Wylfa Newydd DCO – EN010007

North Wales Wildlife Trust – interested party 20011639

Response to Examining Authority's written question and requests for information (EXQ1, issued 30th January 2019)

Introduction

The responses below have been compiled by North Wales Wildlife Trust on behalf of the eNGOs. In particular, National Trust and the RSPB have ratified the responses where the ExA has identified them as a respondent. This applies to questions Q2.2.3, Q2.5.3, Q2.5.4, Q2.5.5, Q2.5.6 and Q2.5.8

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Q2.2.1	**NWWT and the Applicant disagree over baseline data for fungi. In its WR [REP2-349] NWWT states that CHEG fungi cannot be recreated, how much CHEG does NWWT consider would be lost?**
	It is not possible to provide the ExA with an accurate figure of the area of the CHEG fungi resource to be lost due to implementation of the TWA at its proposed location. As indicated in NWWT's WR [REP2-349 ∞ 3.65 – 3.72] all the fungi surveys submitted by Horizon have been severely constrained, most recently in 2017: - "*There was no stock present throughout the survey period and the whole area had not been grazed recently, thus herbage length was not optimum for grassland fungi making recording difficult in places. Other adjacent inland areas had been disturbed for archaeological investigations or machinery movement and were unsuitable*." [APP-168, Area 2 with reference to Figure 3]. The attached aerial photograph shows the extent of the disturbance caused by the archaeological investigations which will have been combined with the lack of grazing [illustrated by photos in APP-168 and photos 1 – 3 and Appendix 1 REP2-349] NWWT has visited the TWA on 4 occasions between April 2016 and October 2017, but did not have the appropriate permissions from Horizon or resources to undertake detailed fungi surveys during that time. However, the observations taken during these visits give a clear indication that suitable soil structures supporting unimproved semi-natural grassland are present on the site widely [see discussion at REP2-349 ∞ 3.81 – 3.89]. It is highly probable that at some time in the past there has been attempts to agriculturally improve the TWA grassland, with over-sowing and potentially even some degree of ploughing on the deeper soils immediately to the north of the SSSI and around Haul Y Gwynt (see 1999 aerial in Appendix). However, most importantly there are large areas within the 16ha TWA site boundary [APP-409] that occur on thinner and/or undisturbed soils and exhibit characteristics which have – until the recent past – received the right type of management to support CHEG grassland. In NWWT's view appropriately structured grassland occurs from the coastline up to and including the rock outcrops, continuing further inland for a couple of tens of meters and along the shoulder of the slopes at the eastern end of the

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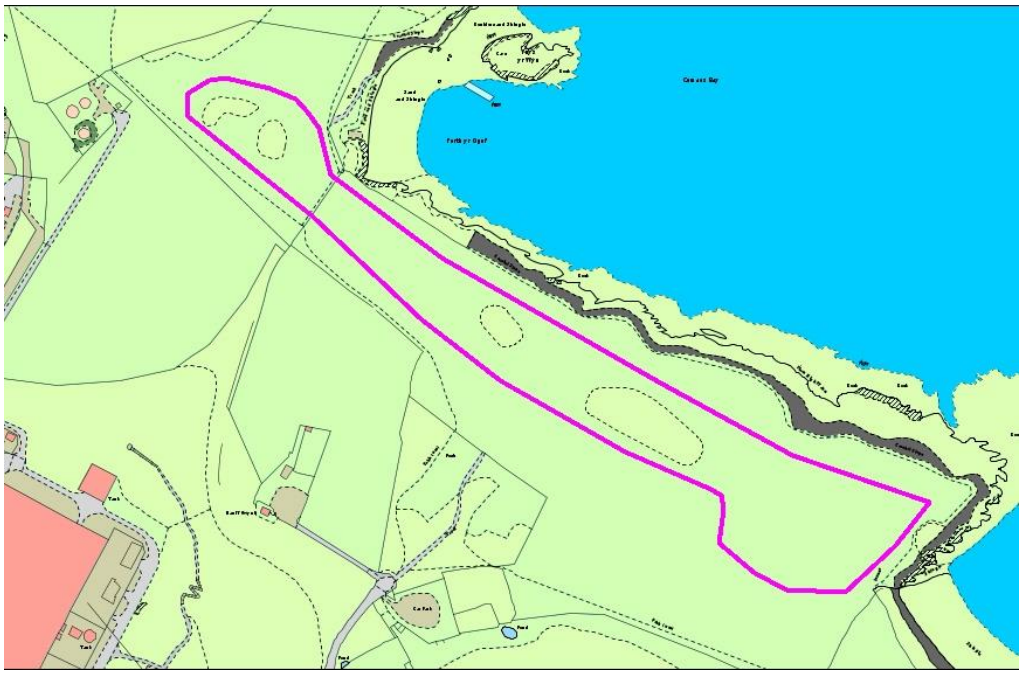
	TWA. A sequence of photos appended to this response demonstrates the condition of this sward with reference to its condition in June 2016. NWWT do not claim that the slopes immediately above the SSSI and within the boundaries of what was Haul Y Gwynt would be highly suitable for nationally significant fungi CHEG resource, but fungi assemblages of lesser conservation significance may occur within some of these areas. It has not been possible to accurately transpose the TWA site boundaries to NWWT's GIS, but the area that in NWWT's opinion has ***very high probability to support CHEG, by virtue of its structure and similarity to those areas where CHEG of national significance were recorded in 2017, is approx 4.6ha within the TWA boundary, which represents approx 28% of the total site***. This is shown indicatively below.  Approx area of high value soils highly suitable for CHEG (not to scale) It is recognised that CHEG will not occupy the whole of this area, as fungi occ at different densities across a suitable site and will occur at small patch sizes (ie colony size). This is similar to how any plant may be distributed within a field or woodland.
Q2.2.3	**While accepting the Applicant's response in [REP2-375] that they do not consider water level management at Cemlyn Lagoon as a required mitigation measure, the ExA would welcome the Applicant and NRW, the RSPB and other IPs views on the importance of such management to support conservation of the site.**
	Water management occurs at nature conservation sites to create advantageous water level conditions for several purposes: - – Flood prevention – lowering water levels – Maintenance of habitats – lowering or increasing water levels. In the case of Cemlyn Nature Reserve this is island breeding habitat.

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	Some form of water level management has occurred at Cemlyn Nature Reserve since the 1930s. Active water management of the tidal sea flows now occurs every year at the Reserve. No active management activities occur to the freshwater terrestrial inflow. The comments below were received directly from Chris Wynne (*pers comm.,* email 5.2.19), the Senior Reserves Manager for NWWT, and who was for several years (early 1990s) one of the Cemlyn seasonal wardens. He currently has managerial responsibility for Cemlyn Nature Reserve; its habitats and the seasonal wardens. His commentary describes the role of water level management at Cemlyn, its importance, how it operates and its susceptibility to change: - The **primary purpose** of water level management at Cemlyn is to protect the tern colony [Anglesey Terns SPA] as the islands are vulnerable to flooding on very high tides (especially spring tides), and /or in stormy summer weather especially if any of these conditions are combined with heavy rain. Intentional modification of sea flows has occurred since the original weir was built by Captain Hewitt in the 1930s. This arrangement failed at least twice resulting in the loss of the entire colony on several occasions in the late 70's and the new weir was constructed at this time to address this issue. Stop logs are manually put in the weir at the end of March/early April – just after the spring tide. They are removed after the terns have left, usually late August/ into September. Since the construction of the 'new' weir flooding of the islands during the breeding season has not occurred. However, extremely rarely the wardens have to close the weir completely to reduce inflow at spring tides during the breeding season, this is usually when combined with heavy rain. The wardens monitor water levels closely around each spring tide and if necessary. At other sites adapting water level controls to maintain a high enough water level is also a technique that may be used to ensure that a 'bridge' is not created to islands, which could allow easier access for terrestrially based predators [WR2-348 ∞ 3.212, 3.213]. In the case of Cemlyn Nature Reserve the lack of land bridge development is a consequence of managing the water levels to prevent flooding and as such is a secondary outcome. If the role of the weir was somehow by-passed NWWT would have to consider how we would respond. Without Wylfa Newydd, this by-passing could become a possibility as a result of lowering of the ridge through winter storms and/or sea level rise due to climate change. This lowering could mean that summer high spring tides flooded over the ridge or the fully closed weir dramatically raising water levels. As described above any combinations with storms or rainfall could exacerbate this. It is contended that Wylfa Newydd with the breakwater it is probable that by passing of the weir and/or changes to the shingle ridge would happen sooner, more dramatically and more catastrophically (for the terns) (Professor Kenneth Pye WR [REP2-316] and eNGO Biodiversity WR [REP2-348 ∞ 3.210 – 3.224]).

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	Modification/repair of the ridge has not been necessary [REP4-044 ISH item 3c]. Management intervention to resolve a problem has only occurred once in the last 20 years where a land bridge developed [REP2-348 ∞3.217]. The solution in that case did not involve alterations to water level management but instead the small island, which consistently had terrestrially based predation, was removed and compensated for by extending the main breeding islands. The active management of the weir takes account of the conservation objectives of Cemlyn Bay SAC and is agreed with NRW. However, increased by passing of the weir may create a more stable saline environment, which may affect the lagoonal brackish conditions [REP2-348 Chapter 4] and the conservation status of the SAC. As Horizon have now agreed to implement a 'monitor and adaptive management' approach to Esgair Gemlyn (due at D5), alteration to water level management may be one in a suite of options that might be drawn up to be implemented depending on results of the monitoring.
Q2.2.5	**In the LHMS [REP2-037] 4.2.2 states that a detailed landscape and visual baseline assessment has been carried out and the landscape maintenance is described in 4.2.34.** **1)How has the assessment taken into account the time taken for the scheme to establish?** **2)<u>Given the exposed/coastal nature of the environment, what assurances are there that planting will establish as quickly as the Applicant assumes</u>?**
	Whilst not directed at the eNGOs, the National Trust Warden (Gwynfor Owen) observes (in relation to item 2) that when he started with the National Trust in the 1980s he planted over 5,000 trees around the coastal estate. The trees had to be replanted as none of them survived past 5 years. Of the replanted stock many failed, but those that did survive did not thrive.
Q2.4.14	**IPs have expressed concern in relation to their ability to keep track of progress with the proposed development and any changes. Should a Register of Requirements be included in the DCO as for example, was included in the A14 Cambridge to Huntingdon Improvement Scheme Development Consent Order as per text below:** ***Register of requirements 22.— ……..***
	Whilst this question is not directed to the eNGOs, this approach is welcomed by NWWT. If NWWT have the resources/grant aid to engage post any DCO permission, if granted, this mechanism would be useful.
Q2.5.3	**During the Issue Specific Hearing on 10 January 2019, the Applicant suggested that declines in productivity at the Cemlyn Bay Tern colony could be linked to density dependent effects resulting from the overall increase in Tern numbers, and that this might also be the reason for terns taking back several food items at once. What are your comments on these points?**
	It is theoretically accepted that every ecosystem's habitat niches have a natural carrying capacity for a species and that as this is reached there may be effects on reproductive productivity via a variety of pathways.

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	It is, however, noted from the Cemlyn Warden's reports (2010 – 2018) that no detailed studies have been undertaken to investigate the productivity changes (either increases or decreases) between one season and the next at Cemlyn Nature Reserve. NRW present the data of both numbers and productivity (REP2-325 fig 6 and fig 7 respectively). The 5-year mean productivity figures will have taken a period of time to reflect the recovery from colony collapse in 2007/2008, whilst the yearly figures show considerable variability, there is nothing within NRW's evidence to suggest that the changes in productivity are related to density dependant pressures – they only state that this is an indication of vulnerability of the colony. For Horizon to conclude that adult terns delivering several food items at once is evidence either that the colony has/is reaching carrying capacity in terms of bird density/numbers or that this is indicative of declining productivity of the Cemlyn breeding tern colony is an unsubstantiated conclusion, which attempts to create a causal link between several potentially unrelated factors. Analysis of the literature may provide some alternative explanations to the occasional observations of changes in prey provisioning to chicks. Some of the possible explanations include: - – Cabot and Nisbet (2013, Terns, New Naturalist Series, pub. Collins) observe "*Although most terns catch fish no more than one at a time, a few birds sometimes bring several fish together. This behaviour has been reported for Sandwich, common, Arctic and roseate terns, but seems to be most characteristic of roseates*." – Increase in prey size is observed over the course of a season in order to provision the increased demand for food by larger chicks as they grow. This behaviour has been recorded, rather than adult birds changing prey item type (ie species of prey). This has specifically been observed at Cemlyn (Wilde & Wright 2013). The return with multiple prey items may be a result of the prey species not being present at larger sizes. – Sandwich tern can forage in windy conditions. However, it is observed that prey item composition changes with worsening weather conditions. (Eglington & Perrow, July 2014, 'Literature review of tern foraging ecology') – Provisioning and size of prey items may be dependent on the rate of kleptoparatism by black-headed gull (Perrow, Gilroy, Skeate and Mackenzie June 2010, 'Quantifying the relative use of coastal waters by breeding terns'). This study and modelling observed that smaller prey items attracted lower rates of kleptoparatism. As discussed in the eNGO WR [REP2-348 ∞ 3.39 and Appendix 4] this kleptoparatism is part of the well documented sympatric relationship between black-headed gull and Sandwich tern. Changes in prey item delivery may be due to one or more of the above factors or to collapse/reduction in fish stocks (see below). However, if prey item delivery, size and species is sub-optimal and outwith the normal range or patterns of behaviour it may be safe to hypothesise that this may be indicative of colony stress. However, to link chick food provisioning with density dependant declines in productivity would appear to be counter intuitive.

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	In relation to decreases in productivity, this is a complex issue where several factors may be at play either individually or together, resulting in stress on the breeding colony in normal circumstances: - – Lack of or collapse in fish stocks have been widely acknowledged to be responsible for changes in colony productivity or even abandonment of colonies. This may be due to anthropogenic factors such as fishing or other mechanisms which result in poor pelagic fish stock recruitment (Garthe & Flore 2007). Both prey item studies along with fish stock records would be useful to elucidate the strands of this factor (see also above). – Predation is critical to a colony's breeding success in any given season. Where this may be at low/moderate levels it will reduce breeding success and productivity, or if sufficiently high can contribute to colony collapse as occurred at Cemlyn Nature Reserve in 2017. – As discussed in the WR of the eNGOs [REP2-348] foraging energetics and physiological stress (NRW's WR [REP2-325]) also have a role to play in an individual bird's breeding condition and consequently colony breeding success and productivity, as discussed at the first ISH on Biodiversity. – There are some anecdotal suggestions that increased numbers of breeding pairs may have been the cause for declines in productivity. This was speculated to be the reason that productivity was low at Seaforth, Common tern colony, in 2010 (Merseyside Ringing Group Report 2014). However, there is little other evidence that has provided further analysis or support of this anecdotal observation from colonies or studies elsewhere. – Additionally, weather conditions from year to year are well known to affect productivity. The Cemlyn warden reports provide evidence of years when this has been one of the factors identified, during or prior to the terns' arrival for the breeding season. – Observed failures to return prey to the nest due to anthropogenic visual disturbance will also contribute to lowering productivity at sites where this occurs [REP2-348 ∞ 3.124- 3.125]. – Abandonment or lowering of numbers of the sympatric population of black-headed gull at a habitual Sandwich tern breeding site can result in less rigorous predator deterrents and consequently reduced productivity in the Sandwich tern breeding population. This is thought to be one of the factors involved within Strangford Lough (Northern Ireland), where the majority of the black-headed gull colony has relocated to Castle Espie WWT Reserve, but which provides less suitable habitat for breeding Sandwich terns (Shane Mousley *pers comm*.). ***Without detailed study it would not be possible for Horizon to attribute any decline in productivity to any one single factor***. If the DCO were to be granted, a robust monitoring programme going forward would help provide more detailed investigation on this or other speculated opinion which can be monitored alongside any future impacts that could result from implementing Wylfa Newydd. As far as the eNGOs are aware no such programme has been suggested or been devised by Horizon either with or without consultation with NRW (REP2-348 ∞3.137 – 3.139)
Q2.5.4	**Sandwich Tern has been described as a species which is very sensitive to disturbance. Could the parties identify the sources of evidence which support this statement?**

Ref:	Question / Response
	First reference "*Many [*traditional breeding areas*] have a long history of occupation, but the species is notoriously fickle and what seems to be slight disturbance can cause complete desertion, sometimes when the eggs have already been laid.*" The Atlas of Breeding Birds in Britain and Ireland, JTR Sharrock, British Trust for Ornithology & Irish Wildbird Conservancy 1976, pub T & AD Poyser. Sandwich Tern species account pg 228 – 229. Second reference: - "*In the event of serious mid-season disturbance there may even be a full-scale transfer of birds such as is believed to have occurred in 2002 when a large influx of over 200 birds arrived at Cemlyn and established a subcolony shortly after the Hodbarrow site in Cumbria was deserted.* *Sandwich Tern populations are notorious fluctuating wildly, due both to this habit of deserting one colony for another, and to their 'boom and bust' productivity, …."* The breeding birds of North Wales, Anne Brenchley, Geoff Gibbs, Rhion Pritchard and Ian Spence, 2013, Liverpool Press. Sandwich Tern species account pg 228 - 229 Third reference: - "*As only a few colonies exist each year, this tern is highly vulnerable to anthropogenic disturbance (Garthe and Flore 2007) and is known to abandon eggs en masse (Gochfield* et al. *2018).*" In fact, Garth and Flore (2007) go as far as to indicate that from a conservation perspective, for the German Sandwich tern, all anthropogenic activities should be stopped near to the colonies on human inhabited islands where the terns establish. Primary reference - BirdLife International (2019) Species factsheet: *Thalasseus sandvicensis*. Downloaded from http://www.birdlife.org on 05/02/2019 Secondary reference - Garthe, S.; Flore, B.-O. 2007. Population trend over 100 years and conservation needs of breeding sandwich terns (*Sterna sandvicensis*) on the German North Sea coast'. *Journal of Ornithology* (2007) 148:215-227. Secondary reference - Gochfeld, M., Burger, J. and Garcia, E.F.J. 2018. Sandwich Tern (*Thalasseus sandvicensis*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, pp. Lynx Edicions. Barcelona. https://www.hbw.com/node/54016.
Q2.5.5	**During the Issue Specific Hearing on 10 January 2019, the Applicant described how noise from construction would be attenuated over the distance between the main power station site and the Tern colony at Cemlyn Bay and would be experienced as background at the colony. If you do not agree with this characterisation of the construction noise environment please could you explain why?**

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	It is well understood that noise will attenuate over distance from a source and the eNGOs accept the noise modelling and predictions as represented in the Environmental Statement (eNGO WR [REP2-348 ∞ 3.4]*). However, the eNGOs do **not** agree with Horizon's description that the alteration in the soundscape by construction will only be experienced as background at the tern colony. The eNGO evidence in their WR [REP2-348 ∞ 3.7 – 3.11], seeks to demonstrate the changes to the soundscape from construction impacts. The eNGOs have considered the D4 additional data [REP4-022 Cemlyn Bay Baseline Noise for 2018] and whilst adding to the sum of data collected (2017 – 25 record sheets and 2018 12 record sheets) this additional information does not alter our opinion. The explanation below provides a brief summary of the changes and the differences in the characteristic of the soundscape the terns will experience at the breeding colony. It is also important to recognise that the soundscape will also change for the 75% of birds that commute through the harbour both during construction and operation. <u>Current soundscape, its signature and characterisation</u> – The evidence presented by Horizon confirms the generally accepted subjective view that the tern colony occurs within a quiet natural landscape (wind noise, wave lapping, leaves in trees etc) with relatively limited anthropogenic noises (agricultural sounds of grazing stock, tractors and low vehicle activity). – The soundscape does not experience many impulsive sounds with rise times that are considered to equate to rock blasting ([APP-225 ∞ 5.2.3 quotes - distant gunshot, tractor door & a grain store door slamming]) in 2018 there was only one clearly perceptible impulsive sound [REP4-022 Appendix 5-3]. – Noise levels at the colony increases due to the terns' behavioural response to events [APP-231 ∞ 4.6, Behavioural Studies] but this is not a continuous increase in level. This will be a soundscape that these colonial birds are entirely habituated to as it is internally generated by the species behaviour. <u>Soundscape during construction, its signature and characterisation</u> – The environment will become noisier as the background levels as a whole increase [APP-231, fig 2 'Predicted bounded case short term noise levels' - Db $L_{AEQ, 5min}$]. – A variety of impulsive and percussive noises (varying tonality) will be generated during construction including dump trucks, rock crushing or piling. This category also includes blasting – an impulsive sound with a distinct steep/rapid rise time sound signature. These have been modelled in the analysis and discussed by all parties (eNGO WR [REP2-348 ∞ 3.10 & Table 2] and Horizon [APP-231 Section 6]). – Not only will the frequency and periodicity of activities generating impulsive/tonal noise increase during construction, but they will have a different sound signatures to those which currently occur at the site and consequently the terns (and other wildlife) will have no familiarity with them.

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	– In addition, there will be a concomitant increase in other general impulsive noises with steep rise times associated with construction (eg equipment doors slamming, industrial equipment banging/graunching together), which will be unpredictable and cannot easily be accounted for in the modelled noise analysis. – There will be spatial and temporal variability in the soundscape – for example impulsively generated noises/unexpected impulsive noises will not always occur when the background levels are also high, or vice versa/other permutations. – All sounds will attenuate with distance from source, but an impulsive noise will still have the same rise time signature and therefore suddenness of character. The increasing number and periodicity of impulsive sounds and when they may occur will still have the ability to punctuate the background soundscape, potentially even where the decibel levels of the two noises are close. – Although some sounds will be subsumed into the increased background environment, there is also the factor that animals – like humans – have a varying acuity and perceptiveness in 'picking out' sounds from a background soundscape [REP2-348 ∞ 3.59]. Whilst the modelling and predictions within the ES are very helpful in analysing the broad changes to the environment, it is extremely difficult for them to accommodate and effectively demonstrate the variability that will occur during construction. This is not a criticism of this particular study, but an observation that in general terms such methodologies provide a levelled-out/smoothed representation. This is important to consider when the WNDA site moves from its current characteristic signature; a countryside landscape with agricultural business - to a large-scale construction site for a harbour and large industrial facility, including the earthworks that are akin to a minerals application with associated rock blasting. * Apologies – some APP document references appear to have been reversed in the eNGO WR [REP2-348] in relation to the two main ES noise documents APP-225 and APP-231.
Q2.5.6	**Could the parties provide references (including copies of abstracts where relevant) for any scientific literature that deals directly with the effects of construction disturbance on Sandwich Terns or closely related species?**
	The eNGOs* have not been able to identify any further published material besides the items discussed in the eNGO WR in relation to common terns versus Sandwich terns at industrial sites [REP2-348 ∞ 3.126 – 3.127] and the discussions in relation to wind turbine construction and operation [REP2-348 ∞ 3.74 – 3.83]. At Zeebrugge harbour it was initially thought that the breeding populations of Sandwich tern were sustainable and that the compensation site on the eastern breakwater, established as a result of loss of habitat elsewhere, was also successful (Steinen 2005). However, by 2006 (Everaert & Steinen) it was clear that this opinion appeared to be no longer valid. As both parties (Horizon and eNGOs) acknowledge this colony has now been abandoned, with the causes of the colony collapses and ultimate abandonment not being entirely clear and likely to be multifaceted. The 2005 paper indicates that at the time the major

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	threats were seen to be harbour development, arrival of fox and competition with large gulls (ie not the sympatric smaller black-headed gull). Additionally, it would also appear that wind turbine fatalities may also have played a part in the abandonment too (Everaert & Steinen 2006). Studies by Jennings (2012) were conducted on common tern, which is widely acknowledged to be more resilient than Sandwich tern and not characteristically known for sudden colony abandonment. It is a species that tolerates more urban environments (Cabot & Nisbet 2013), whereas Sandwich tern mostly nest on low-lying islands (Cabot & Nisbet 2013) with the industrialised Zeebrugge ex-colony apparently being an exception rather than the rule. Jennings observes that despite being habituated to humans common tern are sensitive to unusual or high-level human disturbance factors, although she concludes that gull & crow were, in this case study, the greatest cause of disturbance. However, the paper does state: - "*If, at some point in the future, urban regeneration was to proceed* [at Port Leith]*, the two most obvious causes of disturbance would arise from construction work and subsequent increase in the number of humans. The potential effects of development on predator populations are addressed in Chapter 4. The largest disturbance from construction work, provided it is not performed close to the colony, is likely to be noise-related*." Wind turbine studies The published studies generally talk about avoidance of turbine arrays once constructed rather than during construction. For example, Dierschke 2016 as used by Horizon [APP-050 doc 5.2 [RD81]]. Harwood et al (2017) does consider both prior to construction, construction and initial operational consequences of erecting wind turbines. The Sherringham Shoal work is discussed at REP2-348 ∞ 3.80 – 3.81. Abstracts are provided at the end of this submission. * Note – this ExA question was circulated widely amongst the eNGO community to try to garner additional sources of information on construction impacts. This included tern reserve managers and specialist scientific staff in Wales, England, Scotland, Northern Ireland and Eire. This included staff within National Trust, the RSPB and the National Parks & Wildlife Service.
Q2.5.8	**With regard to disturbance from visual stimuli, the Applicant has stated that there would be no construction work undertaken within 500m of the nesting islands between 15 April and 15 May with no bulk earthworks undertaken within 500m of any known active Tern nests thereafter. Does this address any of the parties concerns? If not, what additional measures would be required?**
	It is accepted that a 500m buffer and the approach proposed is likely to be sufficient, but the re-establishing of bulk earth moving/construction activity from mid-May may still impact on the establishment period of late arriving Sandwich tern, the normal Arctic and common tern laying period and late influxes of birds from other sites where breeding has already failed. This is discussed within the eNGO WR written representation (REP2-348 Figure 1

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	and ∞ 3.41 – 3.45). It is the eNGOs' opinion that the whole of the breeding season should be treated the same in relation to construction mitigation. Additionally, the reworking of mound E in several phases and later in the construction phase will add, unnecessarily in the eNGOs' opinion, to the visual and noise impacts in close proximity to Cemlyn Nature Reserve and the breeding terns. The once-only working of Mound E to create it at its final height, landform and habitat reinstatement would avoid this additional potential impact. It is the view of National Trust and NWWT that the reworking of Mound E will also add to the impacts on landscape ecology and landscape impacts within the AONB and gateway to the Nature Reserve. As indicated within the eNGO WR [REP2-348 ∞ 3.111 – 3.113] there is considerable concern about the visual impacts and physical barriers that will occur within the harbour (MOLF) during the construction phase in combination with the noise disturbance. However, it is considered that it would be impossible to establish a 500m exclusion zone and there are no known techniques which could be introduced which could mitigate this without potentially causing other unintended consequences for the Sandwich tern – where the majority of the population fly within the zone of construction influence and nearly 50% fly through the footprint of the harbour (MOLF).
Q2.8.4	**The Applicant provided an Ecological Enhancements Mitigation Report at D4 which includes an options appraisal for ecological enhancement and revised measures to reduce the effects on rocky reef habitat from a moderate adverse to minor adverse effect. Is NRW and NT content that the mitigation would reduce the effects to minor adverse?**
	Commentary on this matter is being compiled by Dr David Parker on behalf of the National Trust which has been provided under their Examination Questions 2 paper. Having read the additional Horizon submission [REP4-023], NWWT fully endorse the commentary provided and the conclusion that the new proposals represent a welcome improvement but that it does not sufficiently reduce the impacts from moderate adverse to minor adverse.
Q2.14.10	**The ISHs in March will consider the proposed WNDA and its constituent spatial elements in particular what is proposed for the site; what mitigation would be required and how this would be secured through the dDCO, CoCP and subCoCPs or the S106.** **The ExA propose to consider the WNDA as a whole but also propose on an individual basis to address the Marine Off Loading Facility and Breakwater; the Main Power Island Site; the Site Campus/Temporary Workers Accommodation and the other on-site developments.** **In considering these elements particular attention will be paid to issues in relation, but not limited, to the following effects individually and in combination:** **• Landscape and visual; …..** **and ….** **• Ecological Compensation sites.** **With reference to the emerging SoCG are there any areas/topics in relation to the WNDA or the Other Sites where you consider agreement may not be reached before the end of the examination, bearing in mind**

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	the evidence both oral and written that has been submitted to date, and which you would wish the ExA to consider at these ISHs?
	The draft Requirements WN9 and WN11 [REP2-020] and the revised Phasing Strategy [REP4-014] clearly indicate that the LHMS will not be submitted for agreement until 12 months prior to Commission Date of Unit 2 (Y9) and therefore implementation of any scheme will occur in the next growing season post agreement – ie Y10 at the earliest - with all operational mounds being identified as being delivered at the end of reinstatement. This will not address a number of outstanding matters: - – The mitigation needs for chough during the construction phase. NWWT's WR [REP 2-348 ∞ 3.76 – 3.77 and 3.107] – The achievement of no net loss of biodiversity and achieving habitat connectivity for species recolonisation from the NWEA and the Reptile translocation site (Mynydd Ithel). [SoCG NWWT13] – Lack of clarity in relation to the term over which the LHMS management plans will be implemented under Requirement WN11. Chapter 4 indicates that the principles (Chapter 4) will operate for operation. However, Chapter 7 of the LHMS indicates that tree planting establishment will be for 10 years and that plans will be reviewed every 5 years but it does not indicate for how long any of the management plans (site specific or WNDA) will be operational for. [SoCG NWWT9] There are additional concerns given the lateness of restoration in the construction process and the uncertainty that construction may commence but subsequently be abandoned. It is suggested that a restoration bond could be applied (as occurred with the TCPA Site Prep and Clearance application). The National Trust provide more detail on the landscape and ecological implications to the WNDA and its environment provided by their Examination Question responses. Having consulted with National Trust, NWWT fully endorse these responses and concerns in relation to: - – Protection of the National Trust's shoreline in Porth y Pistyll adjacent to the harbour. – Amelioration of impacts within and adjacent to the AONB – The early and once-only creation of the landform of Mound E.

References

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Abstracts for ExA Q2.5.4

Biodivers Conserv (2007) 16:3345–3359
DOI 10.1007/s10531-006-9082-1

ORIGINAL PAPER

Impact of wind turbines on birds in Zeebrugge (Belgium)

Significant effect on breeding tern colony due to collisions

Joris Everaert · Eric W. M. Stienen

Received: 18 April 2006 / Accepted: 12 June 2006 / Published online: 11 November 2006

Abstract We studied the impact of a wind farm (line of 25 small to medium sized turbines) on birds at the eastern port breakwater in Zeebrugge, Belgium, with special attention to the nearby breeding colony of Common Tern *Sterna hirundo*, Sandwich Tern *Sterna sandvicensis* and Little Tern *Sterna albifrons*. With the data of found collision fatalities under the wind turbines, and the correction factors for available search area, search efficiency and scavenging, we calculated that during the breeding seasons in 2004 and 2005, about 168 resp. 161 terns collided with the wind turbines located on the eastern port breakwater close to the breeding colony, mainly Common Terns and Sandwich Terns. The mean number of terns killed in 2004 and 2005 was 6.7 per turbine per year for the whole wind farm, and 11.2 resp. 10.8 per turbine per year for the line of 14 turbines on the sea-directed breakwater close to the breeding colony. The mean number of collision fatalities when including other species (mainly gulls) in 2004 and 2005 was 20.9 resp. 19.1 per turbine per year for the whole wind farm and 34.3 resp. 27.6 per turbine per year for 14 turbines on the sea-directed breakwater. The collision probability for Common Terns crossing the line of wind turbines amounted 0.110–0.118% for flights at rotor height and 0.007–0.030% for all flights. For Sandwich Tern this probability was 0.046–0.088% for flights at rotor height and 0.005–0.006% for all flights. The breeding terns were almost not disturbed by the wind turbines, but the relative large number of tern fatalities was determined as a significant negative impact on the breeding colony at the eastern port breakwater (additional mortality of 3.0–4.4% for Common Tern, 1.8–6.7% for Little Tern and 0.6–0.7% for Sandwich Tern). We recommend that there should be precautionary avoidance of constructing wind turbines close to any important breeding colony of terns or gulls, nor should artificial breeding sites be constructed near wind turbines, especially not within the frequent foraging flight paths.

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Unforeseen Responses of a Breeding Seabird to the Construction of an Offshore Wind Farm

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Abstract Sheringham Shoal Offshore Wind Farm (OWF), comprised of 88 3.6 MW turbines, was built within foraging range of Sandwich Tern *Thalasseus sandvicensis* breeding at a European designated site. Boat-based surveys (n = 43) were used to investigate changes in tern abundance within the site and within 0–2 and 2–4 km buffer areas before and throughout the construction of the OWF, over a study period between 2009 and 2012. Visual tracking of individual birds (n = 840) was also undertaken to document any changes in behaviour. This study is amongst the few to detail the response of a breeding seabird to the construction of an OWF. Navigational buoys in the 0–2 km buffer were used extensively by resting and socialising birds, especially early in the breeding season. Visual tracking illustrated avoidance of areas of construction activity and birds surprisingly kept their distance from installed monopiles. Avoidance was strengthened during turbine assembly, with around 30% fewer birds entering the wind farm, relative to the pre-construction baseline. Flight lines of birds that entered the site were generally along the centre of rows between turbines. A focus on transit flight meant that feeding activity was lower in the site than the buffer areas. As the site remained permeable to terns flying to and from foraging grounds further offshore, the overall abundance within the site was not significantly reduced. Although a number of the responses observed were unforeseen by Environmental Impact Assessment, the overall conclusion of only minor adverse effects was upheld. Analysis of further data from the operational site is now planned.

Keywords Sandwich Tern · Offshore wind farm · Visual tracking · Boat-based survey · Avoidance behaviour

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J. Köppel (ed.), *Wind Energy and Wildlife Interactions*,
DOI 10.1007/978-3-319-51272-3_2

The ecology of an urban colony of common terns *Sterna hirundo* in Leith Docks, Scotland

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Submitted in fulfillment of the requirements for the
Degree of Doctor of Philosophy

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June 2012

Abstract

The Imperial Dock Lock Special Protection Area (SPA) in Leith Docks on the Firth of Forth currently supports the largest common tern (*Sterna hirundo*) colony in Scotland. The nest site, a former lock wall in an operational port, was designated as an SPA for the species in 2004 but very little is known about the ecology of common terns in this man-made environment. This thesis examined their ecology using a combination of long-term data for the Firth of Forth region and field research at the colony. The dynamics of the Firth of Forth breeding population of common terns was linked both to local influences of predators and the regional status of their main food source, the Firth of Forth sprat stock. Colonisation of Leith Docks resulted from relocation of birds from natural islands in the Firth of Forth which were abandoned due to unsustainable levels of predation by gulls. Herring gulls (*Larus argentatus*) and lesser black-backed gulls (*L. fuscus*) are active predators in Leith Docks but at relatively low levels. Predation attempts by mink present a serious threat and could be highly detrimental to the colony. Foraging studies revealed that terns are feeding primarily in the Forth of Forth rather than within the docks, and that their diet consists mostly of sprat, but also sandeels and gadoids. The importance of sprat in the diet is discussed in relation to the potential reopening of the sprat fishery. Surveys of birds commuting between the colony and the feeding grounds showed that a range of flight lines are used but to different extents, and found no evidence of collisions with buildings or other man-made structures. Terns were well-habituated to regular human activity but were sensitive to unusual or high-level human disturbance factors. Gulls and crows, rather than humans, were the greatest disturbance factors for nesting birds overall. Currently the Imperial Dock Lock SPA is the only site in the region that could support common terns breeding in considerable numbers, and so the future of the Firth of Forth population of common terns is now dependent on this one site. There are a number of management options available, and the future persistence of the population relies on the continued monitoring of breeding numbers of terns, of predation levels and further assessment of the sprat stock.

Herrier J.-L., J. Mees, A. Salman, J. Seys, H. Van Nieuwenhuyse and I. Dobbelaere (Eds). 2005. p. 381-392
Proceedings 'Dunes and Estuaries 2005' – International Conference on Nature Restoration
Practices in European Coastal Habitats, Koksijde, Belgium, 19-23 September 2005
VLIZ Special Publication 19, xiv + 685 pp.

Harbouring nature: port development and dynamic birds provide clues for conservation

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Abstract

During the twentieth century, many coastal areas in Europe changed dramatically due to coastal protection works, human expansion drift and booming beach tourism. As a result the natural area of suitable nesting habitat of many coastal birds has decreased enormously and a large number of species are now listed as threatened. Some species were able to exploit new opportunities offered by human activities, but most coastal birds are now confined to islands, protected areas or artificial sites (nature development projects, restored coastal habitats and even floating rafts). Protection of local resources, as well as further development and management of breeding sites is considered vital in maintaining the populations of threatened coastal breeders. The rationale behind nature restoration and development is often solely based on offering suitable habitat to the birds, while its success is mainly judged from the evolution in the number of birds present. As more and more information becomes available on the reproductive performance of coastal birds, it becomes clear that in some protected areas long-term reproductive success is below self-sustaining levels. Apparently humans are able to create artificial nesting habitats that are highly attractive from the birds' perspective but are in fact pitfalls for the population in the long term. In contrast, the port of Zeebrugge, Belgium, is an excellent example of an artificial nesting habitat of high quality in terms of attraction as well as reproduction. Here, vast sandy areas were raised in a former marine habitat in the 1980s. The works mimicked natural dynamic processes and coastal breeding birds instantly reacted. Within 20 years, the area has developed from open sea to a breeding site of major international importance. Peak population figures by far exceed the 1% of the total biogeographical population. At present, Zeebrugge harbours more than 4% of the total north-west European Common Tern population, thus making it the largest colony in Europe. It is a highly productive population and acts as a major source of recruits for the biogeographical population as a whole. Until recently, the success of the bird populations was based on the ongoing creation of suitable nesting habitats and management measures, like removal of the vegetation and covering areas with shell fragments. Further development of the harbour, the arrival of the fox and competition for nesting habitat with large gulls are major threats for the bird population. Therefore part of the colony was allocated to a peninsula and further steps are now being considered to preserve this valuable population. Apparently feeding conditions are very good and the harbour itself and its direct surroundings function as a major source of small prey fish of which the availability is facilitated by the heavy shipping traffic and the sheltered conditions of the feeding areas.

Keywords: Zeebrugge; Nature development; Coastal breeders.

Appendix of photographs to support NWWT Answer to EX2.2.1

Submitted under separate email as file size too large