have similar climatic characteristics to that of the subject site, though from a land-use and soil perspective it will likely reflect the greater proportion of grazing land rather than the till and peat of the SSSI. The flow rate estimated for the outflow of Cae Gwyn may arguably, therefore, be an overestimate, however, as there was no information available to facilitate an adjustment beyond a simple area-based scaling factor, the information from Location A was the best available at the time.

7.62.5 At present, Horizon has no right of access to Cae Gwyn SSSI so is unable to commit to any enhanced mitigation on the site. Horizon note that this is in the context of the risk of impact to Cae Gwyn being low.

7.63 Cae Gwynn SSSI: Hydrology and hydro-ecology

7.63.1 In response to paragraph 7.15.4, Horizon acknowledge NRW are in broad agreement with the 4R and MODFLOW modelling approach for the wider zone of influence and that the modelling outputs are likely to be of the right order of magnitude at a regional scale.

7.63.2 Horizon and NRW agree that the hydrogeology and hydro-ecology of Cae Gwyn is complex and that the model cannot fully characterise the local groundwater and surface water system. Horizon has, therefore, relied upon site specific interpretation from the monitoring installations in the catchment and long-term monitoring and field testing of ecology, hydrology and hydrogeology to understand these in detail. Whilst the baseline data around Cae Gwyn is site specific, it is acknowledged that it is less than ideal for reasons given in above.

7.63.3 Uncertainty is explicitly recognised in the conceptual model and the 4R/MODFLOW model, even when calibrated against long term monitoring. Some of this uncertainty is accounted for via the sensitivity models.

7.64 Cae Gwynn SSSI: Drainage at Mound C

7.64.1 In response to NRW's comments at paragraph 7.15.6, NRW is correct that runoff from Mound C and from a car park, located to the north east of Cae Gwyn SSSI, will discharge to the Nant Caerdegog Isaf downstream of the SSSI.

7.64.2 The drainage arrangements, as described in ES Volume D - WNDA Development App D8-8 - Summary of preliminary design for construction surface water drainage [APP-167], seeks to manage surface water runoff and pollution control from the mound and from the car park, in addition to compensating for the loss of runoff to the Cae Gwyn Catchment via an overflow.

7.64.3 APP-167 acknowledges that there is residual risk of pollution entering the water environment from the car park because of this overflow arrangement and as such mitigation will be explored to avoid impacts on the water environment, including consideration of features such as bio-retention strips, ponds incorporating reed beds or permeable paving. Oil separators would also be an acceptable form of mitigation.

7.64.4 Horizon is committed to revising the preliminary drainage design at the detailed design stage and therefore will propose a requirement as part of an updated draft DCO to be submitted at Deadline 4 (17 January 2019) which will require Horizon to submit, for approval, a surface water drainage design for construction works.

7.65 Air quality effects at Tre’r Gof SSSI

7.65.1 In respect of NRW's comments at 7.16.5, Horizon notes NRW’s confirmation that appropriate measures have been proposed in chapter D9 (APP-128), to mitigate the potential effects of air quality changes on Tre’r Gof SSSI. These measures will be secured through the provisions of the Main Power Station

Site sub-CoCP [APP-415]. As part the updated Main Power Station Site sub-CoCP [REP2-032] submitted at Deadline 2, Horizon made a number of amendments to controls and monitoring of emissions from plant and machinery and air quality monitoring.

7.65.2 Horizon acknowledges that Main Power Station Site sub-CoCP will be further refined during the Examination period, in response to comments from the Examining Authority and stakeholders such as NRW. A revised draft of this document will be submitted into Examination at Deadline 4 (17 January 2019). It is Horizon's opinion that by the close of Examination, the documents will contain the necessary details sought by NRW, and therefore additional approval requirements will not be required.

7.66 Cae Gwynn SSSI: Air quality

7.66.1 In response to paragraph 7.16.6, Horizon has reviewed its air quality assessment for the WNDA as a result of its commitment to applying the additional mitigation to control NOx emissions from construction plant and machinery as proposed in the DCO submission (see section 5.6 of chapter D5 Air quality (excluding emissions from traffic) (APP-124), and Section 7.5 (Emissions from plant and machinery) of the Main Power Station Site sub-Code of Construction Practice (CoCP) (APP-415)). This assessment has been submitted at Deadline 3 (18 December 2018).

7.66.2 The conclusions of this assessment show that Cae Gwyn SSSI requires further ecological consideration as a result of nitrogen deposition levels increasing during the Year 2 peak earthworks and marine works period. Acid deposition and NOx concentrations do not meet the load / level which require further ecological consideration. At Year 5 peak construction, nitrogen and acid deposition and NOx concentration are below the criteria requiring further ecological consideration.

7.66.3 As in chapter D9 Terrestrial and freshwater ecology (APP-128), a study by Caporn et al. (2016)3 was used to predict changes in habitat quality indicators at Cae Gwyn SSSI as a result of incremental changes in long-term nitrogen deposition above critical loads. Nitrogen deposition at Cae Gwyn SSSI predicted to occur at year 2 is an increase of 0.2 kgN/ha/year. Using the Caporn et al. 2016 study, this increase would potentially lead to a 0.2% decrease in overall species richness within the SSSI, a 0.8% decrease in forb species richness, and a 0.3% increase in graminoid cover.

7.66.4 Whilst Horizon accept NRW's comments that increased nitrogen deposition rates are likely to affect those species for which the SSSI is designated, the predicted changes in species composition are less than 1% and are based on a study period of 8 years. The revised air quality assessment models nitrogen deposition loads requiring further ecological consideration at only the year 2

[3] Caporn, S., Field, C., Payne, R., Dise, N., Britton, A., Emmett, B., Jones, L., Phoenix, G., Power, S., Sheppard, L., Stevens, C. 2016. Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance. Natural England Commissioned Reports, Number 2010.

period, with deposition decreasing to loads less than those requiring further ecological consideration by year 5.

7.66.5 Given the short period of exposure to increased nitrogen deposition values, and the less than 1% species composition changes predicted as occurring following a much longer period of exposure to increased nitrogen deposition, it is considered that the conclusion of minor adverse effects on Cae Gwyn SSSI as a result of changes in air quality is suitably precautionary and appropriate.

7.67 Air Quality modelling

7.67.1 In respect of NRW's comments regarding air quality modelling from paragraph 7.16.8, Horizon notes that NRW has raised similar queries on the operational combustion plant dispersion modelling in a notice of request for more information in relation to the application for an Environmental Permit (application number PAN-002429) (i.e. a notice issued under schedule 5 of the Environmental Permitting (England and Wales) Regulations 2016). This notice was issued to Horizon on 17 October 2018 and a response was issued by Horizon on 13 November 2018. Where appropriate, Horizon's response to paragraphs 7.16.8 and 7.16.9 of NRW's Written Representation refers to the response provided to NRW on 13 November 2018. The relevant response document issued to NRW on 13 November 2018 is provided in Appendix E of this document for ease of reference.

7.67.2 In summary, in addressing all the concerns raised by NRW, the response provided to NRW confirmed that the modelling was undertaken appropriately and adequately considered the worst case. The assessment of combustion plant emissions is set out in WNDA Development D5 - Air quality excluding emissions from traffic) [APP-124] of the Environmental Statement. Specific responses are provided below on the individual points a) to f) of paragraph 7.16.8.

7.67.3 With regard to paragraph 7.16.8 point a) on building downwash, this is contained in the response to NRW requirement 1, 5 and 8 of the response document that was issued to NRW (Appendix E), pages 3 to 8.

7.67.4 With regard to paragraph 7.16.8 point b), this was not included in the Schedule 5 comments issued by NRW. A response is provided in the following paragraphs (taken from section 2.11 of appendix D5-3 [APP-141]).

7.67.5 The chemical reactions and equilibria associated with NOx, ozone and other oxidants chemistry in the atmosphere are complex. Given this complex chemistry, the Environment Agency's Air Quality Modelling and Assessment Unit (AQMAU) has adopted a pragmatic, risk-based approach in determining the conversion rate of nitrogen monoxide (NO) to nitrogen dioxide (NO2) which dispersion model practitioners can use in detailed assessments. AQMAU guidance advises that the source term should be modelled as oxides of nitrogen (NOx) (expressed as NO2) and then suggests a tiered approach when considering ambient NO2: NOx ratios:

- Screening Scenario: 50% and 100% of the modelled NOx process contributions should be used for short-term and long-term average NO2 concentrations, respectively;
- Worst Case Scenario: 35% and 70% of the modelled NOx process contributions should be used for short-term and long-term average NO2 concentrations, respectively; and
- Case Specific Scenario: Operators are asked to justify their use of percentages lower than 35% for short-term and 70% for long-term assessments in their application reports.

7.67.6 In line with the AQMAU guidance, this assessment has adopted the 'Worst Case Scenario' approach in determining the conversion rate of NO to NO2 as a robust assumption. The 'Screening Scenario' factors are only applicable for screening assessments using the H1 software tool, not once a decision has been made to progress to detailed modelling. Use of the screening scenario approach in detailed assessments, particularly the assumption of 100% conversion to NO2 would, effectively, require perpetual darkness and a non-limiting ozone concentration, to ensure that photolysis of NO2 does not take place (i.e. reaction R1 described in section 2.11 of appendix D5-3 [APP-141] ceases) and that the equilibrium shifts reaction R2 to completion. These conditions, quite obviously, could not occur in reality and their use in anything other than a basic, screening assessment, is unrealistic and overly pessimistic.

7.67.7 With regard to paragraph 7.16.8 point c), Horizon's response is provided below, and this was discussed in Section 3.3 of appendix D5-3 [APP-141].

7.67.8 The 2007 report produced by the Air Quality Expert Group (AQEG, 2007. 'Air Quality and Climate Change: A UK Perspective') indicated that, in the future with climate change, the winter season may become windier with fewer stable weather conditions by the end of the century (2099), whilst summer seasons are anticipated to become hotter and sunnier, with an increase in unstable weather conditions by the 2040s. The net effect of these anticipated changes on the baseline air quality is difficult to establish but is unlikely to significantly alter the baseline air quality to an extent that it would affect the outcome of this assessment.

7.67.9 In terms of how these possible future conditions could influence the air quality effects of emissions from combustion plant on the Wylfa Newydd Development Area in the future is not possible to determine in any precise manner. This is because, to evaluate whether this could determine that the impact from a particular emission stack could be higher than those proposed in the appendix D5-3 [APP-141] report or lower, a future forecast meteorological data set, suitable for use in the modelling exercises, would be required. Given the current great uncertainty that exists as to exactly how the climate will change and the effect this will have on weather conditions at specific global locations, it is unlikely that such a dataset could be synthesised with any degree of confidence that could accurately mimic possible future events.

7.67.10 Consequently, a simple sensitivity analysis has been included in the penultimate paragraph of Section 3.3 of appendix D5-3 [APP-141], which indicates that, for the standby diesel generators, if the effect of future climate change was such that the potential number of exceedances were to double as a result of climate change effects during summer months, then the probability of an exceedance of the air quality objective (AQO) would still be less than $1x10^{-15}$. Sensitivity analysis demonstrates that the number of hourly exceedances (and, therefore, the frequency of hotter, sunnier summer conditions) would have to increase by more than a factor of 10, for the probability of exceeding the AQO to even increase above $1x10^{-15}$.

7.67.11 With regard to paragraph 7.16.8 point d), this is contained in the response to NRW requirement 10 of the response document that was issued to NRW (Appendix E to this document), page 12. This confirms that there will be no overlap between different generator testing scenarios.

7.67.12 With regard to paragraph 7.16.8 point e), this refers to the Mobile Emergency Equipment Garage (MEEG) emergency exercise (see section 2.4, page 10 of appendix D5-3 [APP-141]), the details of which are contained in Appendix A to appendix D5-3 [APP-141] (see section 3.1.5, page 11). Horizon estimate that there will be a total of 76.5MWth input of generating units deployed during the MEEG emergency exercise, distributed equally in laydown areas adjacent to the nuclear islands of Unit 1 and 2. Due to the complexity of this scenario, including the number of plant and varying release characteristics (up to 31 generators deployed, ranging in capacity from 0.5MWth to 14.5MWth), the modelled scenario assumes a single point source release occurs in each laydown area with release characteristics derived on the basis of 50% of the total aggregated thermal input of all plant involved in the exercise (i.e. 50% assigned to Unit 1 laydown area and 50% to Unit 2 laydown area). Hence, the assessment assumes there will be a single, effective 38.25MWth generating unit deployed in each laydown area for each Unit.

7.67.13 In terms of the derivation of source term parameters, in simple terms, the combustion gas volumes and compositions from diesel combustion were calculated from first principles and the emission rates were calculated by assuming that the emission concentrations of carbon monoxide, NOx and particulate matter were the same as those for the other standby diesel generators (i.e., the EDGs, BBGs and ASGs) as detailed in Table 9 of Appendix A to appendix D5-3 [APP-141]. Emission concentrations of sulphur dioxide were calculated from the sulphur content of the diesel fuel. The starting point of the calculation is an estimate of the diesel required (kg/s) by the effective generator, which is determined from the thermal input (38.25MWth = 38.25MJ/s) and the calorific value of diesel (typically ~ 43.5MJ/kg). Once the diesel requirement has been established, the dry and wet stoichiometric waste gas flows at 288K (i.e. 15°C), 101.3kPa and 0% oxygen) are calculated by multiplying the diesel requirement by published stoichiometric waste gas production factors provided by Rose and Cooper (1977) (Rose, J.W. and Cooper, J.R. (1977) "Technical Data on Fuel." Scottish Academic Press, Edinburgh, 7th Edition, 1977). Combustion of Fuels (dry waste gas flow of $10.57m^3$/kg diesel and wet waste gas flow of $12.14m^3$/kg diesel). The wet and dry stoichiometric waste flows (m^3/s) are then corrected to actual discharge

conditions (Am^3/s) and reference conditions, respectively (Nm^3/s), using the discharge temperatures and oxygen contents applicable for the EDGs, BBGs and ASGs (discharge temperature of 375°C and 13% oxygen) in order to calculate the stack discharge velocity and emission rates. The stack diameter for the single effective generator was sized to produce a discharge velocity similar to the EDGs, BBGs and ASGs. The emission rates were calculated by multiplying the combustion gas volume flow rates at reference conditions by the emission concentrations. With regard to potential "hourly exceedences", this is explained in Section 3.1.5 of Appendix A to appendix D5-3 and Section 3.1 of appendix D5-3 [APP-141] (2nd paragraph on page 32) as follows.

7.67.14 "It should be noted that the results for the MEEG emergency exercise scenario do not permit a direct comparison with the AQOs, particularly those which are expressed on a percentile basis or with an averaging period greater than 1 hour. The results for the emergency exercise have been obtained by assuming the scenario operates continuously throughout the year to allow for consideration of 'worst-case' meteorological conditions. However, the actual duration of this scenario is only 1 hour per annum. Any results presented with an averaging period greater than 1 hour, or presented with a percentile less than 100, are not directly comparable with the AQO. These results have been included only to provide an indication of the potential magnitude of off-site concentrations during the exercise."

7.67.15 This is also discussed in paragraph 5.5.140 of chapter D5 [APP-124], where it is noted that the predicted 99.8th percentile concentrations were above the AQO at some receptors, which confirms there are predicted to be hourly exceedances due to the exercise. However, and as also noted above, paragraph 5.5.140 states that the probability of exceedance of the AQO is zero as the exercise lasts for only one hour per year.

7.67.16 With regard to paragraph 7.16.8 point f), this is contained in the response to NRW requirement 11 of the response document that was issued to NRW (Appendix E), page 12. This confirms there are no exceedances in the routine testing scenario and, hence, there are no exceedances from individual runs of the Emergency Diesel Generators, Back-up Building Generators, and Auxiliary Standby Generators.

7.67.17 The information provided above, and in the response issued to NRW on 13 November 2018, is considered by Horizon to adequately address the concerns raised by NRW and demonstrate that the modelling has been undertaken appropriately. On this basis, additional dispersion modelling is considered to not be required.

7.68 Dust deposition

7.68.1 In response to paragraphs 7.16.10-11, it is acknowledged that dust deposition has the potential to affect designated ecological sites and an assessment of dust from construction works on ecological receptors close to the WNDA was undertaken in the Environmental Statement (see chapter D5 [APP-124] and the associated construction dust assessment in appendix D5-1 [APP-139]).

7.68.2 Section 3.2 of the appendix D5-1 [APP-139] notes some of the direct and indirect effects of dust depositing onto sensitive vegetation or designated ecological sites.

7.68.3 The air quality assessment concluded that, after the application of appropriate dust mitigation and controls, there would not be a significant effect on ecological receptors from dust deposition.

7.68.4 As well as the good working practice dust mitigation measures to prevent or reduce dust emissions set out in the WN Code of Construction Practice (CoCP) [APP-414] and Main Power Station Site sub-CoCP [APP-415], Horizon proposes to use a comprehensive air quality monitoring system with trigger alerts and appropriate response mechanisms to ensure that the dust mitigation measures are being implemented properly, and the condition of relevant ecological receptors is monitored. Since submission of the DCO application, Horizon has developed further detail in relation to air quality monitoring. This was included in Section 7 of the Wylfa Newydd CoCP, Main Power Station Site sub-CoCP submitted at Deadline 2 (4 December 2018) and included more information on the following:

- Further detail of the web-based environmental monitoring system, including data management and access and air quality reporting;
- The proposed location of monitoring equipment for PM10, PM2.5 and dust deposition; and
- Ecological inspections/botanical surveys and the procedure for reviewing and responding to measured dust deposition rates above the trigger levels.

7.69 Post-construction monitoring

7.69.1 In response to paragraph 7.17.6 as part of its Statement of Common Ground with NRW, Horizon had discussions with NRW over an appropriate period of post-construction monitoring for developments which affected protected species.

7.69.2 As agreed during these discussions, Horizon has submitted a revised Main Power Station Site sub-CoCP [REP2-032] at Deadline 2 (4 December 2018), which details the precise monitoring proposals. These are in line with NRW requirements and will be secured as part of relevant protected species licence applications detailed within the Wylfa Newydd CoCP [REP2-031].

7.70 Landscape and habitat management

7.70.1 In response to paragraph 7.17.18, and as noted in response to NRW's comments on the draft DCO [REP1-005], Horizon is happy to provide NRW with a consultation role in respect of landscape and habitat management schemes approved under Requirement WN11. This amendment will be included in the updated DCO to be submitted at Deadline 4 (17 January 2019).

7.70.2 Horizon has made detailed comments in respect of how these management schemes will be secured in response to NRW's comments at paragraph 9.6.6.

7.71 Migratory Fish

7.71.1 At paragraph 7.17.10, NRW notes that detailed mitigation measures for migratory fish should be set out in the Main Site Power Station Site Sub-CoCP and be subject to the approval of the discharging authority, in consultation with NRW.

7.71.2 Horizon notes that the WN CoCP and Main Site Power Station Site Sub-CoCP already contains measures regarding fish (see paragraph 11.2.38 -11.2.40 of the WN CoCP and paragraph 11.6.2 of the Main Site Power Station Site Sub-CoCP). Both control documents will apply to construction activities within the WNDA and be removal or translocation works will be undertaken in accordance with a licence obtained from NRW.

7.71.3 As NRW will have an approval role in respect of licences, Horizon does not consider that this needs to be secured through a separate requirement.

7.71.4 In response to paragraph 7.17.11,the Wylfa Newydd Code of Operational Practice (CoOP) [APP-421] sets out Horizon's commitment to mitigating operation-related environmental effects. As identified by NRW, the Wylfa Newydd CoOP commits Horizon to the principles of monitoring entrapment of fish during the operational phase of the Power Station. The monitoring programme will assess the effectiveness of fish protection measures through a programme to be agreed with NRW through the operation water discharge Environmental Permit under the Environmental Permitting Regulations 2016.

7.71.5 In respect of NRW's comments at paragraph 7.17.12 regarding diversion works, Horizon notes that it has committed to conduct the watercourse realignment works on the Nant Caerdegog Isaf with relevant approval and consents from NRW. This is secured in paragraph 10.2.13 of the Main Power Station Site sub-CoCP (Revision 2.0) [REP2-032] that was submitted at Deadline 2 (4 December 2018).

7.71.6 Horizon is happy to clarify and amend that paragraph of the Main Power Station Site Sub-CoCP [REP2-032] to read '…with relevant detailed design (with consideration of fish requirements) approval and consents for works from NRW…' as that had always been the intent. This amendment will be made in the next version of this document to be submitted at Deadline 4 (17 January 2019).

7.72 Marine Protected Species

7.72.1 In response to NRW's comments at paragraph 7.17.13, Horizon will continue to discuss licence requirements with NRW.

7.73 Marine environment: Benthic habitats

7.73.1 In relation to paragraphs 7.18.1 and 7.18.2, the assessment of the impact on the marine environment presented in chapter D13 (the marine environment) of the Environmental Statement [APP-132] identified a total of 13 impact pathways via which potential effects to benthic habitats could occur within the WNDA and Horizon consider the full range of effects to have been assessed. The assessment presented in section 13.6 of chapter D13, concludes that the

Wylfa Newydd DCO Project could potentially result in two significant effects representing a medium magnitude of change and a moderate adverse effect to benthic habitats: firstly, from the direct loss of habitats and species under the footprint of the Marine Works, and secondly, from the potential introduction of invasive non-native species during Main Construction. When taking into consideration the additional mitigation presented in section 13.8 of chapter D13 of the Environmental Statement, Horizon concludes that in both cases, the residual effects would represent a small magnitude of change and a minor non-significant effect.

7.73.2 Minor non-significant effects to benthic habitats were identified due to the discharge of Cooling Water and the associated thermal and Total Residual Oxidants (TRO) (see paragraphs 13.6.679, 13.6.690, 13.6.784 and 13.6.789 of chapter D13). Assuming a 'worst case' scenario the predicted areal extent of thermal effects (>2℃ rise at the seabed) and for total residual oxidants (TRO) effects (0.01mg/L (95 percentile)) totals 5.6ha. No other topic assessments presented within the Environmental Statement identified effects on benthic habitats.

7.73.3 In relation to paragraph 7.18.3 Horizon acknowledges an omission of text regarding benthic cumulative assessment in the Environmental Statement. This is provided below.

7.73.4 Horizon estimates that a total of 36.1ha (0.56%) of subtidal area would be affected cumulatively by the Wylfa Newydd DCO Project.

7.73.5 The sub lethal effects of TRO and thermal discharge are expected to be highly localised being limited to the immediate zone of discharge (i.e. within a few 100 metres of the outfall). Whilst effects of smaller magnitude may occur further afield, these would remain reasonably localised, covering a subtidal and intertidal area of 4.2ha and 0.3ha, respectively (see paragraphs 13.6.679 and 13.6.689 of chapter D13. The subtidal and intertidal habitats, (including those of conservation importance) that would be affected cumulatively by the Wylfa Newydd DCO Project, are considered common around the north coast of Anglesey and effects considered spatially limited and therefore any loss would not result in wider effects on the structure and function of benthic habitats. Consequently, Horizon does not consider there to be a combined effect to benthic habitats and further consideration of mitigation and/or enhancement measures is unnecessary.

7.73.6 In response to paragraph 7.18.4, Horizon have considered the views raised by NRW through the SOCG and Examination process with respect to ecological enhancement mitigation.

7.73.7 Horizon is in the process of compiling a report outlining the additional information that has been requested by NRW through SOCG meetings to expand upon the details submitted in the SOCG with NRW at Deadline 2 (4 December 2018) (see SOCG appendix A). This new report will expand on the engineering options appraisal that has been undertaken to determine the ecological enhancement measures that are viable and can be considered as part of the Wylfa Newydd DCO Project to mitigate loss of marine habitats and species.

7.73.8 Horizon's intention is to issue this report to NRW early in the new year (2019) through the SOCG process in order to permit ongoing engagement with respect to this matter. This report will be updated to take account of any further comments made by NRW and submitted into Examination at Deadline 4 (17 January 2019).

7.73.9 In response to paragraph 7.18.5, Horizon has already committed and secured in the Marine Works sub-CoCP [APP-416] that where possible, excavated rock material from marine operations will be used in the construction of marine structures as part of the ecological enhancements measures and to reduce the volume of material imported to site and the amount requiring marine disposal (see section 9 – waste and materials management strategy).

7.74 Annex I and Section 7 Benthic habitats – Holyhead North Disposal Site

7.74.1 In response to paragraph 7.18.6 the Marine Works sub-CoCP [APP-415] already makes a commitment to micro-siting rock within a specific area of the Disposal Site (see section 9). Horizon is updating the Marine Works sub-CoCP to include further information regarding the requirement to undertake benthic sampling within 12 months of the disposal activity. This will be submitted to the Examination at Deadline 4 (17 January 2019).

7.74.2 Horizon expects any further refinement on the survey programme to be developed with NRW through the Marine Licence application.

7.75 Section 7 species: Lesser sandeel, whiting and herring

7.75.1 In response to paragraph 7.18.8 Chapter D13, table D13-29 (the marine environment) [APP-132] of the Environmental Statement provides predicted impingement rates for lesser sandeel, whiting and herring. The approach taken to calculate impingement uses an unmitigated catch extrapolated from the Existing Power Station (when it was operational) and therefore represents a worst case. Horizon acknowledges in chapter D13 that the relative proportions may vary and has consulted and agreed with NRW on methods of calculating and assessing fish impingement. The approach taken represents industry good practice and assessments are based on no mitigation.

7.75.2 Horizon understands, based on NRW's response to FWQ8.0.22 that its view is that it is not possible "to accurately predict changes as a result of creating a sheltered bay". That response goes on to say that NRW considers that monitoring will be needed to understand possible changes to baseline. Horizon agrees with NRW's view that it is not possible to accurately predict change, and this is acknowledged in chapter D13 and supported by the assessments based on no mitigation (i.e. worst case). Consideration should be given to the hydrodynamic modelling which shows a good flushing of water through the base of the western breakwater and evidence from impingement surveys at other UK power stations which shows that semi-enclosed onshore intakes do not inherently entrap more fish; it may be on the contrary, that this

may actually reduce the ingress of schooling pelagic fish as they tend to avoid hard structures in the sea.

7.75.3 Horizon has committed to a monitoring programme during operation (see the Wylfa Newydd CoOP [APP-421]). Horizon will develop these monitoring proposals already secured in the DCO application with NRW as a condition of the operational water discharge Environmental Permit.

7.76 Section 7 species: Biosecurity Risk Assessment

7.76.1 Horizon welcomes NRW's comments regarding the draft Biosecurity Risk Assessment in paragraph 7.18.11. The document submitted with the DCO application is in draft and represents a strategy providing outline principles of biosecurity that Horizon will comply with. This commitment is secured within the Marine Works sub-CoCP [APP-416] submitted as part of the DCO application.

7.76.2 In addition, Horizon has also committed to a programme for non-native species monitoring which is also secured in the Marine Works sub-CoCP. The Marine works sub-CoCP is to be approved as part of any DCO grant and will be a certified document.

7.76.3 The Biosecurity Risk Assessment will be developed in-line with the principles secured in the DCO grant and once Horizon appoint a marine contractor. It is expected that Horizon will need to consider all aspects listed by NRW in paragraph 7.18.11 as part of the final Biosecurity Risk Assessment which will be a condition to discharge for the Marine Licence.

7.77 Protected Landscapes: Isle of Anglesey AONB

7.77.1 In response to paragraph 7.19.4, Horizon acknowledges the comments made by NRW in respect of the conclusions in the ES and its assessment of landscape. and visual effects relating to the Isle of Anglesey AONB.

7.77.2 As noted in Horizon's comments on the NRW response to Q7.0.2 of the Examining Authority's first Written Questions (submitted at Deadline 3 (18 December 2018)), the landscape design principles in chapter 4 of the Landscape and Habitat Management Strategy (LHMS) [APP-424] and [APP-425] set out key requirements for detailed landscape design development following grant of DCO. The Draft DCO [APP-029] Requirements WN9 (Final Landscape and Habitat Scheme) and WN11 (Landscape and Habitat Management Schemes) ensure implementation of the principles of the LHMS [APP-424 and APP-425], to be approved by the discharging authority, with NRW consulted on the information submitted to discharge the Requirement.

7.77.3 Requirement WN3 of the Draft DCO [REP2-020], requires that no construction may commence in respect of a building or other structure identified in Requirements WN4 and WN5 until plans and written details of the design (including size, external appearance, siting and materials) have been submitted to and approved by IACC for approval. This would include the Power Station colour scheme. The exact format of the documentation to be submitted for approval has not yet been determined but could include elevation drawings and photomontage visualisations.

7.77.4 Site Campus detailed design approval Requirement WN19 of the Draft DCO [REP2-020], requires that no construction of the Site Campus may commence in respect of a building or other structure identified in Requirement WN20 until plans and written details of the design have been submitted to IACC for approval. The details must be prepared in accordance with the design principles in Volume 3 of Design and Access Statement (Associated Developments and Off-Site Power Station Facilities) (appendix 1-2) including the architectural building design principles at section 4.3 [APP-409].

7.77.5 Marine Works detail design approval Requirement WN25 of the Draft DCO [REP2-020], requires that no construction may commence in respect of a building, works, or other structure identified in Requirement WN27 until plans and written details of the design (including size, external appearance, and siting) have been submitted to and approved by NRW.

7.77.6 With regard to the opportunity for off-site mitigation referred to in NRW's comments at 7.19.6, Horizon has also provided comments on the NRW response to FWQ7.0.2.

7.77.7 Horizon considers that in general landscape and visual mitigation is most effectively provided ‘at source’. This is because measures within the Wylfa Newydd Development Area will mitigate landscape and visual effects on a broad range of surrounding locations and viewpoints, and there is adequate space to provide meaningful mitigation, for example, through extensive landscape mounding and planting. By contrast off-site mitigation tends to provide mitigation for a specific location, receptor or viewpoint. It is also noted that off-site mitigation requires either control of the land concerned or agreement of the landowner.

7.77.8 Horizon notes the difference between off-site mitigation, for example, to mitigate an effect closer to the receptor and off-site ‘compensation’, for example, the provision of a new landscape feature to replace that lost or landscape enhancements to off-set changes or loss of valued features that for practical reasons cannot be replaced on-site.

8 Off-site Power Station Facilities

8.1 Foul Drainage

8.1.1 In response to paragraph 8.2.2 regarding the foul water connection for the Off-site Power Station Facilities, ES Chapter E8-Surface and groundwater [APP-246] states in paragraph 8.4.11 that the foul drainage will connect to the main foul sewer and would only discharge to an on-site package treatment plant if the main sewer was not suitable. Horizon consider this to be consistent with Welsh Government Circular 008/2018 on private drainage and the presumption of foul drainage discharging to a public sewer.

8.1.2 As per the Draft Statement of Common Ground ("SOCG") between Horizon Nuclear Power Wylfa Limited and Dwr Cymru Welsh Water, [REP2-048] Horizon can confirm that the sewerage undertaker has been approached regarding a connection to the foul sewer and that Dwr Cymru Welsh Water and Horizon are in agreement that Associated Development and the Off-site Power Station Facilities buildings which are located off-site will be serviced by the existing mains and foul water supply subject to final design, specification and demand.

8.2 Demolition waste

8.2.1 In response to paragraph 8.2.5, Horizon's approach to the management of demolition materials and waste, including waste Duty of Care and Horizon's Waste Hierarchy – Towards Zero Waste, are included in the WN CoCP [APP-414] and the relevant site-specific sub-CoCPs [APP-415 to APP-419]. This will be further defined in the waste and materials management strategy ("WMMS") stipulated in section 9 of the WN CoCP.

8.2.2 The WMMS will define the approach to materials management that is in accordance with CL:AIRE definition of waste code of practice ("DoWCoP") as stipulated in section 9.2 of the WN CoCP. A further commitment will be included in the WN CoCP at Deadline 4 (17 January 2019) to prepare a Site Waste Management Plan ("SWMP") prior to construction commencing. Further details are included in sections 1.5 and 1.6 of the Local Impact Reports Response Waste Management [LIR Waste APP-pending].

9 Park and Ride facility

9.1 Flood risk

9.1.1 In response to paragraphs 9.1.1 to 9.1.6 Horizon has prepared an FCA Addendum for the Dalar Hir site, submitted at Deadline 3 (18 December 2018) which will address the concerns of NRW that it has outlined in comments at paragraphs 9.1.1 to 9.1.6. In summary,

9.1.2 Updates the FCA to include the redistribution of the flows applied to the hydraulic model.

9.1.3 Adoption of a smaller allowance for climate change (15% instead of 30%) because of the short lifespan of the Park and Ride site (10 years, after which the site would be decommissioned).

9.1.4 The redistribution of flows within the hydraulic chekmodel, and lower climate change allowance, results in a lower volume of flood water within the site and therefore lower flood depths in the baseline case. The site remains at flood risk in the baseline scenario, therefore solutions to avoid, mitigate and manage the risk were explored, including a combination of level changes within the site to raise car parks above flood levels and to provide flood water attenuation in other areas.

9.1.5 NRW is correct that the flood risk at the site is sensitive to blockage of culverts beneath the A5 and A55 and it remains so in the latest scenario. However, blockage was discounted from the adopted 'design' scenarios because the site will be manned and because there will be a regular inspection and maintenance regime that will manage the risk of blockage at these culverts before blockage occurs. Furthermore, the catchment is largely grazing land with little in the way of debris sources that could result in blockage, meaning that the risk of blockage is low.

9.1.6 NRW is also correct that the FCA submitted with the DCO application did not include any mitigation. A solution has been developed, based upon the latest model that has been shown to be effective at managing flood risk at the site. The proposed solution includes two grassed storage areas in the north west of the site and raised car park and road levels in some areas to ensure that they remain dry. This solution has been shown to ensure the site is free from flooding in the 1% AEP event (except one car parking space) and to provide betterment both upstream and downstream of the site.

9.1.7 Hydraulic model runs also suggest that there is also betterment within the site provided in more frequent events, and no detrimental impact in more extreme events. Further, the solution provides a small betterment to agricultural land to the north and to the baseline flood risk identified to the A5 and A55 to the south. Residual risks to the site from blockage of culverts beneath the A5 and A55 or within the site itself would be managed through a maintenance plan for the site.

9.1.8 The conclusions of the FCA Addendum is that development of the Park and Ride will be TAN15 compliant in that it will not be at flood risk itself over its lifetime and will not increase flood risk elsewhere.

9.1.9 With respect to the pluvial flood risk, the size of the catchment means that the flood response to pluvial sources is very similar to that shown in the fluvial flood risk modelling – both scenarios are small catchments with a fast response and driven by intense rainfall events. Consequently, the flood risk management measures proposed will be sufficient to manage the risks from pluvial or fluvial sources.

9.2 Pollution prevention

9.2.1 In response to paragraph 9.2.1, pollution prevention measures for the Park and Ride are described in section 10 of the overarching WN CoCP [REP2-031] and section 10.3 of the Park and Ride sub-CoCP [REP2-035]. The construction environmental management plans prepared by the contractor(s) delivering the compensation works will demonstrate to Horizon how works will comply with the guidance secured in the Wylfa Newydd Code of Construction Practice and any agreed Environmental Permit requirements on suspended solids content of discharges to the water environment.

9.2.2 The CoCP refers to the adoption of best practice CIRA guidance in section 10.2, as well as relevant PPGs and GPPs in relation to the protection of watercourses in paragraph 10.2.7. Paragraph 10.2.7 also notes that the CoCP will be updated as more GGPs become available. The adoption of these measures at the time of construction will carry through to the operation of the drainage scheme.

9.2.3 In respect of oil separators, these are shown in the proposed surface water and foul water drainage plan submitted for approval [APP-023], and are also secured in the Design and Access Statement, Volume 3 – Park and Ride [APP-410] through landscape design principle 3.4.44.

9.3 Foul drainage

9.3.1 The following presents a response to paragraphs 9.2.3 to 9.2.4, 9.5.1 and 11.2.3 relating to foul drainage for the Park and Ride.

9.3.2 ES Volume F8 - Surface water and groundwater [APP-273] presents information on the proposed sewage treatment facilities at the Park and Ride.

9.3.3 Chapter F8 describes the site as containing a package sewage treatment plant that will discharge treated runoff to the Nant Dalar Hir. As there was no foul sewer within close proximity of the Park and Ride, foul water from the building facilities would be treated via a package treatment plant before discharging to the Nant Dalar Hir. Chapter F8 states that discharge from the treatment plant would be subject to an Environmental Permit with conditions bespoke for the Nant Dalar Hir and downstream receptors, including Llyn Traffwll.

9.3.4 Despite the above assessment, presented within the DCO application, Horizon can confirm that the sewerage undertaker has been approached regarding a connection to the foul sewer and that Dwr Cymru Welsh Water and Horizon are currently investigating options for foul water treatment at the Park and Ride.

9.4 Decommissioning

9.4.1 NRWs position at paragraph 9.2.5 in relation to the removal of structures in watercourse is noted.

9.4.2 As indicated in Chapter F8 Surface and groundwater [APP-273], Horizon's current position is that we are not proposing to remove the structures installed at Dalar Hir, as our assessment indicates that this would result in the permanent removal of a small area of natural bed and banks and a localised area of vegetation from the riparian corridor. The effect of this is considered to be negligible for the other drains at the operational stage but minor adverse for the Nant Dalar Hir, which lies upstream of the sensitive Llyn Traffwll.

9.4.3 Horizon recognises the aspiration to return watercourses to their pre-development physical condition or better and is generally supportive. It is likely that, by the time of decommissioning, more environmentally friendly methods and equipment could be available, which may result changes to this position.

9.4.4 Horizon also notes that Requirement PR6 provides that decommissioning of the Park and Ride facility must not commence until a decommissioning strategy has been approved by IACC. The decommissioning strategy must include details of restoration and maintenance of structures to remain within watercourse.

9.5 Demolition waste

9.5.1 In respect of paragraph 9.26 Horizon's approach to the management of demolition materials and waste, including the waste duty of care requirements and the waste hierarchy and in line with all relevant waste legislation and regulation, are included in the 'WNCoCP' [APP-414] and the relevant site-specific sub-CoCPs [APP-415 to APP-419]. This will be further defined in the waste and materials management strategy (WMMS) secured in the updated WN CoCP to be submitted at Deadline 4 (17 January 2019).

9.5.2 The WMMS will define materials management that is in accordance with CL:AIRE The Definition of waste: Development Industry Code of Practice. A commitment to prepare a Site Waste Management Plan ("SWMP") in advance of construction commencing will be added in to the WN CoCP at Deadline 4 (17 January 2019).

9.6 Post-construction monitoring

9.6.1 In its Written Representation, NRW states in paragraph 9.6.1 that bats, otter and great crested newt are present within/adjacent to the Dalar Hir (Park and Ride) site, and in paragraph 9.6.2 they make the same statement regarding water vole and Schedule 1 bird species.

9.6.2 In chapter F9 Terrestrial and freshwater ecology (APP-274), Horizon conclude from baseline surveys that, although potentially present in areas adjacent to the Park and Ride site, great crested newt, otter and barn owl are absent from the site and that pathways of effects on these receptors were also not present as a result of the Park and Ride. These receptors were not discussed further

within the assessment. Bats and water vole were taken forward as receptors within the assessment.

9.6.3 The following potential pathways of effects on bats and water voles were considered: habitat loss; disturbance; hydrological change (water vole only); and, mortality (water vole only). Following embedded and good practice mitigation, detailed within chapter F9, it was concluded that the potential effects from these pathways on bats and water vole were negligible.

9.6.4 Given the conclusions of the assessment, as presented in chapter F9, no specific monitoring proposals were provided.

9.6.5 As part of its Statement of Common Ground with NRW, Horizon had discussions with NRW over an appropriate period of post-construction monitoring for developments which affected protected species.

9.6.6 As agreed during these discussions, Horizon has submitted a memo at Deadline 3 (18 December 2018), which details the revised monitoring proposals.

9.6.7 However, during this discussion, NRW did not raise concerns over protected species monitoring at the Park and Ride and as such there is no additional proposal for post-construction monitoring at this site. This is considered appropriate by Horizon given the negligible effects to those receptors identified by NRW as potentially affected by the Park and Ride.

9.7 Landscape and Habitat Management

9.7.1 In response to paragraph 9.6.6, and as noted in response to NRW's comments on the draft DCO, Horizon is happy to provide NRW with a consultation role in respect of landscape and habitat management schemes approved under Requirement WN11. This amendment will be included in the updated DCO to be submitted at Deadline 4 (17 January 2019).

9.7.2 Horizon does not consider that detailed phasing plans are required in respect of the landscaping in the WNDA - as landscaping is likely to be undertaken cohesively across the whole site at the completion of construction.

9.7.3 In respect of the content of the management schemes, Horizon notes that Requirement WN11 provides that all schemes must be developed in accordance with the management principles in the Landscape and Habitat Management Strategy [APP-424 and APP-425]. The Landscape and Habitat Management Strategy includes provision and management of habitats for protected species (including great crested newt and water vole).

9.7.4 The design and management principles set out in the LHMS commit Horizon to delivering habitat “for the lifetime of the Power Station” and to "manage that habitat to ensure their successful establishment and long-term viability”, thereby guaranteeing the long-term environmental management of the WNDA.

9.7.5 Requirement WN11(4) states that that scheme must be submitted to IACC for approval and implemented as approved.

9.7.6 Given that these measures would already be secured via the DCO, additional securing mechanisms (such as agreements under Section 106 of the Town and Country Planning Act 1990 or Section 39 of the Wildlife and Countryside Act 1981) are not considered necessary- as this would duplicate the controls provided in the draft DCO.

10 A5025 Off-Line Highway Improvements

10.1 Flood risk

10.1.1 In respect of paragraph 10.1.1, Horizon notes and welcomes NRW's confirmation that the modelling has been undertaken appropriately to inform the FCA for the A5025 Off-line Highways Improvements [APP-323].

10.1.2 In respect of paragraph 10.1.2, Horizon notes NRW's concerns over the potential for an unacceptable increase in flood risk. However, refers NRW to the conclusions of the FCA (section 7.1), which indicates that the effect on tidal flood risk is neutral, on fluvial flood risk is slight beneficial and on other sources of flooding the effect is neutral.

10.1.3 In respect of compliance with TAN15 for Section 1, as can be seen in Figure G8-1-7 of the A5025 Off-line Highways Improvements FCA [APP-323], there is no route between the A5 and the A5025 that would not cross Flood Zone C2. The route of the A55/A5/A5025 is the principal route for road-based transport of goods, people and materials to the WNDA site and the corner of A5/A5025 at Valley is a key constraint for the movement of some vehicles, both physically and in terms of potential impacts on people and communities.

10.1.4 The route for section 1 in this location ensures that these impacts are avoided, and it has considered the need to minimise impacts on the floodplain in this sensitive location by locating the route outside of the floodplain where possible or along the edge of the floodplain in a manner that minimises encroachment where this has not been possible. Flood risk mitigation measures ensure that there is no detrimental impact on flooding in this location.

10.1.5 In response to paragraph 10.1.5, the FCA primarily presents information on the fluvial and tidal sources of flooding. Modelling of a scenario where the tidal flaps on the tidal gates are permanently opened was undertaken and the results presented in Appendix G8-01.3 of the FCA.

10.1.6 More recently, failure of the tidal defences has been simulated via modelling of both a 50m wide and 20m wide collapse of the tidal barrier at the mouth of the Afon Cleifiog Estuary in the vicinity of the tidal gates. The results of this have been provided to the Examining Authority at Deadline 3 (18 December 2018). In summary the simulations indicate that the bypass results in a negligible benefit (-0.007m to -0.008m) between the baseline and with-scheme cases in a 0.5% AEP event with climate change to 2115 at all properties. In the case of a 20m wide breach, the result is similar with a negligible benefit (-0.006m to -0.009m) between the baseline and with-scheme cases in a 0.5% AEP event with climate change to 2115 at all properties.

10.1.7 In response to paragraph 10.1.6, the recent hydraulic modelling of breach failure has applied the guidance contained in NRW's Breach and Blockage Guidance.

10.1.8 As indicated above, the effect of a breach/failure of tidal defences has been assessment for the baseline case and with the scheme in place, including comparison against predicted water levels and velocities at properties within the floodplain. This has been provided to the Examining Authority at Deadline 3 (18 December 2018).

10.1.9 In response to paragraph 10.1.8, Horizon welcomes confirmation from NRW that the design of the compensation flood storage for the fluvial and fluvial tide locked events is appropriate for those events.

10.1.10 As indicated in responses above, tidal breach modelling has now been undertaken and it will be provided to the Examining Authority by Deadline 3 (18 December 2018). The results indicate that the proposed compensatory storage remains effective at mitigating any impacts on flood risk in the event of a breach of the tidal defences.

10.1.11 In response to NRW's comments at 10.1.9 regarding the A5025 Off-line Highway Improvements at Llanfachraeth (Section 3), Chapter G8 - Surface water and groundwater [APP-311] and Chapter G8-1 Flood Consequence Assessment [APP-323] describe the impact of the proposed off-line sections of the A5025 on the water environment, including on flood risk from all sources.

10.1.12 The FCA for Section 3 of the A5025 Off-line Highway Improvements indicated that there was a predicted increase in flood risk upstream (east) of the proposed Llanfachraeth Viaduct under both fluvial and tidal conditions. There was, however, a negligible change (<0.001m) observed at the property to the west of the proposed viaduct. The maximum change in flood level observed to the east of the viaduct amounted to 0.09m under fluvial conditions and the primary receptor of this increase was agricultural land, with no increased risk to properties.

10.1.13 Despite this lack of impact to properties, the increased risk to land is acknowledged to be non-compliant with TAN15. The cause of the increase, which is larger in fluvial events than tidal events, is the Viaduct over the Afon Alaw and Afon Llywenan, consisting of three piers and two abutments combined with an encroachment into the floodplain by the viaduct abutments. The abutments result in a reduction in total inundated area equivalent to -505m2, however, there is also a reduction in conveyance of flow, which is the main cause of the increased flood level.

10.1.14 Further assessment and modelling has considered what mitigation may be achievable within the current Order Limits of the A5025 Off-line Highway Improvements. An area of potential compensatory storage was identified to the east of the viaduct that was sufficient to compensate for the direct loss of floodplain storage caused by the encroachment of the abutments into the floodplain. Hydraulic modelling of the potential compensatory storage shows that in the 1% AEP event, with an appropriate allowance for climate change, there remains an increased flood level (up to 0.05m) to the east of the viaduct and in areas outside of the Order Limits. The potential compensatory storage is not, therefore, a solution on its own and the benefit of the option is negligible in terms of overall peak flood level and flood extent.

10.1.15 An alternative option, a legal agreement with the landowner to allow flooding on the land, is being pursued, however, it is acknowledged that this would not prevent the simulated increase in flood risk from occurring and, arguably, remains non-compliant with TAN15, which provides no mechanism for mitigation of this form.

10.1.16 At present, therefore, there is no betterment that can be offered from the position presented the FCA Chapter G8-1 – Flood Consequence Assessment. The impact of the increased flood level was considered in the FCA and in Chapter G8 as Minor Adverse and of Slight Significance.

10.2 Pollution prevention

10.2.1 In response to section 10.2, the Wylfa Newydd CoCP [APP-414] refers to best practice CIRA guidance in section 10.2, as well as relevant PPGs and GPPs in relation to the protection of watercourses in paragraph 10.2.7. Paragraph 10.27 also notes that Horizon's management of construction activities will be updated as more GGPs become available;

10.2.2 Horizon is considering NRW's request for the installation of a pollution cut-off valve in balancing ponds;

10.2.3 As indicated in the A5025 Off-line Highway Improvements sub-CoCP [APP-420], the management, general mitigation controls to be implemented for waste and materials are described in section 9 of the WN CoCP [APP-414], which states that all waste arising from the Wylfa Newydd Project will be managed in a responsible manner with the clear intention of applying Horizon’s waste hierarchy and in line with all relevant waste legislation and regulation;

10.2.4 Horizon understands the particular issues around concrete and the risk it poses to the water environment. Application of relevant CIRA guidance, PPGs and GPPs will ensure that this guidance is followed, however, further consideration will be given to this request;

10.2.5 NRW is correct that the spillage risk assessment presented in G8-2 [APP-324] indicates that the probability of an accidental spillage is well below threshold levels to require the inclusion of additional mitigation measures to deal with a spillage. The request for the installation of a fuel interceptors will be considered by Horizon, though it is noted in Table 8.1 of HD45/09 Design Manual for Roads and Bridges Volume 11 Section 3 Part 10 that other measures, such as a vegetated ditch, can be more effective at reducing pollution.

10.3 Post construction monitoring

10.3.1 In response to paragraph 10.6.5, and as part of its Statement of Common Ground with NRW, Horizon had discussions with NRW over an appropriate period of post-construction monitoring for developments which affected protected species.

10.3.2 As agreed during these discussions, Horizon has submitted a revised A5025 Off-line Highway Improvements sub-CoCP [REP2-036] at Deadline 2 (4 December 2018), which details the precise monitoring proposals. These are in line with NRW requirements and will be secured as part of relevant protected species licence applications detailed within the Wylfa Newydd CoCP [REP2-031].

11 Logistics Centre

11.1 Pollution prevention

11.1.1 In response to paragraph 11.2, Horizon confirms that the risk of pollution incidents will be managed during the construction, operation and decommissioning of the Logistics Centre through the management controls secured in both the Wylfa Newydd CoCP [APP-414] and the Logistics Centre sub-CoCP [APP-419]. Section 10.2 of the Wylfa Newydd CoCP [APP-414] makes specific reference to compliance with the Guidance for Pollution Prevention (in addition to other industry guidance) and the instalment of oil separators as part of the drainage system on the site.

11.1.2 In addition, the design principles set out in the Design and Access Statement Volume 3 [APP-410] stipulate the inclusion of oil/water interceptor infrastructure to attenuate all surface water runoff.

11.1.3 Horizon considers that together, these controls will ensure that NRW's concerns in respect of pollution and drainage are addressed.

11.2 Protected Landscapes

11.2.1 In response to paragraphs 11.7.1-3 Horizon acknowledges the comment made by NRW confirming that they are satisfied the effects on the special qualities of the Isle of Anglesey Area of Outstanding Natural Beauty (AONB) can be mitigated.

11.2.2 The planting strategy for the Logistics Centre is set out in figure 19 and 20 of volume 3 of the Design and Access Statement, appendix 1-4 (Logistics Centre) [APP-410]. The existing low stone wall would be retained along both sides of the Lon Trefignath cycle path that extends along the site frontage and the wider Parc Cybi site. Native tree planting within the grass verge along the Logistics Centre site frontage would not be possible due to the requirement to maintain visibility splays for highway safety at the site entrances. The existing stone walling, that would be retained along both sides of the Lon Trefignath cycle path is a characteristic feature that continues through the wider Parc Cybi site. Planting a low hedge along the Logistics Centre frontage would conceal the stone walling and be out of character with the landscape treatment along other sections of the cycle path.

11.2.3 Design principles for the Logistics Centre site are set out in Section 3.4 of volume 3 of the Design and Access Statement, appendix 1-4 (Logistics Centre) [APP-410]; Paragraph 3.4.22 explains that the architectural design of proposed buildings and structures will complement their surroundings integrating with the landscape and reducing adverse visual effects.

11.2.4 Horizon confirm that the proposed 2.4m high perimeter paladin fencing around the Logistics Centre will be finished using a visually recessive or otherwise appropriate colour to mitigate potential adverse visual impact.

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Appendix A

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Figure 164: Suspended solids concentration (kg/m^3) an hour after the final dredge: Surface.

Areal extents of the increase above 0.61mg/L:
0.61 – 1mg/L = 14.8649ha
1 – 4mg/L = 23.0644ha
4 – 6.1mg/L = 4.4965ha
6.1 – 10mg/L = 3.703ha
>10mg/L = 14.7062ha

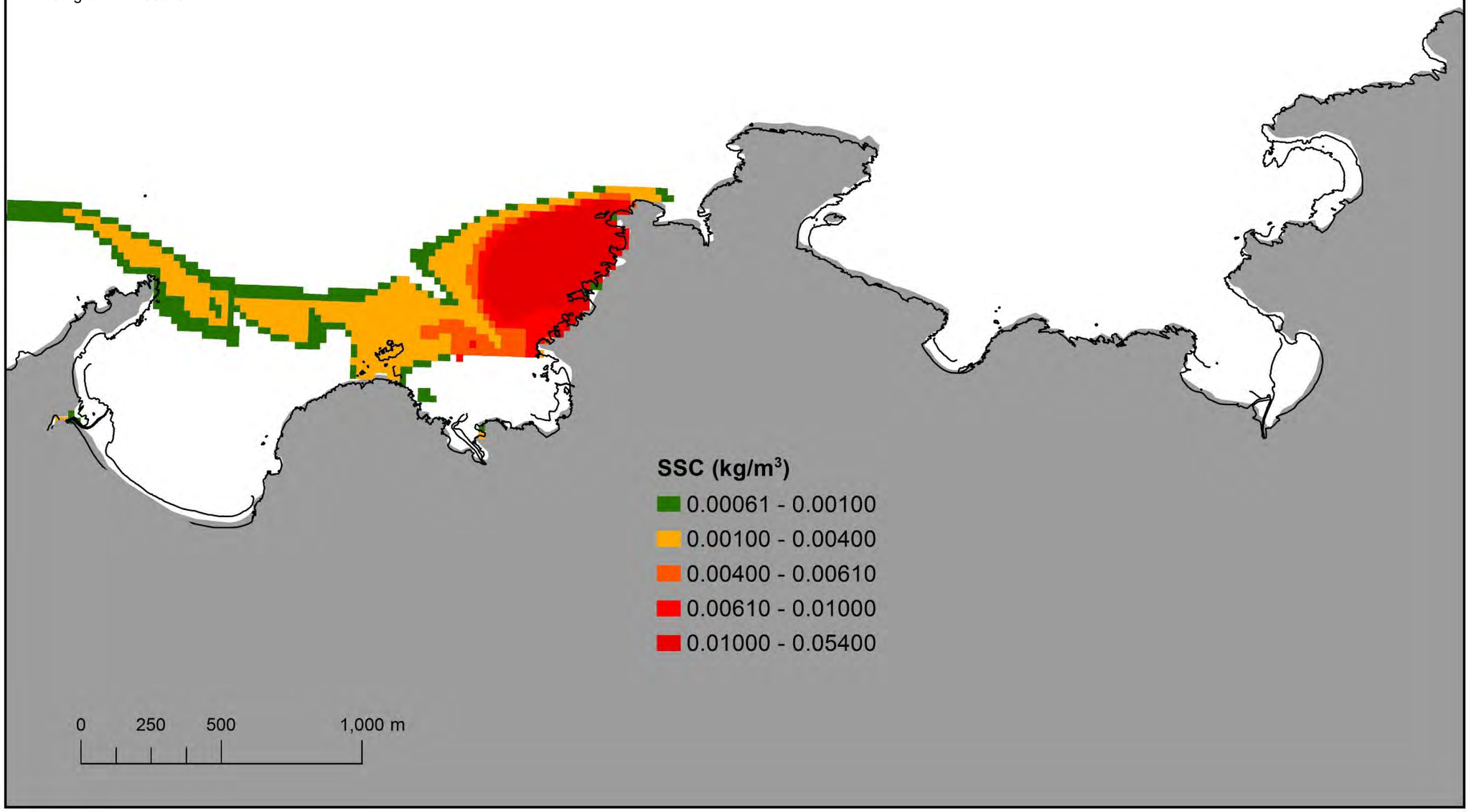


Figure 165: Suspended solids concentration (kg/m^3) an hour after the final dredge: Mid depth.

Areal extents of the increase above 0.61mg/L:
0.61 – 1mg/L = 13.1192ha
1 – 4mg/L = 34.0676ha
4 – 6.1mg/L = 4.3378ha
6.1 – 10mg/L = 6.348ha
>10mg/L = 17.8273ha

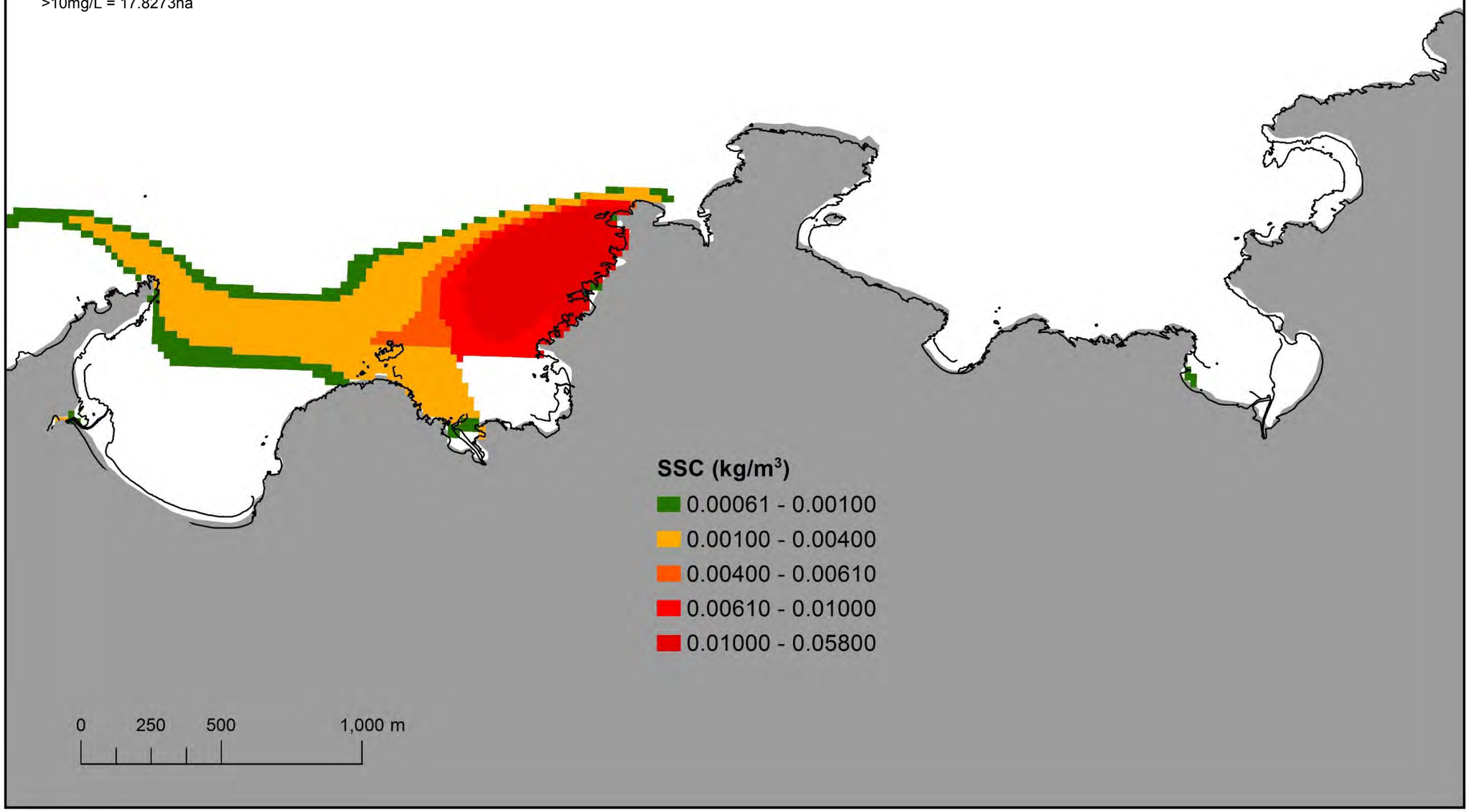


Figure 166: Suspended solids concentration (kg/m^3) an hour after the final dredge: Near bed.

Areal extents of the increase above 0.61mg/L:
0.61 – 1mg/L = 13.4366ha
1 – 4mg/L = 34.9669ha
4 – 6.1mg/L = 8.993ha
6.1 – 10mg/L = 10.58ha
>10mg/L = 10.3684ha

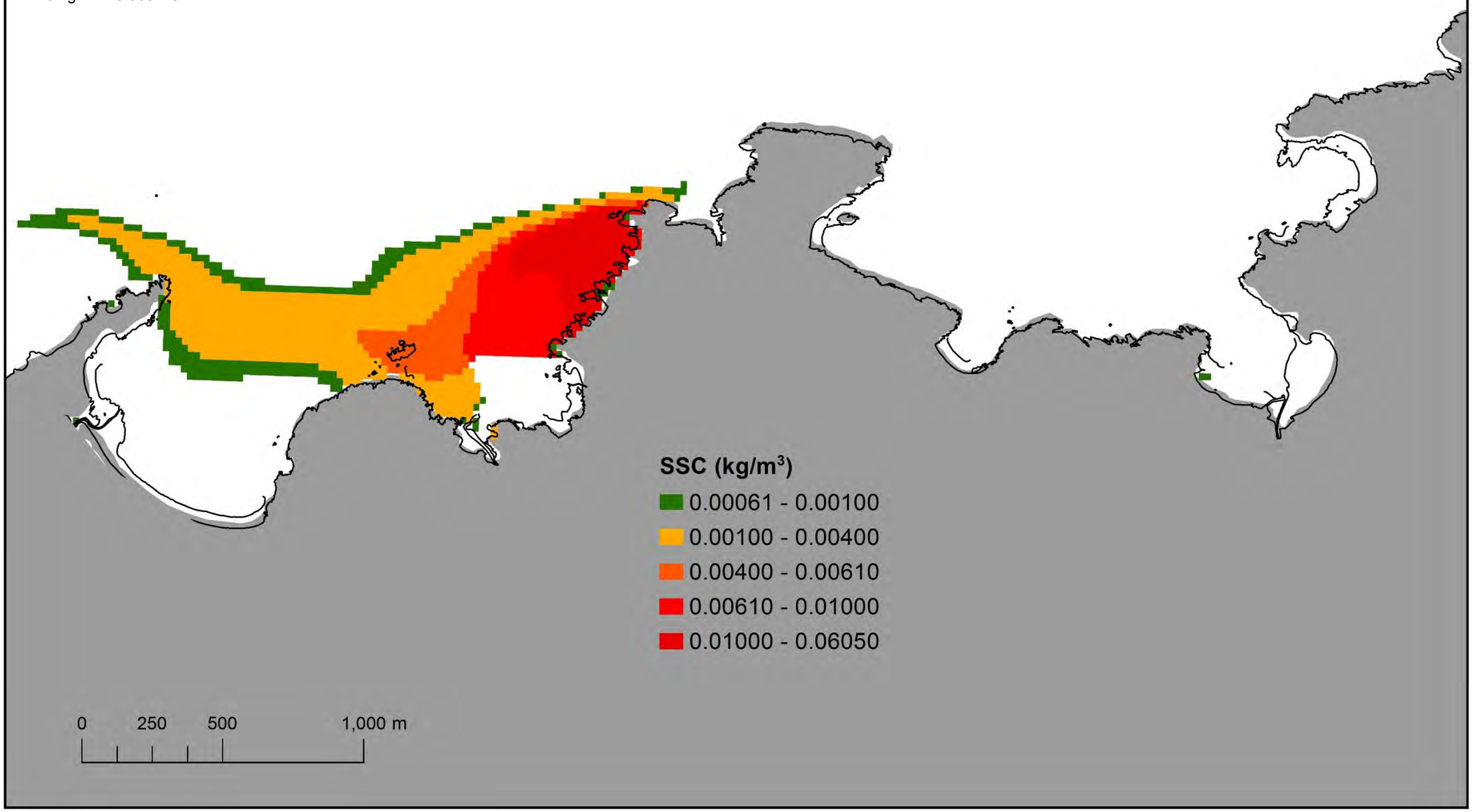


Figure 169: A worst case end of model simulation: a 1 in 2 storm with a 1 in 30 storm event part way through (no wind or waves) construction drainage suspended solids concentration (kg/m^3).

Areal extents of the increase above 0.61mg/L:
0.61 – 1mg/L = 1.2167ha
1 – 2mg/L = 1.1638ha
2 – 3mg/L = 0.1058ha
>3mg/L = 0.1058ha

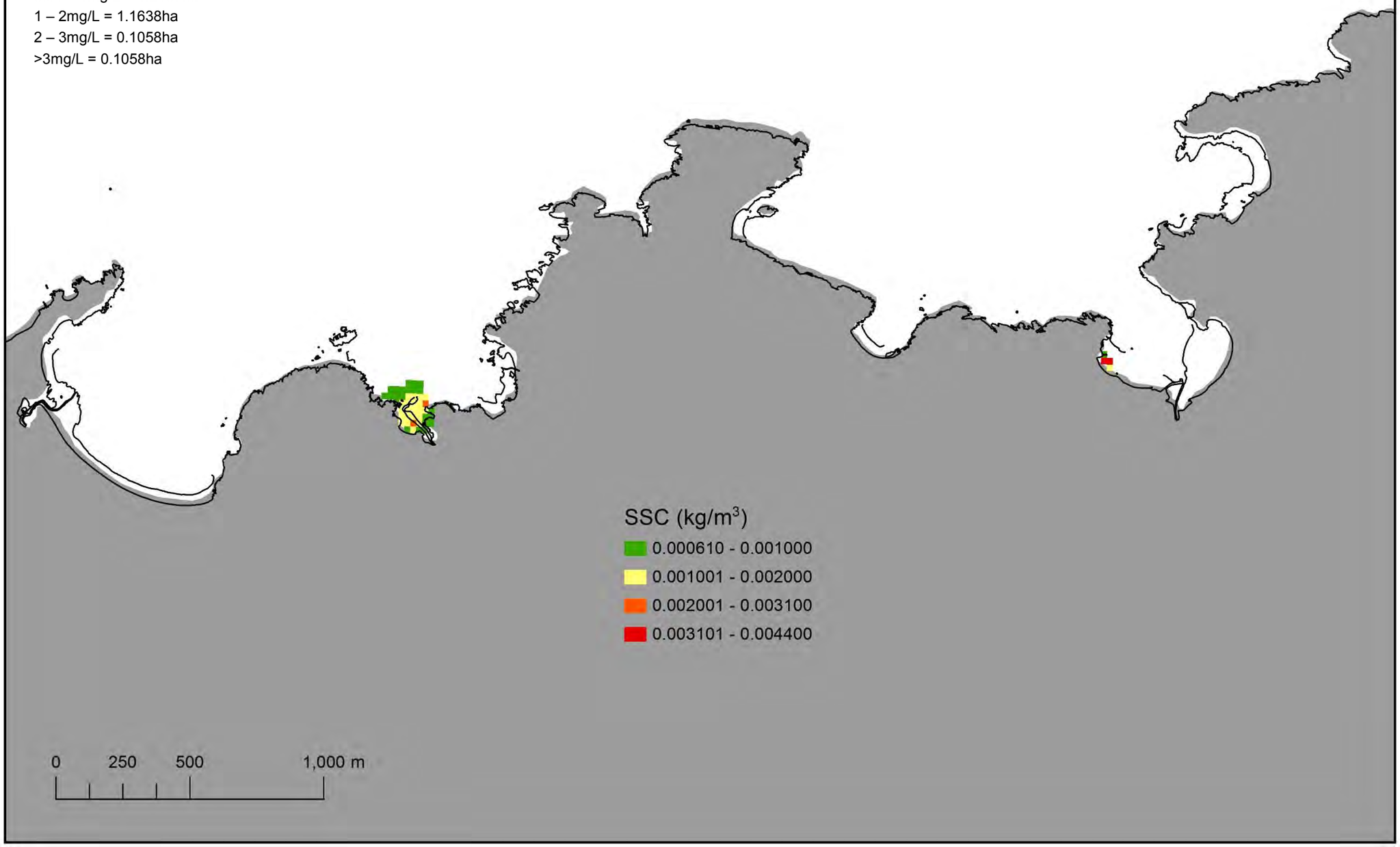
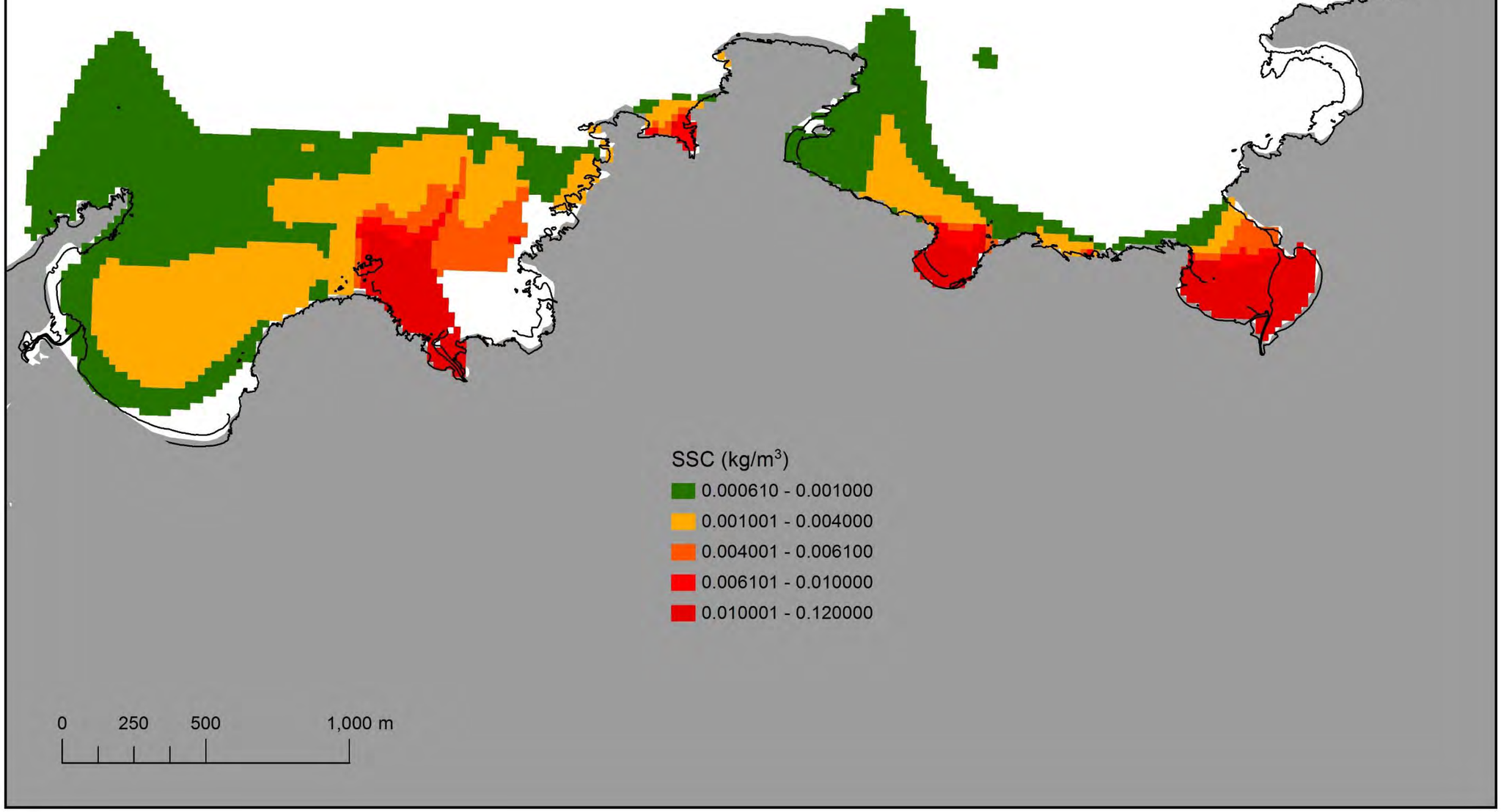


Figure 170: A worst case model simulation: part way through model simulation at the end of a 1 in 30 storm event part way through (no wind or waves) construction drainage suspended solids concentration (kg/m^3). Blanked out area represents the main cofferdam area.

Areal extents of the increase above 0.61mg/L:
0.61 – 1mg/L = 88.5017ha
1 – 4mg/L = 55.8095ha
4 – 6.1mg/L = 11.109ha
6.1 – 10mg/L = 4.6023ha
>10mg/L = 20.7368ha



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Appendix B

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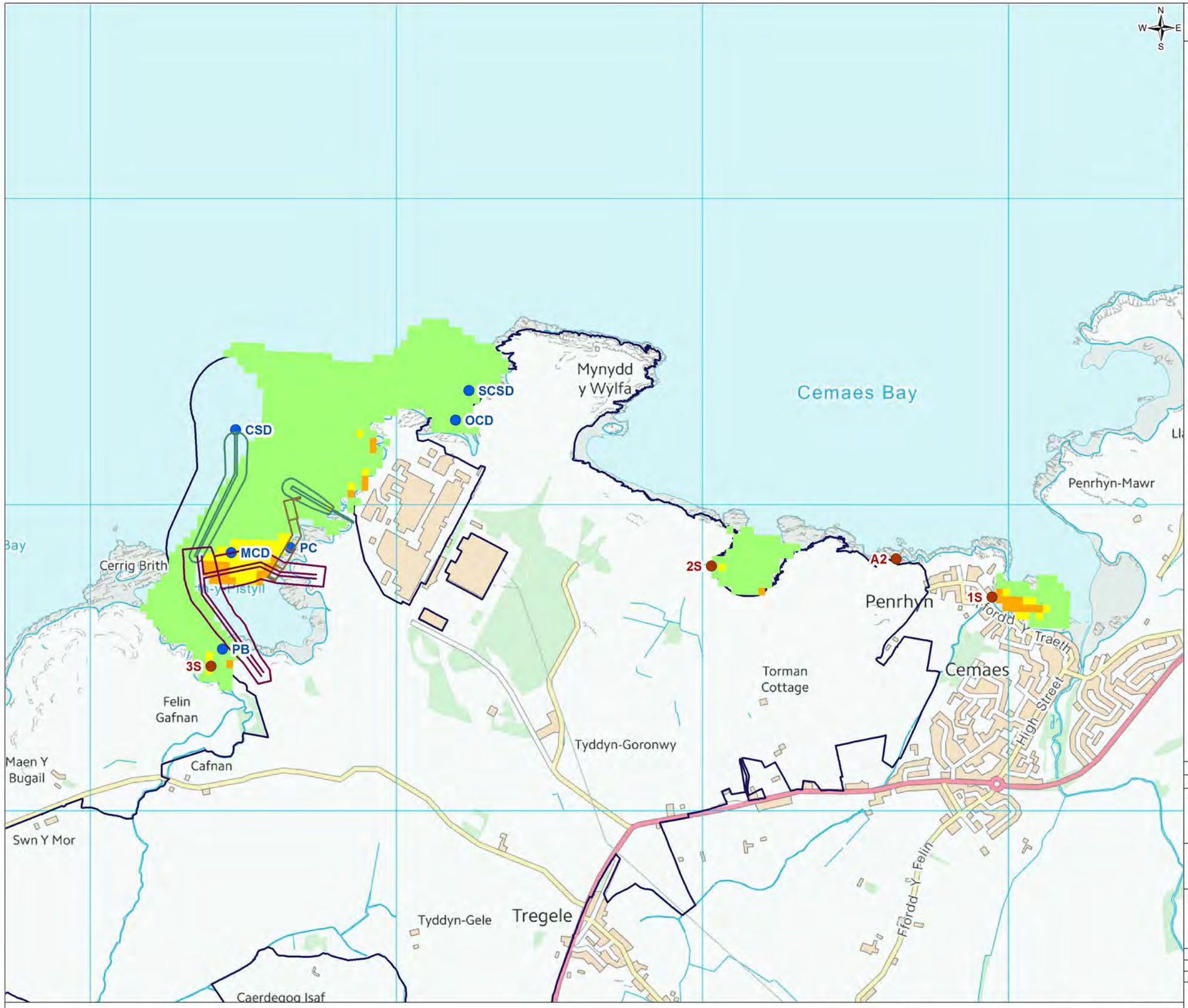
FIGURE A-WR-1-82_1a



Legend

- Wylfa Newydd Development Area
- Breakwaters
- Marine off-loading facility
- Temporary cofferdam and causeway
- Marine outfall point
- Marine discharge point (via surface water discharges)

Suspended solids concentration

- >0.61mg/L - 6.1mg/L
- >6.1mg/L - 10.0mg/L
- >10mg/L - 100mg/L
- >100mg/L

Notes:
CSD: Construction sewage discharge
MCD: Main cofferdam dewatering
OCD: Outfall cofferdam dewatering
SCSD: Site campus sewage discharge (Dŵr Cymru Welsh Water)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	AUG 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: SUSPENDED SOLIDS CONCENTRATION AT MID DEPTH RESULTING FROM DREDGING AND LAND DRAINAGE

Scale @ A3	1:12,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO80AG_DCO_A-WR-1-82_1A

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Appendix C

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MEMO

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DATE:	14 March 2018
OUR REFERENCE:	18-0051/18.02479/RubFi
YOUR REFERENCE:	Email 08-03-2018 15:27:46 CET
AUTHOR:	R.C. Fijn *MSc.*
PROJECT MANAGER:	M.P. Collier *MSc.*
STATUS:	concept
QUALITY CONTROL:	drs. H.A.M. Prinsen

Review of the conclusions of the HRA Wylfa Newydd Power Station with respect to terns and noise effect

Goal

Royal HaskoningDHV are undertaking the HRA for a development in North Wales and approached Bureau Waardenburg to provide a memo containing a review of the conclusions of this HRA with respect to the section regarding terns and noise effects. This review includes Bureau Waardenburgs overall view on the validity of the assessment and its conclusions in relation to noise effects on terns. We were also asked to identify main areas of uncertainty where applicable. The following document contains our review, which is subsequently summarized in a conclusion.

Background

Royal HaskoningDHV are undertaking the HRA for the reconstruction of Wylfa Newydd Power Station in North Wales. The development is adjacent to the Anglesey Terns / Morwenoliaid Ynys Môn SPA, which comprises three breeding colonies and a large expanse of sea that has been identified as the main foraging area for the terns associated with these colonies. The nearest colony to the development is Cemlyn Bay, which holds large numbers of Sandwich Terns (>2000 pairs in recent years), as well as much smaller numbers of Common and Arctic terns.

The effects of the developments around Wylfa Newydd Power Station were described in an HRA. Identified effects of the development on tern species include changes in visual and acoustic stimuli, land-take (including seabed or intertidal), changes in marine water quality, changes in surface and ground-water hydrology, change in air quality, alteration of coastal processes and hydrodynamics, and physical interaction between species and project infrastructure. These effects have the potential to affect the population at the nesting colony (e.g. changes in air quality), within the supporting marine foraging habitats (e.g. changes in marine water quality or prey abundance, composition and distribution) or both at the colony and in their marine foraging habitats (e.g. changes in visual and acoustic stimuli).

Specifically, the visual and acoustic stimuli could affect the population as a result of either disturbance to breeding birds when they are present at the Cemlyn Bay colony (during pre-laying, or in attendance of nests or chicks), or disturbance to breeding birds from the colony when they are commuting or foraging in the marine environment. Disturbance to birds present at the colony could potentially reduce breeding success (e.g. by causing birds to fly up and temporarily leave nests or chicks unattended, making them more vulnerable to predation) and/or directly affecting colony attendance. Disturbance to birds foraging or commuting in the marine environment could reduce the available foraging habitat, foraging efficiency and/or increase energetic demands when commuting between the colony and foraging areas. All of these effects are described and assessed in the HRA.

Review
Below we've reviewed all of the sections regarding noise stimuli and terns.

10.3.8 – No comments, good representation of scientific evidence. One additional issue is that there are indications that higher disturbance levels might lead to higher rates of kleptoparasitism (Martínez *et al.* 2003, Dies & Dies 2005, [RD320], Collar *et al.* 2017) by, for example, Black-headed Gulls (to our knowledge also breeding at Cemlyn Bay). This would reduce the provisioning rate of chicks and thus also have an effect on survival.

10.3.9 – No comments

10.3.10 – True, but I am not aware of any Sandwich Tern colonies in the near vicinity of high levels of human disturbance apart from the former colony in Zeebrugge (inside a harbor, ~ 1000 m away from the nearest industrial activies) and on Texel (~300 m away from a road, with during the breeding season several groups of tourists and birdwatchers every hour).

10.3.11 – It might be useful to add that the current absence of Sandwich Terns in the harbour is due to the presence of foxes (and not the industrial noise, that is described in the document).

10.3.12 – No comments, good representation of scientific evidence.

10.3.13 – No comments, good representation of scientific evidence. Reference [RD320] can be added to “visits to the colony by research staff (e.g. [RD320]), and ….”. It might be worth adding that some parts of the Sandwich Tern breeding cycle are more prone to disturbance than others. See, our previous document: sensitivity to disturbance varies hugely throughout the breeding season. The most sensitive time is during colony establishment. Entire colonies won’t settle if continuous disturbance is present. Sensitivity is lower (although definitely not low) during the latter stages of incubation (e.g. the 10 days prior to hatching) as birds are very attached to their eggs during this stage. Sensitivity is again high during the hatching stage and early chick stage (up to 1 week after hatching). The sensitivity lowers (again it is not low) throughout the chick-rearing period.

10.3.14 – No comments, worthwhile addition in our view.

10.3.24 – No comments

10.3.25 – No comments

10.3.26 – No comments

10.3.27 – [RD32] needs to be [RD25]

10.3.28 – [RD32] needs to be [RD25]

10.3.29 to 10.3.38 – No comments

10.3.39 to 10.3.41 – No comments. The right conclusions are described taking the relevant literature into account. It might be worthwhile to check the reference to 80 dB(A) predictions for unconstrained situations, since these levels are much closer to the described 90 dB(A) threshold of bird responses in 10.3.39

10.3.42 to 10.3.53 – No comments.

10.3.54 – No comments

10.3.55 – No comments

10.3.56 – No comments

10.3.57 – No comments. The work of Jennifer Gill and some of the papers in a special issue of *Ibis* (2007) on human disturbance might contribute to this paragraph: http://onlinelibrary.wiley.com/doi/10.1111/ibi.2007.149.issue-s1/issuetoc

10.3.58 – No comments

10.3.59/60 – No comments. In our opinion the right conclusion and sufficiently substantiated in the paragraphs before this conclusion.

10.3.61 – 10.3.65 – No comments

10.3.82 – No comments

10.3.83 – 10.3.84 – No comments

10.3.85 – 10.3.88 – No comments

10.3.89 – I would suggest to add here that this is based on ***boat-based*** tracking and thus not tracking of individual birds with GPS-loggers.

10.3.90 – 10.3.104 – No comments

Suggestions above are in line with any potential suggestions for the other tern species (Common Tern: 10.3.255 – 10.3.325, Arctic Tern: 10.3.326 – 10.3.410, Roseate Tern: 10.3.411 – 10.3.418)

I would suggest again to add to the sections about tracking of Common and Arctic Terns that these also refer to *boat-based* rather than individual tracking.

Conclusion

The overall conclusion is that we found one shortcoming in the text of 10.3.27 and 10.3.28. Some potentially useful additions were made with regards to other paragraphs. In our view a valid and extensive assessment in relation to noise effects on terns has been produced and the correct conclusions are drawn.

References

Collar, S., Roby, D. D., & Lyons, D. E. (2017). Top-Down and Bottom-Up Interactions Influence Fledging Success at North America's Largest Colony of Caspian Terns (*Hydroprogne caspia*). *Estuaries and Coasts*, *40*(6), 1808-1818.

Dies, J. I., & Dies, B. (2005). Kleptoparasitism and host responses in a Sandwich Tern colony of eastern Spain. *Waterbirds*, *28*(2), 167-171.

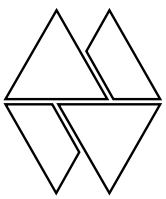
Martínez-Abraín, A., González-Solis, J., Pedrocchi, V., Genovart, M., Abella, J. C., Ruiz, X., ... & Oro, D. (2003). Kleptoparasitism, disturbance and predation of yellow-legged gulls on Audouin's gulls in three colonies of the western Mediterranean. *Scientia Marina*, *67*(S2), 89-94.

Questions regarding the content of this memo can be directed to the project manager of this contract, M.P. Collier.

Signed for publication: Team Manager Bureau Waardenburg

drs. H.A.M. Prinsen

Signature: REDACTED



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Appendix D

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1. Underwater noise modelling conducted for the Wylfa Newydd Project (which informed the Shadow Habitats Regulations Assessment (HRA))

Underwater noise modelling was conducted for the following construction activities which are potential Project generated sources of underwater noise:

- drilling;
- rock cutting;
- rock breaking;
- dredging; and,
- vessels.

The noise source levels used in the underwater noise modelling for these activities are outlined in **Table 1-1**.

Table 1-1 Summary of predicted source levels from underwater noise modelling

Noise source	Predicted source level
Rotary drilling (242 kW)	161.2 dB re 1 µPa (RMS) @ 1 m
Rotary drilling (570 kW)	164.9 dB re 1 µPa (RMS) @ 1 m
Percussive drilling	185.3 dB re 1 µPa (RMS) @ 1 m
Cutter suction dredging	176.1 dB re 1 µPa (RMS) @ 1 m
Rock breaking	208.6 dB re 1 µPa (Peak) @ 1 m
Rock cutting	172.0 dB re 1 µPa (RMS) @ 1 m
Large vessels	168 dB re 1 µPa (RMS) @ 1 m
Medium vessels	161 dB re 1 µPa (RMS) @ 1 m

It should be noted that the noise modelling was undertaken at a depth of 10m, as this represents the deepest proposed marine operations. This, therefore, represents a worst case for underwater noise propagation as noise attenuation is reduced in deeper waters; i.e. noise propagates further in deeper water than in shallower water.

The thresholds and criteria used in the underwater noise assessment for permanent auditory injury (Permanent Threshold Shift; PTS) (see **Table 1-2**) were based on Southall *et al*. (2007) as recommended at the time of preparing and writing the Shadow HRA.

Table 1-2 Southall *et al.* (2007) thresholds and criteria for PTS used as the basis of assessment in the Shadow HRA

Species	Potential impact	Criteria
Harbour porpoise (high frequency species)	PTS	215 dB re 1 μPa^2s (Non-pulsed (continuous) over a 24hr period) 198 dB re 1 μPa^2s (single and multiple pulses)
Dolphin species (mid frequency species)	PTS	215 dB re 1 μPa^2s (Non-pulsed (continuous) over a 24hr period) 198 dB re 1 μPa^2s (single and multiple pulses)
Seal species (pinnipeds in water)	PTS	203 dB re 1 μPa^2s (Non-pulsed (continuous) over a 24hr period) 186 dB re 1 μPa^2s (single and multiple pulses)

The results of the noise modelling and the maximum predicted impact ranges used in the Shadow HRA for drilling, rock breaking, rock cutting, dredging and vessels are presented in **Table 1-3**.

Table 1-3 Maximum predicted effect ranges for PTS in marine mammals using Weighted SEL criteria for drilling, rock breaking, rock cutting, dredging and vessels for continuous 24 hours exposure used in ES and HRA

Potential impact	Maximum predicted range		
	PTS in high-frequency cetaceans	PTS in mid-frequency cetaceans	PTS in pinnipeds (in water)
Rotary drilling	<1m	<1m	1m
Percussive drilling	2m	3m	41m
Rock breaking	25m	36m	450m
Rock cutting	<1m	<1m	4m
Dredging	<1m	<1m	5m
Large Vessels	<1m	<1m	<1m
Medium Vessels	<1m	<1m	<1m

2. Implications of the updated National Marine Fisheries Service (NMFS) (2018) guidance

To assess whether there could be any effect on the conclusions of the Shadow HRA based on using the NMFS criteria, a comparison has been made with recent noise modelling for similar activities based on the NMFS (2018) criteria for a different site. This indicative comparison has been based on data currently available, while the underwater noise modelling is updated using the NMFS (2018) criteria.

The noise source levels used for the NMFS (2018) noise modelling for the example site are outlined in **Table 1-4**.

Table 1-4 Summary of predicted source levels used for the NMFS (2018) underwater noise modelling

Noise source	Predicted source level
Dredging	186 dB re 1 µPa (RMS) @ 1 m
Drilling	179 dB re 1 µPa (RMS) @ 1 m
Rock placement	172 dB re 1 µPa (RMS) @ 1 m
Large vessels	171 dB re 1 µPa (RMS) @ 1 m
Medium vessels	164 dB re 1 µPa (RMS) @ 1 m

It should be noted that, for the example project, the NMFS (2018) modelling was undertaken based on a water depth of 45-55m. The deeper water depth compared to that relevant to the Wylfa Newydd Project results in more extensive noise propagation and, therefore, the predictions from the NMFS modelling example overestimate the effect that would be expected for the Wylfa Newydd Project.

The thresholds and criteria used in the NMFS (2018) noise modelling for PTS are presented in **Table 1-5**.

Table 1-5 NMFS (2018) thresholds and criteria for PTS

Species	Potential impact	Criteria
Harbour porpoise (high frequency species)	PTS	173 dB re 1 μPa^2s (Non-impulsive; continuous over a 24hr period)
Dolphin species (mid frequency species)	PTS	198 dB re 1 μPa^2s) (Non-impulsive; continuous over a 24hr period)
Seal species (pinnipeds in water)	PTS	201 dB re 1 μPa^2s (Non-impulsive; continuous over a 24hr period)

The results of the NMFS (2018) noise modelling and the maximum predicted impact ranges for drilling, rock placement, dredging and vessels at the example site are presented in **Table 1-6**.

Ranges smaller than 100m (cumulative) have not been determined in the NMFS criteria and, therefore, it is not possible to define predicted effect ranges for distances below 100m.

However, at the modelled noise levels, any marine mammal would have to remain in close proximity to the source continuously for 24 hours to be exposed to levels sufficient to induce PTS, according to the NMFS (2018) criteria. For most hearing groups, the predicted noise levels are low enough that there would be a negligible risk of PTS.

Table 1-6 Maximum predicted effect ranges for PTS in marine mammals using Weighted SEL criteria for drilling, rock placement, dredging and vessels for continuous 24 hours exposure based on NMFS (2018) for a different site

Potential impact	Maximum predicted range		
	PTS in high-frequency cetaceans	PTS in mid-frequency cetaceans	PTS in pinnipeds (in water)
Drilling	<100m	<100m	<100m
Rock placement	<100m	<100m	<100m
Dredging	<100m	<100m	<100m
Large Vessels	<100m	<100m	<100m
Medium Vessels	<100m	<100m	<100m

3. Comparison of the assessment of the potential impacts on marine mammals

The potential number of marine mammals that could be at risk of PTS was assessed in the Shadow HRA based on the maximum number of individuals that could be present in the maximum impact area, put into the context of the relevant reference population (**Table 1-7**). These results have been compared to the worst-case scenario based on the NMFS (2018) criteria and modelling for the example site (**Table 1-8**).

Despite using a worst-case potential impact range of less than 100m (or <0.1km; equating to an area of <0.031km^2) compared to the sub 1m scale modelled for the Shadow HRA, and taking into account the differences in source levels, water depth and criteria, the relative increase in the number of individuals and percentage of the reference populations that could be affected does not indicate any significant change in the potential risk of PTS in harbour porpoise, bottlenose dolphin, grey seal and harbour seal; based on noise modelling that uses the NMFS (2018) criteria compared to that presented in the ES and HRA. Consequently, the conclusion of no adverse effect on the integrity of the cSAC/SCIs and SACs assessed in the Shadow HRA for harbour porpoise, bottlenose dolphin, grey seal and harbour seal is unchanged.

Table 1-7 **Estimated number of harbour porpoise, bottlenose dolphin, grey seal and harbour seal that could be at risk of PTS, based on the maximum area of effect and maximum estimated density at Wylfa Newydd Development Area and Disposal Site during construction (result reported in the Shadow HRA)**

Potential Impact	Estimated maximum number of individuals					
	Drilling	Rock breaking	Dredging		Large vessels	
	Wylfa Newydd Development Area	Wylfa Newydd Development Area	Wylfa Newydd Development Area	Disposal site	Wylfa Newydd Development Area	Disposal site
PTS in harbour porpoise[1]	0.00004 (<0.00001%)	0.003 (<0.00001%)	0.000004 (<0.00001%)	0.000008 (<0.00001%)	0.000004 (<0.00001%)	0.000008 (<0.00001%)
PTS in bottlenose dolphin[2]	0.000017 (<0.00001%)	0.0014 (0.00035%)	0.000001 (<0.00001%)	0.000001 (<0.00001%)	0.000001 (<0.00001%)	0.000001 (<0.00001%)
PTS in grey seal[3]	0.004 (0.00006%)	0.15 (0.0025%)	0.00002 (<0.00001%)	0.00001 (<0.00001%)	0.0000007 (<0.00001%)	0.0000004 (<0.00001%)
PTS in harbour seal[4]	0.00001 (0.00003%)	0.0005 (0.001%)	<0.00001 (<0.00001%)	<0.00001 (<0.00001%)	<0.00001 (<0.00001%)	<0.00001 (<0.00001%)

1 Reference population = 104,695 individuals; maximum estimated density at Wylfa Newydd Development Area (1.26/km^2) and Disposal Site (2.534/km^2)
2 Reference population =397 individuals; maximum density at Wylfa Newydd Development Area and Disposal Site (0.344/km^2)
3 Reference population = 6,000 individuals; maximum estimated density at Wylfa Newydd Development Area (0.24/km^2) and Disposal Site (0.13/km^2)
4 Reference population = 50 individuals; and maximum estimated density at Wylfa Newydd Development Area (0.0009/km^2) and Disposal Site (0.0007/km^2)

Table 1-8 **Estimated number of harbour porpoise, bottlenose dolphin, grey seal and harbour seal that could be at risk of PTS, based on the maximum area of effect and maximum estimated density at Wylfa Newydd Development Area and Disposal Site during construction (based on NMFS (2018) criteria)**

Potential Impact	Estimated maximum number of individuals					
	Drilling	Rock placement	Dredging		Large vessels	
	Wylfa Newydd Development Area	Wylfa Newydd Development Area	Wylfa Newydd Development Area	Disposal site	Wylfa Newydd Development Area	Disposal site
PTS in harbour porpoise[1]	0.04 (0.00004%)	0.04 (0.00004%)	0.04 (0.00004%)	0.08 (0.00008%)	0.04 (0.00004%)	0.08 (0.00008%)
PTS in bottlenose dolphin[2]	0.01 (0.0025%)	0.01 (0.0025%)	0.01 (0.0025%)	0.01 (0.0025%)	0.01 (0.0025%)	0.01 (0.0025%)
PTS in grey seal[3]	0.007 (0.00012%)	0.007 (0.00012%)	0.007 (0.00012%)	0.004 (0.00007%)	0.007 (0.00012%)	0.004 (0.00007%)
PTS in harbour seal[4]	0.00003 (0.00006%)	0.00003 (0.00006%)	0.00003 (0.00006%)	0.00002 (0.00004%)	0.00003 (0.00006%)	0.00002 (0.00004%)

1 Reference population = 104,695 individuals; maximum estimated density at Wylfa Newydd Development Area (1.26/km^2) and Disposal Site (2.534/km^2)
2 Reference population =397 individuals; maximum density at Wylfa Newydd Development Area and Disposal Site (0.344/km^2)
3 Reference population = 6,000 individuals; maximum estimated density at Wylfa Newydd Development Area (0.24/km^2) and Disposal Site (0.13/km^2)
4 Reference population = 50 individuals; and maximum estimated density at Wylfa Newydd Development Area (0.0009/km^2) and Disposal Site (0.0007/km^2)

Appendix E

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Introduction

This document provides Horizon's response to the Schedule 5 Notice issued by NRW on 17/10/2018 under paragraph 4 of Part 1 of Schedule 5 of the Environmental Permitting Regulations (England and Wales) 2016. The Notice requires further information on Horizon's Combustion Activity Environmental Permit application PAN-002429.

NRW's requests for information are reproduced in the tables below (shown in bold text), together with Horizon's response.

Air Dispersion Modelling & Assessment

NRW requirement 1: Section 2.3, p9. "EDG A and EDG B have their stacks routed up the sides of the reactor building, the first configuration assumes the stacks are 3m above the reactor building's parapet, which in turn is 7m lower than the reactor building dome." Please provide evidence that this configuration represents a worst-case scenario in terms of building downwash effects.

NRW requirement 5: Table 2.4, p20. Please state how many building roofs associated with stack emissions are not flat but modelled as flat roofs. Please provide detailed information of building roof features (i.e., dome, slope) and any sensitivity analysis that has been undertaken to consider the impact of these roof features in terms of building downwash effect.

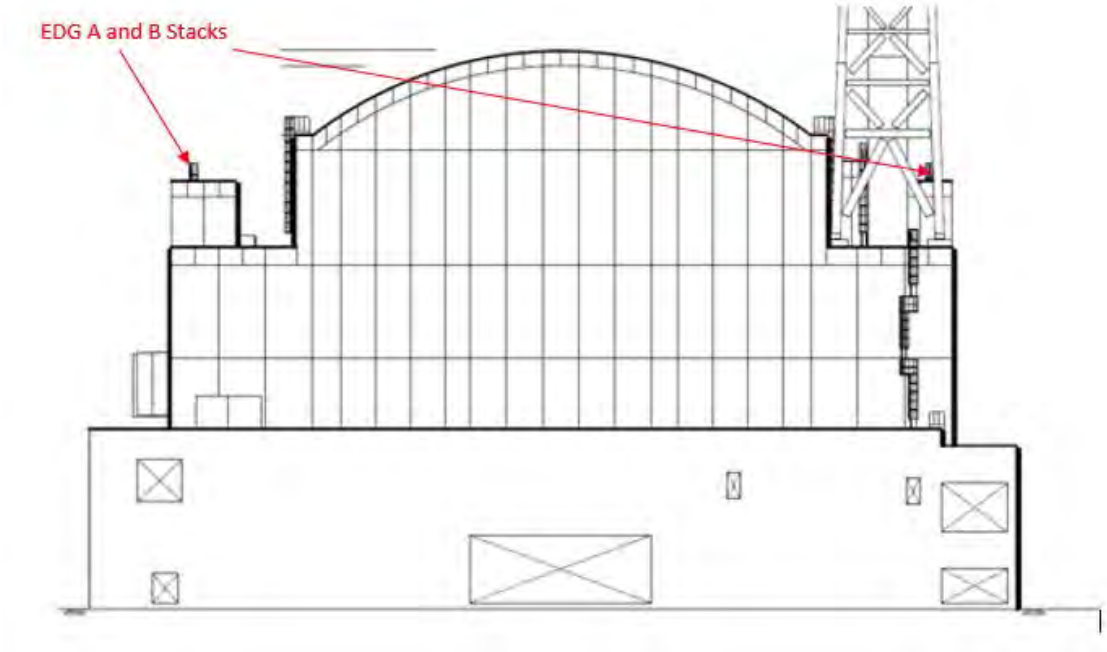
NRW requirement 8: Table 2.2, p10. Please provide the detailed information of the shape and dome features on the roof of 1-101 and 2-101 buildings. Please provide any sensitive analyses undertaken in terms of the selection of roof height (from parapet to apex), selection of main buildings (i.e., 49 m buildings). Please provide evidence that the proposed approach (moving stack away from the wall) would not affect plume-trapping in the building downwash. Also, please provide evidence that the selected scenario (i.e. main building, building height and moving stack) has reflected a worst-case prediction in terms of building downwash effect.

Horizon's Response

The reactor buildings (1-101 and 2-101) are the only modelled buildings which do not have flat roofs. The reactor building is a tiered building arrangement with a domed roof. EDGs A and B are installed in buildings immediately adjacent to the reactor building. However, due to this proximity, it is possible to route their stacks up the side of the reactor building, using the reactor building walls as support. It is not possible to do so for Unit 1 and Unit 2 EDG C since these EDGs are installed in a building which is a greater distance from the reactor building.

The stacks for EDGs A and B discharge 3 m above a parapet on the second tier of the reactor building, resulting in the stacks discharging approximately 4 m below the apex of the reactor dome (the top of the parapet is 7 m below the apex of the dome). Figure 1 visually depicts the tiered structure of the reactor building and the location of the stacks for EDGs A and B.

Figure 1 Reactor building profile



This arrangement does present certain challenges for the modelling assessment since, due to the number of other buildings included in the model, it is not possible to model each tier of the reactor building without exceeding the maximum number of buildings allowed by the model. Furthermore, the dispersion model can only model flat roofs. Consequently, certain simplifications to the building and stack representation in the model have been made by necessity, such as modelling the reactor building as a single tiered, flat roof building. However, where simplifications have been made, these aim to produce a more conservative estimate of the resulting impact.

With the assumption of a single tiered building, a scenario needs to be avoided whereby the stack(s) discharge within the building itself, since the model will not run where this is the case. Consequently, various options were considered to represent the reactor building and discharge points for EDGs A and B in the model. These options can be visualised in Figure 2.

- Option 1: EDGs discharge from their actual stack location and height, reactor building height modelled as the dome apex height, reactor building width taken as the width of the third tier;
- Option 2: EDGs discharge from their actual stack location and height, reactor building height modelled as the height of parapet, reactor building width taken as the width of the bottom tier;
- Option 3: EDGs discharge from their actual stack location but at a height 3 m above the height of the apex of the dome, reactor building height modelled as the dome apex height, reactor building width taken as the width of the bottom tier; and
- Option 4: EDG discharge location moved such that it is immediately adjacent to the modelled building, EDG discharge height modelled as 3 m above the parapet level, reactor building height modelled as the dome apex height, reactor building width taken as the width of the bottom tier.

Figure 2 Visualisation of various modelled reactor building and discharge location options

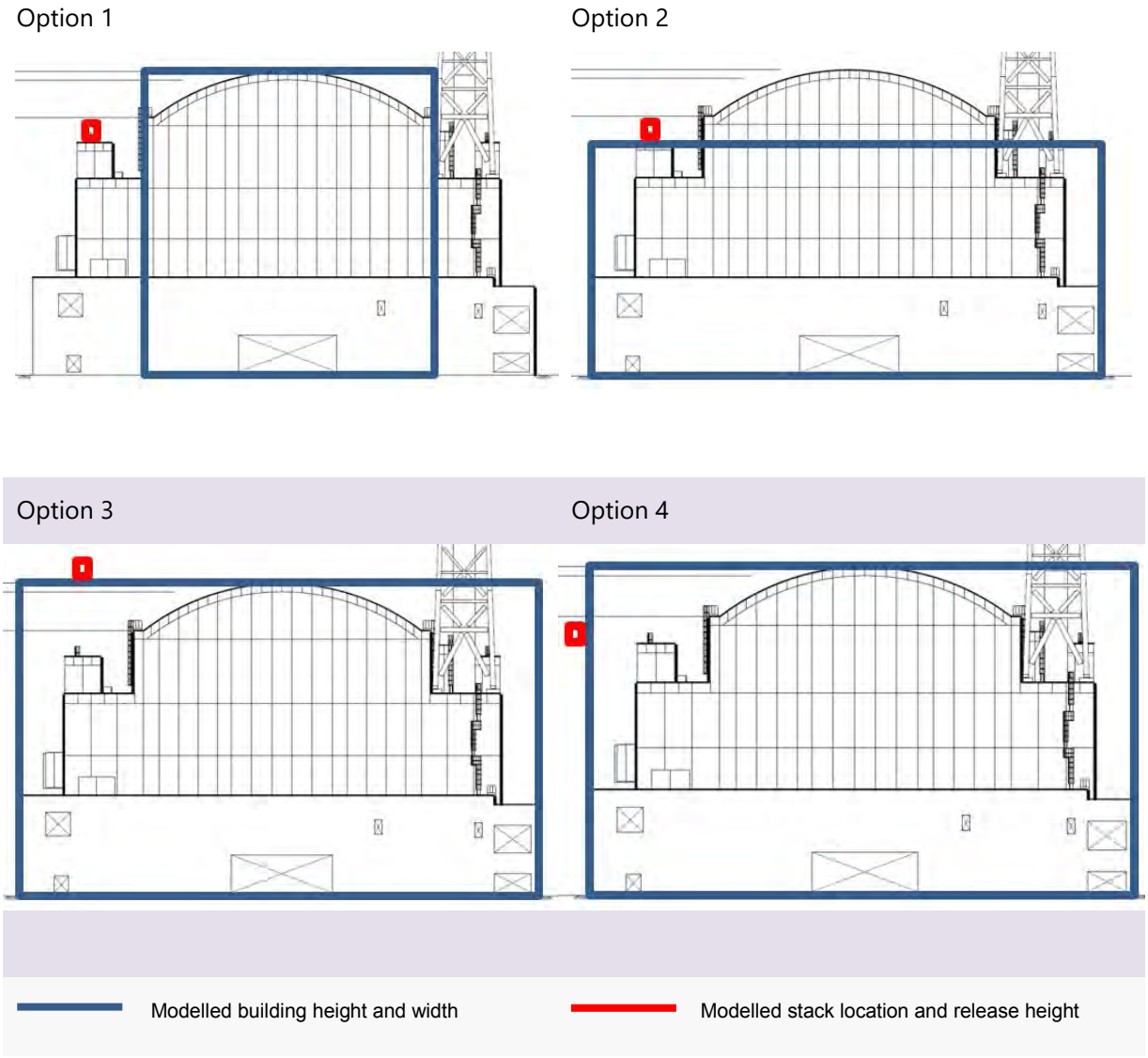
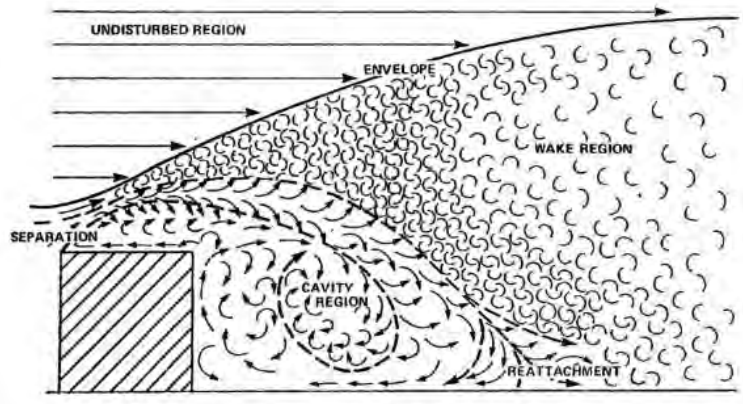


Figure 3 presents the predominant flow characteristics near a building. The flow regime primarily consists of a recirculating flow region ('cavity') in the immediate lee of the building and a turbulent wake further downwind. The largest impact on ground level concentrations occurs when a plume is fully entrained within the cavity region, as the plume is rapidly advected towards ground level in this recirculation zone. The residence time in the cavity determines the ground level concentration.

Figure 3 Flow regions in the vicinity of a building



In terms of building downwash, such effects will be enhanced with:

- Increasing building height for a fixed stack height;
- Increasing proximity of the stack to the building;
- Increasing building 'bulk'/projected width; and
- Emissions being discharged directly within the cavity zone.

Option 1 would contribute to enhancement of building downwash due to the height of the modelled building relative to the release height and due to the stack discharging directly within the modelled building cavity region with a high likelihood that a significant proportion of the plume will become entrained. However, the cavity length and mean residence time within the cavity will be reduced as a result of a smaller building 'bulk'/projected width.

Option 2 increases the building bulk, but the stack no longer discharges directly within the cavity, so the fraction of material entrained will reduce, whilst the reduced building height compared to Option 1 also reduces the cavity residence time.

Option 3 increases the building height and would result in a larger cavity length, but the release is unlikely to be fully entrained, since it no longer discharges directly within the cavity. Furthermore, the actual height of the release has been artificially increased, which will result in lower model predictions outwith the building effects zone.

Option 4 maximises the building height and bulk such that it is considerably greater than the actual building volume and any of the other options considered. Whilst the stack location has been artificially moved by a small distance, its height remains consistent with the actual discharge height. Furthermore, the initial release occurs within the building cavity, which will result in near full entrainment in the cavity, whilst the residence time in the cavity is increased due to the larger than actual building dimensions. From a building downwash/plume trapping perspective, this option represents the worst-case option of any option considered and would exaggerate the actual downwash effects of the reactor building.

The shift in the stack location is negligible compared to the distance to the nearest receptor, notwithstanding the fact that the stacks are moved closer to the nearest receptor (in the order of ~5%) so, therefore, present a more conservative estimate of impact. Artificially increasing the stack height as per Option 3 represents a 19% increase in stack height from the actual

case and would have a much larger influence (reduction) on the predicted ground level concentration.

Consequently, for the factors discussed above, Option 4 is considered to represent the most conservative representation of the reactor building in terms of potential downwash effects. This is the option used in the modelling assessment.

ADMS itself includes further simplification of the modelled buildings. The model does not explicitly model the effects on atmospheric flow from each individual building. Rather, it agglomerates all modelled buildings in to a single, effective building. The length and width of this effective building changes for each source and for each hour of meteorological data, whilst its height is based on the height of the user-defined 'main' building.

The selection of the main building should not be based solely on whichever building is tallest. For example, a tall, narrow building is unlikely to have considerable effects on an emission source a significant distance away compared to a slightly shorter, but wider building located immediately adjacent to the emission source.

Based on **nominal dimensions** the reactor building is the tallest on-site building and one of the largest in terms of overall building footprint. As the EDGs discharge adjacent to the reactor building, this building will have the greatest actual influence on downwash effects. Consequently, the reactor building was defined as the 'main' building for all EDG stacks.

It should, however, be highlighted that the model is not based solely on nominal dimensions but a combination of minimum, nominal and maximum dimensions as dictated by the parameter plan (further discussion on nominal, minimum and maximum dimensions of the parameter plan is provided in paragraph 2.1.22). Consequently, the tallest and largest footprint modelled building, other than the reactor building, is the turbine building (1-108 and 2-108) which is 49 m tall based on maximum dimensions (it is shorter than the reactor building based on nominal dimensions and has the same height of the reactor building based on maximum dimensions). There are also other buildings located closer to the EDG stacks which have the same height as the turbine building but a smaller footprint.

These buildings have not been defined as the 'main' building for the simple reason that they only appear to be taller than the reactor building in the model because the reactor building has been modelled at its minimum height, whereas the other buildings have been included in the model based on their maximum height. The reactor building has been modelled at is minimum height, since the height of the EDG A and B stacks is directly related to the height of this building i.e., the design basis is that they discharge 3 m above the parapet so a lower height for the reactor building produces a lower release height for the EDG stacks. Consequently, modelling the minimum reactor building height results in a lower stack height and, hence, higher predicted impact (paragraph 2.1.29 demonstrates this is the case).

In an actual scenario where the turbine building is constructed based on its maximum height, it would be highly likely that the reactor building would also be constructed based on its own maximum height, since the parameter plan assigns a maximum height of 49 m to the entire reactor island polygon. The maximum height of the reactor building is also 49 m and it would once more be the dominant building influencing building downwash. Hence, it is a simple artefact of the model that other buildings appear taller than the reactor building, whilst conservatism has already been introduced in the model by defining the EDG stack heights based on the minimum reactor building height.

Notwithstanding any of the factors previously discussed, the buildings sensitivity analysis in Section 2.15 of the air dispersion modelling report demonstrates that, whilst long-term and short-term process contributions do increase when buildings are introduced to the model set up, the model itself is relatively insensitive to such considerations. This is likely to be due to the distance to the receptors, with the receptors located outside the building cavity zone where the largest impact on ground level concentrations will occur.

Despite the above, additional sensitivity analysis has been undertaken to ascertain how assumptions on assignment of the 'main' building might affect the conclusions of the assessment. The Commissioning Scenario A model was re-run with the turbine buildings defined as the main building for the EDGs instead of the reactor building. This was found to have a negligible effect on the maximum predicted 99.9th percentile hourly mean concentration at any receptor, with the modelled result changing by just 1.6%. The maximum impact at any receptor was actually found to decrease in the sensitivity case, reflecting the fact that it is not simply building height, but location relative to the stack and overall dimensions which affects how assumptions on the main building influences an assessment.

NRW requirement 2: Section 2.4, second bullet point, p10. Scenario B; emissions from three EDGs have different building-association and height, please provide evidence that the combination with the highest prediction was properly assessed.

Horizon's Response

Two separate source groups have been defined for Commissioning Scenario B – one source group for commissioning of the Unit 1 EDGs and a second for commissioning of the Unit 2 EDGs. The results reported in the assessment are the highest prediction from either source group for each individual receptor, i.e., one receptor result may be based on the Unit 1 source group result, whilst another receptor result may be based on the Unit 2 source group result.

With respect to which two of the three EDGs in each source group are modelled as being operational during Commissioning Scenario B, EDG C has been included in each source group, since this EDG has a stack height of 20 m compared to 37 m for EDG stacks A and B and, consequently, produces higher ground level impacts than a scenario where EDGs A and B are considered. The remaining choice between EDG A and EDG B has been made following analysis of which EDG contributes to the maximum predicted impact at any receptor in the routine testing scenario – that scenario includes each EDG as an individual source group and allows contributions from individual EDGs to be identified.

NRW requirement 3: Section 2.9, p18. Please provide more detailed information regarding the 'parameter plan' and provide evidence why, as the submitted report claimed, "it was considered that it was most appropriate to use the nominal lengths and widths for each building."

Horizon's Response

At DCO and EP application stage, the design of the plant is not fixed. In particular, building dimensions have been specified as nominal dimensions but, theoretically, could ultimately be constructed to any size between a defined minimum and maximum envelope. This is known as the 'parameter plan'. Table 1 presents how these parameters are defined with respect to building heights as an example.

Table 1 Parameter plan for building heights

Name	Nominal height (m)	Minimum height (m)	Maximum height (m)
1-101	44	41	49
1-102	25	20	49
0-104	42	35	49
1-105	14	9	49
1/2-107	33	27	38
1-108	42	37	49
0-109	21	20	49
1-110a	23	17	49
1-110b	23	17	49
1-110c	23	17	49
2-101	44	41	49
2-102	25	20	49
2-108	42	37	49
2-105	14	9	49
2-110a	23	17	49
2-110b	23	17	49
2-110c	23	17	49
218	20	17	25
249	20	18	22
204a	9	9	14
204b	9	9	14

It is not plausible to include the maximum lengths and widths of the buildings defined by the parameter plan in the model, since this results in buildings overlapping each other and, in some cases, results in stacks discharging within a building; such a scenario could, quite evidently, not occur in reality.

Consequently, the model was based on the nominal building length and widths of the parameter plan, since this would produce a more conservative estimate of building induced effects than modelling based on the minimum dimensions.

In most cases, the difference between the nominal and maximum building length and width is negligible. For example, there is only a difference of 5 m between the maximum building length and width and the nominal building length and width of the reactor building.

Furthermore, it is important to realise that, as previously discussed, the dispersion model does not explicitly model the effects of each individual building, with the model only considering the effects of a single, effective building on its predictions. Due to the modelled buildings covering a large geographic area, the modelled effective building is very large; in some cases, this has dimensions of ~ 200 m x 350 m. Consequently, changes to individual buildings in the order of ~5 m are likely to be within the footprint of the modelled effective building and would have minimal effect on the model prediction.

NRW requirement 4: Section 2.9, p18. Please provide evidence supporting the following statements. "Similarly, taller buildings will tend to produce higher ground-level concentrations from elevated sources, so the maximum height was used for buildings which act purely as obstacles. However, for buildings which are associated with sources, the first stack configuration has the stacks 3m above the top of the building, so in these cases the minimum building height was used. This is because having the emission at a lower height will have a greater impact on ground-level concentrations than the building height. This building configuration is therefore judged to be most likely to produce the highest ground-level concentrations, within the bounds of the provided parameter plan". Please also provide evidence that the adopted approach represents a worst-case.

Horizon's Response

It is fundamental dispersion theory that:

- Reducing stack height results in an increase in maximum ground level concentrations, since the plume has less time to mix with ambient air before reaching ground level; and
- For a fixed stack height, increasing building height increases maximum ground level concentrations since it results in a larger cavity zone and longer residence time in the cavity.

Hence, adopting the minimum building height (and hence lowest stack height) for those buildings where stacks discharge from/adjacent to and which define the minimum acceptable stack height, whilst adopting the maximum building height for other buildings which act purely as obstacles and do not define the minimum stack height, would produce the most conservative estimate of impact of the various possibilities under the parameter plan.

To illustrate this quantitatively, the original model has been re-run for Commissioning Scenario A with all buildings and stack heights set to their maximum values under the parameter plan. The results of this additional sensitivity analysis are presented in Table 2. Results have been normalised by the value obtained from the scenario resulting in the highest ground level concentration. For example, a value of 0.85 would indicate the prediction from that scenario is 15% lower than the maximum prediction from any scenario.

Table 2 Model sensitivity to alternative parameter plan basis

Scenario	Normalised 99.79 Percentile 1-hour Mean NO_2 PC
As reported (minimum height for buildings where stacks discharge from or adjacent to, maximum height for all other buildings acting purely as obstacles)	**1.00**
Sensitivity case (maximum height for all buildings and stacks in the parameter plan)	0.77

Table 2 demonstrates that the original model scenario represents a considerably more conservative case with maximum 99.79 percentile hourly mean NO2 process contributions at any receptor 23% lower in the sensitivity case. This is a consequence of the model being more sensitive to changes in release height than to changes in building height. As such, whilst the building heights have increased, which would enhance downwash, the increase in stack height more than off-sets this effect.

NRW requirement 6: Section 2.13, p25. Appendix H used the Jacobs 2017 report; however, Jacobs 2015 was used for this section. Please provide a reason for this.

Horizon's Response

The stack height assessment preceded the full dispersion modelling report and was produced at an earlier stage of the assessment process. The stack height assessment simply forms the basis for defining the stack heights and does not represent a full assessment of operational emissions. Appendix H is the full dispersion modelling report produced after completion of the stack height assessment and represents the full, final modelling report and that upon which the air quality impact assessment in Appendix I has been made.

NRW requirement 7: p33-35. In the commissioning scenario the number of hourly exceedances modelled was 182 (which was the same as Appendix H). In the LOOP/LOCA scenario the number of hourly exceedances modelled was 1833, but Appendix H was 1651. Please explain why different hourly exceedances were predicted for the LOOP/LOCA scenario but not for the commissioning scenario.

Horizon's Response

This is an error in the Stack Height Assessment report. We have reviewed the model outputs and reports, and this appears to be due to a track change from an earlier version of the stack height assessment being inadvertently rejected in the final report during the document production process. The actual number of modelled exceedances from the LOOP/LOCA scenario is 1,651, consistent with the output from the full modelling in Appendix H.

NRW requirement 9: Figure 2.1, p17. There are discrepancies between Figure 2.1 – Locations of modelled receptor locations in Appendix G and Appendix H. Please clarify why some receptors are missing from the (north) Wylfa Newydd Development Zone in Appendix H.

Horizon's Response

These are the North Wales Coast Path seaward option receptors, an option that was initially considered when the stack height assessment model was being developed. However, the seaward option was not being taken forward when the full modelling report was produced and, consequently, these receptors were removed. The footnote to Figure 2.1 in Appendix G clarifies that, whilst these receptors are included in the stack height assessment models, they do not actually form part of the stack height assessment and full air quality impact assessment.

NRW requirement 10: Appendix A Section 3.1.1, paragraphs 2-4, p8 of 40. Please confirm that there will be no overlap between different testing scenarios.

Horizon's Response

This is confirmed.

NRW requirement 11: Appendix A, Section 3.1.2, paragraph 2, p9 of 40. Please confirm if there are any exceedances from individual runs of the EDG, BBG and ASG.

Horizon's Response

This type of operation reflects the routine testing scenario, where each individual EDG, BBG and ASG has been modelled as an individual source group, with the maximum result from any individual source group at each receptor location reported in the assessment. These results confirm there are no exceedances in the routine testing scenario and, hence, there are no exceedances from individual runs of the EDGs, BBGs and ASGs.

Noise Modelling & Assessment

NRW requirement 12: Source terms. Please explain why there are discrepancies between the noise and air quality modelling regarding source locations and heights

Horizon's Response

In order to address inevitable changes to the site design through its development process, a parameter-based approach has been used for the environmental modelling and assessments presented in the DCO and EP applications. To keep the development within a flexible defined envelope that can accommodate a reasonable level of change, maximum and minimum parameters (such as limits on height and location of buildings) have been set out for key buildings.

For each assessed environmental topic, parameters have been selected within the parameter envelope that are judged to represent a conservative assessment approach for that topic. For air quality and noise modelling, these parameters in relation to source height and building height are not identical. The effect of this is that the heights and locations of sources are different in the noise and air quality models.

The considerations relevant to selection of the most conservative parameters for air quality modelling are set out in the responses to questions 1-3, 5 and 8 above.

The noise modelling has represented a conservative assessment by using the following approach:

- When calculating noise break-out levels for the buildings containing noise sources, the maximum dimensions from the parameter envelope for each building have been used. This results in the highest potential sound value being used to represent the break-out levels for each building.
- Only the screening associated with the following buildings has been accounted for in the model: Reactor Buildings, Control Buildings, Turbine Buildings, Heat Exchanger Buildings and Service Building. As screening provided by all other buildings is not accounted for in the model, the calculated noise levels at receptors are higher than those that would be expected in practice.
- The screening associated with the Reactor Buildings, Control Buildings, Heat Exchanger Buildings and Service Buildings has been minimised by using the minimum dimensions from the parameter envelope for each building. This results in a lower degree of screening in the model than would be expected in practice, leading to an overestimate of noise levels at receptors.
- All rooftop point noise sources (e.g. the exhaust stacks, air intakes, cooling fans and AHUs) are modelled as being located at or above the maximum roof height. The adoption of the maximum roof height results in a marginally greater spatial separation between rooftop sources and receiver points, leading to marginally greater distance attenuation. However, it also results in a lower degree of screening in the model for these sources than would be expected in practice. As the reduction in screening has a greater effect on noise levels at nearby receivers than the change in distance attenuation, the adopted approach is conservative.

The northing and easting co-ordinates used for the rooftop point noise sources (e.g. the exhaust stacks, air intakes, cooling fans and AHUs) in the noise modelling are the nominal

locations from the design, rather the absolute 'worst case' for any particular receptor group. A model specific to each receptor group (i.e. with all point noise sources located at the closest point on the building roof to that receptor group) results in a negligible (i.e. less than 0.2 dB) difference in overall noise level when compared to the case using the nominal locations from the design. It was therefore considered proportionate to base the assessment on the point sources at the nominal locations for the following reasons:

- The scenario where all point noise sources are located at the closest point on any building roof to any particular receptor group is sufficiently far from any realistic design scenario to be discounted.
- The differences in overall noise level at receptors associated with the 'micro-siting' of all point sources around the building roofs are considered negligible, particularly in the context of the other conservative modelling approaches (e.g. the deliberate absence of screening associated with site buildings).
- The development of seven separate noise models was judged likely to introduce a disproportionate level of complexity into the assessment process.

NRW requirement 13: Table 4.6, p17. Please provide further detail as to how Receptor Group G is "linked to development". Please provide clarification regarding the status of the receptor when assessing the impact.

Horizon's Response

Receptor Group G represents Caerdegog Isaf, which comprises two properties, one of which is habitable, the other of which is not in a habitable condition (and is uninhabited).

Horizon has an 18-year lease on the inhabited property and will either rent the property to an Horizon employee or leave the property vacant for some or all of the lease period. The status of the property after the 18-year lease period has not currently been determined.

In the noise assessment that supports the EP Application, Receptor Group G is considered as a normal residential property with no commercial connection to the project.

NRW requirement 14: Appendix 2 – Source noise levels used in calculations. Please supply references or further explanation as supporting evidence for the reverberant level within the building, stack and intake source levels.

Horizon's Response

1. Reverberant noise level within Back-up Buildings and EDG Buildings

The dominant noise source within these buildings is expected to be the casing of the diesel generator in the case of the EDG Buildings, and the casing of the back-up generator in the case of the Back-up Buildings.

Data obtained from a leading manufacturer of generators* with similar electrical output rating, indicate that sound pressure levels at 1m from these casings are expected to be approximately

110 dB(A) without an engineered noise enclosure. This also corresponds with professional experience of measurements undertaken around similar units.

Using this level, the calculation sheets (in Appendix 1) based on BS12354-4 present the calculation of the reverberant sound pressure level within the EDG Building and Backup Buildings.

2. Reverberant noise level within Auxiliary Boiler Building

The dominant noise source within the boiler room is expected to be the forced draft fan providing combustion air to the boiler, as the combustion aspect of modern industrial boilers is known to not give rise to significant levels of noise. Sound pressure levels at 1m from fan casings are expected to be less than 80 dB(A), based on information contained in CIBSE HVAC Guide B51. Therefore, the assumption that 80dB(A) would be incident upon the entire internal envelope of the building is a conservative assumption.

3. Reverberant noise level within ASG Building

ASGs are to be located within high performance acoustic enclosures such that 85dB(A) is met internally at building walls. High performance acoustic enclosures on power generation projects are typically specified to achieve a sound pressure level of 80-85 dB(A) at 1m to control the noise exposure of employees working in their vicinity. This provides a strong indication that achieving this level is feasible using standard noise enclosure design techniques.

4. Stack sound power values

The design includes silencers in all exhaust systems. Data obtained from a leading manufacturer* of similar diesel generators to the proposed EDGs (i.e. those with similar electrical output rating) indicate that a stack sound power level of 95 dB(A) is achievable with high performance exhaust stack silencers. This is based on the following manufacturers data for the unsilenced exhaust sound power and exhaust silencer transmission loss.

	Octave band centre frequency, Hz									dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000	
Exhaust gas sound power	132	143	140	133	122	126	135	132	132	139
Stack silencer transmission loss	13	35	39	41	40	48	48	45	41	-
Silenced exhaust sound power	119	108	101	92	82	78	87	87	91	95

To account for potential variability of noise performance between commercial suppliers, a factor of +4dB has been added to the overall level. This factor has been selected based on professional experience of the variability of noise output between commercial suppliers. The EDG stack sound power level of 99 dB(A) used in the noise model should therefore be regarded as a conservative assumption.

[1] Noise and vibration control for HVAC : CIBSE guide B5. Chartered Institution of Buildings Services Engineers (CIBSE), London, 2002

Sound power levels for the stacks of the ASGs and BBGs have been derived by correcting the EDG stack sound power value using the relationship between stack sound power and electrical output (i.e. Lw α 10*$\log_{10}$ MW) set out in *Engineering Noise Control* by Bies & Hansen[2].

5. Air intake aperture sound power values

The design includes acoustic attenuators in all combustion air intake duct systems. Data obtained from a leading manufacturer* of similar diesel generators to the proposed EDGs (i.e. those with similar electrical output rating) indicate that an air intake sound power level of 94 dB(A) is achievable with standard acoustic attenuators. This is based on the following manufacturers data for the unsilenced air intake sound power and attenuator transmission loss.

	Octave band centre frequency, Hz									dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000	
Combustion air intake sound power	117	112	111	111	112	125	129	133	127	136
Attenuator transmission loss	2	6	14	19	28	47	54	46	35	-
Silenced intake sound power	115	106	97	92	84	78	75	87	92	94

To account for potential variability of noise performance between commercial suppliers, a factor of +4dB has been added to the overall level. This factor has been selected based on professional experience of the variability of noise output between commercial suppliers. Therefore, the EDG air intake sound power level of 98 dB(A) used in the noise model should be regarded as a conservative assumption.

Sound power levels for the air intakes of the ASGs and BBGs have been derived by correcting the EDG air intake sound power value using the relationship between air intake sound power and electrical output (i.e. Lw α 5*$\log_{10}$ MW) set out in *Engineering Noise Control* by Bies & Hansen.

* *As the manufacturer's data was provided in commercial confidence on other projects, Jacobs are not in a position to be able to identify the specific manufacturer / model.*

NRW requirement 15: Appendix 2 – Source noise levels used in calculations. The noise modelling input files show EDG stacks located 3m above the EDG building roofs (49m + 3m, total height 52m). This is contradictory to the air quality model where the stacks are located next to the EDG buildings and at a height of 37m. Please clarify and justify that this does not change predicted noise levels.

Horizon's Response

The response to Question 12 provides a general explanation of why point sources are located differently in the air quality and noise models.

To specifically answer this query, if the EDG stacks were modelled as being next to the EDG buildings in the direction of a particular receptor group at a height of 37m, the maximum

[2] D. A. Bies and C. H. Hansen, "Engineering Noise Control: Theory and Practice," 4th Edition, Spon Press, London, 2009

increase in overall noise level at the receptor group would be less than 0.1 dB, which is considered a negligible difference.

Shadow Habitats Regulations Assessment

NRW requirement 16: Please provide an up to date National Vegetation Classification (NVC) map of the habitats present within the Shingle ridge community interest feature of Cemlyn Bay SAC.

Horizon's Response

The NVC survey report and mapping [Wallace, H. & Jones, L. (2018). National Vegetation Classification mapping of Cemlyn Bay Shingle Bar. Final report to Royal Haskoning DHV] accompanies this Schedule 5 Response; this document has previously been informally shared with NRW.

NRW requirement 17: Please provide justification for the use of the less precautionary critical load for Nitrogen deposition at Cemlyn Bay SAC of 20KgN/ha/year used in table 7-26 p371 of the Shadow HRA (Appendix L) instead of the 8KgN/ha/year used in Table 26 of Appendix I, p79.

Horizon's Response

A technical note [Wylfa Newydd Power Station – Case Work towards the Shadow HRA Review of case work, literature, and critical load assessment, Jones & Bealy 2018] explaining the reasoning behind using the 20KgN/ha/year was included as Appendix G of the Shadow HRA (Appendix L, Volume B to the Combustion Activity Environmental Permit Application) and has been shared with NRW informally for comment. This report accompanies this Schedule 5 response.

The 8 KgN/ha/yr value was used in Appendix I as this was the Critical Load (CL) value provided by NRW that was initially used, on a precautionary basis, before the assessment which lead to the adoption of the 20kgN/ha/yr value. The assessment in Appendix I was not revised after the adoption of the 20kgN/ha/yr value as the nitrogen deposition screened out as not significant based on the lower CL value.

A further note [Nitrogen Inputs from Marine Sources (Jones & Bealey 2018)] accompanies this Schedule 5 response, this document has previously been informally shared with NRW.

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Appendix 1 – Calculation Sheets of the reverberant sound pressure level within the EDG Building and Backup Buildings

EDG Building Noise Calculation - BS12354-4

Calculation of SWL within EDG Building

Average Free field SPL at 1m from EDG (L_{Aeq}, dB)	110.0

	Length L	Width W	Height H
Estimated dimensions of turbine (m)	12	4	5
Measurement distance (m)	1	1	1
Dimensions of measurment surface (m)	13	6	7
Surface area of measurement surface (m^2)	380.0		
Conformal surface area correction (dB)	25.8		
Sound power of unit (L_{WA}, dB)	135.8		

	Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Example spectrum given in Bies and Hansen Table 11.17	-7	-6	-9	-10	-10	-12	-13	-17	**-4.8**
Spectrum scaled up to meet SWL value calculated above	133.6	134.6	131.6	130.6	130.6	128.6	127.6	123.6	**135.8**

Consideration of Reverberant Properties of EDG Building

				63	125	250	500	1000	2000	4000	8000
Wall α	6003	Block, 'Breeze' or 'Cinder'	8526m²	0.10	0.20	0.45	0.60	0.40	0.45	0.40	0.40
Open Area	-	-	0m²	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Floor α	5017	Concrete	1872m²	0.00	0.02	0.02	0.02	0.03	0.03	0.04	0.00
Ceiling α	2092	Plain steel ceiling planks	1872m²	0.00	0.25	0.15	0.10	0.08	0.05	0.05	0.00

Dimensions of turbine hall

Area S_{total}	12270m²
Length L	48m
Width W	39m
Height H	49m

	63	125	250	500	1000	2000	4000	8000
Mean absorption coefficient α	0.07	0.18	0.34	0.44	0.29	0.32	0.29	0.28
Room constant R_c	916	2696	6282	9455	5127	5904	5052	4723
Turbine Hall $K_{(rev)}$	-23	-28	-31	-33	-31	-31	-31	-30

Calculation of reverberant sound pressure level within EDG Building

	Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Turbine SWL	133.6	134.6	131.6	130.6	130.6	128.6	127.6	123.6	**135.8**
Reverberant SPL within Turbine Hall (diffuse)	110.6	106.6	100.6	97.6	99.6	97.6	96.6	93.6	**104.7**

Backup Building Noise Calculation - BS12354-4

Calculation of Backup generator SWL

Average Free field SPL at 1m from Backup generator (L_{Aeq}, dB)	110.0

	Length L	Width W	Height H
Estimated dimensions of turbine (m)	12	4	5
Measurement distance (m)	1	1	1
Dimensions of measurment surface (m)	13	6	7
Surface area of measurement surface (m^2)	380.0		
Conformal surface area correction (dB)	25.8		
Sound power of unit (L_{WA}, dB)	135.8		

	Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Example spectrum given in Bies and Hansen Table 11.11	12	11	9	9	6	9	13	19	**20.3**
Spectrum scaled up to meet SWL value calculated above	127.5	126.5	124.5	124.5	121.5	124.5	128.5	134.5	**135.8**

Consideration of Reverberant Properties of Backup Building

				63	125	250	500	1000	2000	4000	8000
Wall α	6003	Block, 'Breeze' or 'Cinder'	11322m²	0.10	0.20	0.45	0.60	0.40	0.45	0.40	0.40
Open Area	-	-	90m²	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Floor α	5017	Concrete	5762m²	0.00	0.02	0.02	0.02	0.03	0.03	0.04	0.00
Ceiling α	2092	Plain steel ceiling planks	5762m²	0.00	0.25	0.15	0.10	0.08	0.05	0.05	0.00

Dimensions of EDG Building

Area S_{total}	22846m²
Length L	86m
Width W	67m
Height H	37m

	63	125	250	500	1000	2000	4000	8000
Mean absorption coefficient α	0.05	0.17	0.27	0.33	0.23	0.25	0.22	0.20
Room constant R_c	1285	4695	8397	11265	6786	7460	6594	5760
$K_{(rev)}$	-25	-30	-33	-34	-32	-32	-32	-31

Calculation of reverberant sound pressure level within Backup Building

	Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1000	2000	4000	8000	
SWL within hall	127.5	126.5	124.5	124.5	121.5	124.5	128.5	134.5	**135.8**
Reverberant SPL within Hall (diffuse)	102.5	96.5	91.5	90.5	89.5	92.5	96.5	103.5	**104.4**

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