Awel y Môr Offshore Wind Farm

Category 5: Reports

Report 8.2, Annex 2: Evidence Plan Report Appendices Part 2 (D to F)

Date: April 2022

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1 Appendix D: Documents Submitted via the Evidence Plan

1.1 D1: Documents Tracker

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
Overarching consultation documents to all ETG members				
October and November 2020	Evidence Plan Engagement Plan	Document outlining the Evidence Plan progress to date and the ETG consultation programme proposed to take place in support of development of the PEIR.	Appendix A2	N/A
November 2020	Cumulative Effects Assessment methodology note	Draft form of the Cumulative Effects Assessment annex that would accompany the PEIR and ES. Feedback was sought on the methodology and the long-list of projects to be considered cumulatively with AyM.	ES Volume 1, Annex 3.1: Cumulative Effects Assessment (application ref: 6.1.3.1)	Written feedback from JNCC in Appendix F3. Written Feedback from NRW in Appendix F3 Written feedback from NRW specific to fish and shellfish ecology in Appendix F3.
ETG 1: Shipping and Navigation				
March 2021	Regular operator letter	Letter sent to regular commercial shipping operators identified during the shipping and navigation baseline characterisation to gain feedback on the project proposals.	Appendix D2	Correspondence via email directly with the appointed shipping and navigation consultants (Anatec) who arranged follow-up meetings as required (see Appendix C1)
ETG 2: Offshore Ornithology				
27/11/2020	Note on red-throated diver	Presentation of site-specific displacement evidence of red-throated diver from AyM and GyM aerial survey data.	Appendix D3	Written feedback from JNCC in Appendix F2.

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
17/12/2020	HRA ornithology screening update	Update of the HRA screening that was previously included with the Scoping Report. A report was submitted with an accompanying spreadsheet of the ornithological sites and features screened in for the RIAA.	The final ornithology screening is presented in RIAA Annex 2 (application ref: 5.2.2).	Written response from JNCC in Appendix F2. Written Feedback from NRW in Appendix F2
	Note on migratory non-seabirds	Provided an update to the HRA screening in respect of migratory non-seabird species.		Written response from JNCC in Appendix F2. Written Feedback from NRW in Appendix F2
12/03/2021	Ornithology assessment position paper	Document provided to the offshore ornithology ETG to inform of the proposed approach to CRM and displacement assessment. Agreement was sought on the parameters of those assessments.	The final CRM and displacement methodologies are given in ES Volume 4: Annex 4.2: Offshore Ornithology Displacement (application ref: 6.4.4.2) and Volume 4, Annex 4.3: Offshore Ornithology CRM (application ref: 6.4.4.3).	Written response from JNCC in Appendix F2. Written Feedback from NRW in Appendix F2
08/12/2021	Apportioning methodology note	Provided an example of the breeding season apportioning process undertaken for the ornithology assessment in the RIAA to confirm the approach was appropriate	The final apportioning methodology is presented in RIAA Annex 5 (application ref: 5.2.5).	Written response from JNCC in Appendix F2. Written Feedback from NRW in Appendix F2 Written feedback from Natural England in Appendix F2.
	RIAA comments log	Record of the feedback received on the RIAA during statutory consultation and the proposed approach to addressing those comments. Note that this document included comments related to all aspects of the RIAA, including offshore ornithology and marine mammals.	The comments received on the draft RIAA during statutory consultation are presented within the consultation section of the final RIAA (application ref: 5.2)	
22/12/2021	Migratory CRM screening matrix	Screening matrix of the species proposed to be included in the migratory CRM assessment, using the MigroPath tool and the broad-front approach.	ES Volume 4, Annex 4.4.4: Migratory CRM (application ref: 6.4.4.4).	Written response from JNCC in Appendix F2.

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
				Written Feedback from NRW in Appendix F2
ETG 3 and 4: Marine Ecology and Marine Mammals				
22/10/2020	Fish and Shellfish Ecology Technical Baseline	Baseline characterisation of the receiving environment for fish and shellfish ecology.	ES Volume 4, Annex 6.1: Fish and Shellfish Technical Baseline (application ref: 6.4.6.1).	Written feedback from NRW in Appendix F3.
20/11/2020	Marine Water and Sediment Quality Position Paper	Document outlining the proposed scope of the Marine Water and Sediment Quality assessment.	ES Volume 2, Chapter 3: Marine Water and Sediment Quality (application ref: 6.2.3).	Written feedback from NRW in Appendix F3.
	Physical Processes Position Paper	Document providing the proposed methodology for undertaking the physical process assessment and associated numerical modelling.	ES Volume 4, Annex 2.2: Physical Process Modelling Calibration (application ref: 6.4.2.2) and Volume 4, Annex 2.3: Physical Processes Modelling Results (application ref: 6.4.2.3).	Written feedback from NRW in Appendix F3.
17/12/2020	HRA screening update (non-ornithology	Update of the HRA screening that was previously included with the Scoping Report. A report was submitted with an accompanying spreadsheet of the non-ornithological sites and features screened in for the RIAA.	The final non-ornithology screening is presented in RIAA Annex 1 (application ref: 5.2.1).	No comments received.
01/02/2021	Clarification note on the use of Acoustic Deterrent Devices (ADDs) for mitigation	Provided information on the use of ADDs as mitigation for PTS caused by piling, after it was requested by ETG members that further information be provided on how ADDs would be considered in the Outline MMMP.	Appendix D4. The use of ADDs is also discussed in Volume 4, Annex 7.2: Outline MMMP (application ref: 6.4.7.2).	NRW confirmed they had no comments (Appendix E). TWT provided comments via email, see Appendix F3.
17/03/2021	WFD Scoping Paper	Document provided to the Marine Ecology ETG to seek agreement on the scope of the WFD Assessment.	The final scope of the WFD Assessment is presented in ES Volume 4, Annex 3.1: WFD Assessment (application ref: 6.4.3.1)	NRW provided a written response in Appendix F3.
07/04/2021	Sediment contaminants data	Provision of sediment contaminant analysis data from the site-specific surveys following an ETG meeting action.	The sediment contamination data is presented within ES Volume 2, Chapter	

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
			3: Marine Water and Sediment Quality (application ref: 6.2.3)	
26/11/2021	Fish and shellfish ecology clarification note: Noise sensitivity weightings	Provision of information on how the sensitivity of fish and shellfish receptors is weighted with regard to sensitivity to noise impacts following NRW feedback on the PEIR.	Appendix D4. The final fish and shellfish ecology assessment was updated to include this information (ES Volume 2, Chapter 6: Fish and Shellfish Ecology (application ref: 6.2.6).	NRW provided a response to the fish and shellfish ecology clarification notes, as well as the marine mammal UXO and marine mammal PTS sensitivity clarification notes in Appendix F3. NRW provided a response to the marine mammal cumulative PTS and updated baseline documents in Appendix F3. JNCC provided a response to the marine mammal clarification notes in Appendix F3.
	Fish and shellfish ecology clarification note: Spawning potential calculations	Provision of information on the spawning potential assessments on key fish and shellfish receptors (those noise-sensitive species with spawning grounds local to AyM), following NRW feedback on the PEIR.		
	Marine mammal clarification note: UXO disturbance assessment	Clarification note outlining the potential threshold options that could be used to assess behavioural disturbance from UXO detonations.	Appendix D4. The assessment of marine mammal disturbance from UXO detonation is contained in ES Volume 2, Chapter 7: Marine Mammals (application ref: 6.2.7)	
	Marine mammal clarification note: PTS sensitivity	Clarification note providing additional information on the results of the expert elicitation for the effects of PTE-onset from pile driving on marine mammal vital rates. The document also updated the sensitivity definitions for marine mammals to this impact.	Appendix D4. The final assessment is presented in ES Volume 2, Chapter 7: Marine Mammals (application ref: 6.2.7).	
	Marine mammal baseline report	Updated version of the marine mammal baseline report consulted on during statutory consultation.	ES Volume 2, Annex 7.1: Marine Mammals (application ref: 6.4.7.1)	
	Marine mammal clarification note: Cumulative PTS onset	Provision of information outlining the limitations of cumulative Sound Exposure Level (SEL_{cum}) predictions.	Detail is included in ES Volume 2, Annex 7.3: Marine Mammal Quantitative Assessment Assumptions (application ref: 6.4.7.3). The final assessment is presented in ES Volume 2, Chapter 7: Marine Mammals (application ref: 6.2.7).	

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
08/12/2021	Outline MMMP	Updated version of the Outline MMMP that was consulted on during statutory consultation.	The final Outline MMMP is provided in ES Volume 4, Annex 7.2: Outline MMMP (application ref: 6.4.7.2).	NRW provided a response in Appendix F3. JNCC provided a response in Appendix F3.
ETG 5: Onshore Ecology				
11/02/2021	Preliminary Ecological Appraisal (PEA) Report	The results of the PEA were provided to the onshore ecology ETG members.	The final PEA Report is provided in ES Volume 5, Annex 5.1: PEA (application ref: 6.5.5.1).	
25/06/2021	Bat roost survey scope	Clarification note outlining the scope of surveys of bat roosts in trees that may be affected by the AyM project.	Appendix D5. The survey report is contained in ES Volume 5, Annex 10: Bat Survey (application ref: 6.5.5.10)	
18/11/2021	Ecology survey results summary	Provided a brief overview of the 2021 ecology survey results that were not available for drafting the PEIR.	Appendix D5. The final PEA Report is provided in ES Volume 5, Annex 5.1: PEA (application ref: 6.5.5.1).	
November 2021	Mitigation proposals	A clarification note that set out the proposals for mitigation that were to be presented during the November 2021 Onshore Ecology ETG meeting, seeking ETG feedback for discussion at that meeting.	Appendix D5.	
ETG 6: Onshore Hydrology, Geology and Ground Conditions				
	Hydrology technical note	A clarification note outlining the discussion points of the meeting on16 March 2021. Also included a plan of the onshore cable route.	Appendix D6.	
	Note on Sustainable Drainage Systems (SUDS)	Note setting out the Applicant's position regarding the approval of SUDS for surface water by DCC acting in its SAB role.	Appendix D6	
ETG 7: SLVIA and LVIA				

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
	Combined comparative wirelines	Comparative wirelines of the suite of options available for the proposed array refinement for discussion at the ETG meeting on 25/01/2021.	The final wirelines and visualisations are provided in ES Volume 6, Annex 10.5: SLVIA Visualisations (application ref: 6.6.10.5).	
	Plan of viewpoint locations	Plan of proposed viewpoint locations provided to ETG members prior to the ETG meeting on 25/01/2021.	The final viewpoint locations are provided in ES Volume 6, Annex 6.4: SLVIA Figures (application ref: 6.6.10.4).	
15/02/2021	Proposed viewpoint output	Proposed viewpoint locations list.		
	Comparative wirelines	Comparative wirelines for discussion at the meeting on 10/02/2021.	The final wirelines and visualisations are provided in ES Volume 6, Annex 10.5: SLVIA Visualisations (application ref: 6.6.10.5).	
	Final viewpoints list	Final viewpoints list as agreed with the ETG members.	The final viewpoints are described in ES Volume 2, Chapter 10: SLVIA (application ref: 6.2.10).	
ETG 8: Archaeology and Cultural Heritage				
	Assessment of offshore setting	Proposed methodology on the assessment of offshore setting in the archaeology and cultural heritage assessment.	Appendix D8.	
	Offshore archaeology assessment methodology	Proposed methodology for the offshore archeology and cultural heritage impact assessment.	Appendix D8.	
	Preferred cable route plan	Map of the proposed cable route.	The final project design is presented in ES Volume 2, Chapter 1: Offshore Project Description (application ref: 6.2.1) and ES Volume 3, Chapter 1: Onshore Project Description (application ref: 6.3.1).	
	Onshore archaeology proposal	Technical note outlining initial proposals for the onshore archaeological fieldwork.	Appendix D8.	

DATE	DOCUMENT	DESCRIPTION	REFERENCE	FEEDBACK FROM ETGS
ETG 9: Human Environment				
	Onshore noise scoping	Proposed scope of the noise and vibration assessment, including a description of the noise-sensitive receptors in the vicinity of AyM.	Appendix D9.	
16/02/2021	Traffic and transport technical note	Technical note outlining the proposed scope of the traffic and transport assessment, provided for comment on the baseline data in order that the assessment requirements can be agreed.	Appendix D9.	
29/03/2021	Note on proposed access arrangements	Descriptions and maps of the proposed access arrangement locations for AyM.	Appendix D9.	
16/11/2021	Public Access Management Plan (PAMP)	Copy of the Outline PAMP that was included with the PEIR.	The final Outline PAMP is included as an appendix to the Outline Code of Construction Practice (CoCP) (application ref: 8.3.9)	
	Socioeconomic, tourism and recreation Topic Guide	Note provided to ETG members asking a series of questions to establish the baseline environment and identify key stakeholder concerns.	Appendix D9.	
04/06/2021	EMF Note	Technical note informing ETG members of the approach to the assessment of EMF.	Appendix D9.	

1.2 Appendix D2: Shipping and Navigation

Address: Anatec Ltd.
10 Exchange Street
Aberdeen AB11 6PH
Tel: 01224 253700

Email: aberdeen@anatec.com

Website: www.anatec.com

Date: DD/MM/YYY

Consultation on the Proposed Awel y Môr Offshore Wind Farm in Relation to Shipping and Navigation

Dear Sir/Madam,

As you may be aware, Awel y Môr Offshore Wind Farm Limited (hereafter referred to as the 'Applicant') is currently planning to submit an application for the Awel y Môr offshore wind farm (AyM), located approximately 6nm off the Welsh coast in the Irish Sea. The site boundary is adjacent to the existing Gwynt y Môr (GyM) offshore wind farm, which has been operational since 2015 (noting that AyM and GyM are considered "sister" projects).

A Scoping Report for AyM was submitted to the Planning Inspectorate in June 2020, and the Applicant is now in the process of completing the Preliminary Environmental Information Report (PEIR). As required, this will include a Navigational Risk Assessment (NRA) to support the shipping and navigation aspects of the PEIR. The outputs of the PEIR process will feed into the subsequent Environmental Statement (ES), which will include an updated NRA based on the feedback received.

An overview of the AyM array (i.e. the area where the wind turbines will be located) and the export cable corridor is provided in Figure 1. The array covers an area of approximately 33 nm^2.

Further information about the development can be found here.

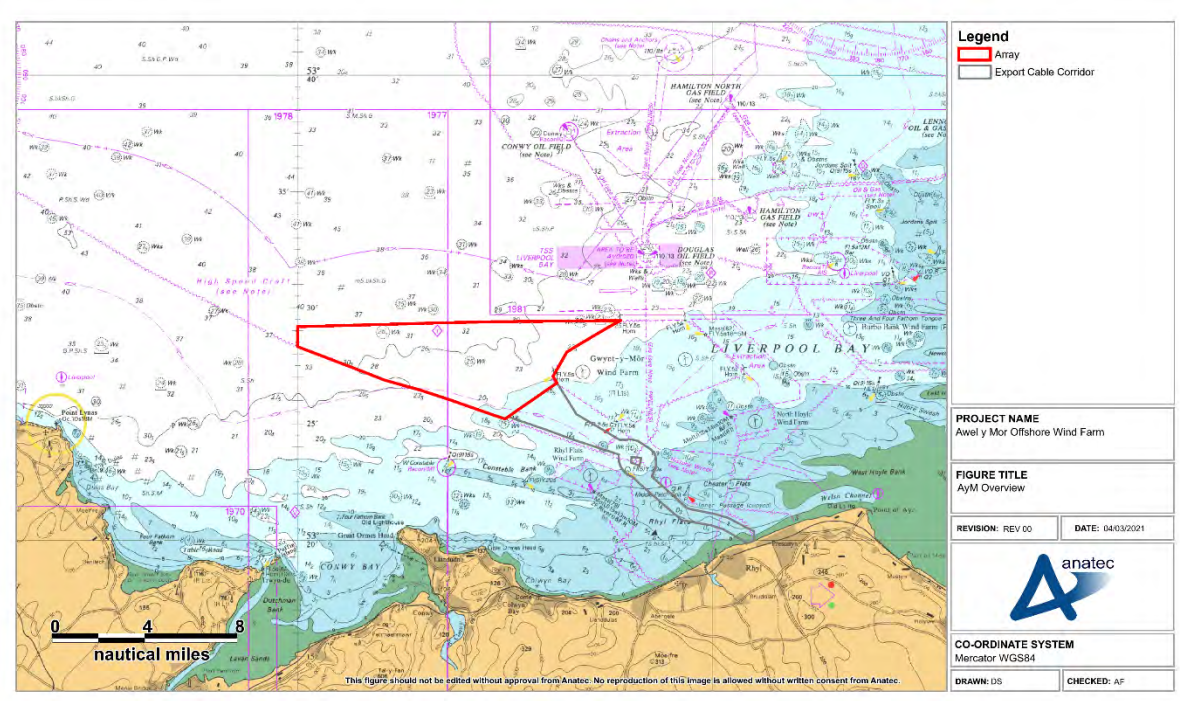

Figure 1 Overview of AyM

Anatec has been contracted by the Applicant to provide technical support on shipping and navigation during the consenting process, including production of the NRA. A key aspect of any NRA is comprehensive consultation with relevant stakeholders, including at a local level. Therefore, as part of this process, Anatec has undertaken an assessment of 12 months of Automatic Identification System (AIS) data to identify regular commercial operators of relevance to the area. Your company's vessel(s) have been identified as regularly navigating within and/or in proximity to the array, and on this basis we invite your feedback on AyM, including any impact it may have upon the navigation of vessels.

We would be grateful if you could provide us with any comments or feedback that you may have by the XXX 2021. This will allow us to incorporate your input into the NRA currently being undertaken. We would also be grateful if you could forward a copy of this information to any other vessel operators / owners you feel may be interested in commenting.

Noting that all feedback is welcome, we are particularly interested in the following points:

1. Whether AyM is likely to impact the routeing of any specific vessels and/or route, including the nature of any change in regular passage.
2. Whether any aspect of AyM poses any safety concern to your vessels, including any adverse weather routeing (i.e. any navigational safety concerns).
3. Whether your vessels would choose to make passage internally through the array of structures.
4. Whether you are aware of any planned changes to routeing which may be relevant to AyM.
5. Whether you wish to be retained on our list of shipping and navigation stakeholders and consulted throughout the NRA process.
6. Whether you wish to attend a Hazard Workshop to discuss shipping and navigation impacts in April 2021.

Responses should be sent via email to XXX@anatec.com In the meantime, should you have any queries about the published information or require any further information to support your review, please do not hesitate to get in touch.

Yours sincerely,

XXX
Anatec Ltd.

1.3 Appendix D3: Offshore Ornithology

Awel y Môr Offshore Wind Farm Offshore Ornithology Expert Topic Group

Red-throated diver technical note

Date: November 2020

Revision: A

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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A	Nov 2020	For ETG review	APEM	GoBe	RWE

APEM Note for Awel y Môr Offshore Wind Farm

Red-throated Diver: Site-specific Displacement Evidence from APEM's Aerial Digital Survey Data

Introduction

The proposed Awel y Môr Offshore Wind Farm (OWF) is a proposed extension to the existing Gwynt y Môr OWF, off the north coast of Wales. Red-throated diver (*Gavia stellata*) is considered as being sensitive to disturbance as a consequence of OWF activities that may result in displacement. As red-throated divers are a designated feature of the nearby Liverpool Bay SPA they have been identified as a key species to be assessed in the upcoming Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) for Awel y Môr OWF.

A considerable amount of data on seabirds (including red-throated divers) have been collected for over 10 years within or in close proximity to Awel y Môr and Gwynt y Môr OWFs. This note provides an overview of the existing site-specific data relating to red-throated diver from APEM's aerial digital surveys and associated reporting to provide an evidence base to determine the abundance and distribution of divers within the area of interest and for use in determining whether displacement may be apparent or not. These data are also provided with the intension to inform the EIA and HRA assessments and reporting on potential levels of displacement (or habituation if apparent) from a site-specific evidence-base in order to allow more accurate quantification of potential impacts from Awel y Môr on red-throated diver.

Gwynt y Môr OWF Aerial Digital Survey Data

The existing Gwynt y Môr OWF was constructed between 2012 and 2013. One of the conditions within the Gwynt y Môr's Marine Licence was to undertake aerial digital surveys in order to monitor offshore ornithological interests throughout the pre-, during- and post-construction. This was to inform Natural Resource Wales (NRW) on the abundance and distribution of key seabirds (red-throated diver and common scoter (*Melanitta nigra*) in particular) as a consequence the OWF's activities during the construction and early operational phases to identify any potential changes in comparison to before the OWF was developed. APEM undertook a programme of aerial digital surveys between 2010 and 2019 across the Gwynt y Môr and the wider control area of Colwyn Bay, the latter area referred to as NW5 (Figure 1).

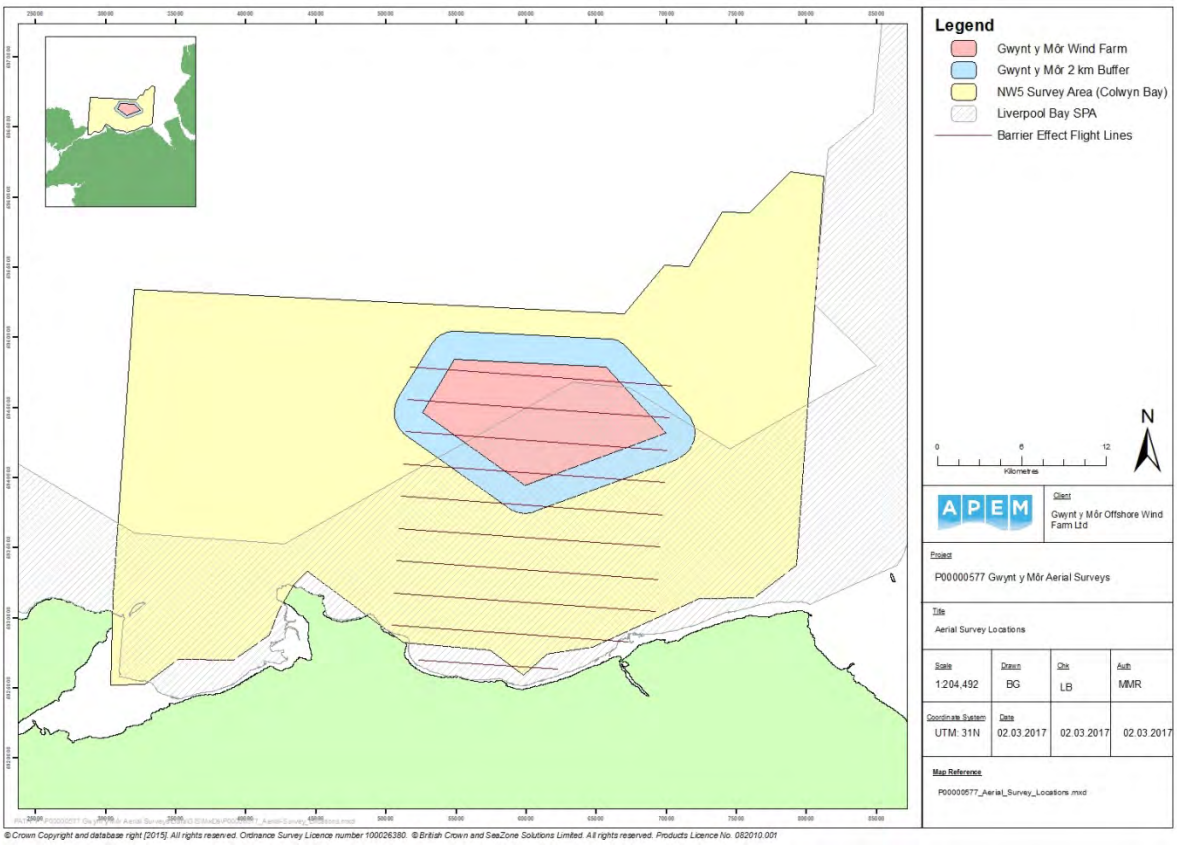

Figure 1 Location of the Gwynt y Môr wind farm area and associated buffer zone, with the wider survey area NW5, barrier effect survey flight lines and the Liverpool Bay SPA for reference.

The survey programme collected data from October to March during each non-breeding period, when red-throated diver may be present (additional July surveys carried out as part of the same survey programme have been excluded from analysis, as red-throated diver are not expected to be present during summer months). The raw count data from each non-breeding period for each area were then used to estimate the overall abundance and density of red-throated divers during each phase of the Gwynt y Môr development. A summary table of the resulting mean abundances and densities from these surveys for red-throated diver are presented in Table 1.

Table 1 Mean densities and abundances of red-throated divers for pre-, during- and post-construction offshore ornithology surveys for Gwynt y Môr OWF

Survey period	Survey area	Red-throated diver mean density (birds per km^2)	Mean estimated abundance per survey area (number of birds)
Pre-construction (2010/2011)	Gwynt y Môr OWF	0.000	0
	Gwynt y Môr OWF plus 2 km buffer	0.011	2
	NW5 Area	0.060	72
Construction (2012/2013)	Gwynt y Môr OWF	0.025	2
	Gwynt y Môr OWF plus 2 km buffer	0.013	2
	NW5 Area	0.066	80
Post-construction (2016 – 2019)	Gwynt y Môr OWF	0.016	2
	Gwynt y Môr OWF plus 2 km buffer	0.016	3
	NW5 Area	0.075	91

To investigate whether there was a difference in the mean number of red-throated divers between pre-construction, during construction and post-construction (operation) phases, a two-factor mixed-effect nested Analysis of Variance (ANOVA) was conducted using NW5 as the reference zone and Gwynt-y-Môr OWF plus a 2 km buffer as the impact zone. The data collected and subsequent analysis indicate that the operation of the Gwynt y Môr OWF appears to have had little influence on the presence (abundance and density) of red-throated divers in this area. Overall, an insignificant effect was established for the effects of Gwynt y Môr OWF on red-throated divers across pre-, during- and first-, second- and third-year post-construction periods.

The small numbers of red-throated divers counted within the Gwynt y Môr OWF area mean that it is not possible to statistically demonstrate any changes in population size, but it does provide evidence that any potential displacement effect must be less than 100% as similar abundances and densities of red-throated divers were detected within the Gwynt y Môr OWF area throughout the different stages of post-consent monitoring surveys. There was actually a slight (but not statistically significant) increase in red-throated diver numbers across the NW5 area from pre-construction to during-construction, and a further increase from the during-construction to post-construction phase. This would indicate that Gwynt y Môr has not had a negative impact on regional red-throated diver populations and has not adversely affected the integrity of the Liverpool Bay SPA.

A post-construction (February 2019) dawn survey carried out along the “Barrier Effect Flight lines” shown in Figure 1 indicated that the majority of red-throated divers were found close to the shore, which corresponds with the known ecology of red-throated diver. The results are shown in Figure 2, though as this survey was undertaken post-construction it does not provide any evidence with regards to a displacement effect.

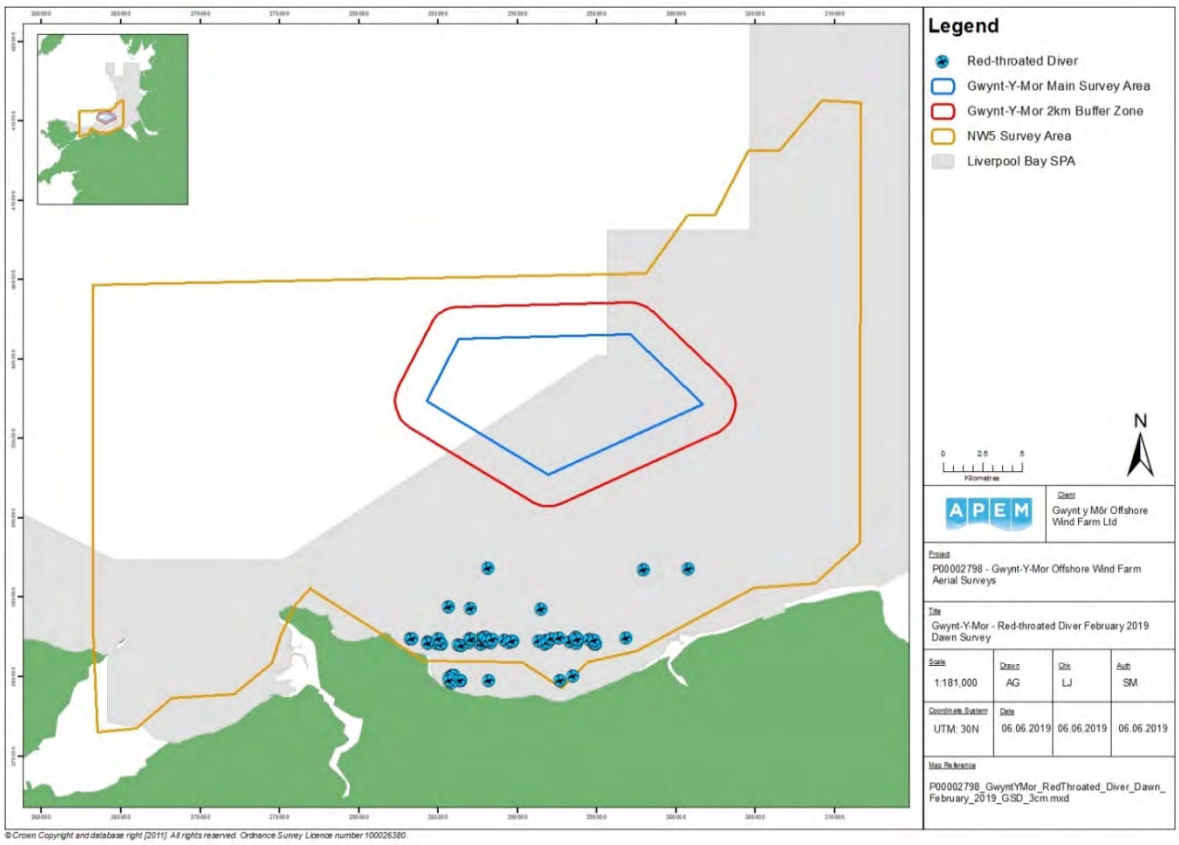

Figure 2 **Spatial distribution of divers recorded during the 6th February 2019 dawn survey.**

Awel y Môr OWF Aerial Digital Survey Data

Aerial digital surveys collecting offshore ornithology data for Awel y Môr OWF's baseline characterisation have been conducted on a monthly basis since March 2019 and are ongoing (the last of the 24 months programme is due in February 2021). These surveys cover the proposed Awel y Môr OWF and a buffer extending 4 km to the north (seaward) and 8 km to the south (landward) as shown in Figure 3. As Awel y Môr OWF is immediately adjacent to Gwynt y Môr OWF, this buffer encompasses the majority of the Gwynt y Môr OWF's array area footprint also.

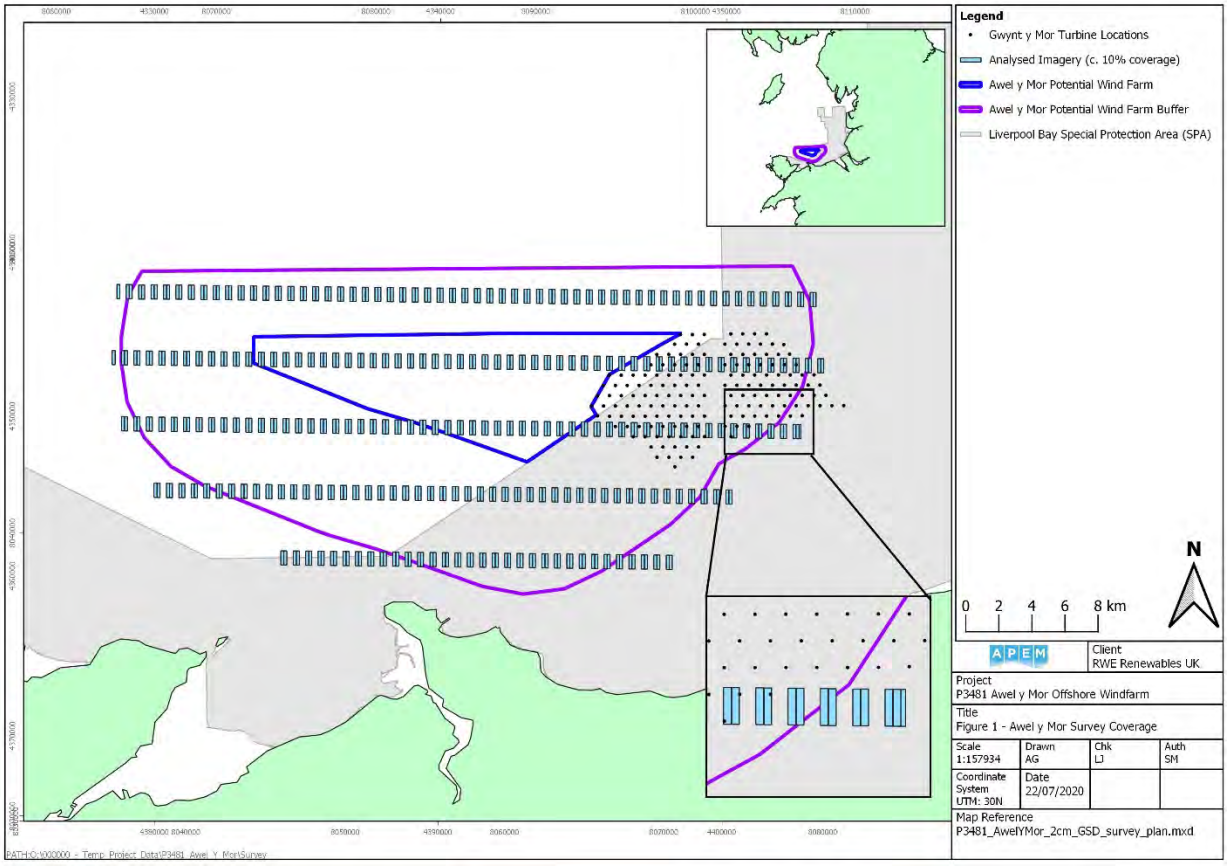

Figure 3 Awel y Môr OWF survey region, showing image capture points, wind turbine generators of the existing Gwynt y Môr OWf, and Liverpool Bay SPA.

The results of the most recent aerial digital surveys for Awel y Môr OWF are presented in Table 2 and Figure 4 to Figure 10. No formal analyses have been undertaken to date, but initial observations indicate red-throated diver are most common within the south-eastern part of the buffer zone, often in close proximity to the existing operational Gwynt y Môr OWF (Figure 3 to Figure 9).

Table 2 **Raw counts and abundance and density estimates (bird per km^2) of red-throated divers in: a) Awel y Môr OWF plus buffer, b) Awel y Môr OWF, and c) the Awel y Môr OWF buffer only.**

a) Awel y Môr OWF plus buffer			
Survey	**Raw Count**	**Abundance**	**Density**
Mar-19	12	101	0.16
Apr-19	4	40	0.06
Oct-19	9	78	0.12
Nov-19	2	17	0.03
Dec-19	3	26	0.04
Jan-20	9	91	0.14
Feb-20	6	60	0.10
Winter (Oct – Mar) mean	**6.8**	**93.3**	**0.098**
b) Awel y Môr OWF			
Survey	**Raw Count**	**Abundance**	**Density**
Apr-19	1	9	0.08
Oct-19	1	8	0.07
Feb-20	1	9	0.08
Winter (Oct – Mar) mean	**0.3**	**2.8**	**0.025**
c) Buffer only			
Survey	**Raw Count**	**Abundance**	**Density**
Mar-19	12	102	0.20
Apr-19	3	31	0.06
Oct-19	8	70	0.14
Nov-19	2	18	0.03
Dec-19	3	26	0.05
Jan-20	9	93	0.18
Feb-20	5	51	0.10
Winter (Oct – Mar) mean	**6.5**	**60**	**0.117**

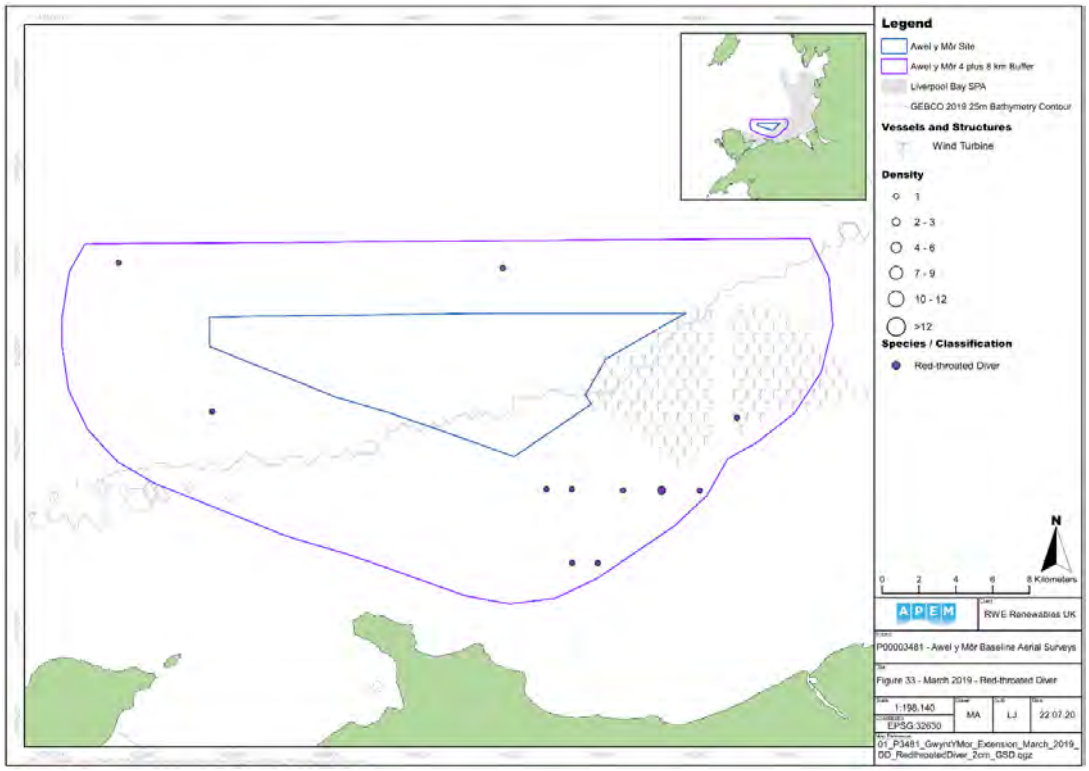

Figure 4 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in March 2019.

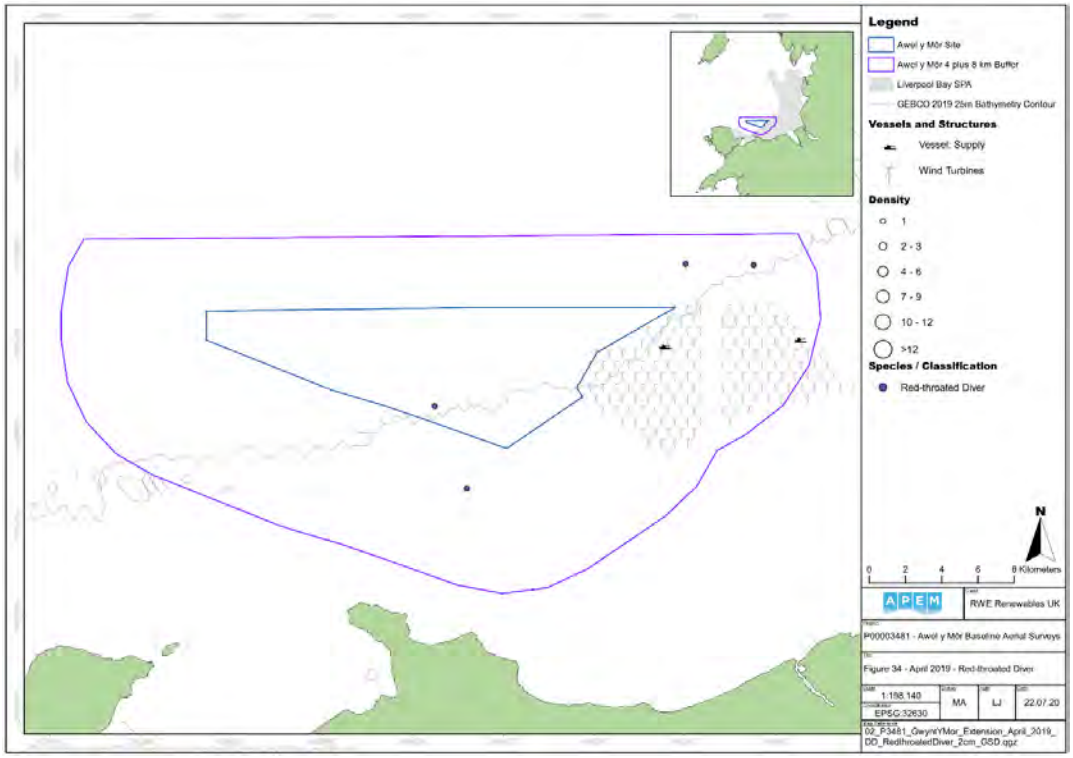

Figure 5 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in April 2019.

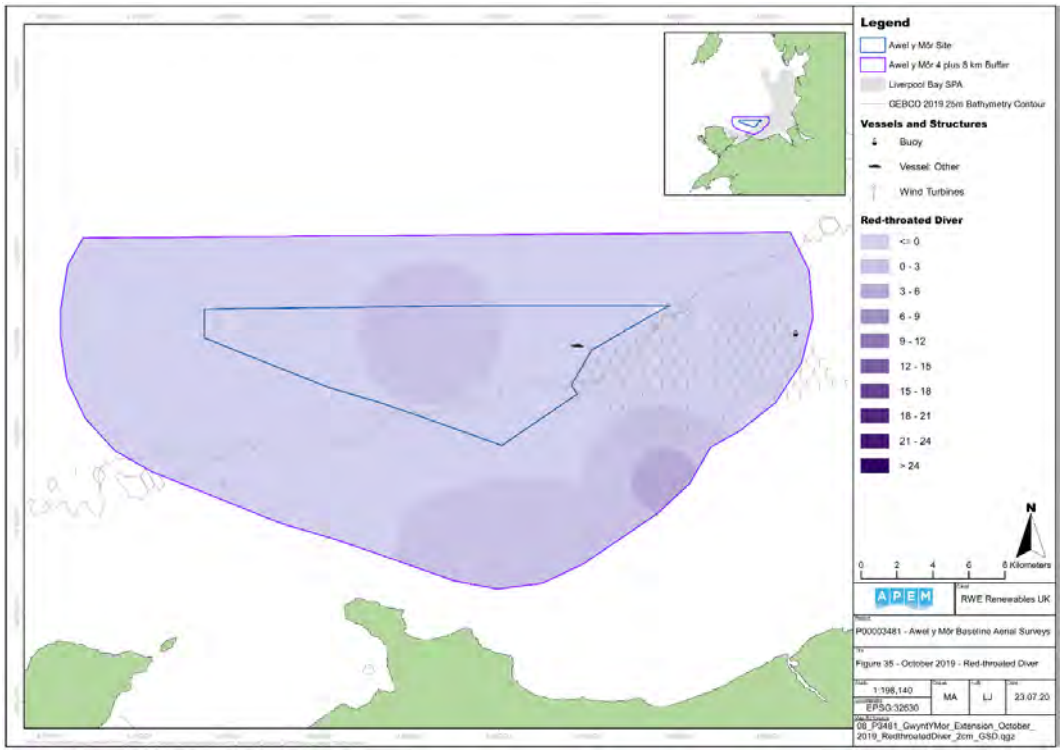

Figure 6 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in October 2019.

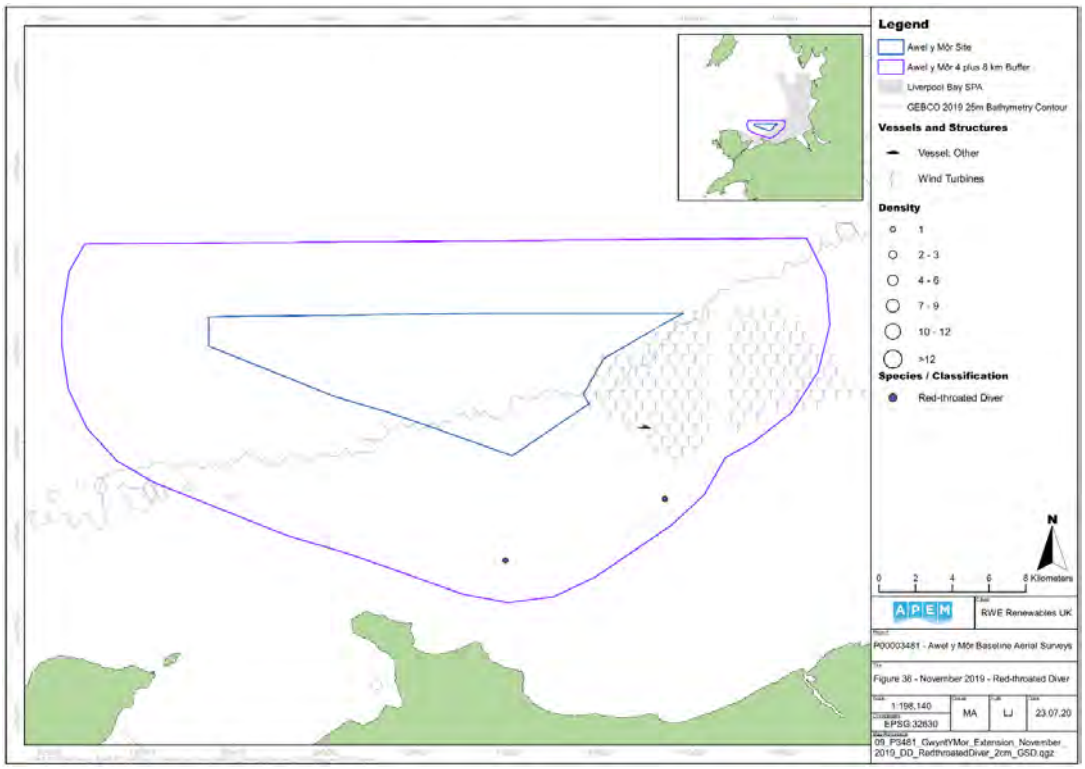

Figure 7 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in November 2019.

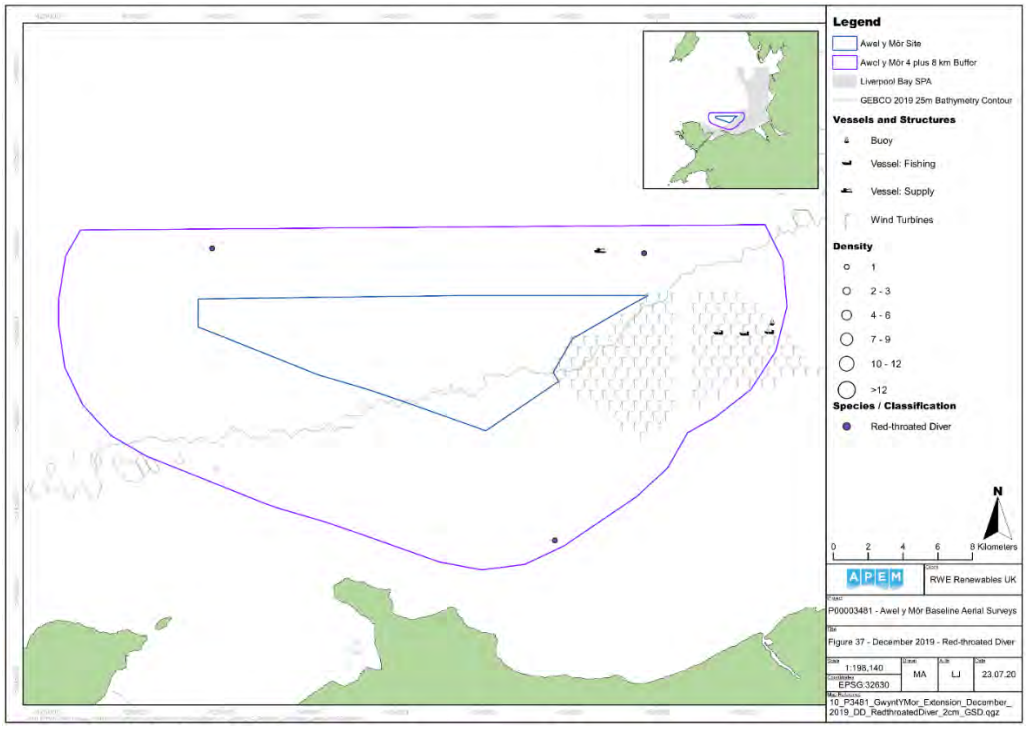

Figure 8 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in December 2019.

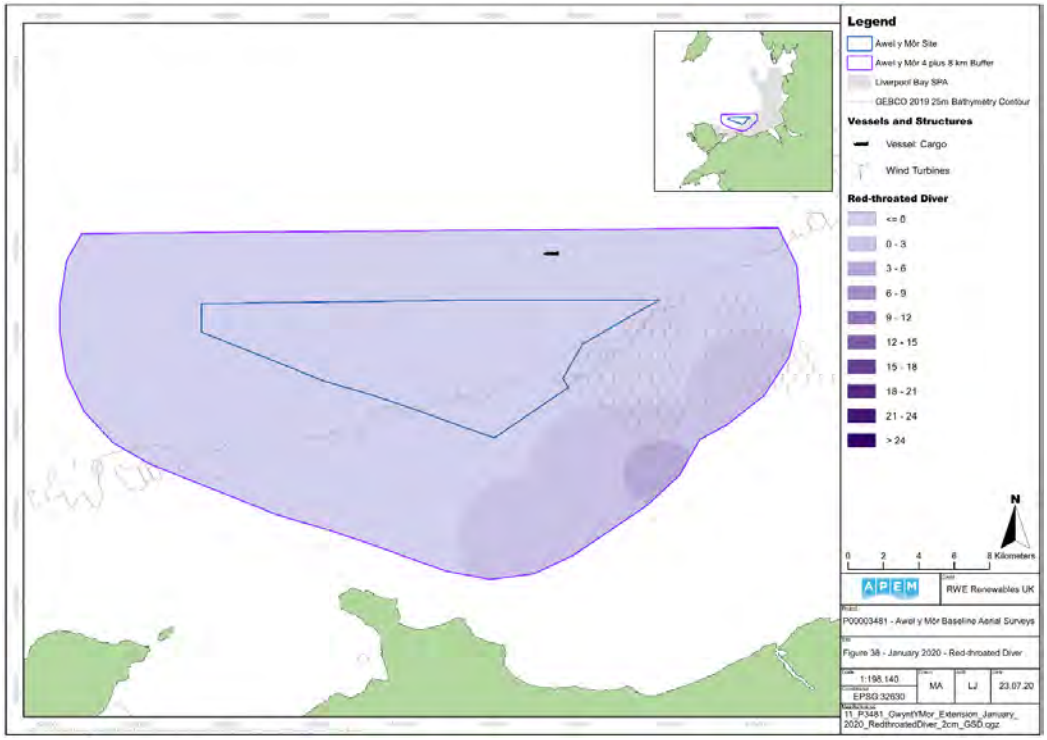

Figure 9 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in January 2020.

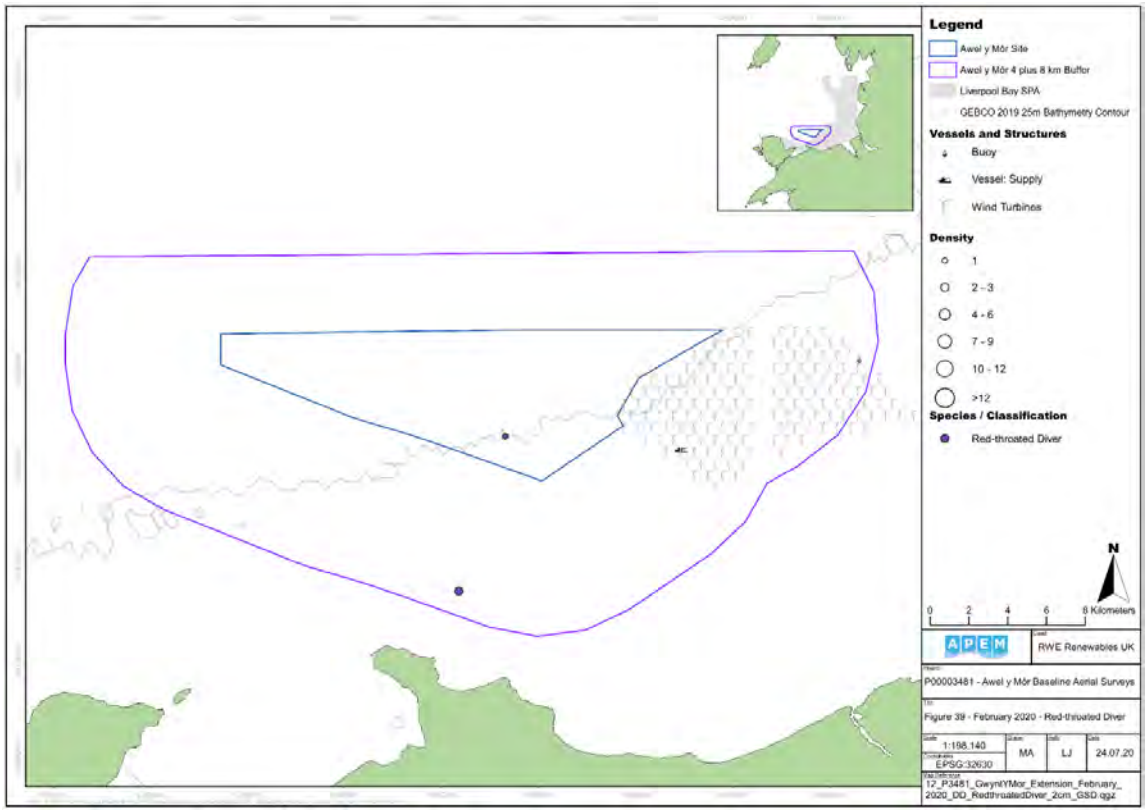

Figure 10 Distribution of red-throated divers recorded in the Awel y Môr OWF plus 4-8 km buffer in February 2020.

1.4 Appendix D4: Marine Ecology and Marine Mammals

Dec 2020

SMRU Consulting

understand • assess • mitigate

Briefing Note

Use of ADDs to mitigate PTS-onset from pile driving

Background

As part of the Awel-y-Mor (AyM) Environmental Impact Assessment (EIA), the Applicant wishes to retain the option to include the use of Acoustic Deterrent Devices (ADDs) as part of the Marine Mammal Mitigation Protocol (MMMP) in order to reduce the potential impact of permanent threshold shift (PTS) from pile driving to negligible levels. The use of ADDs as mitigation relies on the premise that the ADD noise will deter marine mammals out of the piling PTS-onset impact area in order to reduce the risk of auditory injury caused by subsequent pile driving activities. In October 2016, the Joint Statutory Nature Conservation Bodies[1] released a position statement on the use of Acoustic Deterrents for the mitigation of injury to marine mammals during pile driving for offshore wind farm construction. The position statement concluded that:

> *" the SNCBs agree that the evidence presented in the Phase 2, Stage 1 report[2] supports the premise that some ADDs could significantly reduce the risk of harbour porpoise and harbour seals being present within the typical zones of auditory injury resulting from pile driving."*

Therefore, recently constructed offshore wind farms have incorporated use of ADDs into their MMMPs, in order to help deter marine mammals out of the PTS-onset injury zone and thus reduce the risk of PTS to negligible levels. However, it is recognised that using this well established and effective mitigation involves adding more noise to the environment. Therefore, as part of the AyM EIA Evidence Plan process, Natural Resources Wales (NRW) have requested further information on the approach that AyM will use to incorporate ADDs in the modelling and MMMP.

AyM approach

The AyM quantitative impact assessment will assess the unmitigated impact of pile driving on marine mammals in order to determine the potential significance of impact (i.e. no ADD use before the soft start). This will provide the unmitigated impact ranges for the onset of PTS. Should these PTS-onset impact ranges extend further than can be mitigated by measures that do not cause disturbance, such as Marine Mammal Observers (MMOs) and Passive Acoustic Monitoring (PAM), then additional methods will need to be considered in the MMMP.

Recent offshore windfarm projects have considered the use of ADDs as pre-piling mitigation in the MMMP. In these circumstances, the duration of the ADD use is calculated as the amount of time it would take a fleeing animal to exit the PTS-onset impact range, calculated using underwater noise propagation modelling. At the pre-application phase, until unmitigated PTS-onset impact range have been modelled, the Applicant is unable to judge how long an ADD duration period would be required

[1] JNCC, Natural England, Scottish Natural Heritage and Natural Resources Wales

[2] Sparling, C., C. Sams, S. Stephenson, R. Joy, J. Wood, J. Gordon, D. Thompson, R. Plunkett, B. Miller, and T. Götz. 2015. ORJIP Project 4, Stage 1 of Phase 2: The use of Acoustic Deterrents for the mitigation of injury to marine mammals during pile driving for offshore wind farm construction. Final Report. SMRUC-TCT-2015-006, Submitted to The Carbon Trust, October 2015 (Unpublished).

to remove animals from the PTS-onset impact zone. Modelling planned during this pre-application phase will be based on what is considered a realistic set of worst case assumptions with regard to parameters that influence underwater noise propagation to ensure that confidence can be held by regulators that the actual constructed scenario will be no greater (and frequently substantively lower) than presented in the ES. Therefore, it is important to recognise that any consideration of ADD usage, duration and effects at this stage apply to the mitigation of this set of worst case assumptions, and not to the mitigation of the actual constructed scenario. Until information such as site-specific ground data, the selected final foundation parameters and the foundation piling contractors installation specifications are available, the PTS-onset ranges predicted will remain worst case and precautionary. It is not until post consent studies have been completed, the final scheme design is fixed and contractors are in place that the final noise modelling can take place. This final noise modelling will assess the actual construction parameters and will be used to refine the final MMMP that is developed prior to the commencement of offshore works.

In terms of how the AyM assessment will actually consider impacts from application of ADDs, we propose to present the unmitigated maximum design scenario PTS-onset impact ranges in the ES. A decision will then be made as to whether or not these impact ranges can be mitigated by MMOs and PAM. If not, then the use of alternative methods to reduce the risk of PTS to negligible levels will be considered. This will include, but will not be limited to, ADDs.

In the draft MMMP that will accompany the ES, we will present the evidence base for various mitigation options (including effective deterrence ranges for ADDs) and will summarise the potential impacts of these mitigation methods on marine mammals, as well as potential impacts on the duration of construction activity. If ADDs are considered, then it is important to recognise that there are a number of different ADD's in the marketplace, all of which result in different noise emission profiles. The Lofitech device is the most frequently used device around which the most empirical evidence exists and therefore, it is proposed that for the purposes of the MMMP, consideration of effects from ADD will be informed from evidence for this device. However, it is important to note that RWE do not wish to restrict themselves to this device at this stage.

Therefore, the AyM ES chapter will present the unmititgated PTS-onset risk, and the accompanying MMMP will determine what mitigation may be required to reduce these ranges to negligible levels, and will present an evidence base for effectiveness of any mitigation options considered.

Awel y Môr Offshore Wind Farm

ETG Clarification Note: Fish Noise Sensitivity Weighting Justification

Date: 26th November 2021

Revision: A

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AWEL Y MÔR
Offshore Wind Farm

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Fish Sensitivity Weighting Classification

1.1 Background

1 Following their statutory review of the fish and shellfish ecology assessment presented in the Preliminary Environmental Information Report (PEIR), Natural Resource Wales (NRW) requested clarification on how the sensitivity of fish and shellfish receptors is considered and weighted with regards sensitivity to noise impacts (for full details of the relevant consultation responses see Table 1). The clarification was specifically requested in relation to Group 1, 2 and 3 fish receptors as defined by Popper *et al.,* (2014).

2 This was discussed through the Evidence Plan Process at the Marine Ecology and Marine Mammals Expert Topic Group (ETG) meeting on 1st November 2021, where it was agreed that a clarification note be provided on the subject to the ETG members.

1.2 Applicant's Response

3 In response to NRW's request, Awel y Môr Offshore Wind Farm Limited (the 'Applicant') has provided additional justification within this clarification note for the sensitivity weightings assigned to receptors within the fish and shellfish noise assessment as undertaken in the PEIR (Volume 2, Chapter 6: Fish and Shellfish Ecology) hereafter referred to as the Fish and Shellfish Chapter.

4 The aim is that the content of this note will be agreed so that the assessment presented in the Environmental Statement can be updated to reflect this. Therefore, NRW and the Applicant will be able to reach agreement on the conclusions of the assessment in the final ES.

Table 1: Consultation relevant to this clarification note.

NRW SECTION 42 RESPONSE	APPLICANT'S RESPONSE
It is not clear how the different vulnerability, recoverability or importance has been weighted or combined to produce an overall 'low' sensitivity of group 1 receptor species. For instance, sandeel are a Section 7 species, a key forage species for other receptors and has high intensity spawning grounds within the AyM study area, sandeel (*Hyperoplus lanceolatu, Ammodytes tobianus*) have very specific habitat requirements and are known to show site fidelity. Although NRW does not disagree that sandeel have low sensitivity to noise, it is not clear how the other attributes have been considered or weighted to arrive at the Low Sensibility rating. Furthermore, when compared to subsequent evaluations for group 2 receptors these have also been ascribed a 'low 'sensitivity, despite having a higher value/importance and higher being more sensitive to noise impacts.	This note provides clarification on how vulnerability, recoverability and importance have been considered in respect to Group 1 receptors (inclusive of sandeel) and Group 2 receptors in Table 3.
As per previous comments, in paragraph 92 group 3 receptors are given a sensitivity level of medium despite the group containing hearing specialist such as herring (*Clupea harengus*) and cod (*Gadus morhua*). The text	This note provides further rationale and evidence to support the sensitivity assessment of Group 3 receptors, (inclusive of herring and cod in Table 3.

NRW SECTION 42 RESPONSE	APPLICANT'S RESPONSE
provides no rationale or evidence to support the sensitivity level for the various fish receptors considered and NRW is therefore unable to comment on whether it is considered appropriate.	
In paragraph 93 it states: 'Group 3 receptors which have spawning grounds within the local vicinity of AyM (and so might be considered as stationary) include cod and whiting (*Merlangius merlangus*). All these species are pelagic spawners and so are not limited to specific sedimentary areas for spawning and consequently are considered likely to move away from injurious effects. It is not clear from this whether cod and whiting are considered as static receptors, or fleeting receptors. Furthermore, herring are described as being reactive to sound, when not engaged in spawning activity, indicating that they should therefore as static receptors when spawning, however this is not clear from the text. The Fish and Shellfish baseline report map of herring spawning areas and substrate suitability (page 30 of the pdf when viewed electronically) and further in Figure 11 shows suitable herring spawning area close to the array, and potentially within the 207 dB SPL peak/cum contour line.	Additional clarification on the sensitivity assessments of cod and whiting has been provided in Table 3. To confirm, cod and whiting have been considered as fleeing receptors in the assessment on the basis that they are pelagic spawners and are therefore not limited to specific sedimentary areas for spawning. Additional clarification on the sensitivity assessments of herring has been provided in Table 3. To confirm, the sensitivity of herring to noise impacts has been considered in the assessment, but on the basis that no herring spawning grounds are located within the vicinity of AyM, herring are considered likely to move away from injurious effects rather than remain stationary (as may be expected if engaging in spawning in spatially discrete spawning grounds). Suitable spawning substrates for herring alone does not indicate the presence of active spawning sites.

1.2.1 Sensitivity Weightings

5 Sensitivity scores of High, Medium, Low and Negligible are assigned to receptors in order to inform the impact assessments conducted within the Fish and Shellfish chapter. The sensitivity of a receptor to an impact and the magnitude of the impact itself are taken into consideration to determine the overall significance of the effect. Further detail on the matrix utilised to determine the significance of the impact are provided in Fish and Shellfish chapter.

6 The sensitivity of a receptor is determined by the vulnerability of the receptor to an impact, the recoverability of the receptor after the impact, and the receptor's value and importance.

7 The following parameters have also been taken into account:

- Timing of the impact: whether impacts overlap with critical life-stages or seasons (i.e. spawning, migration); and
- Probability of the receptor-impact interaction occurring (e.g. risk as defined by Popper *et al*. (2014)).

8 The criteria used to inform the overall sensitivity are detailed further below.

1.2.2 Vulnerability

9 The determination of a receptor's vulnerability to an impact is based on the ability of a receptor to accommodate a temporary or permanent change. The vulnerability of a receptor to noise impacts is based primarily on the receptor's hearing apparatus, specifically the role of the swim bladder in hearing. The basis for the vulnerability determination is the classification of the receptors into Popper *et al.* (2014) categories. These categories are as followed:

- Group 1 receptors: no swim bladder (particle motion detection);
- Group 2 receptors: Fish where swim bladder is not involved in hearing (particle motion detection); and
- Group 3 receptors: Fish where swim bladder is involved in hearing (primarily pressure detection).

10 The assessment of the receptor's vulnerability also considers the mobility of the receptor. Receptors that have the ability to flee from an impact are considered less sensitive than those that are stationary and unable to flee. When applying this consideration to a fish and shellfish assessment, static receptors typically include shellfish of limited mobility, fish that will potentially be engaging in spawning behaviours, substrate dependant receptors, and eggs and larvae. On this basis, 'static' receptors are considered to be of increased vulnerability to an impact.

11 In determining the overall sensitivity of a receptor to noise, the vulnerability of a receptor to the impact is given the greatest weighting.

1.2.3 Recoverability

12 The recoverability of the receptor is defined as the extent to which a receptor will recover following an impact. The rate of recovery is also taken into consideration in this criterion.

13 Regarding fish and shellfish receptors, the recoverability of a receptor typically relates to the ability of a receptor to return/recolonise an area after an impact, or for normal behaviours to resume. In addition, the rate in which recovery occurs is also taken into consideration.

14 There are various studies that evaluate the recoverability of fish and shellfish receptors following noise impacts, therefore this criterion is generally informed by a literature review. These sources are described in the Fish and Shellfish chapter.

1.2.4 Value and Importance

15 The value and importance of a receptor is a measure of the importance of a receptor in terms of its relative ecological, social or economic value or status. Regarding fish and shellfish receptors, the value and importance of the receptors is primarily informed by the conservation status of the receptor, the receptor's role in the ecosystem, and the receptor's geographic frame of reference. Note that for stocks of species which support significant fisheries, commercial value is also taken into consideration.

16 The value and importance of the receptor is defined by the following criteria:

- High value and importance: Internationally or nationally important (i.e. Annex II species listed as features of SACs and Section 7 species);
- Medium value and importance: Regionally important or internationally rare (i.e MCZ/rMCZ features (species classified as features of conservation importance), or Species that are of commercial value to the fisheries which operate within the Irish Sea);
- Low value and importance: Locally important or nationally rare (i.e species of commercial importance but do not form a key component of the fish assemblages within the AyM fish and shellfish study area); and
- Negligible value and importance: Not considered to be particularly important or rare.

1.2.5 Sensitivity weightings for noise impacts

17 Regarding the weighting of the criteria (vulnerability, recoverability and value and importance) for noise impacts, greater weighting is assigned to the vulnerability of a receptor, considering the hearing apparatus of each individual receptor as informed by the Popper *et al.*, 2014 criteria, and the mobility (of lack of), of each receptor. Expert judgement is used as appropriate, in line with the CIEEM 2018 Guidance (CIEEM, 2018), when applying the sensitivity criteria to the sensitivity assessment of receptors. For example, if receptors are considered of high value/importance, or have rapid recovery rates, these criteria may be given greater weighting in the assessment. A breakdown of the reasoning behind the sensitivity scores is provided in Table 2 below.

Table 2: Sensitivity of VERs.

RECEPTOR SENSITIVITY	DESCRIPTION/ REASON
High	Nationally and internationally important receptors with high vulnerability and no ability for recovery.

RECEPTOR SENSITIVITY	DESCRIPTION/ REASON
Medium	Regionally important receptors with high vulnerability and no ability for recovery. Nationally and internationally important receptors with medium to high vulnerability and low to medium recoverability.
Low	Locally important receptors with medium to high vulnerability and low recoverability. Regionally important receptors with low vulnerability and medium recoverability. Nationally and internationally important receptors with low vulnerability and medium to high recoverability.
Negligible	Receptor is not vulnerable to impacts regardless of value/ importance. Locally important receptors with low vulnerability and medium to high recoverability.

1.2.6 Underwater Noise Sensitivity Assessments of Awel y Môr VERs

18 The sensitivities of the VERs as defined in Volume 4, Annex 6.1: Fish and Shellfish Ecology Technical Baseline to underwater noise impacts are evaluated in Table 3, with justification for the assignment of sensitivity scores.

Table 3: Sensitivity assessment of VERs in the context of underwater noise impacts.

VALUED ECOLOGICAL RECEPTOR	VULNERABILITY	RECOVERABILITY	VALUE/IMPORTANCE	SENSIVITY
Sandeel	Low vulnerability Group 1 receptors (Popper *et al.*, 2014). Sandeel spawning grounds (of low and high intensity) and suitable spawning habitats are widely distributed across the Irish Sea, and therefore noise impacts are anticipated to be small in the context of the wider environment. Sandeel are considered stationary receptors due to their burrowing nature, substrate dependence and demersal spawning nature, sandeel are consequently thought to have limited ability to flee the affected area.	Medium recoverability. Sandeel are anticipated to recover from noise impacts shortly after noise disturbance, with normal behaviours resuming (Hassel *et al.*, 2004). On this basis, sandeel are considered to have medium recoverability to noise impacts.	National importance. Environment (Wales) Act 2016 Section 7 priority species.	**Low** sensitivity
Sole (*Solea solea*)	Low vulnerability Group 1 receptors (Popper *et al.*, 2014). These species lack swim bladder and are of mobile nature and are therefore able to flee from noise disturbance.	Medium recoverability. Based on their low vulnerability to noise impacts, and their mobile nature, these receptors are expected to recover quickly, returning to normal behaviours, and recolonising areas shortly after disturbance	National importance. Environment (Wales) Act 2016 Section 7 priority species.	**Low** sensitivity
Plaice (*Pleuronectes platessa*)				**Low** sensitivity
Mackerel (*Scomber scombrus*)			Regional importance. Commercially important species to the region.	**Low** sensitivity
Dab (*Limanda limanda*)			Local importance. Commercially important species to the region.	**Low** sensitivity
Elasmobranchs			Local to international (Basking Shark) importance	**Low** sensitivity

VALUED ECOLOGICAL RECEPTOR	VULNERABILITY	RECOVERABILITY	VALUE/IMPORTANCE	SENSIVITY
Sea lamprey (*Petromyzon marinus*)			International Importance. Designated under Appendix III of the Bern Convention, Annex II of the EC Habitats Directive, Schedule 5 of the Wildlife and Countryside Act, and are Environment (Wales) Act 2016 Section 7 priority species.	**Low** sensitivity
River lamprey (*Lampetra fluviatilis*)				**Low** sensitivity
Atlantic Salmon (*Salmo salar*)	Low vulnerability Group 2 receptors (Popper *et al.*, 2014). These species possess a swim bladder, but it is not involved in hearing (but can detect particle motion). These species are migratory and are therefore likely to be transient receptors within the site and are therefore considered to be mobile receptors, and able to flee from noise impacts.	Medium recoverability. Based on their low vulnerability to noise impacts, and their mobile nature, these receptors are expected to recover quickly, returning to normal behaviours, and recolonising areas shortly after disturbance.	International importance. Designated under Annex III of the Bern convention and freshwater populations on Annexes II and V of the EC Habitats Directive. Atlantic salmon are a Section 7 priority species under the Environment (Wales) Act 2016.	**Low** sensitivity
Sea trout (*Salmo trutta*)			National importance Environment (Wales) Act 2016 Section 7 priority species.	**Low** sensitivity
Herring	Medium vulnerability Group 3 receptors (Popper *et al.*, 2014). These species have a swim bladder involved in sound detection and are therefore considered to be the most sensitive to underwater noise, with direct detection of sound pressure, and particle motion. Herring do not have spawning grounds close enough to AyM to be affected by underwater noise and have high mobility, and consequently are considered likely to	Medium recoverability. Based on their mobile nature, these receptors are expected to recover quickly, returning to normal behaviours, and recolonising areas shortly after disturbance.	National importance Environment (Wales) Act 2016 Section 7 priority species.	**Medium** sensitivity

VALUED ECOLOGICAL RECEPTOR	VULNERABILITY	RECOVERABILITY	VALUE/IMPORTANCE	SENSIVITY
	move away from injurious effects rather than remain stationary.			
Sprat (*Sprattus sprattus*)	Medium vulnerability Group 3 receptors (Popper *et al.*, 2014). These species have a swim bladder involved in sound detection and are therefore considered to be the most sensitive to underwater noise, with direct detection of sound pressure, and particle motion.		Regional Importance. Species of commercial importance	**Medium** sensitivity
Ling (*Molva molva*)			National importance Environment (Wales) Act 2016 Section 7 priority species.	**Medium** sensitivity
Hake (*Merluccius merluccius*)			National importance Environment (Wales) Act 2016 Section 7 priority species. Likely prey items for fish, bird and marine mammal species.	**Medium** sensitivity
European eel (*Anguilla Anguilla*)			International importance. Critically endangered on the IUCN Red List and Environment (Wales) Act 2016 Section 7 priority species.	**Medium** sensitivity
Allis shad (*Alosa alosa*)			International importance. Appendix III of the Bern Convention respectively, Annexes II and V of the EC Habitats Directive, Schedule 5 of the Wildlife and Countryside Act and Environment (Wales) Act 2016 Section 7 priority species	**Medium** sensitivity
Twaite shad (*Alosa fallax*)				**Medium** sensitivity
Smelt (*Osmerus eperlanus*)			National importance Environment (Wales) Act 2016 Section 7 Priority Species	**Medium** sensitivity
Cod	Medium vulnerability		International importance.	**Medium** sensitivity

VALUED ECOLOGICAL RECEPTOR	VULNERABILITY	RECOVERABILITY	VALUE/IMPORTANCE	SENSIVITY
	Group 3 receptors (Popper *et al.*, 2014). These species have a swim bladder involved in sound detection and are therefore considered to be the most sensitive to underwater noise, with direct detection of sound pressure, and particle motion. Whilst cod and whiting both have spawning grounds within the vicinity of AyM, both species are pelagic spawners and are therefore not limited to specific sedimentary areas for spawning, and consequently are considered likely to move away from injurious effects.		Commercially important species. Listed by OSPAR as threatened and/or declining and listed as vulnerable on the IUCN Red List.	
Whiting			National importance Environment (Wales) Act 2016 Section 7 Priority Species Forms a key component of the fish assemblages across the AyM array area.	**Medium** sensitivity

1.3 References

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Awel y Môr Offshore Wind Farm

ETG Clarification Note: Fish Spawning Potential

Date: 26th November 2021

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Table 1: Consultation relevant to this clarification note. 5
Table 2: Spawning potential affected by piling on key receptors. 10

Spawning Potential Calculations for Key Receptors

1.1 Background

1 Following their statutory review of the fish and shellfish ecology assessment presented in the Preliminary Environmental Information Report (PEIR), Natural Resources Wales (NRW) requested clarification on the spawning potential assessments on key receptors (receptors with spawning grounds across the site, with the potential to be sensitive to noise). The full comment from NRW is presented in Table 1 below.

2 This was discussed through the Evidence Plan process at the Marine Ecology and Marine Mammals Expert Topic Group (ETG) meeting on 1st November 2021, where it was agreed that a clarification note be provided on the subject to the ETG members.

3 The aim of this clarification note is to provide further detail with regards the use of the 'spawning potential' assessment methodology, to facilitate agreement of the approach and methodology.

4 It should be noted that the spawning potential calculations presented in this note are worked examples based upon the project design at the PEIR stage for the explicit purpose of presenting the methodology, and therefore as the project design is refined for final ES, the results of those calculations may change relative to those parameters presented in this note.

Table 1: Consultation relevant to this clarification note.

NRW SECTION 42 RESPONSE	APPLICANT'S RESPONSE
In several places in the assessment it is stated that the potential extent (area) of spawning/habitat affected is minimal, however no assessment of the total area of available habitat used in the	In response to NRW's request, Awel y Môr Offshore Wind Farm Limited (the 'Applicant') have provided additional clarification on the rationale and the calculations undertaken to define the spawning

NRW SECTION 42 RESPONSE	APPLICANT'S RESPONSE
assessment or the rationale has not been provided. E.g. for sandeel the text in paragraph 84 states that the worst-case temporal effect (see above on clarification on how spatial and temporal effects are defined) is <0.01% spawning potential, however it is not clear what has been considered the total available spawning grounds and why, and how this relates to the information presented in the Fish and Shellfish baseline report and spawning/nursery maps in Figures 2-6, in the Chapter itself. We are therefore unable to agree or disagree with the conclusion of minor adverse significance for group 1 receptors.	potentials of key spawning receptors, as provided in Section 1.5 of this note. The approach utilised to define spawning potentials of key receptors has been previously adopted for UK offshore wind farm projects including Walney Extension and Gwynt y Môr and aims to contextualise spatial impacts in terms of their temporal overlap with spawning periods. The use of a spawning potential approach is therefore established for Nationally Significant Infrastructure Projects (NSIPs), and in particular has been applied to consideration of potential effects on sole (Gwynt y Môr) and herring (Walney Extension), This approach is therefore considered appropriate to in considering the potential impact on the spawning potential for key AyM receptors.

1.2 Spawning Potential

5 The first step is to define the spawning potential for each species in terms of its spatial and temporal extent. To do this, the spawning periods for each species (t) are multiplied by the spawning area (a) to give the spawning potential S(pot).

6 Combining the spawning area and spawning period allows the calculation of the total spawning potential for each species which could be affected by noise impacts from AyM, using the formula:

$$t \times a = S(pot)$$

7 The spawning area for sole is defined by the Ellis *et al.* (2012) spawning ground extents for the Irish Sea, with high and low intensity spawning grounds located across the Irish Sea, of an area approximately 51,263 km^2.

8 The spawning ground for sandeel is defined by the Ellis *et al.* (2012) spawning ground extents for the Irish Sea, with high and low intensity spawning grounds located across the Irish Sea, of an area approximately 55,284 km^2.

9 For herring, the spawning grounds are defined by Coull *et al.* (1998) and are located off the Isle of Man. The high and low intensity spawning grounds cover an area of approximately 1093 km^2.

10 The spawning potential for each species respectively have been calculated using the formula presented above, the results are provided in Table 2 below.

1.3 Piling Time

11 Taking into account the temporal maximum design scenario (MDS), the piling of monopiles, the total piling time is 288 hours (based on 48 monopiles at a 6-hour piling duration per monopile) over a three-year construction period.

1.4 Piling Area

12 The piling area is defined as the potential spawning area affected by the potential zone of influence associated with underwater noise impacts and is represented by the modelled noise contours that overlap with the spawning grounds for the key receptors (sole, sandeel and herring). The following modelled noise contours for fleeing and spawning receptors have been used to inform the definition of the piling areas.

- 207dB – Mortality and mortal injury onset for Group 2 and Group 3 receptors;
- 203bB – Recoverable injury onset for Group 2 and Group 3 receptors; and
- 186dB - Temporary Threshold Shift (TTS) onset for Group 1, Group 2 and Group 3 receptors.

13 The modelled noise outputs and their spatial overlaps with spawning grounds are presented in Figure 1, Figure 2 and Figure 3.

14 For herring, there is no overlap of any of the noise contours with the Isle of Man spawning ground (see Figure 3), and therefore it can be concluded with confidence that there is no meaningful effect-receptor pathway that could lead to a significant effect on herring spawning from noise impacts. Herring are therefore not considered any further in the assessment of spawning potential within this clarification note.

15 In Table 2, the piling areas have been presented in terms of both the fleeing modelling presented in the PEIR chapter, and stationary receptor modelling. Whilst the fleeing receptor model is supported by scientific literature including alignment with mean swim speeds recorded during the spawning season, it is recognised that the static receptor model provides for a highly precautionary assessment.

16 It should be noted that the maximum values given are reliant on piling at the worst-case modelled location being piled for the full 288 hours. In practice the maximum predicted spatial footprint for underwater noise will reduce at all other locations within the area and therefore, the maximum values presented can be concluded with confidence to be highly conservative.

1.5 Percentage of Spawning Potential

17 For the percentage of spawning potential affected, the affected spawning potential (area affected multiplied by piling time) is expressed as a percentage of the total spawning potential for each species and has been agreed as a suitable method of calculating the scale of potential impact on other OWFs within UK waters.

18 Table 2 provides the information used to inform each step of the spawning potential calculation for both sole and sandeel. Initially the total area of spawning grounds is presented, alongside the spawning period duration; this is calculated in hours through reference to the total spawning season. The total piling duration is then presented alongside the maximum predicted zone of influence for each of the agreed thresholds, from eggs and larvae through to a potential temporary threshold shift (TTS) in adult fishing hearing. Finally, the conclusions are presented by expressing the predicted impact on spawning potential as a proportion of the overall species spawning potential.

19 Table 2 concludes that the spawning potential affected for both sole and sandeel (eggs and larvae through to TTS) is predicted to be less than 1% for both species when considered as either fleeing or stationary receptors.

20 With the provision of impact ranges for both fleeing and stationary receptors, and the worst-case modelled locations used to inform the assessment, the approach used is considered very precautionary. The results therefore provide a robust and precautionary basis on which to draw a conclusion for the likely impact on spawning potential.

21 As a result of <1% spawning potential being impacted under any scenario for either sole or sandeel, no significant effects are anticipated to occur on the spawning stocks of sole or sandeel. In this context, any further mitigation such as seasonal restrictions or the application of bubble curtains) are considered disproportionate to the scale of effect and would not offer a material benefit.

Table 2: Spawning potential affected by piling on key receptors.

TOTAL SPAWNING PERIOD		
Sole	Total spawning time (from April to June) over three years	6,552 hrs
	Total spawning area across Irish Sea (Ellis *et al.*, 2010)	51,263 km^2
	Total Maximum spawning potential	335,875,176 km^2hr
Sandeel	Total spawning time November to February (Ellis *et al.*., 2012)) over three years	8,064 hrs
	Total spawning area across Irish Sea (Ellis *et al.*, 2010)	55,284 km^2
	Total Maximum spawning potential	445,810,176 km^2hr
PILING TIME		
Sole	Max Piling Time over 65 Day period (over 3-year construction period	288 hrs
Sandeel	Max Piling Time over 65 Day period (over 3-year construction period	288 hrs
PILING AREA		
Area of Spawning Grounds Affected by Subsea Piling Noise at 186 dB SEL_{cum}		
Sole	Stationary receptor (Ellis *et al.,* 2012)	2442.30 km^2
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	777.74 km^2

Sandeel	Stationary receptor (Ellis *et al.*, 2012)	2442.30 km^2
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	777.74 km^2
Area of Spawning Grounds Affected by Subsea Piling Noise at 203 dB SEL_{cum}		
Sole	Stationary receptor (Ellis *et al.*, 2012)	466.40 km^2
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.06 km^2
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	466.40 km^2
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.06 km^2
Area of Spawning Grounds Affected by Subsea Piling Noise at 207 dB SEL_{cum}		
Sole	Stationary receptor (Ellis *et al.*, 2012)	241.67 km^2
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.04 km^2
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	241.67 km^2
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.04 km^2
AFFECTED SPAWNING POTENTIAL		
Affected Spawning Potential by Subsea Piling Noise at 186 dB SEL_{cum}		
Sole	Stationary receptor (Ellis *et al.*, 2012)	703382.40 km^{2}hr

	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	223989.12 km²hr
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	703382.40 km²hr
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	223989.12 km²hr
Affected Spawning Potential by Subsea Piling Noise at 203 dB SEL_{cum}		
Sole	Stationary receptor (Ellis *et al.*, 2012)	134323.49 km²hr
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	17.11 km²hr
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	134323.49 km²hr
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	17.11 km²hr
Affected Spawning Potential by Subsea Piling Noise at 207 dB SEL_{cum}		
Sole	Stationary receptor (Ellis *et al.*, 2012)	375,073.39 km²hr
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	60.79 km²hr
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	375,073.39 km²hr
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	60.79 km²hr
% OF TOTAL SPAWNING POTENTIAL AFFECTED BY PILING		
% of Total Spawning Potential Affected by Piling (TTS 186 dB SEL_{cum})		

Sole	Stationary receptor (Ellis *et al*. 2012)	0.209%
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al*. 2012)	0.067%
Sandeel	Stationary receptor (Ellis *et al*. 2012)	0.158%
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al*. 2012)	0.050%
% of Total Spawning Potential Affected by Piling (203 dB SEL_{cum})		
Sole	Stationary receptor (Ellis *et al.*, 2012)	0.040%
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.000%
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	0.030%
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.000%
% of Total Spawning Potential Affected by Piling (207 dB SEL_{cum})		
Sole	Stationary receptor (Ellis *et al.*, 2012)	0.112%
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.000%
Sandeel	Stationary receptor (Ellis *et al.*, 2012)	0.084%
	Fleeing Receptor (Assuming 1.5m/s fleeing speed) (Ellis *et al.*, 2012)	0.000%

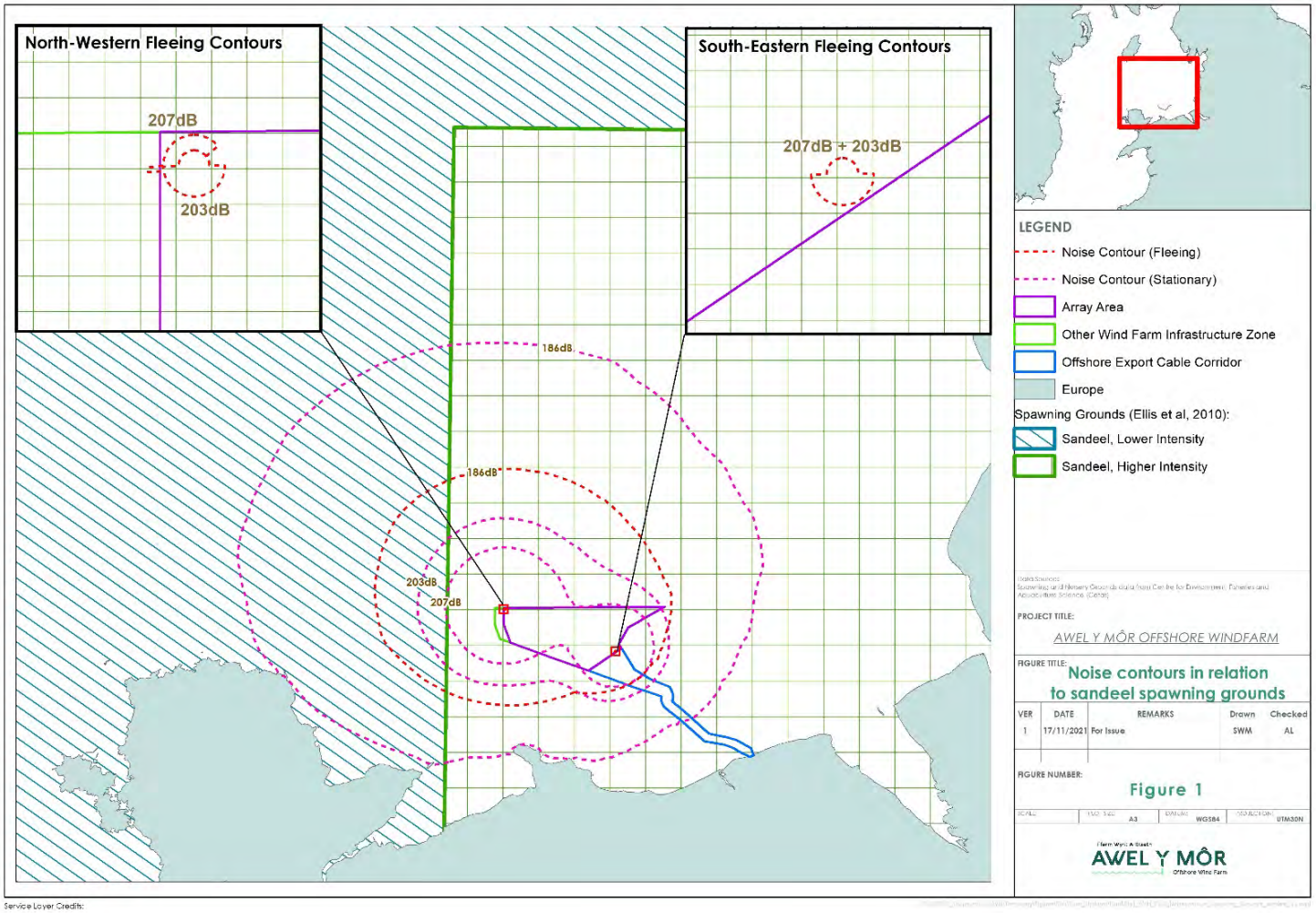

Figure 1: Noise contours in relation to sandeel spawning grounds.

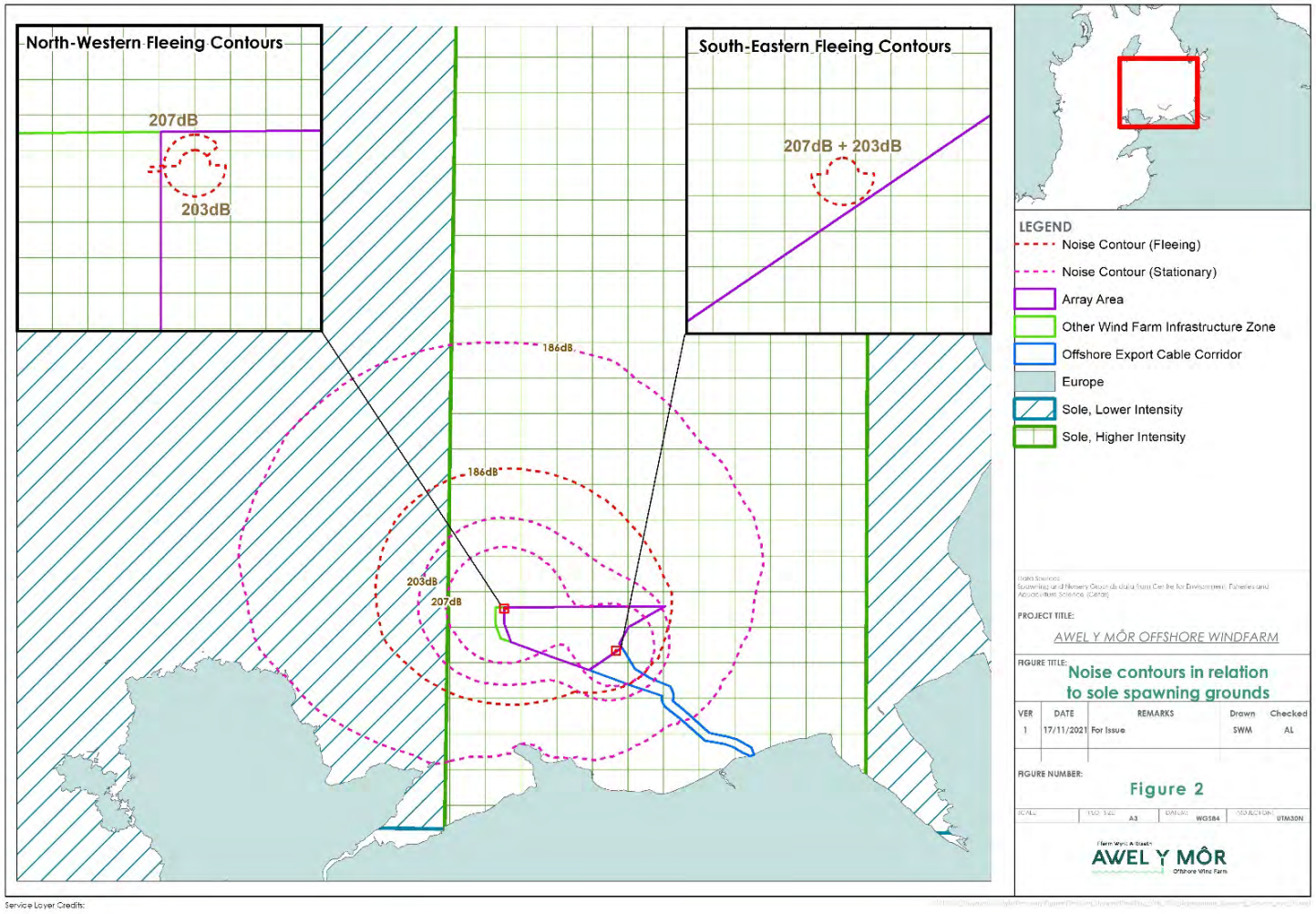

Figure 2: Noise contours in relation to sole spawning grounds.

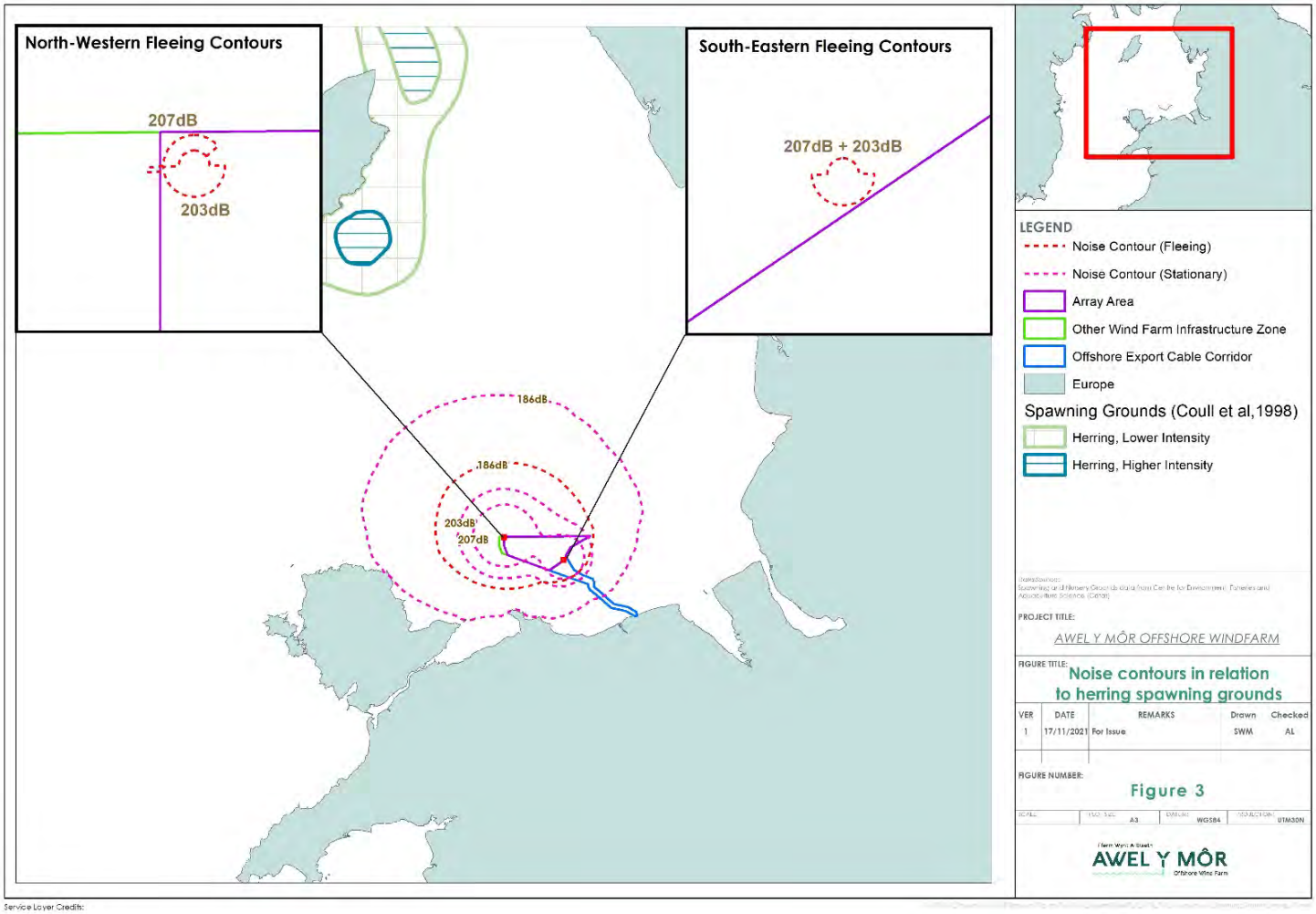

Figure 3: Noise contour in relation to herring spawning grounds.

1.6 References

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Ellis, J.R.. Milligan, S.P. Readdy, L. Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Cefas Scientific Series Technical Report 147.

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ETG Clarification Note: Marine Mammal PTS Sensitivity to Piling

Date: 26th November 2021

Revision: A

Fferm Wynt Alltraeth
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Offshore Wind Farm

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November 2021

PTS Sensitivity Note

SMRU Consulting
understand • assess • mitigate

Marine mammal sensitivity to PTS-onset from pile driving

Background

The Awel y Môr (AyM) PEIR was submitted in August 2021 and included an assessment of the impact of PTS-onset from impact pile driving on marine mammal species. The PEIR concluded that the sensitivity of cetacean species to PTS-onset from pile driving was "Low" and for grey seals was "Negligible". In their s42 comments, NRW stated the following:

> *NRW do not agree with the PTS sensitivity score of 'negligible' for grey seal, and believe it should be ranked 'low'*
>
> *NRW do not agree with the PTS sensitivity score of 'low' for cetaceans, and believe it should be ranked 'medium'*
>
> *The sensitivity decision justifies a conclusion of 'low' by stating "there is currently no evidence that PTS at this specific frequency and at this specific magnitude will cause a significant impact on either survival or reproductive rates." The sensitivity criteria makes no reference to the significance of an impact, instead describing the presence of any effect and the potential for adaptability. The elicitation suggests that a low but not negligible impact on fertility and survivability is present […]. NRW advise that the supporting evidence demonstrates that a change may be caused in both reproduction and survivability in bottlenose dolphin and harbour porpoise, that this change (the threshold shift) is not recoverable, and that the capacity for animals to adapt to or overcome the resulting change in survivability or fertility is unknown. Because of this NRW advise that the cetacean sensitivity to PTS, bottlenose dolphin sensitivity in particular, should be ranked 'medium' instead of 'low'.*

The purpose of this note is to:

- Provide additional information on the results of the expert elicitation for the effects of PTS-onset from pile driving on marine mammal vital rates (survival and reproduction), which is the only scientific assessment to date, of the effect of threshold shifts on vital rates.
- Update the definitions for marine mammal sensitivity to consider the significance of impact.

PEIR definition of sensitivity

Table 1 outlines the definitions that were used to assess marine mammal sensitivity in the AyM PEIR chapter. As noted by NRW, these definitions did not make any reference to the significance of an impact. However, based on the results of the expert elicitation on the effects of PTS-onset on marine mammals (see next section), SMRU Consulting considers that it is important to consider the significance of an impact, rather than solely whether or not an impact could potentially occur.

PTS Sensitivity Note

Table 1 Definition of sensitivity used in the AyM marine mammal PEIR

Sensitivity	Description
High	No ability to adapt behaviour so that individual survival and reproduction rates are affected. No tolerance – effect will cause a change in both reproduction and survival rates. No ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Medium	Limited ability to adapt behaviour so that individual survival and reproduction rates may be affected. Limited tolerance – effect may cause a change in both reproduction and survival of individuals. Limited ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Low	Ability to adapt behaviour so that individual reproduction rates may be affected but survival rates not likely to be affected. Some tolerance – effect unlikely to cause a change in both reproduction and survival rates. Ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Negligible	Receptor is able to adapt behaviour so that individual survival and reproduction rates are not affected. Receptor is able to tolerate the effect without any impact on reproduction and survival rates. Receptor is able to return to previous behavioural states/activities once the impact has ceased.

PTS expert elicitation

The ecological consequences of PTS for marine mammals are uncertain. At a Department for Business, Energy & Industrial Strategy (BEIS) funded expert elicitation workshop held at the University of St Andrews (March 2018), experts in marine mammal hearing discussed the nature, extent and potential consequence of PTS to UK marine mammal species (Booth and Heinis 2018). **This workshop outlined and collated the best and most recent empirical data available on the effects of threshold shifts on marine mammals.** A number of general points came out in discussions as part of the elicitation. These included that PTS did not mean animals were deaf (instead a limited notch of hearing would be lost, in a specific frequency range of hearing ability), that the limitations of the ambient noise environment on maximum threshold shifts from broadband impulsive noise should be considered, and that the magnitude and frequency band in which PTS would manifest are critical to assessing the effect on vital rates.

Southall *et al.* (2007) defined the onset of PTS as a non-recoverable elevation of the hearing threshold of 6 dB. Based upon TTS growth rates obtained from the scientific literature, it has been assumed that the onset of PTS occurs after TTS has grown to 40 dB. The growth rate of TTS is dependent on the

frequency of exposure, but is nevertheless assumed to occur as a function of an exposure that results in 40 dB of TTS (i.e. 40 dB of TTS is assumed to equate to 6 dB of PTS).

For piling noise, most energy is between ~30-500 Hz, with a peak usually between 100–300 Hz and energy extending above 2 kHz (Kastelein et al. 2015, Kastelein et al. 2016). Studies have shown that exposure to impulsive pile driving noise induces TTS in a relatively narrow frequency band (ie a 'notch') in harbour porpoise and harbour seals (reviewed in Finneran 2015), with statistically significant (but not necessarily ecologically significant) TTS occurring at 4 and 8 kHz (Kastelein et al. 2016) and centred at 4 kHz (Kastelein et al. 2012a, Kastelein et al. 2012b, Kastelein et al. 2013, Kastelein et al. 2017). Therefore, during the expert elicitation, the experts agreed that any threshold shifts as a result of pile driving would manifest themselves in the 2-10 kHz range (Kastelein et al. 2017) and that a PTS 'notch' of 6 dB, in a narrow frequency band in the 2-10 kHz region, is unlikely to significantly affect the fitness of individuals (ability to survive and reproduce). The expert elicitation concluded that:

> *… the effects of a 6 dB PTS in the 2-10 kHz band was unlikely to have a large effect on survival or fertility of the species of interest.*
>
> *… for all species experts indicated that the most likely predicted effect on survival or fertility as a result of 6 dB PTS was likely to be very small (i.e. <5 % reduction in survival or fertility).*
>
> *… the defined PTS was likely to have a slightly larger effect on calves/pups and juveniles than on mature females survival or fertility.*

The following sections are extracts from the conclusions and figures in the expert elicitation report (Booth and Heinis 2018).

Harbour porpoise	The key conclusion statements for the impact of a 6 dB PTS in the 2-10 kHz band on harbour porpoise are outlined in Table 2. The predicted decline in harbour porpoise vital rates from the impact of a 6 dB PTS in the 2-10 kHz band for different percentiles of the elicited probability distribution are provided in Table 3. Probability distributions for the effects on vital rates for harbour porpoise as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band are provided in Figure 1 (fertility), Figure 2 (adult survival) and Figure 3 (calf survival).
Bottlenose dolphin	The key conclusion statements for the impact of a 6 dB PTS in the 2-10 kHz band on bottlenose dolphins are outlined in Table 4 . The predicted decline in bottlenose dolphin vital rates from the impact of a 6 dB PTS in the 2-10 kHz band for different percentiles of the elicited probability distribution are provided in Table 5. Probability distributions for the effects on vital rates for bottlenose dolphins as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band are provided in Figure 4 (fertility), Figure 5 (adult survival) and Figure 6 (calf survival).
Harbour & grey seals	The key conclusion statements for the impact of a 6 dB PTS in the 2-10 kHz band on harbour and grey seals are outlined in Table 6.

	The predicted decline in harbour and grey seals vital rates from the impact of a 6 dB PTS in the 2-10 kHz band for different percentiles of the elicited probability distribution are provided in Table 7. Probability distributions for the effects on vital rates for harbour and grey seals as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band are provided in Figure 7 (fertility), Figure 8 (adult survival) and Figure 9 (pup survival).

Harbour porpoise

Table 2 Conclusion statements from the expert elicitation for PTS effects on harbour porpoise

Fertility	*"Overall, experts felt that there was an **extremely low risk** of harbour porpoise fertility being affected by the defined PTS, because foraging is unlikely to be affected as echolocation signals are well outside the PTS band."*
Adult survival	*"Experts felt that the impacts of both defined PTS magnitudes on mature female porpoise survival were likely to be **low**, because both fell outside the key frequency range used in foraging."* *"Experts noted that even with a larger PTS (18 dB), animals (in this frequency band) would still be ambient noise limited most of the time."*
Calf survival	*"Experts also felt there was an increased risk of predation from marine predators (e.g. seals, bottlenose dolphins) in naïve porpoises."* *"Overall, experts agreed that […] the most likely effect on survival was **very low**."*

The predicted decline in harbour porpoise vital rates from the impact of a 6 dB PTS in the 2-10 kHz band for different percentiles of the elicited probability distribution are provided in Table 3. The data provided in Table 3 should be interpreted as:

- Experts estimated that the median decline in an individual mature female harbour porpoise's survival was 0.01% (due to a 6 dB PTS (a notch a few kHz wide and 6 dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual mature female harbour porpoise's fertility was 0.09% (due to a 6 dB PTS (a notch a few kHz wide and 6 dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual harbour porpoise juvenile or dependent calf survival was 0.18% (due to a 6 dB PTS (a notch a few kHz wide and 6 dB high) occurring somewhere in the hearing between 2-10 kHz).

Table 3 Predicted decline in harbour porpoise vital rates for different percentiles of the elicited probability distribution.

	Percentiles of the elicited probability distribution								
	10%	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**
Adult survival	0	0	0	0.01	**0.01**	0.03	0.05	0.1	0.23
Fertility	0	0	0.02	0.05	**0.09**	0.16	0.3	0.7	1.35
Calf or Juvenile survival	0	0	0.02	0.09	**0.18**	0.31	0.49	0.8	1.46

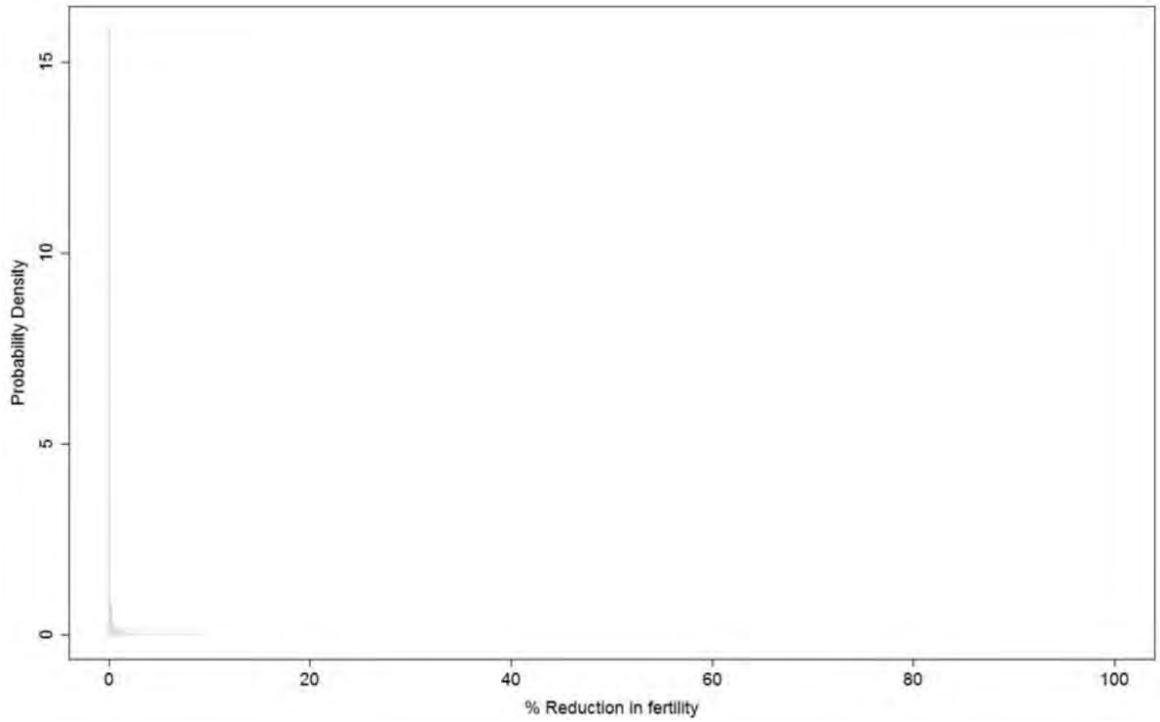

Figure 1 Probability distribution showing the consensus distribution for the effects on **fertility of a mature female** harbour porpoise as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

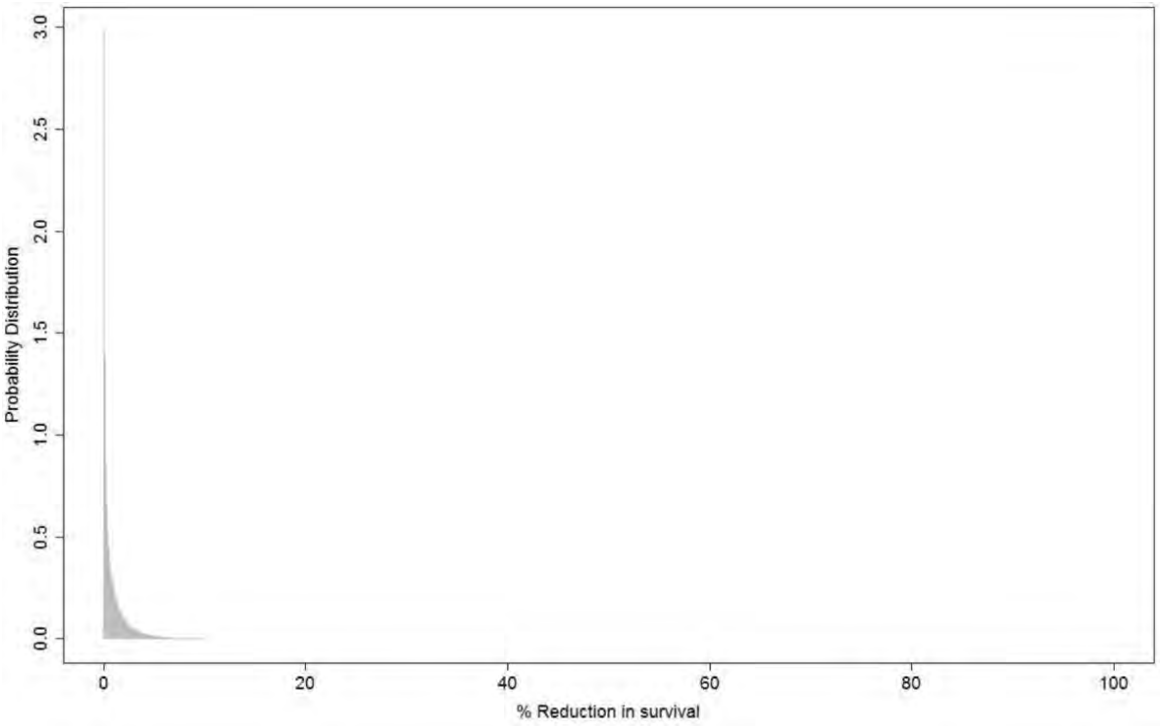

Figure 2 Probability distribution showing the consensus distribution for the effects on **survival of a mature female** harbour porpoise as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band

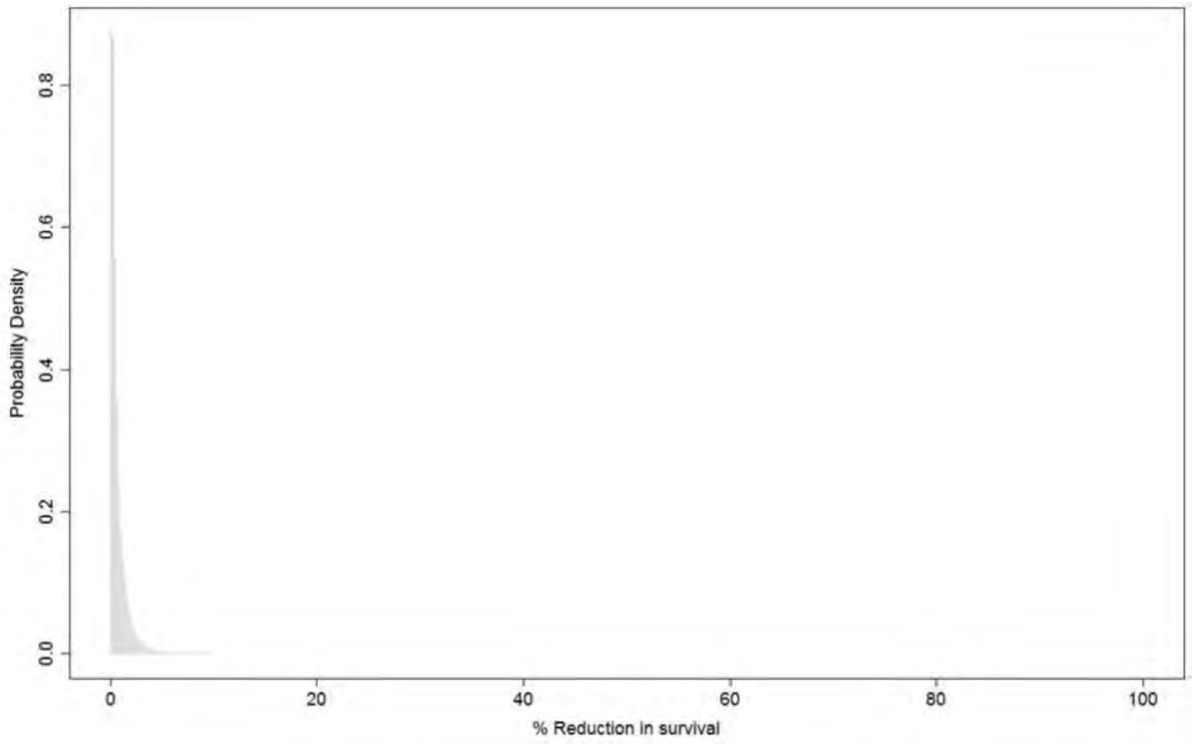

Figure 3 Probability distribution showing the consensus distribution for the effects on **survival of juvenile or dependent calf** harbour porpoise as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

Bottlenose dolphin

Table 4 Conclusion statements from the expert elicitation for PTS effects on bottlenose dolphins

Fertility	*"Experts noted that a 6 dB PTS would not be considered to have a large impact on communication for foraging and therefore a **small effect** was the most likely outcome in animals with the defined PTS."*
Adult survival	*"Experts felt that a reduced ability to detect vessels/shipping (potentially increasing the risk of collision in areas of heavy vessel use) might have some small impact on the probability of survival, but overall the risk of PTS affecting survival was **low**."*
Calf survival	*"Experts felt that a reduced ability to detect vessels/shipping (potentially increasing the risk of collision in areas of heavy vessel use) might have some small impact of the probability of survival, but overall the risk of PTS affecting survival was **low.**"*

The predicted decline in bottlenose dolphin vital rates from the impact of a 6 dB PTS in the 2-10 kHz band for different percentiles of the elicited probability distribution are provided in Table 5. The data provided in Table 5 should be interpreted as:

- Experts estimated that the median decline in an individual mature female bottlenose dolphin's survival was 1.6% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual mature female bottlenose dolphin's fertility was 0.43% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual bottlenose dolphin juvenile survival was 1.32% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual bottlenose dolphin dependent calf survival was 2.96% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).

Table 5 Predicted decline in bottlenose dolphin vital rates for different percentiles of the elicited probability distribution.

	Percentiles of the elicited probability distribution								
	10%	20%	30%	40%	**50%**	60%	70%	80%	90%
Adult survival	0	0.18	0.57	1.04	**1.6**	2.34	3.39	5.18	10.99
Fertility	0	0.04	0.13	0.26	**0.43**	0.85	1.66	3.49	6.22
Juvenile survival	0.01	0.11	0.35	0.75	**1.32**	2.14	3.3	5.19	11.24
Calf survival	0	0.29	0.93	1.77	**2.96**	4.96	7.81	10.69	14.79

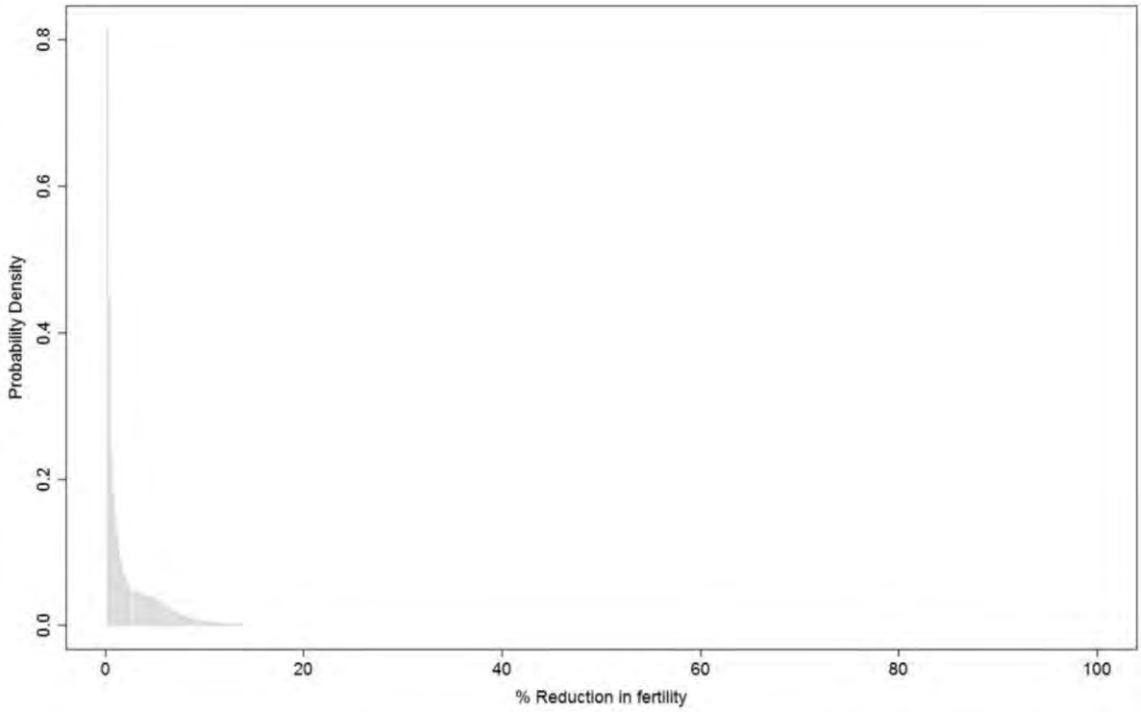

Figure 4 Probability distribution showing the consensus distribution for the effects on **fertility of mature female** bottlenose dolphin as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

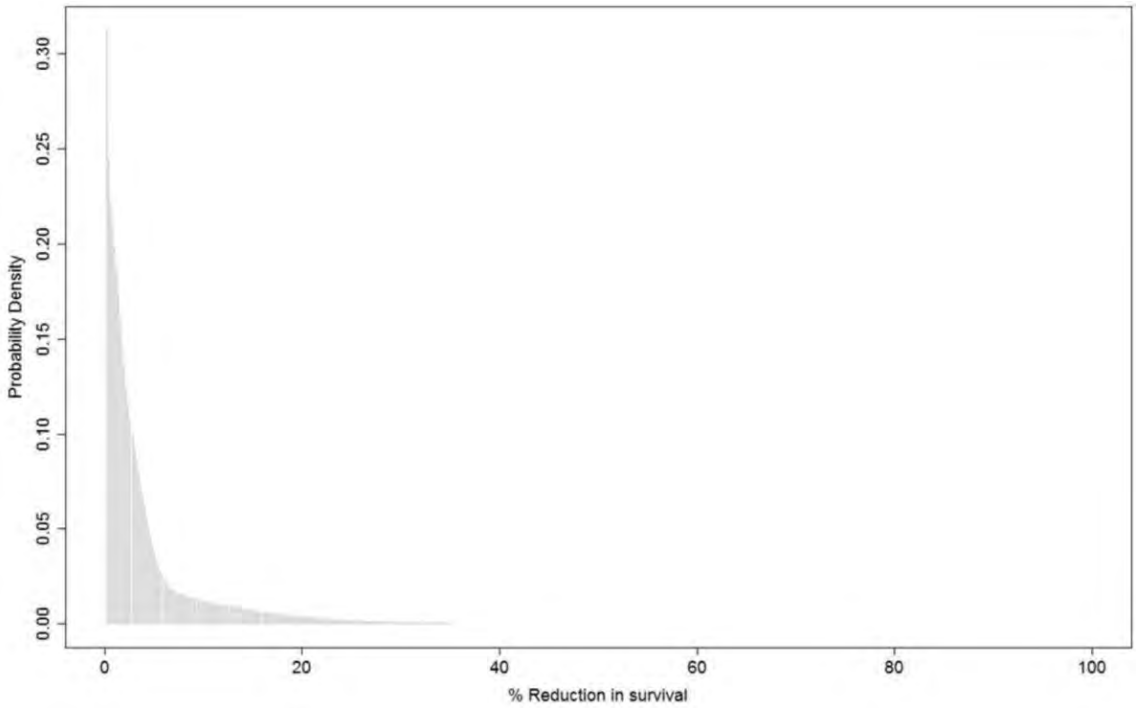

Figure 5 Probability distribution showing the consensus distribution for the effects on **survival of mature female** bottlenose dolphin as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

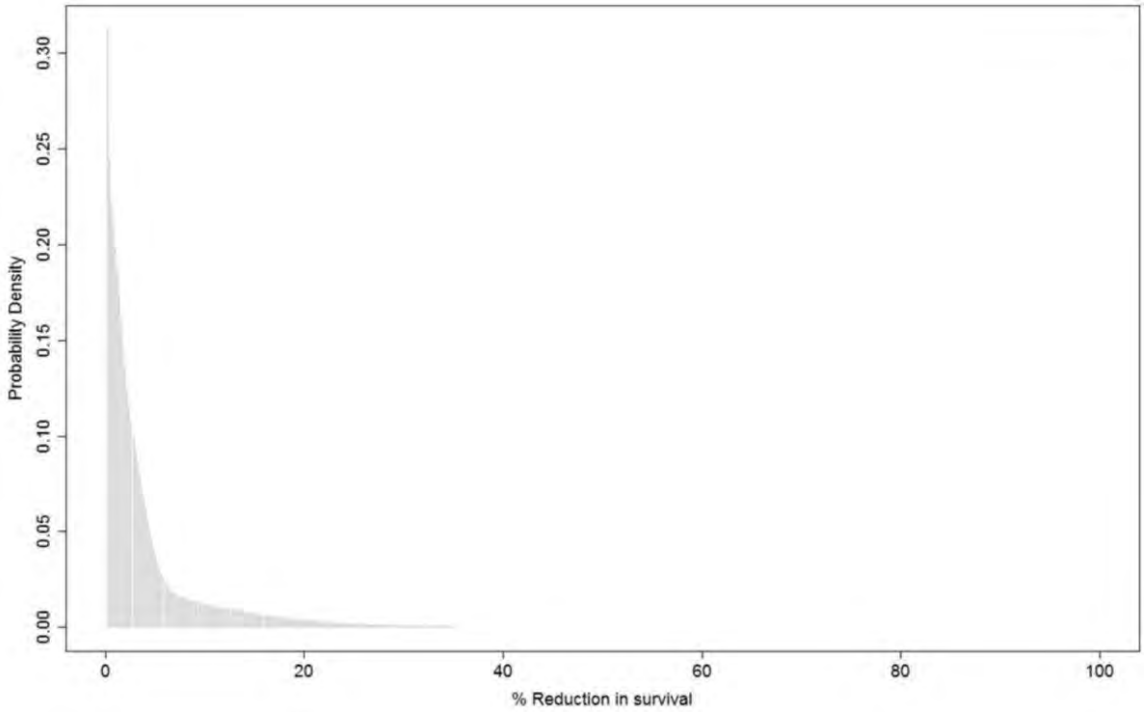

Figure 6 Probability distribution showing the consensus distribution for the effects on **survival of juvenile or dependent calf** bottlenose dolphin as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

Seals

Table 6 Conclusion statements from the expert elicitation for PTS effects on harbour and grey seals

Fertility	*"Experts felt that the overall effect of the defined PTS on seal fertility was low as there were limited mechanisms by which fertility could be impacted by a narrowband reduction in hearing sensitivity."* *"Overall, experts agreed that […] the most likely effect on fertility was **very low** (i.e. below a 5% reduction in fertility)"*
Adult survival	*Experts felt that the overall effect of the defined PTS on mature female seal survival was low as there were limited mechanisms by which survival could be impacted by a narrowband reduction in hearing sensitivity."* *"Overall, experts agreed that […] the most likely effect on survival was **very low** (i.e. below 5% reduction in survival)."*
Calf survival	*"Experts felt there was an increased risk of predation and/or disturbance from gulls, dogs, humans and marine predators in naïve animals. In addition, experts acknowledged it was possible that pups could potentially be exposed in utero and therefore get PTS (though this is poorly understood), but still the overall risk to survival was low (given the limited impact on foraging etc.).* *"Overall, experts agreed that […] the most likely effect on survival was **very low**."*

The predicted decline in harbour and grey seals vital rates from the impact of a 6 dB PTS in the 2-10 kHz band for different percentiles of the elicited probability distribution are provided in Table 7. The data provided in Table 7 should be interpreted as:

- Experts estimated that the median decline in an individual mature female seal's survival was 0.39% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual mature female seal's fertility was 0.27% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).
- Experts estimated that the median decline in an individual seal pup/juvenile survival was 0.52% (due to a 6 dB PTS (a notch a few kHz wide and 6dB high) occurring somewhere in the hearing between 2-10 kHz).

Table 7 Predicted decline in harbour and grey seal vital rates for different percentiles of the elicited probability distribution.

	Percentiles of the elicited probability distribution								
	10%	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**
Adult survival	0.02	0.1	0.18	0.27	**0.39**	0.55	0.78	1.14	1.89
Fertility	0.01	0.02	0.05	0.14	**0.27**	0.48	0.88	1.48	4.34

Calf survival	0	0.04	0.15	0.32	**0.52**	0.8	1.21	1.88	3

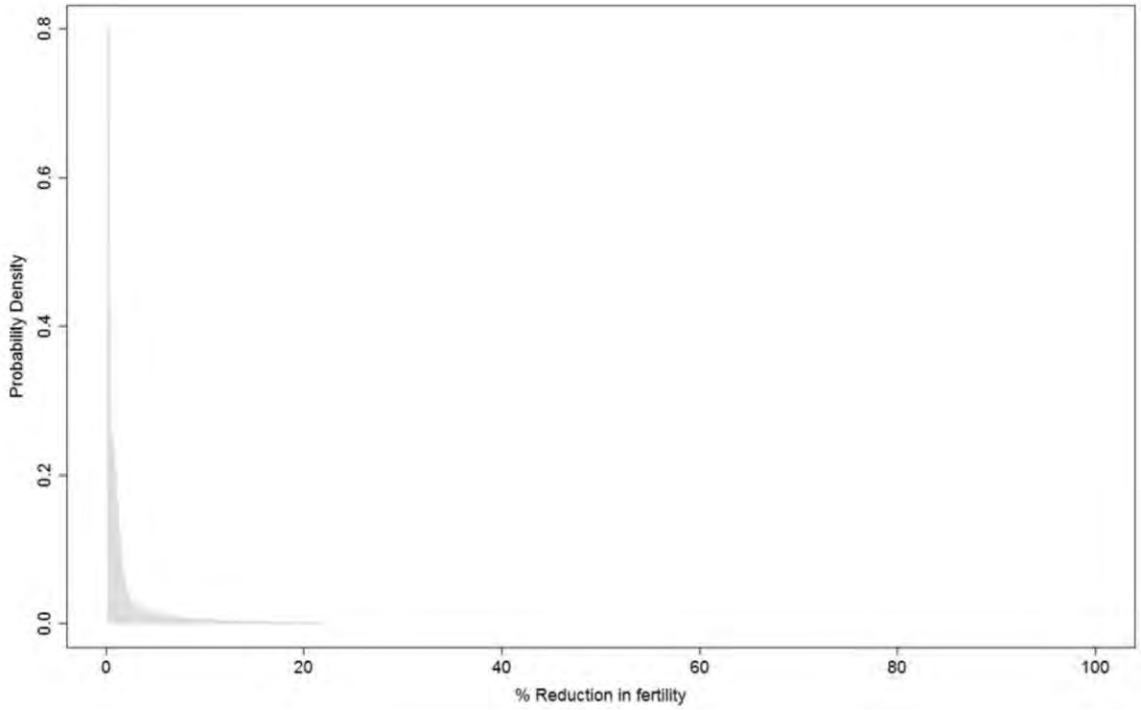

Figure 7 Probability distribution showing the consensus distribution for the effects on **fertility of a mature female** (harbour or grey) seal as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

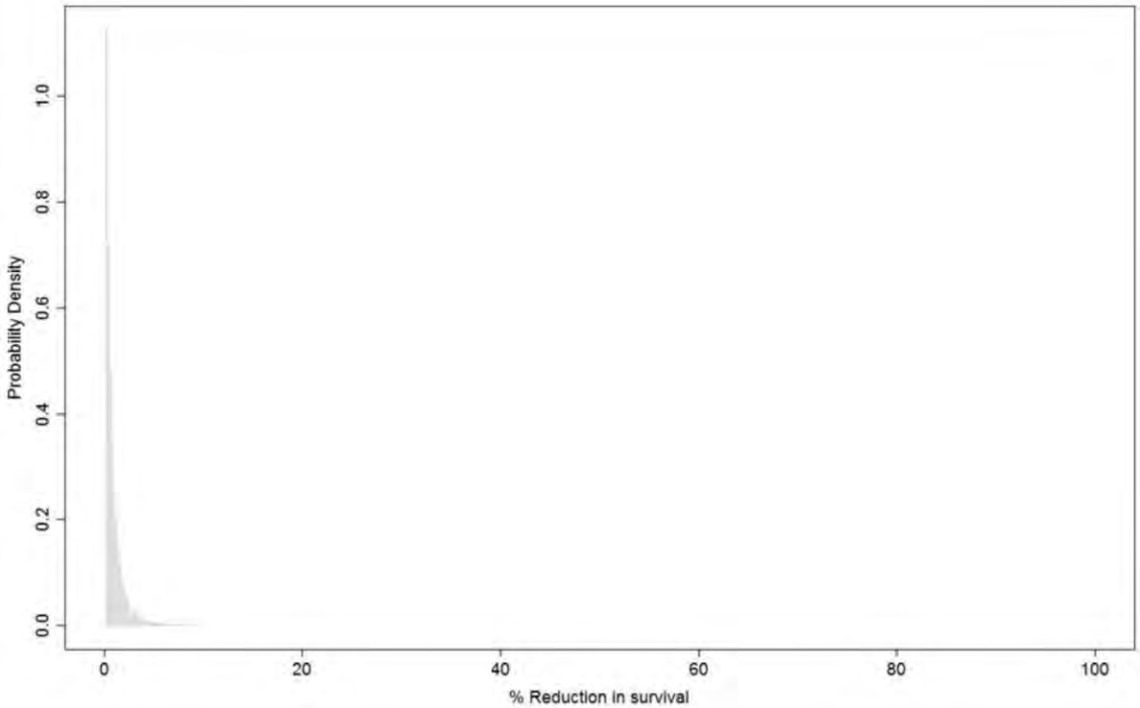

Figure 8 Probability distribution showing the consensus distribution for the effects on **survival of a mature female** (harbour or grey) seal as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

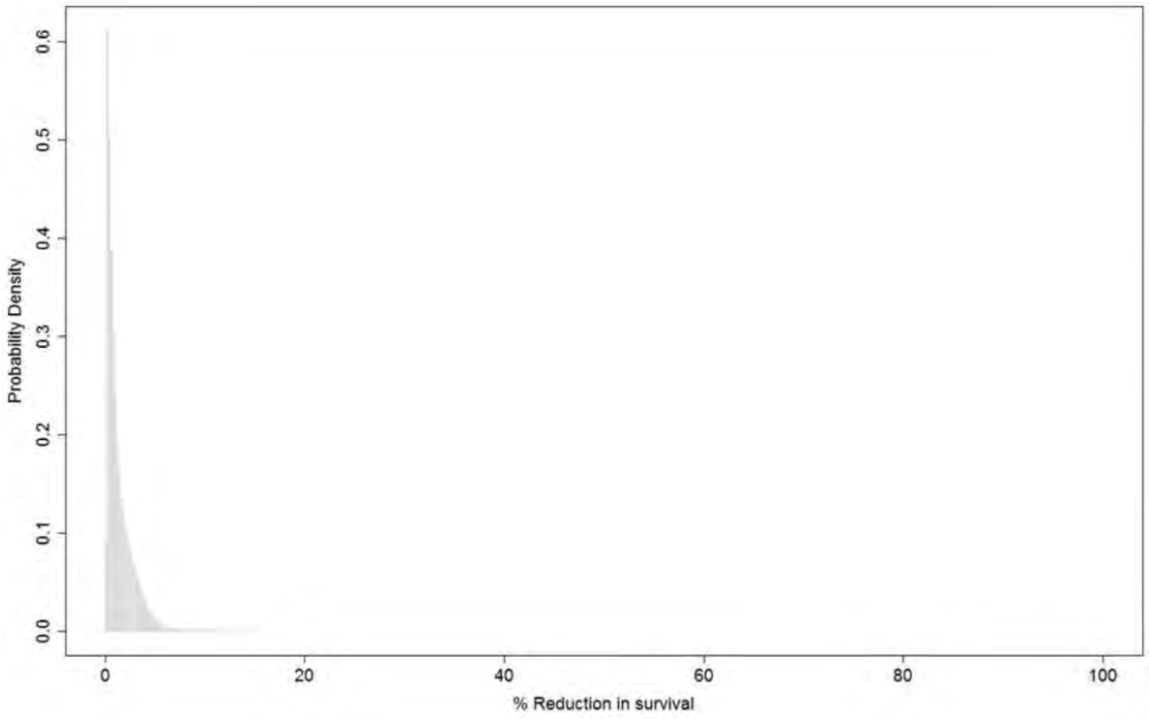

Figure 9 Probability distribution showing the consensus distribution for the effects on **survival of juvenile or dependent pup** (harbour or grey) seal as a consequence of a maximum 6 dB of PTS within a 2-10 kHz band.

Updated definition of sensitivity

Based on the results of the expert elicitation, SMRU Consulting considers that there is only a very small likelihood of 6 dB of PTS within a 2-10 kHz band resulting in any changes to vital rates, and that any changes that do occur will not be significant. Therefore, in order to better assess sensitivity in the ES chapter, SMRU Consulting recommends slight updates to the sensitivity definitions in order to adapt them from simple descriptions of the presence/absence of effect, to consider the likelihood of a significant effect instead. The updated sensitivity definitions are provided in Table 8.

The Applicant is seeking agreement with NRW on the use of these updated sensitivity definitions for the AyM ES chapter.

Table 8 Updated sensitivity definitions to take forward to the AyM marine mammal ES

Sensitivity	PEIR description	Updated Description
High	No ability to adapt behaviour so that individual survival and reproduction rates are affected. No tolerance – effect will cause a change in both reproduction and survival rates. No ability for the animal to recover from any impact on vital rates (reproduction and survival rates).	No ability to adapt behaviour so that individual vital rates (survival and reproduction) are **highly likely to be significantly affected**. No tolerance – effect **will cause a significant change** in individual vital rates (survival and reproduction). No ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Medium	Limited ability to adapt behaviour so that individual survival and reproduction rates may be affected. Limited tolerance – effect may cause a change in both reproduction and survival of individuals. Limited ability for the animal to recover from any impact on vital rates (reproduction and survival rates).	Limited ability to adapt behaviour so that individual vital rates (survival and reproduction) **may be significantly affected**. Limited tolerance – effect **may cause a significant change** in individual vital rates (survival and reproduction). Limited ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Low	Ability to adapt behaviour so that individual reproduction rates may be affected but survival rates not likely to be affected. Some tolerance – effect unlikely to cause a change in both reproduction and survival rates. Ability for the animal to recover from any impact on vital rates (reproduction and survival rates).	Ability to adapt behaviour so that individual vital rates (survival and reproduction) **may be affected, but not at a significant level**. Some tolerance – **no significant change** in individual vital rates (survival and reproduction). Ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Negligible	Receptor is able to adapt behaviour so that individual survival and reproduction rates are not affected. Receptor is able to tolerate the effect without any impact on reproduction and survival rates. Receptor is able to return to previous behavioural states/activities once the impact has ceased.	Receptor is able to adapt behaviour so that individual vital rates (survival and reproduction) are **not affected**. Receptor is able to tolerate the effect **without any impact** on individual vital rates (survival and reproduction). Receptor is able to return to previous behavioural states/activities once the impact has ceased.

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1.5 Appendix D5: Onshore Ecology

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

Bat Survey of Trees

Background

This note relates to bat survey at trees that may be affected by the proposed onshore element of Awel y Môr Offshore Wind Farm. The proposed scope of these surveys has been revised subsequent to the recommendations made in the PEA. As a result of the number and context of trees potentially affected by onshore elements of the project, there is considered to be justification in differing from the BCT Guidelines. For clarity, the scope of bat activity surveys remains unchanged to that detailed in the PEA that was shared with NRW in Jan 2021.

The rationale has been informed by professional judgement, gained through direct experience on other large linear infrastructure projects involving landscape level tree loss and is based upon the following:

1. Tree roosting bats swap roosts a lot. This means that survey results in terms of roost locations are only as good as the day they were completed (this is much different to building roosts).
2. Sufficient survey will be undertaken for EIA; i.e. to determine the impacts to local bat populations, know where and how to avoid/mitigate/compensate for those impacts, and have confidence that an EPSL would be obtained (if necessary).
3. The results used to inform the EIA would be redundant at the time of construction: the survey would need to be re-scoped and undertaken in view of the final scheme design and footprint. Bat use of the landscape will likely have also changed in the interim/population trends may have altered such that impacts have changed.

The method proposed is based upon appropriate and proportionate techniques to inform the EIA, and focussed upon:

- accurately determining the potential roost resource that would be directly affected by the scheme. Potential impacts would be couched in terms of loss of potential roost features and a commitment made to mitigate for every/a very high proportion of moderate or high potential PRF lost.
- Determining the likely presence of locally significant bat roost(s) (i.e. locally rare species, or maternity colonies etc) within groups or lines of trees (if possible, but not necessarily identifying precise roost locations). Accepting that roosts used by small numbers of bats will occur, but may not be identified (at this stage) but would be mitigated (see first bullet).
- In combination with desk study data, and detail from the bat activity surveys already underway, enable robust assessment of impacts to the conservation status of local bat populations.

To be clear, the proposed method does not seek to pinpoint every small roost; this is because such roosts are highly dynamic (see point 1 above), with bats using a suite of potential roost features in any given season.

If the project is granted consent, a commitment would be made to resurvey every tree affected as part of pre-construction work, the season prior to work commencing, in accordance with BCT Guidelines or other best practice in place at that time. EPSL/mitigation requirements would then be determined as a result of those surveys, but ensured via the commitments made in the ES and secured through DCO Requiurement.

Proposed Method to Inform EIA

All trees with bat roost potential which could potentially be affected by the project are shown on the attached plan. The trees on the attached plan are colour coded according to the ground-based assessment of bat potential already completed (red= high roost potential, orange = moderate, yellow = low, white = large tree difficult to assess from the ground, assumed high potential). Proposed survey methods for moderate and high potential trees are as follows:

1. Climbing inspection at all moderate or high potential trees (where safe to do so). This survey will be used to robustly determine the number and location of potential roost features.
2. Dusk emergence and dawn re-entry survey, with groups or lines of trees surveyed as discrete blocks. These are identified on the attached plan. All blocks would receive two visits, with those containing high potential trees receiving three. Surveyors will be equipped with full spectrum bat detectors and thermal imaging cameras in order to maximise the chances of detecting bats, record evidence of bat presence and identify bat species.

Outputs from Survey

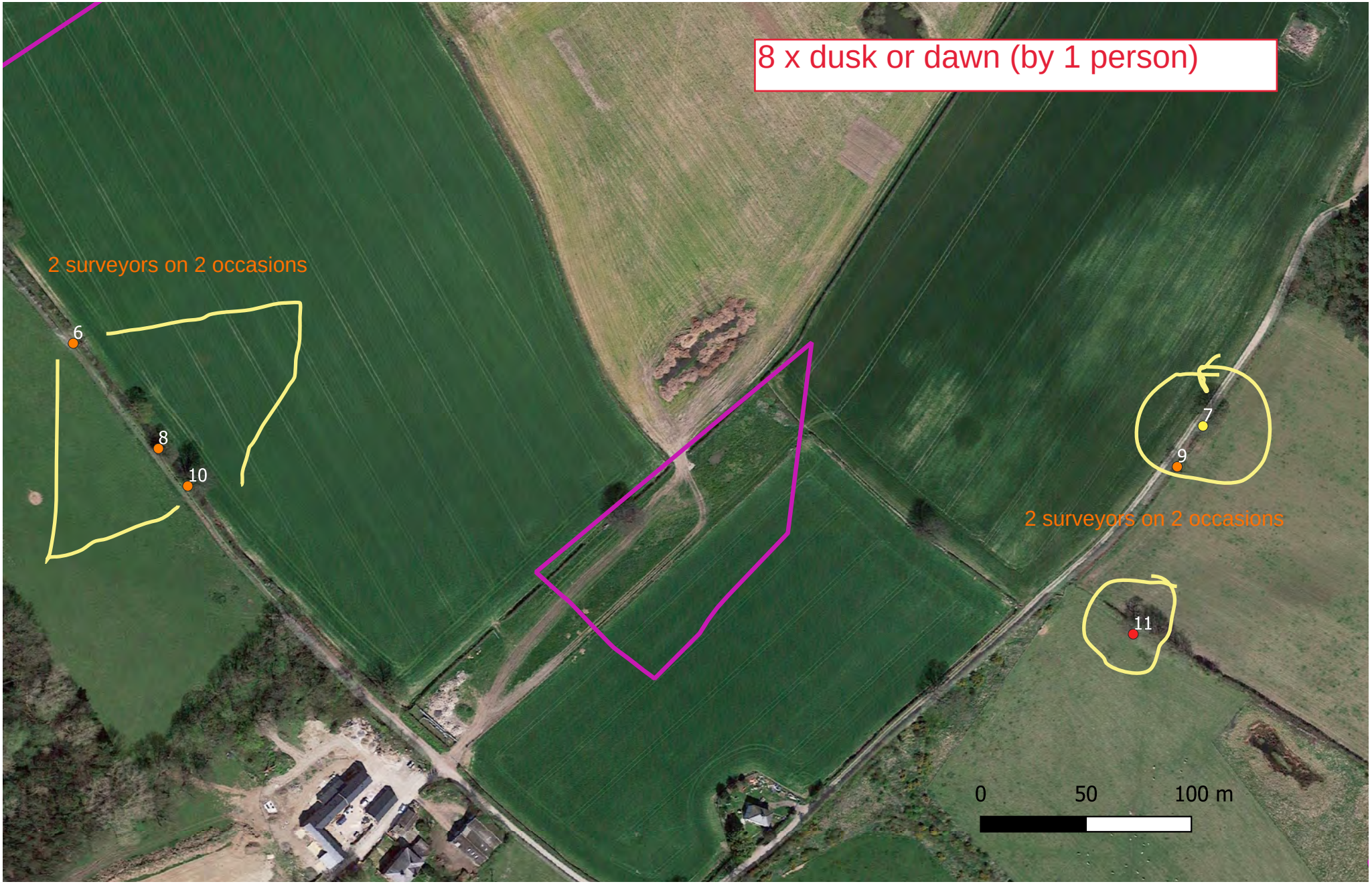
The results would be used in combination with all other available bat data, including existing records and bat activity survey data, to:

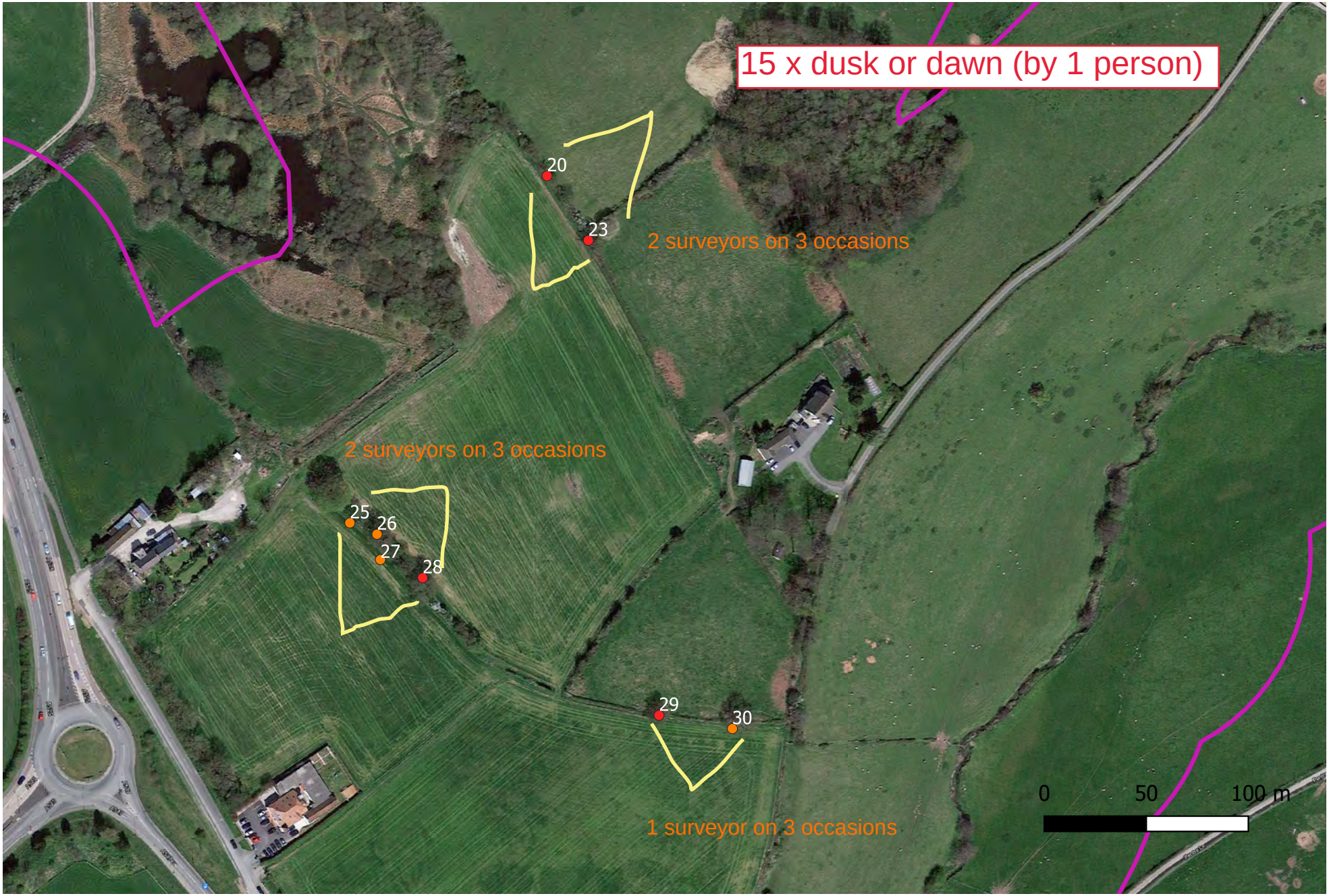
- identify presence or likely absence of a locally significant bat roost that may be affected by the project.
- Determine the number of potential roost features that would be affected, in order that the loss of these can be adequately compensated/mitigated for.
- Enable an assessment of the potential impact of the scheme on the conservation status of the local bat populations.

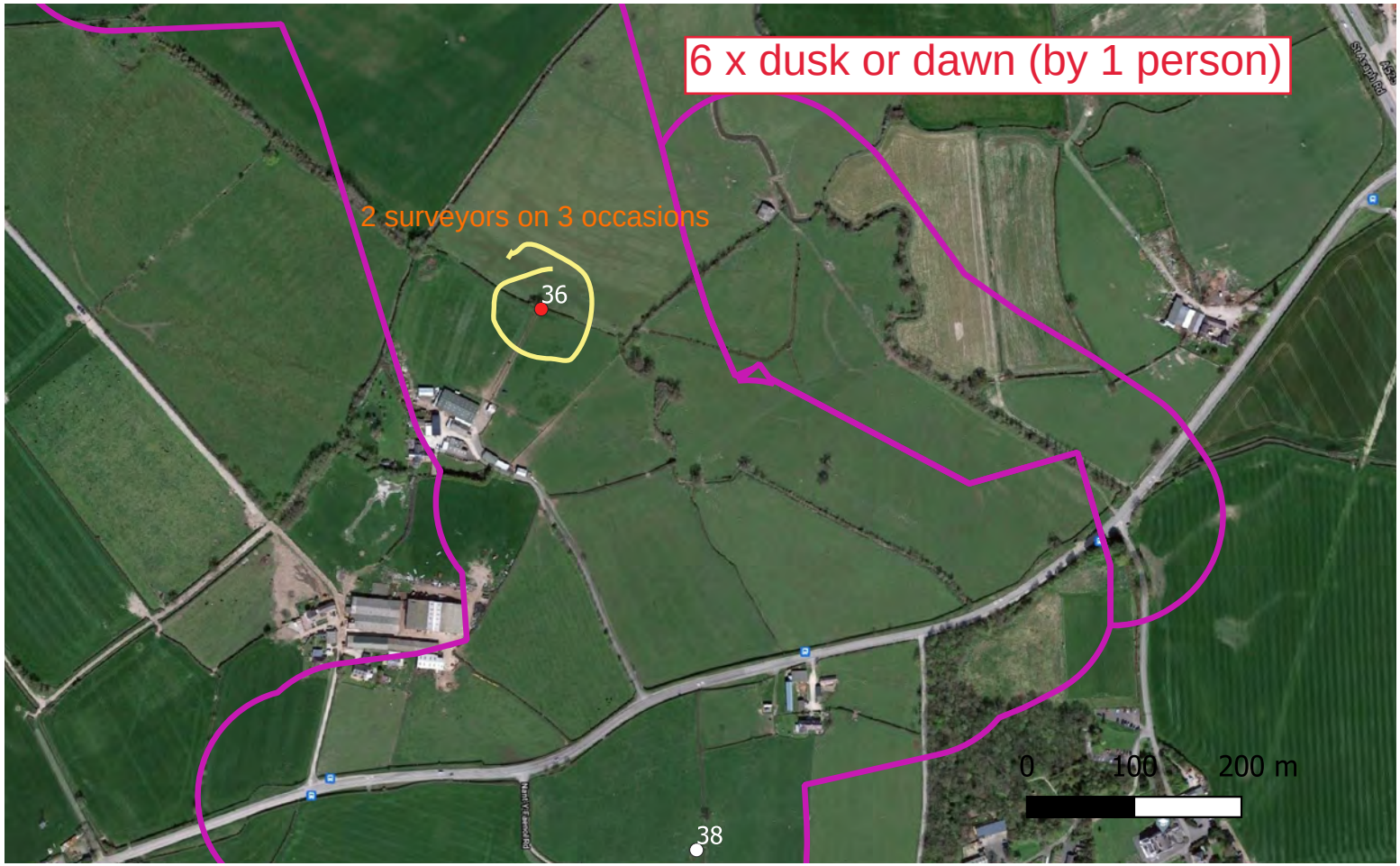
Ongoing Review of Survey Methodology

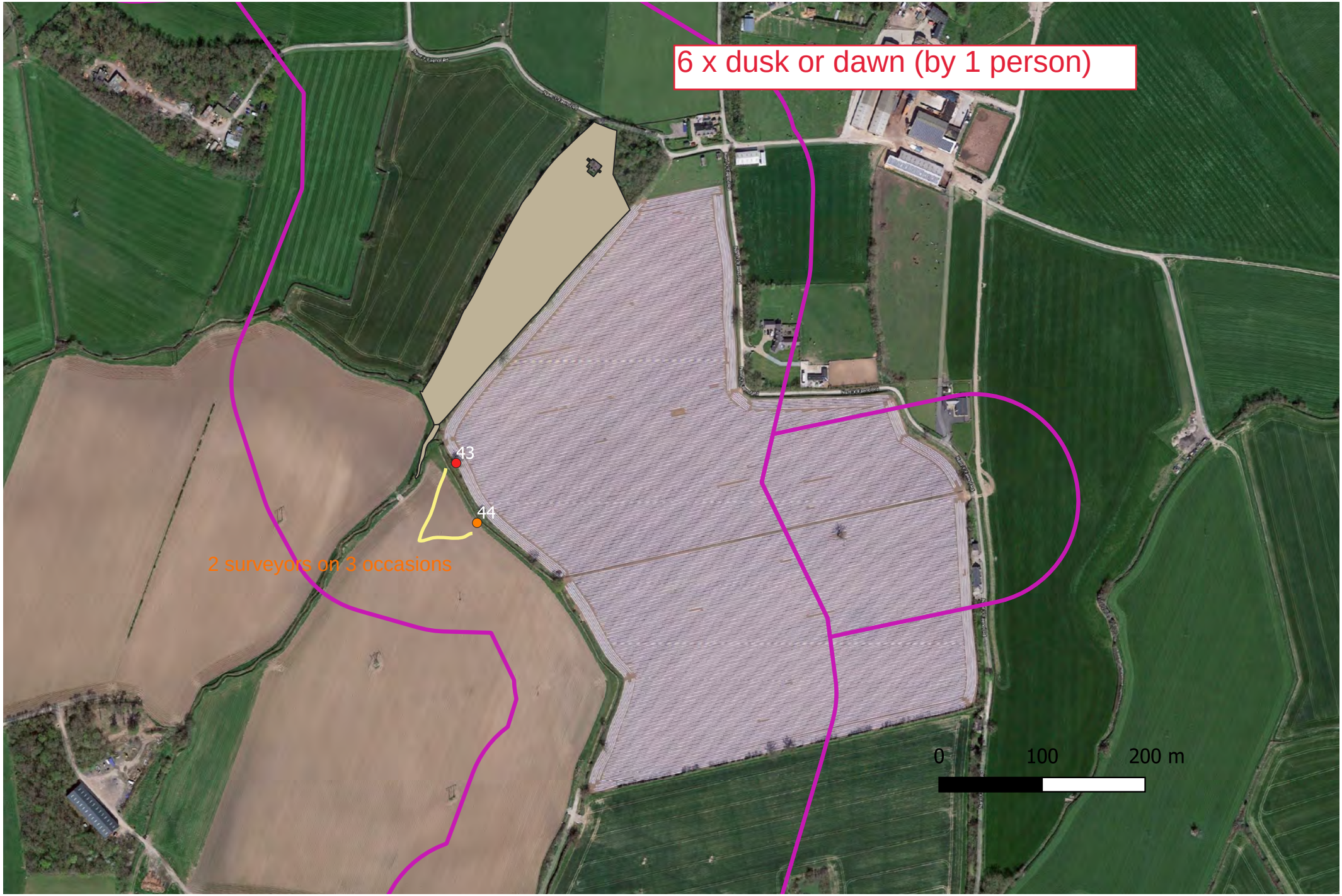
An important part of the proposed method is the ability to adapt the method depending on the results as we go. Instances that would trigger review of the survey method (which may increase or decrease survey effort) include:

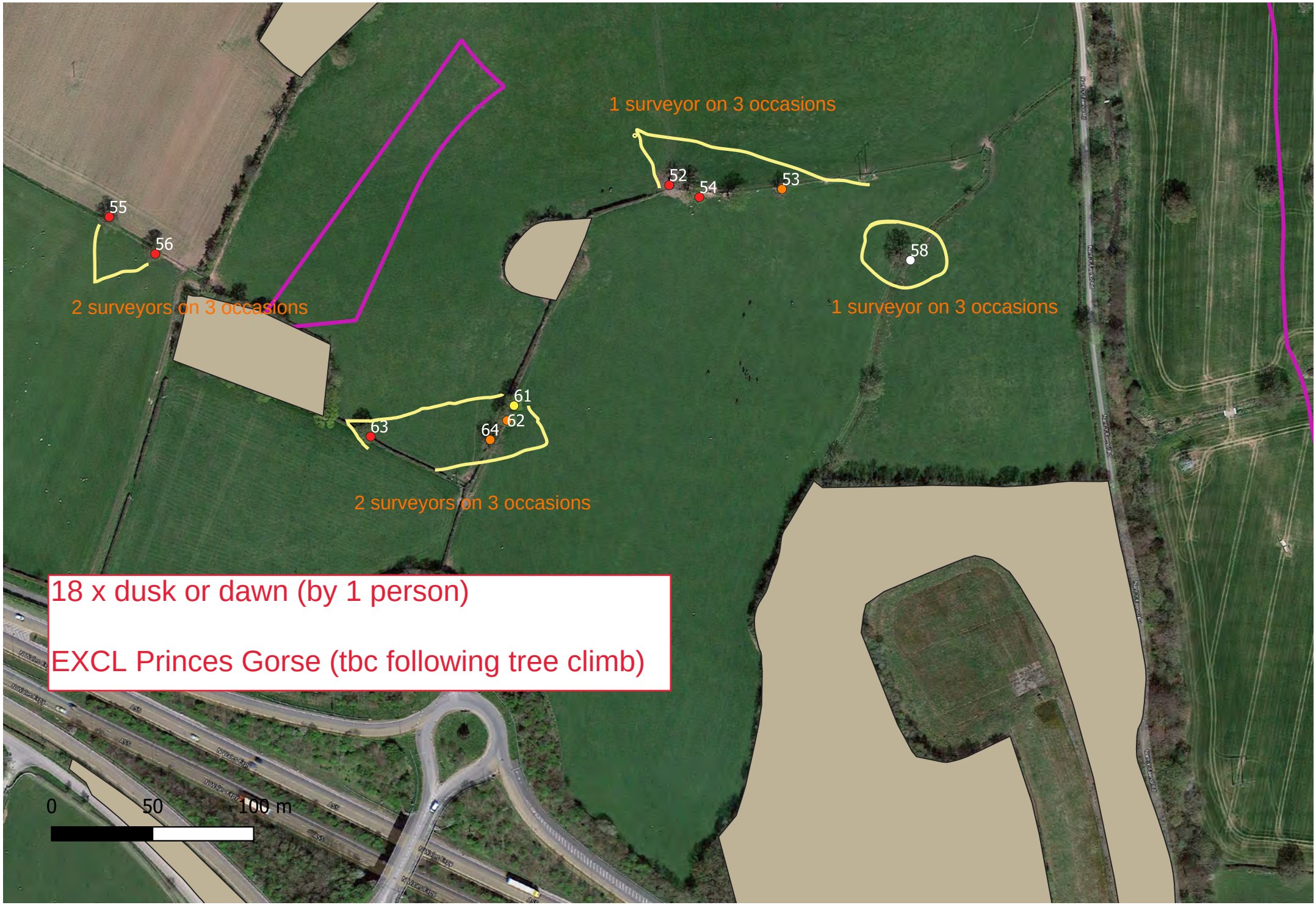
1. Re-evaluation of bat potential of a PRF following climbing inspection;
2. If the climbing inspection proves exhaustive such that bat absence/presence is conclusively known (in which case repeat climbs may be more appropriate than dusk or dawn visits); and/or
3. Suspected or confirmed presence of a significant roost.

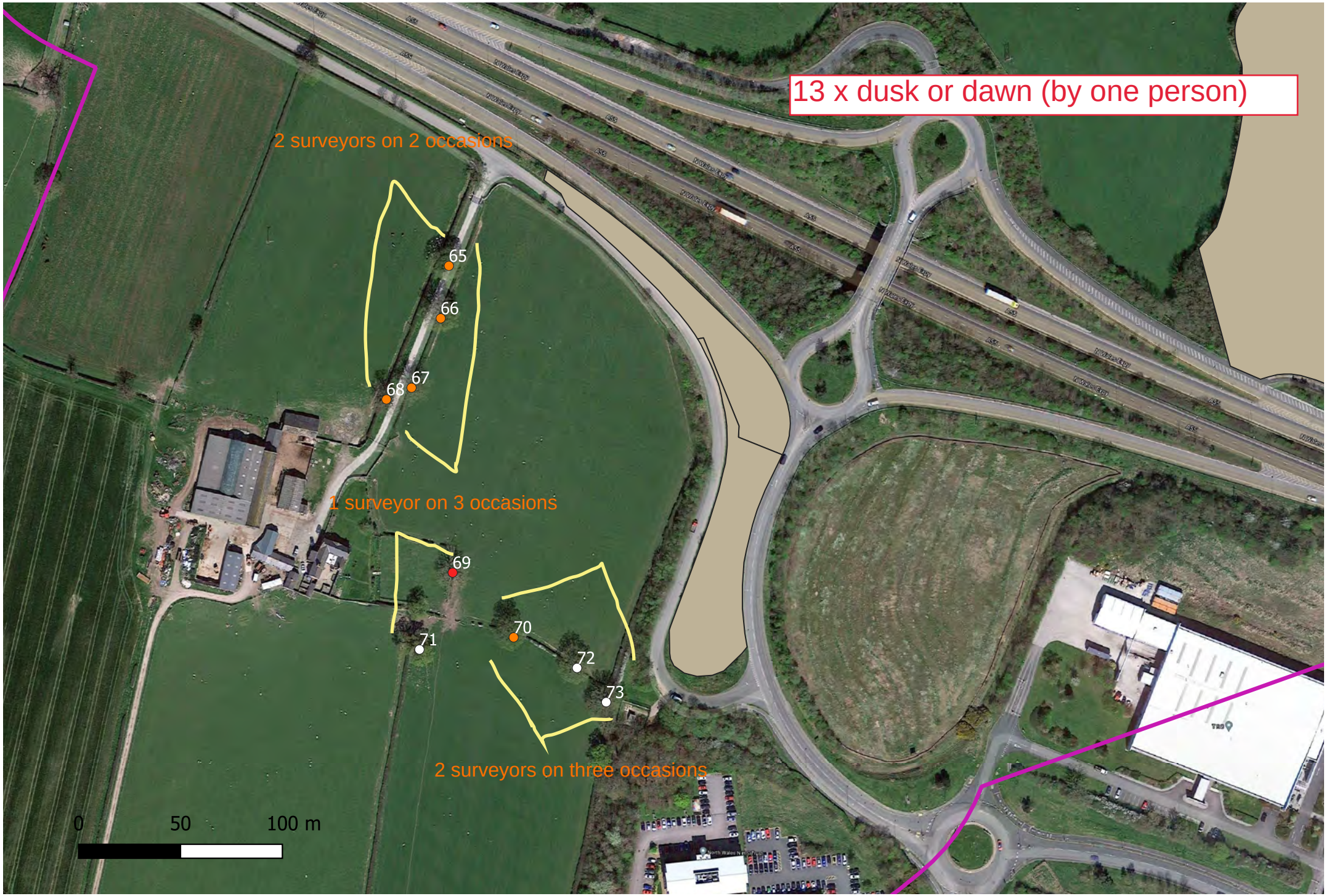

8 x dusk or dawn (by 1 person)
2 surveyors on 2 occasions
6
8
10
7
9
2 surveyors on 2 occasions
11
0
50
100 m


15 x dusk or dawn (by 1 person)
20
23
2 surveyors on 3 occasions
2 surveyors on 3 occasions
25
26
27
28
29
30
1 surveyor on 3 occasions
0
50
100 m

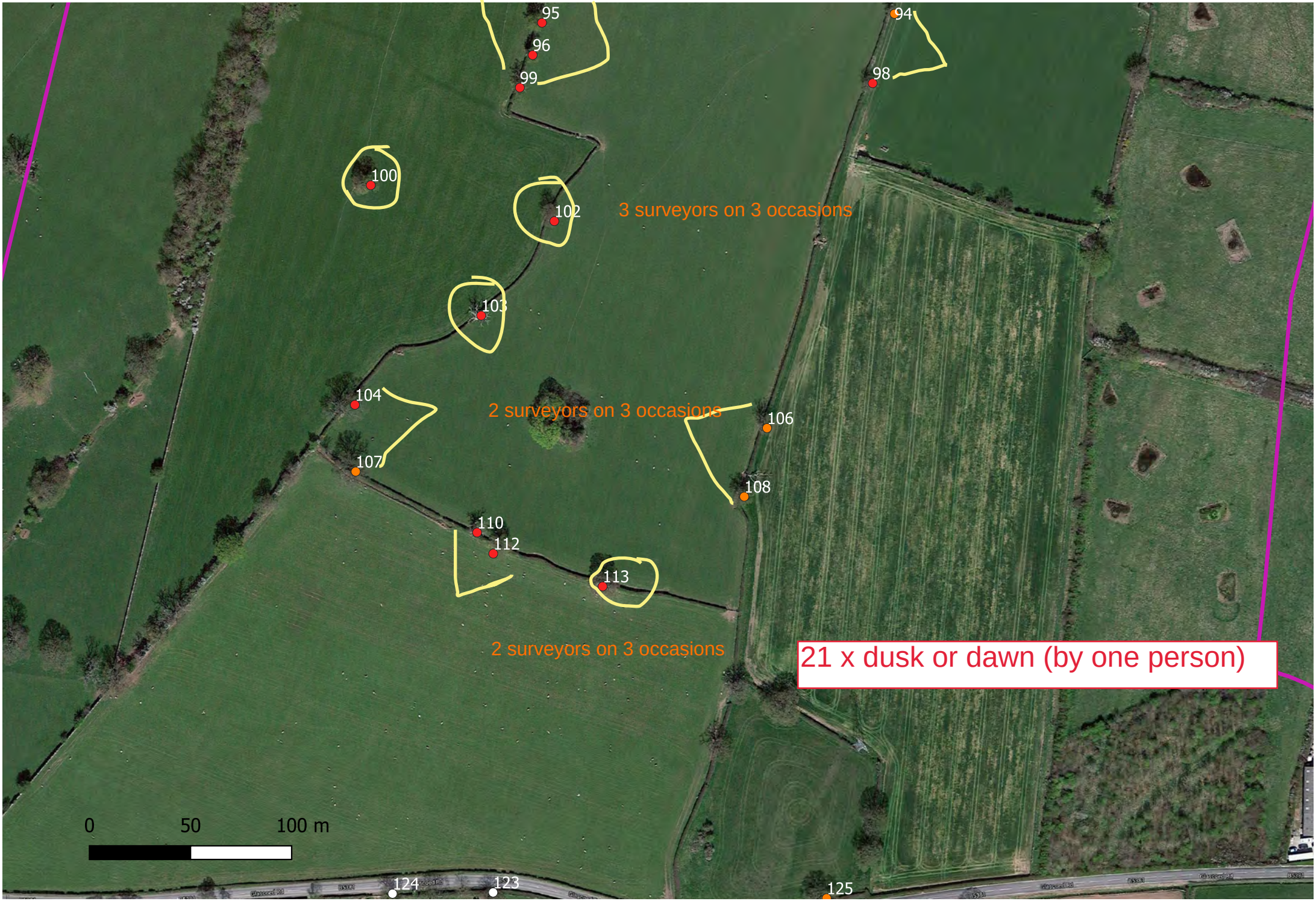

6 x dusk or dawn (by 1 person)
2 surveyors on 3 occasions
36
38
0
100
200 m

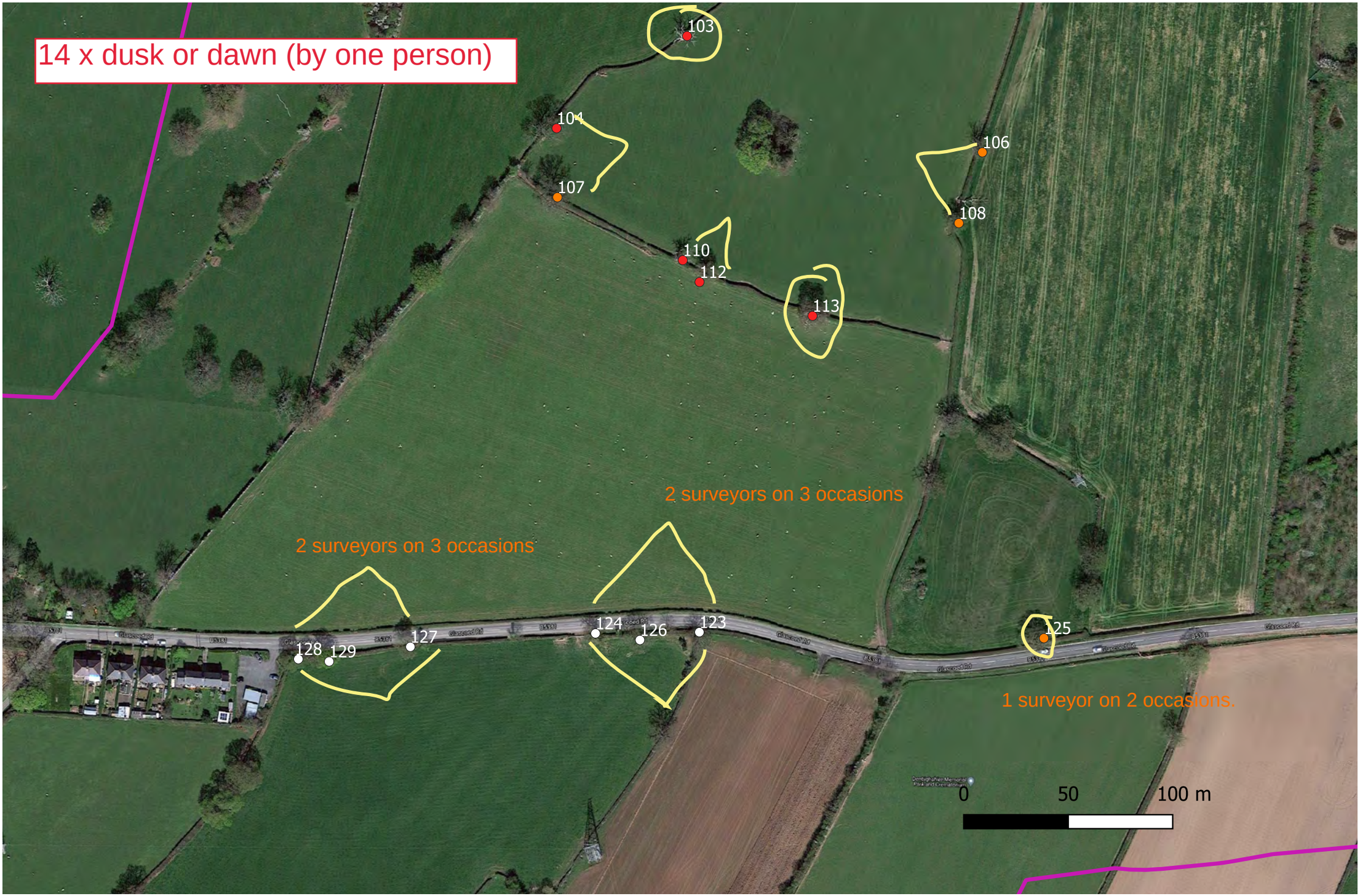

6 x dusk or dawn (by 1 person)
43
44
2 surveyors on 3 occasions
0
100
200 m

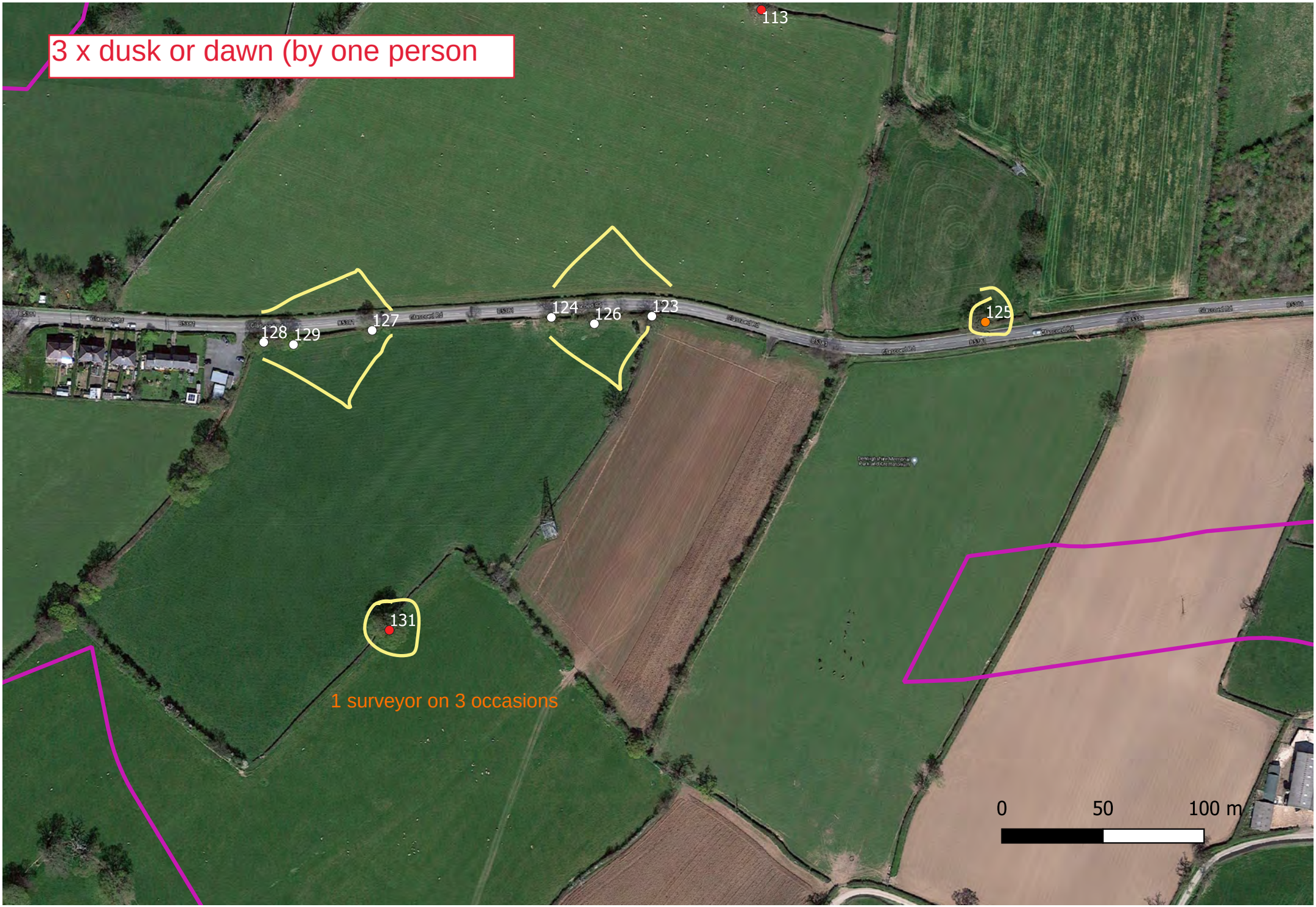

1 surveyor on 3 occasions
52
54
53
55
56
2 surveyors on 3 occasions
58
1 surveyor on 3 occasions
61
62
63
64
2 surveyors on 3 occasions
18 x dusk or dawn (by 1 person)
EXCL Princes Gorse (tbc following tree climb)
0
50
100 m

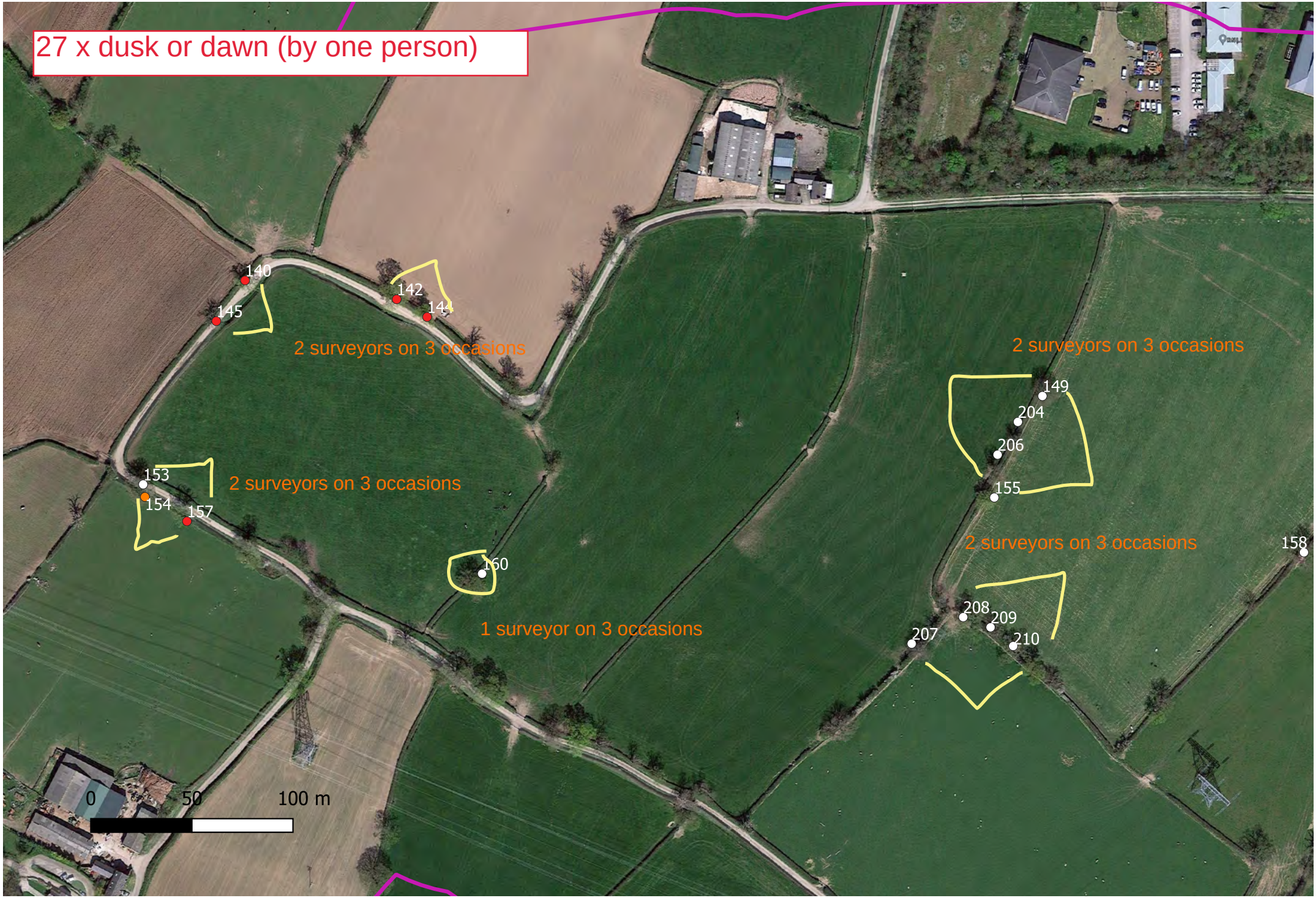

13 x dusk or dawn (by one person)
2 surveyors on 2 occasions
65
66
67
68
1 surveyor on 3 occasions
69
70
71
72
73
2 surveyors on three occasions
0
50
100 m

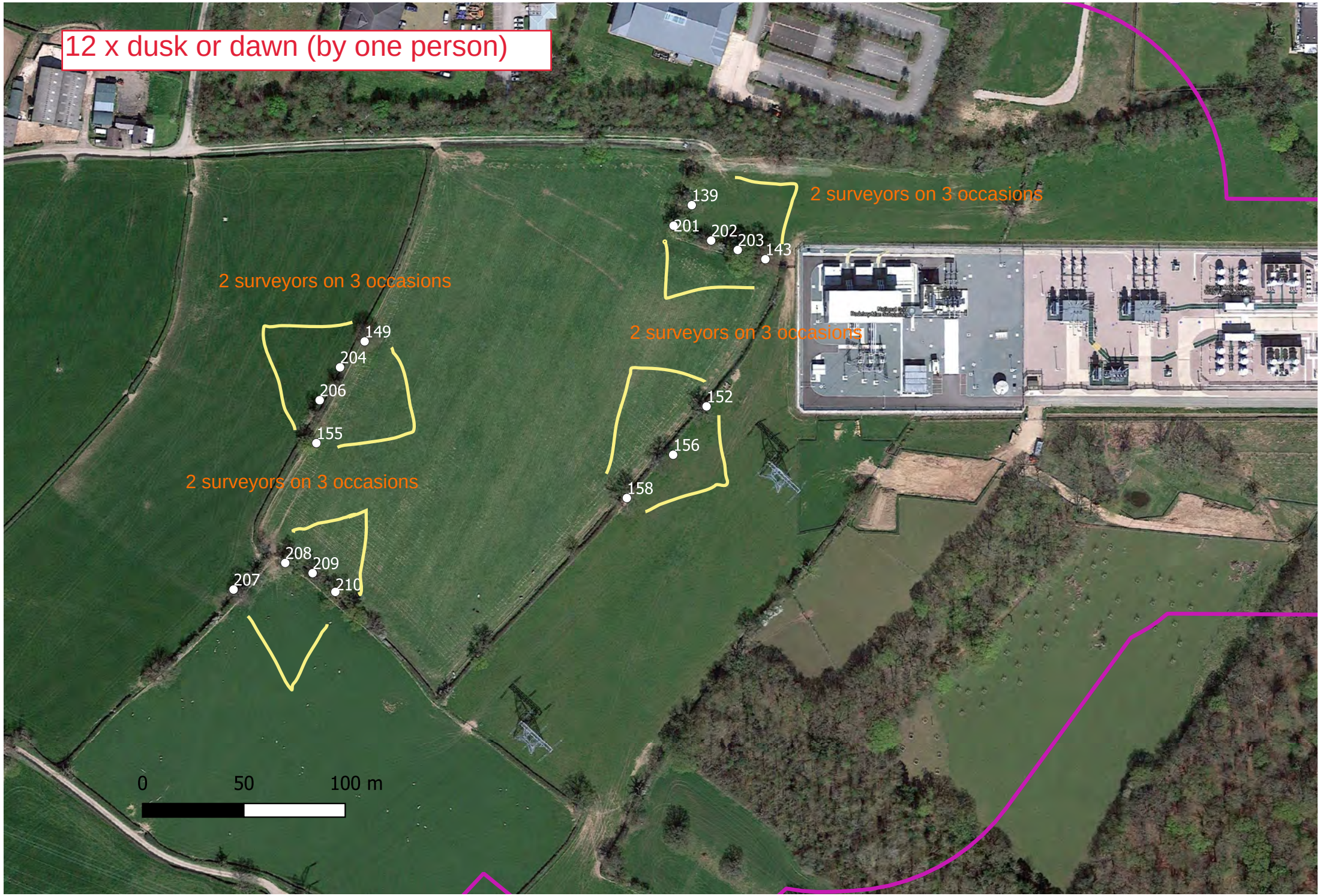
42 x dusk or dawn (by one person)
1 surveyor on 3 occasions
1 surveyor on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
73
74
75
76
77
78
79
80
82
84
85
86
87
88
89
90
91
92
93
94
95
96
98
99
0
50
100 m


95
96
99
94
98
100
102
3 surveyors on 3 occasions
103
104
2 surveyors on 3 occasions
106
107
108
110
112
113
2 surveyors on 3 occasions
21 x dusk or dawn (by one person)
0
50
100 m
124
123
125


14 x dusk or dawn (by one person)
103
104
107
106
108
110
112
113
2 surveyors on 3 occasions
2 surveyors on 3 occasions
128
129
127
124
126
123
125
1 surveyor on 2 occasions.
0
50
100 m


3 x dusk or dawn (by one person
113
128
129
127
124
126
123
125
131
1 surveyor on 3 occasions
0
50
100 m


27 x dusk or dawn (by one person)
140
145
142
144
2 surveyors on 3 occasions
153
154
157
2 surveyors on 3 occasions
160
1 surveyor on 3 occasions
2 surveyors on 3 occasions
149
204
206
155
2 surveyors on 3 occasions
158
208
209
210
207
0
50
100 m


12 x dusk or dawn (by one person)
2 surveyors on 3 occasions
139
201
202
203
143
2 surveyors on 3 occasions
149
204
206
155
2 surveyors on 3 occasions
152
156
158
2 surveyors on 3 occasions
208
209
207
210
0
50
100 m

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

Onshore Biodiversity and Nature Conservation November 2021 ETG: 2020/2021 Summary of Ecology Survey Results

This note provides a summary of the 2021 ecology survey results that were not available when drafting the Preliminary Environmental Information Report (PEIR). The summary is provided in order to update consultees on findings and to inform discussion on mitigation for the onshore elements of the Awel y Mor offshore windfarm.

Survey Results Summary

Wintering Birds – Report included at PEIR, results not repeated here.

Breeding Birds – the following species of conservation concern were confirmed to be breeding within the survey area:

- At the landfall - Skylark, song thrush, dunnock and linnet.
- River Clwyd - A kingfisher was recorded flying along a ditch to the north of Clwyd View Touring Caravan Park. No holes were found along this ditch, though parts of the bank were obscured by long vegetation so this has been classified as possibly breeding.
  Skylark, song thrush, dunnock, house sparrow, reed bunting, willow warbler, swallow and mallard were confirmed to be breeding within the survey area.
- Substation Area - song thrush, dunnock, bullfinch, willow warbler, tawny owl, coal tit, long-tailed tit and redstart were confirmed to be breeding within the survey area.
- Barn owl survey - Nesting barn owls were confirmed to be present in a derelict house and within a mature oak tree, though the latter nest appeared to have been abandoned.
- Kingfisher survey - One kingfisher was seen during the breeding bird survey in a ditch to the north of Clwyd View Caravan Park, west of the River Clwyd. No holes were found along the ditch, although long and dense vegetation obscured the view of the ditch in places and it has been classified as possibly breeding.

Dormice – Final survey visit scheduled during the last week in November. No evidence of dormice to date and none anticipated.

Reptiles – Desk study data confirms that reptiles are present locally at St Asaph Cemetery, Glan Clwyd Hospital and coastal habitats in particular; suitable habitats within the onshore Export Cable Corridor (ECC) linked to these areas are considered likely to assist with supporting the local populations. Reptiles are considered to be absent from the Onshore Substation (OnSS) location, based on negative results during all surveys.

Otter and Water Vole - Otter is confirmed to occur within the Survey Area at the River Clwyd and Glanfyddion Cut. Relatively limited evidence was found during the surveys in 2021, just two spraints on the Glanfyddion Cut and one on the River Clwyd (though the tidal nature of the river at this point would regularly remove signs).

No conclusive evidence of water vole presence was found in any of the surveyed watercourses in 2021. However, desk study information suggests that the species was recorded “before 2004” at Glanfyddion Cut and potentially also in 2000 at three locations on the Aberkinsey stream, east of Rhyl.

Badgers - Setts were recorded at seven broad locations, as follows (and shown on the attached plan):

- Erw'r Gaseg Woodland: 44 entrances; Erw'r Gaseg Woodland sett is considered to be a main sett, due to the high level of activity, large size of sett, length of use (the Cofnod record for this setts dates from 2005) and lack of any larger known setts nearby. A likely subsidiary sett (eight entrances) is noted in woodland to the west, based on Cofnod data from 2009.
- Long Covert: 15 entrances; Long Covert is considered likely to be a subsidiary sett, given the number of holes and relatively little evidence of use noted during the 2021 survey, plus nearby sett records. Cofnod hold records of a 20 entrance sett in woodland a short distance northeast of the survey area, active in 2012 plus another 20 entrance inactive sett in woodland slightly more distant to the north east. No other setts of a similar size are known nearby.
- Bryn-y-Wal: 10 entrances; Bryn-y-Wal is considered likely to be a subsidiary sett. This is due to its size and the relatively small number of entrances in use at the time of survey.
- Prince's Gorse; two subsidiary setts present, one is a single entrance the other has four entrances. Cofnod have records from 2008 and 2009 of a single hole sett and a five hole sett from within the woodland, which may relate to the same locations (the Cofnod record has approximate grid references). In addition a four entrance sett recorded in 2003 was recorded in scrub a short distance to the north of Prince's Gorse; this was not relocated during current surveys.
- Fishponds: 11 entrances; the fishponds sett is considered likely to be subsidiary sett. The Cofnod dataset includes details of three sets within woodland south of the fishponds (outside of the survey area), with a combined total of 53 entrances, recorded as active in 2000. This large number of entrances is concluded likely to be a main sett meaning the sett within the Survey Area is most likely to represent a subsidiary sett;
- Coed y Gors: 6 entrances, also considered to be subsidiary, due to above noted large, probably main sett to the southwest; and
- West of "The Flash": a single hole was recorded, without well-worn paths or signs of recent use. This entrance was considered most likely to be an outlier, but its location at the edge of impenetrable scrub, plus fresh prints noted nearby, mean that additional entrances could exist in deep scrub at this location.

Bats – Activity survey data has yet to be fully analysed, but in addition to the expected species, includes the occasional presence of greater horseshoe bat and Nathusius pipistrelle both of which are considered to be locally rare.

The tree survey work is summarised on the attached drawing and has confirmed the presence of five roost trees:

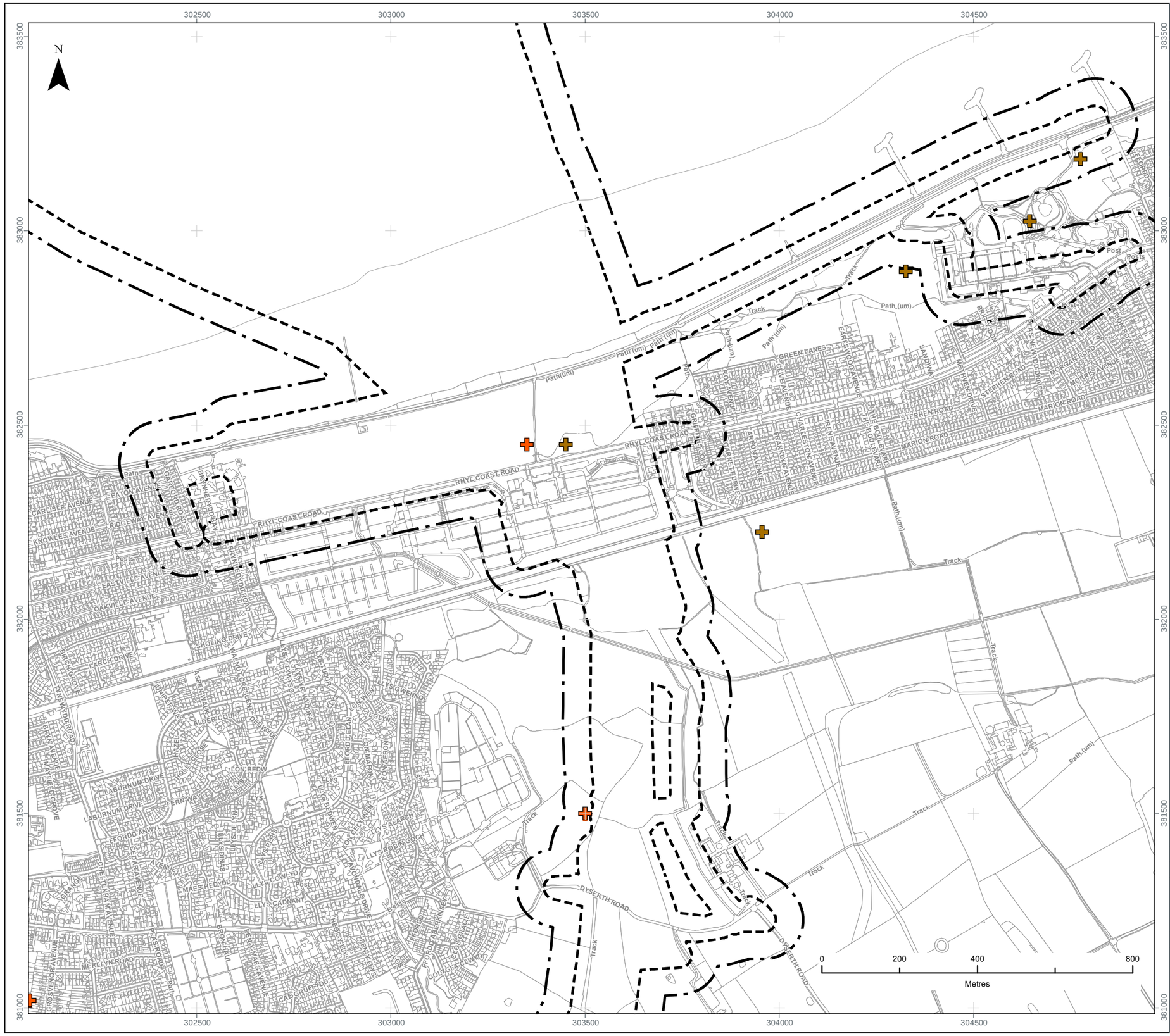
- Tree 21 - soprano pipistrelle dayroost;
- Tree 27 – soprano pipistrelle dayroost;
- Tree 64 – common pipistrelle maternity colony;
- Tree 68 – common pipistrelle dayroost; and
- Tree 81 – common or soprano pipistrelle (identification not possible) dayroost.

A very large proportion of trees were also found to have moderate or high potential to support bats.

Great Crested Newts

The results are summarised on the attached drawing.

Ponds 2 and 3 are isolated from the wider pond network (more than 500m from the next nearest pond) and have a combined peak population that is small.



LEGEND

- Draft Order Limits presented at Statutory Consultation 30 m Buffer
- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Badger - Cofnod Records

- Badger Sett
- Badger - Other Field Signs

Data Source:
© Cofnod 2021
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BADGER SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND FIELD SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	MF

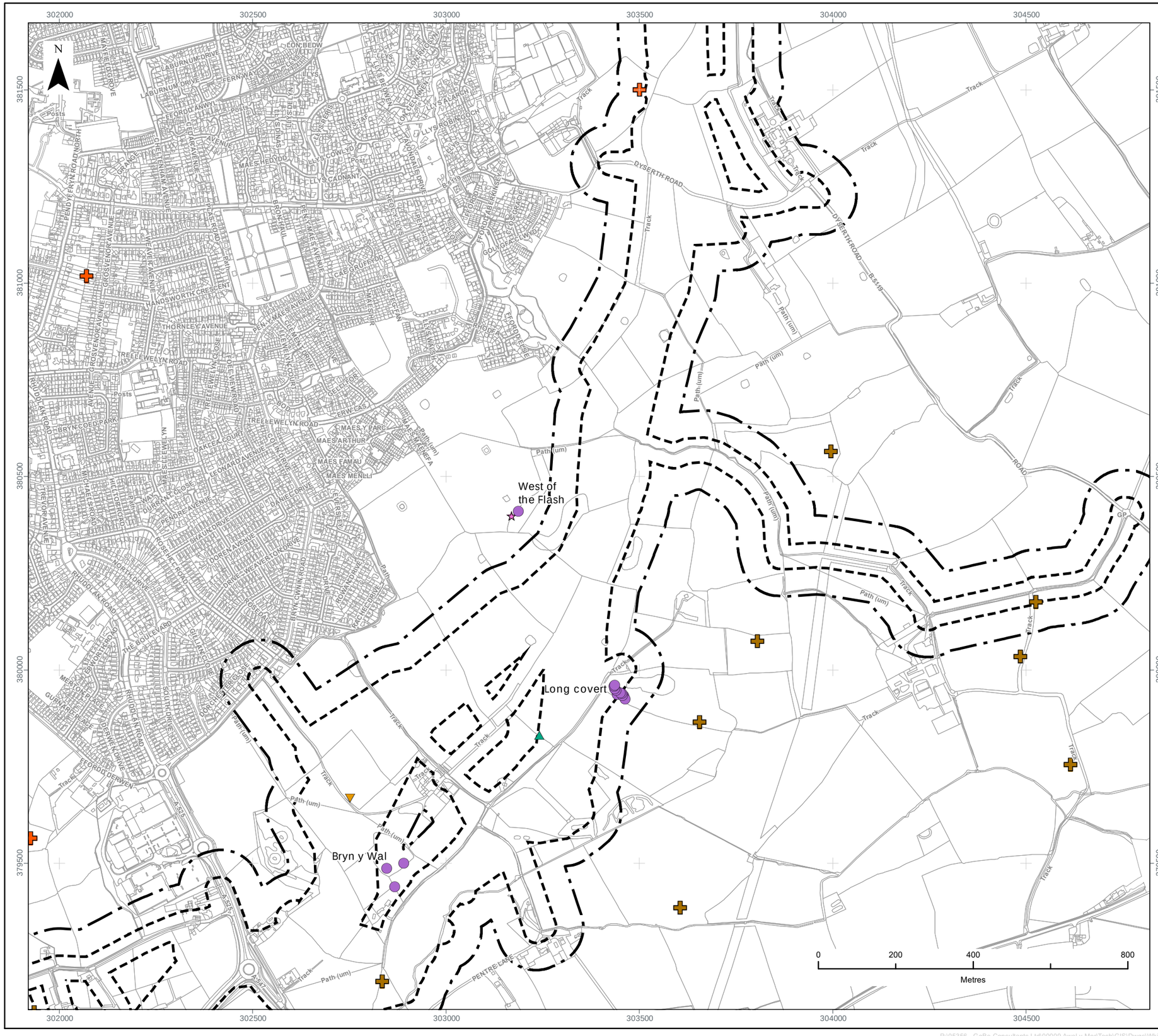
FIGURE NUMBER:

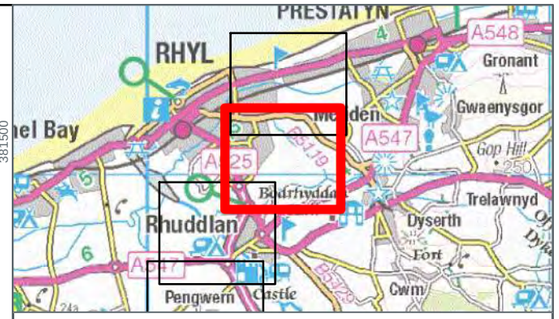
FIGURE 2

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

P:\05356 - GoBe Consultants Ltd\00009 Awel y Mor\Tech\GIS\Dwgs\Wking\202110 Ecology Species Reports\Badgers\05356.00009.0251.0 Pre-existing Records and Field Survey Results.mxd





LEGEND

- Draft Order Limits presented at Statutory Consultation 30 m Buffer
- Draft Order Limits presented at Statutory Consultation 100 m Buffer

2021 Survey Results - Badger Evidence

- Sett Entrance
- Latrine
- Dungpit
- Print

Badger - Cofnod Records

- Badger Sett
- Badger - Other Field Signs

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BADGER SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND FIELD SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	MF

FIGURE NUMBER:

FIGURE 2

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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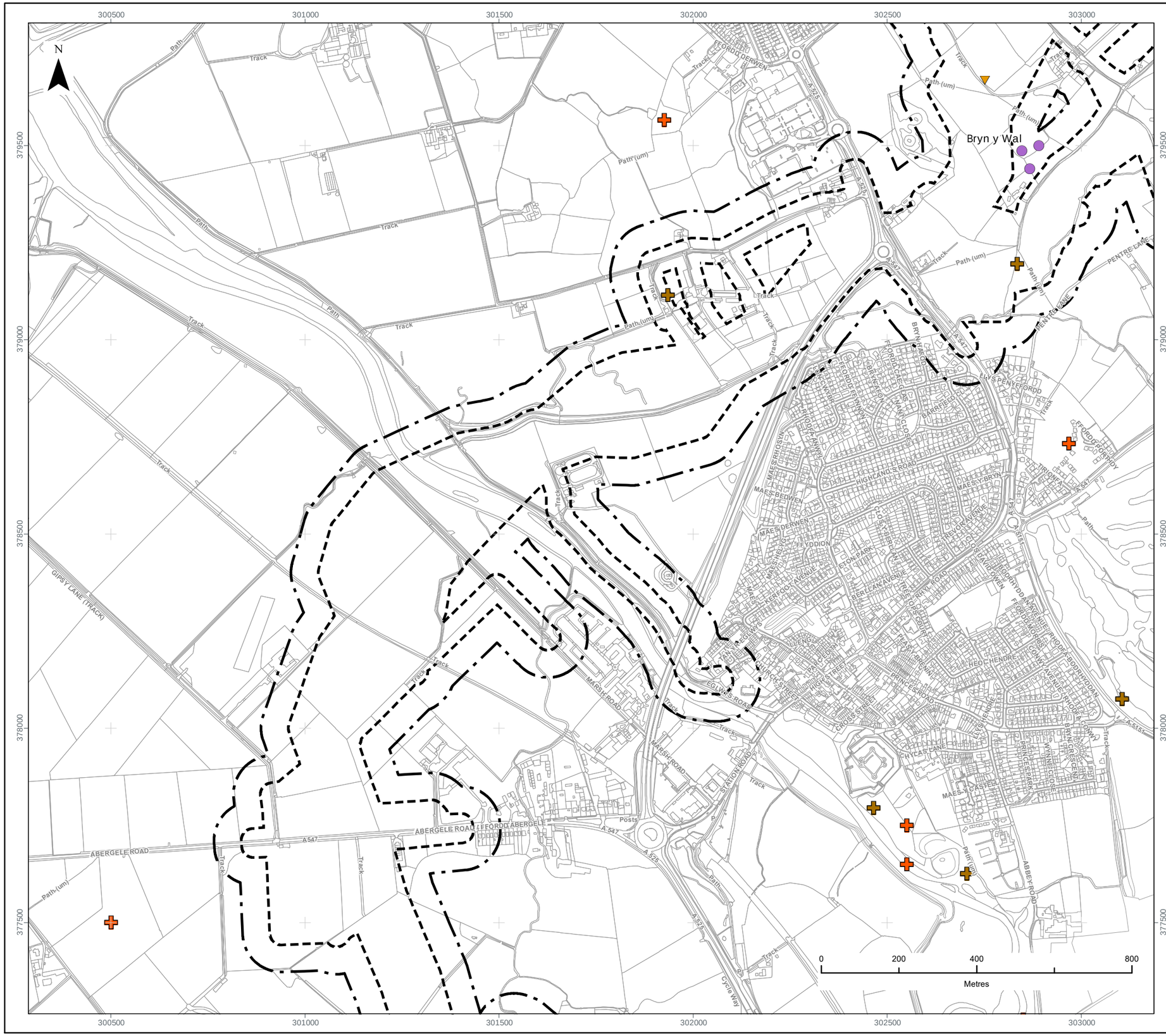

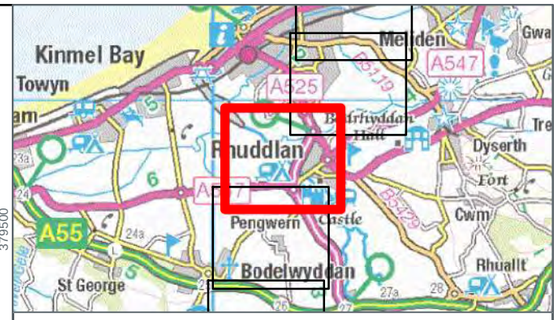

LEGEND

- Draft Order Limits presented at Statutory Consultation 30 m Buffer
- Draft Order Limits presented at Statutory Consultation 100 m Buffer

2021 Survey Results - Badger Evidence

- Sett Entrance
- Dungpit

Badger - Cofnod Records

- Badger Sett
- Badger - Other Field Signs

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BADGER SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND FIELD SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
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Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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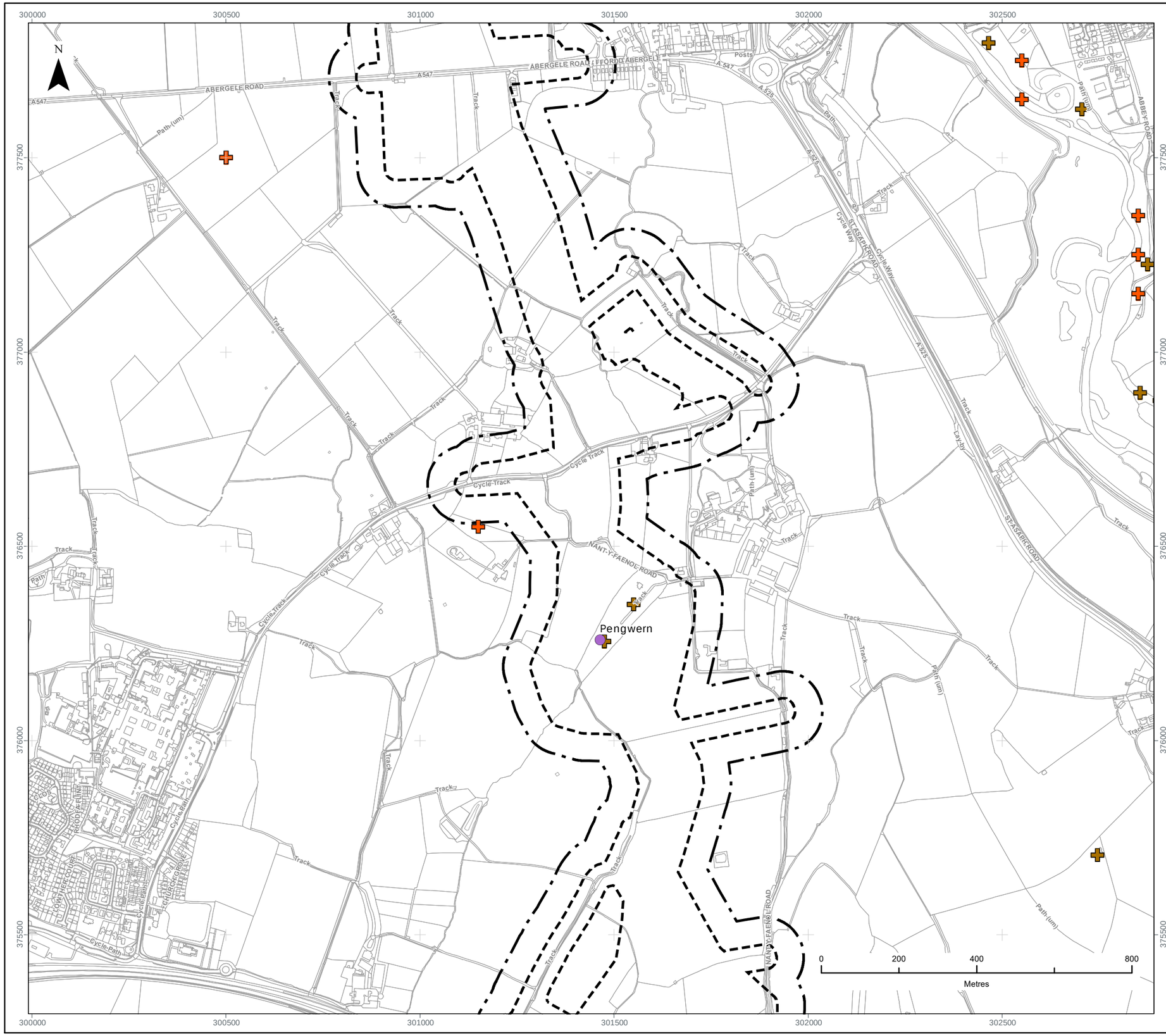

LEGEND

- Draft Order Limits presented at Statutory Consultation 30 m Buffer
- Draft Order Limits presented at Statutory Consultation 100 m Buffer

2021 Survey Results - Badger Evidence

- Sett Entrance

Badger - Cofnod Records

- Badger Sett
- Badger - Other Field Signs

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BADGER SURVEY REPORT

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PRE-EXISTING RECORDS AND FIELD SURVEY RESULTS

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Offshore Wind Farm

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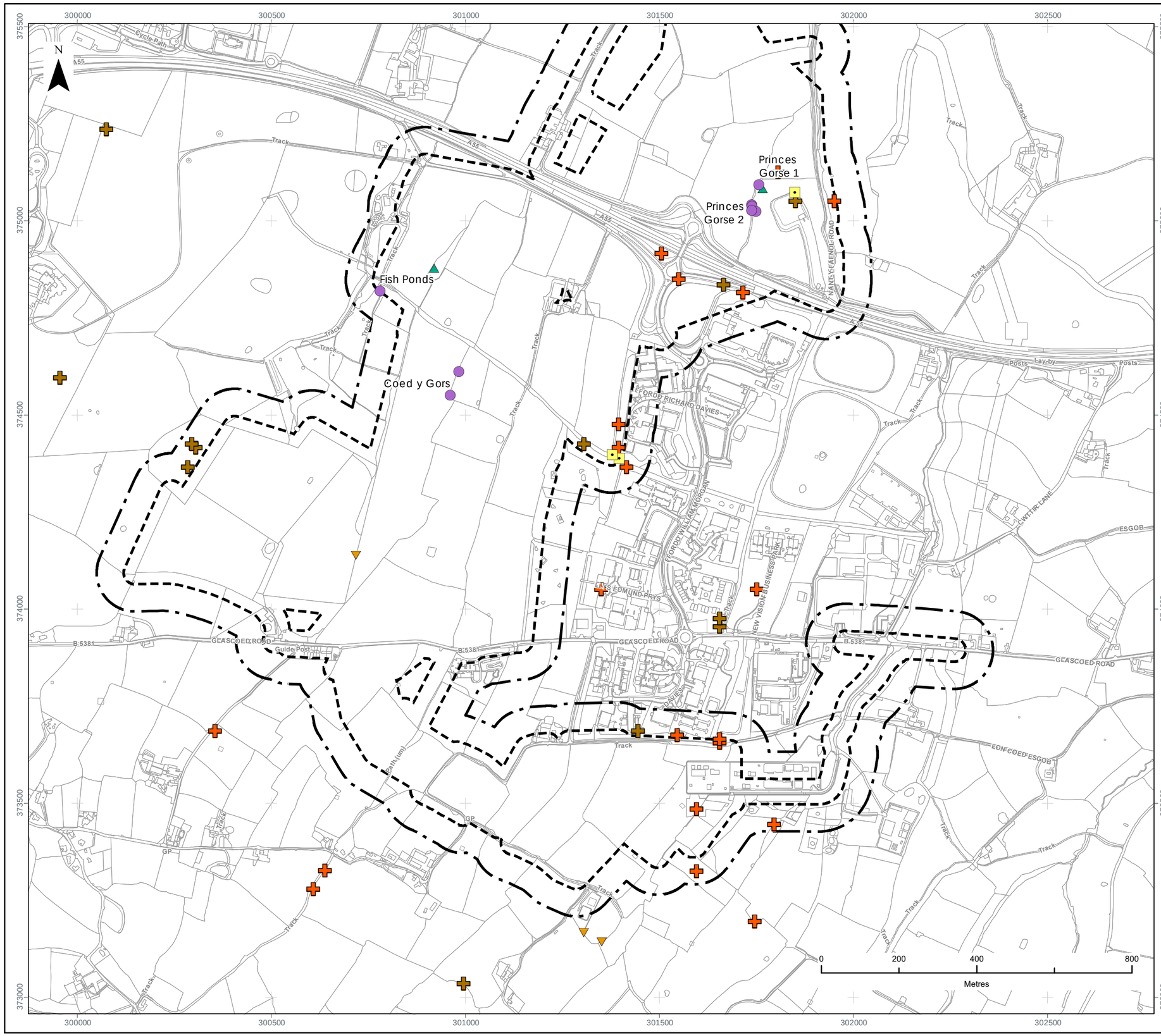

LEGEND

- Draft Order Limits presented at Statutory Consultation 30 m Buffer
- Draft Order Limits presented at Statutory Consultation 100 m Buffer

2021 Survey Results - Badger Evidence

- Sett Entrance
- Latrine
- Dungpit
- Path

Badger - Cofnod Records

- Badger Sett
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BADGER SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND FIELD SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
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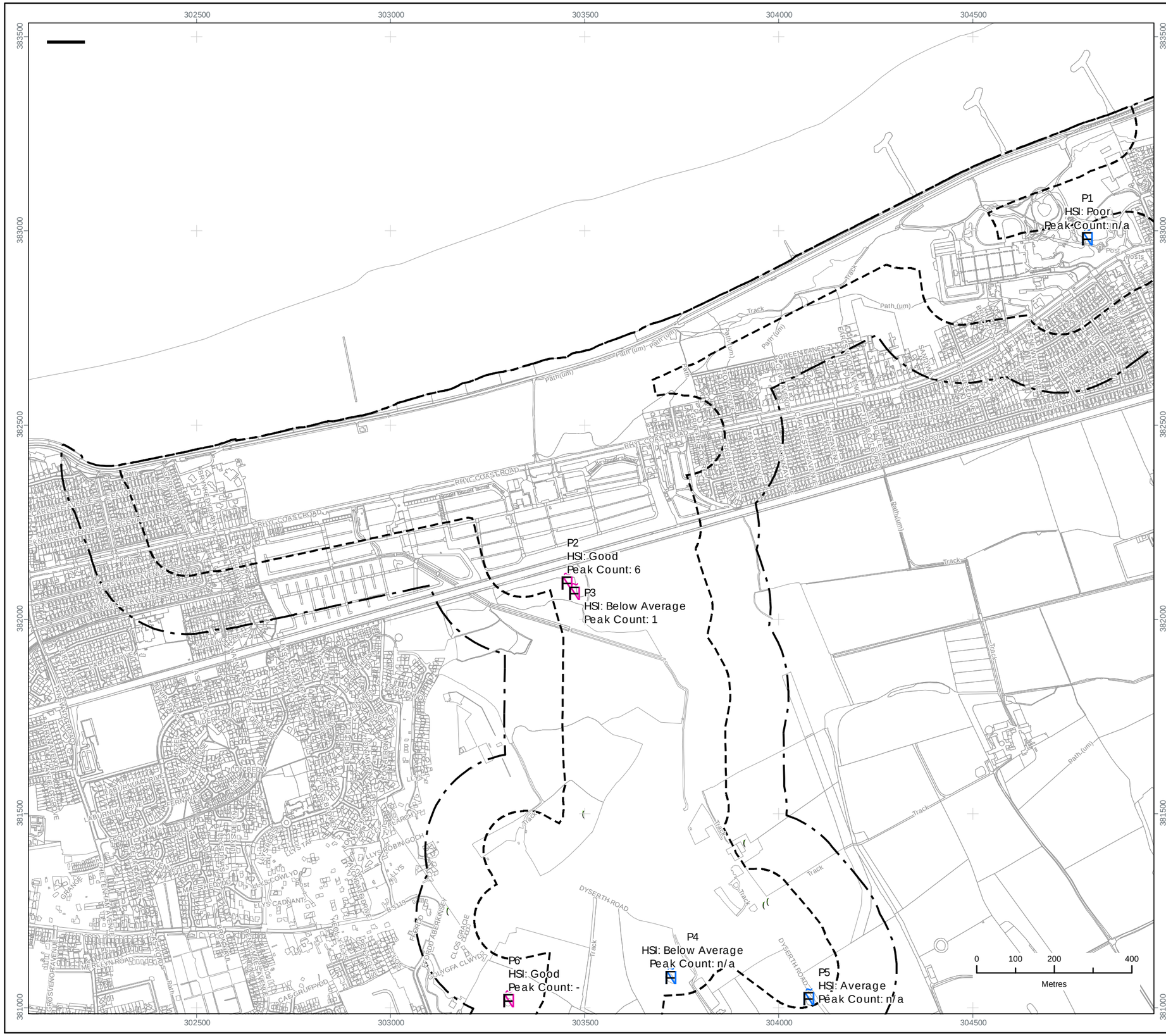
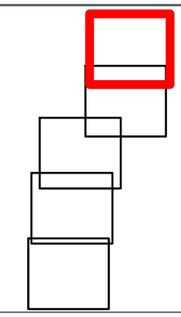
FIGURE NUMBER:

FIGURE 2
Page 5 of 5

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm





LEGEND

- Onshore Infrastructure 100 m Buffer
- Onshore Infrastructure 250 m Buffer
- GCN Present
- GCN Absent
- Pre-2021 GCN Record (Cofnod Data)

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
GCN SURVEY REPORT

FIGURE TITLE:

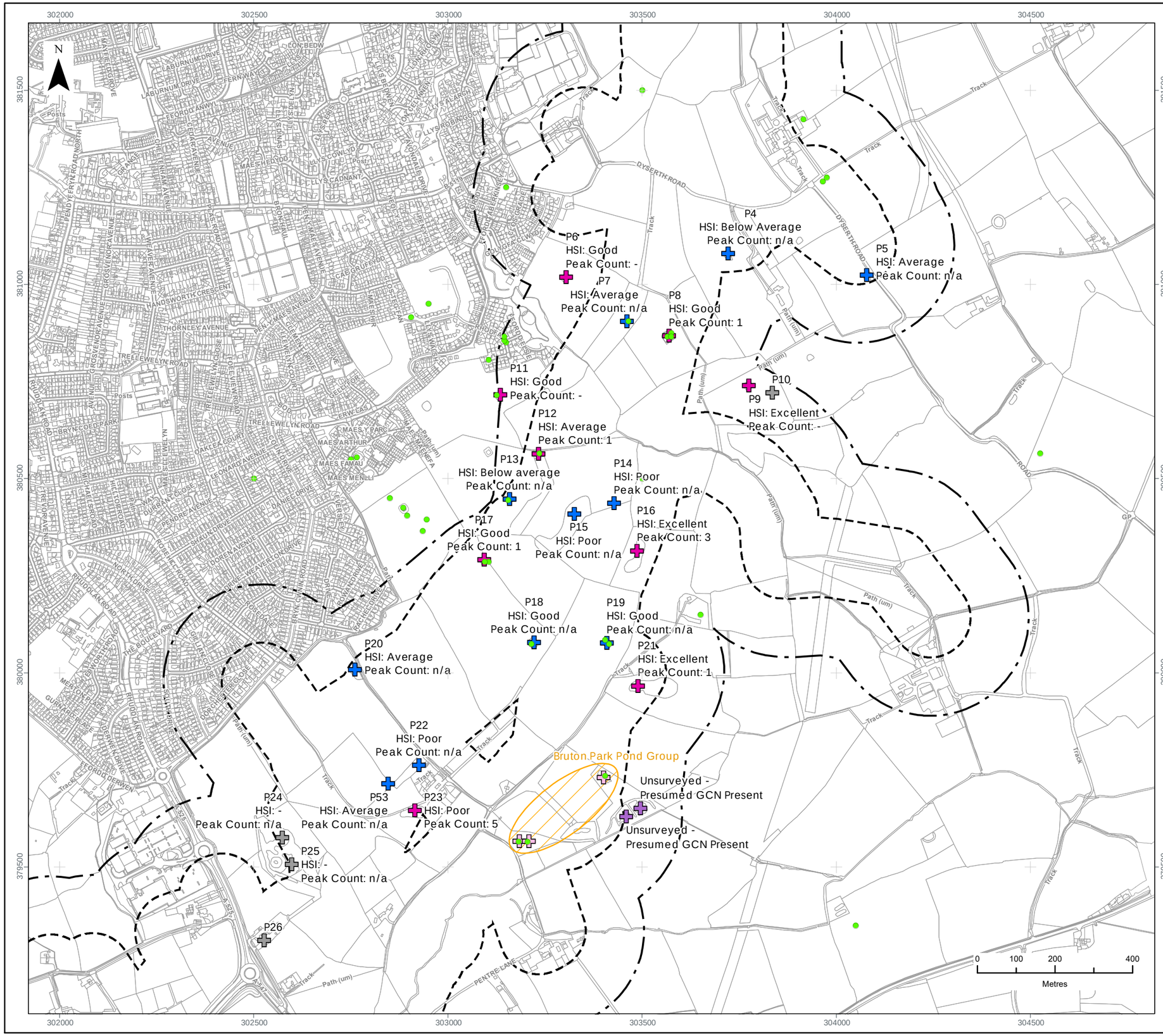
PRE-EXISTING RECORDS AND
GCN SURVEY RESULTS

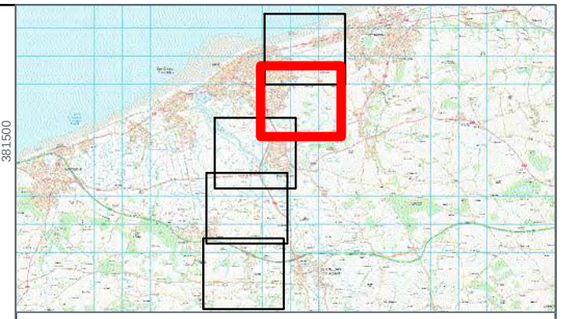
VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid





LEGEND

- Onshore Infrastructure 100 m Buffer
- Onshore Infrastructure 250 m Buffer
- GCN Present
- GCN Present (Pre-Existing Data from Cofnod/NRW)
- GCN Present (Pond within 250m of Another with GCN Present
- GCN Absent
- N/A - Pond Not Surveyed / Pond Not Present at Time of Survey
- Pre-Existing Data from Cofnod/NRW Pond Group
- Pre-2021 GCN Record (Cofnod Data)

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
GCN SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND GCN SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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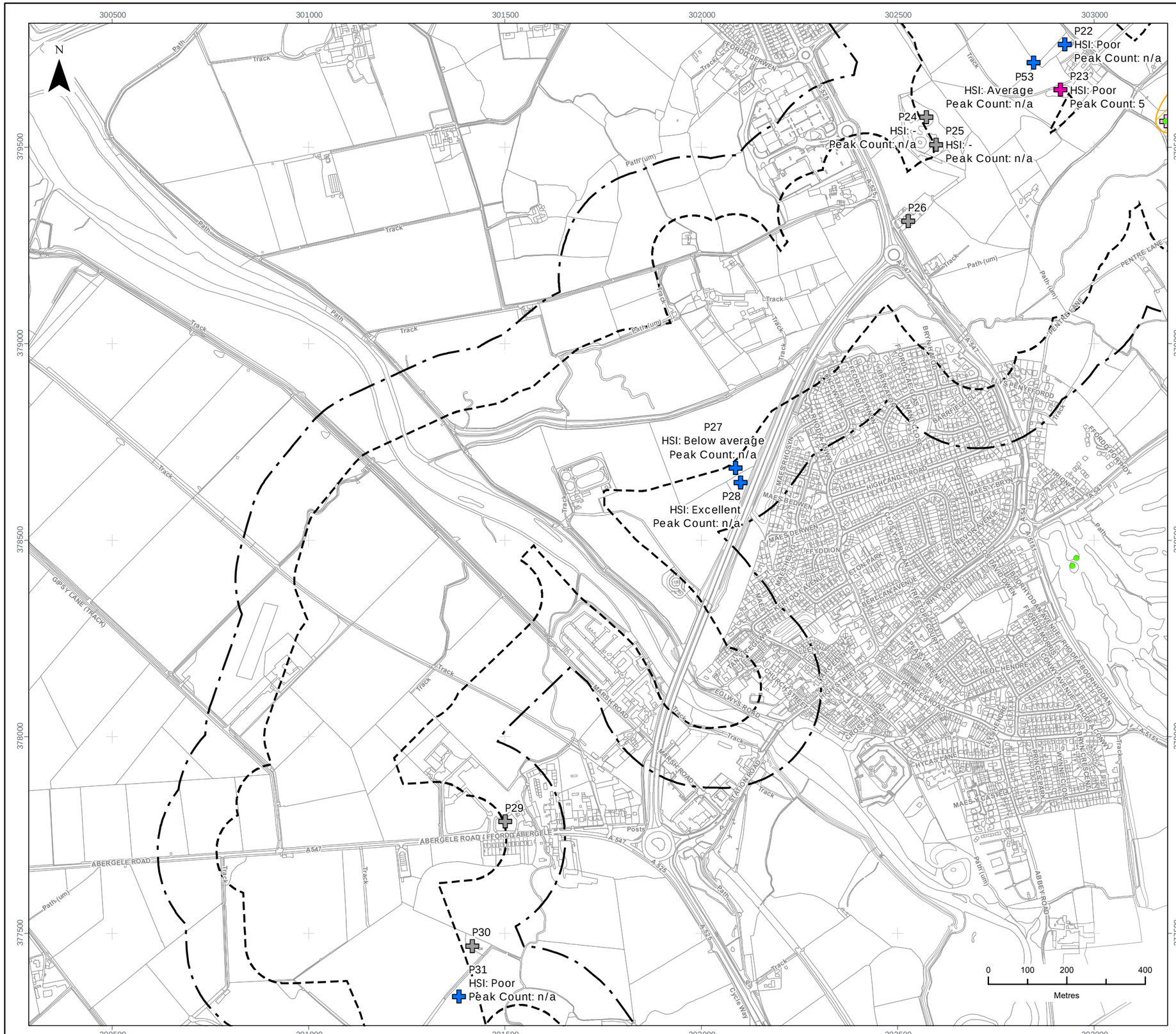

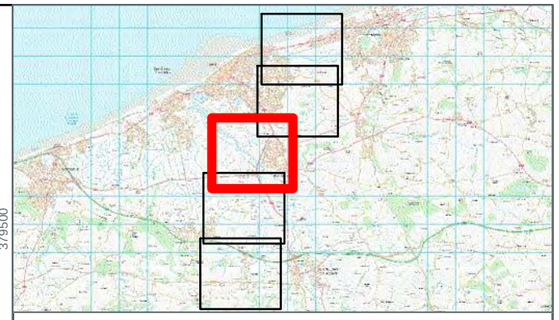

LEGEND

- Onshore Infrastructure 100 m Buffer
- Onshore Infrastructure 250 m Buffer
- GCN Present
- GCN Present (Pre-Existing Data from Cofnod/NRW)
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PROJECT TITLE:
AWEL Y MÔR OFFSHORE WINDFARM
GCN SURVEY REPORT

FIGURE TITLE:
PRE-EXISTING RECORDS AND GCN SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
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SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
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Fferm Wynt Alltraeth
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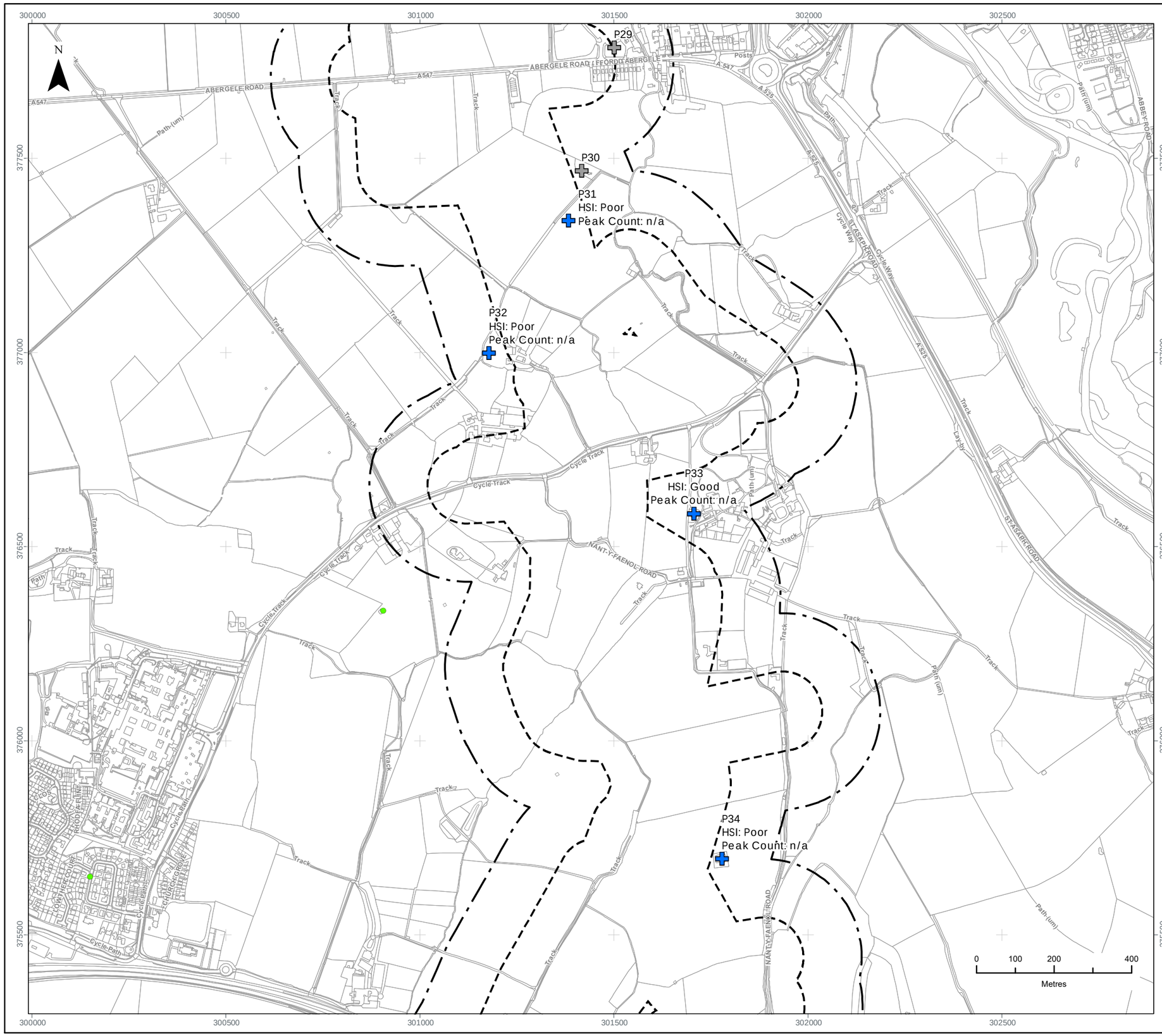

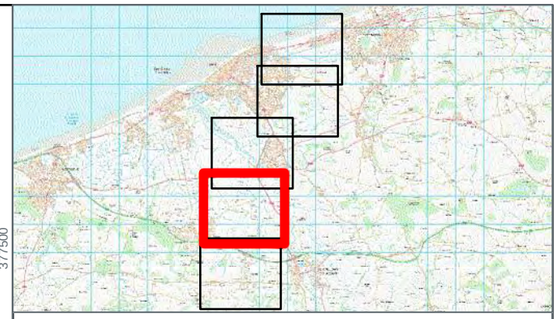

LEGEND

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
GCN SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND GCN SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
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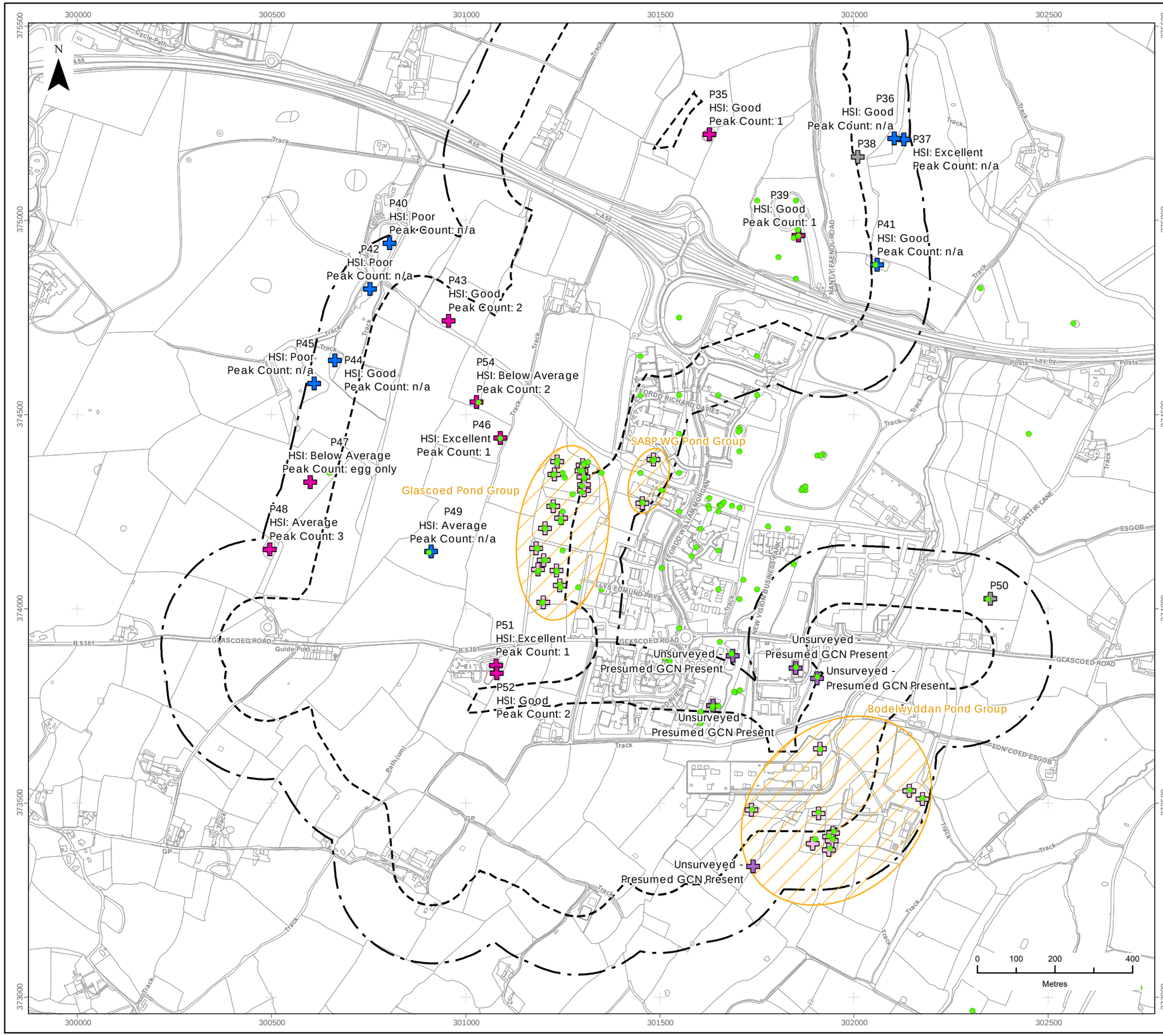

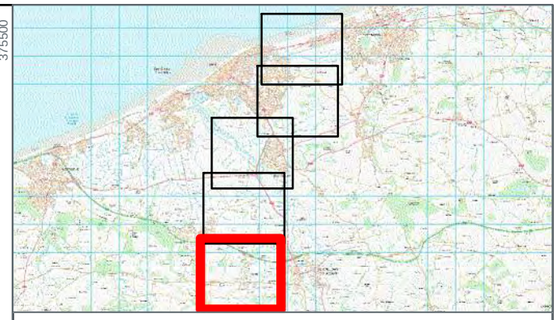

LEGEND

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- Pre-2021 GCN Record (Cofnod Data)

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM GCN SURVEY REPORT

FIGURE TITLE:

PRE-EXISTING RECORDS AND GCN SURVEY RESULTS

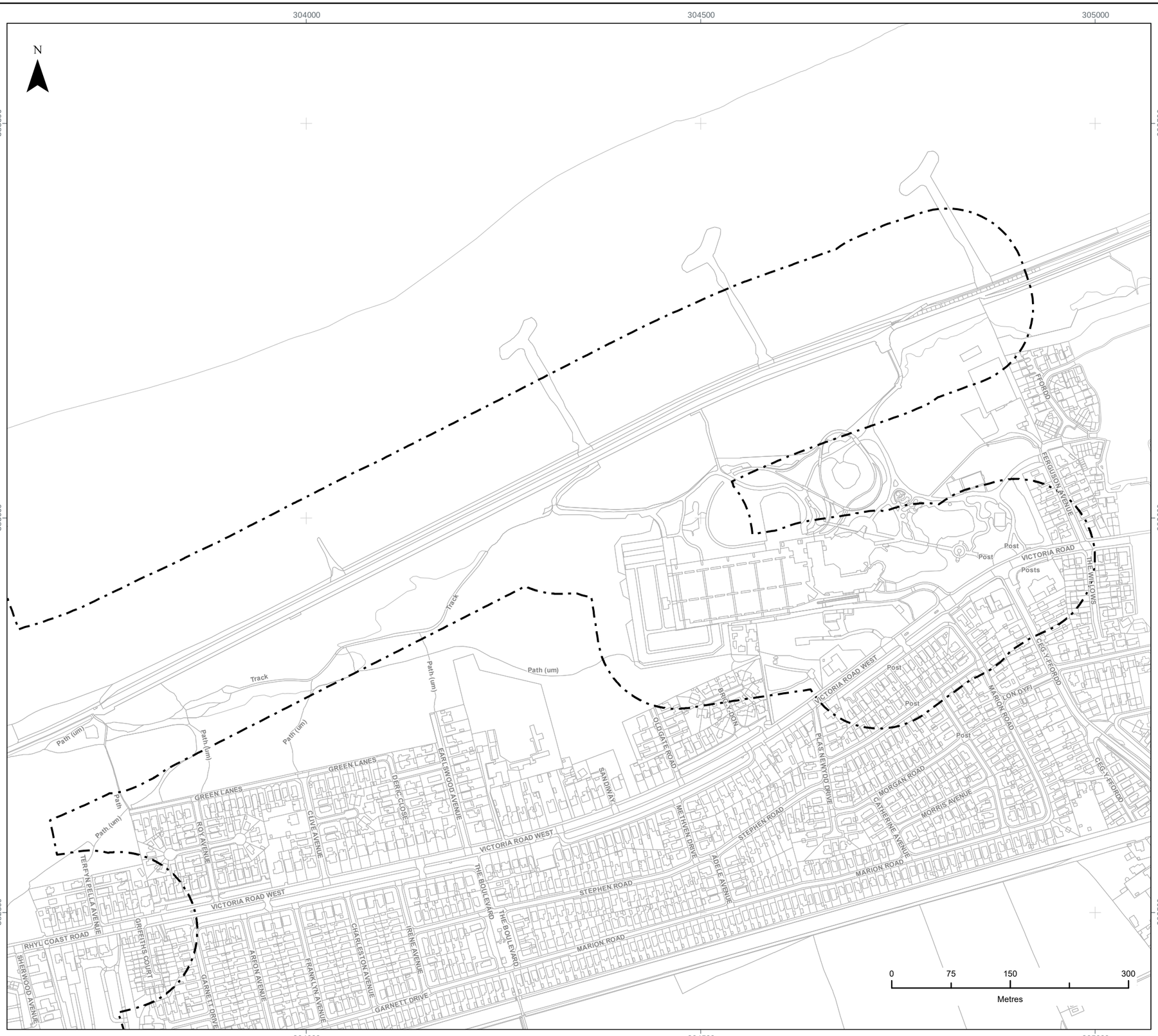
VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

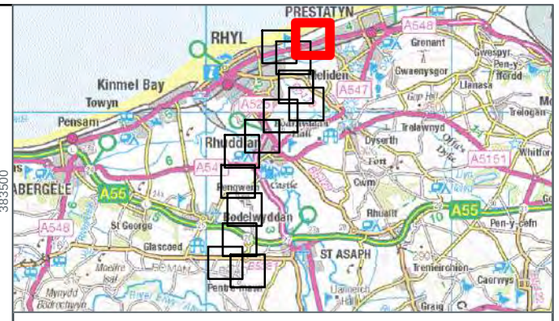
FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm





LEGEND

Draft Order Limits presented at Statutory Consultation 100 m Buffer

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:

BAT SURVEY - PRE-EXISTING ROOST RECORDS AND 2021 TREE SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:5,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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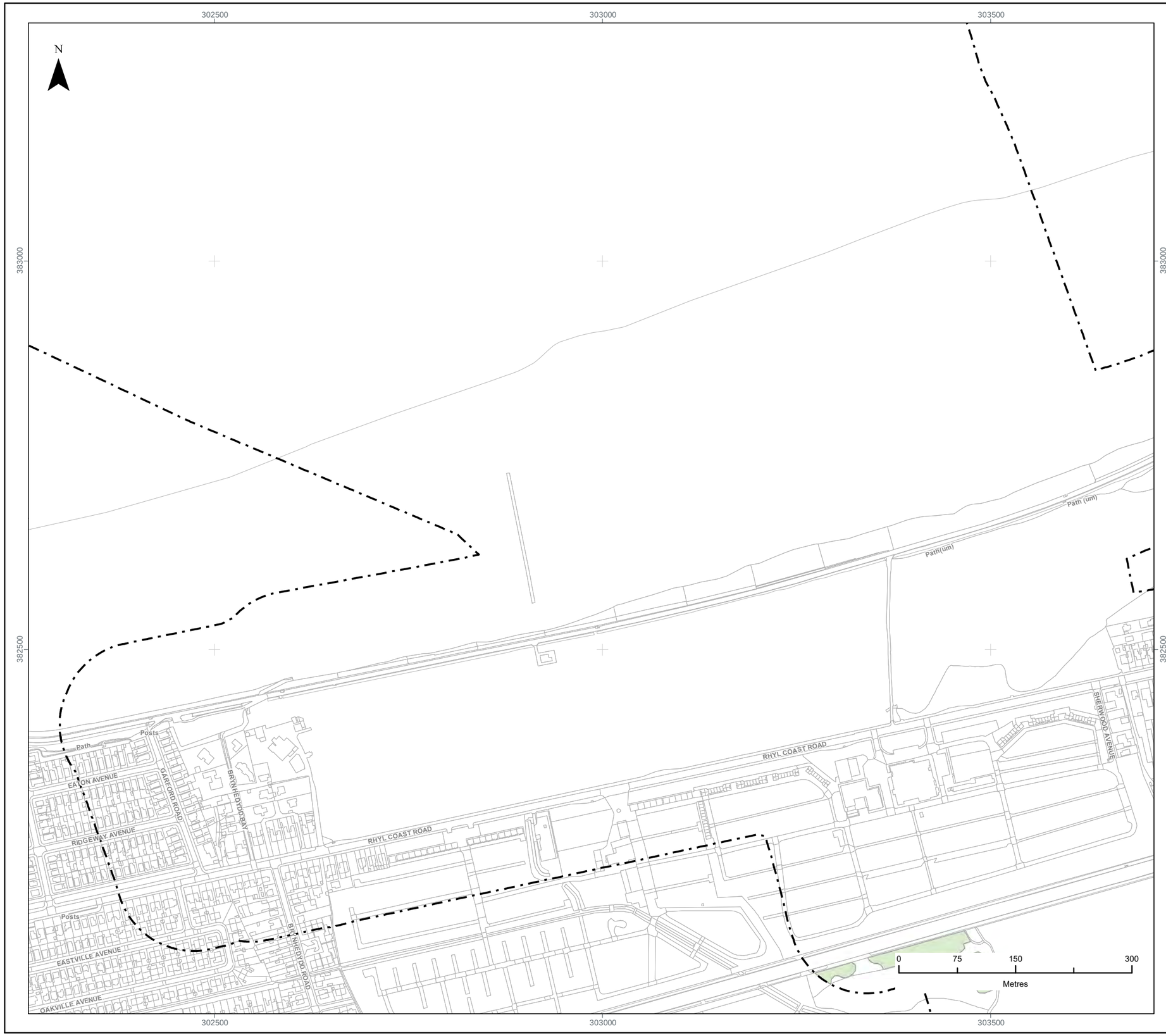

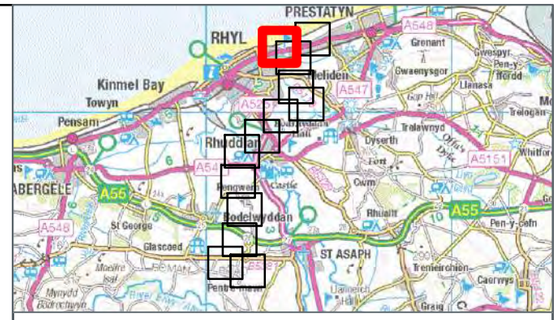

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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PROJECT TITLE:
AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:
BAT SURVEY - PRE-EXISTING ROOST RECORDS AND 2021 TREE SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

FIGURE NUMBER:

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Fferm Wynt Alltraeth
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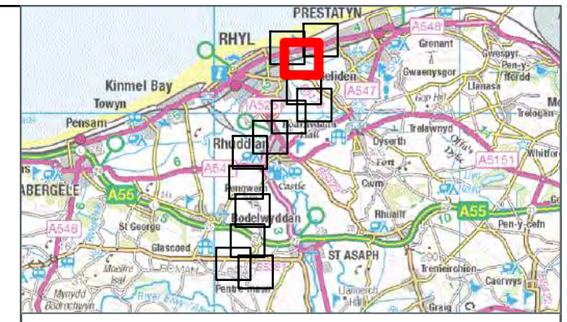

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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PROJECT TITLE:
AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:
BAT SURVEY - PRE-EXISTING ROOST RECORDS AND 2021 TREE SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
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FIGURE NUMBER:
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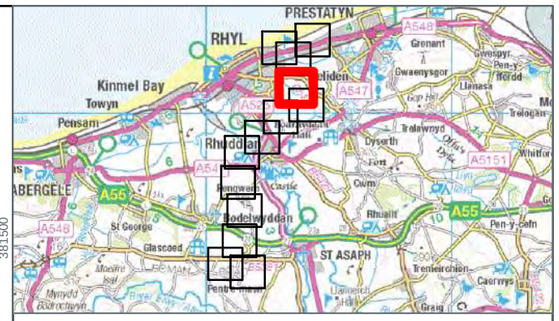

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer
- Tree Not Subject to Detailed Survey - Not Affected by Development
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:

BAT SURVEY - PRE-EXISTING ROOST RECORDS AND 2021 TREE SURVEY RESULTS

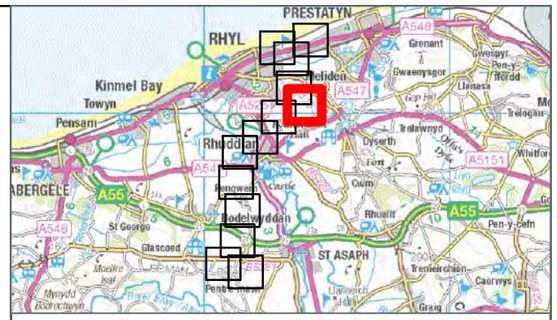
VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:5,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm



LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Trees with Bat Roost Potential

- Neglible Potential
- Tree Not Subject to Detailed Survey - Not Affected by Development

Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:

BAT SURVEY - PRE-EXISTING ROOST RECORDS AND 2021 TREE SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
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FIGURE NUMBER:

FIGURE 1

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Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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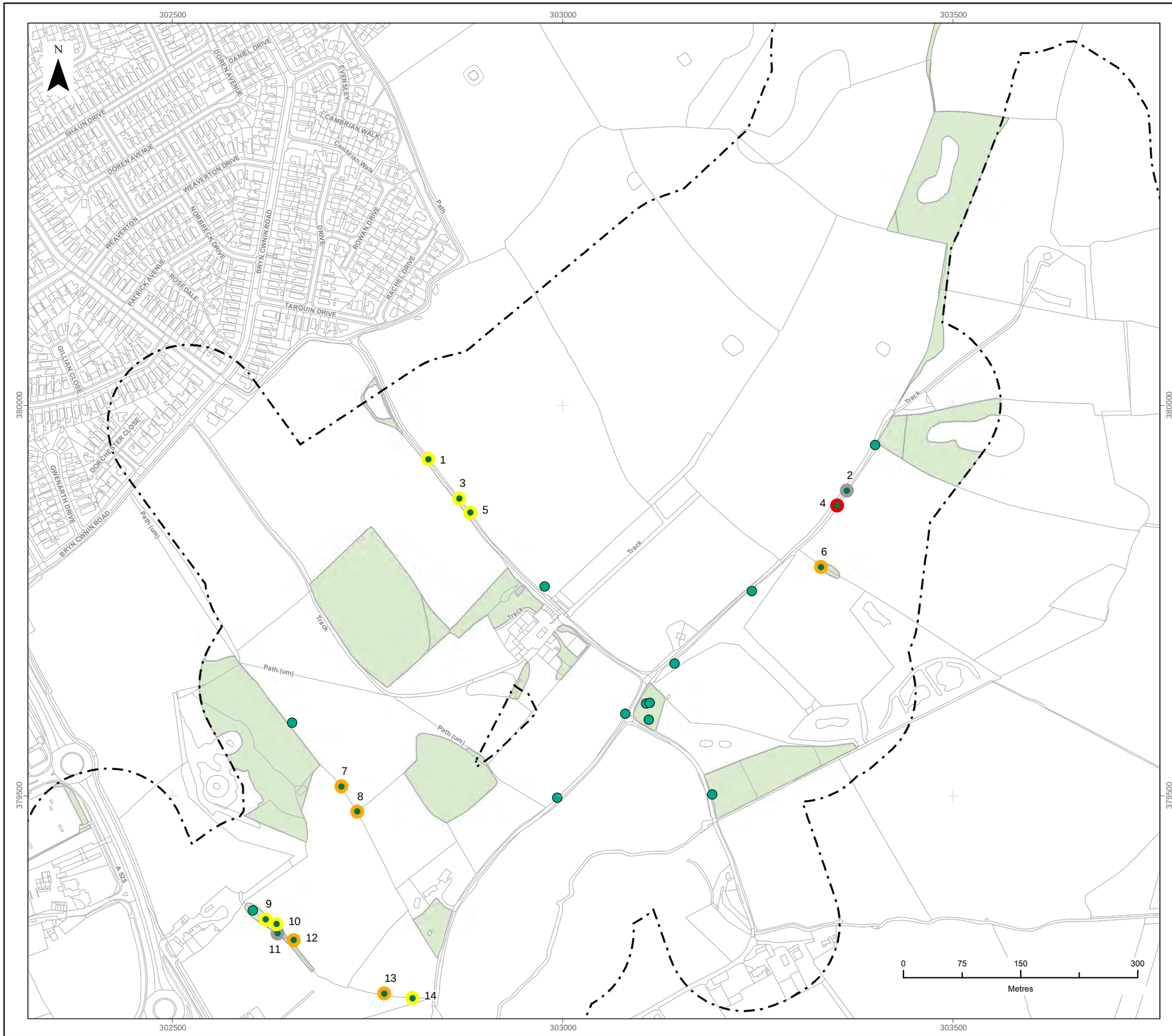

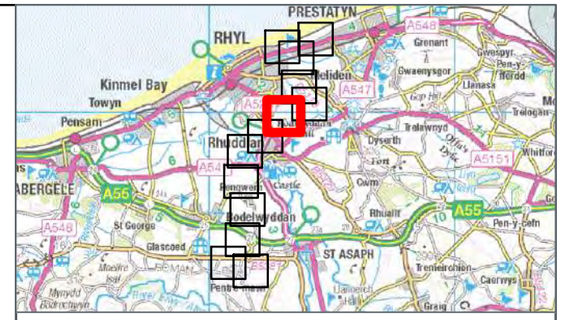

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Trees with Bat Roost Potential

- High Potential
- Moderate Potential
- Low Potential
- Neglible Potential
- Tree Not Subject to Detailed Survey - Not Affected by Development

Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

Data Source:
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PROJECT TITLE:
AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:
BAT SURVEY - PRE-EXISTING ROOST RECORDS AND 2021 TREE SURVEY RESULTS

VER	DATE	REMARKS	Drawn	Checked
1	02/11/2021	Draft	JRS	JC

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:5,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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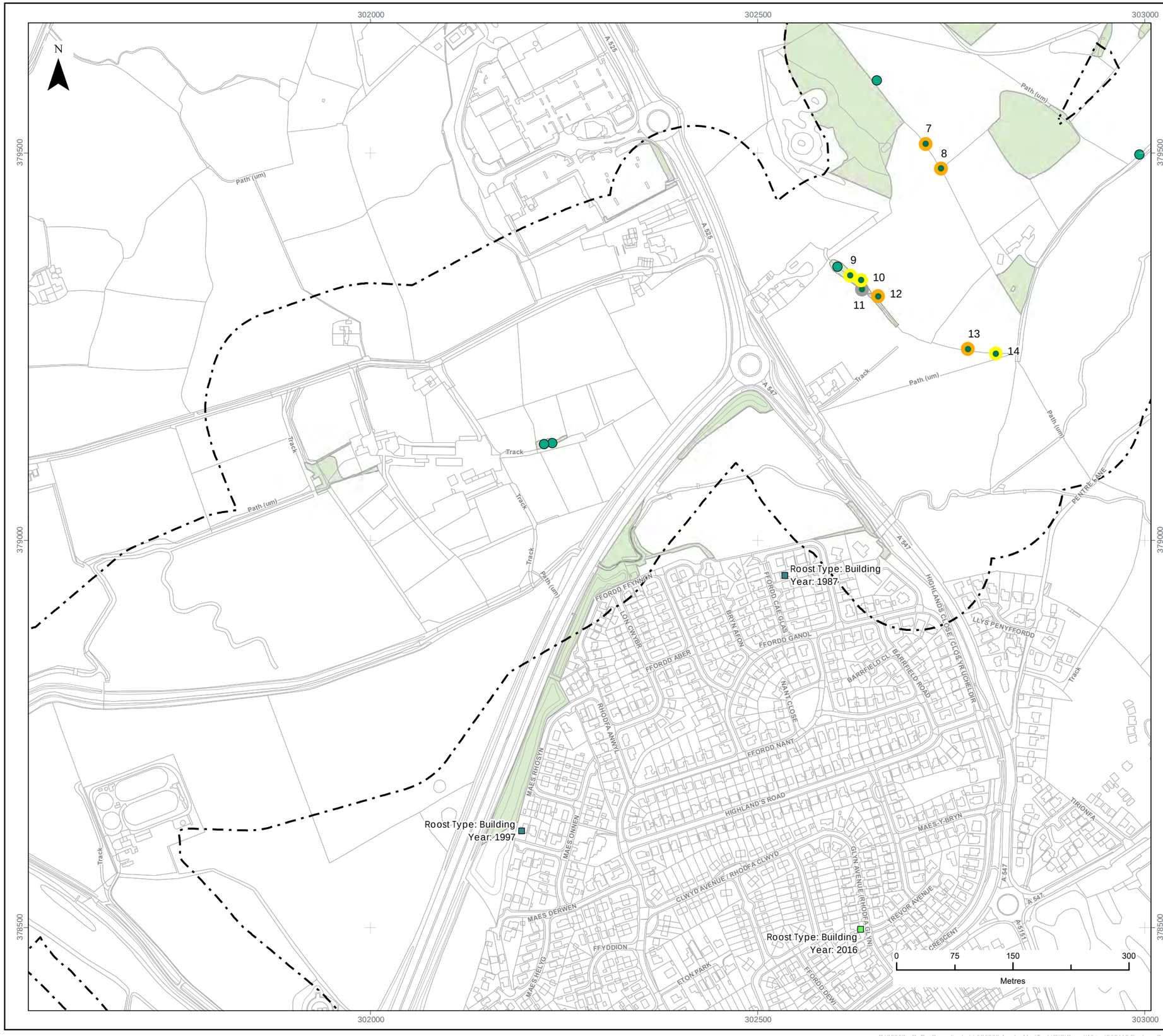

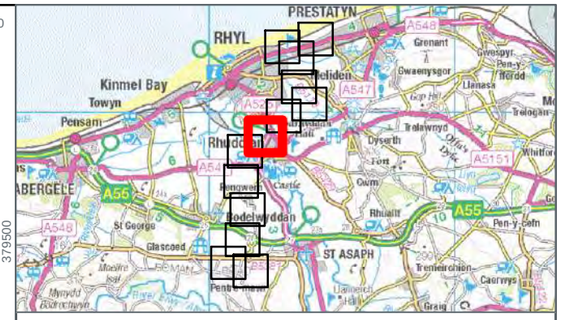

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer
- Cofnod Record Bat Roost (Species) - Roost Type and Year Labelled
  - Pipistrellus Bat Species
  - Unknown Bat
- Trees with Bat Roost Potential
  - Moderate Potential
  - Low Potential
  - Neglible Potential
  - Tree Not Subject to Detailed Survey - Not Affected by Development
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM
BAT SURVEY REPORT

FIGURE TITLE:

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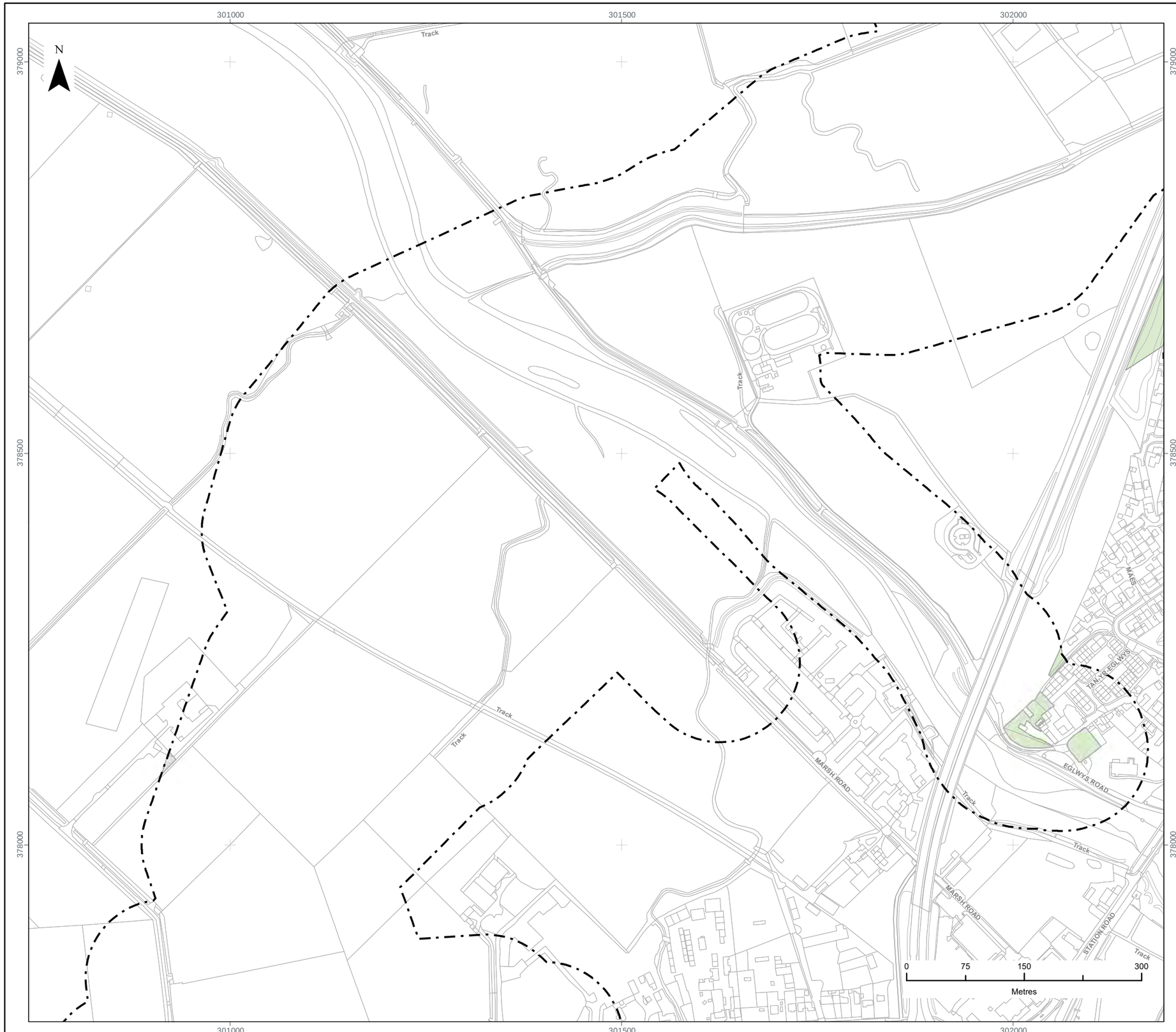

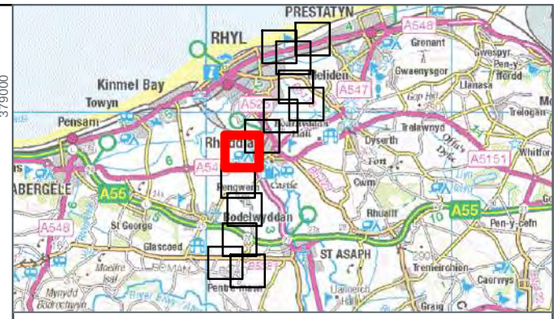

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer
- Cofnod Record Bat Roost (Species) - Roost Type and Year Labelled
- Unknown Bat
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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AWEL Y MÔR OFFSHORE WINDFARM
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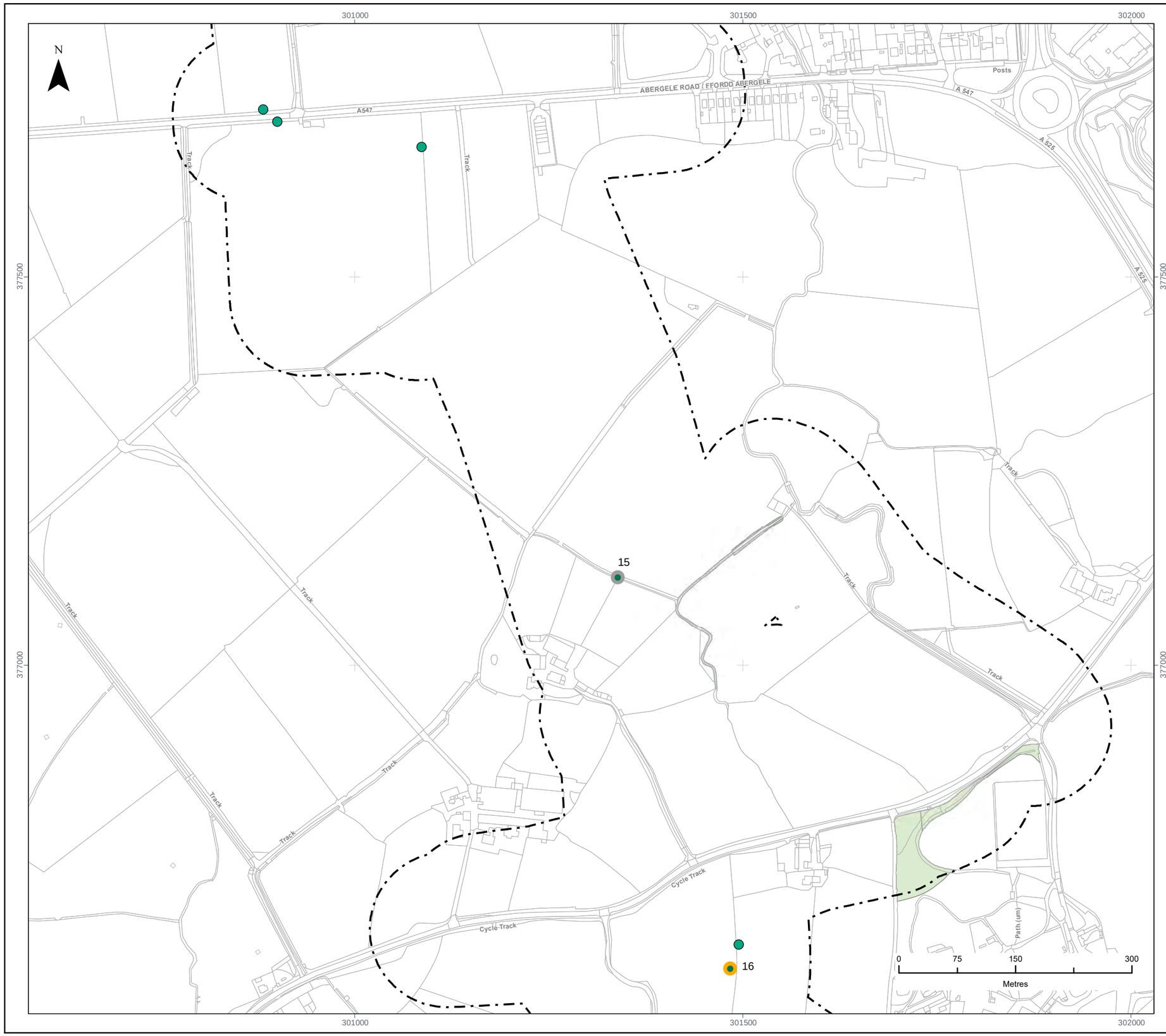

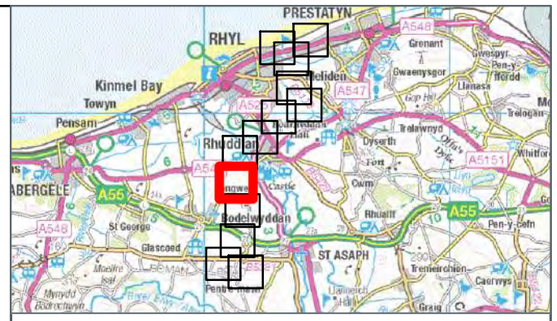

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Trees with Bat Roost Potential

- Moderate Potential
- Neglible Potential
- Tree Not Subject to Detailed Survey - Not Affected by Development

Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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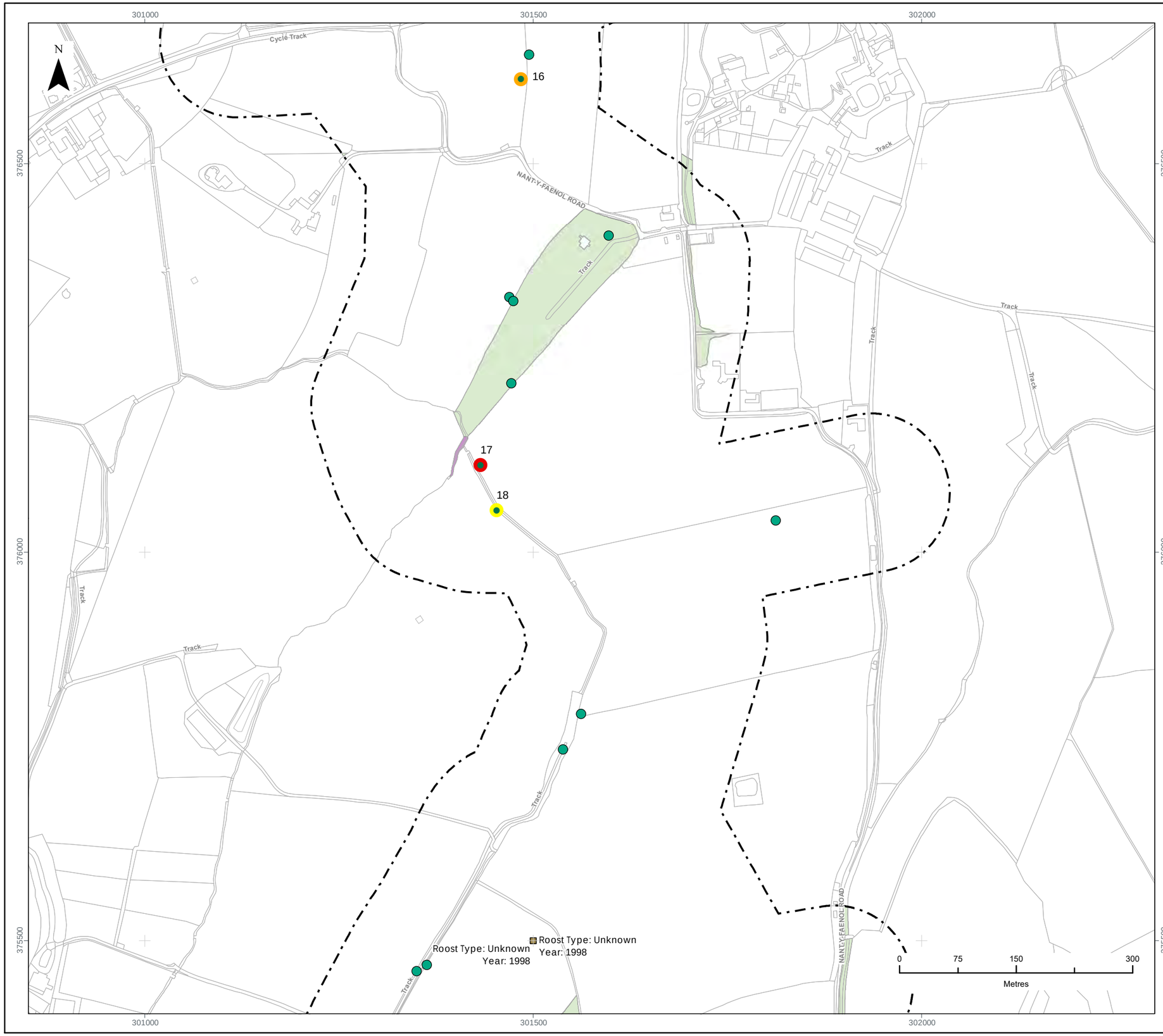

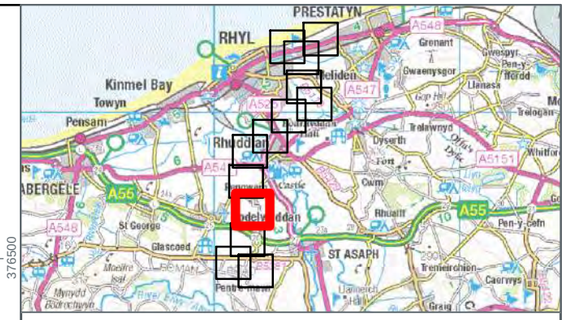

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Cofnod Record Bat Roost (Species) - Roost Type and Year Labelled

- Common Pipistrelle
- Noctule Bat
- Soprano Pipistrelle

Trees with Bat Roost Potential

- High Potential
- Moderate Potential
- Low Potential
- Tree Not Subject to Detailed Survey - Not Affected by Development
- Woodland Subject to Detailed Bat Survey - Affected by Development
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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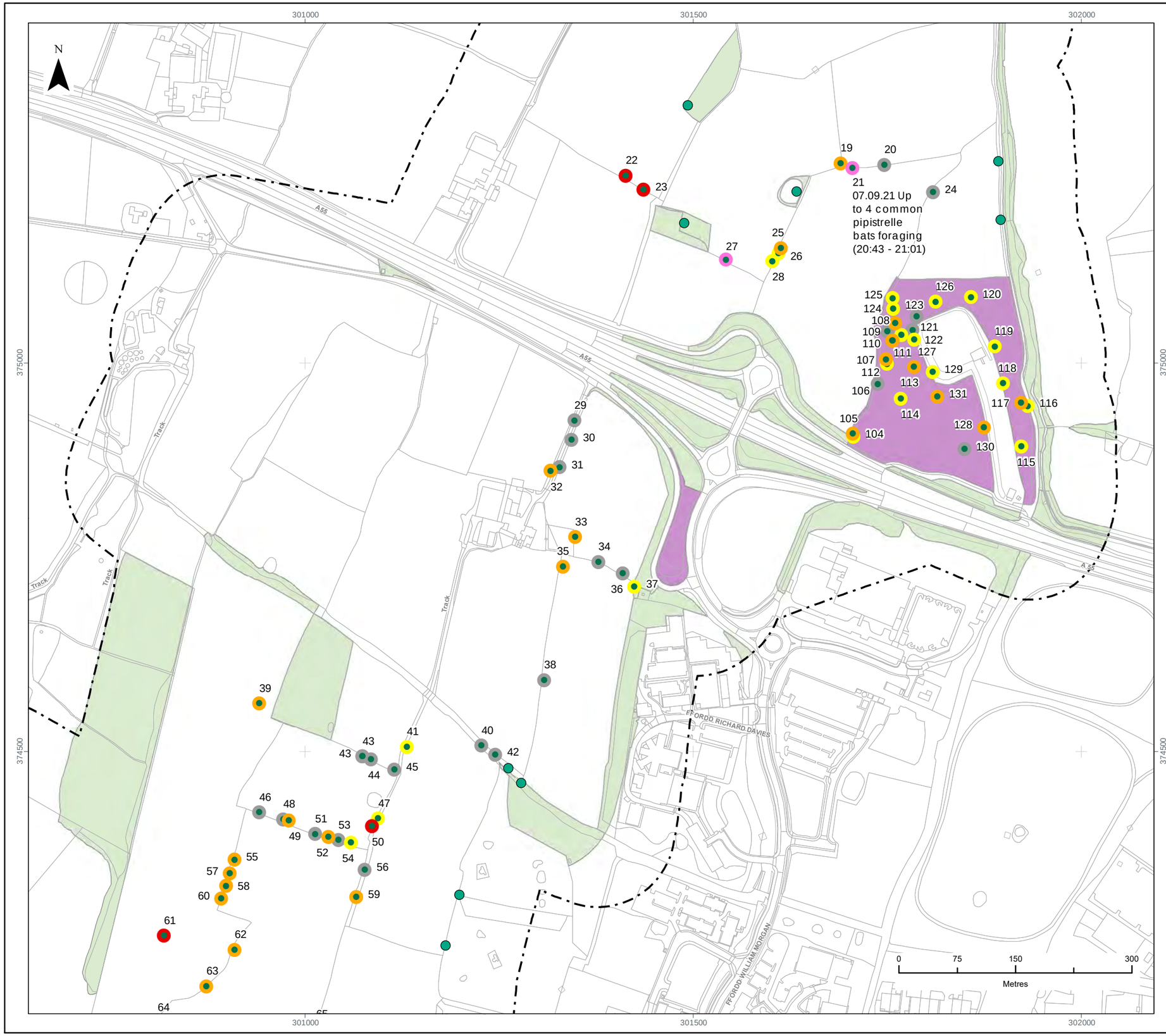

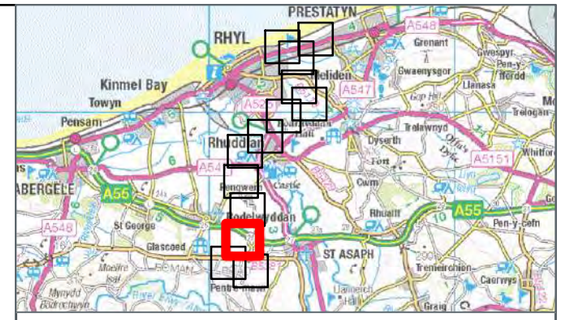

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Trees with Bat Roost Potential

- Confirmed Bat Roost
- High Potential
- Moderate Potential
- Low Potential
- Neglible Potential
- Tree Not Subject to Detailed Survey - Not Affected by Development

- Woodland Subject to Detailed Bat Survey - Affected by Development
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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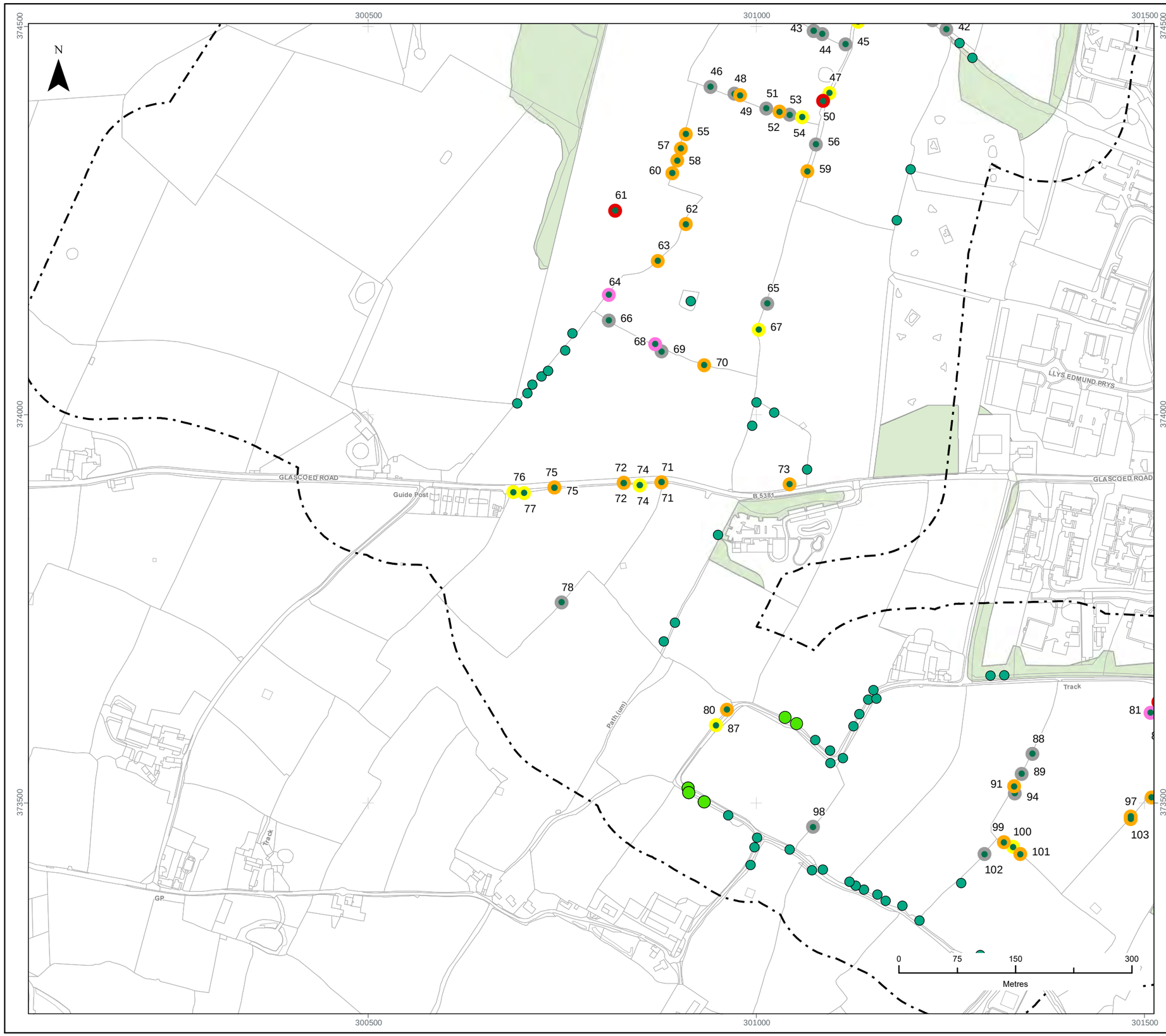

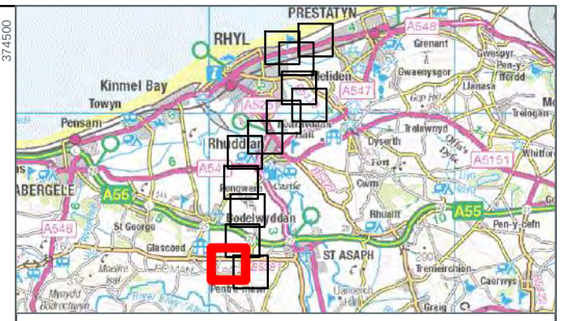

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Trees with Bat Roost Potential

- Confirmed Bat Roost
- High Potential
- Moderate Potential
- Low Potential
- Neglible Potential
- Negligible or Low Potential, Not Subject to Detailed Survey
- Tree Not Subject to Detailed Survey - Not Affected by Development
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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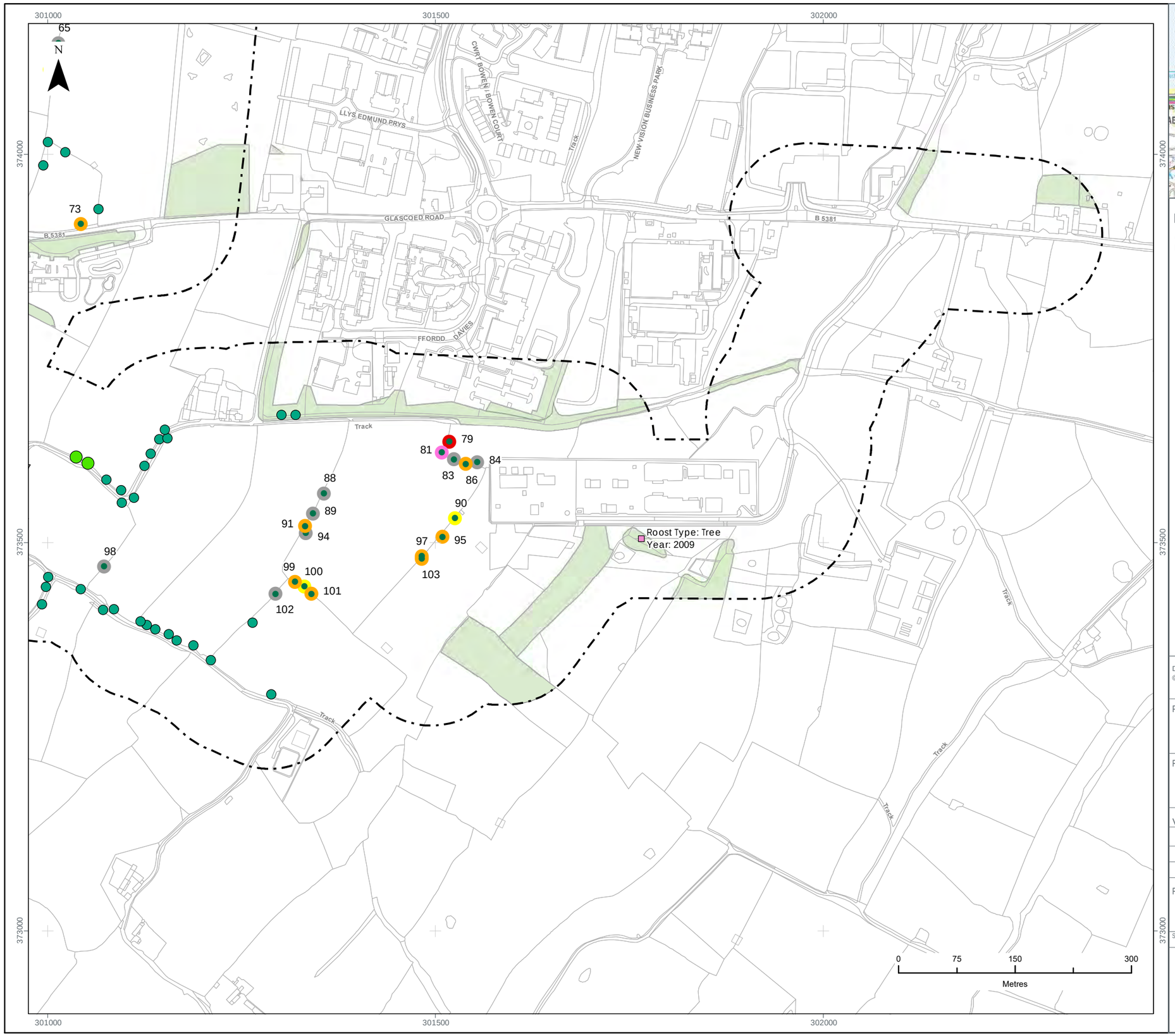

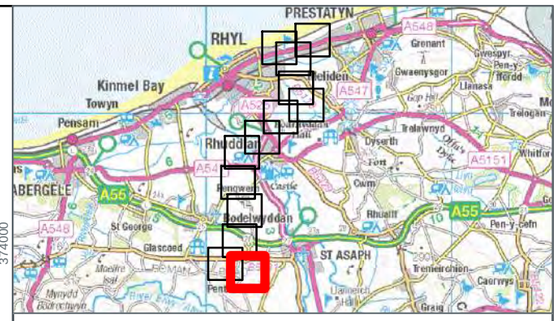

LEGEND

- Draft Order Limits presented at Statutory Consultation 100 m Buffer

Cofnod Record Bat Roost (Species) - Roost Type and Year Labelled

- Noctule Bat

Trees with Bat Roost Potential

- Confirmed Bat Roost
- High Potential
- Moderate Potential
- Low Potential
- Neglible Potential
- Negligible or Low Potential, Not Subject to Detailed Survey
- Tree Not Subject to Detailed Survey - Not Affected by Development
- Woodland Not Subject to Detailed Bat Survey - Not Affected by Development

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AWEL Y MÔR OFFSHORE WINDFARM
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AWEL Y MÔR
Offshore Wind Farm

Ponds 4 – 26, Pond 53 and the Bruton Park ponds are within 500m of each other are considered to support the same metapopulation. Of these 26 ponds, 16 currently or historically supported GCN. The GCN population present in 2021 is considered to be of medium size.

Ponds 35-39 and Pond 41 are within 500m of each other and wider pond network. The A55 is considered to represent a barrier to most, but not all GCN movement, such that the population here is considered reasonably distinct from that south of the A55. The GCN population present in 2021 is small.

The remaining ponds (40, 42-52, 54, Glascoed Ponds, SABP Ponds, Bodelwyddan Ponds, all other ponds within St Asaph Business Park (SABP)) are considered to support the same metapopulation. Whilst full survey details for this entire metapopulation are not available for 2021, it seems possible that the SSSI Selection criteria[1] for an "exceptional site" (a single night count of over 100 individuals) may be met.

[1]Section 3.2.2 of JNCC Guidelines for the selection of SSSIs – Reptiles and Amphibians (under revision) https://data.jncc.gov.uk/data/765b2344-f86b-4500-8718-dc9ecf9375b6/SSSIs-amp-rep-C15.pdf

Onshore Biodiversity and Nature Conservation November 2021 ETG: 2020/2021 Proposed Mitigation Update

The note sets out proposals for mitigation that will be presented during the Onshore Biodiversity and Nature Conservation November 2021 ETG, and upon which RWE would like to seek consultee feedback to be provided two weeks following the ETG meeting.

Mitigation Principles

Key principles for mitigation were set out within the Landscape and Ecology Design Principles Plan provided as part of PEIR. The Key principles are copied below for ease of reference:

GCN

Principle 1. Mitigation for temporary loss of foraging areas will be provided as close as possible to the area that is lost, and remain accessible to the nearest breeding ponds. In most cases this is anticipated to comprise a relaxation of/changes to agricultural grassland management in areas near to the ECC/ OnSS, to enable a more diverse sward to develop. Depending on the location, additional seeding of grassland/ tall herbs may be used to ensure sufficient resource remains. Cut vegetation (such as arisings from hedgerow or scrub removal) will be used to create brash piles for use by sheltering amphibians.

Principle 2. Permanent loss of woodland and hedgerows which may be used by sheltering GCN will be compensated via creation of new broadleaved woodlands and species rich hedgerows comprising locally appropriate species. These will be located so as to link or buffer existing woodlands, scrub and hedgerows, within areas identified as Woodland Focal Areas by NRW, and will serve toward objectives within the NRW North East Wales Area Statement, most particularly the "Promoting the resilience of ecosystems in maintaining and enhancing biodiversity" theme.

Brash piles and log piles will be created to serve as hibernaculae and places of shelter.

Principle 3. Retained ponds to remain accessible to GCN throughout the construction phase via protected habitat links and/ or underpasses.

In view of the fact that the presence of the OnSS plus related construction compounds and construction access may present a barrier to GCN movement, a wildlife underpass is proposed to enable continued east-west movement across the area. The design of the underpass will be informed by the best available evidence from current guidance and successful mitigation schemes.

Principle 4. Seek Enhancements. Pond loss is not anticipated at the OnSS; creation of addition ponds is therefore not proposed as mitigation or compensation. However, it may be considered as part of a wider package of ecological enhancements that the scheme will deliver, and that would be detailed in full in the OLEMP.

Other species

The construction of the OnSS will result in the loss of a number of mature trees, mainly oaks. Surveys are being undertaken to identify which trees have existing bat roost potential. Key principles that will be followed in order to mitigate and compensate for impacts are described below.

Principle 1. No net loss of bat roosting habitat. Compensation roost features will be provided for every moderate or high potential roost feature prior to loss; to include bat boxes on retained trees or installed

poles, re-use of whole felled trunks by setting vertically as monoliths and/ or veteranisation (cutting and carving into healthy trees to mimic nature, to speed the process of decay and rot holes) as appropriate.

Principle 2. Compensation features will be installed as close as possible to those lost, whilst also addressing other constraints, such as the requirement to be within an unlit area, ideally away from Public Rights of Way (PROW) and within or close to potential flight lines. In all cases the compensation measures for confirmed roost loss would be within the Core Sustenance Zone of the species concerned, and subject to any NRW licence requirements.

The mitigation described above for GCN at the OnSS will also be of benefit to other important ecological features including hedgerows, mammals, invertebrates and birds.

Proposed Mitigation/Compensation Locations

Mitigation proposals remain preliminary, since the final design has not yet been frozen. However, unless significant additional constraints come to light, it has been presumed that the preferred corridor identified at PEIR will be the basis for the DCO application, with no transition joint bays within Rhyl Golf Course, taking the northernmost cable corridor route option at Bryn Cwnin and using the westernmost crossing at the A55.

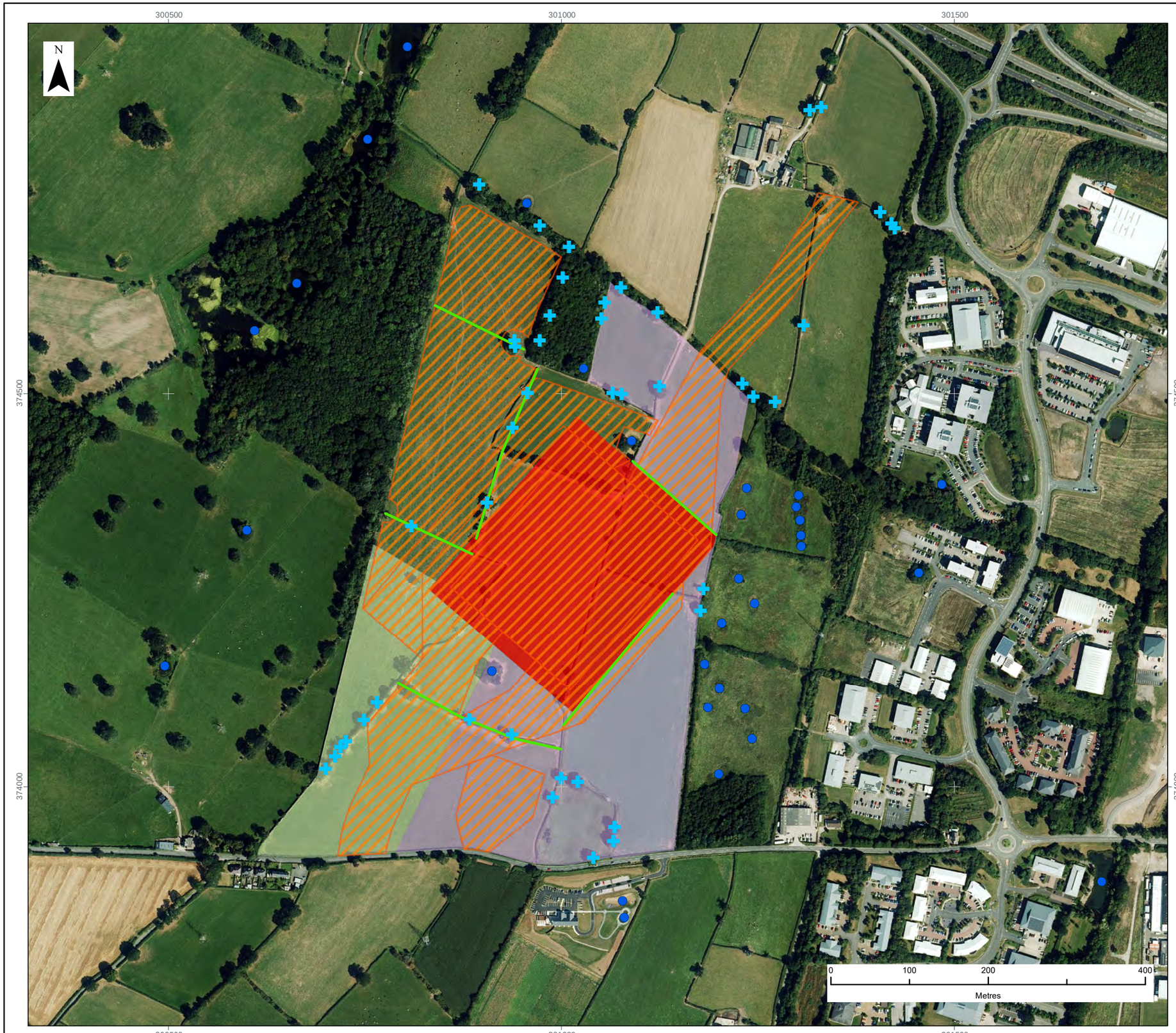
Temporary mitigation along the route corridor will primarily comprise habitat management for the benefit of GCN that could be impacted via terrestrial habitat loss or fragmentation, in addition to measures to ensure safe passage of badgers.

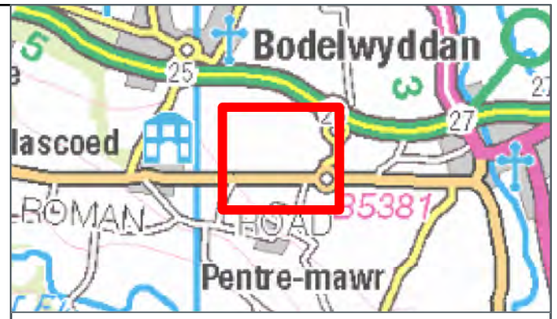
At the OnSS location where permanent impacts will occur, the exact location of each construction element and/or scheme design at the OnSS will be determined through detailed design post-consent. A “worst case” plan is therefore presented on the attached plan, which is issued in draft for discussion, showing the maximum areas within which construction and operational impacts may occur.

The plan for discussion includes the following areas:

- Permanent mitigation and compensation areas – these areas will be restored and managed for the benefit of biodiversity (with a focus on GCN) for the lifetime of the project.
- Enhancement area - these areas will be restored and managed for the benefit of biodiversity (with a focus on GCN) for the lifetime of the project. It is noted that this area will also include areas of planting for visual screening purposes.

We are keen to discuss with ETG members the types of mitigation and compensation measures that could be incorporated into these locations in order to complement existing projects and build into the aims of the NRW Area Statement, local and national planning policies, as well as minimise impacts to local biodiversity.





LEGEND

- Potential Locations for Bat Mitigation/Compensation
- Existing Ponds
- Replacement or New Hedgerows
- Substation Construction Zone
- Temporary Disturbance During Constuction
- Enhancement Area Post Construction
- Permanent Mitigation/Compensation

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PROJECT TITLE:
AWEL Y MÔR OWF OUTLINE

FIGURE TITLE:
MITIGATION, COMPENSATION AND ENCHANCEMENT AREAS: FOR DISCUSSION

VER	DATE	REMARKS	Drawn	Checked
1	11/11/2021	Version 1	PW	MF
2	18/11/2021	Version 2	JS	MF

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
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Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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1.6 Appendix D6: Onshore Hydrology and Flood Risk

Technical Note: Hydrology and Flood Risk Data Discussion

Awel y Môr Offshore Windfarm

16th March 2021

General

The following note sets out the discussion points and questions we would like to go through with Natural Resources Wales (NRW) and Denbighshire County Council (DCC). The note is accompanied by a plan showing the location of the preferred 100m wide cable corridor and substation location.

During the meeting, we would like to discuss the presence of the following in proximity to the cable corridor and substation zone:

- Pumping station asset information and managed drainage networks, flood event history and surface water quality data from NRW
- Fluvial and tidal flood data for areas known to be at risk of flooding (from NRW)
- Flood defence asset data and future flood defence plans (from NRW)
- Flood event history, flood defence asset information and future flood defence plans (from DCC)
- Registered private water supply information from DCC for cable route and substation area, in particular land near HDD sections, temporary works and any permanent infrastructure (substation, landfall, etc)
- Registered water abstraction or discharge points in proximity to the cable route or substation

Work is progressing on baseline reporting for all site areas and initial FCA / outline drainage strategy works for the substation zone.

Cable corridor review

To date our appraisal has comprised the following aspects:

- Desk based assessment of a range of maps and aerial imagery.
- Opensource data from a range of sources including NRW flood mapping, LiDAR and water quality data.
- Review of obstacle crossing data.
- Liaison with ecology team.

Our next phase includes site work to confirm presence of features through site observations.

Substation area

The proximity of local surface water features has been reviewed.

Regulatory ownership of features at the substation location is to be confirmed and we would like to discuss this during the ETG meeting.

We would also like to discuss with SuDS Approval Body (SAB) the position that the Project will be taking with regard drainage.

We note that schedule 3 paragraph 7 to the Flood and Water Management Act 2010 contains the requirement for approval, from the relevant approval body, of the SuDS prior to construction of the development. However, para 7(3) contains an exemption for “work requiring development consent under section 31 of the Planning Act

2008" (I.e. nationally significant infrastructure projects). This is confirmed in the relevant statutory guidance[1] under exemptions from the need for SAB approval.

It is therefore our intention that relevant SuDS principles will be applied to the substation development and secured through a requirement of the DCO.

We would like to confirm whether there is a need for infiltration testing prior to submission?

Management of surface water

A review of the cable corridor has been undertaken to highlight areas where access to surface water features for management and disposal of water is remote.

Project team discussions are being held over potentially extending the 40m corridor in discrete locations to increase access to surface water during construction.

We would like to discuss with DCC (as SuDS Approval Body) any requirement with regard to temporary drainage serving Temporary Construction Compounds (TCCs):

- x2 TCC downstream of Clwyd crossing
- x2 TCC between Clwyd crossing and substation
- TCC at substation
- TCC at National Grid connection point

We would intent to capture this through surface water drainage covered by a Code of Construction Practice (CoCP) and secured by condition of the DCO.

We would like to ask what would stakeholders expect or require with regard to controls for management of water quality on site?

- Sediments
- Control of polluting chemicals / fuels / oils / etc.
- Litter / debris / dust

What is the best way to manage any requirement for dewatering in terms of licencing?

Likely Key Issues

Context

The cable corridor and substation zone are drained by a number of watercourses, ranging in significance from the River Clwyd, main rivers such as Afon Fyddion (Glanfyddion Cut) and Nant-y-faenol (Pont Robin Cut) and by numerous smaller rivers, streams, drainage channels and ditches. All drainage ultimately discharges into either the Clwyd Estuary or into Liverpool Bay. None of the main rivers or inland tributaries are classified as environmentally designated areas, however the coastal area is classed as a Special Protection Area (Liverpool Bay SPA).

Groundwater beneath the site is present within Principal bedrock aquifers of the Clwyd Limestone group and Kinnerton Sandstone Formation. Less sensitive Secondary A bedrock aquifers are present within the mudstones of the Warwickshire Group. Superficial deposits underlying the cable corridor comprise mainly Tidal Flat Deposits, Devensian Diamicton Till and Glaciofluvial Sheet Deposits. The substation zone is underlain by the

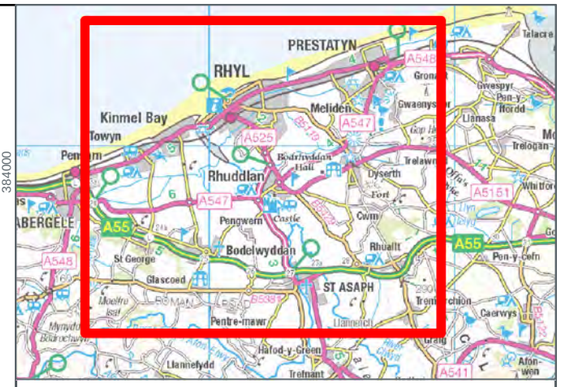
[1] Sustainable Drainage (SuDS) Statutory Guidance, Welsh Government, 2019

Devensian Diamicton Till. These deposits are generally classed as Secondary (undifferentiated or Secondary A) aquifers.

Proposed key issues for consideration

The following points set out the likely key issues that we have identified to date. We welcome any feedback from DCC and NRW as to whether there are any other issues that should be included in the assessment.

- Flood risk and informing the emerging design so that essential infrastructure is located in areas that are not at flood risk. Where areas of risk cannot be avoided, design must ensure that provision is made for flood mitigation and flood resilience measures.
- Construction of cable routes beneath flood defences and larger watercourse crossings. Any works in close proximity to or crossing (including HDD sections) flood defence assets or managed watercourses will require appropriate consents.
- Construction of cable trenches in or near sensitive habitats (and in particular any habitats identified by ecology teams as being dependent on surface water or groundwater resources).
- Management of suspended solids, geogenic and anthropogenic pollution sources near to licensed and unlicensed water abstractions, watercourses and managed drains particularly during the construction phase.
- Control of any dewatering activity for excavations and cable trenching.



LEGEND

100m Cable Corridor

Data Source:
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PROJECT TITLE:

AWEL Y MOR OFFSHORE WINDFARM

DRAWING TITLE:

PROPOSED 100m CABLE CORRIDOR ROUTE

VER	DATE	REMARKS	Drawn	Checked
1	10/03/2021	Draft	JRS	MF

DRAWING NUMBER:

1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:50,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

\\gisfs1\G\Projects\05356 - GoBe Consultants Ltd\00009 Awel y Mor\Tech\GIS\Dwgs\Wking\202103 EIA Setup\05356.00009.0085.0 Proposed 100m Cable Corridor Overview.mxd

AWEL Y MÔR OFFSHORE WIND FARM APPLICATION

RWE'S POSITION WITH REGARD TO THE APPROVAL OF SUSTAINABLE DRAINAGE SYSTEMS (SUDS) FOR SURFACE WATER BY DENBIGHSHIRE COUNTY COUNCIL (DCC) ACTING IN ITS SUDS APPROVING BODY (SAB) ROLE

This note sets out RWE's position with regard to the approval of sustainable drainage systems (SuDS) for surface water by Denbighshire County Council (DCC) acting in its SuDS Approving Body (SAB) role.

The proposed Awel y Môr Offshore Wind Farm (AyM OWF) comprises an offshore generating station with a capacity of greater than 100 MW and therefore is a Nationally Significant Infrastructure Project (NSIP), as defined by Section 15(3) of the Planning Act 2008. As such, there is a requirement to submit an Application for a Development Consent Order (DCO) to the Secretary of State.

In Wales all new developments where the construction area is 100 square meters or more (such as the onshore elements of the AyM OWF), will require SuDS for surface water. The SuDS must be designed and built in accordance with Statutory SuDS Standards published by the Welsh Ministers and SuDS Schemes must be approved by the local authority acting in its SuDS Approving Body (SAB) role, before construction work begins.

RWE notes that schedule 3 paragraph 7 to the Flood and Water Management Act 2010 contains the requirement for approval, from the relevant approval body, of the SuDS prior to construction of the development. However, para 7(3) contains an exemption for "work requiring development consent under section 31 of the Planning Act 2008" (I.e. nationally significant infrastructure projects). This is confirmed in the relevant statutory guidance under exemptions from the need for SAB approval. It is therefore our intention that relevant SuDS principles will be applied to the substation development and secured through a requirement of the DCO. Discharge of the DCO Requirement would require review and approval of SuDS details by DCC post-consent and before the commencement of works rather than in parallel to the planning application.

1.7 Appendix D7: SLVIA

KEY TO VISUALISATION OUTPUTS (COLUMN M of Viewpoint tab)	
FULL	Baseline photograph and cumulative wireline (cylindrically projected, 90 degree field of view and with further 90 degree segments as required to inform the assessment of effects), wireline and photomontage (53.5 degree field of view planar projection). Prepared at extended A3 size.
PLUS NIGHT TIME	Baseline dusk photograph and cumulative wireline (cylindrically projected, 90 degree field of view and with further 90 degree segments as required to inform the assessment of effects), wireline and lighting photomontage (53.5 degree field of view planar projection). Prepared at extended A3 size.
PLUS ALT SCENARIO	Most numerous, smallest turbines proposed illustrated in further cumulative wireline and photomontage as well as being assessed in the SLVIA.
PHOTO & WIRE	Baseline photograph and cumulative wireline (cylindrically projected, 90 degree field of view and with further 90 degree segments as required)
WIRE	Cumulative wireline only

Notes referred to within the viewpoint tab

NOTE 1: It is proposed that the representative viewpoints will be assessed in the SLVIA and may be cross referenced and assessed in the CHIA. Illustrative viewpoints would not be assessed in full in the SLVIA but would be used to inform assessments such as those from other nearby locations (where there is already a representative viewpoint), to provide information about views from routes for sequential assessment or wider effects on a designation/visual receptor or to scope out effects (English coast). Cultural Heritage Viewpoints would not be assessed in full in the SLVIA but may be used in a similar manner to Illustrative Viewpoints.

NOTE 2: SNH guidance advises that photomontages should be prepared for viewpoints out to 20km. For these larger turbines we have suggested that we will be able to prepare a photomontage for VP10 at 32.4km but it may not be possible for VPs 34 and 43 which are at distances of over 35km. At this range the ability of a photograph to clearly pick up the existing turbines as well as the size of the pixels compared with the scale of the turbines becomes problematic.

VP_Label	VP_Name	NOTE	Adjusted Easting (to be microsited to match photo)	Adjusted Northing (to be microsited to match photo)	Proposed approach (NOTE 1)	Visualisations output (see key)
1	Amlwch - Wales Coast Path	Alternative location on Wales Coast Path suggested by IACC.	242576	394538	Representative viewpoint included in SLVIA	FULL
2	Point Lynas - PRoW to north of Lighthouse	Alternative location on open access land/PRoW to north of lighthouse provided by IACC. CH chapter to consider night time effects on setting of lighthouse with reference to VP4 night time visualisation.	247989	393535	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
3	Mynydd Eilian - near Trig point	(IACC) Location at or near the Trig point	247283	391721	Representative viewpoint included in SLVIA	FULL
4	Moelfre Headland - north	(IACC) views from the north would be preferable	251517	386798	Representative viewpoint included in SLVIA	FULL PLUS NIGHT TIME & ALT SCENARIO
5	Red Whalf Bay	IACC consider sensitive			Representative viewpoint included in SLVIA	FULL
6	Bwrdd Arthur - near Trig point	(IACC) Location at or near the Trig pointTrig Point at Bydd Arthur (VP6) are obscured due to scrub vegetation. A better view is available on the descent from the Trig Point towards the north east.	258576	381286	Representative viewpoint included in SLVIA	FULL
7	Penmon Point - north of parking	(IACC) micro-siting of the viewpoint photo should exclude views of parked cars but consider the setting of Trwyn Du Lighthouse. Grid coordinates updated to photo location. CH chapter to consider night time effects on setting of lighthouse with reference to VP4 night time visualisation.	264062	381275	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
8	Beaumaris - Wales Coast Path	(IACC) suggested micro-site to WCP further south than LT current location or on pier. Grid coordinates not updated to reflect this.	260936	376202	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
9	Bangor Pier (Southern End)	Northern end of pier has more limited visibility. Grid coordinates updated to photo location.	258432	373236	Representative viewpoint included in SLVIA	FULL
10	Carnedd Llewelyn		268361	364372	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO (see NOTE 2)
11	Lanfairfechan		267933	375394	Representative viewpoint included in SLVIA	FULL
12	Conwy Mountain		276011	377800	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
13	Great Orme; Summit		276660	383405	Representative viewpoint included in SLVIA	FULL PLUS NIGHT TIME & ALT SCENARIO
14	Isle of Anglesey Coastal Path near Penrhyn		249165	388349	Representative viewpoint included in SLVIA	FULL
15	Great Orme; Café	VP13: Great Orme - summit suggested as suitable alternative	275635	384392	Representative viewpoint	FULL
16	Benlech Bay View Road		252322	382437	Representative viewpoint included in SLVIA	FULL
17	Penrhyn Castle		260294	371891	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
18	Llandudno, Paddling Pool	Grid coordinates updated to photo location.	279904	382175	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
19	Rhos-on-Sea	Considered by ETG to be represented by VP 20	284310	380810	Illustrative viewpoint	WIRE
20	Bryn Euryn	Microsite to high point	283252	379798	Representative viewpoint included in SLVIA	FULL
21	Mynydd Marian		288590	377780	Representative viewpoint included in SLVIA	FULL
22	Abergele Station		294545	378740	Representative viewpoint included in SLVIA	FULL PLUS NIGHT TIME & ALT SCENARIO
23	Rhyl Aquarium		300678	381565	Representative viewpoint included in SLVIA	FULL
24	Graig Fawr		306029	380327	Representative viewpoint included in SLVIA	FULL & ALT SCENARIO
25	Prestatyn Nova Centre		306235	383835	Representative viewpoint included in SLVIA	FULL
26	Bryn-Ilwyn Viewpoint (Prestatyn Hillside viewpoint,	Relatively close to Graig Fawr	307450	381850	Illustrative viewpoint	WIRE
27	Point of Ayr		312458	384955	Representative viewpoint included in SLVIA	FULL
28	Trwyn y Penrhyn parking		262971	379807	Representative viewpoint included in SLVIA	FULL
29	Colwyn Bay Promenade	Grid coordinates updated to photo location.	284997	379285	Representative viewpoint included in SLVIA	FULL PLUS ALT SCENARIO
30	Hilbre Point	Provide a wireline. Effects not likely to be significant			Illustrative viewpoint	WIRE
31	Crosby	Provide a wireline. Effects not likely to be significant			Illustrative viewpoint	WIRE
32	Formby Lifeboat Station (Formby Point)	Provide a wireline. Effects not likely to be significant			Illustrative viewpoint	WIRE
33	Southport (pier)	Provide a wireline. Effects not likely to be significant			Illustrative viewpoint	WIRE
34	Snowdon Summit		261026	354341	Representative viewpoint included in SLVIA	PHOTO & WIRE (See NOTE 2)
35	Blackpool Tower	Provide a wireline. Effects not likely to be significant			Illustrative viewpoint	WIRE
36	Tal y Fan	Consider if a wireline would be sufficient due to other VP locations in SNP.	272936	372648	Representative viewpoint included in SLVIA	FULL
37	Cefn Coch Stone Circle	Cefn Coch Stone Circle and Wales Coast Path. Also to be representative of uplands above Llanfairfechan and Penmaenmawr. Location agreed between NRW and HENEB/CADW.	TBC	TBC	Representative viewpoint included in SLVIA	FULL
38	Foel Fras		269613	368121	Representative viewpoint included in SLVIA	FULL
39	The North Wales Path at Garreg Fawr	Location to be microsited. Provide a wireline.	TBC		Illustrative viewpoint	WIRE
40	Above Capelulo - Wales Coast Path	Above Capelulo on Wales Coast Path. Location to be determined on site.	274723	376532	Representative viewpoint included in SLVIA	FULL
41	Wales Coast Path east of Rhôs Mynach Fawr	Close to and similar alignment to VP3. Provide a wireline			Illustrative viewpoint	WIRE
42	Mynydd Bodafon - Trig Point	Mynydd Bodafon trig point	247245	385417	Representative viewpoint included in SLVIA	FULL
43	Mynydd y Garn		231503	390689	Representative viewpoint included in SLVIA	PHOTO & WIRE (See NOTE 2)
44	Beaumaris Castle	Location on upper levels of castle battlements as discussed with CADW. Location on inner south-eastern tower or elevated walkway to east of former dock.			Representative viewpoint included in SLVIA	FULL

VP_Label	VP_Name	NOTE	Adjusted Easting (to be microsited to match photo)	Adjusted Northing (to be microsited to match photo)	Proposed approach (NOTE 1)	Visualisations output (see key)
45	Conwy Castle	No view at ground level. Location to be at watch tower located on Stock House Tower. (2nd on right after entry).			Cultural Heritage Viewpoint	PHOTO & WIRE
49	Menai Suspension Bridge	SAM and Wales Coast Path represented by view from bridge (potential requirement for photomontage to be reviewed and agreed once photograph			Illustrative Viewpoint	PHOTO & WIRE (potential requirement for photomontage to be reviewed and agreed once photograph available)
50	Gwrych Castle - Terrace	Location discussed with CADW. To be on terrace to north of main castle ruin.	TBC		Cultural Heritage Viewpoint	FULL
52	Pen y Dinas Camp (Scheduled Monument CN039)	Not far from VP13: Great Orme Summit.			Cultural Heritage viewpoint	PHOTO & WIRE
53	Puffin Island	Location of telegraph station (OS 265438/382353), which is closer than scheduled monastry. Close to Viewpoint 7: Penmon Point and VP28: Trwyn y Penrhyn parking. CADW has advised not required as sufficient information from VP7 Penmon Point. CADW agreed as not required.	265122	382142	Cultural Heritage Viewpoint	WIRE
54	y Foel (Common land and hill east of Dyserth)	Suggested for purposes of tourism assessment. Close to VP24: Graig Fawr. Provide a wireline for VP 54.	306309	378356	Illustrative viewpoint	WIRE
55	Footpath above Cilgwyn Mawr	Suggested for purposes of tourism assessment.			Illustrative viewpoint	WIRE
56	Pen-y-corddyn-mawr	Suggested for purposes of tourism assessment.			Illustrative viewpoint	WIRE
57	Moelfre Isaf	Suggested for purposes of tourism assessment.			Illustrative viewpoint	WIRE
58	Little Orme on the Wales Coast Path	Relatively close to VP18: Llandudno, Paddling Pool. Provide wireline from	TBC		Illustrative viewpoint	WIRE
proposed alternative	Little Orme at Trig Point	Suggested by stakeholder (micrositing of location required).	281298	382283	Illustrative viewpoint	FULL
59	Llandundo promenade - near Lifeboat slipway/Trevor Street		TBC		Representative Viewpoint included in SLVIA	FULL
60	Night time visualisation representative of views from SNP alternatives provided by NRW for consultants to determine most suitable location (current suggestions include VP37 (Cefn Coch Stone Circle) and minor road on slopes of Cefn Maen Amor, same approximate location SH74479 74607. Another possible location is a car park on Mountain Lane, the slopes of		TBC		SLVIA Night time assessment	NIGHT TIME VIEWPOINT

1.8 Appendix D8: Archaeology and Cultural Heritage

Awel y Môr Offshore Windfarm

Assessment of Offshore Setting

1.1 Assessment of setting

1.1.1 The NPPF (Department for Communities and Local Government, 2012) defines setting as 'the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral.'

1.1.2 The impact of the proposed development on heritage assets onshore are dealt with elsewhere. This note is limited only to those assets present offshore. Currently, there is no specific guidance regarding the assessment of setting for offshore archaeological and cultural heritage assets. However, Cadw's Setting of Historic Assets in Wales (2017) provides general guidance, largely applicable to terrestrial sites, and notes that the importance of setting 'lies in what it contributes to the significance of a historic asset' (Cadw, 2017: 3). With regards to significance for heritage policy, the National Planning Policy Framework notes that the interest of a heritage asset 'may be archaeological, architectural, artistic or historic' (DCLG, 2012).

1.1.3 Cadw states that 'The setting of a historic asset includes the surroundings in which it is understood, experienced and appreciated, embracing present and past relationships to the surrounding landscape. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive, negative or neutral contribution to the significance of an asset.' (Cadw, 2017: 2).

1.1.4 The setting of a historic asset can include physical elements of its surroundings as well as less tangible elements. Although views to and from a historic asset are often the most obvious factors, other sensory elements can also affect setting (ibid.) Reference in the guidance is also made to the setting associated with buried heritage assets which may not be readily appreciated by a casual observer, but retains a presence in the landscape such as, for example, wreck sites that are periodically, partly or wholly submerged (ibid.: 2).

1.1.5 Cadw's Managing the Marine Historic Environment of Wales (2020) states that 'Development and use of the marine environment can, however, affect historic assets both directly and indirectly, including: loss of, or damage to, historic material; alteration to the setting of historic assets which can positively or negatively affect the ability to understand and appreciate them or through burial or exposure.'

1.1.6 In order to assess whether, how and to what degree setting makes a contribution to the significance of heritage assets, the following must be considered: the physical surroundings of the asset including its relationship with other heritage assets; the way the asset is appreciated, and the asset's associations and patterns of use.

1.1.7 The approach for the assessment of setting presented in this document, and proposed to be adopted for the purposes of the Awel y Môr Environmental Impact Assessment follows the guidance discussed in the paragraphs above, is based on the baseline assessment of

the palaeogeography, terrestrial, maritime and aviation assets, and is described using the following two factors; Physical surroundings and View, and Non-visual factors. The approach proposed to be adopted for each of these factors is presented in the following sections.

1.2 Physical Surroundings and Views

1.2.1 Physical surroundings and Views include the physical presence of the asset on the seabed, its surroundings, and relationship with other assets and navigational hazards in the immediate area. Views to and from the asset, and how the asset is experienced in its immediate physical surroundings are also considered. Impacts in relation to construction, operation and decommissioning will be considered in terms of how this may impact access and therefore appreciation of the asset and where there are changes to their physical environment. Physical Surroundings and Views of a wreck will be determined on approximate proximity to another wreck or a feature that could be the cause of sinking. For example, SS *Albanian* (2000) sank following a collision with British sailing vessel *Nydia* (2007) therefore they may share a setting. These will be stablished from the sources and confirmed from dive trails and details from local dive clubs.

1.3 Non-visual factors

1.3.1 Non-visual factors include the way the asset is appreciated in a broader historical, artistic and intellectual capacity, and the asset's associations. Typically, we would contend that where scheme infrastructure such as turbines and their foundations are not intervisible with the asset due to turbidity then anyone diving on the asset would not experience a material change in the setting of that asset.

1.3.2 It should be noted that for heritage assets offshore, sites are generally only experienced by divers, remotely operated vehicle (ROV), or by geophysical survey, and the views to the asset are often very limited due to reduced visibility in the water column. In addition, unlike many terrestrial sites, the position of the asset on the seabed has not been deliberately chosen, and although some sites may have reached their position through military action (e.g. wartime losses and losses from mine-laying activity)(Natural Resources Wales 2015c) or have been lost due to a particular navigational hazard (e.g. hitting a harbour wall like that of Rhyl or being stranded on a particular sandbank for instance in Cefn Sidan near Llanenlli), many positions are entirely arbitrary, and even with military sinking events, an attack on the surface could lead to a wreck being deposited on the seabed miles from where the event took place. Non-visual factors may include associations with particular battles, wars, minefields, and other historic events, as well as how the wreck can be appreciated in its wider context, for example through well-known trade routes, collisions or local industry. Association between the asset and the local social history is another important aspect of an asset's non-visual importance, including rescue attempts or losses occurring within modern memory.

1.3.3 It is not possible to ascertain the setting of currently unidentified marine heritage assets, where limited information is known, for example unknown wrecks or wrecks that have not characterised to determine their period of build, use or loss. Similarly, setting cannot be assessed for geophysical anomalies of archaeological potential or potential sites that have not yet been discovered. As such we propose to scope the assessment out for this receptor group, and for non-visual factors more broadly.

1 OFFSHORE ARCHAEOLOGY AND CULTURAL HERITAGE METHODOLOGY

1.1 Study area(s)

1.1.1 The study area for the desk-based assessment comprises a 2 km buffer around the Awel y Môr array area as well as the export cable corridor, as supplied by the client. This buffer creates a comprehensive search area for obtaining records from relevant archive databases, which provides not only context for the discussion and interpretation of the known and potential marine archaeological resource within the study area, but also allows for potential inaccuracies in positional data that could be present in archival records.

1.1.2 The study area for the Preliminary Environmental Information Report (PEIR) will comprise the project red-line boundary, and sites beyond the boundary will only be included in the discussion if they are close enough to be impacted (i.e. located on or under the seabed just beyond the boundary where an Archaeological Exclusion Zone would extend into the boundary, or if impacts are predicted to extend beyond the boundary).

1.2 Archaeological desk-based assessment

Key themes

1.2.1 The methodology follows the best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) *Standard and Guidance for Historic Environment Desk-Based Assessment* (2014, updated 2020).

1.2.2 The marine themes relevant to marine archaeological baseline as assessed in this report are:

- Palaeogeography (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. handaxes), including setting;
- Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris), including their settings;
- Intertidal heritage assets; and
- Historic seascape character

Data sources

1.2.3 All existing baseline studies for marine archaeology and cultural heritage produced in support of the existing Gwynt y Môr OWF as well as data specific for the Awel y Môr OWF study area, including;

- the United Kingdom Hydrographic Office (UKHO) data;
- the National Heritage List (Cadw);
- Coflein (online database for the National Monuments Record of Wales (NMRW);

- Lle (Geo-portal for Wales);
- Receiver of Wreck;
- the relevant county Historic Environment Record(s) (HER) particularly from Gwynedd Archaeological Trust and Clwyd-Powys Archaeological Trust;
- relevant mapping including Admiralty Charts, historic maps and Ordnance Survey;
- a wide range of secondary sources, including those providing an overview of the historical and archaeological resources of the waters around the coast;
- relevant documentary sources and grey literature held by Wessex Archaeology, and those available through the Archaeological Data Service and other websites; and
- Welsh Research Frameworks.

Data structure

1.2.4 In order to compile the marine archaeological baseline, where possible, the sources will be incorporated into a project Geographic Information System (GIS) using ArcGIS 10.6, enabling the data to be spatially analysed.

1.2.5 The RCAHMW and HER records will be discriminated between records for which there is known material on the seabed and 'recorded losses' (vessels and aircraft that are known to have been lost, but do not, except by chance, have material on the seabed at their recorded loss location). The records with known material on the seabed will be included in a 'wrecks and obstructions' gazetteer along with data from the UKHO. The recorded losses will be in a separate gazetteer and will be used to assess the potential for further discoveries.

1.2.6 For the purposes of the report, the gazetteers will be compiled and illustrated in Universal Transverse Mercator (UTM) Zone 30 north projected from the ETRS 1989 datum. Information relating to the archaeological and cultural heritage that does not include location or positional information will be used to inform the marine archaeological baseline assessment where relevant.

1.2.7 For archaeological sites recorded in the UKHO, RCAHMW, Gwynedd Archaeological Trust and Clwyd-Powys Archaeological Trust datasets, the co-ordinates from the UKHO will be the ones used in the gazetteer and GIS. As these relate to survey co-ordinates, they have been assessed as likely to be more accurate.

Chronology

1.2.8 Archaeological material is generally studied within a framework of 'periods' or 'ages' that reflect the activities and cultural changes taking place over time. All dates are referred to as BCE (Before Common Era), BP (Before Present) or AD (Anno Domini) within the text. BCE refers to calibrated radiocarbon chronology that can be considered equivalent to calendar years. BP dates are used for periods of time older than circa 10,000 years ago.

1.2.9 A list of the main archaeological periods in Britain referred to in the text, along with their broadly defined dates are presented here.

Tab. 1 Chronology of Wales based on the Research Frameworks (2017).

Palaeolithic and Mesolithic Wales	250,000 BC - 4,000 BC
Neolithic and Earlier Bronze Age Wales	4,000 BC - 1,500 BC
Later Bronze Age and Iron Age Wales	1500 BC - AD 43
Roman Wales	AD 43 – AD 410
Early Medieval	410 - 1100
Medieval	1110 - 1539
Post-medieval	1539 - 1750
Later Post-Medieval and Industrial	1750 - 1899
Modern	1900 – present day

Palaeogeography

1.2.10 The baseline summary for palaeogeography will be based on a review of geological mapping of seabed sediments, solid geology and bathymetry from published BGS sources. This will be enhanced by the geoarchaeological review of geotechnical and geophysical datasets and core samples gathered for the Awel y Môr OWF project to produce a stratigraphic framework for understanding the archaeological potential of the Quaternary geology within the Site. This assessment will be further supported by the examination of models of past sea level, palaeoshorelines and submerged prehistoric landscapes. This palaeogeographic review, alongside the known archaeological record, forms the basis upon which the potential for submerged prehistory could be developed and discussed.

Seabed features: maritime and aviation sites

1.2.11 The baseline summary for maritime and aviation archaeology will be developed by means of accessing any records of sites, find spots, wrecks, casualties and seabed features obtained from the UKHO, RCAHMW and HERs within the study area. The baseline assessment of maritime and aviation archaeology will be further supplemented by a review of relevant primary and secondary source material in order to provide an indication on the nature of maritime and aviation activity across the region. As well as summarising the known archaeological resource, the baseline assessment underlines the potential for encountering unknown shipwreck and aircraft crash sites within the study area.

Intertidal archaeology

1.2.12 The baseline summary for intertidal archaeology will be developed by means of accessing any records of sites and find spots obtained from the UKHO, RCAHMW, Gwynedd Archaeological Trust and Clwyd-Powys Archaeological Trust within the study area. The

baseline assessment of intertidal archaeology will be further supplemented by the results of the walkover survey.

Historic seascape characterisation

1.2.13 The baseline summary for character of the historic seascape within the study area will be developed using the results of Countryside Council for Wales' 2009 National Seascape Assessment for Wales. In particular, the assessment will focus on the Marine Character Areas for Colwyn Bay and Rhyl Flats (MCA 02), Red Wharf and Conwy Flats (MCA 03) and North Wales Open Water (MCA 04) using the report and data sheets assessing Welsh seascapes and their sensitivity to offshore developments (Countryside Council for Wales 2009).

1.3 Walkover survey methodology

1.3.1 A walkover survey of the intertidal site and foreshore will take place at low tide along the landfall route in order to determine whether there are any archaeological features present. Several photographs will be taken from all views in order to contribute to the seascape characterisation. It will comprise a visual inspection, positioning, identification of material and photographic record of visible features.

1.3.2 The walkover survey will be undertaken in conjunction with the Onshore Archaeological and Cultural Heritage (Volume 3, Chapter 8) assessment, to ensure a seamless approach.

1.4 Geophysical methodology

Geophysical data – processing

1.4.1 The sub-bottom profiler (SBP) data will be processed using CodaOctopus Survey Engine Seismic+ software. This software allows the data to be visualised with user-selected filters and gain settings in order to optimise the appearance of the data for interpretation. The software then allows an interpretation to be applied to the data by identifying and selecting sedimentary boundaries and shallow geological features that might be of archaeological interest.

1.4.2 The SBP data will be interpreted with a two-way travel time (TWTT) along the z-axis. In order to convert from TWTT to depth, the velocity of the seismic waves will be estimated to be 1,600 ms-1. This is a standard estimate for shallow, unconsolidated sediments.

1.4.3 The SBP data can also be used to identify small reflectors, which may indicate buried material such as a wreck site covered by sediment. The position and dimensions of any such objects will be noted in a gazetteer, and an image acquired of each anomaly for future reference. It should be noted that anomalies of this type are rare, as the sensors must pass directly over such an object in order to detect an anomaly.

1.4.4 The Multi Beam Echo Sounder data will be analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data will be analysed using QPS Fledermaus software, which enables a 3D visualisation of the acquired data and geo-picking of seabed anomalies. The MBES data will also be used in the palaeogeographic assessment.

1.4.5 The high frequency sidescan sonar (SSS) data files will be processed using CodaOctopus Survey Engine Sidescan+ software. This allows the data to be replayed with various gain

settings in order to optimise the quality of the images. The data will be interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies within Coda by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference.

1.4.6 A mosaic of the SSS is produced during this process to assess the quality of the sonar towfish positioning. This process allows the position of anomalies to be checked between different survey lines and for the positioning to be further refined if necessary.

1.4.7 The form, size and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature and therefore of archaeological interest. A single small but prominent anomaly may be part of a much more extensive feature that is largely buried. Similarly, a scatter of minor anomalies may be unrelated individual features, define the edges of a buried but intact feature, or may be all that remains as a result of past impacts from, for example, dredging or fishing. Assessment is made of such groups of anomalies during data interpretation to determine which of these alternatives is the most likely.

1.4.8 The magnetometer data will be processed using Geometrics MagPick and proprietary software in order to identify any discrete magnetic contacts which could represent buried ferrous debris or structures such as wrecks.

1.4.9 The software enables both the visualisation of individual lines of data and gridding of data to produce a magnetic anomaly map. The data will first be smoothed to try and eliminate any spiking. A trend will then be fitted to the resulting data and the trend values subtracted from the smoothed values, to remove natural variations in the data (such as diurnal variation in magnetic field strength and changes in geology). The processed data will then be gridded to produce a map of magnetic anomalies, and individual anomalies tagged based on the grid and individual profile lines in proprietary software. Images are taken in a similar process to that of the SSS data.

1.4.10 For the array area, 100% of the SSS, MBES, and magnetometer data will be assessed. Initially, 25% of the SBP data will be assessed, with additional infill lines interpreted to further delineate the extents of any features identified during the initial assessment.

1.4.11 All findings from all the reviewed data will be used to inform the EIA; the PEIR will be informed by all completed geophysical review at time of submission. For the export cable corridor, 100% of the magnetometer and MBES data will be assessed, but initially a targeted interpretation of the SSS and SBP data will be undertaken. This will involve the assessment of the central three lines of SSS data, and the centre line only of SBP data, at the end of which an interim set of results will be issued. Following this, the remaining SSS data will be interpreted until 100% of the survey lines have been assessed. Initially two additional wing lines of the SBP data will be assessed, followed by additional infill lines if necessary, as per the array area assessment.

Geophysical data – anomaly grouping and discrimination.

1.4.12 The previous section describes the initial interpretation of all available geophysical datasets which will be conducted independently of one another. This inevitably leads to the possibility

of any one object being the cause of numerous anomalies in different datasets and apparently overstating the number of archaeological features in the study area.

1.4.13 To address this fact, the results of the initial interpretation will be loaded into Arc GIS and the anomalies will be grouped together. This allows one ID number to be assigned to a single object for which there may be, for example, a UKHO record, a MBES anomaly, and multiple SSS anomalies.

1.4.14 Once all the geophysical anomalies and desk-based information have been grouped, a discrimination flag will be added to the record in order to discriminate against those which are not thought to be of an archaeological concern.

1.4.15 The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features of potential archaeological interest to be highlighted, while retaining all the information produced during the course of the geophysical interpretation and desk-based assessment for further evaluation should more information become available.

1.4.16 Any anomalies located outside of the defined study areas, either previously recorded in known databases (e.g. United Kingdom Hydrographic Office) or identified during the geophysical assessment, will be deemed beyond the scope of the assessment and consequently not included in the resulting report.

1.5 Assessment of setting

1.5.1 The parameters for the assessment of setting have been developed in detail in a separate document (Awel y Mor Offshore Windfarm Assessment of Offshore Setting 2021), for discussion with the archaeological curators. The agreed setting methodology will be used for the assessment of setting.

1.6 Determining value and sensitivity

1.6.1 In order to assess the potential impacts of a development upon the marine environment, EIAs typically adopt the conceptual approach known as the 'source-pathway-receptor' model. This approach is based on the identification of the source (i.e. the origin of a potential impact), the pathway (i.e. the means by which the effect of the activity could impact a receptor) and the receptor that may be impacted (e.g. known/ potential offshore archaeology and cultural heritage assets). In order for the significance of any given impact to be fully understood, the sensitivity of any receptors that may be impacted need to be considered. This section outlines the means by which the sensitivity of marine heritage assets is ascertained.

1.6.2 The capability of a receptor to accommodate change and its ability to recover if affected is a function of its sensitivity. Receptor sensitivity is typically assessed via the following factors:

- Adaptability – the degree to which a receptor can avoid or adapt to an effect;
- Tolerance – the ability of a receptor to accommodate temporary or permanent change without significant adverse impact;
- Recoverability – the temporal scale over and extent to which a receptor will recover following an effect; and

- Value – a measure of the receptor's importance, rarity and worth.

1.7 Impact assessment criteria

Asset sensitivity

1.7.1 Since archaeological receptors cannot adapt, tolerate or recover from physical impacts caused by a proposed development for the purpose of this assessment, the sensitivity of each asset will be quantified only by its value. The UK Marine Policy Statement (HM Government, 2011) describes a heritage asset as holding a degree of significance. Significance is the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic or historic.

Value of an asset

1.7.2 The value of known archaeological and cultural heritage assets will be assessed on a four-point scale using professional judgement informed by the criteria provided in table 1 of this document. Assets for which inadequate information is available for assessment will be described as 'unknown'.

Tab. 2 Criteria to assess the archaeological value of offshore assets.

Value	Definition
High	• Best known, only example, or above average example and/ or high potential to contribute to knowledge and understanding and/or outreach. • Receptors with a demonstrable international dimension to their importance are likely to fall within this category. • Wrecked ships and aircraft that are protected under the *Protection of Wrecks Act* 1973, *Ancient Monuments and Archaeological Areas Act* 1979 or *Protection of Military Remains Act* 1986 with an international dimension to their importance, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value. • Known submerged prehistoric sites and landscapes with the confirmed presence of largely *in situ* artefactual material. Palaeogeographic features with demonstrable potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	• Average example and/ or moderate potential to contribute to knowledge and understanding and/ or outreach. • Receptors with a demonstrable district level dimension to their importance are likely to fall within this category. • Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. • Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.

Low	• Below average example and/ or low potential to contribute to knowledge and understanding and/ or outreach. • Receptors with a demonstrable local dimension to their importance are likely to fall within this category. • Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. • Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Negligible	• Poor example and/ or little or no potential to contribute to knowledge and understanding and/ or outreach. Assets with little or no surviving archaeological interest.
Unknown	• There is not presently enough information available about the site to assess its value.

Tab. 3 Impact magnitude definitions.

Magnitude	Definition
High	Total or considerable loss of or alteration to key elements or features of the pre-development conditions, such that the post-development character of the archaeological heritage asset would be fundamentally or considerably changed. For beneficial – total or considerable protection and understanding gained from key elements or features above and beyond the pre-development conditions, such that the post-development character of the archaeological heritage asset would be fundamentally better understood.
Medium	Loss of or alteration to key elements or features of the pre-development conditions, such that the post-project character of the archaeological heritage asset would be partially changed. For beneficial – protection and understanding gained from key elements or features above the pre-development conditions, such that the post-development character of the archaeological heritage asset would be considerably better understood.
Low	Minor alteration from pre-development conditions.
Negligible	No or unquantifiable change to pre-development conditions.

Tab. 4 Matrix to determine effect significance.

	SENSITIVITY			
	HIGH	MEDIUM	LOW	NEGLIGIBLE

ADVERSE MAGNITUDE	**HIGH**	Major	Major	Moderate	Minor
	MEDIUM	Major	Moderate	Minor	Negligible
	LOW	Moderate	Minor	Minor	Negligible
	NEGLIGIBLE	Minor	Minor	Negligible	Negligible
BENEFICIAL MAGNITUDE	**NEGLIGIBLE**	Minor	Minor	Negligible	Negligible
	LOW	Moderate	Minor	Minor	Negligible
	MEDIUM	Major	Moderate	Minor	Negligible
	HIGH	Major	Major	Moderate	Minor

1.8 Cumulative impact methodology

1.8.1 Cumulative environmental assessment will be undertaken in accordance with guidelines issued by RenewableUK, Cumulative Impact Assessment Guidelines – Guiding principles for cumulative impacts assessment in offshore wind farms (2013), the Guidance for Assessment of Cumulative Impacts on the Historic Environment (Oxford Archaeology, 2008), and Advice Note 17: Cumulative Effects Assessment (PINS, 2015). The cumulative environmental assessment has been undertaken in section 13.14.

1.8.2 Cumulative impacts will be considered to identify potentially significant impacts of the development in-combination or cumulatively with other projects or activities. Cumulative impacts are defined as those that result from additive impacts caused by other past, present and reasonably foreseeable actions, together with the plan, programme and project itself and in-combination impacts that arise from the reaction between impacts of a development plan, programme or project on different aspects of the environment (RenewableUK, 2013).

1.8.3 Cumulative impacts may therefore occur to archaeological receptors that have the potential to be incrementally impacted by other existing, consented and/ or proposed developments or activities. These impacts may be seen individually as minor, but collectively as significant. The emphasis in this assessment is on potentially significant impacts, rather than on any impact that could possibly occur.

1.8.4 The cumulative impact assessment will be based on the methodology and long list of projects described in the PEIR Volume 1, Annex 3.1 Cumulative Effects Assessment. From the long list, projects with the potential for cumulative impacts on offshore archaeology and cultural heritage assets will be brought forward and considered.

1.8.5 The assessment of cumulative impact will consider whether impacts on a receptor can occur on a cumulative basis between Awel y Môr and other projects, within a 50 km radius.

1.8.6 The types of impact to be assessed include: direct impact to offshore archaeological and cultural heritage receptors; indirect impacts arising as a result of changes to sedimentary and erosion regimes; and indirect effects.

1.9 Embedded mitigation

1.9.1 The impact assessment will assume that embedded mitigation measures have been agreed and will be included in the project either to specifically mitigate anticipated impacts or to avoid or reduce impacts.

1.9.2 The proposed embedded mitigation measure for offshore archaeological and cultural heritage assets comprises an Offshore Archaeological Written Scheme of Investigation (WSI), that will be agreed with the regulator, with advice from the archaeological curators, outlining mitigation measures such as those identified below:

- Careful planning of the offshore development components and routing of the inter-array and export cables to avoid known sites of archaeological interest and key areas of sensitivity. This will be achieved through:
    - Archaeological Exclusion Zones for known sites; and
    - Recommended avoidance of potential archaeological features. Should avoidance of potential archaeological features not be possible, further survey would be required to characterise any sites that may be impacted and identify if further mitigation is required.
- Assessment of further geophysical survey data;
- Assessment of further geotechnical data, and/or continued work on samples of archaeological potential;
- Watching brief during intertidal works, if appropriate; and
- A Protocol for Archaeological Discoveries to ensure that any chance or unexpected finds can be reported and recorded.

1.9.3 It should be noted that it is the implementation of the WSI, rather than its production, that constitutes the mitigation.

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Awel y Môr Wind Farm

Onshore Survey Proposal Discussion Document

1 INTRODUCTION

1.1.1 This brief technical report relates to initial proposals for archaeological fieldwork survey to contribute to the evidence base for the onshore connection to the Awel y Môr Offshore Wind Farm (the Project). This report specifically considers the preferred onshore cable route from landfall up to and including the substation location.

1.1.2 This Report is supported by a summary gazetteer (Appendix 1), but this is not intended to constitute a formal Desk-Based Assessment (DBA). Additional information will be added through further work. A formal DBA will be presented as a Technical Report to inform the baseline to be set out in and appended to the Preliminary Environmental Information Report (PEIR) when that is issued for consultation later in the year.

1.1.3 This Report sets out a summary consideration of the route, likely impacts and an outline proposal for the use of suitable survey techniques at various locations. This is informed in part by Consultees comments provided in response to the Environmental Impact Assessment (EIA) Scoping Report, as well as our own professional judgement, and appreciation of the design as it stands to date. It is intended as a starting point for discussion, the purpose of which is to ensure that the evidence base is appropriate, robust, and meets the needs of both the Project and Consultees.

1.1.4 At the ETG meeting, the Project team will present the preferred route and to set out our proposed approach to undertaking survey along this route to inform the ongoing assessment. The objective of the meeting is to reach agreement on the appropriate approach and broad specification in advance of the characterisation surveys commencing and prior to drafting of the Preliminary Environmental Information Report (PEIR). Following the meeting, a Written Scheme of Investigation setting out the detail of the fieldwork and reporting etc., will be prepared for agreement by the Consultees.

2 ROUTE

2.1.1 The routing site selection process has been undertaken to avoid, as far as practicable, areas of known archaeological importance. The onshore cable route corridor leads from a landfall location sited to the east of Rhyl, running south then south-west to the south of Rhyl, before crossing the River Clwyd. The cable route then runs south and under the A55, to a substation that is proposed to be constructed to the east of Boddelwyddan Hall and associated registered landscape.

2.1.2 The preferred cable route corridor is shown in red on the attached figures. This is set within a 100m (either side) buffer zone, to provide context. Reference is also made throughout this document to an emerging preferred ~40m route. The 40m is approximate as it varies in limited locations to allow for engineering optionality, such as wider approaches for horizontal directional drilling. The ~40m emerging preferred route is anticipated to form the basis for

the 'final' route that will be presented within the final application, subject to any changes that may be made either in response to baseline and assessment findings, or to stakeholder feedback. Any revisions made to the 40m route will be made within the 100m corridor.

2.1.3 The area to the south of the proposed substation location (south of Glascoed Road) is required for the purpose of connection to the National Grid and forms part of the DCO application and so will be included in the survey proposals.

3 SURVEY APPROACH

3.1 Archaeological Background

3.1.1 A full consideration of the archaeological background will be set out in the DBA which will be appended to the PEIR and then the Environmental Statement at the relevant stage. For purposes of this discussion document a few key points are highlighted below.

3.1.2 Consideration of available Historic Environment Record (HER) and other data indicates that there is some potential for archaeological remains of all periods to be encountered along the cable route. The majority of records relate to post-medieval and modern development and activity, but there are records relating to medieval and earlier archaeological phases (including hints of Mesolithic activity in the Clwyd floodplain).

3.1.3 The environments through which the cable route passes are largely rural (i.e., the route crosses fields etc. through most of its length) even in the immediate vicinity of Rhyl. These environments range from the inter-tidal beach zone at the north through to rural farm and former parkland at the southern end (adjacent to Boddelwyddan). The area of the River Clwyd floodplain provides a different environment, and there may be potential for deposits of palaeoenvironmental interest to survive in this area (and elsewhere).

3.2 Proposed Survey

3.2.1 It should be noted that, to date, the Project has not been able to secure access for survey to all land across which the preferred cable route lies. Access is still being actively pursued, but there are currently limits to where survey can take place.

3.2.2 In considering which survey techniques to apply we have had regard to the availability of land access, the local environment/use of that land as well as the archaeological background as currently understood, and the scoping responses.

3.2.3 It is proposed to deploy a range of techniques across the cable route corridor, primarily focussing on non-intrusive means, such as geophysical survey, but allowing for intrusive test-pitting and trial trenching at specific locations. We envisage the determination of surveys as an iterative process, the timings of which will be discussed with the Consultees as the results of preliminary phases become available.

3.2.4 For purposes of this discussion we have divided the route into sections. These are indicated on the attached Figures.

Zone 1 Intertidal Zone, Beach and back of Beach

3.2.5 This zone includes the landfall site itself and the cable run leading across and off the beach running south through the caravan park and south of the North Wales railway line.

3.2.6 Given access limitations as well as technical considerations, we propose some online test-pitting in this location. We will integrate the results with historic borehole records (and later, any boreholes undertaken as part of the Project's Ground Investigation works) to form a deposit model and provide information on the coastal formation processes, from the sea through the beach to the interior. Geophysical (magnetometer) survey is not proposed for this area, as it is not considered to be appropriate in terms of the ability to provide meaningful results across the beach, and due to the nature of occupation of the caravan park behind the beach.

3.2.7 It is proposed to undertake an auger transect of the beach (from the low-tide mark) to provide data to inform a basic deposit model. This will be enhanced with data from the project's GI investigation once these are completed. It is currently being proposed that archaeological attendance may be provided at some GI locations to observe starter pits (dependant on methods proposed).

Zone 2

3.2.8 This Zone runs from south of the railway, and passes east and south-west of Rhyl, and crosses under the A525. The Zone's western boundary (for purposes of this Report) is set South of Cwybr Villas. The HER has a limited record in this zone, which is largely occupied by fields immediately adjacent to Rhyl. There are traces of Roman activity immediately east of the A525 roundabout and west of Long Covert, including a stray coin find (HER ref 106448) and a cropmark (HER ref 102650) attributed to this period.

3.2.9 It is initially proposed to survey (by magnetometer) approximately 25% of this zone, but ensuring that 100% of the emerging preferred 40m corridor is covered, with coverage extended within the 100m corridor to include the cropmark location. Consideration may be given to limited trial trench evaluation at the location of the presumed Romano-British cropmark (and elsewhere) subject to the results of the geophysical survey.

Zone 3 River Clwyd Crossing

3.2.10 This Zone covers the immediate flood plain either side of the River Clwyd. The river will be crossed using Horizontal Directional Drilling (HDD) beneath the river-bed by cable runs fed from HDD locations on either side (final positions to be determined). The HER record indicates some Mesolithic activity in the area (see HER ref 35030; a point reference is given immediately west of the sewage works), and the wider environment to the south (in and around Rhuddlan) contains traces of medieval and earlier activity. There is potential for deposits of palaeoenvironmental interest, and the development of the river and its relation to the floodplain and earlier human exploitation of this zone will be of interest (should evidence survive).

3.2.11 It is proposed to use a mix of geophysical survey, supplemented by test-pitting (with soil sieving) in this location. Subject to ground conditions and the extent of the HDD locations, we envisage an initial 50% of the area covered by magnetometer survey (but will include 100% of the 40m corridor). Whilst the zone appears quite extensive this is to allow for consideration of two crossing options at the current time. Coverage will include both routes. Optionality might be retained in this location to allow for further technical assessment in order to identify the most suitable crossing place.

Zone 4 Hafod-Llwyn to A55

3.2.12 This Zone covers a largely agricultural zone. The cable will run underground and will generally be installed by trenching. The HER contains few records within the preferred route corridor, perhaps suggesting limited or essentially rural activity in the past although this lack of evidence may be related to the lack of fieldwork in the immediate area. Additional information is required to inform the archaeological potential of this zone.

3.2.13 It is proposed to carry out geophysical survey of 50% of the area (100% of the 40m corridor) where access is permitted in this zone. This will be supplemented by specific walkover in and around Princes Gorse.

3.2.14 The proposed 40m cable corridor passes under the site of the WWII Rhuddlan Chain Home Radar station. Upstanding remains of this site are located west of the minor road west of Pengwern Farm, and south-east of Sarn Lodge. A concrete structure housing the top of a bunker are located in the woodland west of the minor road. Whilst this is situated at some distance from the proposed cable route, it is not definitely known how extensive the underground spaces are, and where any escape tunnel is located. A second concrete structure survives within the south-western part of this woodland, within the proposed 40m corridor. Other structures may exist within, concealed by undergrowth. It is not possible currently to access these structures safely to assess what remains survive, and how deep the structures extend. On the basis of comparison with recorded examples elsewhere in the UK, it is understood underground rooms could be as much as 15-20 feet (3-5m) below the ground surface.

3.2.15 The cable passes under the wood via HDD, and at a depth believed sufficient to avoid any structural remains. However, as a precaution, it is proposed to undertake a survey of the corridor route as it passes under the woodland by GPR (from HDD starter site to end point) as this should enable identification of structures/voids to approximately 5m maximum below the ground surface (subject to ground conditions). The fields to either side will be subject to a more extensive magnetometer survey (to ensure the haul/access road is covered). A level 1 photographic record of the upstanding structures is proposed, but no survey of the interior will be carried out (in part due to safety concerns).

Zone 5 South of A55 to Glascoed Road.

3.2.16 This zone covers the indicative Substation location, Substation option 5 (Substations 10 and 11 are no longer under consideration). It is largely farmland (pasture) and former parkland. It lies to the immediate east of the registered parkland associated with Boddelwyddan Hall. The HER data indicates some medieval activity to the south, as well as tentative records of Roman activity (associated with Glascoed Road) and one record to the east of Felin y Gors mill.

3.2.17 It is proposed to conduct geophysical survey across the whole of the zone in the section north of Glascoed Road, and up to 50% of the area south of Glascoed Road (but to ensure 100% of the 40m Corridor)

Other

3.2.18 The final form, scope and extent of these proposed surveys will be agreed with the consultees in the form of a Written Scheme (or Schemes) of investigation, following feedback and discussion on this note. At this stage it is proposed that feedback will be received from stakeholders on the 3rd February, following which the WSI will be prepared within two weeks of receipt of that feedback, and submitted for formal approval. Ideally, we

aim to undertake survey work in late February and into March, so that the results can inform the PEIR.

3.2.19 Results of agreed survey work will be reported as Technical Reports and appended to the PEIR if available in time, otherwise with the ES at application. Interim results will be shared with ETG members at the earliest opportunity to assist in consideration of design and to inform the requirement for (and if required, timing of) additional investigation.

3.2.20 In addition to the fieldwork survey proposed here, it is intended that other data sources, such as any topographic mapping Ground Investigation undertaken as part of the Project will be considered and integrated with the formal archaeological survey data. Consideration will also be given to LiDAR datasets and aerial photographic records, as well as other relevant archival materials (to be included in the DBA), with a view to making the baseline as complete as practicable and appropriate when the PEIR is submitted.

3.2.21 Decisions on the requirement for and timing of additional surveys or investigations will be based on the results of the surveys proposed in this document.

4 CONCLUSION

4.1.1 Initial work on the dataset gathered to date (recognising the limitations of that dataset at the current time) suggests that there is archaeological potential within the preferred cable route corridor, which requires further investigation to inform the baseline condition.

4.1.2 This Project team consider that this potential requires further characterisation by means of additional archaeological fieldwork survey. This document sets out a high-level and outline approach to providing the data for this characterisation, by means of non-intrusive and intrusive survey works.

4.1.3 We seek engagement from the consultees to the following, bearing in mind their experience with similar projects in the area:

- Is the broad approach set out here appropriate?
- Is the selection of techniques appropriate?
- Is the (broad) level of coverage proposed appropriate?
- Are the broad survey zones appropriate, or would further refinement be of benefit?
- Are there key areas/assets that require specific consideration, and/or are other techniques recommended at specific locations?
- Are there specific additional data sources that require consideration (as related to the survey proposals)?
- Within what timeframe are the Consultees able to review/agree Written Schemes of Investigation?

APPENDICES

Appendix 1: Gazetteers

Table 1: Designated heritage assets

List Entry	Name	Designation	Easting	Northing
Within the cable route corridor				
1378	Barn to NW of Faenol-broper Farmhouse	Grade II Listed Building	301255	374817
80758	Tyddyn-isaf	Grade II Listed Building	301207	375199
Within 1km of route corridor				
1380	Fferm Farmhouse	Grade II Listed Building	301233	376976
1495	Felin-y-gors	Grade II Listed Building	300839	375000
14984	Farmbuildings at Rhydorrdwy Fawr Farm	Grade II Listed Building	303831	381382
14990	Bryn Cwnin Farmhouse	Grade II Listed Building	302984	379680
14991	L-Plan Range of Farmbuildings at Bryn Cwnin Farm	Grade II Listed Building	302951	379712
19929	Pentre Meredydd	Grade II Listed Building	301115	373001
80738	Bryn Celyn Lodge on Bodelwyddan Park Boundary	Grade II Listed Building	300522	373931
80750	Gors Mill Cottage	Grade II Listed Building	300843	375017
105808	Rhuddlan	Historic settlement core	302637	377828

Table 2: Non-designated heritage assets

HER ref.	Name	Period	Easting	Northing
Within the cable route corridor				
35030	Rhuddlan bypass, mesolithic activity	Mesolithic	301600	378610
106448	Bryn Cwybr Roman Coin	Romano-British	302700	379200
102650	Bryn Cwnin Cropmark	Romano-British	303300	379900
102569	Perth Saint	Medieval	301900	375100
143519	Groesffordd ridge and furrow I	Medieval	300770	373728
143520	Groesffordd ridge and furrow II	Medieval	300811	373664
143523	Pentre-cefn ridge and furrow	Medieval	300972	373562
143527	Waen-Meredydd ridge and furrow I	Medieval	301119	373489
143528	Waen-Meredydd ridge and furrow II	Medieval	301172	373483
143529	Waen-Meredydd ridge and furrow III	Medieval	301268	373496
152294	Wrexham, Bridge Street, brewery	Undated	303650	382500
Within 1km of route corridor				
81662	Rhuddlan, Gwindy Street (site D), mesolithic activity	Mesolithic	302270	378270
102029	Ysgawen Stone Axe	Neolithic	302220	378460
57747	Rhuddlan, Gwindy Street, bronze age activity I	Bronze Age	302280	378220
57749	Rhuddlan, Gwindy Street, bronze age activity II	Bronze Age	302270	378250
101478	Cae Garnedd cairn	Bronze Age	300610	373340
102568	Cae Garreg Lwyd	Bronze Age	301500	374600

102985	Wernglodd Y Palmant Fieldname	Romano-British	301750	374000
104607	Varae-Kanovium Roman Road RR67b	Romano-British	301670	373940
104608	Varae-Kanovium Roman Road RR67b	Romano-British	300350	373930
144311	Roman Road	Romano-British	301964	373929
38624	Bodelwyddan Roman metal detector finds	Romano-British	301000	375000
46828	St Asaph - Caerhun	Romano-British	301102	373912
46829	St Asaph - Caerhun	Romano-British	300970	373913
101858	Pen-y-fford Enclosure	Iron Age	301700	379300
102041	Rhuddlan Church (St Mary), cross	Early medieval	302119	378097
16374	Rhuddlan Church (St Mary), cross	Early medieval	302119	378097
101409	Croes Y Cefn Du	Medieval	301000	379000
102975	Croes-y-berllan Fieldname	Medieval	302430	378320
142445	Rhuddlan	Medieval	302000	378000
17962	Rhuddlan Chantry (St John)	Medieval	302000	378000
16449	Rhuddlan Church (St Mary), yard	Medieval	302139	378111
29439	Rhuddlan Medieval Town	Medieval	302150	378250
29440	Rhuddlan Medieval Town	Medieval	302250	378250
29441	Rhuddlan Medieval Town	Medieval	302150	378150
101949	Rhuddlan mint	Medieval	302000	378000
57745	Rhuddlan, Gwindy Street, Edwardian borough defences	Medieval	302280	378220
57746	Rhuddlan, Gwindy Street, medieval well	Medieval	302280	378220
101958	Rhuddlan, Princes Street, Edwardian borough defences	Medieval	302080	378170
143517	Ty-cnap ridge and furrow I	Medieval	300873	373829
143518	Ty-cnap ridge and furrow II	Medieval	300910	373805
143521	Groesffordd ridge and furrow III	Medieval	300675	373638
143522	Groesffordd ridge and furrow IV	Medieval	300736	373562
143524	Ty-cnap ridge and furrow	Medieval	301255	373850
143525	Waen-Meredydd ridge and furrow	Medieval	301173	373618
143526	Pentre-mawr ridge and furrow	Medieval	301004	373384
143530	Waen-Meredydd ridge and furrow IV	Medieval	301201	373423
143531	Waen-Meredydd ridge and furrow V	Medieval	301318	373593
143532	Pentre-Meredydd ridge and furrow I	Medieval	301196	373255
143533	Pentre-Meredydd ridge and furrow II	Medieval	301101	373154
34047	Pentre bach ridge and furrow	Medieval	300830	373240
34048	Hendy Farm ridge and furrow	Medieval	301350	372850
123557	Bodelwyddan, finds	Post-medieval	301800	376400
36155	Bryn Cwnin Farm, house	Post-medieval	302984	379680
36156	Bryn Cwnin Farm, L-plan range	Post-medieval	302940	379698
66132	Bryn-carog, farmstead	Post-medieval	301172	376805
66134	Bryn-carog, trackway I	Post-medieval	300650	377252
66135	Bryn-carog, trackway II	Post-medieval	300697	376974

66136	Bryn-carog, trackway III	Post-medieval	300988	376822
66133	Bryn-carog, well	Post-medieval	301129	376840
37878	Cottage Covert fishpond	Post-medieval	303466	380292
102565	Cwybr Mawr	Post-medieval	302351	379363
103539	Faenol Boundary Marker II	Post-medieval	299940	378110
103540	Faenol Boundary Marker III	Post-medieval	299980	378160
103544	Faenol Boundary Marker III	Post-medieval	299940	378000
66137	Faenol-fawr, boundary stone I	Post-medieval	300519	376670
66130	Faenol-fawr, pond	Post-medieval	300372	376944
102967	Fferm farmhouse	Post-medieval	301229	376975
66131	Fferm, pond	Post-medieval	301207	376944
103581	Ffrith Beach Golf Course boundary stone	Post-medieval	303705	382818
103580	Green Lanes Boundary Stone	Post-medieval	303785	382526
103601	Marsh Road Foundry	Post-medieval	301840	377990
103605	Marsh Road Tannery	Post-medieval	301860	378090
103600	Meadow Brook Farm Boundary Stone	Post-medieval	301910	376940
66129	Pen-lan, outbuilding	Post-medieval	300459	376570
103543	Pengwern Boundary Marker	Post-medieval	301730	377000
102053	Pengwern Hall	Post-medieval	301918	376618
99617	Pengwern Hall, coach house with outbuildings range to west	Post-medieval	301900	376570
99621	Pengwern Hall, Garden Cottage	Post-medieval	301940	376640
99623	Pengwern Hall, Georgian House (former stables)	Post-medieval	301950	376590
131031	Pengwern Hall, greenhouse	Post-medieval	301818	376583
106455	Pengwern Hall, grotto	Post-medieval	301700	376550
103542	Pengwern Hall, icehouse	Post-medieval	301748	376588
131029	Pengwern Hall, pond I	Post-medieval	301838	376441
131030	Pengwern Hall, pond II	Post-medieval	301710	376580
99633	Pengwern Hall, Woodwork Block (former Coach House)	Post-medieval	301940	376660
103604	Pentre Mill	Post-medieval	303210	379360
37703	Plas Bruton Covert gravel pit	Post-medieval	303101	380550
12156	Rhuddlan culvert	Post-medieval	302080	378090
34301	Rhuddlan quay	Post-medieval	302000	378200
35189	Rhuddlan quay trackway	Post-medieval	302000	378130
83517	Rhuddlan warehouse	Post-medieval	301980	378140
83525	Rhuddlan wharf II	Post-medieval	301830	378250
83526	Rhuddlan wharf III	Post-medieval	301870	378186
83518	Rhuddlan wharf IV	Post-medieval	302000	378010
57748	Rhuddlan, Gwindy Street, post medieval activity	Post-medieval	302280	378220
142070	Rhuddlan, National School (Girls)	Post-medieval	302188	378224
36152	Rhyd-wen Farmhouse	Post-medieval	303308	381416
36151	Rhydorddwy Fawr Farm	Post-medieval	303867	381365

36150	Rhydorddwy Fawr Farm, house	Post-medieval	303880	381333
36174	Rhydorddwy Fawr Farm, outbuildings	Post-medieval	303843	381393
26139	Rhydorddwy Goch Farmhouse	Post-medieval	303850	380989
37700	Rhyl, Volunteers' rifle range	Post-medieval	302788	382579
101571	Sarn, trackway	Post-medieval	300890	376580
103103	Felin Y Gors Mill	Post-medieval	300842	375018
125075	Gors-uchaf, farmstead	Post-medieval	300607	374661
125076	Bodelwyddan Park, ice house	Post-medieval	300667	374590
125169	Pen-y-cefn, mine shaft	Post-medieval	301223	372477
125171	Cae-llwyd, limekiln	Post-medieval	301238	372711
125172	Cae-llwyd, mine shaft	Post-medieval	301235	372641
141423	Bodelwyddan, musket ball	Post-medieval	301089	373817
142788	Bodelwyddan Park, field boundary	Post-medieval	300428	373993
142790	Bodelwyddan Park, field boundary	Post-medieval	300388	374021
142812	Bodelwyddan Park, ridge and furrow	Post-medieval	300478	373980
142819	Bodelwyddan Park, field boundary	Post-medieval	300312	373982
142832	Bodelwyddan Park, ridge and furrow	Post-medieval	300431	374015
143513	Pentre-mawr limekiln	Post-medieval	300852	373336
143514	Groesffordd well	Post-medieval	300710	373621
143516	Pentre-mawr quarry	Post-medieval	300807	373326
143534	Ty-cnap milestone	Post-medieval	301035	373895
18046	Coed Celyn	Post-medieval	301300	372600
26128	Faenolbroper, barn to NW of Faenolbroper farmhouse	Post-medieval	301255	374818
34045	Cae Capel fieldname	Post-medieval	300720	373330
38625	Bodelwyddan Post medieval metal detector find	Post-medieval	301000	375000
46827	St Asaph - Caerhun	Post-medieval	301660	373934
46830	St Asaph - Caerhun	Post-medieval	300921	373915
99615	Bodelwyddan Park, Bryn Celyn Lodge	Post-medieval	300510	373930
99625	Gors Mill Cottage	Post-medieval	300830	375010
99631	Tyddyn-isaf	Post-medieval	301210	375200
99661	Pentre Meredydd	Post-medieval	301120	373000
48777	Bryn-carog, farm building	19th century	301141	376833
144785	Ffynnongroyw, Ffynnongroyw And Penyfford, war memorial	Modern	302001	378001
66139	Gypsy Lane, structure I	Modern	300089	377877
66140	Gypsy Lane, structure II	Modern	300178	377674
130268	MILES MASTER I N7937	Modern	303000	381000
131032	Pengwern College, Art Building	Modern	301747	376598
132201	Pengwern, PoW camp	Modern	301700	376200
132183	Vale of Clwyd, drill ground	Modern	300000	378000
141424	Rhyl, wood and metal object	Undated	302500	382600
130277	DE HAVILLAND VAMPIRE FB5 WA417	Modern	301000	373000

132201	Pengwern, PoW camp	Modern	301700	376200
142771	Bodelwyddan practice trenches, fire trench	Modern	300397	373953
142779	Bodelwyddan practice trenches, communication trench	Modern	300368	373969
142780	Bodelwyddan practice trenches, "D" head recess	Modern	300385	373968
142781	Bodelwyddan practice trenches, island traverse	Modern	300336	374051
142782	Bodelwyddan practice trenches, communication trench	Modern	300380	373989
142783	Bodelwyddan practice trenches, communication trench	Modern	300340	373941
142784	Bodelwyddan practice trenches, fire trench	Modern	300342	374018
142785	Bodelwyddan practice trenches, communication trench	Modern	300379	374024
142786	Bodelwyddan practice trenches, fire trench	Modern	300400	374014
142787	Bodelwyddan practice trenches, trench	Modern	300382	373985
142789	Bodelwyddan practice trenches, communication trench	Modern	300367	374015
142791	Bodelwyddan practice trenches, communication trench	Modern	300352	373989
142792	Bodelwyddan practice trenches, communication trench	Modern	300345	373994
142799	Bodelwyddan practice trenches, communication trench	Modern	300411	374006
142800	Bodelwyddan practice trenches, fire trench	Modern	300433	373951
142801	Bodelwyddan practice trenches, fire trench	Modern	300365	373959
142802	Bodelwyddan practice trenches, dugout	Modern	300331	373945
142803	Bodelwyddan practice trenches, dugout	Modern	300340	373946
142804	Bodelwyddan practice trenches, dugout	Modern	300348	373945
142805	Bodelwyddan practice trenches, dugout	Modern	300356	373950
142806	Bodelwyddan practice trenches, dugout	Modern	300360	373957
142807	Bodelwyddan practice trenches, dugout	Modern	300365	373954
142808	Bodelwyddan practice trenches, communication trench	Modern	300378	373963
142809	Bodelwyddan practice trenches, dugout	Modern	300363	373978
142810	Bodelwyddan practice trenches, dugout	Modern	300343	373975
142811	Bodelwyddan practice trenches, dugout	Modern	300351	373995
142813	Bodelwyddan practice trenches, communication trench	Modern	300356	374051
142830	Bodelwyddan practice trenches, dugout	Modern	300341	373938
143371	Bodelwyddan practice trenches, communication trench	Modern	300355	373982
143372	Bodelwyddan practice trenches, trench	Modern	300346	374036
143425	Bodelwyddan practice trenches, trench	Modern	300338	374031
143473	Bodelwyddan practice trenches, dugout	Modern	300367	373960
143484	Bodelwyddan practice trenches, slit trench	Modern	300368	374020
143535	Pentre Chapel	Modern	300706	373357
152248	St. Asaph ROC Post	Modern	302010	375170

1.9 Appendix D9: Human Environment

1.0 Proposed Scoping Text for Noise and Vibration Assessments

1.1 General Scope

This document identifies the onshore noise and vibration sensitive receptors of Awel y Môr Offshore Wind Farm (AyM OWF) onshore Landfall, Onshore Export Cable Corridor (ECC) and substation. Whilst being submitted to the AyM Evidence Plan Human Environment Expert Technical Group (ETG) for approval, it focusses specifically on engagement with Denbigh County Council, as the likely zone of influence for onshore related effects are limited to the area within Denbighshire County boundary.

The potential effects of the construction, operation and maintenance of AyM OWF is described and sets out the proposed scope of the noise and vibration aspects of the EIA and the proposed methodology used for assessments presented in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

The noise and vibration study area for the works is defined as the areas located in the vicinity of the AyM OWF landfall, onshore ECC and substation which contain the nearest sensitive receptos.

The nearest noise and vibration sensitive receptors to the offshore elements of the AyM OWF and the associated assessment methodology are being scoped separately and will be agreed with the wider AyM Evidence Plan Human Environment ETG.

1.2 Baseline Monitoring

The preferred options and location of the landfall, the substation and the onshore ECC has now been confirmed, consequently the baseline monitoring will measure baseline sound levels at the nearest noise-sensitive receptors (NSR's) to the

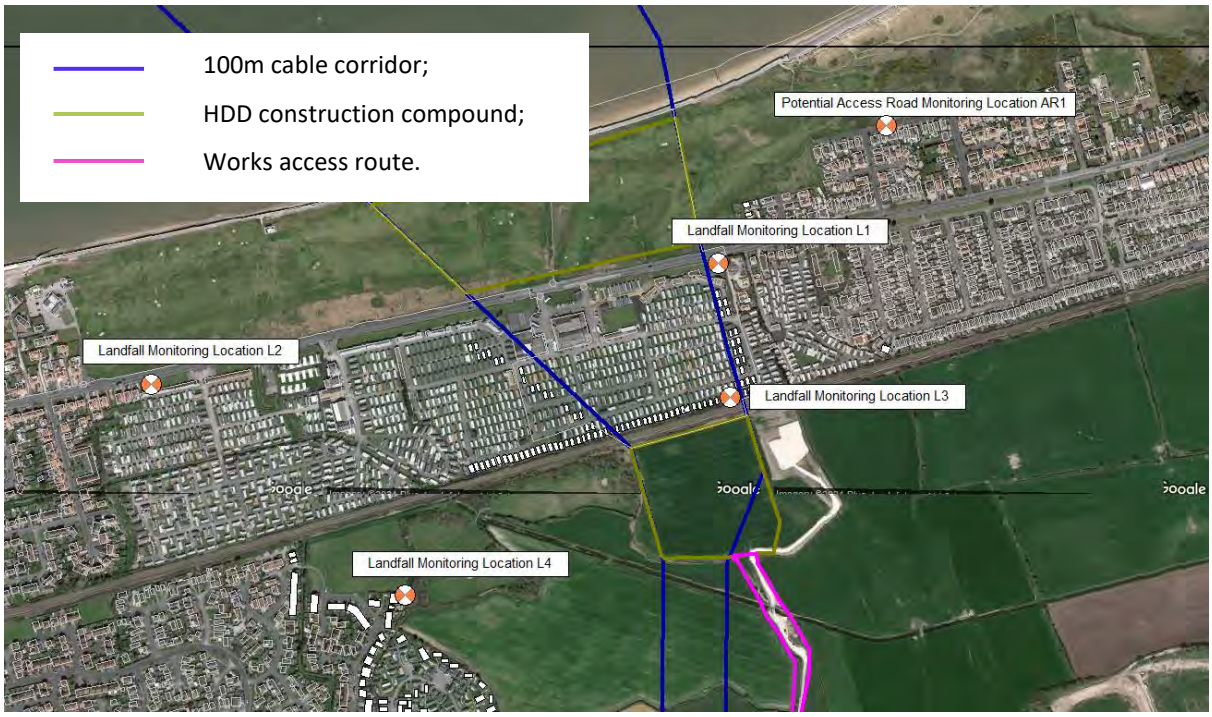
- landfall;
- substation; and
- along the cable route.

1.2.1 Landfall

It is envisaged that baseline sound levels would be measured at the following NSR's located near the chosen landfall area, associated construction zones and potential access road, as shown on Figure 1;

- Location L1 – in the north-east corner of the caravan park, representative of the caravans themselves and the residential properties located on Terfyn Pella Avenue;
- Location L2 – on the north-west corner of the caravan park, representative of the caravans themselves and the residential properties located on Rhyl Coast Road;
- Location L3 - on the south-east corner of the caravan park, representative of the caravans themselves and the residential properties located on Cherry Close;
- Location L4 – to the west of the HDD construction compound representative of the residential properties on Maes Y Gog;
- Location AR1 – to the east of the northern HDD compound representative of the residential properties on Green Lanes for the potential new access road.

Figure 1
Landfall Baseline Monitoring Locations



It is envisaged that the sound level meters would be installed at the locations shown above for a minimum of a 96-hour period to include a weekend during which they would be left unattended.

Assuming suitable weather conditions prevail, it is considered that the above period of monitoring would provide sufficient representative baseline data in conjunction with BS5228:2009+A1:2014 and similar construction noise assessments of this nature.

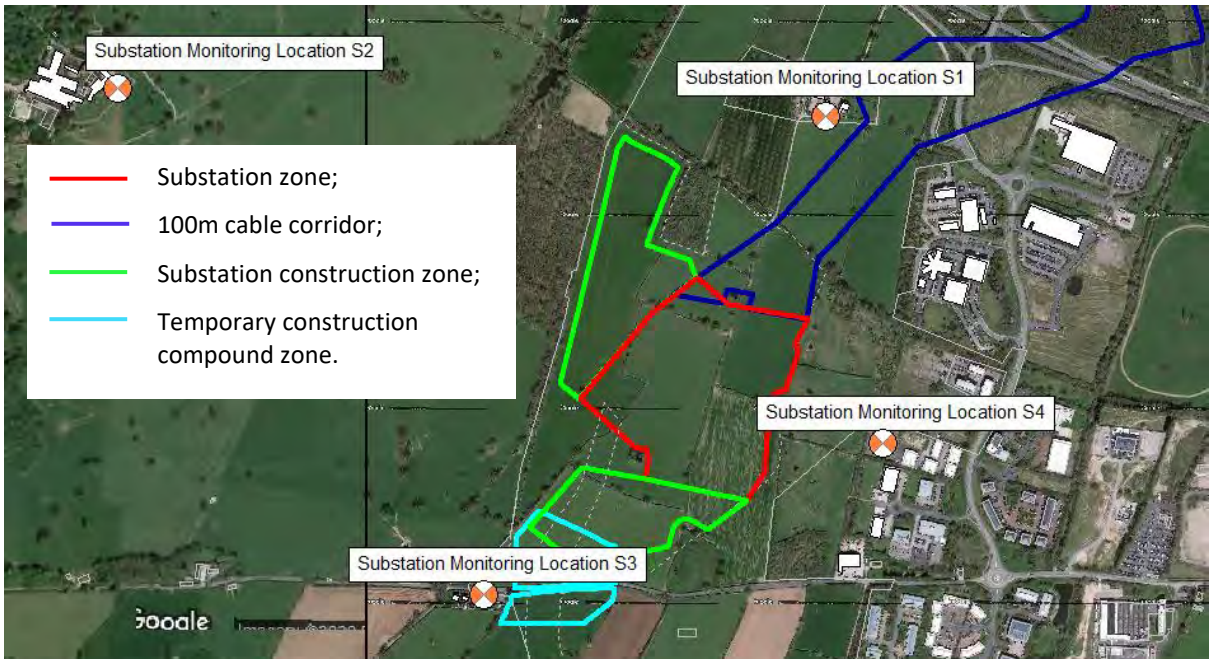
Details of the prevailing soundscape at each monitoring location would be noted by the qualified acoustician during the equipment installation and collection.

1.2.2 Substation

It is envisaged that baseline sound levels would be measured at the following NSR's located near the chosen substation and associated construction zones;

- Location S1 – to the north of the substation area, representative of the farm and residential property to the north-west;
- Location S2 – to the west of the substation area, representative of Bodelwyddan Castle Hotel;
- Location S3 – to the south-west of the substation area, representative of the residential properties located on Glascoed Road; and
- Location S4 – to the east of the substation area, representative of the commercial units to the east.

Figure 2
Substation Baseline Monitoring Locations



It is envisaged that the sound level meters would be installed at the locations shown above for a minimum of a 96-hour period to include a weekend during which they would be left unattended.

Assuming suitable weather conditions prevail, it is considered that the above period of monitoring would provide sufficient representative baseline data in conjunction with BS4142:2014+A1:2019 and similar operational noise assessments of this nature.Details of the prevailing soundscape at each monitoring location would be noted by the qualified acoustician during the equipment installation and collection.

1.2.3 Cable Route

It is envisaged that baseline sound levels would be measured at the following NSR's located along the chosen cable route and associated temporary construction compounds:

- Location CR1 – to the west of the cable route, representative of the properties associated with the New Pines Holiday Home Park;
- Location CR2 – to the east of the cable route, a temporary construction compound and final off route access road, representative of the Farm House;
- Location CR3 – to the west of the cable route, representative of the residential properties located on Rhodfa Logan;
- Location CR4 – to the north-west of the cable route, representative to the residential properties in Rachel Drive;
- Location CR5 – to the north-west of the cable route and south-east of the alternative cable route, representative of the Farm House and other residential properties located at a similar distance away from the A525 and A547;

- Location CR6 – to the north of the cable route where is crosses the A525, representative of the residential properties located adjacent to the A525 and A547;
- Location CR7 – to the south-east of the cable route and A525, representative of the residential properties located on Ffordd Ffynnon;
- Location CR8 - to the east of the cable route and temporary construction compound, representative of the residential properties on Ffordd Abergele;
- Location CR9 – to the west of the cable route and temporary construction compound, representative of the Farm House;
- Location CR10 – to the east of the cable route and south-east of the temporary construction compound, representative of the Farm House;
- Location CR11 – to the west of the cable route and final off route access road, representative of the Farm House and other properties located similar distances away from the A55;
- Location CR12 – to the north of the cable route connection between the substation and the national grid site and temporary construction compound, representative of the Farm House;
- Location CR13 – to the south of the cable route connection between the substation and the national grid site and temporary construction compound, representative of the Farm House.

The locations described above are shown on Figures 3, 4, 5, 6 and 7 below and overleaf.

Figure 3
Cable Route Baseline Monitoring Locations CR1, CR2 and CR3

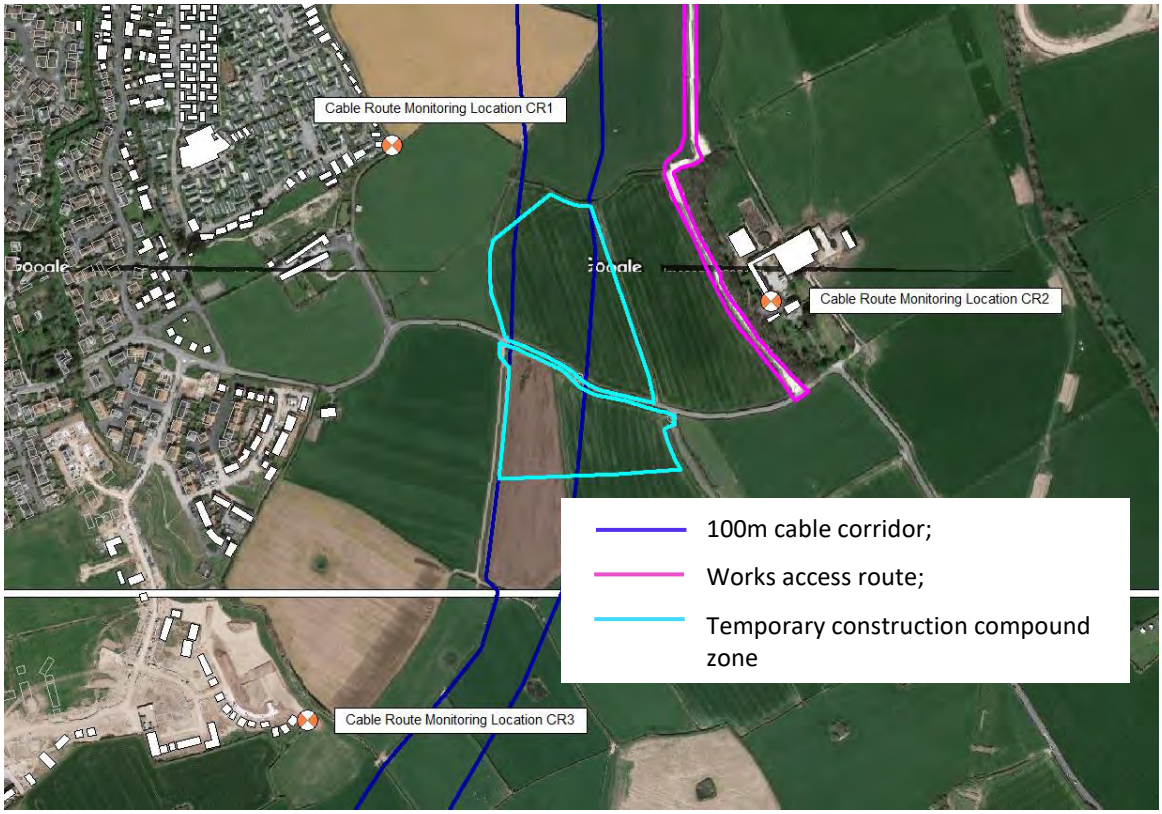


Figure 4
Cable Route Baseline Monitoring Locations CR4, CR5, CR6 and CR7

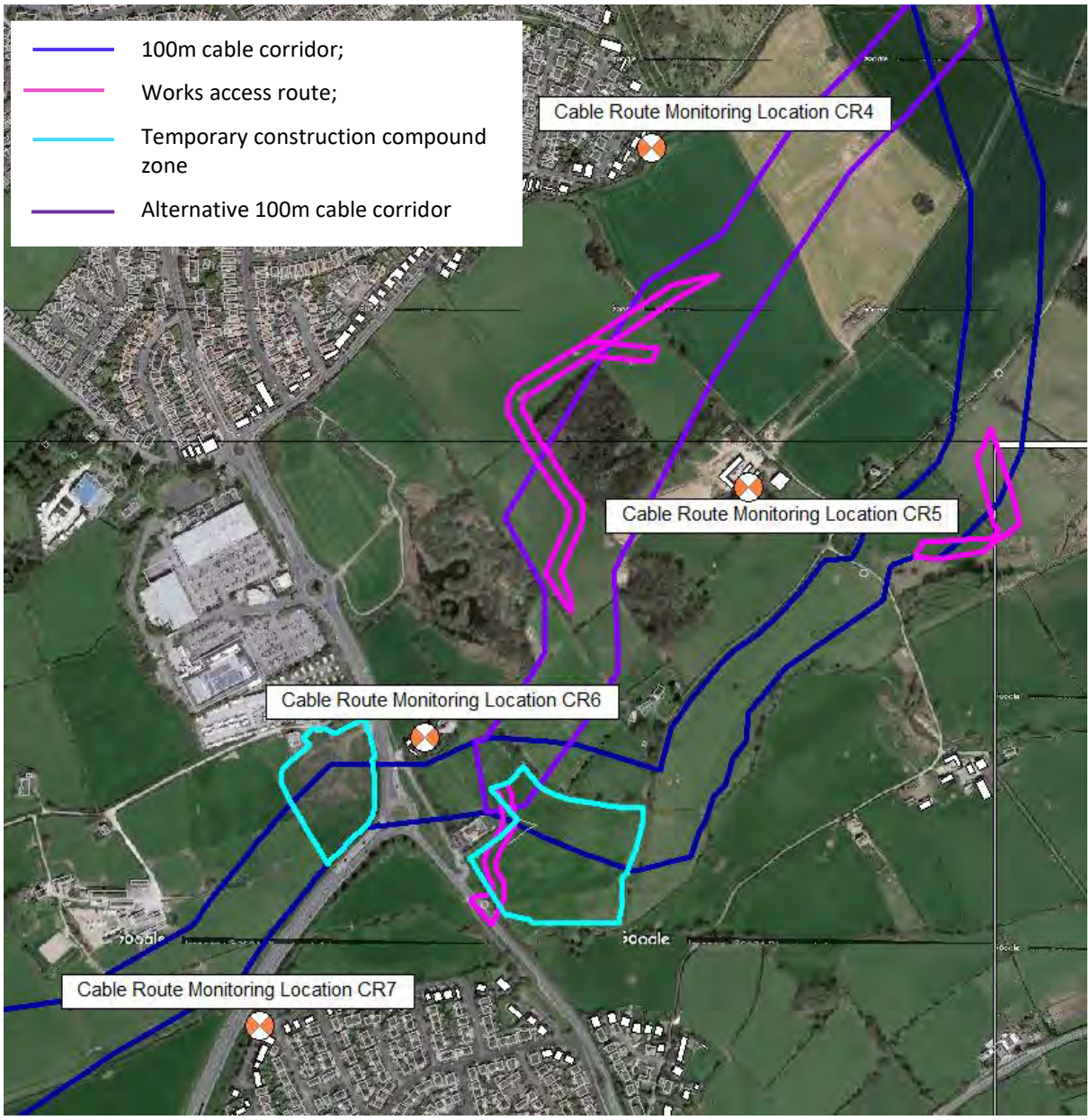


Figure 5
Cable Route Baseline Monitoring Locations CR8, CR9 and C10

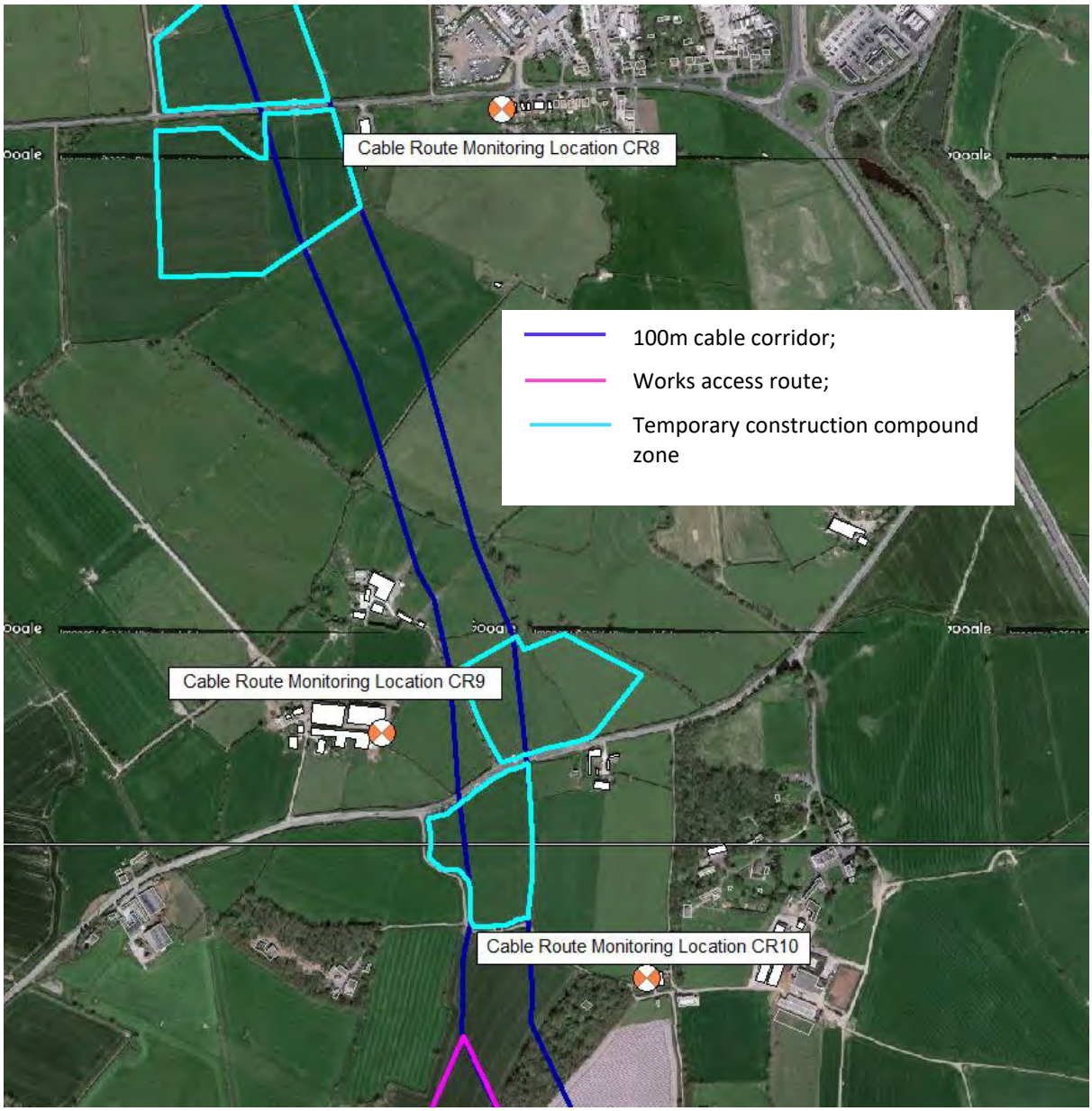


Figure 6
Cable Route Baseline Monitoring Location CR11

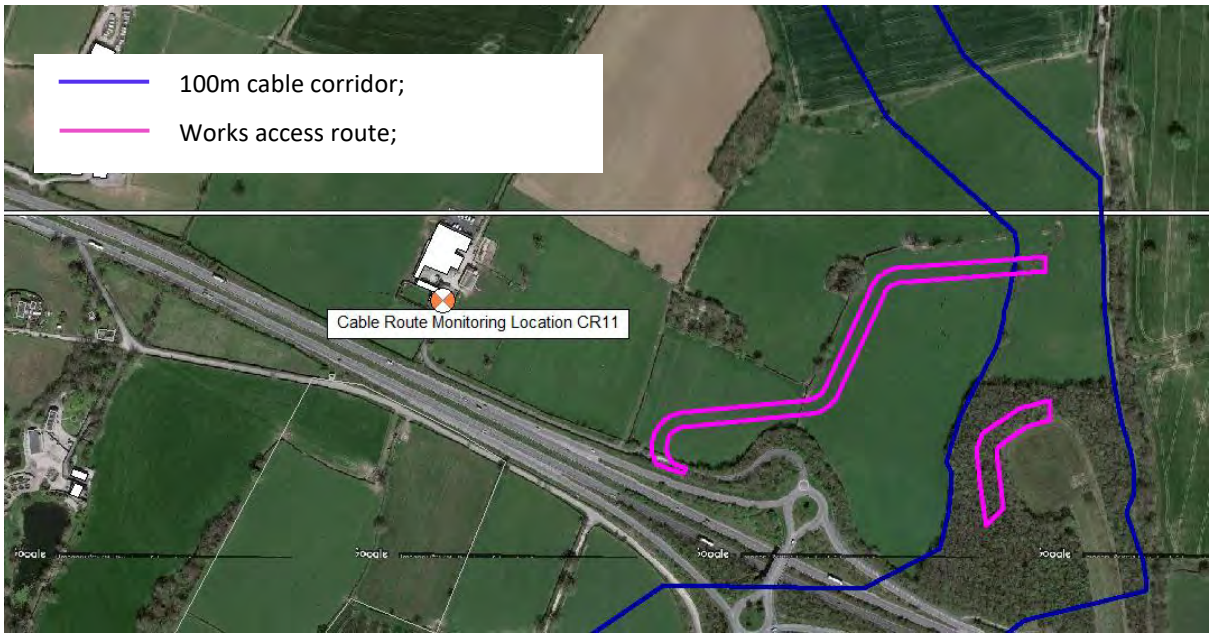
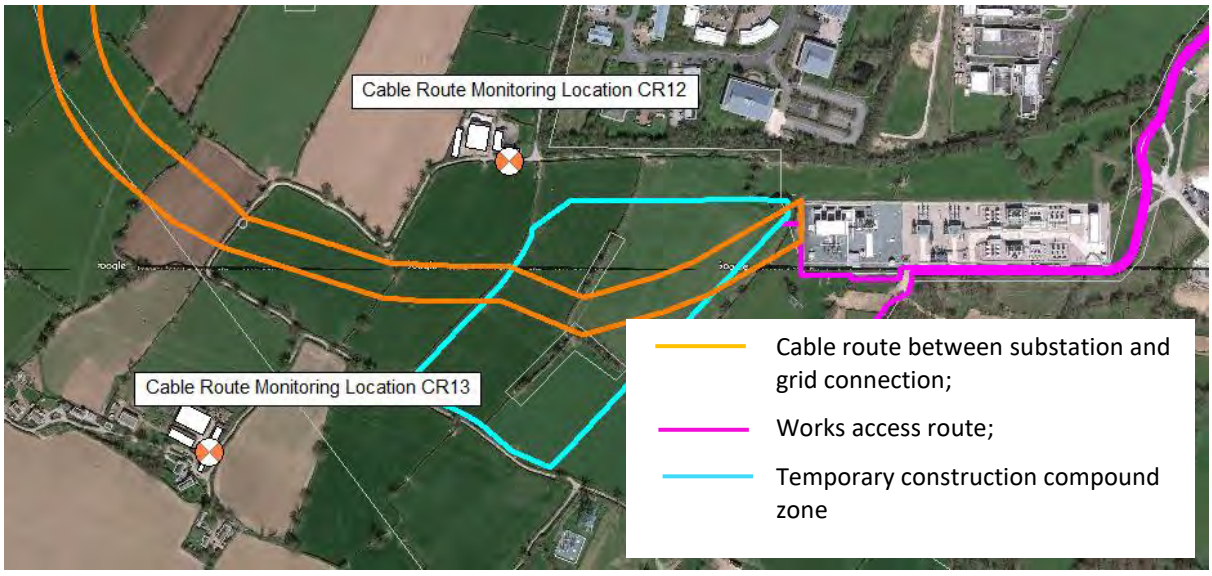


Figure 7
Cable Route Baseline Monitoring Locations CR12 and CR13



It is envisaged that baseline surveys at the cable route locations shown on Figures 3-7 above would be fully attended and consist of a one-hour continuous measurement at each location during a midweek daytime period.

1.2.4 Equipment and Data to be Recorded

The sound level meters utilised for the baseline surveys would be of a Type 1 standard.

The microphones at each of the monitoring locations shown on Figures 1 to 7 would be positioned in free-field conditions i.e. at least 1.5m above ground level and 3.5m from any reflecting surface and the following noise indices would be recorded;

- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period T.
- L_{A90} The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise.
- L_{A10} The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise.
- L_{AFmax} The maximum A-weighted noise level during the measurement period.

In addition to the above frequency data in 1/3 octave bands would be recorded for use in the subsequent assessment if required.

The qualified surveyor would also record the following information during the baseline surveys;

- The prevailing soundscape at each monitoring location;
- The prevailing weather conditions including wind speed and direction, temperature, cloud cover and precipitation.

Where the sound level meters are being left unattended (landfall, substation) the information regarding the prevailing sound climate and weather conditions would be noted during the equipment installation and collection.

1.3 Construction Noise and Vibration Assessments

Construction noise and vibration assessments would be undertaken for the landfall area, the cable route and substation. The assessments would be undertaken in conjunction with BS5228:2009+A1:2014, *Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1 Noise and Part 2 Vibration*.

Construction noise limits would be set at the identified NSR's in conjunction with the measured baseline levels and the ABC Method contained in BS5228:2009+A1:2014.

Construction noise levels would be predicted at the identified NSR's using the Cadna/A noise modelling software and the calculation algorithms contained in BS5228:2009+A1:2014, Part 1 and assessed against the specified limits.

The assessment would include consideration of noise from the construction activities including use of plant and machinery, construction delivery traffic and excavation works at each of the landfall, substation and landfall areas. In addition, drilling activities at landfall and construction of the substation will be included. SLR would prepare an inventory of likely plant which would be used and would identify typical sound power levels from the plant from published data sources.

Where adverse impacts have been identified specific mitigation measures would be detailed Within the PEIR and ES, with more specific detailed design of mitigation proposed as a potential DCO Requirements post-consent.

Vibration levels from construction works (i.e. piling/vibratory rolling) would be predicted at the nearest NSR's in accordance with the methodologies contained in BS5228:2009+A1:2014, Part 2 and assessed against the guidance levels shown in Table B.1 of the guidance.

1.4 Operational Noise

1.4.1 Substation

Noise generated by the onshore substation would be predicted at the nearest NSR's using the methodology in ISO 9613-2:1996, *Acoustics – Attenuation of Sound during Propagation Outdoors*, and assessed in accordance with BS4142:2014+A1:2019 (*Methods for Rating and Assessing Industrial and Commercial Sound*), whereby sound levels associated with the operation of the substation would be compared to measured daytime and night-time background sound levels at the closest receptors.

A subjective opinion of the potential acoustic features would also be included, and this would consider penalties for tonal, impulsive and/or intermittent characteristics.

The results of the assessment would be used to determine whether noise levels generated by the operation of the substation would lead to adverse impacts at the nearest noise-sensitive receptors.

The assessment would indicate whether additional mitigation is required to reduce any identified impacts. As with construction noise, where adverse impacts have been identified specific mitigation measures would be detailed Within the PEIR and ES, with more specific detailed design of mitigation proposed as a potential DCO Requirements post-consent.

1.5 Ecological Receptors

It has been determined that there are no International or National ecological sites situated near to the identified cable route and the nearest ecological receptors to the substation is a Special Area of Conservation (SAC) located approximately 1.5 kilometres to the south, consequently it is considered that an assessment of noise impacts upon ecological receptors is not required for the cable route or substation.

A Special Protection Area (SPA) for birds has been identified to the north of beach area, it is considered that the noise being generated by construction operations associated with the landfall area would have the potential to impact on this SPA.

Consequently, the noise generated by construction operations would be predicted at the SPA and assessed in accordance with the limits contained in AQTAG09 (Air Quality Technical Advisory Group 09), *Guidance on the effects of industrial noise on wildlife,* which is intended to be used to assess the potential adverse impact of sound, of an industrial and/or commercial nature on wildlife.

1.6 Exclusions

The EIA Scoping Opinion provided by the Planning Inspectorate (the Inspectorate) on behalf of the Secretary of State (SoS) agreed that the following assessments are not be required as part of the noise and vibration chapter;

- An operational noise and vibration assessment of the cable route;
- An operational vibration assessment for the substation;
- An operational traffic assessment for the substation.

1.7 Cumulative Impacts

The impact of the construction operations associated with the landfall and cable route and the construction and operation of the substation would be assessed cumulatively with any other planned developments in the vicinity.

SLR has undertaken a search of the planned developments in the area local to the landfall, cable route and substation and the most significant developments which need to be considered within the cumulative assessment are;

- The construction and operation of a 5 MW flexible gas fired power plant to be located on the St Asaph Business Park to the east of the Substation (Application Ref: 40/2018/1036);
- The construction of a Solar Farm at Gwernigron Farm located to the east of the section of the cable route immediately north of the A55 (Application Ref: 46/2020/0156).

Technical Note: Data Requirements

Awel y Môr Offshore Windfarm

16th February 2021

Introduction

This note has been prepared by SLR Consulting Ltd (SLR) and is provided to inform further discussions with Expert Topic Group (ETG) 'Traffic and Transport' members; North and Mid Wales Trunk Road Agency (NMWTRA) and Denbighshire County Council (DCC) regarding the baseline data requirements to inform the Traffic and Transport chapter of the Environmental Impact Assessment (EIA) for the onshore element of the Awel y Môr Offshore Windfarm.

Purpose of this Note

We are seeking views on baseline data, so the requirements can be agreed and finalised now that the preferred cable corridor and cable route, landfall location and substation location have been selected and are being taken forward for assessment which will be presented in the Preliminary Environmental Information Report (PEIR).

Specific questions for ETG members are set out in this note; however, in broad terms, we would like ETG members to confirm the following:

- Do you agree with the proposed construction access routes?
- Do you agree with the proposed sources of data?
- Do you agree with the proposed scope of data?

The maximum design scenario that will inform the construction traffic generation assessment presented in the PEIR is currently being finalised. Once the likely highway links and junctions that would be impacted are identified, further liaison with ETG members will be undertaken to discuss and agree the scope of the assessment scenarios. This is likely to be towards the middle of March. At this stage, feedback on data sources and construction routeing is being sought.

Datasets

The key datasets required (where appropriate) to inform the Traffic and Transport chapter of the PEIR are:

- A55 - link flow data;
- Local roads - link flow data;
- Local roads – peak period turning counts (dependent on trip generation and any sensitive junctions identified by ETG members);
- Speed surveys for temporary and permanent construction site access visibility;
- Accident data; and
- Qualitative assessment of Public Rights of Way (PROW and Active Travel Routes (ATR)), including usage (if any survey or anecdotal information is available)

Project Red Line Boundary and Proposed Construction Accesses

The proposed Project Red Line Boundary for the onshore works being taken forward for the PEIR is shown in **Figure X** in **Appendix 01.** This shows the landfall location, a 100m wide cable for the cable route corridor

(within which a preferred 40m corridor will be shown at PEIR), the substation location and the connection to the National Grid Substation.

Between landfall and the National Grid Substation, there will be a number of access locations required to facilitate temporary access to Horizontal Directional Drilling (HDD) and Transition Jointing Bay (TJB) compounds, Temporary Construction Compounds (TCC) and the haul roads.

A schedule of the proposed construction access points from the local highway network have been identified for a number of sections of the cable route between and including landfall and the connection onto the National Grid Substation, and are set out in **Table 1** below and in **Figure X**

Table 1
Proposed Construction Access Locations

Cable Route Section	Proposed Access	Compounds
Landfall Option 1	B5119 Dyserth Road (adjacent to Rhydorddwy Fawr)	Landfall HDD compound TJB construction compound
Landfall Option 2	A548 Rhyl Coast Road – • Garford Road (west of the Golf Course); • Existing Golf Course access on the A548 Rhyl Coast Road; and • New access from The A548 Rhyl Coast Road.	
Section 1	A547 - Upgrade of Existing B5119 Dyserth Road	HDD compounds Main TCC at A547 Access Minor TCC at B5119 Access
Section 2	A525 - Upgrade of existing	HDD compounds Minor TCC at A525 Access
Section 3	A547 Abergele Road Sarn Lane Farm Track from Junction 26 of A55	HDD compounds Main TCC at A547 Access Minor TCC at Sarn Lane Access
Section 4	B5381 Glascoed Road (west of St Asaph Business Park)	HDD compounds Minor TCC at B5381
Substation	B5381 Glascoed Road (west of St Asaph Business Park)	HDD compounds Minor TCC
National Grid Substation	B5381 Glascoed Road (east of St Asaph Business Park)	Minor TCC

Likely Access Routes

The access routes between the A55 and each of the construction accesses to be considered are:

- Landfall Option 1
    - LF1 - A548 Rhyl Coast Road, A525 to Junction 26 of the A55, or via A547 to Junction 28 of the A55
- Landfall Option 1
    - LF2A - B5119, A548, A525 to Junction 26 of the A55, or via A547 to Junction 28 of the A55; and
    - LF2B - B5119, A547, A525 to Junction 26 of the A55, or via A547 to Junction 28 of the A55.
- Section 1
    - S1A - B5119, A548, A525 to Junction 26 of the A55, or via A547 to Junction 28 of the A55;
    - S1A - B5119, A548, A525 to Junction 26 of the A55;
    - S1B - B5119, A547, A525 to Junction 26 of the A55; and
    - S1C - A525 to Junction 26 of the A55
- Section 2
    - S2 - A525 to Junction 26 of the A55
- Section 3
    - S3A - A547, A525 to Junction 26 of the A55;
    - S3B - Sarn Lane, A525 to Junction 26 of the A55; and
    - S3C - Access Lane at Junction 26 of the A55
- Section 4 / Substation / National Grid Substation
    - S4A - B5381 Glascoed Road, Ffordd William Morgan to Junction 26 of the A55; and
    - S4B - B5381 Glascoed Road, A525 to Junction 27 of the A55

We would welcome any feedback from ETG members on the access routes proposed in terms of suitability for HGV traffic in particular, subject to any traffic management measures that may be required.

Likely affected PROW / ATR

The PROW to be included in the baseline assessment (which are crossed by the proposed cable route and/or construction access) are as follows:

- 201/9, 201/7, 206/4, 206/40, 201/14, 201/12, 206/29, 206/46, 206/20, 206/17, 206/44, 206/18, 206/12, 200/3, 206/14, 206/15, 206/16 and 206/17

The ATR to be included in the baseline assessment (which are crossed by the proposed cable route and/or construction access) are as follows:

- DB-PRE-C012;
- DB-PRE-C011;
- DB-PRE-C011B;
- Den-Bod-SUP030;
- Den-Rhud-SUP030;
- Den-Rhud-SUP010B; and
- Den-Rhud-SUP020

We would welcome any feedback from ETG members regarding the list of PROW and ATR to be included in the assessment and whether there are any other routes you would like included in the assessment.

Sources of Data

A55 – link flow data

Baseline traffic flows for the A55 would be obtained using DfT data, with the following datasets available in the vicinity the three junctions on the A55 proposed for accessing the construction routes on the local highway network:

- Site number: 40530 between Junction 25 and 26 (AADT, also hourly 07:00 to 19:00, both directions) – 2017 actual count and estimates for 2019; and
- Site number: 20531 between Junction 27 and 27a (AADT, also hourly 07:00 to 19:00, both directions) – 2019 actual count.

We would welcome any feedback from NMWTRA on the baseline traffic flow data identified for the A55.

Local roads - link flow data / peak period turning counts

Whilst the highway links or junctions on the local highway network that will require assessment to inform the PEIR are still being finalized; we would welcome feedback from ETG members on the options for obtaining suitable traffic data:

Existing sources

- Recent Transport Assessments prepared for development proposals within the study area and the use of assumptions and factors to estimate traffic flows. We have collated a number of Transport Assessments that contain traffic data on some of the routes / routes within close proximity; however, this data is limited and mainly peak hour flows, rather than 12-hour flows; and
- Traffic survey data held by DCC. We would welcome confirmation of any available traffic datasets on the likely access routes identified above.

Could DCC provide contact information for investigating any existing traffic survey data available, should this be required?

New survey data

Given the current Covid-19 pandemic and associated travel restrictions, collecting new traffic data may not be adequately representative.

We would therefore welcome feedback from DCC on the potential for obtaining new data once this lockdown period has ended, with a view to collecting the data towards the end of March, to enable assessment to inform the PEIR.

Could DCC also confirm if a permit or license is required to install traffic data collection equipment and is there a lead in time for this?

Speed data

If required, ATCs will be installed by the specialist traffic data collection company at proposed construction site accesses so that 85th percentile vehicle speeds can be identified to derive the required visibility splays, to ensure highway safety is maintained.

Accident data

Accident data will be obtained from the STATS19 database from DCC for the local road network and from the Welsh Government Knowledge and Analytical Service for the A55.

We would welcome feedback from ETG members confirming the sources of data for speed and accident data are suitable.

PROW / ATR

The baseline data for assessing the impact of the construction traffic on the users of the PROW and ATR that would be crossed by the cable route and/or temporary construction access will be obtained from a desk based assessment, supplemented by site visits to identify the following in the vicinity of each identified PROW and ATR:

- General observations of usage;
- Key trip generators and local amenities;
- Alternative walking, cycling and horse-riding network facilities; and
- Personal injury collision data if the PROW crossed or is adjacent to the local highway network.

Additionally, the baseline assessment will consider:

- Any related walking, cycling & horse-riding policies and strategies; and
- Input from the baseline assessment undertaken for the recreation EIA topic, which will identify the relevant importance of each PROW and ATR and any anecdotal usage information from key stakeholders.

We would welcome feedback from DCC confirming the method of data collection for PROW and ATR affected is suitable.

Timing of Data

Traffic Data

We would welcome feedback from ETG members regarding the timing of baseline data (notwithstanding the issues outlined above regarding the collection of new data), specifically whether a seasonality adjustment would be required, to take account of tourism in the summer months.

The potential for seasonality adjustment factors for the strategic and local highway networks is set out below.

A55 – link flow data

Annual Average Daily Traffic (AADT) flows are available without any seasonal variations. SLR has obtained some data showing monthly traffic volumes on the A55 in the study area, as shown below in **Figure 1**.[1] (2016 data). This shows much higher traffic flows in August. Factors can be applied to the AADT data on the A55 to take account of the likely timing of the construction period, to ensure a robust assessment is undertaken, should this be required.

[1] A55 / A494 Network Resilience Study WelTAG Stage 1 Report WSP on behalf of North and Mid Wales Trunk Road Agency

Figure 1
Proposed Seasonality Factors – A55

Table 2-7: A55 Seasonality

	Penmaen-bach Gwynedd EB	Penmaen-bach Gwynedd WB	Bodel-wyddan EB	Bodel-wyddan WB	Pont Dafydd, E. of St Asaph EB	Pont Dafydd, E. of St Asaph WB	Northop BP (West) Clwyd EB	Northop BP (West) Clwyd WB	Hawarden Bypass Clwyd EB	Hawarden Bypass Clwyd WB
Jan	12,374*	11,693*	16,005	15,657	17,024	16,190	22,277	21,861	12,220	11,503
Feb	6,539*	4,742*	17,248	17,444	18,534	18,255	24,163	24,337	12,921	12,521
Mar	16,488*	5,801*	18,919	19,308	20,887	20,918	26,608	27,156	13,578	13,422
Apr	17,676	12,515	20,235	20,572	22,238	22,098	28,273	28,710	14,359	14,062
May	18,284	18,174	21,048	21,858	23,314	23,480	29,247	29,729	14,865	14,653
Jun	19,075	18,268	21,210	20,812	24,168	23,308	30,222	29,876	14,992	14,472
Jul	19,256	19,588	22,100	23,233	24,436	24,620	30,332	31,030	14,785	14,868
Aug	21,561	21,331	25,327	25,188	27,977	27,367	33,376	33,280	15,654	15,574
Sep	18,862	18,339	21,823	21,466	23,685	22,749	29,597	29,241	14,796	14,410
Oct	18,158	18,017	20,594	20,780	22,771	22,382	28,762	28,953	14,697	14,393
Nov	16,295	15,964	18,337	18,471	19,777	19,223	25,642	25,614	13,741	13,233
Dec	14,661	14,781	17,765	17,827	18,113	18,231	23,703	24,364	12,622	12,317

Note: *Planned roadworks closed the Penmaenbach tunnels during the first quarter of 2016.

Local roads - link flow data / peak period turning counts

Any existing data or new traffic counts (should this be possible given the Covid-19 pandemic) can be factored for summer seasonality (if required) using factors identified on some local highway links assessed as part of the National Grid (North Wales Connection Project), as shown in **Figure 2**.[2]

Figure 2
Proposed Seasonality Factors – Local Highway Network

Table 7.7: Seasonality Factors Along Highway Links

Highway Link	Link Ref	August / February AM	August / February PM
A4244	20	0.90	1.14
A5	13	0.95	1.34
A4080	16	0.96	1.49
B5111	4 & 4.1	0.83	0.95
A5	17	0.94	1.45
A5114	8	0.92	1.08
A5025	1	1.01	0.94
		0.93	**1.20**
Average		**1.06**	

[2] National Grid (North Wales Connection Project) Chapter 13 – Appendix 1 (Transport Assessment)

Speed surveys

We would suggest the timing of speed surveys is not critical to the assessment.

Accident data

STATS19 data will be obtained and analysed for the previous five years (of available data).

PROW / ATR

We would suggest the timing of collecting data associated with the PROW / ATR is not critical to the assessment.

We would welcome feedback from ETG members confirming the timing of collecting speed, accident and PROW / ATR data is suitable.

Data Collection Time Periods

A55 – link flow data

24 hour AADT data is the only time period available on the DfT Road Traffic Data Statistics website. Should different time periods (such as 18 hour, 12 hour or peak hour) be required for the assessment (including for other EA topics), any other datasets available from NMWTRA on the A55 or ATC data available on local roads in the study would be used to derive such time periods.

We would welcome feedback from NMWTRA regarding the above method; however we will seek further agreement on this with NMWTRA once this data has been identified.

Local roads - link flow data / peak period turning counts

Any new ATCs would collect classified traffic flow data and speeds on highway links, would be installed for one week, to capture 24 hours, seven days.

Should a junction be identified as sensitive by ETG members and if the traffic associated with the construction phase impacts on the junction, should existing data not be available, Manual Classified Counts (MCCs) would collect turning movements and also queue lengths in the morning and evening peak periods (07:00 to 10:00 and 16:00 to 19:00) on a weekday.

We would welcome feedback from ETG members regarding the above method and if any junctions associated with the access routes can be considered sensitive; however, we will seek further agreement on this with ETG members once the construction traffic generation and route assignment has been undertaken in March.

Speed surveys

ATCs, which will collect classified traffic flow data and speeds on highway links, would be installed for one week, to capture 24 hours, seven days.

Accident data

Any accident data within the agreed refined study area across the five year period will be analysed.

PROW / ATR

We would suggest the time period for collecting data associated with the PROW / ATR is not relevant to the assessment.

We would welcome feedback from ETG members confirming the time periods associated with collecting speed, accident and PROW / ATR data are suitable.

Summary

This note sets out the proposed parameters for baseline data collection to inform the Traffic and Transport chapter of the EIA for the onshore element of the Awel y Môr Offshore Windfarm.

We would welcome feedback from ETG members on the questions set out in this note at the earliest opportunity, to enable us to plan the baseline data collection.

Access A

Coordinates

Easting: 304809.725

Northing: 382895.725

Access Requirement

Possible access to Beach for personnel to monitor HDD progress - Access from the A548 via Caravan Park at Ffrith Beach Arena Park.

Access Description

Use of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto A548 at Rhyl.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking West Along A548

Google Street View Image—Looking East Along A548

Access B1

Coordinates

Easting: 303371.425

Northing: 382405.55

Access Requirement

Possible access to golf course north of A548 required if short landfall HDD option taken forward.

Access Description

No exact location currently identified - access may be taken at any point where access zone meets the road. Possible use of current footpath crossing as vehicle access - may not be suitable access location if proposed flood defence works are undertaken.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto A548 at Rhyl.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A548

Google Street View Image—Looking East Along A548

Access B2

Coordinates

Easting: 302635.025

Northing: 382246.905

Access Requirement

Possible access to golf course north of A548 required if short landfall HDD option taken forward.

Access Description

No exact location currently identified. Possible routeing of access around proposed flood defence bund which is proposed to be constructed around golf course. Vehicular access to northern side of bund may be available from the golf club.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto A548 at Rhyl.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A548

Google Street View Image—Looking East Along A548

Access B3

Coordinates

Easting: 302417.675

Northing: 382390.5

Access Requirement

Possible access to golf course north of A548 required if short landfall HDD option taken forward. Possible access to Beach for personnel to monitor HDD progress.

Access Description

No exact location currently identified. Possible routeing of access around proposed flood defence bund which is proposed to be constructed around golf course. Vehicular access to northern side of bund may be available from access off Garford Road, via flood defence gate.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 , onto A548 at Rhyl then onto Garford Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking South Along Garfod Road

Google Street View Image—Looking North Along Garfod Road to Access Point

Access C1

Coordinates

Easting: 303351.45

Northing: 382385.25

Access Requirement

Access to HDD alignment within Robin Hood Holiday Camp for personnel to monitor HDD progress.

Access Description

Use of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto A548 at Rhyl.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A548

Google Street View Image—Looking East Along A548

Access C2

Coordinates

Easting: 303419.825

Northing: 382399.95

Access Requirement

Access to HDD alignment within Robin Hood Holiday Camp for personnel to monitor HDD progress.

Access Description

Use of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto A548 at Rhyl.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A548

Google Street View Image—Looking East Along A548

Access C3

Coordinates

Easting: 303636.55

Northing: 382448.975

Access Requirement

Access to HDD alignment within Robin Hood Holiday Camp for personnel to monitor HDD progress.

Access Description

Use of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto A548 at Rhyl.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A548

Google Street View Image—Looking East Along A548

Access D

Coordinates

Easting: 303888.0388

Northing: 381231.979

Access Requirement

Access to off route haul road to Landfall HDD Zone, north of B5119.

Access Description

Reuse / upgrade of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547 then B5119.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Dyserth Road (B5119)

Google Street View Image—Looking East Along Dyserth Road (B5119)

Access E

Coordinates

Easting: 303618.93

Northing: 381247.29

Access Requirement

Access to cable route north of B5119 or haul road crossing of road if not direct access to be taken.

Access Description

Actual access location still to be finalised—may be 100m to east / west of shown location.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547 then B5119.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Dyserth Road (B5119)

Google Street View Image—Looking East Along Dyserth Road (B5119)

Access F

Coordinates

Easting: 303525.52

Northing: 381288.495

Access Requirement

Access to cable route south of B5119 - Access F or G to be used, not both, or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised - possible upgrade of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547 then B5119.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Dyserth Road (B5119)

Google Street View Image—Looking East Along Dyserth Road (B5119)

Access G

Coordinates

Easting: 303733.19

Northing: 381197.32

Access Requirement

Access to cable route south of B5119 - Access F or G to be used, not both, or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised - possible upgrade of existing access.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547 then B5119.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Dyserth Road (B5119)

Google Street View Image—Looking East Along Dyserth Road (B5119)

Access H

Coordinates

Easting: 302607.13

Northing: 379101.125

Access Requirement

Access to cable route east of A525.

Access Description

Actual access location still to be finalised - existing farm access could be upgraded.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking North West Along A547

Google Street View Image—Looking South East Along A547

Access I1

Coordinates

Easting: 302444.763

Northing: 379345.223

Access Requirement

Access to cable route west of A525.

Access Description

Actual access location still to be finalised - existing farm access could be upgraded or new access off minor road to the north. I1 or I2 required, not both.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking North Along A525

Google Street View Image—Looking South Along A525

Access I2

Coordinates

Easting: 302375.535

Northing: 379345.685

Access Requirement

Access to cable route west of A525.

Access Description

Actual access location still to be finalised - existing farm access could be upgraded or new access off minor road to the north. I1 or I2 required, not both.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then onto minor road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Minor Road

Google Street View Image—Looking South Along Minor Road

Access J

Coordinates

Easting: 301134.1716

Northing: 377730.586

Access Requirement

Access cable route north of A547 or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A547

Google Street View Image—Looking East Along A547

Access K

Coordinates

Easting: 301138.73

Northing: 377716.2137

Access Requirement

Access to cable route south of A547 or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised - existing farm access could be upgraded.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then A547.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along A547

Google Street View Image—Looking East Along A547

Access L

Coordinates

Easting: 301458.9512

Northing: 376762.0796

Access Requirement

Access to cable route north of Sarn Lane / Rhuddlan Road or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then Sarn Lane / Rhuddlan Road.

OR

Off A55 at Junction 25 onto Sarn Lane / Rhuddlan Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Sarn Lane

Google Street View Image—Looking East Along Sarn Lane

Access M

Coordinates

Easting: 301405.335

Northing: 376719.595

Access Requirement

Access to cable route South of Sarn Lane / Rhuddlan Road or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised - existing farm access could be upgraded.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then Sarn Lane / Rhuddlan Road.

OR

Off A55 at Junction 25 onto Sarn Lane / Rhuddlan Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Sarn Lane

Google Street View Image—Looking East Along Sarn Lane

Access N

Coordinates

Easting: 301585.31

Northing: 375007.45

Access Requirement

Possible access to cable route from minor farm access off Junction 26 of A55'

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 26 then onto minor farm access road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking North Towards Access N

Google Street View Image—Looking South From Access N

Access O

Coordinates

Easting: 300780.6883

Northing: 373915.6258

Access Requirement

Access to cable route north of B5381 or haul road crossing of road if no direct access to be taken. Substation permanent access may be taken from this location.

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 26, onto Ffordd William Morgan then B5381 Glascoed Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Glascoed Road (B5381)

Google Street View Image—Looking East Along Glascoed Road (B5381)

Access P

Coordinates

Easting: 300780.3684

Northing: 373907.5268

Access Requirement

Access to cable route south of B5381 or haul road crossing of road if no direct access to be taken.

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 26, onto Ffordd William Morgan then B5381 Glascoed Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Glascoed Road (B5381)

Google Street View Image—Looking East Along Glascoed Road (B5381)

Access Q

Coordinates

Easting: 302109.4608

Northing: 373903.2261

Access Requirement

Access to National Grid construction zone.

Access Description

Reuse of existing Gwynt Y Môr Permanent Access Road.

Initial Traffic Routeing from A55

Off A55 at Junction 26, onto Ffordd William Morgan then B5381 Glascoed Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

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Google Street View Image—Looking West Along Glascoed Road (B5381)

Google Street View Image—Looking East Along Glascoed Road (B5381)

Access R

Coordinates

Easting: 302052.38

Northing: 378123.28

Access Requirement

Access to southern side of Afon Ffyddion for construction of bridge over watercourse only.

Access Description

Reuse of existing access to sewage works. Access for equipment to construct haul road bridge across Afon Ffyddion only. Not for general site access/egress.

Initial Traffic Routeing from A55

Off A55 at Junction 27 onto A525 then Station Road and Tan-yr-eglwys Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking East from Access R

Google Street View Image—Looking North West Towards Access R from Tyn-yr-eglwys Road

Access S

Coordinates

Easting: 301103.6470

Northing: 373914.3676

Access Requirement

Substation permanent access may be taken from this location.

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 26, onto Ffordd William Morgan then B5381 Glascoed Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking West Along Glascoed Road (B5381)

Google Street View Image—Looking East Along Glascoed Road (B5381)

Access T

Coordinates

Easting: 301443.5074

Northing: 374756.3006

Access Requirement

Substation permanent access may be taken from this location.

Access Description

Actual access location still to be finalised.

Initial Traffic Routeing from A55

Off A55 at Junction 26, onto Ffordd William Morgan then Minor Road.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking North West Along Ffordd William Morgan Towards Minor Road Junction

Google Street View Image—Looking South Along Ffordd William Morgan Towards Minor Road Junction

Crossing A

Coordinates

Easting: 303323.5335

Northing: 379842.1978

Access Requirement

Haul Road crossing of Pentre Lane.

Access Description

Actual haul road crossing location still to be finalised.

Initial Traffic Routeing from A55

N/A - Crossing of road only.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Wardell Armstrong Site Photo—Looking North East Along Pentre Lane

Crossing B

Coordinates

Easting: 303135.5689

Northing: 379563.3272

Access Requirement

Haul Road crossing of Pentre Lane.

Access Description

Actual haul road crossing location still to be finalised.

Initial Traffic Routeing from A55

N/A - Crossing of road only.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking North Along Pentre Lane

Google Street View Image—Looking South Along Pentre Lane

Crossing C

Coordinates

Easting: 301435.2248

Northing: 376510.3737

Access Requirement

Haul Road Crossing of Nant -Y-Faenol Road.

Access Description

Actual haul road crossing location still to be finalised.

Initial Traffic Routeing from A55

N/A - Crossing of road only.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking West Along Nant-Y-Faenol Road

Google Street View Image—Looking East Along Nant-Y-Faenol Road

Crossing D

Coordinates

Easting: 300939.8536

Northing: 373583.8753

Access Requirement

Haul Road Crossing of minor road.

Access Description

Actual haul road crossing location still to be finalised.

Initial Traffic Routeing from A55

N/A - Crossing of road only.

Left: Overall Cable Route Access Locations With Subject Access Highlighted / Above: Access Location Plan

Project Red Line Boundary Shown As Brown Hatch

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Google Street View Image—Looking North Along Minor Road

Google Street View Image—Looking South Along Minor Road

Topic guide for stakeholder consultations

1.1 Hatch has been appointed to carry out the socio-economic and tourism and recreation assessments for the proposed Awel y Môr Offshore Wind Farm development, to feed into the Preliminary Environmental Information Report (PEIR) and subsequent Environmental Statement.

1.2 This work will:

- analyse the direct, indirect and induced economic impacts arising from the construction, operation and decommissioning phases of the proposed development
- explore wider impacts, including opportunities for local people to gain employment as a result of the proposed development, and the impacts of the proposed development on local infrastructure
- assess the potential impact on tourism and both onshore and offshore recreation activities, as a result of direct and indirect effects of the construction, operations and decommissioning phases of the proposed development.

1.3 As part of this process, we are keen to speak to local authority economic development, tourism and leisure/recreation managers to better understand:

- the scale and nature of the existing wind energy supply chain which might benefit from the additional activity
- whether there are complementary business / skills development schemes being delivered in the area
- whether you believe there will be any impacts on the tourism sector
- whether you believe there will be any impacts on offshore recreation activity in the area.

Questions

Socio-economics

2) What are the key strengths of the local wind energy supply chain in this area, and where do you expect to see growth in the coming years?

3) How successful have local companies been in recent years in winning contracts for offshore wind farm construction / operations activities?

4) Are there particular firms in the area that are very well placed to win such contracts? Which companies are these, and which parts of the wind energy supply chain do they support?

5) How important do you feel local offshore wind developments such as Awel y Môr are, to the growth opportunities for wind energy supply chain firms in this area?

6) What do you feel are the challenges for local firms in securing contracts for activity relating to construction / operations activities for the development? Is there anything more that you feel the developer could do to increase local sourcing?

7) Are you aware of any recent research into the scale of the local renewables (and especially wind energy) sector in this area and its future growth projections?

8) Do you feel that there are sufficient suitably skilled people in the area to be able to secure jobs created by new construction or operations phase activities generated by this development?

9) Are you aware of other schemes operating in the area to support growth of this sector e.g. business support, specific college courses, apprenticeship schemes etc?

Tourism

10) Are you aware of particular concerns in the local tourism sector regarding offshore wind developments? What do these concerns particularly relate to?

11) Are you aware of any impacts on local tourism of the existing Gwynt y Môr offshore wind farm?

12) Are you aware of any local research that has been done regarding the impacts of offshore wind developments on local tourism?

13) Do you have particular concerns about impacts on local tourism during the construction phase of the project?

14) Do you have particular concerns about impacts on local tourism during the c.25-year operational phase of the project?

15) Is there anything that you feel that could be done in order to minimise / mitigate any negative impacts of the development on local tourism activity?

Offshore recreation

16) Could you describe the nature of any offshore recreational activity you are aware of which may use the Awel y Môr offshore area, or which might be affected by wind farm construction or operational phases?

- Are you aware of any particular concerns relating to impacts of the construction or operational phases of the offshore wind farm on offshore recreational activity?

17) Are there any specific organisations or user groups you are aware of in this local authority area which you would recommend us to consult with.

18) Are you aware of any negative impacts from the construction or operational phases of the Gwynt y Môr or other offshore wind farms on local offshore recreational activity?

.Technical Note: Electro-Magnetic Fields

Awel y Môr Offshore Windfarm

4th June 2021

Summary

This note has been prepared by SLR Consulting Ltd (SLR) and is provided to inform consultees of the approach the Awel y Mor Offshore Wind Farm (AyM OWF), proposes to take with regard to the assessment of Electro-Magnetic Fields (EMF) within the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

The Purpose of this note is to provide an update on the selection of a preferred corridor for the transmission infrastructure and to seek agreement from Public Health Wales (PHW), Public Health England (PHE) and Denbighshire County Council (DCC) for the proposed approach and preliminary findings to the assessment of EMF.

In line with NPS EN-5 (DECC, 2011), the electrical infrastructure will be designed to comply with current guidelines on levels of public exposure and design of electrical infrastructure. It is also important to note that the project have made an active design decision to bury all electrical cable infrastructure.

As set out below, the selected Onshore Export Cable Corridor does not contain any residential properties and all transmission infrastructure will be placed underground. As ground-level magnetic fields from underground cables fall much more rapidly with distance than those from a corresponding overhead line, the AyM OWF Onshore Export Cable Corridor estimated levels are not anticipated to exceed guidance levels established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). As the onshore transmission elements of the AyM OWF are anticipated to be compliant with ICNIRP guidelines, and hence with Public Health England recommendations and Government policy, the anticipated effect of EMF is predicted to be negligible.

Project Background

In February 2021 RWE announced a preferred corridor for the transmission infrastructure associated with the AyM OWF. Prior to the selection of a preferred route, the project had considered a number of landfall, cable routing and substation siting options.

Taking on board valuable feedback received during public consultation in November 2020 along with technical and environmental studies and statutory stakeholder consultation, RWE has been able to select a preferred corridor for the transmission infrastructure. This is the route within which AYM OWF's electricity cables and substation would be located.

The Preferred route would start at the offshore wind farm out at sea and end at the substation near St Asaph business park where the electricity would feed into the National Grid. The eastern offshore cable corridor which runs between the existing Gwynt y Môr and Rhyl Flats cables has been selected. These cables would meet the land east of Rhyl and travel west of Rhuddlan and then south to St Asaph. The preferred substation zone is located west of the National Grid's existing 400kV substation at St Asaph.

EIA Scoping and Consultation

A Formal request for an EIA Scoping Opinion was provided to the Planning Inspectorate (PINS), on the 11 June 2020, with a subsequent Scoping Opinion provided in July 2020 by the Inspectorate on behalf of the Secretary of State in respect of the Proposed Development. EIA Scoping was undertaken at a stage when the landfall, cable route and substation were undetermined and so an opinion was sought on the basis of an onshore Search Area.

The onshore Search Area extended from Prestatyn in the east to Penrhyn Bay in the west and extended south to include St Asaph.

Although the location of transmission infrastructure was not determined, the EIA Scoping Request made reference to International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines and, through project design, committed to comply with current guidelines on levels of public exposure and design of electrical infrastructure. As such, the EIA Scoping Request proposed that the impact would be of negligible magnitude and would not result in significant effects in EIA terms such that it was intended to scope the onshore impact of EMF during operation of the AyM OWF out of further consideration within the EIA.

In response, PINS did not consider that sufficient evidence had been provided within the Scoping Request to support scoping these matters out from the assessment. PINS advised that the Applicant should make effort to agree the approach to the assessment with relevant consultation bodies ensuring that the assessment is both proportionate and robust.

The proposed approach to the assessment of EMF was discussed during the Human Environment Expert Topic Group (ETG), meeting on the 29th September 2020. During the meeting it was confirmed that a technical note would be provided against the final preferred route with a focus on EMF with reference to ICNIRP guidelines with an aim to scope EMF out of assessment within the EIA.

This note responds to this advice from PINS and sets out the proposed approach to assessment in order to seek agreement from PHW), PHE and DCC.

Policy and Guidance

There are no statutory regulations in the UK with regard to exposure to EMF. However, in 2004 the UK Government adopted guidelines published in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP, 1998) in accordance with the terms of the 1999 EU Council recommendation on limiting public exposure to EMF (EU, 1999). The criteria establish acceptable limits for exposure of the public to EMF that adopt a precautionary approach taking into account various scenarios and potentially more vulnerable groups (such as infants).

Whilst there are no statutory regulations in the UK that limit the exposure of people to power-frequency EMF, responsibility for implementing appropriate measures for the protection of the public lies with the UK Government, who have a clear policy, restated in October 2009 (Department of Health, 2009) and incorporated in NPS EN-5 (DECC, 2011), on the exposure limits and other policies they expect to see applied. It is important to note however that whilst reference is made to EN-5 insofar as it relates to electrical infrastructure the AyM OWF project has been actively designed to avoid overhead lines and the associated effects by committing to underground all electrical cable infrastructure. Practical details on EMF exposure limits, appropriate design of electrical infrastructure and how the policy is to be implemented are contained in Codes of Practice (see below) agreed between industry and Government. This guidance is referenced by Public Health England within it's position paper on 'NSIP Planning Statement on Electromagnetic fields', which has also been adopted by Public Health Wales:

- Power Lines: Demonstrating compliance with EMF public exposure guidelines – a Voluntary Code of Practice (DECC, March 2012a);
- Optimum Phasing of high voltage double-circuit Power Lines – a Voluntary Code of Practice (DECC, 2012b); and
- Power Lines: Control of microshocks and other indirect effects of public exposure to electric fields - a Voluntary Code of Practice (DECC, July 2013).

Government, in turn, acts on the scientific advice from Public Health England, which has responsibility for advising on non-ionising radiation protection, including power frequency fields.

The ICNIRP guidance, to which the UK Government policy follows, outlines two categories of public exposure levels, 'reference levels' and 'basic restriction' levels. The ICNIRP 'reference levels' for the public are:

- 100 microteslas (µT) for magnetic fields; and
- 5 kilovolts (kV) per metre for electric fields.

While the ICNIRP 'basic restriction' for levels of public exposure are higher at:

- 360 µT for magnetic fields; and
- 9 kV per metre for electric fields.

In the ICNIRP guidelines and the EU Recommendation, the actual limit is the basic restriction. The reference levels are not limits, but are guides to when detailed investigation of compliance with the actual limit, the basic restriction, is required. If the reference level is not exceeded, the basic restriction cannot be exceeded and no further investigation is needed. If the reference level is exceeded, the basic restriction may or may not be exceeded.

If the fields produced by an item of equipment are lower than 9 kV/m and 360 µT, the fields corresponding to the ICNIRP basic restriction, it is compliant with the ICNIRP guidelines and hence with Public Health England recommendations and Government policy. If the fields are greater than these values, it is still compliant with Government policy if the land use falls outside the residential and other uses specified in the Code of Practice (DECC, 2012a) and it may still be compliant if the fields are non- uniform.

Onshore Export Cable Corridor

Following the selection of a preferred route in Feb 2021, RWE has continued to optimise the cable routing proposals and has identified an Onshore Export Cable Corridor (onshore ECC). The ECC is approximately 100m wide and runs from landfall southwards to the proposed substation near St Asaph business park. From the proposed substation the ECC continues south eastwards and connects the proposed substation to the existing 400kV National Grid substation which is located to the south of St Asaph Busines Park.

A series of PDF mapsheets showing the landfall location, onshore ECC and substation locations are provided alongside this note.

The landfall location for AyM OWF is proposed to be between Rhyl and Prestatyn. The landfall denotes the location where the offshore cables are brought ashore and jointed to the onshore cables within Transition Joint Bays that would be located either within land formally designated as Rhyl Golf club, or to the south of the Railway (North Wales Coast Line).

The ECC will comprise approximately 14km of underground cable, connecting the Transition joint Bays to the proposed substation, that will comprise of 1 or 2 circuits with a voltage rating of up to 400KV. Each circuit will consist of 3 onshore power cables (one power core for each phase), each approximately 150 mm in diameter. The power cables will be installed in individual lengths varying from c.500 m to c.1000 m and then jointed. Each circuit will typically have three main ducts, one for each electrical cable. In addition, each circuit will include communications cables and an earth cable.

The cable circuits will be buried with a minimum Depth of Burial (DOB) from the original ground level to the top of the duct of 0.6m and a maximum DOB of 1.64m. In many places along the ECC, a trenchless technique such as Horizontal Directional Drilling (HDD) will be used to pass beneath features such as roads, watercourses and large woodlands. HDD depth is typically 20m. HDD will be used to pass beneath the Robin Hood Holiday Park caravan site that is located near the Landfall.

The cable circuits will be separated from each other to prevent heat build-up which increases resistivity in the cables and reduces transmission efficiency. Each circuit will typically be installed in individual trenches with a typical separation distance of 3.5 m centre-to-centre (separation distance is dependent on cable depth and

surrounding ground conditions). For the purpose of this technical note, it is assumed that the cable circuits could be located anywhere within the 100m ECC.

In line with NPS EN-5 (DECC, 2011), the electrical infrastructure will be designed to comply with current guidelines on levels of public exposure and design of electrical infrastructure. It is also important to note that the project have made an active design decision to bury all electrical cable infrastructure.

Potential Receptors

In routing the ECC, RWE has sought to avoid residential properties and there are no residential properties located within the 100m wide ECC. Table 1 lists the residential properties within 50m of the ECC:

Table 1 – Residential properties within 50m of the ECC

Receptor	Grid Reference	Distance to ECC	Observations
Bryn Celyn Collages	303155, 379702	43m	
Bryn y Wal Children's Home	302848, 379393	37m	
Cwbr-bach	302520, 379319	16m	ECC will be via HDD at this point so cable will be at greater depth
Plas Lorna Care Home	302594, 379213	6m	ECC will be via HDD at this point so cable will be at greater depth
Glanywern	301669, 376430	33m	ECC will be via HDD at this point so cable will be at greater depth
Faenol-Bropor Farmhouse	301292, 374778	12m	
Gwelfryn	300648, 373886	37m	

In addition, the ECC includes areas of the Robin Hood Holiday park which comprises static caravans next to the landfall area. Although within the ECC, it is proposed to use HDD in order to pass beneath the caravan park at a depth of 10 to 20m below ground level. The ECC also intersects with a number of Public Rights of Way.

The nearest residential property to the proposed substation is approximately 350m to the south west (Gwelfryn).

Consideration of potential impacts

The transport of electricity through the cables has the potential to emit a localised electromagnetic radiation which could potentially affect public health depending on vulnerability, levels of EMF and exposure time.

All onshore infrastructure built as part of AyM OWF will comply with the government guidelines on electromagnetic radiation emission. The following section sets out how maximum magnetic field values are all below the 'reference levels' and significantly below the 'basic restriction' of the ICNIRP guidance exposure levels.

Studies on human health impacts caused by exposure to electromagnetic radiation suggest there may be an increased risk of Alzheimer's disease and childhood leukaemia due to higher than usual magnetic field exposures in homes, some of which are near to large above ground powerlines. However, the balance of evidence is towards no effects and there is no known mechanism or clear experimental evidence to explain how these effects might happen (Public Health England, 2013).

Electric fields depend on the operating voltage of the equipment producing them and are measured in V/m (volts per metre). The operating voltage of most equipment is a relatively constant value. Electric fields are shielded by most common building materials, trees, and fences, and diminish rapidly with distance from the source.

As a consequence of their design, some types of equipment do not produce an external electric field. This applies to underground cables and gas insulated switchgear (GIS), which are enclosed in a metal sheath (a protective metal layer within the cable) and have solid metal enclosures respectively.

As the ECC will comprise underground cables, it is proposed to scope out the consideration of potential impacts from electric fields from further assessment.

Magnetic fields are measured in µT (microtesla) and depend on the electrical currents flowing, which vary according to the electrical power requirements at any given time. They are not significantly shielded by most common building materials or trees but do diminish rapidly with distance from the source.

The strength of the magnetic field decreases rapidly horizontally and vertically with distance from source. Objects such as trees, buildings and earth will reduce the strength further still.

National Grid provides the following information with regards the magnetic fields for buried underground cables and substation via the website:

https://www.emfs.info/[1]

The website provides maximum and typical magnetic field value for 400kV underground cables at a point 1m above ground levels for three main types of undergound cable:

- Trough: the separate cores of the cable are in a concrete trough, typically only 0.3 m or less below ground, but also only 0.15 m apart
- Direct buried: the separate cores of the cable are laid directly in the ground, typically 1 m below ground and 0.3-0.5 m apart
- Tunnel: the cable is carried in a tunnel typically 20 m below ground

The AyM OWF ECC will utilise a combination of direct buried cable and Tunnel (HDD) cable.

The maximum magnetic field that is typically produced by a single circuit direct buried underground 400kV HVAC cable is estimated at 96.17 µT directly over the cable, dropping to 13.05 µT at 5m from the cable centreline, and further to 3.58 µT at 10m from the cable centreline. These maximum magnetic field values are all below the 'reference levels' and significantly below the 'basic restriction' of the ICNIRP guidance exposure levels.

The typical magnetic field values for a 400kV Direct buried underground cable are considerably lower at 24.06 µT directly over the cable, dropping to 3.26 µT at 5m from the cable centreline, and further to 0.9 µT at 10m from the cable centreline. The typical magnetic field values are significantly below both the 'reference levels' and the 'basic restriction' of the ICNIRP guidance exposure levels.

The nearest residential receptor will be at least 12m from the edge of the ECC. As the anticipated magnetic field levels are lower than 9 kV/m and 360 µT, the fields corresponding to the ICNIRP basic restriction, the AyM OWF ECC is compliant with the ICNIRP guidelines and hence with Public Health England recommendations and UK Government policy.

Alternative data sources also indicate that magnetic field strength from a typical 400 kV cable buried at 1 m below ground would be over 30 µT at ground level directly over the cable, falling to 10 µT at 2 m above the ground (lower for lower voltages) (ICF, 2003).

[1] Accessed 5th April 2021

With regard to caravan users at the Robin Hood holiday Park, the cables will be installed via HDD at an anticipated depth of 10 to 20m below ground level. As such, the conductors cannot be approached closely by members of the public, and the magnetic field at the surface is much reduced, lower than an equivalent overhead line and often lower than background fields from other sources.

Fields from substations are usually measured rather than calculated. Calculations are not usually feasible because of the complex geometry of the current paths within a substation. At the perimeter fence of a large, high-voltage substation, the highest fields are invariably produced by overhead lines or underground cables entering the substation. Away from these lines and cables, the field would normally be below 1µT. The nearest residential receptor to the substation zone is 350m to the south west.

In conclusion, all infrastructure built will comply with the government guidelines on electromagnetic radiation emission (ICNIRP, 1998; DECC, 2012a; DECC, 2012b; ENA, 2017). The embedded mitigation in place as well as no conclusive scientific evidence relating EMF and certain health effects leads to the magnitude of impact to be deemed as Negligible.

References

- Department of Energy and Climate Change (DECC) (2011), 'National Policy Statement (NPS) for Electricity Network Infrastructure (EN-5)'.
- Department of Health (2009), 'Government response to the stakeholder advisory group on extremely low frequency electric and magnetic fields (ELF EMFs) (SAGE) recommendations'.
- Department of Energy and Climate Change (DECC) (2012a), 'Power Lines: Demonstrating compliance with EMF public exposure guidelines – a Voluntary Code of Practice (document dated March 2012 replacing document with the same title dated February 2011)'.
- Department of Energy and Climate Change (DECC) (2012b), 'Optimum Phasing of high voltage double-circuit Power Lines – a Voluntary Code of Practice'.
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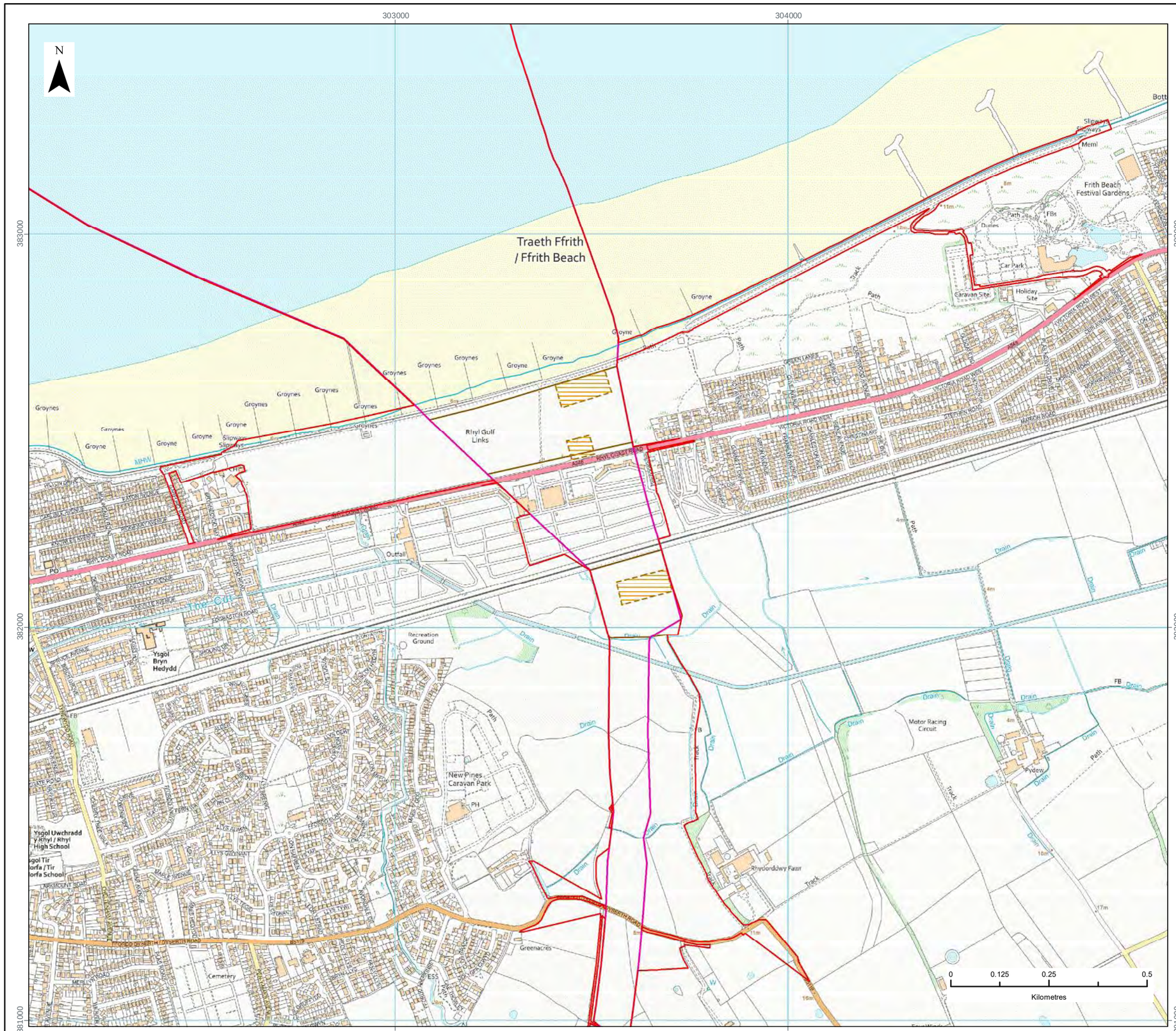
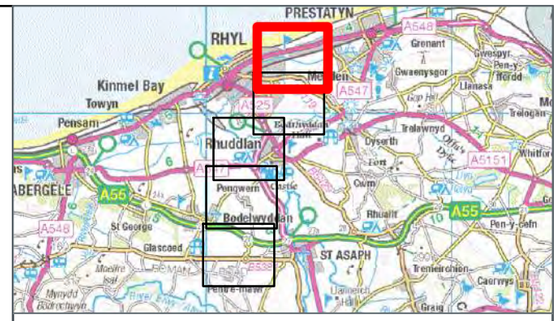
- ICF Consulting Ltd (2003) Overview of the Potential for Undergrounding the Electricity Networks in Europe. Prepared for the DG TREN/ European Commission. https://ec.europa.eu/energy/sites/ener/files/documents/2003_02_underground_cable s_icf.pdf [Accessed: May 2018]
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998), 'Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)'. *Health Phys*, 74: 494-522.
- Energy Networks Association (ENA) (2017), EMFs The Facts. http://www.emfs.info/wp-content/uploads/2017/09/EMF_The_Facts_250917.pdf [Accessed: May 2018].





LEGEND

- Red Line Boundary
- Proposed Onshore Export Cable Corridor 100m
- Proposed Horizontal Direction Drilling Compound

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

DRAWING TITLE:

ONSHORE INFRASTRUCTURE OVERVIEW

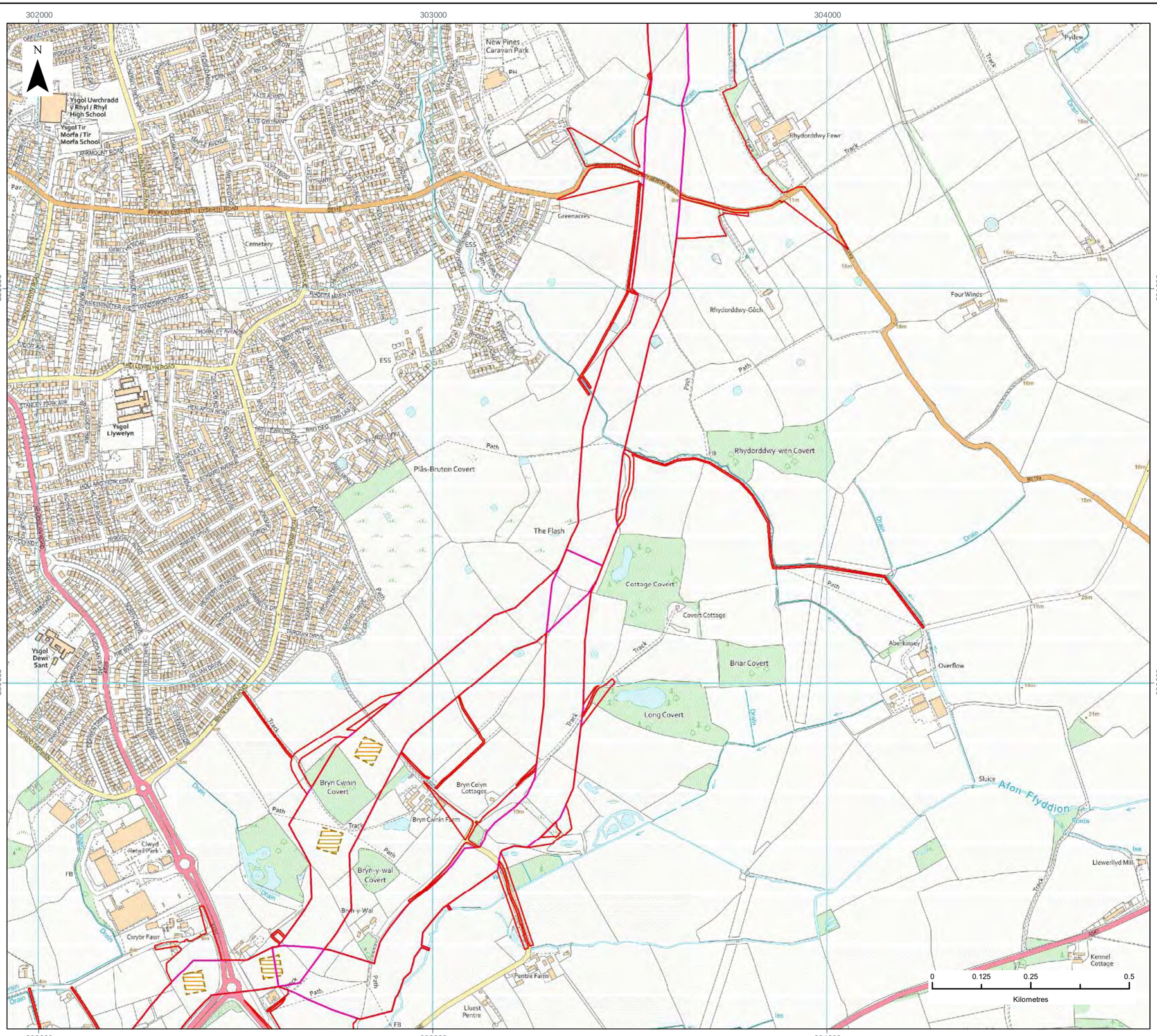
VER	DATE	REMARKS	Drawn	Checked
1	05/05/2021	Draft	JRS	MF

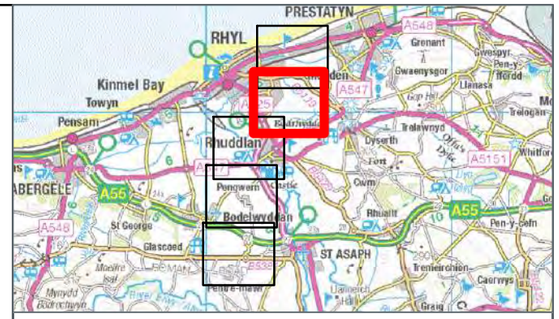
FIGURE NUMBER:

1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm





LEGEND

- Red Line Boundary
- Proposed Onshore Export Cable Corridor 100m
- Proposed Horizontal Direction Drilling Compound

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

DRAWING TITLE:

ONSHORE INFRASTRUCTURE OVERVIEW

VER	DATE	REMARKS	Drawn	Checked
1	05/05/2021	Draft	JRS	MF

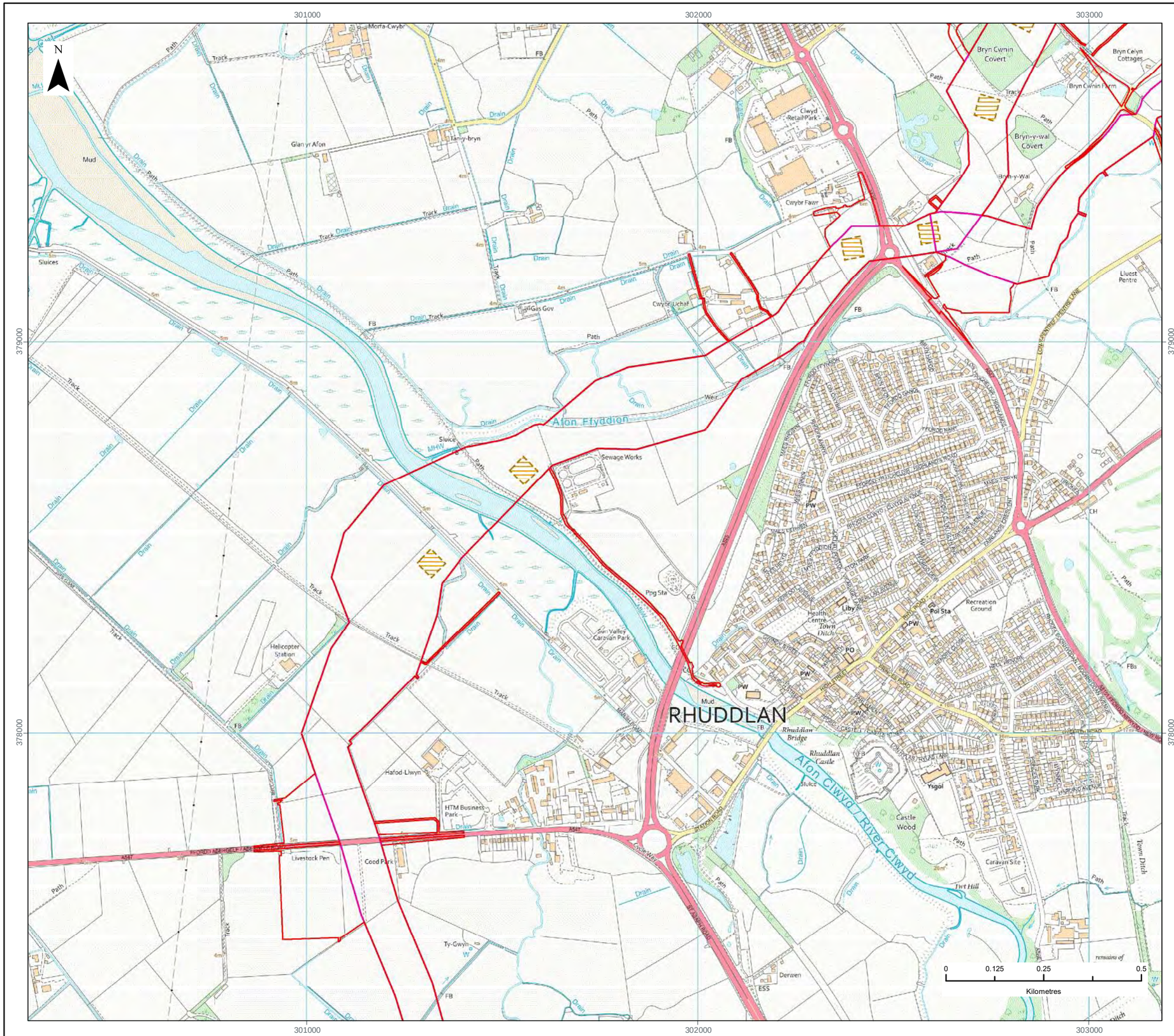
FIGURE NUMBER:

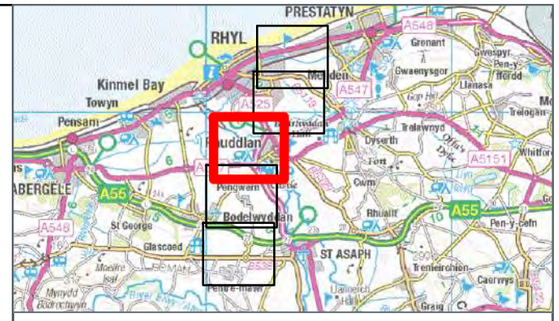
1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

\\gisfs1\GI\Projects\05356 - GoBe Consultants Ltd\00009 Awel y Mor\Tech\GIS\Dwgs\Wking\202103 Onshore Infrastructure\05356.00009.0117.0 Infrastructure Overview - EMF Variation Activity.mxd





LEGEND

- Red Line Boundary
- Proposed Onshore Export Cable Corridor 100m
- Proposed Horizontal Direction Drilling Compound

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

DRAWING TITLE:

ONSHORE INFRASTRUCTURE OVERVIEW

VER	DATE	REMARKS	Drawn	Checked
1	05/05/2021	Draft	JRS	MF

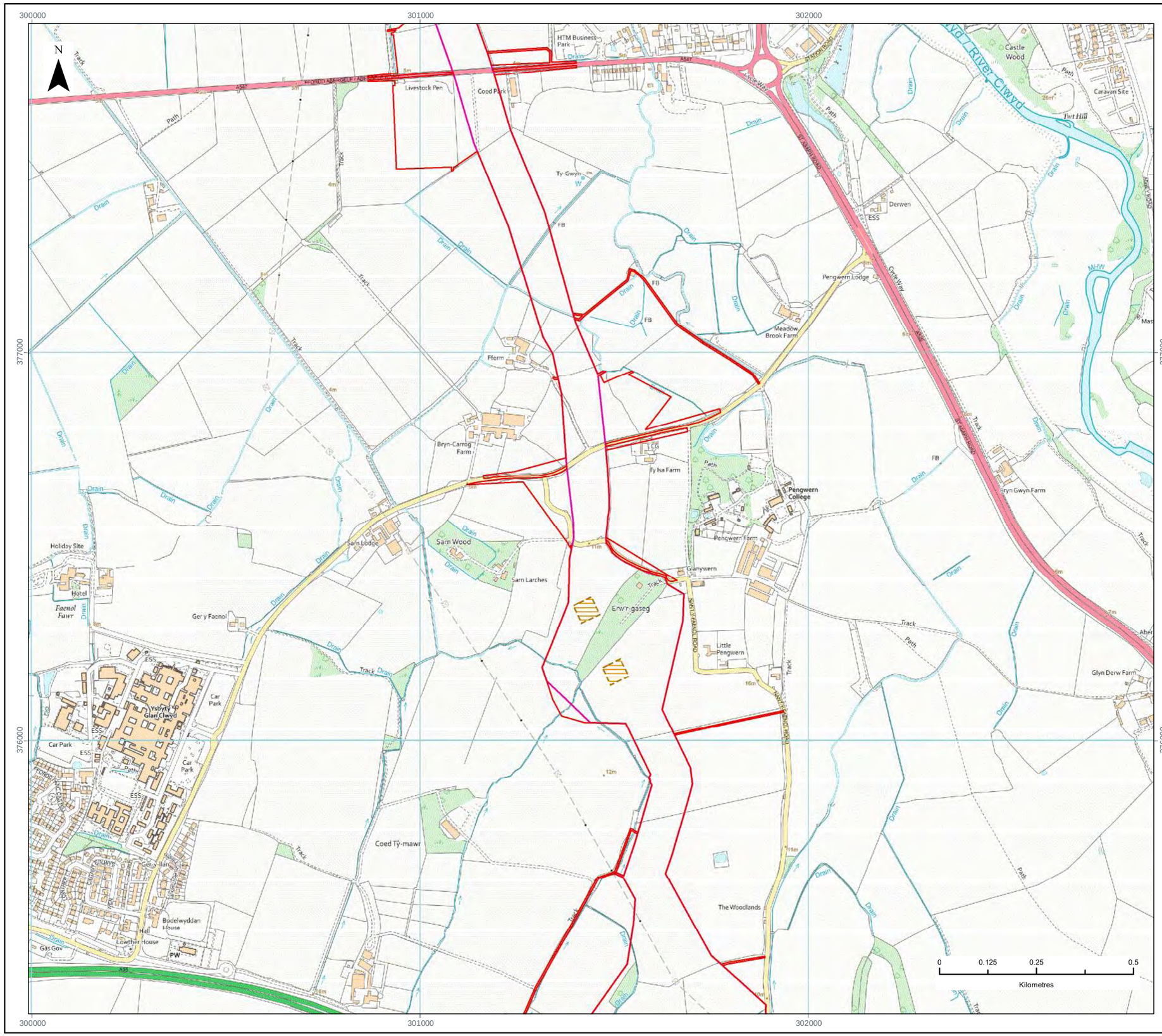
FIGURE NUMBER:

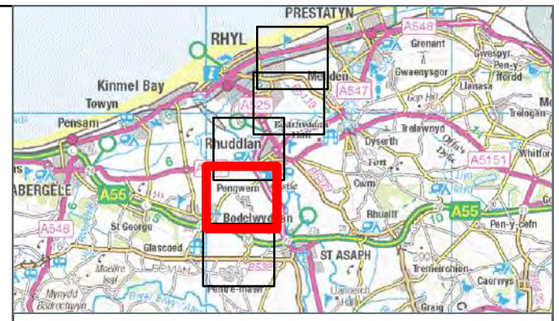
1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

\\gisfs1\G\Projects\05356 - GoBe Consultants Ltd\00009 Awel y Mor\Tech\GIS\Dwgs\Wking\202103 Onshore Infrastructure\05356.00009.0117.0 Infrastructure Overview - EMF Variation Activity.mxd





LEGEND

- Red Line Boundary
- Proposed Onshore Export Cable Corridor 100m
- Proposed Horizontal Direction Drilling Compound

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

DRAWING TITLE:

ONSHORE INFRASTRUCTURE OVERVIEW

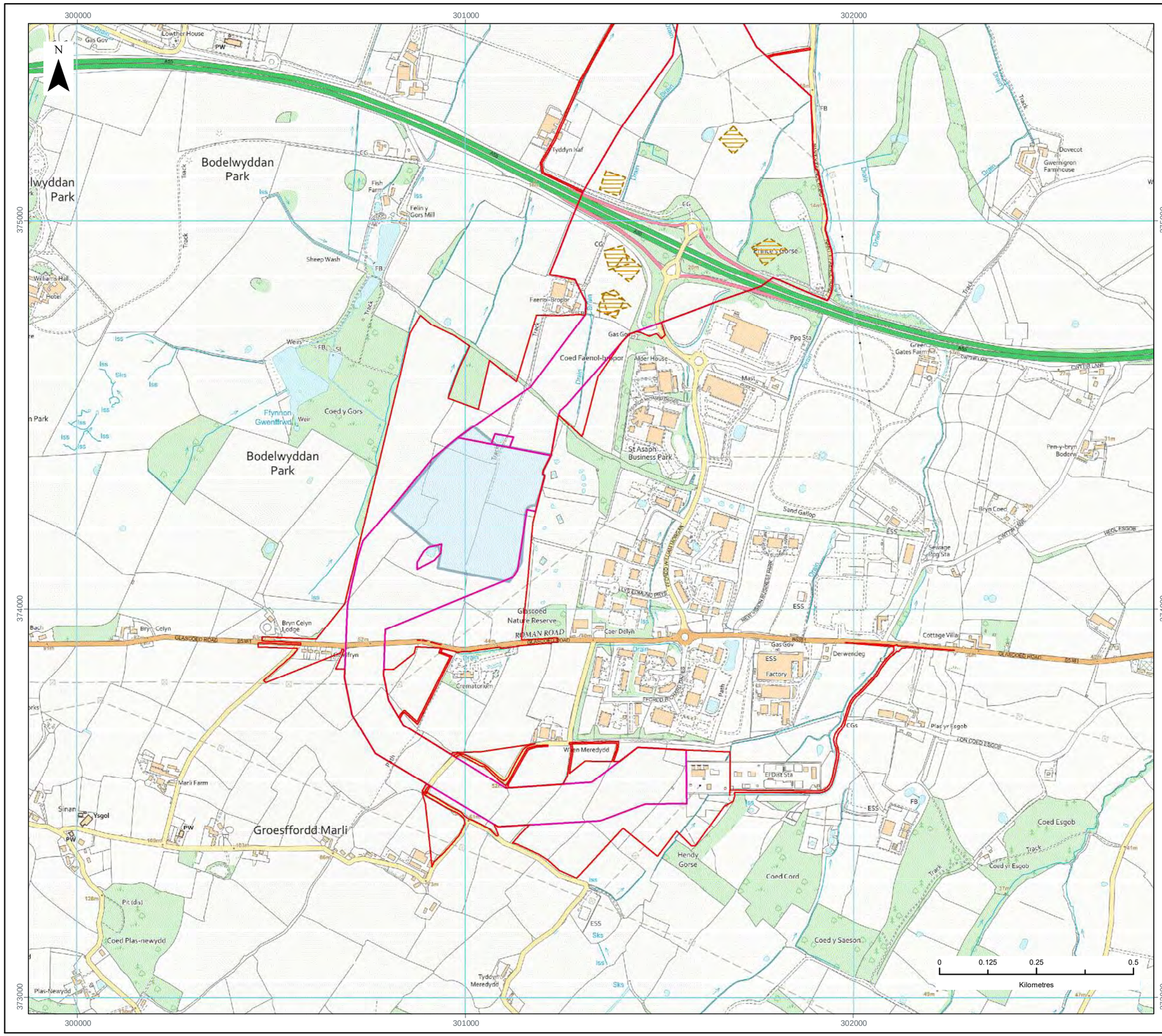
VER	DATE	REMARKS	Drawn	Checked
1	05/05/2021	Draft	JRS	MF

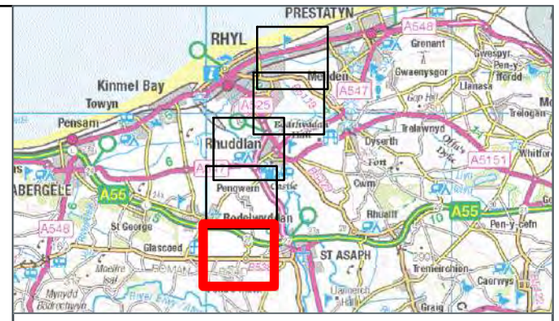
FIGURE NUMBER:

1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm





LEGEND

- Red Line Boundary
- Proposed Onshore Export Cable Corridor 100m
- Proposed Horizontal Direction Drilling Compound
- Proposed Substation Zone

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

DRAWING TITLE:

ONSHORE INFRASTRUCTURE OVERVIEW

VER	DATE	REMARKS	Drawn	Checked
1	05/05/2021	Draft	JRS	MF

FIGURE NUMBER:

1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:10,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

2 Appendix E: Correspondence

From:	Cooper, Adam
To:	Ryan McManus; awelymor@rwe.com
Cc:	Sean Leake; Thomas, Helen; Fraser Carter; [redacted] Carter, Paul; [redacted]; Stephens, Nia
Subject:	RE: AyM Offshore Ornithology ETG - Documents for information and review
Date:	14 December 2020 11:52:08
Attachments:	image001.png image002.png image003.png image004.png

Hi Ryan

We have reviewed the meeting minutes (of 13/11/2020) and the red throated diver note and we have no suggested alterations or comments on either.

Thanks
Adam

Adam Cooper

Uwch Gynghorydd Morol (Rhaglen Ynni Adnewyddadwy ar y Môr)
Senior Marine Advisor (Offshore Renewable Energy Programme)
Cyfoeth Naturiol Cymru / Natural Resources Wales
0300 065 3219 / 07773 040293
Dysgwr Cymraeg
www.cyfoethnaturiol.cymru / www.naturalresources.wales
Yn falch o arwain y ffordd at ddyfodol gwell i Gymru trwy reoli'r amgylchedd ac adnoddau naturiol yn gynaliadwy.
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Ffoniwch ni ar **03000 65 3000** (24-awr) i roi gwybod am ddigwyddiadau amgylcheddol / Call us on **03000 65 3000** (24-hour) to report environmental incidents

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From: Ryan McManus <[redacted]>
Sent: 27 November 2020 16:41
To: awelymor@rwe.com
Cc: Sean Leake [redacted]; Thomas, Helen <[redacted]>; Fraser Carter [redacted]
Subject: AyM Offshore Ornithology ETG - Documents for information and review

Dear offshore ornithology ETG members,

Thank you for your continued engagement with us on this project. Following the HRA focused ornithology meeting on 13th November, attached are a few documents for your information and/or review. Where focus on a particular stakeholder is anticipated, this is described below, but in the interest of transparency, all documents are provided to all members of this ETG.

Proposed timescales below are indicative of a 2 week review cycle for minutes, and a 3 week review cycle for other documents and position papers. However, if additional time is required, please get in touch. Follow up meetings will be arranged in the new year where necessary, prior to the drafting period for the main PEIR documentation.

Kind regards,
Ryan

Document	**File name**	**Purpose/action**	**Expected review timescale**
Draft minutes from November HRA meeting	AyM-Minute-HRA ETG_131120	For comment/ approval.	14/12/2020
Red-throated diver technical note	P4817_APEM Note on RTD for Awel y Mor_271120	For information/ comment. It is expected that this document has most relevance to NRW (Matty Murphy), however any comments are welcome from other attendees.	21/12/2020
Cumulative effects assessment methodology and long list	0141_AyM_PEIR_Annex_CEA_Final	For information/ comment. It is anticipated that this document be most relevant to NRW and local planning authorities, with wider context for other ETG members. However, comments are welcome from all members.	The CEA long list has already been provided to NRW, with comment sought by 21/12/2020.
Final minutes from September	AyM_ETG2_Minutes_180920	For information.	N/A Final minutes as agreed.

ETG meeting			
HRA offshore ornithology presentation	AYM Nov HRA Offshore Ornithology - Final	Copy of the presentation given on 13/11/202 for in formation.	N/A Presentation as given.
Evidence Plan Engagement Plan	AyM Evidence Plan engagement plan - Oct 20 - Feb 21	Outline of the planned engagement over the coming months. The offshore ornithology ETG is ETG2. Planned engagement is summarised in the first tab, with blue cells indicating the week that engagement is programmed to take place. Actions from previous meetings are contained within the ETG-specific pages.	N/A Information for the ETG.

From:	Sean Leake
To:	Cooper, Adam
Cc:	Maidment, Olwen; Jones, Christopher Robert; awelymor@rwe.com; Ryan McManus; Matt Faulkner; Lynda Thomson
Subject:	RE: Awel Y Mor - NRW SLVIA input update
Date:	12 January 2021 09:38:41
Attachments:	image001.png image002.png image003.png image004.png

Good morning Adam,
Many thanks for this, and Olwen thank you for your time in catching up with all of this; it's no small feat to catch up on a new project and we appreciate it very much.
Many thanks for the notes on the cumulative project list, my colleague Ryan is progressing with updating the note with all received stakeholder feedback.
With regards the site visits it is unfortunate that the ETG team will be unlikely to carry any out, but we do of course appreciate the challenges at the current time. If there is anything that we as a team can do to support you on that, I know our SLVIA and Cultural Heritage leads have managed to undertake some limited site visits and may be able to share some resources if helpful.
All the best
Sean

From: Cooper, Adam <[redacted]k>
Sent: 12 January 2021 09:27
To: Sean Leake <[redacted]>
Cc: Maidment, Olwen <[redacted]>; Jones, Christopher Robert [redacted]
Subject: Awel Y Mor - NRW SLVIA input update

Hi Sean

Olwen has caught up with progress to date and we can give the following update on our input regarding SLVIA matters:

Cumulative Effects Assessment methodology
We note that Table 4.2 zone of influence for SLVIA states that this is based on the maximum extent of the ZTV. It doesn't explicitly say so but Scoping Opinion SLVIA 4.10 indicates no significant effects beyond 50km & this has been agreed by stakeholders & PINS. NRW has agreed that 50km is acceptable as maximum extent of ZTV.

Table 4.6 includes the 5 offshore wind farms; West Anglesey Demonstration Zone (Morlais), Holyhead Deep & Bardsey Island tidal schemes; 2 operational/approved wind farms (Hafaty Uchaf & Clocaenog Forest), Wylfa Newydd and a long list of numerous onshore schemes including housing, industrial, solar. Following discussion with other stakeholders these developments have also been mentioned: Minesto tidal scheme, Holyhead Port Expansion, several onshore windfarms on Anglesey, outside but visible from Anglesey AONB and several outside SNP but visible e.g. Clocaenog/Brenig. We advise that Table 4.6 requires updating to include existing, consented and proposed onshore windfarms that are potentially visible from

the viewpoints as the proposal, or sequentially when travelling through the designated landscapes.

SLVIA ETG Actions

Olwen has discussed the actions with the other stakeholders. NRW will be extremely unlikely to be able to carry out any site visits but will continue discussion with other stakeholders who may be able to do so. We aim to provide comments as per the outstanding actions by end of next week.

I hope that's useful, please get in touch if you would like to discuss.

Adam

Adam Cooper

Uwch Gynghorydd Morol (Rhaglen Ynni Adnewyddadwy ar y Môr)
Senior Marine Advisor (Offshore Renewable Energy Programme)
Cyfoeth Naturiol Cymru / Natural Resources Wales
0300 065 3219 / 07773 040293
Dysgwr Cymraeg
www.cyfoethnaturiol.cymru / www.naturalresources.wales
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From:	Cooper, Adam
To:	Ryan McManus; awelymor@rwe.com
Cc:	Sean Leake; Herbert, Alex; Carter, Paul; Thomas, Helen; Greenhill, Cassie
Subject:	RE: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review
Date:	25 January 2021 11:48:30
Attachments:	image002.png image003.png image004.png image005.png image006.png

Hi Ryan

Apologies for not getting this to you on Friday.

We have reviewed the HRA screening update and have no further comments as our previous comments have been addressed.

Also can I take this opportunity to share this message with you that we are sending to all casework projects we are involved with:

Please note that our teams are not working to full capacity at the moment due to Covid-related issues, so we may not be able to supply a full service and longer deadlines than usual may be necessary, however, we will do our best to accommodate requests.

Thanks
Adam

Adam Cooper

Uwch Gynghorydd Morol (Rhaglen Ynni Adnewyddadwy ar y Môr)
Senior Marine Advisor (Offshore Renewable Energy Programme)
Cyfoeth Naturiol Cymru / Natural Resources Wales
0300 065 3219 / 07773 040293
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Croesewir gohebiaeth yn y Gymraeg a'r Saesneg / Correspondence welcomed in both Welsh and English.
Ffoniwch ni ar **03000 65 3000** (24-awr) i roi gwybod am ddigwyddiadau amgylcheddol / Call us on **03000 65 3000** (24-hour) to report environmental incidents

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From: Ryan McManus <[redacted]>
Sent: 17 December 2020 16:42
To: awelymor@rwe.com
Cc: Sean Leake <[redacted]>; Herbert, Alex <[redacted]>; Carter, Paul <[redacted]>; Thomas, Helen <[redacted]>; Greenhill, Cassie <[redacted]>
Subject: RE: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review

Dear marine ecology and marine mammal ETG members,

Please find attached the following documents listed in the table below for your information and/or review, following up on actions from the meeting in November. Proposed review timescales are indicative of roughly a 3-week cycle, however with Christmas inevitably a lot of people are going to be on leave. Therefore, if you required extra time, please do not hesitate to get in touch if you wish to provide comment.

Merry Christmas,
Ryan

Document	Filename	Purpose/action	Expected review timescale – comments expected by:
Final minutes from HRA (non-ornithological features) meeting of 10th November.	AyM-Minute-HRA ETG_101120	For information. Minutes have been reviewed, amended and agreed by attendees.	N/A – final minutes as agreed
HRA screening update – non-ornithology	Awel y Mor HRA Screening Update - Non Ornithology_161220	For review/comment	22/01/21

From: Ryan McManus
Sent: 04 December 2020 16:55
To: awelymor@rwe.com
Cc: Sean Leake <[redacted]>; Herbert, Alex <[redacted]>; Carter, Paul [redacted]; [redacted] Greenhill, Cassie [redacted]>; Phil New <[redacted]>
Subject: RE: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review

Dear marine ecology and marine mammal ETG members,

In addition to the documents below, please find attached the final minutes from the fish and shellfish ecology call held on Monday 30th November for your information. The only action arising from this meeting has now been completed.

Kind regards,
Ryan

Document	Filename	Purpose/action	Expected review timescale – comments expected by:
Marine Ecology (Fish and Shellfish Ecology) Meeting Minutes 301120	AyM-Minute-FishandShellfishEcology ETG 301120_final	Final minutes from the meeting held on 30/11/2020 for information.	N/A – final minutes as agreed.

From: Ryan McManus

Sent: 20 November 2020 15:42
To: awelymor@rwe.com
Cc: Sean Leake <[redacted]>; Herbert, Alex [redacted]>; Carter, Paul [redacted]>; [redacted]; Greenhill, Cassie <[redacted]>
Subject: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review

Dear marine mammal and marine ecology ETG members,

Thanks again for your engagement and attendance of meetings over the last few weeks. Apologies for the large email, but hopefully it's easier for you to receive this information in one go rather than in bits and pieces.

Proposed review timescales of a suite of documents are given below that are indicative of a 4-week review period, but if additional time is needed given the proximity to the Christmas period, please get in touch. I should note that some of these documents are for information only we are not anticipating all members to review. Where focus is given on a particular topic, this is noted below. Follow up meetings to discuss comments will be arranged in the new year if necessary, prior to drafting of the main PEIR documentation. Where there is a particular focus on an organisation or individual, this is described below.

Kind regards,
Ryan

Document	Filename	Purpose/action	Expected review timescale – comments expected by:
Evidence Plan Engagement Plan	AyM Evidence Plan engagement plan - Oct 20 - Feb 21	Outline of the planned engagement over the coming months. The Marine Ecology and Marine Mammals ETGs are ETG3 and 4, respectively. Planned engagement is summarised in the first tab, with blue cells indicating the week that engagement is programmed to take place. Actions from previous meetings are contained within the ETG-specific pages (page 5 of the pdf for marine ecology).	N/A Information for the ETG.
Marine Ecology and Marine Mammal ETG Minutes 210920	AyM-ETG3 and 4_Minutes-MarineEcologyMarineMammals_210920_Finaldraft	Final minutes from the ETG meeting of 21/09/20 incorporating comments/edits received on draft.	N/A Final minutes as agreed.
Marine	AyM-Minute-FishandShellfishEcology ETG 250920-	Final minutes from	N/A

Ecology (Fish and Shellfish Ecology) Meeting Minutes 250920	final	the fish ecology-specific ETG meeting of 25/09/20 incorporating comments/edits received on draft.	Final minutes as agreed.
Cumulative Effects Assessment Methodology and Long List	0141_AyM_PEIR_Annex_CEA_Final	Proposed assessment methodology for the cumulative effects assessment, including offshore and onshore schemes. The purpose of this document is to agree the principles of assessment going forward, and to agree the long list of projects considered. We would appreciate any feedback you have, including additional projects, plans and activities that we may have missed. This document will also be shared with all other ETGs for agreement.	**Monday 21st December 2020** Comments particularly welcomed from NRW and planning authorities with local knowledge.
Marine Water and Sediment Quality EIA Position Paper	AyM_MWSQ_PositionPaper_Final	Follows action from the ETG of 21/09/20, focusing on the EIA (non-WFD) aspects of the water and sediment quality assessment.	**Monday 21st December 2020** Comments are sought from Kate Borrowdale (NRW) in particular.
Physical Processes Method Statement	R3547 Final_AyM OWF PhyProcMthdStmt_Final	Follows action from ETG of 21/09/ to draft a note on the physical processes modelling proposed approach.	**Monday 21st December 2020** Comments are sought from Joanna Ibrahim (NRW) in particular.

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Consultant, GoBe Consultants

01626 326111 | 01626 323890 | Microsoft Teams

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From:	Sean Leake
To:	Owen Cara (AMG)
Cc:	awelymor@rwe.com
Subject:	RE: 0141 - AyM ETG SLVIA (SLVIA/Cultural heritage sub-group minutes)
Date:	09 February 2021 10:28:18
Attachments:	image001.png

Hi Cara,
Many thanks for your confirmation. Apologies, you'll have just received an agenda that lists you as Snowdonia – I'll correct on the copy here to note that you are associated with Gwynedd rather than SNPA.
All the best
Sean

From: Owen Cara (AMG) <[redacted]>
Sent: 09 February 2021 09:56
To: Sean Leake [redacted]>
Subject: RE: 0141 - AyM ETG SLVIA (SLVIA/Cultural heritage sub-group minutes)

Good morning,

Thank you for the minutes. I have nothing to raise with regard to the matters relating to the areas within Gwynedd Council LPA, I agree with the points made with regard to Penrhyn Castle and Bangor Pier.

Please note that I work for Gwynedd Council and not the SNPA and I would be grateful if this could be corrected.

Kind regards,

Cara

Cara Owen

Rheolwr Cynllunio / Planning Manager
Gwasanaeth Cynllunio a Gwarchod y Cyhoedd / Planning and Public Protection Service
Adran Amgylchedd/ Environment Department
Cyngor Gwynedd / Gwynedd Council
Ffordd y Cob, Pwllheli, Gwynedd, LL53 5AA.

01766 771 000
cynllunio@gwynedd.llyw.cymru
planning@gwynedd.llyw.cymru

From: Sean Leake <[redacted]>
Sent: Dydd Iau, 4 Chwefror 2021 17:13
To: [redacted]

NorthPlanning@cyfoethnaturiolcymru.gov.uk; marine.advice@cyfoethnaturiolcymru.gov.uk; marine.area.advice@cyfoethnaturiolcymru.gov.uk; [redacted]; Owen Cara (AMG) <[redacted]> Thomas, Helen <[redacted]> Leake <sean@gobeconsultants.com>; Ryan McManus <Ryan@gobeconsultants.com>; Matt Faulkner <[redacted]>

Subject: 0141 - AyM ETG SLVIA (SLVIA/Cultural heritage sub-group minutes)

Dear all,

Many thanks again for your time on the 25th January, please find attached the minutes from the meeting. Please note, for completeness I am providing these minutes to the full ETG, rather than just the sub-groups. For those of you who attended the meeting we welcome your feedback. For those of you who were either unable to attend, or for whom the SLVIA/setting element is not your area of specific interest, these are attached for your reference.

For the sub group attendees attending the SLVIA/cultural heritage MDS workshop next Wednesday I shall be in touch shortly to confirm agenda and approach.

Kind regards

Sean

NOTE: Our Head Office Address has changed – please update your records and inform your accounts department with our new address details stated below.

Sean Lindsley-Leake

Principal Consultant, GoBe Consultants

07867 386436 | 01626 323890 | Microsoft Teams

www.gobeconsultants.com

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From:	Ceri Thomas
To:	Sean Leake
Cc:	Paula Jones; David H Watson; Robin Sandham; James Harland
Subject:	RE: Email 2 of 2 - RE: Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 1 - offshore array site selection and alternatives
Date:	09 February 2021 12:33:32

Good afternoon Sean,

Further to your request for feedback by today, we have discussed the various options at Officer level.

As you appreciate, the project would involve the extending the present cluster of offshore windfarms significantly further west than the existing arrays, and would be considerably larger than the present turbines. The additional turbines would have significant visual impacts on the settings of designated landscape and heritage designations and on the landscape character from key tourism destinations, and the cumulative impacts with existing arrays would result in result in the windfarms becoming the dominant landscape feature from a number of these locations. The wireframe diagrams presented for Options A, C, H, J and M indicate fairly similar impacts from viewpoints in Conwy, and we do not therefore wish to indicate a preference for any of these options.

We feel that it would be beneficial to undertake a comparative assessment of a wider range of options, including those which consist of lower tip heights/blade diameters and a reduced number of turbines (especially at the western end). This would enable a more meaningful range of options to be presented to inform the selection of the final scheme.

We look forward to discussing future options for comparative purposes, but regret that we are not in a position to express a preference between those options presented to date.

Regards,

Ceri Thomas

Pen Swyddog Cynllunio / Principal Planning Officer
Cyngor Bwrdeistref Sirol Conwy / Conwy County Borough Council

---

From: Sean Leake <s[redacted]>
Sent: 25 January 2021 13:43
To: [redacted]

[redacted]

Subject: Email 2 of 2 - RE: Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 1 - offshore array site selection and alternatives

Dear all,
As promised please find attached the materials to be presented this afternoon. Lynda and the team will also be showing these on screen, but we provide them for ease of reference.
Kind regards
Sean

-----Original Appointment-----
From: Sean Leake
Sent: 04 January 2021 10:47
To: Sean Leake; [redacted]; Thomas, Helen; [redacted] Lynda Thomson; Mark Turner; Ryan McManus; Pete Gaches; Flik Clark; [redacted]; Matt Faulkner
Subject: Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 1 - offshore array site selection and alternatives
When: 25 January 2021 14:00-16:30 (UTC+00:00) Dublin, Edinburgh, Lisbon, London.
Where: Microsoft Teams Meeting

Detailed agenda to follow.

Microsoft Teams meeting

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From: Angharad Crump
To: Sean Leake
Subject: RE: 0141 - AyM ETG SLVIA (SLVIA/Cultural heritage sub-group minutes)
Date: 15 February 2021 13:52:00
Attachments: image002.jpg
image003.png

Sean,

I can confirm that the Council is happy with these minutes but Ed Henderson is going to pick on one matter directly with Lynda.

Kind regards

Angharad

Angharad Wyn Crump MRTPI
Swyddog Achos Arweiniol Prosiectau Mawr (Amgylchedd)
Lead Case Officer Major Projects (Environment)
Rheoleiddio a Datblygu Economaidd
Regulation and Economic Development

Cyngor Sir Ynys Mon / *Isle of Anglesey County Council,*
Canolfan Fusnes Môn/*Anglesey Business Centre*
Parc Busnes Bryn Cefni/*Bryn Cefni Business Park*
LLANGEFNI
LL77 7XA

☎ 01248 752484
[redacted]

A yw'r e-bost hwn wedi ei farcio'n 'Swyddogol-Sensitif'? Os ydyw, rhaid i chi ystyried a oes gennych hawl i'w ddyblygu, ei argraffu neu ai anfon ymlaen. Os oes, sicrhewch os gwelwch yn dda fod yr e-bost ynghyd ag unrhyw atodiadau'n cael eu marcio'n 'Swyddogol-Sensitif'. Eich cyfrifoldeb chi yw sicrhau fod mesurau'n cael eu cymryd i ddiogelu, storio a chael gwared ar y wybodaeth mewn modd priodol. Mae hyn yn golygu fod rhaid diogelu'r wybodaeth gyda chyfrinair neu ei chadw mewn cwpwrdd ffeilio y mae modd ei gloi. Rhaid cael gwared ar ddogfennau 'Swyddogol-Sensitif' yn y biniau gwastraff y mae modd eu cloi. Os ydych yn ansicr ynghylch sut i ddefnyddio gwybodaeth 'Swyddogol-Sensitif', yna cysylltwch os gwelwch yn dda gyda llywodgwyb@ynysmon.gov.uk

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From: Sean Leake <[redacted]>
Sent: Dydd Iau, 4 Chwefror 2021 17:13

To: [redacted]

Subject: 0141 - AyM ETG SLVIA (SLVIA/Cultural heritage sub-group minutes)

Dear all,

Many thanks again for your time on the 25th January, please find attached the minutes from the meeting. Please note, for completeness I am providing these minutes to the full ETG, rather than just the sub-groups. For those of you who attended the meeting we welcome your feedback. For those of you who were either unable to attend, or for whom the SLVIA/setting element is not your area of specific interest, these are attached for your reference.

For the sub group attendees attending the SLVIA/cultural heritage MDS workshop next Wednesday I shall be in touch shortly to confirm agenda and approach.

Kind regards

Sean

NOTE: Our Head Office Address has changed – please update your records and inform your accounts department with our new address details stated below.

Sean Lindsley-Leake

Principal Consultant, GoBe Consultants

07867 386436 | 01626 323890 | Microsoft Teams

www.gobeconsultants.com

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Mae'r neges e-bost hon a'r ffeiliau a drosglwyddyd ynghlwm gyda hi yn gyfrinachol ac efallai bod breintiau cyfreithiol ynghlwm wrthynt. Yr unig berson sydd 'r hawl i'w darllen, eu copio a'u defnyddio yw'r person y bwriadwyd eu gyrru nhw ato. Petaech wedi derbyn y neges e-bost hon mewn camgymeriad yna, os gwelwch yn dda, rhowch wybod i'r Rheolwr Systemau yn syth gan ddefnyddio'r manylion isod, a pheidiwch datgelu na chopio'r cynnwys i neb arall.

Mae cynnwys y neges e-bost hon yn cynrychioli sylwadau'r gyrrwr yn unig ac nid o angenrheidrwydd yn cynrychioli sylwadau Cyngor Sir Ynys Mon. Mae Cyngor Sir Ynys Mon yn cadw a diogelu ei hawliau i fonitro yr holl negeseuon e-bost trwy ei rwydweithiau mewnol ac allanol.

Croeso i chi ddelio gyda'r Cyngor yn Gymraeg neu'n Saesneg. Cewch yr un safon o wasanaeth yn y ddwy iaith.

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From: Sean Leake
To: [redacted] awelymor@rwe.com
Subject: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS
Date: 17 February 2021 22:13:20
Attachments: 201464_AWE_VP_Plan_A1_Low_Res.pdf
AyM_Proposed_VP_output_15.02.21.xlsx
image001.png

Dear all,
Please find attached the viewpoint (VP) record, updated following feedback received during the recent meetings, and following receipt of feedback from previous discussions.

We would welcome your confirmation that the viewpoints proposed, and approach to be adopted for each viewpoint, are appropriate and agreed for the purposes of the PEIR. We would welcome further **feedback by the 10th March**; after this date the team will mobilise to site and undertake the photography for the purposes of PEIR. Within the attached spreadsheet you will find an initial tab with a legend and notes to accompany the second tab which is viewpoint by viewpoint record. The record identifies 'site', 'notes', and 'approach', and 'visualisations output'; the 'approach' and 'visualisations' output clearly present whether a particular viewpoint will be assessed using photomontage/wireline/combined MDS approach. The site list should be read in conjunction with the attached viewpoints plan.

As noted previously it is considered that these viewpoints adequately characterise the receiving environment and provide appropriate representative viewpoints for assessment. In considering the adequacy of the viewpoints we have considered fully the relevant guidelines, some of which were referred to at the meeting on the 10th February. The guidelines for the preparation of visualisation of wind farms prepared by Scottish Natural Heritage https://www.nature.scot/sites/default/files/2019-09/Guidance%20-%20Visual%20representation%20of%20wind%20farms%20-%20Feb%202017.pdf sets out the methodology to be followed in the preparation of the visualisations for the SLVIA (as set out in the scoping request) and it is proposed that the same methodology would also be followed for those visualisations prepared to inform the Cultural Heritage assessment.

These guidelines also advise on the appropriate selection of viewpoints to cover a range of receptors and views and provide a rationale as to why too many viewpoints is not considered beneficial.

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proportionate number of viewpoints.

Feedback gathered by our research project and steering group suggests that there are still too many viewpoints being represented in applications. We therefore encourage all applicants and consultees to further scrutinise the list of viewpoints selected and reduce these where possible. A final list of agreed viewpoints to be illustrated in the ES should be agreed pre submission with the planning authority. Some viewpoints may be dropped during the assessment process if the effects are assessed as not significant, or if two viewpoints illustrate similar effects, with the agreement of the planning authority.'

It is appreciated that the viewpoints included in the PEIR and ES may be for more than just SLVIA purposes and where possible viewpoints can be shared across the topics. However, in order to agree a proportionate number of viewpoints to be submitted as part of the application we have prepared the attached spreadsheet showing the proposed list and subject/level of assessment and the proposed approach for the inclusion of visualisations to inform the assessments. Accompanying this is a plan showing the viewpoint locations. The precise locations would still require to be micro-sited during field work.

Kind regards
Sean

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Sean Lindsley-Leake

Principal Consultant, GoBe Consultants

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From:	Christina Platt
To:	Ryan McManus
Cc:	Nia Jones; Tania Davey
Subject:	RE: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review
Date:	17 February 2021 09:33:57
Attachments:	image002.jpg image003.png SMRUC_BriefingNote_Use of ADDs for mitigation_final.pdf

Hi Ryan,

North Wales Wildlife Trust and The Wildlife Trusts have reviewed the ADD briefing note and we would like to provide the following comments:

- We would advise that ADDs should be added to the disturbance assessments. ADDs produce noise which adds to the cumulative impact of underwater noise.
- Will this same approach be used to mitigate the impacts from UXO clearance? A great deal more work is required to understand the effectiveness of current mitigation measures for UXO clearance and to develop better options if the current mitigation is found to be inadequate.
- We suggest that monitoring is undertaken to confirm the effectiveness of ADD if this technology is used to mitigate piling or UXO clearance.

Would you be able to add me to the mailing list for the marine ecology and marine mammal ETG please?

Kind regards,

Christina

Christina Platt
Marine Planning Officer
Tel: 01636 670012

Stay in touch with The Wildlife Trusts across the UK. Find us on our website, Twitter, Facebook, and Instagram

Royal Society of Wildlife Trusts, The Kiln, Waterside, Mather Road, Newark, Nottinghamshire NG24 1WT. Registered Charity Number 207238

From: Ryan McManus <[redacted]
Sent: 01 February 2021 15:46
To: awelymor@rwe.com
Cc: Sean Leake [redacted]
Subject: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review

Dear marine ecology and marine mammal ETG members,

Thank you for the feedback received on the documents below and continued engagement with the project. The project team are currently planning for the next suite of ETG meetings to be held in March, however until then,

please find the attached document for your consideration, as well as a few helpful updates below.

Document	Filename	Purpose/action	Expected review timescale – comments expected by:
Briefing Note: Use of ADDs to mitigate PTS-onset from pile driving	SMRUC_BriefingNote_Use of ADDs for mitigation_final	For review/comment. Feedback is sought in particular from Ceri Morris, marine mammals advisor at NRW, however comments are welcome from all ETG members.	22/02/2021

Physical Processes

Comments have been taken on board and will be addressed in the PEIR. I can confirm that in addition to hydrodynamic modelling, full numerical modelling will also be undertaken for plume dispersion, in addition to the spreadsheet and evidence-based approaches. In relation to Constable Bank, you may be aware that the project has announced it's preferred offshore and onshore cable routes, for which the western route has been dropped (https://awelymor.cymru/news/).

Marine Water and Sediment Quality

Thank you for your comments relating to the MWSQ scope position paper, which have been taken on board and will be addressed through in the PEIR. A separate document consisting of the Water Framework Directive Assessment screening is planned to be submitted to this ETG for your review in the next 2-3 weeks.

Cumulative Effects Assessment

Thank you for your feedback on the cumulative effects assessment methodology and long list, comments have been considered and will be addressed in the PEIR. We are also proposing a cut off date for cumulative projects of 30th June 2021. In order to allow time for projects to be given due consideration in the PEIR, any projects identified to be forthcoming after this date will not be included within the PEIR, however, prior to final application, the long list will be reviewed for any new projects to be included within the ES, with a similar cut-off date applied to allow these to be assessed within the ES. I can confirm that the long-list will be updated to include the Mersey tidal lagoon and Port of Mostyn tidal lagoon (Project Flagstaff). We also note that Horizon Nuclear Power on 27th January 2021 withdrew their application for development consent of the Wylfa Newydd nuclear power station.

Kind regards,
Ryan

From: Ryan McManus
Sent: 20 November 2020 15:42
To: awelymor@rwe.com
Cc: Sean Leake [redacted]
Subject: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review

Dear marine mammal and marine ecology ETG members,

Thanks again for your engagement and attendance of meetings over the last few weeks. Apologies for the large email, but hopefully it's easier for you to receive this information in one go rather than in bits and pieces.

Proposed review timescales of a suite of documents are given below that are indicative of a 4-week review period, but if additional time is needed given the proximity to the Christmas period, please get in touch. I should

note that some of these documents are for information only we are not anticipating all members to review. Where focus is given on a particular topic, this is noted below. Follow up meetings to discuss comments will be arranged in the new year if necessary, prior to drafting of the main PEIR documentation. Where there is a particular focus on an organisation or individual, this is described below.

Kind regards,
Ryan

Document	Filename	Purpose/action	Expected review timescale – comments expected by:
Evidence Plan Engagement Plan	AyM Evidence Plan engagement plan - Oct 20 - Feb 21	Outline of the planned engagement over the coming months. The Marine Ecology and Marine Mammals ETGs are ETG3 and 4, respectively. Planned engagement is summarised in the first tab, with blue cells indicating the week that engagement is programmed to take place. Actions from previous meetings are contained within the ETG-specific pages (page 5 of the pdf for marine ecology).	N/A Information for the ETG.
Marine Ecology and Marine Mammal ETG Minutes 210920	AyM-ETG3 and 4_Minutes-MarineEcologyMarineMammals_210920_Finaldraft	Final minutes from the ETG meeting of 21/09/20 incorporating comments/edits received on draft.	N/A Final minutes as agreed.
Marine Ecology (Fish and Shellfish Ecology) Meeting Minutes 250920	AyM-Minute-FishandShellfishEcology ETG 250920-final	Final minutes from the fish ecology-specific ETG meeting of 25/09/20 incorporating comments/edits received on draft.	N/A Final minutes as agreed.
Cumulative Effects Assessment Methodology and Long List	0141_AyM_PEIR_Annex_CEA_Final	Proposed assessment methodology for the cumulative effects assessment, including offshore and onshore	**Monday 21st December 2020** Comments particularly welcomed

		schemes. The purpose of this document is to agree the principles of assessment going forward, and to agree the long list of projects considered. We would appreciate any feedback you have, including additional projects, plans and activities that we may have missed. This document will also be shared with all other ETGs for agreement.	from NRW and planning authorities with local knowledge.
Marine Water and Sediment Quality EIA Position Paper	AyM_MWSQ_PositionPaper_Final	Follows action from the ETG of 21/09/20, focusing on the EIA (non-WFD) aspects of the water and sediment quality assessment.	**Monday 21st December 2020** Comments are sought from Kate Borrowdale (NRW) in particular.
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Ryan McManus

Consultant, GoBe Consultants

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From: Cooper, Adam
To: Ryan McManus
Subject: RE: AyM Marine Ecology and Marine Mammals ETG - Documents for information and review
Date: 22 February 2021 16:25:06
Attachments: image002.png
image003.png
image004.png
image005.png
image006.png

Hi Ryan

We have reviewed the briefing note 'Use of ADDs to mitigate PTS onset from pile driving'.

We advise the note gives a comprehensive outline of how the applicant proposes to approach underwater noise assessment, and how the use of ADDs will be incorporated into the proposed marine mammal mitigation protocol.

We agree with the proposed approach.

Our marine mammal advisor also asked to extend her thanks to the applicant for their continued transparent and collaborative engagement on this issue which is very much appreciated.

As always , please get in touch if you have any questions.

Adam

Adam Cooper

Uwch Gynghorydd Morol (Rhaglen Ynni Adnewyddadwy ar y Môr)
Senior Marine Advisor (Offshore Renewable Energy Programme)
Cyfoeth Naturiol Cymru / Natural Resources Wales
0300 065 3219 / 07773 040293
Dysgwr Cymraeg
www.cyfoethnaturiol.cymru / www.naturalresources.wales
Yn falch o arwain y ffordd at ddyfodol gwell i Gymru trwy reoli'r amgylchedd ac adnoddau naturiol yn gynaliadwy.
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Ffoniwch ni ar **03000 65 3000** (24-awr) i roi gwybod am ddigwyddiadau amgylcheddol / Call us on **03000 65 3000** (24-hour) to report environmental incidents

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Ryan McManus

Consultant, GoBe Consultants

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From:	Sean Leake
To:	Ryan McManus; Lynda Thomson; Mark Turner
Cc:	Pete Gaches; [redacted]
Subject:	FW: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS
Date:	23 February 2021 15:24:12
Attachments:	image002.png image003.png image004.png image005.png image006.png Awel y Mor SLVIA MDS and viewpoint NRW comments.pdf

FYI – I haven't read through yet, but will also pass on the Isle of Anglesey feedback received today.
All the best
Sean

From: Cooper, Adam <[redacted]>
Sent: 23 February 2021 14:25
To: Sean Leake [redacted]>
Cc: Maidment, Olwen <[redacted]
[redacted]
Subject: RE: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS

Hi Sean

Please find attached our comments on the MDS and viewpoints.

Please get in touch if you have any questions.

Adam

Adam Cooper

Uwch Gynghorydd Morol (Rhaglen Ynni Adnewyddadwy ar y Môr)
Senior Marine Advisor (Offshore Renewable Energy Programme)
Cyfoeth Naturiol Cymru / Natural Resources Wales
0300 065 3219 / 07773 040293
Dysgwr Cymraeg
www.cyfoethnaturiol.cymru / www.naturalresources.wales
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From: Sean Leake [redacted]
Sent: 17 February 2021 22:14
To: [redacted]
Cc: Flik Clark [redacted]
awelymor@rwe.com
Subject: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS

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https://www.nature.scot/sites/default/files/2019-09/Guidance%20-%20Visual%20representation%20of%20wind%20farms%20-%20Feb%202017.pdf sets out the methodology to be followed in the preparation of the visualisations for the SLVIA (as set out in the scoping request) and it is proposed that the same methodology would also be followed for those visualisations prepared to inform the Cultural Heritage assessment.

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Feedback gathered by our research project and steering group suggests that there are still too many viewpoints being represented in applications. We therefore encourage all applicants and consultees to further scrutinise the list of viewpoints selected and reduce these where possible. A final list of agreed viewpoints to be illustrated in the ES should be agreed pre submission with the planning authority. Some viewpoints may be dropped during the assessment process if the effects are assessed as not significant, or if two viewpoints illustrate similar effects, with the agreement of the planning authority.'

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From:	Sean Leake
To:	Angharad Crump
Cc:	awelymor@rwe.com; Ryan McManus; Lynda Thomson
Subject:	RE: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS
Date:	23 February 2021 14:15:30
Attachments:	image002.jpg image003.png

Hi Angharad,
Many thanks for this. I'll pass on to the wider team read, through in detail, and get back to you with any clarifications or queries.
Many thanks for the detailed reply, and continued engagement.
Kind regards
Sean

From: Angharad Crump <[redacted]k>
Sent: 23 February 2021 14:12
To: Sean Leake [redacted]
Subject: RE: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS

Sean,

Further to the meeting that took place on the 25th January and subsequent information provided by email the Council has now had the opportunity to consider its position and provide the following advice.

Overview
The Maximum Design Scenario approach is based on PINS Advice Note 9 https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf and establishes a 'maximum adverse case scenario' or 'worst case scenario' for the purposes of the ES. The scenarios aim for maximum output from the site rather than the avoidance of significant adverse effects on seascape, landscape and visual receptors, although it accepted that some adverse effects are likely due to the location and extent of the site boundary.

At this early stage it is unclear how any of the scenarios presented could conform with the Welsh National Marine Plan's policies SOC 06 for Designated landscapes and SOC 07 for Seascapes and the need to demonstrate how potential impacts have been taken into consideration and whether it has:

a. avoided adverse impacts; and/or
b. minimise impacts where they cannot be avoided; and/or
c. mitigate impacts where they cannot be minimised.

Given the sensitivity of the receptor, the Council considers that the magnitude of change will result in significant adverse effects contrary to the guidelines included in the NRW commissioned report from White Consultants.

All the scenarios indicate that significant adverse effects (due to the sensitivity of the receptor and the magnitude of change) are likely due to the horizontal spread, potential

grouping and size of the turbines.

Due to the orientation of the proposed Awel y Mor site when seen from the Ynys Môn coast, MDS 'C' has a reduced horizontal spread which means that this scenario is perceptibly different to the others and appears to represent the best (potentially least harmful) of the 'worse case scenarios' under consideration for the ES. The taller turbines (300 metre rotor diameter) in either of the layouts (regular/perimeter) also represent a worst case scenario for the purposes of the MDS.

While there are changes in the grouping (density and stacking) these are more difficult to differentiate. In any event it has been explained that the Development Consent Order (DCO) and Marine Licence do not fix a WTG layout and do not fix locations of individual turbines, only the number and dimensions of turbines. With this in mind the final layout may not represent any of the scenarios.

Layout scenarios A, C, H, J and M.

In addition to the Base Business Case, 5 layouts are proposed as potential MDS and in relation to views from the Anglesey AONB, the scenario for three coastal viewpoints have been received with viewpoint photos to correspond with the wireframe visualisations for VPs 7 and 8. These are all viewpoints close to sea level, although viewpoint from SNP indicate how the array could appear from elevated viewpoints from within the AONB.

Viewpoint 7 – Penmon

When the viewpoint photo and wireframe are seen together layout C is preferable in reducing the horizontal spread. Layout A maintains the turbines at a marginally greater distance. In both layouts a further reduction in the horizontal spear would affect only a small number of outlying turbines and from the viewpoint photo at least, would reduce encroachment on the Lighthouse.

Viewpoint 8 – Beaumaris (WCP)

As the full extent of the site boundary array is not visible from viewpoint 8, the scenarios are not distinctly different in terms of visible horizontal spread. The tips of outlying turbines are visible in to the left of the image in some of the Maximum Design Scenarios, but all are grouped around and visible over the coastal landform at Penmon and Puffin island. There are imperceptible differences between the MDS in the distances to the nearest turbines.

Viewpoint 2 – Point Lynas

Layout C reduces the horizontal spread marginally although due to the orientation of the viewpoint. There are imperceptible differences between the MDS in the distances to the nearest turbines.

Turbine height (200 and 300metres) and layout scenarios (perimeter and regular)

While we are being asked to consider these matters separately, it is difficult to separate the MDS layout options (A etc.) from the height and layout scenarios above. Layout C was not among the options presented and Layout J would appear (in terms of horizontal spread) to be the layout among those presented, with greatest similarity to Layout C.

On the whole the larger turbines represented a worst case in the viewpoint wireframes due to their ability to visually compete in views of the coastal landform, whether on Ynys Môn or in borrowed views from the mainland. There were very marginal differences between the perimeter and regular layouts such that we did not perceive a difference that would result in a potentially measureable effect and are happy that the regular layout as recommended in the meeting of February 10th is suitable for the assessment.

We are concerned that the selection of a MDS which includes the larger turbines (without an assessment of the smaller turbines) will mean that measures to address policy considerations from the Welsh National Marine Plan along with recommendation from the NRW commissioned White Consultants report, are not being given sufficient weight at this stage of the EIA process, and the potential to avoid significant adverse effects is not being adequately considered.

We trust that the above advice will be taken into consideration and that the engagement between all parties in particular through the ETG will continue.

Should you require any further discussion or clarification please do not hesitate to contact us.

Kind regards

Angharad

Angharad Wyn Crump MRTPI
Swyddog Achos Arweiniol Prosiectau Mawr (Amgylchedd)
Lead Case Officer Major Projects (Environment)
Rheoleiddio a Datblygu Economaidd
Regulation and Economic Development

Cyngor Sir Ynys Mon / *Isle of Anglesey County Council,*
Canolfan Fusnes Môn/*Anglesey Business Centre*
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[redacted]

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From: Sean Leake <[redacted]>
Sent: Dydd Mercher, 17 Chwefror 2021 22:14
To: [redacted]
Cc: Flik Clark [redacted]
awelymor@rwe.com
Subject: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario ACTIONS

Dear all,
Please find attached the viewpoint (VP) record, updated following feedback received during the recent meetings, and following receipt of feedback from previous discussions.

We would welcome your confirmation that the viewpoints proposed, and approach to be adopted for each viewpoint, are appropriate and agreed for the purposes of the PEIR. We would welcome further **feedback by the 10th March**; after this date the team will mobilise to site and undertake the photography for the purposes of PEIR. Within the attached spreadsheet you will find an initial tab with a legend and notes to accompany the second tab which is viewpoint by viewpoint record. The record identifies 'site', 'notes', and 'approach', and 'visualisations output'; the 'approach' and 'visualisations' output clearly present whether a particular viewpoint will be assessed using photomontage/wireline/combined MDS approach. The site list should be read in conjunction with the attached viewpoints plan.

As noted previously it is considered that these viewpoints adequately characterise the receiving environment and provide appropriate representative viewpoints for assessment. In considering the adequacy of the viewpoints we have considered fully the relevant guidelines, some of which

were referred to at the meeting on the 10th February. The guidelines for the preparation of visualisation of wind farms prepared by Scottish Natural Heritage https://www.nature.scot/sites/default/files/2019-09/Guidance%20-%20Visual%20representation%20of%20wind%20farms%20-%20Feb%202017.pdf sets out the methodology to be followed in the preparation of the visualisations for the SLVIA (as set out in the scoping request) and it is proposed that the same methodology would also be followed for those visualisations prepared to inform the Cultural Heritage assessment.

These guidelines also advise on the appropriate selection of viewpoints to cover a range of receptors and views and provide a rationale as to why too many viewpoints is not considered beneficial.

'After reducing the number of viewpoints to those that are required to illustrate the ES, it is common for there to be around 10-25 viewpoints within a LVIA in Scotland. However, this number will vary depending on the specific circumstances of a proposal. Over-provision of viewpoints can be as unhelpful as under-provision. This is because an excessive number of viewpoints may distract attention from the smaller number of viewpoints where impacts may be significant. An appropriate balance must be struck through the LVIA consultation process to agree a proportionate number of viewpoints.

Feedback gathered by our research project and steering group suggests that there are still too many viewpoints being represented in applications. We therefore encourage all applicants and consultees to further scrutinise the list of viewpoints selected and reduce these where possible. A final list of agreed viewpoints to be illustrated in the ES should be agreed pre submission with the planning authority. Some viewpoints may be dropped during the assessment process if the effects are assessed as not significant, or if two viewpoints illustrate similar effects, with the agreement of the planning authority.'

It is appreciated that the viewpoints included in the PEIR and ES may be for more than just SLVIA purposes and where possible viewpoints can be shared across the topics. However, in order to agree a proportionate number of viewpoints to be submitted as part of the application we have prepared the attached spreadsheet showing the proposed list and subject/level of assessment and the proposed approach for the inclusion of visualisations to inform the assessments. Accompanying this is a plan showing the viewpoint locations. The precise locations would still require to be micro-sited during field work.

Kind regards
Sean

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Mae cynnwys y neges e-bost hon yn cynrychioli sylwadau'r gyrrwr yn unig ac nid o angenrheidrwydd yn cynrychioli sylwadau Cyngor Sir Ynys Mon. Mae Cyngor Sir Ynys Mon yn cadw a diogelu ei hawliau i fonitro yr holl negeseuon e-bost trwy ei rwydweithiau mewnol ac allanol.

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From:	Sion R Roberts
To:	Sean Leake
Subject:	Awel y Mor - Comments on site boundaries and Design Scenarios
Date:	24 February 2021 15:36:43
Attachments:	image001.jpg

Good afternoon Sean,

Thank you very much for the meetings held on January 25th and February 10th and for all the information provided. I have included SNPA's thoughts and comments below.

Layout and site boundaries

We welcome the site boundary considerations as a means of attempting to minimise the impact of the development. Of the options displayed in the Comparative Wires document presented during the January meeting, it would seem that options J and H (H more so than J) would be the least impactful from a National Park's point of view (for Tal y Fan, Conwy Mountain and Carnedd Llywelyn). However this being said we don't feel that there is a great deal of difference in the options overall in terms of the impact of the proposal and that the visual impact of the development will likely still be high regardless of the options.

Turbine height design scenarios

In terms of the information provided in the February meeting, the larger turbines certainly present the worst case scenario and would have the biggest impact, partly due to their relationship with the current smaller turbines in the bay. Similarly to the above answer, H would likely be the least impactful we believe from the National Park's point of view (in comparison with option A) as it had a slightly reduced horizontal field of view. Again we don't believe there isn't a huge amount of difference in between the options, however the smaller turbines (200m) and the regular option of H would seem to be the best on offer here.

The Authority would still comment that we would maintain concerns at this point, about the scale of this development and in particular the cumulative effect in combination with existing developments at Gwynt y Môr, Rhyl Flats and to a lesser extent North Hoyle. The cone of sight being taken up currently from viewpoints within the National Park will be increased substantially regardless of the options chosen.

We look forward to further discussions and presentations regarding this proposal.

Thank you

Sion Roberts
Swyddog Cynllunio (Polisi) / Planning (Policy) Officer
Awdurdod Parc Cenedlaethol Eryri / Snowdonia National Park Authority
Penrhyndeudraeth
Gwynedd
LL48 6LF

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E-bost/E-mail - [redacted]
Gwefan/Website - **www.eryri-npa.gov.uk**

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From:	Owen Cara (AMG)
To:	Sean Leake
Cc:	Jenny Emmett
Subject:	Awel y Mor
Date:	25 February 2021 16:13:30

Dear Sean,

I refer to the Seascape, Landscape, Visual Impact Assessment; Cultural Heritage Expert Topic Group Meeting on 25 January 2021 and the various scenarios relating to the proposed scheme.

I would note that Gwynedd Council (as the LPA) are concerned about the visual impacts of the scheme, particularly from the viewpoints shown at Bangor Pier and Castell Penrhyn. The wireframe diagrams that have been presented appear to show similar visual impacts and consequently it is difficult to provide a clear opinion or state a preference.

I would advise that Jenny Emmett, Senior Planning Archaeologist for Gwynedd Archaeological Planning Service (acting on behalf of Gwynedd LPA) will provide a response in terms of archaeological matters. I would also advise Porth Penrhyn (sitting between Bangor Pier and Castell Penrhyn) and the surrounding area is a candidate World Heritage Site.

I trust that the above is of assistance and look forward to further discussions relating to the above.

Kind regards,

Cara Owen

Rheolwr Cynllunio / Planning Manager
Gwasanaeth Cynllunio a Gwarchod y Cyhoedd / Planning and Public Protection Service
Adran Amgylchedd/ Environment Department
Cyngor Gwynedd / Gwynedd Council
Ffordd y Cob, Pwllheli, Gwynedd, LL53 5AA.

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planning@gwynedd.llyw.cymru

From:	Sean Leake
To:	Flik Clark
Cc:	Ryan McManus
Subject:	FW: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario - Minutes
Date:	03 March 2021 15:28:27
Attachments:	image002.png image003.png image004.png image005.png image006.png AvM-Minute- SLVIA ETG 2 100221_NRW comments.docx

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From: Cooper, Adam <Adam.Cooper@cyfoethnaturiolcymru.gov.uk>
Sent: 03 March 2021 15:28
To: Sean Leake <sean@gobeconsultants.com>
Subject: RE: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario - Minutes

Hi Sean

Please find our comments on the minutes attached.

Also I note your email of today re the SLVIA scope – I will discuss with Olwen and Chris and get back to you.

Thanks
Adam

Adam Cooper

Uwch Gynghorydd Morol (Rhaglen Ynni Adnewyddadwy ar y Môr)
Senior Marine Advisor (Offshore Renewable Energy Programme)
Cyfoeth Naturiol Cymru / Natural Resources Wales
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From: Sean Leake [redacted]
Sent: 17 February 2021 21:54
To: Jones, Christopher Robert <[redacted]>
Cc: Flik Clark [redacted]
Subject: 0141 Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario - Minutes

Dear all,

Many thanks for your time at the meeting on the 10th February. Please find attached the draft minutes of the meeting for your review.
Given the detailed nature of the meeting I am attaching the word version of the minutes and we would welcome your feedback.
I shall follow this email with some of the material for the actions taken at the meeting.
Kind regards
Sean

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Matt Faulkner

From: Jess Colebrook
Sent: 25 June 2021 16:50
To: [redacted]
Cc: Matt Faulkner; Sean Leake; awelymor@rwe.com; Duncan Watson
Subject: Awel Y Mor: bat survey of trees scope
Attachments: 210624 AyM - Technical Note - Bat Survey of Trees.pdf

Dear Matt,
Following our discussion last month I am pleased to attach a technical note and sketch plan setting out an updated scope for bat survey of trees that may be impacted by the proposed Awel y Mor windfarm onshore work.
I would be grateful for your opinion on the attached, ideally confirming that the scope is adequate for the purpose of assessing impacts to local tree roosting bat populations as part of the EIA process.
If you wish to discuss this at all please do not hesitate to get in touch.
Best regards,
Jess

Jess Colebrook
Principal - Ecology

d 9281
o [redacted]
m [redacted]
e [redacted]

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Hermes House, Oxon Business Park, Shrewsbury, SY3 5HJ

Matt Faulkner

From: Jones, Christopher Robert <[redacted]
Sent: 02 July 2021 10:27
To: Jess Colebrook
Cc: Ellis, Matthew; North Planning; Matt Faulkner; [redacted] awelymor@rwe.com; Duncan Watson; Cooper, Adam
Subject: RE: Awel Y Mor: bat survey of trees scope

Dear Jess,

Further to Matt's response below, I would just like to reiterate my previous request for the project team to please copy me and our North Planning inbox in to any further correspondence to NRW regarding the onshore aspects of the project.

As our Development Planning Advice Service's case manager for the onshore aspect of the project, it's important that I'm aware of such consultations so that I can co-ordinate our responses accordingly and ensure that our case file is kept up to date with the relevant information, as well as managing any work that falls within the scope of our current Discretionary Advice Service agreement.

In addition, our North Planning inbox is regularly monitored, so in the event of any unforeseen staff absences emails can still be logged and dealt with accordingly.

Best regards,

Chris Jones MIEMA MCIEEM
Uwch Gynghorydd, Cynllunio Datblygu / Senior Advisor, Development Planning
Cyfoeth Naturiol Cymru / Natural Resources Wales
Symudol / Mobile: 07971 937092
Maes y Ffynnon, Bangor

Dysgwr Cymraeg

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From: Ellis, Matthew [redacted]>
Sent: 02 July 2021 10:01
To: Jess Colebrook <[redacted]>
Subject: RE: Awel Y Mor: bat survey of trees scope

Hi Jess

Thank you for your email

I apologise for any delay in replying to you

To confirm we concur with your proposed bat survey tree scope.

We look forward to seeing a copy of your results

Best wishes

Matt

From: Jess Colebrook <[redacted]m>
Sent: 25 June 2021 16:50
To: Ellis, Matthew <[redacted]>
Cc: Matt Faulkner <[redacted]
[redacted]
Subject: Awel Y Mor: bat survey of trees scope

Dear Matt,
Following our discussion last month I am pleased to attach a technical note and sketch plan setting out an updated scope for bat survey of trees that may be impacted by the proposed Awel y Mor windfarm onshore work.
I would be grateful for your opinion on the attached, ideally confirming that the scope is adequate for the purpose of assessing impacts to local tree roosting bat populations as part of the EIA process.
If you wish to discuss this at all please do not hesitate to get in touch.
Best regards,
Jess

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SLR

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Principal - Ecology
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From: Kristian James (Public Health Wales - No. 2 Capital Quarter)
To: Matt Faulkner; Philip Caldwell
Cc: Andrew Lord - Denbighshire CC; PHW Environment; Sean Leake [redacted] ; awelymor@rwe.com
Subject: RE: Awel y Mor Offshore Windfarm - Request for feedback on approach and findings of assessment of EMF
Date: 08 June 2021 12:12:36
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
image008.png
image009.png
image010.png

Hello Matt

We have consulted with EMF specialists at PHE. I have simply cut and pasted their comments below. We are happy to remain as an intermediary for this subject area given our role in the wider consultation. Please get back in touch if required.

Dear Matt,

Having reviewed the technical note, our main comment would be:

On the basis of the EMF public exposure voluntary code of practice, for 275 and 400 kV cables a calculation or measurement of the maximum fields directly above the cable is required to provide evidence of compliance with exposure guidelines.

This has been achieved somewhat indirectly by referring to examples from the following National Grid -maintained industry website: https://www.emfs.info/sources/overhead/specific/400-kv/

The compliance conclusion, therefore, is wholly dependent on the windfarm cables being constructed and operating in the same way as the National Grid examples. Further assurance, in terms of detailed cable layout information, phase arrangement and operating loads etc, could be provided to confirm this is indeed the case.

Kristian James CEnvH MPH
Prif Arbenigwr Iechyd Cyhoeddus Amgylcheddol
Principal Environmental Public Health Specialist

Adran Amddiffyn Iechyd, Iechyd Cyhoeddus Cymru, Llawr 4, Rhif 2 Capital Quarter, Tyndall Street, Caerdydd CF10 4BZ
Health Protection Division, Public Health Wales, Floor 4, Number 2 Capital Quarter, Tyndall Street, Cardiff CF10 4BZ

Tel/Ffon: 0300 00 300 32
Direct Line: 02920 104 509
Internet/Rhyngrwyd: www.publichealthwales.org

From: Matt Faulkner <[redacted]>
Sent: 04 June 2021 07:32
To: Philip Caldwell <[redacted]
Cc: Andrew Lord - Denbighshire CC <[redacted]; awelymor@rwe.com
Subject: Awel y Mor Offshore Windfarm - Request for feedback on approach and findings of assessment of EMF

Hello Both,

Further to previous discussions as part of the Human Health Expert Topic Group (ETG) for Awel y Mor Offshore Windfarm, we have put together the attached note and drawings which provide an update on the approach and preliminary findings of the assessment the project has taken with regard to Electro Magnetic Fields (EMF).

Although the project will be presenting preliminary environmental information (including the consideration of EMF), as part of formal consultation in August, we would very much welcome any initial feedback that Public Health Wales (as well as Public Health England) and Denbighshire County Council may have on the approach we have used and the findings set out in the note.

Kind Regards

Matt

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Matt Faulkner
Principal - Planning
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SLR Consulting Limited
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From: Matt Faulkner
To: [redacted] Algate, Karen
Subject: Awel y Mor - Query regarding access to proposed substation
Date: 11 November 2021 15:55:35
Attachments: image001.png
image679889.png
image540348.png
image279639.png
image508330.png
image137726.png
image735174.png
image807624.png
image035818.png
image997017.png
image538162.png

Hello Mike,

I hope you are keeping well. RWE are making some final refinements to the design of the onshore infrastructure for the Awel y Mor offshore windfarm and would very much appreciate your view on a proposed access to the substation site from Glascoed Road (I appreciate you are busy so thought putting it in an e-mail may help – happy to have a call to discuss if more convenient for you)

Although not yet fixed, RWE is considering having both construction access and operational access to the proposed substation from Glascoed Rd.

To date, we have been working with a 'zone' through which the final access track for construction and operation would be routed (the 'zone' is shown in yellow below alongside the proposed cable route shown in blue dashed line). Feedback from DCC asked that RWE look to further refine the substation design and we have been looking at whether we could refine this access zone to move the western edge further from properties on Glascoed Road (for noise and visual considerations).

Moving the westernmost edge of this zone inwards (so narrowing the zone), would mean the final bellmouth location is more likely to be located further east, away from the properties, but nearer the slight bend and crematorium access and may require a permanent speed reduction. On our call a couple of weeks ago I mentioned a temporary speed restriction for construction which I think you were comfortable with. Although we appreciate that from a highways perspective an access point may be preferable where the road is straighter, we are tyring to balance this against the noise/visual considerations for residential properties and any views you have on this would be very much appreciated. Any feedback we are able to get from DCC that they would approve an access point to the East and would be happy with a permanent speed reduction would be helpful.

Kind Regards

Matt

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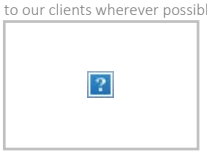

Matt Faulkner

Principal - Planning

[redacted]

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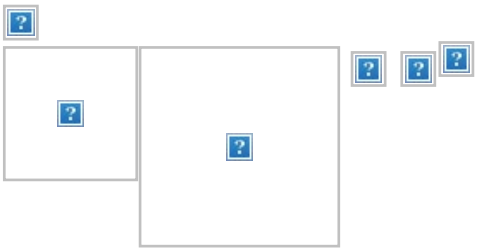

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From:	Matt Faulkner
To:	Rights of Way
Cc:	Hannah Arndt; Sean Leake ([redacted]) Mike Furness; Daniel Moran; awelymor@rwe.com
Subject:	Awel y Mor - Proposals for management of interaction with PRoW
Date:	16 November 2021 10:44:56
Attachments:	image277350.png image557557.png image484332.png image509867.png 8.3.9_AyM_PEIR_Volume 8_Document 3.9_CoCP_Appendix 8 Outline PAMP_VFinal.pdf LA_004_11102021_DCC S.42 pre-app consultation response - FINAL 11-10-21.pdf

Hello Adrian,

We had a very useful discussion with Hannah last week on the proposals for managing interactions between the Awel y Mor onshore cable works and PRoW, ATR and NCN. At the meeting we were hoping to discuss the feedback that DCC had provided in response to the consultation materials that RWE provided in August (I have attached a copy of the DCC Feedback for reference).

With regard to PRoW, DCC has expressed concern regarding the need to temporarily stop or divert PRoW and has asked that any such measures to be as short a duration as possible. The DCC response suggested it was not clear whether PRoW would be stopped up permanently, and I'm pleased to confirm that this would not be the case. The majority of the ATR or PRoW within the onshore ECC interact with the construction of AyM on a temporary basis, and will require temporary control measures to be put in place.

One of the consultation documents that RWE had provided was an outline Public Access Management Plan (PAMP), that set out the principles for how interaction between construction and PRoW would be managed. Temporary management measures proposed within the PAMP include:

- Appropriately fenced (unmanned) crossing points;
- Manned crossing points;
- Temporary closures with diversions; and
- Temporary closures without (formal) diversions

At this stage the PAMP is an outline document setting out the principles that would be followed post-consent and in advance of any construction works. There would be a requirement within the Development Consent Order (DCO), for the PAMP to be submitted to, and approved by DCC on the basis of detailed scheme design. The PAMP forms part of the overall Code of Construction Practice (CoCP).

I have attached a copy of the PAMP for reference and wanted to check with you whether the information within it addressed the concerns expressed within DCC's feedback, and to confirm with you whether we should include any additional detail within the DCO application. I would be very happy to discuss these details with you if helpful

If you are able to review the PAMP and confirm whether this meets the points raised in the DCC response I would be very grateful

Kind Regards

Matt

Matt Faulkner

Principal - Planning

9282

+[redacted]

[redacted]

[redacted]

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Matt Faulkner

From: Matt Faulkner
Sent: 22 November 2021 18:34
To: [redacted]
Cc: Algate, Karen; [redacted])
Subject: FW: Awel y Môr Expert Technical Groups - ETG6 - Onshore hydrology and flood risk Draft Minutes
Attachments: AyM-Minute-ETG 6 Onshore Hydrology and Flood Risk.docx; AyM ETG Hydrology and Flood Risk - Note on SAB.pdf

Hello Denise,

It was good to talk to you and colleagues from DCC earlier today. I have attached a copy of the short note we have produced setting out the position with regard to SAB and the DCO process that was discussed earlier (and with Wayne at an ETG earlier in the month). Please let us know if you have any feedback on the note or would like to discuss further (possibly during the meeting we hope to have specifically on SUDs proposals with in the application)

Kind Regards

Matt

From: Matt Faulkner [redacted]
Sent: 22 November 2021 18:30
To: [redacted]; awelymor@rwe.com
Subject: Awel y Môr Expert Technical Groups - ETG6 - Onshore hydrology and flood risk Draft Minutes

Hello All,

Please find attached a draft set of minutes from the Hydrology, hydrogeology, flood risk and WFD Expert Topic Group Meeting that was held on the 5nd November.

I have attached the note on SAB (proposing that SUDS arrangements be covered by DCO Requirement) that had previously been prepared and issued after the previous ETG in March 21.

Please let me have any comments/suggested edits by the end of November and we will then circulate to the full list of ETG members

Kind Regards

Matt

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SLR

Matt Faulkner

Principal - Planning

[redacted]

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From:	Jones, Christopher Robert
To:	Matt Faulkner
Cc:	Ellis, Matthew; Jess Colebrook; North Planning
Subject:	Awel y Môr: onshore ecology ETG meeting - NRW comments regarding GCN
Date:	25 November 2021 10:53:52
Attachments:	Maximum Great Crested Newt Counts - Sites 2021.xlsx

Hi Matt,

I've discussed the actions taken from yesterday's ETG meeting with Matt Ellis, as well as the two documents that you sent us. Please see our comments on these below. We would be happy to discuss any queries regarding this during Friday morning's meeting if you wish.

1. The Current Conservation Status of the local GCN population at St. Asaph.

   Although not defined, from the current data (see attachment) we consider the current conservation status (CCS) to be 'unfavourable'. We have not defined favourable conservation status but based on attributes such as population size and habitat quality we consider these attributes' possible targets are population size: 500 and no. of ponds: 60-70.

2. Are there any specific GCN mitigation examples that we are aware of from other projects that have worked well in the past?

   St. Asaph where there has been a significant increase and Lane End, Buckley.

3. NRW comments on the Mitigation, Compensation and Enhancement Area Plan (18/11/21) and Onshore Biodiversity and Nature Conservation November 2021 ETG: 2020/2021 Proposed Mitigation Update.

   We consider the extent of the proposed ecology area to be satisfactory in principle.

   Our detailed comments on the documents are as follows:
   a. Will areas be required for other purposes such as surface water attenuation (i.e. detention/ retention water features)? If so, we would expect these sites to be included in the GCN monitoring proposals.
   b. In terms of the plan, we advise the approach follows the previous Gwynt y Môr and Burbo Bank Sub-station proposals.
   c. We advise the submission of details and associated plans concerning GCN avoidance and mitigation measures including, but not limited to: fence design, specifications and proposed locations; consideration of access issues across fence lines (including PROW if applicable); fence monitoring and maintenance requirements; and supervised removal of barrier fences. The submission should include proposed timescales and reporting requirements.
   d. We advise that pond creation is also considered as one of the underpinning mechanisms for evidencing no detriment to maintenance of the FCS of the local population of GCN. This is consistent with restoration under Article 2(2) of the Habitats Directive and the previous substation mitigation schemes (3 ponds were created in respect of both previous sub-station mitigation schemes).
   e. No consideration appears to have been given to incidental capture/killing of amphibians during the operational phase of the scheme. *E.g.* the installation and

maintenance of an amphibian friendly surface water management system that does not include gully pots (or other similar features).

f. Previous infrastructure proposals (where impacts on GCN included temporary habitat loss/severance) have included commuted sums to Building Wildlife (see www.buildingwildlife.org.uk), we therefore suggest that this is considered as part of the suite of proposals.

g. We advise the submission of a long-term site management plan (for the operational phase of the proposal) that includes the following:
    - defined aims and objectives;
    - habitat management prescriptions;
    - contingency measures if fish or invasive non-native species (INNS) are detected;
    - proposals that are capable of being implemented in the event of failure to undertake or to appropriately implement identified or contingency actions;
    - site liaison and wardening;
    - licensing requirements for undertaking habitat management and surveillance;
    - current and any proposed changes to tenure of the compensation area;
    - tenure of the compensation to be approved by the decision-making body;
    - persons or bodies responsible for undertaking management and surveillance together with required skills and competencies;
    - reporting requirements; and
    - proposed dates for updating or revising the management plan

h. In terms of tenure we suggest consideration be given to the selection being informed by the definition of 'responsible' bodies under Section 119 (9) of the Environment Act 2021 (Environment Act 2021 (legislation.gov.uk). We advise that material questions include:
    a. Specialist knowledge, skills and competencies in-house and any implications following changes to personnel
    b. Specialism at local and national spatial scales
    c. Demonstration of experience
    d. Knowledge/experience of managing adverse factors *e.g.* fish or invasive non-native species

i. We advise that post construction monitoring and record dissemination lasts for a period of not less than 25 years. All ponds to be added to the Wales Great Crested Newt Monitoring Scheme, (see https://www.cofnod.org.uk/LinkInfo?ID=7) with individuals/bodies identified as being responsible for monitoring and reporting works. The methodology should include annual [or biennial] abundance counts and Habitat Suitability Index (HSI) assessments. Each water body should be individually numbered on site.

j. We also advise that you consider the submission of a biosecurity risk assessment and external ecological compliance audit.

Best regards,

Chris Jones MIEMA MCIEEM
Uwch Gynghorydd, Cynllunio Datblygu / Senior Advisor, Development Planning
Cyfoeth Naturiol Cymru / Natural Resources Wales
Symudol / Mobile: 07971 937092
Maes y Ffynnon, Bangor

Dysgwr Cymraeg

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Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi. Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

From: Mike Parker
To: Matt Faulkner
Subject: RE: Awel y Mor - Query regarding access to proposed substation
Date: 29 November 2021 10:18:39
Attachments: image012.png
image013.png
image014.png
image015.png
image016.png
image017.png
image018.png
image019.png
image020.png
image021.png
image022.png

Hi.

Sorry for the delay in responding I have been off.

As long as any access meets the required design/visibility standards we would have no objection.

Thnaks.

Mike Parker
Gwasanaethau Datblygiad / Development Services
Gwasanaethau Cynllunio a Gwarchod y Cyhoedd / Planning & Public Protection Services
Ffon / Tel 07771504785
e bost mike[redacted]

Rydym yn croesawu gohebiaeth yn Gymraeg a ni fydd unrhyw oedi wrth ymateb i ohebiaeth a dderbyniwyd yn Gymraeg.

We welcome correspondence in Welsh and there will be no delay in responding to correspondence received in Welsh.

From: Matt Faulkner [redacted]
Sent: 24 November 2021 15:23
To: Mike Parker <[redacted]>
Subject: RE: Awel y Mor - Query regarding access to proposed substation

Hello Mike

Just following up on my e-mail below to see if DCC is able to give a view on a proposed access to the substation site from Glascoed Road

Kind Regards

Matt

From: Matt Faulkner [redacted]m>
Sent: 11 November 2021 15:56
To: [redacted]
Subject: Awel y Mor - Query regarding access to proposed substation

Hello Mike,

I hope you are keeping well. RWE are making some final refinements to the design of the onshore infrastructure for the Awel y Mor offshore windfarm and would very much appreciate your view on a proposed access to the substation site from Glascoed Road (I appreciate you are busy so thought putting it in an e-mail may help – happy to have a call to discuss if more convenient for you)

Although not yet fixed, RWE is considering having both construction access and operational access to the proposed substation from Glascoed Rd.

To date, we have been working with a 'zone' through which the final access track for construction and operation would be routed (the 'zone' is shown in yellow below alongside the proposed cable route shown in blue dashed line). Feedback from DCC asked that RWE look to further refine the substation design and we have been looking at whether we could refine this access zone to move the western edge further from properties on Glascoed Road (for noise and visual considerations).

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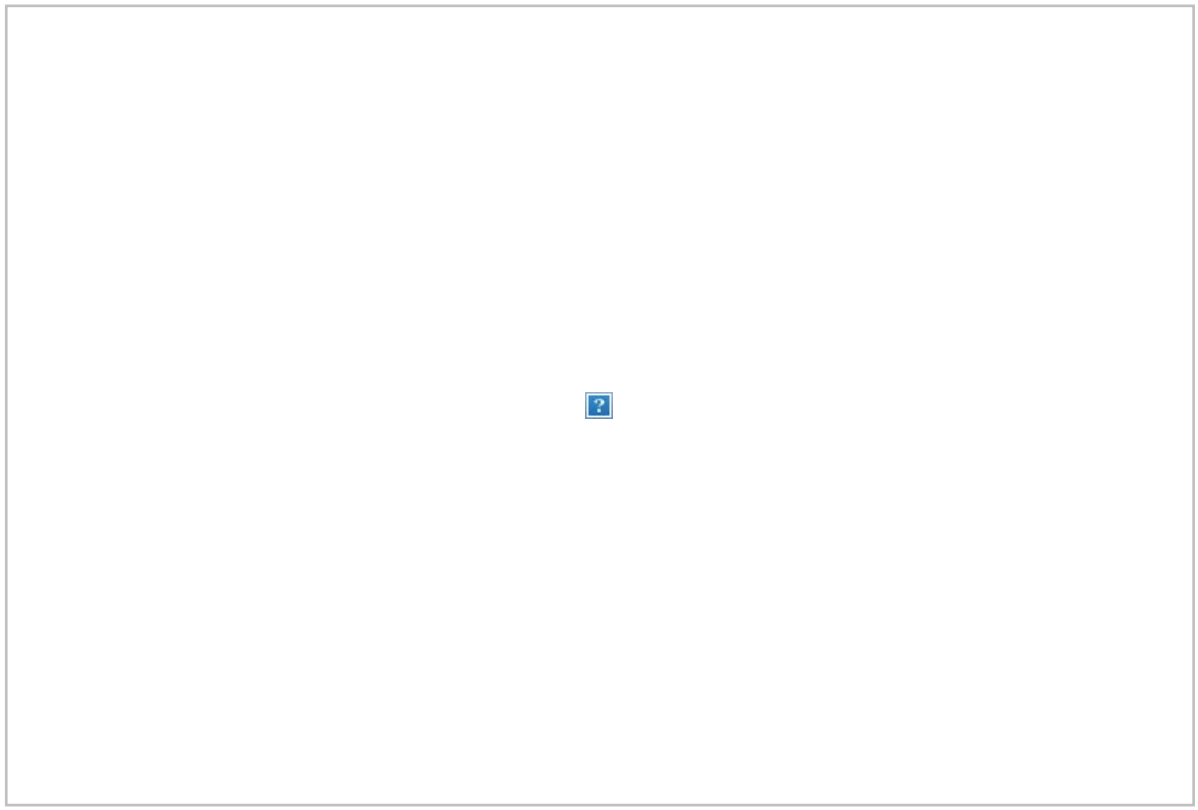

Kind Regards

Matt

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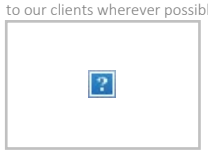

Matt Faulkner
Principal - Planning
[redacted]
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From:	Benedict Sarton
To:	[redacted] Matt Faulkner
Subject:	Awel y Mor offshore windfarm - Conway Response
Date:	06 December 2021 08:23:23
Attachments:	image728798.png image910149.png image695286.png image201304.png LA_008_07102021_ENQ30592 response.pdf

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Hi Lianne, I hope you are OK

I'm writing with regard to the Awel y Mor offshore windfarm and the recent consultation that took place on the project. Conwy have provided the attached consultation response which requests additional baseline noise monitoring is undertaken for the consideration of noise from offshore sources.

With regards to the noise impact assessment that was presented in the Preliminary Environmental Information Report (PEIR), provided with the consultation, and the identified impacts identified within the PEIR, these were based on the baseline sound levels measured at receptors close to the landfall, which were very low due to the very calm and dry prevailing weather conditions during the survey.

Based on these measured sound levels, limits were set for off-shore piling operations in conjunction with the ABC method contained in BS5228:2009:+A1:2014, due to the low baseline levels the limits were based on Category A threshold levels.

The assessment of the predicted noise levels from off-shore piling operations, showed that during the daytime period (23:00 to 19:00) and the evening period (19:00 to 23:00) the predicted noise levels were below the threshold noise limits.

During the night-time the assessment showed that the predicted noise levels were above the threshold limit of 45dB at the nearest receptors.

However, it is considered that the assessment represented a worst-case scenario where the background sound levels were very low and the piling operations were being undertaken at their closest approach to the receptors, and has assumed downwind propagation.

Further to the above, for significant periods during the year, the weather conditions within the study area for the Array for are likely to be more unsettled, with periods of precipitation and high wind speeds. During these periods, the prevailing ambient noise levels at the NSRs would be higher and subsequently the identified impacts from offshore piling operations would be reduced.

Based on the above it was recommended that night-time piling operations would be subject to relevant DCO Requirements which would specify night-time noise limits in neutral weather conditions only.

It is recognised however, that the baseline sound levels were measured at the receptors nearest the landfall and not at the receptors closest to the Array in Conwy (specifically Penrhyn Bay) in

neutral weather conditions.

In view of the above, would be possible to undertake further monitoring at the relevant receptors in Conwy during a variety of weather conditions i.e., during periods of increased wind speeds and precipitation. Sound level meters would be installed at two locations for a period of up to two weeks to as far as reasonably practicable measure baseline levels during a different weather conditions, a weather station would also be installed so the exact weather conditions could be recorded.

The measured levels baseline levels, for each different weather condition would then be compared to the threshold limits contained in BS5228:2009:+A1:2014 and the predicted noise levels from the offshore piling conditions.

The conclusions of assessment described above would be utilised to refine the noise limits for offshore piling operations with respect to the times of the day and differing weather conditions.

However, noting that the baseline measurements presented in the PEIR (taken at the landfall location in Denbighshire), were very low and so presented very much a worst case, I wanted to conform that Conwy CBC were happy to undertake further baseline monitoring (that may not be as low), for the final assessment

Please could you confirm that you agree with the proposals, methodology above, if you have any further questions or queries please do not hesitate to contact me. Alternatively, I would be happy to discuss if you could suggest a suitable time/date

Regards

Ben

Benedict Sarton

Technical Director - Acoustics & Vibration

4006

[redacted]

SLR Consulting Limited

2nd and 3rd Floors, 15 Middle Pavement, Nottingham, NG1 7DX

From: Lianne Martin <[redacted]uk>
Sent: 10 March 2021 10:37
To: Matt Faulkner [redacted]
Subject: RE: Awel y Môr offshore wind farm project - Update on forthcoming ETG and request for dates

Hi Matt,

I would be interested in attending the noise sub-group and have no date preference for the weeks proposed.

Many Thanks
Lianne

Lianne Martin
Uwch Swyddog Iechyd Yr Amgylchedd
Senior Environmental Health Officer
Gwasanaethau Rheolaethol / Regulatory Services
Cyngor Bwrdeistref Sirol Conwy / Conwy County Borough Council
[redacted]

From:	Huw Robat Williams
To:	Benedict Sarton; Ceri Thomas
Cc:	Matt Faulkner
Subject:	RE: Awel y Mor offshore windfarm - Conwy Response
Date:	16 December 2021 09:24:45
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png image007.png image008.png image009.png image010.png image011.png

Dear Ben,

Following on from recent emails, I have been asked to comment regarding your proposals.

I welcome your proposal to undertake further monitoring at two locations within Conwy – perhaps you could suggest a few sites, then we could discuss and agree upon two sites that would and/or could provide representative baseline levels in the locality.

Can you please clarify your penultimate paragraph "…conform that Conwy CBC were happy to undertake further baseline monitoring.." I trust you meant that Conwy CBC were happy with you undertaking further baseline monitoring.

Regards

Huw

Huw R Williams
Pen Swyddog Iechyd yr Amgylchedd / Principal Environmental Health Officer
Gwasanaethau Rheoleiddio a Thai / Regulatory and Housing Services
Cyngor Bwrdeistref Sirol CONWY County Borough Council
E-bost/E-mail: [redacted]
Gwe/Web: www.conwy.gov.uk/gorfodaethtai / www.conwy.gov.uk/housingenforcement
Ffon/Tel (01492) 574180

From: Lianne Martin [redacted]
Sent: 09 December 2021 16:04
To: Benedict Sarton [redacted]
Cc: Matt Faulkner [redacted]>
Subject: RE: Awel y Mor offshore windfarm - Conway Response

Hi Ben,

I would acknowledge receipt of your e-mail as shown below.

In response please be advised that my colleague Mr Huw Williams, Principal Environmental Health Officer is currently taking the lead on this application. As such I have copied him into this e-mail and I am sure he will come back to you with a response in the near future.

Kind Regards
Lianne

Lianne Martin
Uwch Swyddog Iechyd Yr Amgylchedd
Senior Environmental Health Officer
Gwasanaethau Rheolaethol / Regulatory Services
Cyngor Bwrdeistref Sirol Conwy / Conwy County Borough Council
[redacted]

https://www.conwy.gov.uk/emailimg/email-covid.png

From: Benedict Sarton [redacted]
Sent: 06 December 2021 08:23
To: Lianne Martin [redacted]
Cc: Matt Faulkner [redacted]>
Subject: Awel y Mor offshore windfarm - Conway Response

Hi Lianne, I hope you are OK

I'm writing with regard to the Awel y Mor offshore windfarm and the recent consultation that took place on the project. Conwy have provided the attached consultation response which requests additional baseline noise monitoring is undertaken for the consideration of noise from offshore sources.

With regards to the noise impact assessment that was presented in the Preliminary Environmental Information Report (PEIR), provided with the consultation, and the identified impacts identified within the PEIR, these were based on the baseline sound levels measured at receptors close to the landfall, which were very low due to the very calm and dry prevailing weather conditions during the survey.

Based on these measured sound levels, limits were set for off-shore piling operations in conjunction with the ABC method contained in BS5228:2009:+A1:2014, due to the low baseline levels the limits were based on Category A threshold levels.

The assessment of the predicted noise levels from off-shore piling operations, showed that during the daytime period (23:00 to 19:00) and the evening period (19:00 to 23:00) the predicted noise levels were below the threshold noise limits.

During the night-time the assessment showed that the predicted noise levels were above the threshold limit of 45dB at the nearest receptors.

However, it is considered that the assessment represented a worst-case scenario where the background sound levels were very low and the piling operations were being undertaken at their closest approach to the receptors, and has assumed downwind propagation.

Further to the above, for significant periods during the year, the weather conditions within the study area for the Array for are likely to be more unsettled, with periods of precipitation and high wind speeds. During these periods, the prevailing ambient noise levels at the NSRs would be higher and subsequently the identified impacts from offshore piling operations would be reduced.

Based on the above it was recommended that night-time piling operations would be subject to relevant DCO Requirements which would specify night-time noise limits in neutral weather conditions only.

It is recognised however, that the baseline sound levels were measured at the receptors nearest the landfall and not at the receptors closest to the Array in Conwy (specifically Penrhyn Bay) in neutral weather conditions.

In view of the above, would be possible to undertake further monitoring at the relevant receptors in Conwy during a variety of weather conditions i.e., during periods of increased wind speeds and precipitation. Sound level meters would be installed at two locations for a period of up to two weeks to as far as reasonably practicable measure baseline levels during a different weather conditions, a weather station would also be installed so the exact weather conditions could be recorded.

The measured levels baseline levels, for each different weather condition would then be compared to the threshold limits contained in BS5228:2009:+A1:2014 and the predicted noise levels from the offshore piling conditions.

The conclusions of assessment described above would be utilised to refine the noise limits for offshore piling operations with respect to the times of the day and differing weather conditions.

However, noting that the baseline measurements presented in the PEIR (taken at the landfall location in Denbighshire), were very low and so presented very much a worst case, I wanted to conform that Conwy CBC were happy to undertake further baseline monitoring (that may not be as low), for the final assessment

Please could you confirm that you agree with the proposals, methodology above, if you have any further questions or queries please do not hesitate to contact me. Alternatively, I would be happy to discuss if you could suggest a suitable time/date

Regards

Ben

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Benedict Sarton
Technical Director - Acoustics & Vibration
[redacted]
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2nd and 3rd Floors, 15 Middle Pavement, Nottingham, NG1 7DX

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From: Lianne Martin <[redacted]
Sent: 10 March 2021 10:37
To: Matt Faulkner[redacted]
Subject: RE: Awel y Môr offshore wind farm project - Update on forthcoming ETG and request for dates

Hi Matt,

I would be interested in attending the noise sub-group and have no date preference for the weeks proposed.

Many Thanks
Lianne

Lianne Martin
Uwch Swyddog Iechyd Yr Amgylchedd
Senior Environmental Health Officer
Gwasanaethau Rheolaethol / Regulatory Services
Cyngor Bwrdeistref Sirol Conwy / Conwy County Borough Council
[redacted]

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Matt Faulkner

From: Jones, Christopher Robert <[redacted]>
Sent: 20 December 2021 15:03
To: Matt Faulkner
Cc: Sean Leake ([redacted]); Jess Colebrook; North Planning; Ellis, Matthew
Subject: RE: Awel y Mor - Discussion on Ecology Mitigation/Compensation/Enhancement

Hi Matt,

Thanks for your email regarding the above. In response to your queries:

1) We are content with the meeting minutes to be distributed to the wider ETG as the final version.

2) While we would have preferred to see actual area figures, based on the submitted plans we are able to confirm that the mitigation/compensation/biodiversity enhancement quantum for the application is agreed and therefore meets the relevant Policy requirements.

3) We agree that there is no requirement to consider a biodiversity nett gain metric in this case.

If you have any further queries about the above please don't hesitate to contact me.

Best regards,

Chris Jones MIEMA MCIEEM
Uwch Gynghorydd, Cynllunio Datblygu / Senior Advisor, Development Planning
Cyfoeth Naturiol Cymru / Natural Resources Wales
Symudol / Mobile: 07971 937092
Maes y Ffynnon, Bangor

Dysgwr Cymraeg

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Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi. Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

From: Matt Faulkner [redacted]>
Sent: 20 December 2021 14:43
To: Jones, Christopher Robert <[redacted]
Cc: Sean Leake ([redacted]
Subject: Awel y Mor - Discussion on Ecology Mitigation/Compensation/Enhancement

Hello Chris and Matt,

Many thanks for the comments on the draft minutes. I have tried to incorporate these in the attached version. If this is OK I will issue to the wider ETG as a definitive set of minutes.

As mentioned on the call on the 26th November, RWE is now in a position where it needs to freeze the design and the application red line in order to finalise the application documents. We would be very grateful if NRW is able to confirm the mitigation/compensation/biodiversity enhancement quantum for the application is now agreed and therefore meets the relevant Policy requirements. It is the Project's position that we have achieved this, and our interpretation from the call is that this should be the case for NRW as well. With this in mind, please can NRW also confirm (for the avoidance of any doubt) that no consideration of biodiversity net gain (in the context of the application of the Defra Metric) is required.

Kind Regards

Matt

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SLR

Matt Faulkner
Principal - Planning

o [redacted]
m [redacted]
e [redacted]

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Matt Faulkner

From: Jones, Christopher Robert <[redacted]k>
Sent: 20 January 2022 10:15
To: Jess Colebrook
Cc: Matt Faulkner; awelymor@rwe.com; Ellis, Matthew; North Planning
Subject: RE: Awel y Mor: draft EPSL requirements

Dear Jess,

Thank you for your email regarding the above.

I have discussed your query with Matt Ellis and we wish to confirm that we could be satisfied in principle that an EPSL could be granted in relation to bats and GCN (in the absence of draft EPSL MS's being submitted pre-consent), based upon the compensation and enhancement proposals agreed at the last ETG which we understand have been carried over into the ES and OLEMP. We would be content for the finer details to be conditioned/supplied later on in the planning decision-making process (*i.e.* post-consent), as you have proposed.

We would advise that any subsequent EPSL application should include GIS shapefiles of the relevant areas to be secured for ecological mitigation/compensation/enhancement.

For any specific EPSL application queries we advise that you contact NRW's Species Licensing team at:
[redacted]

If you wish to discuss this further or have any other queries please don't hesitate to contact me.

Best regards,

Chris Jones MIEMA MCIEEM
Uwch Gynghorydd, Cynllunio Datblygu / Senior Advisor, Development Planning
Cyfoeth Naturiol Cymru / Natural Resources Wales
Symudol / Mobile: 07971 937092
Maes y Ffynnon, Bangor

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Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi. Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

From: Jess Colebrook [redacted]
Sent: 19 January 2022 16:58
To: Ellis, Matthew <[redacted]>; Jones, Christopher Robert <[redacted]>
Cc: Matt Faulkner [redacted]>; awelymor@rwe.com
Subject: Awel y Mor: draft EPSL requirements

Dear Matt and Chris
I am finalising the ES ecology chapter and outline Landscape and Ecology Management Plan for the onshore parts of the proposed Awel y Mor offshore wind farm. At PEIR it was our intention to supply draft EPSL Method Statements (MS) for GCN and bats as an annex to the ES chapter.
On balance, this now seems premature, given the degree of certainty about final scheme design at the point of application (ie there remains flexibility in terms of certain HDD locations and construction footprint). Proposing specific GCN fence locations or bat box locations at this point in time would be academic/a large proportion of any such work would prove abortive for both the project team, and NRW case officers.
Detailed guiding principles (as discussed during ETGs) and locations for compensation/mitigation/enhancement are included in the ES and OLEMP. It is anticipated that the draft MS for bats and GCN would be prepared and provided to NRW after consent (if granted), at the point the design is fixed, and the LEMP is finalised.

My reason for writing is to ask if NRW could be satisfied in principle that an EPSL could be granted in relation to bats and GCN, based upon the compensation and enhancement proposals set out at the last ETG, and which have been carried over into the ES and OLEMP, in the absence of draft EPSL MSs?

I would be grateful if you could confirm, and pleased to discuss further in order to ensure NRWs requirements are met.

Thanks,

Jess

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SLR

Jess Colebrook
Principal - Ecology

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From: Bohan-Rayson, Aurelie
To: Ryan McManus
Cc: [redacted]
Subject: RE: Awel y Mor Offshore Wind Farm: Marine mammal HRA ETG
Date: 20 January 2022 17:22:54
Attachments: image004.png
image005.png
image006.jpg
image007.jpg

Dear Ryan,

Thank you for circulating this, due to the location designated sites, Natural England are happy to defer to the advice of NRW and JNCC for marine mammal advice on this application. Please accept our apologies for attendance and comment back on the Marine Mammal Mitigation Protocol.

Best wishes,
Aurelie

Aurélie Bohan-Rayson
Strategic Coastal Lead Adviser
Coast and Marine Team
Cheshire, Greater Manchester, Merseyside and Lancashire Area Team

Natural England
2nd Floor
Arndale House
The Arndale Centre
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M4 3AQ

Jabber / Office: 02080266127
[redacted]

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ne-email-signature

From: Ryan McManus [redacted]
Sent: 18 January 2022 11:54
To: awelymor@rwe.com; [redacted]

marine.area.advice@cyfoethnaturiolcymru.gov.uk; NorthPlanning@cyfoethnaturiolcymru.gov.uk; marine.advice@cyfoethnaturiolcymru.gov.uk; Bohan-Rayson, Aurelie
[redacted]
Cc: Berridge, Richard [redacted]
Subject: RE: Awel y Mor Offshore Wind Farm: Marine mammal HRA ETG

Dear all,

Thanks for those who have provided availability so far.

In advance of the calendar invitation being issues, see attached the updated Outline Marine Mammal Mitigation Protocol (MMMP) for your consideration – we propose to discuss any comments you have on this at the meeting. Please note that this has been updated based on your Section 42 comments on the PEIR and discussions had at the November 2021 ETG meeting. Since then, we have also received your feedback on the clarification notes that were issued to you following that ETG meeting, which included the note on the limitations of cumulative SEL predictions. Whilst the Outline MMMP has not yet been updated to reflect that most recent feedback, we would very much like to use at as an agenda point for discussion at this next meeting. If you would like a track changed version of the document to highlight where it differs from the version presented at PEIR, let me know.

Document	**File name**	**Purpose/action**	**Expected review timescale**
Outline Marine Mammal Mitigation Protocol (MMMP)	6.4.7.2_AyM_ES_Volume4_Annex7.2_MMMP_180122	For ETG review in advance of the Marine Mammal ETG meeting	Before next ETG meeting - end of January/ beginning of February

Kind regards,
Ryan

From: Ryan McManus
Sent: 14 January 2022 15:17
To: [redacted]

[redacted]

Subject: Awel y Mor Offshore Wind Farm: Marine mammal HRA ETG

Dear ETG members,

I hope you all had a refreshing Christmas and new year break! Since we unfortunately ran out of time to discuss marine mammals at the last meeting just before Christmas, we're arranging a meeting specific to marine mammals that will cover HRA matters and the revised outline MMMP, a copy of which I'll circulate for consideration ahead of the meeting for discussion.

Before Christmas, it was suggested that this meeting could occur towards the end of January. In that regard, please could representatives from NRW, NE and JNCC let me know your availability in the following dates and times and we'll try and find a slot that suits as many people as possible:

- Monday 31st Jan: 09:00 – 12:00;
- Tuesday 1st Feb: 11:00 – 17:00;
- Wednesday 2nd Feb: 10:00 – 12:00, or 13:00 – 15:00;
- Thursday 3rd Feb: 13:00 – 15:00;
- Friday 4th Feb: Any time.

Kind regards,
Ryan

Ryan McManus

Consultant, GoBe Consultants

M: 07579 216308

DD: 01626 326111

HQ: 01626 323890

Microsoft Teams

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From:	Julie Black
To:	Ryan McManus; Sean Leake
Cc:	Jillian Whyte
Subject:	AYM migrant screening matrix, JNCC comments
Date:	21 January 2022 11:27:09

Hi, as promised, JNCC comments on the migrant screening matrix for AYM.

JNCC welcomes the overall approach to screening for migrant collision risk.

We would request that the following species are screened in:

- lesser black-backed gull
- short-eared owl;. Given potential variability in migratory behaviour, it should be screened in for 'potential' risk acknowledging that this may not be consistent across years.

We would ask that confirmation from NRW, NE and DEARA is sought regarding roseate tern breeding attempts at west-coast Britain or northern Ireland, in recent years. This information should be used for any screening decision for this species.

There is some inconsistency in terms of which species have been screened in/out where there is uncertainty regarding migratory paths, and request further justification for excluding the following species:

- pintail
- goldeneye
- Slavonian grebe
- great crested grebe, especially given that it has been seen in AYM and GYM surveys
- merlin; *subaesalon* race would seem to be more at risk.
- dotterel

Thanks

Julie Black

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3 Appendix F: ETG Feedback

3.1 Appendix F2: Offshore Ornithology

21 December 2020

Awel y Môr Offshore Wind Farm

Review of:

- Red-throated diver technical note
- Cumulative effects assessment methodology and long list

Red-throated diver technical note

This is a really useful note presenting available data on Red-throated diver distributions, from both Gwynt y Môr Offshore Wind Farm, and from the proposed Awel y Môr footprint plus buffer. It would be helpful to see this data alongside other contextual information, such as the visual aerial surveys from 2004/05 and 2010/11 presented in JNCC report 576.

The note states that APEM undertook the programme of aerial digital surveys between 2010 and 2019. Was the method and survey design the same throughout this period? Had the technology improved/evolved during this period? In other words, could there be an evolving effect of survey design/technology on the numbers of divers observed and the abundances estimated?

JNCC would like to request more detail on the APEM aerial digital surveys? Including:

- How many surveys there were in total?
- At what frequency, and what coverage of the survey area was provided?
- Maps of monthly and annual observations would be useful if available, as well as combined pre, during and post-construction distributions.

Was there only one survey carried out along the 'Barrier Effect Flight lines' (as shown for 6th February 2019 in Figure 2)?

Cumulative effects assessment methodology and long list

When considering the zone of interest, the ecological population/scale is relevant. At what population scale is the impact proposed to be assessed for birds? The ZoI's presented in Table 4.2 appear arbitrary, and only consider distance from activity at which effects may occur. Consideration is required of the population scale at which the Cumulative Effects Assessment will be made, and the 'effects distances' would then be considered as a buffer around this population scale. For example, a meaningful scale for assessment for birds would be the Biologically Defined Minimum Population (Furness *et al* 2015) Scales (BDMPS).

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Joint Nature Conservation Committee

22 January 2021

Awel y Môr Offshore Wind Farm

Review of:

- HRA Screening Update – Ornithology (Revision 1, December 2020)
- HRA Screening Update – Ornithology (spreadsheet)
- Migratory Non-seabirds Note (Revision 1, December 2020)

HRA Screening Update – Ornithology

- JNCC feels it would be helpful if Table 2-2 included the country (e.g. Scotland, England, Wales etc) for each Special Protected Area (SPA).
- We would question why sites in the rest of Europe have not been revisited based on the updated approach to screening?
- It would be useful for the update to describe the types of information used to supplement the generic approach (e.g. Woodward foraging ranges). For example, some features are screened out although they are within foraging range, because tracking data from the colony suggests no connectivity with Awel y Môr (e.g. gannets at Grassholm SPA). Whilst in other cases there is an assumption around the birds within Awel y Môr being primarily from one colony and therefore others are screened out even if within foraging range of Awel y Môr (e.g. some tern features). A generic description of the approaches and types of information used would be helpful.
- With regard to paragraph 24, it is not clear what is meant here. Have they concluded that sites designated for fulmar and Manx shearwater were not screened in because of a perceived low risk? The risk to Manx shearwater is being revisited (given some evidence of higher flight heights in some areas/contexts). Sufficient justification is required if species are dropped due to low perceived risk, especially those occurring in high numbers within Awel y Môr.

HRA Screening Update – Ornithology (Spreadsheet)

- The layout, description and information columns in the screening spreadsheet are informative, useful and helpful. An additional column stating the country within the UK, and whether sites are inshore or offshore would be helpful in identifying which Statutory Nature Conservation Body (SNCB) should be consulted for each SPA.
- JNCC are content with screening decisions in the update regarding offshore (or partially offshore) sites.
- NatureScot, the Department of Agriculture, Environment and Rural Affairs (DAERA) and Natural England (NE) should be consulted. There are several SPAs for which a generic approach would screen them in, but the decision has been taken to screen them out due to additional information (e.g. Manx shearwater and Rum SPA). This needs to be discussed with relevant SNCBs for each of these SPAs. JNCC are content with the approach and types of information used, but cannot comment on screening of individual SPAs outside of our jurisdiction.

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- Assumptions have been made around low vulnerability of Manx shearwater to offshore wind development. There is some evidence that Manx shearwaters may fly higher than generally assumed, in some areas or contexts. This is being explored further outside of the Awel y Môr context but should be borne in mind, and may influence some screening decisions should there be deemed a risk of collision in some situations.

Migratory Non-seabirds Note

JNCC has no comments to make as this applies to inshore SPAs only. However, as such, NatureScot, DAERA and NE should be consulted as the points raised by Natural Resources Wales (NRW) may also be applicable outside of Wales.

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Awel y Mor Cumulative Effects Assessment Methodology Consultation

Adam Cooper
Senior Marine Advisor
26 January 2021

Introduction

This advice is provided in response to the Awel y Mor – HRA Screening Update – Ornithology dated December 2020 and the associated spreadsheet: 0141AyM_HRA_ScreeningUpdate_OffshoreOrnithology_Spreadsheets_Final.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

The customer acknowledges that the content of any advice or assistance provided by NRW is advisory only and that it shall not be deemed to bind or in any other way restrict NRW in performing its statutory functions.

The recipient acknowledges that:

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- the final decision as to any representations made by NRW as statutory consultee will be based on all the relevant information available to NRW at the time it makes such representations;
- NRW cannot and does not give any guarantee as to the representations it may make as statutory consultee; and,
- any advice given by NRW may be overtaken by changes in available information, law, policy and guidance relevant to the subject matter of the advice.

Specialisms consulted on:
Marine Ornithology

Advice

Key Issues

The report and accompanying spreadsheet are not precautionary enough. Features are dismissed without a proper evaluation. No evidence or insufficient evidence is presented for why features and/or sites have been screened out.

Detailed Comments

HRA Screening Update

Page 5, 2.3 Methods, 16: Mean maximum foraging ranges – we welcome the change to using the Mean maximum foraging ranges plus 1 standard deviation from Woodward et al 2019.

Page 5, 2.3 Methods, 17: Regarding potential connectivity during migration and Criterion 4 from the Awel y Mor HRA screening Report, will there be an update to this following NRW's comments on the screening report and following the collection of the full 2 years of survey data?

Page 6, 2.4 Results, 23: Any analysis looking at foraging ranges of seabirds should do this via the sea and not across the land. Therefore those colonies whose foraging ranges do not reach Awel y Mor via a sea route can be screened out.

The foraging range from a colony should be measured from the location of the colony and not the SPA boundary. This can change things significantly, for instance, the common tern colony in the Dee is at the southern end of the estuary and is therefore 49 km away from Awel y Mor, this is way beyond the mean max +1SD of 26.9 km from Woodward et al, 2019.

Page 6, Table 2-2: The common tern colony in the Dee Estuary SPA is not within foraging range of Awel y Mor, this feature can be screened out.

NRW's view is that LSE cannot be discounted at this stage for:

- Gannets from Grassholm SPA
- Lesser black backed gull, Manx shearwater and storm petrel from Skomer, Skokholm and the Seas off Pembrokeshire SPA
- Cormorant from Puffin Island SPA.

These features/sites are within foraging range of Awel y Mor and should be screened in and included in the table. See further information on this below in comments on the spreadsheet.

3. Migratory non-seabird screening update, Table 3-1: There are breeding features of these wintering sites, which can potentially be screened out using Woodward et al 2019.

HRA screening update spreadsheet:

We disagree with sites being screened out at this very early stage without proper justification and evidence. The rationale provided in the spreadsheet is insufficient to satisfy the HRA process.

Screening for likely significant effects should be a relatively quick and straightforward decision and:

- show that a plan or project clearly has no ecological connectivity to the site's qualifying interests
- show that a plan or project obviously won't undermine the conservation objectives for the qualifying interests to which it has a connection
- should include plans and projects at any distance beyond the Natura site's boundaries
- should include whether the plan or project concerned is capable of having an effect.

If this document is draft due to not all the years of survey data being used it would be helpful if this was made clear.

Liverpool Bay SPA, we agree that breeding common tern can be screened out. The wintering features of Liverpool Bay SPA are not mentioned in these documents, to clarify, is this because it has already been screened in for wintering species?

We do not agree with the screening out of the cormorant feature of Puffin Island SPA without any justification or reference to any scientific evidence. Awel y Mor is within foraging range of cormorants from this site therefore there is a clear ecological connectivity.

We do not agree with the screening out of Grassholm SPA. While tracking data may suggest that there is no connectivity with Awel y Mor, the percentage of the colony that have been tracked is very small. Given the large foraging range of gannets and that birds do travel north to forage from Grassholm (see Figure 1 in Scales et al 2014 for example) there is the potential for that colony to reach the windfarm. Grassholm SPA should be screened in at this stage and looked at through the apportioning tool and measured against the conservation objectives of the SPA.

We do not agree with some of the features of Skomer and Skokholm and the Seas off Pembrokeshire SPA that have been screened out (lesser black backed gull, Manx shearwater and storm petrel). Awel y Mor is within the foraging range of all these species and therefore there is potential ecological connectivity and the potential for any of these species to be impacted by collision or displacement. The level of the potential effect needs to be assessed for these species. They should be looked at robustly through the use of the apportioning tool as well as potential effects of displacement and collision.

We disagree with the dismissal of Manx shearwaters and storm petrels as having "relatively low sensitivity to impacts from OWF" with insufficient evidence to back this up. Manx shearwater have been screened in for Bardsey island yet not for Skomer and Skokholm.

A breeding site cannot just be screened out on the effects during the breeding period but also the potential collision and displacement during the non breeding season.

References

Scales K.L., Miller P.I., Embling C.B., Ingram S.N., Pirotta E. and Votier S.C. (2014) Mesoscale fronts as foraging habitats: composite front mapping reveals oceanographic drivers of habitat use for a pelagic seabird *J. R. Soc. Interface.* **11** 20140679

Awel y Môr Offshore Wind Farm: Ornithological Approach to Assessment Position Paper.

JNCC comments

Julie Black and Rebecca Hall

07/04/21

1.1.1 Collision Risk.

3. JNCC propose that the sCRM be used stochastically, in as far as appropriate mean and SDs are available to do so. There not be appropriate SDs available for all parameters and these may need to be set to zero.

4. May need to consider inclusion of Manx shearwater; Aerial surveys at Rhiannon/Celtic Array suggested a good proportion of Manx shearwaters were at altitudes above 20m, including a small proportion at altitudes above 50m. This has led to questions around the assumptions that Manx shearwater consistently fly too low to be at risk of collision. researchers at Oxford University are exploring GPS tracking collected from Skomer island and extracting altitudes from this data.

7. JNCC propose that in addition to using site specific flight height data, the Donovan, 2017 sCRM tool also be applied based on generic flight heights, as a comparison.

8. Table 1-1 should be updated as/when additional evidence or guidance becomes available. For example an updated SNCB advice note on avoidance rates is currently being developed. There is work to extract behaviour parameters from tracking data commissioned by Marine Scotland that may be published soon.

1.1.2 Disturbance and Displacement

11. “other species recorded … in trivial numbers (and thus predicted impacts would be negligible)” Although this might generally be a sensible approach, we’d argue that even trivial numbers of highly sensitive species can be meaningful, especially if the species is rare and so low numbers of individuals affected can lead to meaningful impacts.

13. “Birds which have remained within the existing GyM OWF array area seem unlikely to be subsequently displaced by the construction of AyM.” During construction there’s likely to be more, larger vessels in AyM which could displace birds in GyM (those habituated to GyM are habituated to the structures and small maintenance vessels, not big jack-up barges).

13. “Birds within the array area of AyM but within a short distance of GyM would also seem to be more tolerant of disturbance and therefore less likely to be subsequently displaced than would be assumed for an OWF in a previously undisturbed region.” This seems like an un-founded assumption; how is individual response relate to size, spatial configuration etc of infrastructure? It may be that the larger combined windfarm footprint will increase displacement levels (numbers of individuals displaced and/or displacement distances).

16. We agree analysis for each 1km band would be useful.

16. In terms of applying a gradient of displacement level, this would need further discussion; we are not clear at this stage what levels of displacement would be appropriate for each buffer zone, although agree that in principle, some gradation may be appropriate.

Awel y Mor Ornithological Position Paper

Adam Cooper
Senior Marine Advisor
22 April 2021

Introduction

This advice is provided in response to the Awel y Môr Offshore Wind Farm: Ornithological Approach to Assessment Position Paper, March 2021, Revision 1.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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Advisors consulted:
Marine Ornithology

Advice

Comments on Ornithology Assessment Position Report:

1.1.1;3: We agree with the Marine Science Scotland Stochastic Collision Risk Model being used **deterministically**, following on from the advice given by natural England for Hornsea 4, as the new avoidance rates for the stochastic model are yet to be finalised. NE's advice at Hornsea 4 is that Option 2 of the basic Band model is preferred, run multiple times per species to capture variability, on an individual parameter basis, for the key input parameters (Nocturnal Activity Factor, Potential Collision Height, Avoidance Rate, bird density). This gives an indication of which parameters might have the most influence on the prediction of collision risk, recognising that individually these will not reflect the effect of uncertainty across all parameters as within a stochastic model. A matrix detailing the permutations of these parameters that have been used should be provided, in order to allow a clear understanding of the range of scenarios.

1.1.1;4: We cannot agree to only looking at the species mentioned as we have yet to see the data to see which birds are potentially at collision risk.

1.1.1;5: We cannot agree to only looking at the species mentioned as we have yet to see the data to see what birds are potentially at collision risk. Even if Lesser black-backed gull and terns species are in small numbers CRM should be done for these species so that cumulative assessments can be made.

1.1.1; 7: Here the applicant mentions *"Flight heights will be based on site-specific flight height data from the digital aerial surveys"*. We advise all CRM's to be done with the Johnston et al data (2014). APEM's method could be used for comparison but this method hasn't been proven to give accurate data on flight heights.

1.1.1: 8: We agree that if the sCRM app can't be used then Band (2012) model can be used instead.

1.1.1: Table1-1: For this table it would be good that the parameters are referenced so we know where they are from. We can only comment on the parameters presented and cannot comment that other species may need CRM until we examine the data.

1.1.1: Table1-1: We agree with the species biometrics used for body length and wingspan.

1.1.1: Table1-1: We agree with the avoidance rates for the four species presented.

1.1.1: Table1-1: We advise the use of gannets upper value of 14.9 as opposed to the lower value of 13.3 as advised by NE for Hornsea 4, from Cook et al (2014). We agree with the use of the flight speed for the other species.

1.1.1: Table1-1: We agree with the nocturnal activity for the four species presented.

1.1.1: Table1-1: For flight heights, we advise the use of maximum likelihood as the mean and the upper and lower limits from the 95% confidence intervals (Johnstone et al, (2014).

1.1.1: Table1-1: We advise that mean density should be used as the mean but for the min and max to be based around the SD of the mean. For the creation of the SD on Hornsea 4 NE advised that the use of 1000 samples from a distribution of mean densities (eg from a bootstrapped sample). We would welcome a detailed description and justification being provided on how this is done.

1.1.2: Disturbance and displacement

1.1.2 ; 9: We agree to the use of the matrix as described in the Joint SNCB Interim Displacement Advice Note (2017)

1.1.2 ; 10: We cannot agree that these are the only species that need to be looked at in terms of displacement as we haven't seen the data yet. Although we do agree that these will need to be looked at there may be others depending on the data.

1.1.2 ; 11: *"other species recorded within the AyM array area plus buffer, additional species were either recorded in trivial numbers (and thus predicted impacts would be negligible)"* There is no definition of what is trivial and what that might mean to the species population or site and there is uncertainty about whether some species are affected by displacement or not. For example kittiwake can be displaced and Manx shearwaters have been shown to avoid the windfarm at North Hoyle in Liverpool Bay (Dierschke et al , 2016)

1.1.2 ; 13: Here the document states *"Birds which have remained within the existing GyM OWF array area seem unlikely to be subsequently displaced by the construction of AyM."* However, during construction there's likely to be more, larger vessels in AyM which could displace birds in GyM.

1.1.2 ; 13: Here the document states *"Birds within the array area of AyM but within a short distance of GyM would also seem to be more tolerant of disturbance and therefore less likely to be subsequently displaced than would be assumed for an OWF in a previously undisturbed region."* This assumption is un-founded. Individuals may respond differently to size, spatial configuration etc of infrastructure. However we do agree that the best available evidence in terms of how birds have behaved to present wind farms would be from the local area itself so an analysis of the GYM data in terms of displacement would probably give the best available evidence to bear on this issue.

1.1.2 ; 14: We agree that the buffer doesn't need to extend into the existing windfarm for the reasons given.

Gradient approach for red-throated diver displacement analysis

1.1.2 ; 16: In line with the NE advice used at East Anglia One North and East Anglia Two OWFs , we recommend that a default displacement of up to 100% displacement and 10% mortality, across the site and 4km buffer should be used. Past 4km the 1km buffer assessment could be used. **However**, if there is local evidence from existing windfarms which are adjacent to Awel y Mor such as Gwynt y Mor or close by such as Rhyl Flats, which can inform how red-throated divers have been displaced or not, then this can be used to inform the assessment.

References:

Band, B. (2012) Using a collision risk model to assess bird collision risks for offshore windfarms.

Cook, A.S.C.P., Humphreys, E.M., Masden E.A. & Burton N.H.K. (2014). The Avoidance Rates of Collision Between Birds and Offshore Turbines. Scottish Marine and Freshwater Science Volume 5 Number 16.

Dierschke V, Furness RW, Garthe S (2016) Seabirds and offshore wind farms in European waters: avoidance and attraction. Biol Cons 202:59–68

Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. & Burton, N.H.K. (2014a) Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. Journal of Applied Ecology, 51: 31-41.

Joint SNCB Interim Displacement Advice Note (jncc.gov.uk)

Awel y Mor HRA ETG - Actions

Adam Cooper
Senior Marine Advisor
14 January 2021

Introduction

This advice is provided in response to the Awel y Mor HRA Expert Topic Group Actions (ETG held on 17/12/202). Advice is provided on the remaining 2 ornithology questions (rows 4 and 11) in the RIAA comments log.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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Advisors consulted:
Ornithology

Advice

4) RIAA document should include calculations for the SNH 2018 apportioning approach to sites – not clear if this included large colonies and not just SPA's.	An Apportioning Note is provided with this table (as requested at the ornithology ETG), which provides an example of the apportioning approach used within the assessment. The apportioning approach used is based on SNH (2018) but with slight adaptions to account for meanmaximum plus 1SD foraging ranges. **Awel y Môr seek agreement that this approach is acceptable.**	NRW agree that the apportioning approach suggested is acceptable. NRW welcomes the inclusion of SPA sites that are beyond mean-maximum foraging but within mean-maximum +1SD and all colonies within the mean-maximum foraging range. In addition to the apportioning analysis, qualitative discussion of implications of any available tracking data for species that have been shown to have inter-colony segregation of foraging areas could also be provided by the applicant.
11) Combining impacts across construction, O&M and decommissioning as well as across displacement and collision.	Awel y Môr agree that impacts should be combined, where appropriate. Following discussion during the offshore ornithological EIA ETG on the best way to calculate gannet displacement and collision in order to avoid double counting, the approach decided from these discussions will also be used within the HRA. However, mortality for each species is calculated per year, and not as an overall impact number for the combined phases of the project. Therefore, it is not appropriate to combine impacts across construction, O&M and decommissioning. Also, the impacts are different for each phase and therefore, need to be addressed in isolation. **Awel y Môr therefore seek agreement that this approach is acceptable.**	NRW welcomes the agreement that impacts should be combined where appropriate. At present SNCBs regard the impacts of collision and displacement as additive and advice that they should be summed (see 2017 SNCB Interim Displacement Advice Note). NRW agree that the approach agreed for gannet displacement and collision in the EIA ETG is acceptable for the HRA. Regarding combining impacts across construction and operation & maintenance, the provision of a summary or table that brings together these impacts and the duration over which they will operate in a way which

		aids comparison would be welcomed. This should allow a qualitative assessment of the 'worst case' scenario of displacement due to vessel traffic, particularly for common scoter and red-throated diver features of Liverpool Bay SPA.

AWEL Y MÔR OFFSHORE WIND FARM APPLICATION

Awel y Môr response to stakeholder feedback

JNCC comments

Julie Black 14/01/22
Discussed with NRW and NE.

Following JNCC response to requests for clarity or confirmation, largely provided on 21st Dec 2021, two remaining responses are detailed here.

RIAA document should include calculations for the SNH 2018 apportioning approach to sites – not clear if this included large colonies and not just SPA's.

It has therefore, been deemed appropriate to include all colonies within mean-maximum foraging range and additionally those SPA colonies within mean-maximum foraging range +1SD. JNCC are content with this approach; we agree that should include SPA colonies within mean-max +1SD but not non-SPA colonies (to avoid dilution of effects).

In addition to above approach, any relevant colony-specific evidence should be presented; in particular where this shows that specific colonies do not appear to utilise the AYM area. Discussion of how removing such colonies from apportioning might influence impacts apportioned to remaining colonies (less dilution of impacts).

Combining impacts across construction, O&M and decommissioning as well as across displacement and collision.

We would advise to combine impacts across displacement and collision (we need a 'total annual impact' per species, including all effects pathways).

Re combining across construction, operation & maintenance, and decommissioning: Where it is possible to quantify effects during each phase, this should be done so, and presented together to aid comparison.

For clarity, and consistent with our previous advice: For common scoter and red-throated diver we would recommend a quantitative analysis of the impacts across phases, and for disturbance by turbine array and disturbance by vessels.

- Disturbance by turbines during construction and decommissioning should be assessed as 50% of the impacts of turbine disturbance during operation, over the whole of the construction and decommissioning phases.
- We advise that a 2km buffer around vessels is used for the assessment of 100% displacement (Burt et al., 2017, Burger et al., 2019, Fliessbach et al. 2019). This should be based on an assumed 'worst case' scenario of vessel movements, using some broad assumptions around likely vessel routes and numbers of transits.
- We would then like to see impacts presented together across the construction, operational and decommissioning phases, and for array and vessel related impacts.

DRAFT

References

Burger, C., Schubert, A., Heinänen, S., Dorsch, M., Kleinschmidt, B., Žydelis, R., Morkūnas, J., Quillfeldt, P. & Nehls, G. (2019). A novel approach for assessing effects of ship traffic on distributions and movements of seabirds. Journal of Environmental Management, Vol. 251, Article 109511.

Burt, M.L., Mackenzie, M.L., Bradbury, G. & Darke, J. (2017) Investigating effects of shipping on common scoter and red-throated diver distributions in Liverpool Bay SPA. Report number: CREEM-15198-2017-2. Provided to Natural England (Project ref. 23732) August 2017 (Unpublished)

Fliessbach K.L., Borkenhagen K., Guse N., Markones N., Schwemmer P., Garthe S. (2019) A Ship Traffic Disturbance Vulnerability Index for Northwest European Seabirds as a Tool for Marine Spatial Planning. Frontiers in Marine Science, Vol. 6, pp. 192 https://doi.org/10.3389/fmars.2019.00192

DRAFT

Date: 14 January 2022
Our ref: DAS/UDS A001207 / 379864
Your ref: AyM HRA ETG

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Crewe Business Park
Electra Way
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T 0300 060 3900

Paul Carter
Awel y Môr Offshore Wind Farm Limited

BY EMAIL ONLY

Dear Paul

Discretionary Advice Service (Charged Advice) - UDS A001207
Development proposal: Awel y Môr Offshore Wind Farm
Consultation: Actions from HRA ETG meeting 17 December 2021

This advice is being provided as part of Natural England's Discretionary Advice Service in accordance with the Quotation and Agreement dated 2 September 2021 to Awel y Mor Offshore Wind Farm Limited.

The following advice is based upon the information within;

- Awel y Môr Offshore Wind Farm Apportionment Methodology Note – Breeding Season, Version Number 1; GoBe (received 8 December 2021);
- Awel y Môr Offshore Wind Farm ETG Note Report to Inform Appropriate Assessment (RIAA), Comments Log; GoBe (received 8 December 2021);
- Awel y Môr Offshore Wind Farm Habitats Regulations Assessment (HRA) Expert Technical Group Meeting, (17 December 2021).

Overarching comments

Natural England have focused our review of the documents listed above as outlined in the request. It should be noted that we have not undertaken a full review of the following document;

- Awel y Môr Offshore Wind Farm Migrant Screening Matrix (received 22 December 2021).

Further time and information would be required in order to undertake a full review of the approach and species for the Migrant Screening Matrix. We are aware JNCC have requested further information regarding the methods used to produce the Migrant Screening Matrix. Natural England will contribute to any joint SNCB position sought, and defer to JNCC to provide the response in full.

We have provided detailed comments below against updated approaches set out in the RIAA Comments Log to be taken forward for Awel y Môr Environmental Impact Assessment (EIA) and HRA. We have not provided our previous comments again and where no additional comment has been provided, Natural England's previous comments still apply.

Detailed comments

For full clarity, Natural England has set out below responses to specific action requests taken from the Report to Inform Appropriate Assessment Comments Log. The Stakeholder comment and Awel y Môr response have been taken directly from the RIAA Comment Log.

For brevity, Natural England have only included Stakeholder Comments where our agreement was sought (i.e. we have not included comments where the response was specifically directed at Natural Resources Wales (NRW) and we have no additional comment. For these we defer to NRW for response.).

Ref	Stakeholder comment	AyM response	NE further comment
1	Additional sites and species need to be screened for LSE/screened through to AA.	Following the initial HRA Screening report feedback, all additional sites flagged as concern by NRW were included within the updated Screening report. These sites were taken to Stage Two. Additional sites that Awel y Môr agree should be considered are: Kittiwake at Skomer, Skokholm and Seas off Pembrokeshire SPA Manx shearwater and Kittiwake at Skomer, Skokholm and Seas off Pembrokeshire SPA and Aberdaron Coast and Bardsey Island SPA. Waterbird assemblage at Liverpool Bay SPA For additional species mentioned within the response, they have been discussed individually below. Where waterbird assemblages are screened in, these will be considered as an assemblage rather than individual features. All screened in features will be considered, however where impact is low (i.e. below 1 bird resultant mortality), a less detailed assessment will be undertaken as this will not lead to AEoI but allows future in-combination assessments to be performed. Awel y Môr therefore seek agreement that this approach is acceptable.	Natural England agree that this approach is acceptable.
2	Red Throated Diver (RTD) - a 10% mortality rate and 8km buffer should be used for displacement.	Following on from the Offshore Ornithology EIA ETG, the same approach as discussed will be used in the HRA, i.e. gradient approach for red- throated diver displacement analysis considering abundances in buffer zones out to 8 km to the south (agreed with Natural Resources Wales and in line with the asymmetric survey design: IR0485 GyM Extension Aerial Baseline Surveys, Innogy Renewables UK Ltd. APEM Ref: P00003481, Date: November 2019.). This would enable what we consider likely to be a more realistic graduated approach to displacement analysis, with different displacement rates applied to the array area and each subsequent buffer. Awel y Môr therefore seek agreement that this approach is acceptable.	Natural England agree with the gradient approach suggested for use in the HRA, assuming the use of displacement rates of 100% from the array, 90% at 0-5km from the array and 50% at 5-8km from the array can be confirmed. Natural England advise that the displacement assessment considers a range of mortality rates, from 1-10% inclusive.
3	Need to consider in-combination effects of aggregates	A high-level review of other industries which may contribute an in-combination level impact on RTD and Common Scoter (CS) will	Natural England agrees with the proposed approach.

Ref	Stakeholder comment	AyM response	NE further comment
	dredging, dredging and disposal and cable laying on RTD from Liverpool Bay SPA.	be undertaken to determine data availability for understanding impacts. It is worth noting that a large amount of non-WF impacts will form part of the baseline, as these activities have been on-going or consented prior to the designation of the Liverpool Bay SPA. Where activity does not form this baseline (i.e. was consented after the designation of the SPA), this will be considered within the updated in-combination assessment. Awel y Môr therefore seek agreement that this approach is acceptable.	The baseline should be clearly defined as the point in time that the surveys informing the Liverpool Bay SPA designation were concluded. Note that this will pre-date the actual designation and vary by feature. For Liverpool Bay SPA common scoter, red-throated diver and waterbird assemblage features, the supporting data was collected in the wintering seasons of 2001/2002, and 2002/2003 (Webb *et al.*, 2006)[1]. For little gull, the designation is based on data from years 2004/05, 2005/06 and 2010/11 (Lawson *et al.* 2016)[2]. For little tern the designation is based on numbers at associated breeding colonies from the breeding seasons of 2010 – 2014. For common tern the designation is based on numbers at associated breeding colonies from the breeding seasons of 2011 – 2015 (NE, NRW and JNCC, 2016)[3].
4	RIAA document should include calculations for the SNH 2018 apportioning approach to sites – not clear if this included large	An Apportioning Note is provided with this table (as requested at the ornithology ETG), which provides an example of the apportioning approach used within the assessment. The apportioning approach used is based on SNH (2018) but with slight adaptions to account for mean-maximum plus 1SD foraging ranges.	Natural England agree with the approach to apportioning and welcome the use of mean-max foraging ranges +1SD to capture potential impacts on distant SPA colonies. However, it should be

[1] Webb, A., McSorley, C.A., Dean, B.J., Reid, J.B., Cranswick, P.A., Smith, L. & Hall, C. 2006. An assessment of the numbers and distributions of inshore aggregations of waterbirds using Liverpool Bay during the non-breeding season in support of possible SPA identification. JNCC Report No. 373, JNCC, Peterborough, ISSN 0963-8091.

[2] Lawson, J., Kober, K., Win, I., Allcock, Z., Black, J. Reid, J.B., Way, L. & O'Brien, S.H. 2016. An assessment of the numbers and distribution of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area of search. JNCC Report No 576. JNCC, Peterborough.

[3] Natural England, Natural Resources Wales, and Joint Nature Conservation Committee, 2016. Liverpool Bay / Bae Lerpwl potential Special Protection Area (pSPA) Proposal for extension to existing site and adding new features: Advice to the Welsh Government and UK Government.

Ref	Stakeholder comment	AyM response	NE further comment
	colonies and not just SPA's.	Awel y Môr seek agreement that this approach is acceptable.	considered that in some cases the inclusion of such colonies may dilute impacts on more local colonies, where birds are more likely to originate from. Natural England suggest a careful appraisal of any evidence on colony and species-specific movement patterns (e.g. tracking/tagging) or known segregation of colony foraging ranges (e.g. Wakefield et al 2013[4]), which may allow some SPA colonies within the extended foraging range to be scoped out.
5	Need to assess Dee Estuary SPA and Ramsar features for collision during migration – using Migropath or SOSS tool	As agreed at the ornithology EIA ETG, APEM sent a note to SNCBs regarding details of Migropath. NRW and JNCC have confirmed their acceptance of this method for assessing migratory waterbirds. Awel y Môr therefore seek agreement that NRW's comment is now addressed.	Natural England agree that this approach is acceptable.
6	Need to use Migropath or SOSS tools for assessing Tern features for collision risk.	As agreed at the ornithology EIA ETG, APEM sent a note to SNCBs regarding details of the broad front approach. NRW and JNCC have confirmed their acceptance of this method for assessing migratory seabirds. Awel y Môr therefore seek agreement that NRW's comment is now addressed.	Natural England agree that this approach is acceptable.
7	Combining impacts across construction, O&M and decommissioning as well as across displacement and collision.	Awel y Môr agree that impacts should be combined, where appropriate. Following discussion during the offshore ornithological EIA ETG on the best way to calculate gannet displacement and collision in order to avoid double counting, the approach decided from these discussions will also be used within the HRA. However, mortality for each species is calculated per year, and not as an overall impact number for the combined phases of the project. Therefore, it is not appropriate to combine impacts across construction, O&M and decommissioning. Also, the impacts are different for each phase and therefore, need to be addressed in isolation. Awel y Môr therefore seek agreement that this approach is acceptable.	Natural England attended a meeting on 7/1/22 with JNCC and NRW ornithologists to discuss this issue and reach a consensus. Natural England agree that it may not be appropriate to combine impacts across project phases. However, a qualitative assessment and comparison of impacts might be aided by a summary table presenting impacts and timescales across the project.

[4] Wakefield, ED, Bodey, TW, Bearhop, S *et al.* (19 more authors) (2013) Space Partitioning Without Territoriality in Gannets. Science, 341 (6141). 68 - 70.

Ref	Stakeholder comment	AyM response	NE further comment
			A quantitative analysis of displacement arising during operation, and from construction and decommissioning is recommended. A separate analysis should be conducted for disturbance by turbine and vessel presence. A worst-case scenario should be assessed to consider displacement impacts on red-throated diver and common scoter within Liverpool Bay SPA by vessel traffic.
8	Common and Arctic tern need to be assessed for Anglesey tern SPA.	Mean-maximum +1SD foraging ranges suggest no connectivity for common tern. Arctic tern has low vulnerability to collision. There is therefore no effect-receptor pathway for common tern, and no meaningful collision or barrier impact for Arctic tern. If new tracking data suggests otherwise, Awel y Môr request it be provided in order to be incorporated into the report. Awel y Môr therefore seek agreement that the approach is acceptable, or that data be provided to support the assessment.	Site is entirely within Welsh waters, therefore Natural England defer to NRW for comment.
9	The mean max from Woodward *et al.* (2019) needs to be used for Sandwich tern rather than site specific maximum foraging range. NRW staff have personal experience using ribs to track Sandwich terns up to 40 km away from colonies.	The Sandwich tern colony at Anglesey Terns SPA is 40km from the AyM array. The mean-maximum foraging range + 1 standard deviation for Sandwich tern is 57.5km. However, data provided in Woodward *et al.* (2019) shows that the site specific maximum foraging range from this colony is 25km, therefore this is more appropriate to use than the mean-maximum foraging range as it is colony specific and relates to the environmental conditions of that site. It is also the most precautionary metric to use as it the maximum foraging range, rather than the mean of the maximum. If new tracking data has shown that Sandwich terns from this SPA are seen over 40km from the SPA during the breeding season, then this data needs to be presented in order to be incorporated into the report. Awel y Môr request any additional data from NRW to support the suggested 40 km range	As discussed at the HRA ETG meeting (17 December 2021), data informing the colony specific maximum foraging range in Woodward *et al.* (2019)[5] is not considered robust. It was gathered over a single breeding season and many of the tracks were incomplete. Natural England advise that rather than the site specific foraging range for Sandwich terns at Anglesey Terns SPA, the more precautionary mean-max foraging range presented in Woodward *et al.* (2019) should be used to account for inter-annual variation

[5] Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. 2019. Desk-based revision of seabird foraging ranges used for HRA screening. BTO research report number 724

Ref	Stakeholder comment	AyM response	NE further comment
			and a high level of uncertainty in the colony specific range.
10	10% mortality rate to be used for red-throated diver, common scoter, puffin and gannet.	Following on from the offshore ornithology EIA ETG, the same approach will be used for in the HRA for all species. Awel y Môr therefore seek agreement that this approach is acceptable.	Natural England advise that a range of mortality rates should be considered in the assessment of displacement impacts, from 1-10% inclusive.
11	Assessment for cable laying assumes that birds do not fly or swim away and are just placid with the movement of the tide. If the boat is effectively static then this conflicts with the statement about birds being able to come back after it has moved.	The boat will be moving during cable laying activity so birds will be able to return to any specific area once the vessel has moved through. However, the speed of the boat is at a pace where it will look as if it is stationary for the majority of the time to birds due to tidal movements, minimising any flushing response. Awel y Môr therefore seek agreement that this approach is acceptable.	Natural England agree that this approach is acceptable.
12	Assessment is needed for the impacts of vessel movement during operation and maintenance for red-throated diver and common scoter.	Vessel maintenance routes are not known, so at present numbers are currently not available, therefore a precautionary qualitative assessment has been undertaken. Additionally, Awel y Môr propose to include a vessel management plan which will include the measures identified in the plan level HRA e.g. avoid rafting birds, using regular routes where it is practicable. This minimises the risk to red-throated diver and common scoter during maintenance. Awel y Môr therefore seek agreement that this approach is acceptable.	The commitment to a vessel management plan is welcomed. It should be considered that the most effective mitigation that could be included is the planning of routes to avoid areas where divers and scoters are likely to occur. A quantitative assessment of impacts arising from vessel movements should be presented. For both red-throated diver and common scoter a 2km buffer and a 100% displacement rate from that buffer should be considered. It is accepted that vessel routes are not yet known, in which case a worst-case scenario should be assessed, assuming vessel transits through the Liverpool Bay SPA. Impacts should be considered in light of the conservation objectives, and therefore include an assessment of lost of habitat and changes in distribution as well as estimated mortality.

For clarification of any points in this letter, please contact me using the details provided below.

Yours sincerely
Aurélie Bohan-Rayson

Strategic Coastal Lead Adviser
Coast and Marine Team
Cheshire, Greater Manchester, Merseyside & Lancashire Area Team
[redacted]

☒ The advice provided in this letter has been through Natural England's Quality Assurance process.

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Cc commercialservices@naturalengland.org.uk

Awel y Mor Migrant Screening Matrix

Adam Cooper
Senior Marine Advisor
14 January 2021

Introduction

This advice is provided in response to the Awel y Mor Migrant screening Matrix (dated 22/12/2021).

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

The customer acknowledges that the content of any advice or assistance provided by NRW is advisory only and that it shall not be deemed to bind or in any other way restrict NRW in performing its statutory functions.

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Advisors consulted:
Ornithology

Advice

NRW welcomes that the majority of welsh wintering SPA features have been screened in within the migrant screening matrix. However, NRW advise that pintail should be included as this species is a wintering feature of multiple welsh SPAs, but has not been selected for modelling.

It is not clear why some breeding sites/features have been left out such as Anglesey terns SPA but then breeding Little tern for the Dee has been included in the matrix. NRW advise that all of the relevant sites should be assessed in this manner, breeding and non-breeding (breeding sites currently omitted that NNRW would like assessed are Aberdaron Coast and Bardsey Island SPA, Anglesey Terns SPA, Grassholm SPA,Skomer, Skokholm and the Seas off Pembrokeshire SPA).

3.2 Appendix F3: Marine Ecology and Marine Mammals

Awel y Mor Fish and Shellfish Ecology Technical Baseline Report Consultation Response (Revision 1 – October 2020)

Adam Cooper
Senior Marine Advisor
20 November 2020

Introduction

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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Advisors consulted

Ida Tavner, Specialist Advisor Marine and Estuarine Fish

Advice

Key Issues

NRW welcomes the report and, subject to the comments below, advise that the report appears to fulfil its purpose as defined in section 1.2, to provide a robust assessment of the available fish data to form a baseline for the project for the purposes of the EIA. NRW furthermore agrees that sufficient data exist and that no additional fisheries surveys are required for the project.

Detailed Comments

NB * please note page numbers referred to below are those given by the pdf reading software rather than those in the footer of the document (as the numbers in the footer only start relatively near the end of the document, and differ from that given by the pdf software).

p.37, Section 3.3.8 Species of Conservation Importance. NRW have provided comments on the HRA screening report for the project and we would advise that the 100km buffer proposed in the HRA Screening report is adopted for screening in riverine and estuarine SACs for diadromous fish, as fish are mobile species and the migration routes and feeding areas are unknown.

p.37, Section 73 – the river Dee is designated under EU Habitats Directive for Atlantic Salmon. - '*As noted within the "Salmonid and fisheries statistics for England and Wales 2018" salmon rivers within England and Wales are considered to be predominantly 'at risk' or 'probably at risk', with year on year catches of salmon (net) broadly stable for 2017 and 2018 (10,133 and 10,645 respectively) but overall declined when compared to the 5-year mean. The England and Wales statistics draw on combined rod and net fishing statistics, with the 'rod days' decreasing during this period from 164,000 to 106,000, and the net licences also reducing from 304 to 231.*' To contextualise these numbers the text should specify that these totals are for all rivers 64 in England and Wales.

p.39, Section 81 – the rivers of primary importance – Tywi, Wye and Usk are also designated SACs for shad spp.

p.39, Section 84 – both lamprey species are also designated on the river Dee and Bala lake SAC.

p.46, Table 3.2 - Conservation Fish VERs – Atlantic salmon should be classed as International importance due to being designated in the River Dee and Bala lake SAC, River and Sea lamprey should both be included and classed as of International Importnace due to being a feature of the Dee Estuary SAC. Both these SACs are within the AyM study area.

p. 49, section 109 - *'Locally, on the North Wales coast, commercial fishermen take the view that the salmon approach from the west, through the Menai Strait, moving on the flood tide over the intertidal areas rather than further offshore.*' NRW notes this as a very interesting statement, however there is no reference for where it originated. It is not considered sufficient however, to scope out Atlantic salmon.

Section 110 – *'Sea trout do not appear to take the same sea migration as salmon, but remain in coastal waters, likely close to their natal river. In addition to this, they are considered more likely to enter an estuary and wait there in the pools for conditions to be right for the run upriver rather than remaining at sea off the estuary mouth as salmon tend to do. Taking this into consideration, is it considered unlikely that sea trout will have any interaction with the proposed AYM site'.* As above – there is no reference for where this statement originated. It is not considered sufficient to scope out Sea trout.

p. 52, section 4 Conclusions – NRW would agree that the surveys and information presented in report is sufficient to define a list of baseline species, their distribution and use of habitat within the defined study area.

Awel y Mor Cumulative Effects Assessment Methodology Consultation

Adam Cooper
Senior Marine Advisor
21 December 2020

Introduction

This advice is provided in response to the Awel y Mor Cumulative Effects Assessment document version 1.0, dated November 2020.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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Specialisms consulted on:

Marine Topics
Marine Ornithology
Physical Processes
Benthic Ecology
Marine Mammals
Fish

Marine Water Quality

Onshore Topics:
Flood Risk
Designated Sites
Air quality
Protected Species
Water Framework Directive / Migratory Fish
Hydrogeology/Land contamination

Marine Advice

Overarching Comments

There are concerns across a variety of specialisms regarding the lack of information given to justify the distances used in identifying the Zones of Influence. We advise that further clarification should be provided.

Marine Ornithology

Key Issues

It is not clear how the initial screening ranges have been decided upon.

Detailed comments

Page 13, 4.2.1, 22: The applicant states *"…these initial screening ranges are based on what are considered to be the maximum extents of potential impacts from those activities and are therefore considered to be highly precautionary."* It is not clear how these initial screening ranges have been decided upon.

Page 13, Table 4.2: The proposed zone of influence for offshore energy for example, is 500km. We are concerned that there may be offshore energy projects further away than 500km which could be impacting upon some bird species from Welsh seabird sites. The potential effects should be looked at for each site on a case by case basis and should be based on a suitable evidence base e.g. tagging and tracking studies, foraging ranges and the relevant BDMPS (Furness 2015).

It should also be noted that SPAs in other countries could be affected cumulatively with Awel y Mor and other projects. The analysis of the ornithological survey data will enable this assessment to be made.

Physical Processes

Comment 1 – 4.2.2 – Tiered approach paragraph 30
States *"It is noted in PINS Advice Note 17 that where other projects are expected to be completed before the construction of the proposed NSIP and the effects of those projects are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of assessment in the construction and operational phase (noting that the assessment should clearly distinguish between projects forming part of the*

baseline and those in the CEA).” It is important that baseline is kept updated particularly if new construction is completed.

We advise that any model scenarios which define the baseline physical processes assessment for Awel y Mor must include any new projects that will be in place prior to the construction phase of Awel y Mor. It is noted in the Physical processes method statement Table 1. Key sensitivities and potential impacts for the Physical Processes topic, under cumulative that there is a potential for cumulative changes in hydrodynamics, waves and sediment transport arising from interaction with other wind farms including Gwynt y Môr, Rhyl Flats, North Hoyle Burbo Bank and Burbo Bank Extension and as a result they will be included as part of the baseline scenario for the proposed hydrodynamic and wave modelling.

Comment 2
Please include Project Flagstaff (Tidal Lagoon on the Welsh side of the Dee Estuary) as a potential project under consideration at present. It is not included on Figure Offshore Renewable Energy (Offshore wind, wave and tidal).

Comment 3 – Table 4.6 Topic-specific screening ranges applied to the long list
The maximum extent of effect and justification for physical processes is 15 km from the array area and offshore ECR, based on the distance of one tidal excursion ellipse. This 15km extent is also used to define marine water and sediment quality, benthic subtidal and intertidal ecology and marine archaeology. Clarification is needed regarding what evidence has been used to define the 15km excursion extent for the North Wales coast. The maximum spring tidal excursion ellipse buffer should be used and will be site specific and may vary from inshore to offshore depending on the bathymetry and hydrodynamic forcing.

Comment 4
Please clarify why coastal protection works (e.g. sea walls, groynes, breakwaters, revetments, beach nourishment) is not factored into Table 4.6 topic-specific screening ranges and please define how the maximum extent of effect for the coastal protection works will be determined. Coastal protection works is considered as onshore works (Table 4.3). However, such works may also extend below MHWS including the beach foreshore and intertidal and therefore should also be considered as offshore works.

Benthic Ecology

Table 4.6 Benthic subtidal and intertidal ecology
We refer the applicant to comments made by NRW Physical Processes Specialist with regards to the screening range applied.

Page 19, Map Offshore renewable energy projects
We advise the applicant there are two Tidal projects in concept/early planning in the Dee Estuary: Mersey Tidal Lagoon and Project Flagstaff (A tidal Lagoon on the Welsh side of the Dee Estuary)

Marine Mammals

Zones of influence
It is not clear how the initial screening ranges have been decided upon. This should be clarified.

The cables and pipelines zone of influence of 50km doesn't makes sense at 50km when others with similar impact pathways have larger ZoI – cables may have unexploded ordnance issues, causing underwater noise disturbance which may extend beyond 50km.

Table 4.6 – Topic specific screening ranges, for marine mammals it states that it will be *" Dependent on the reference population extent, i.e. the Celtic and Irish Seas management unit for harbour porpoise.*" We support this and advise that the relevant management unit should be used for each marine mammal species.

Projects missing from the long list:

1. Greenlink Interconnector
2. Morlais Tidal Development Zone (West Anglesey Demonstration Zone is included as a tidal energy lease area, as is '*Morlais Orbital 02'* which we are not familiar with. This may need to be corrected with the full description of the Morlais project).
3. Under the category Military, Aviation and Radar –the firing ranges at Aberporth and Castlemartin should be included.

Marine Water Quality

Table 4.6
In addition to Comment 3 of the Marine and Coastal Physical Processes comments. Please clarify what evidence has been used to derive the 15km excursion extent.

Onshore Advice

Overarching Comments

We note that the document refers to other relevant projects that will be considered as part of the cumulative effects assessment. We consider that the local planning authority (or other determining authority as appropriate) to be best placed to advise on the list of relevant projects.

Flood Risk

We would expect that other on shore projects assess both construction techniques and timings of any crossings of watercourses and/or flood defences to ensure that there is no cumulative impact. The screening distance will therefore be associated with individual flood plains and flood defence assets. This is likely to be included in the Cumulative Effects Assessment and any other site specific Flood Consequence Assessments complied for each project.

Designated Sites

We note that Table 4.6 refers (for Terrestrial Ecology) to a 5km precautionary screening range but adds that "*distances will vary depending on the type of development/the potential impacts anticipated and the ecological receptor that may be affected*". We agree that distances will need to consider impacts on mobile features of any designated sites.

We can provide further advice once in receipt of more detailed information regarding the likely impacts of the scheme.

Air Quality

With regards to dust, we request clarification as to where the 700m screening distance comes from. Our advice with regard to dust relates to impacts on protected sites. Clarification on how the 700m screening range is derived would be useful.

In relation to traffic, we note that table 4.6 that cumulative effects will be assessed where "*there is a spatial and temporal overlap in terms vehicle movements generated from both the proposed development, and other committed developments (no set distance as this is determined at a transport level*)". For information, and in considering the guidance in DMRB, we would consider 200m to be the screening distance from the road, for all affected roads, to require assessment of impacts on designated sites. As highlighted in table 4.6, the cumulative effects assessment should then consider where these impacts overlap.

Protected Species

We consider the screening range to be appropriate.

Water Framework Directive / Migratory Fish

In relation to migratory fish (including as a biological element of WFD water bodies) we note that the crossing of watercourses may affect migratory fish (and possibly from Horizontal Direct Drilling during sensitive times). As detailed in Table 4.6 (Terrestrial ecology) "*distances will vary depending on the type of development/the potential impacts anticipated and the ecological receptor that may be affected*". The cumulative effects assessment should take account of migratory routes of any impacted species. The WFD Compliance Assessment, which we assume to be a standalone assessment, will also need to consider cumulative effects.

Hydrogeology/Land contamination

We consider the screening ranges to be appropriate.

Awel y Mor Cumulative Effects Assessment Methodology Consultation

Adam Cooper
Senior Marine Advisor
05 January 2021

Introduction

This advice is provided in response to the Awel y Mor Cumulative Effects Assessment document version 1.0, dated November 2020. The advice concerns fish only and is an addendum to the wider advice provided on other topics on 21 December 2020.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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Specialisms consulted on:

Fish

Advice

Table 4.6, - screening ranges maximum extent and justification for fish and shellfish receptors.

The text says:
"50 km from the array area, based on a precautionary impact range from underwater noise. 15 km from the offshore ECR, based on the distance of one tidal excursion ellipse."

While we agree with the range proposed for the offshore ECR with regards to fish, we would advise that further justification for the proposed range of 50km for UW noise for the array area. As discussed at the ETG meetings, fish are a mobile feature and as such, may be exposed to an impact outside sites where they are protected, and a 100 km range has been agreed as appropriate for the HRA. Furthermore, UW noise is the only impact mentioned, it is not however, the only potential effect which should be considered relating to Cumulative Effects from other plans or projects.

Finally, it would appear that the proposed tidal lagoon in the Dee estuary (the Flagstaff project) has been missed off the list of potential projects. Wylfa Newydd is included but only in the on-shore cumulative matrix. We would advice that both projects be included for offshore and ECT, as they may have elements, such as dredging/ marine infrastructure works which may act cumulatively with the AyM development.

Awel y Mor Physical Processes Method Statement Consultation

Adam Cooper
Senior Marine Advisor
21 December 2020

Introduction

This advice is provided in response to the Awel y Mor Marine Water and Sediment Quality-EIA Scope Position Paper, Revision 1 dated November 2020.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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Advisors consulted:

Kate Borrowdale, Specialist Advisor, Marine Water Quality

Advice

Section 2 paragraph 8. We acknowledge the clarification that any activity with the potential to generate SSC has been scoped in and will be included in the WFD assessment.

We welcome the explicit inclusion of the release of bentonite via Horizontal Directional Drilling (HDD) in the assessment (Table 1).

3.1 paragraph 14 We cannot agree to scope out transboundary issues at this time. Clarification on the Inspectorates assessment is requested.

We note what has been said in 3.2.1 and Table 2 regarding the non-turbidity impacts on water quality through the release of bentonite and agree that this can be scoped out of the EIA for MW&SQ receptors.

We note what has been said in 3.3.1 regarding the impacts on water temperature through the presence of cables and agree that any thermal heating from the cables would be minimal. We agree that this can be scoped out.

We are hesitant to scope out the impacts on water quality from scour (3.3.2) at this stage without further evidence that the sediment is not contaminated. There is not sufficient evidence to show that there are no contaminants in the sediment, further investigation and sediment sampling Is required. The impacts of scour should be included in the coastal and physical processes section of the EIA.

We agree that the impacts on the marine environment from onshore activities (3.4.1) will be covered in the WFD assessment and so it can be scoped out of the EIA. However, we ask that there is a linkage between the assessment of the methods and the potential for turbid run-off in the Hydrology, Hydrogeology and the Flood Risk chapter and the MW&SQ chapter of the Awel y Mor EIA.

3.4.2 Impacts on the marine environment through cable breakages. Providing that oil filled cables are not used, we agree that this can be scoped out.

Other notes
Table 1 – Impacts proposed to be scoped into the MW&SQ assessment
In the decommissioning project phase, the description mentions construction activities

Awel y Mor Physical Processes Method Statement Consultation

Adam Cooper
Senior Marine Advisor
21 December 2020

Introduction

This advice is provided in response to the Awel y Mor Physical processes method statement document version 3, dated November 2020.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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- any advice given by NRW may be overtaken by changes in available information, law, policy and guidance relevant to the subject matter of the advice.

Advisors consulted:

Jo Ibrahim, Specialist Advisor, Marine and Coastal Physical Processes

Advice

Q. Have all potential impacts resulting from Awel y Môr OWF now been identified for the physical processes assessment?

Comment 1 Section 3 Key Marine Coastal Processes Issues
Physical processes also have the potential to indirectly impact the Water Framework Directive Coastal Water body status. Please ensure that the WFD assessment is linked to Physical Processes impacts.

Comment 2 Table 1: Key sensitivities and potential impacts for the Physical Processes topic
We note that our previous comments on the physical processes assessment EIA Scoping Report have been taken into consideration and we are satisfied that all potential impacts resulting from Awel y Mor OWF on the physical processes have now been included. However, we would require that table 1 is more explicit when defining "*changes at the coast"* caused by cable installation at landfall. This will depend on the method chosen whether it will be HDD or cable protection across the intertidal. Cable protection across the intertidal will cause a direct physical barrier to longshore sediment transport and will alter the hydrodynamics which can cause changes to the beach morphodynamics locally as well as causing changes to the regional coastal morphology through sediment starvation to downstream locations.

Comment 3 – Bottom paragraph page 4
We welcome that the Project Design Statement (which will be described in the Offshore Project Description chapter of the PEIR/ ES) will provide information on the nature and extent of the ground preparation works that may be required to install the WTG foundations. We further note that this information will also be set out clearly in the Physical Processes chapter (as it underpins several of the assessments) and will include information on (for instance) how much sediment would be excavated and displaced or disposed of for the whole footprint of the OWF. Please confirm that the ground preparation works will include the amount of sediment removed through sand wave clearance in preparation for laying the export cable (if chosen route necessitates sand wave clearance), as well as the WTG foundation preparation? We also require that the actual volume of sediment to be excavated/disposed is described by its percentage distribution of fines, sands and gravel.

Q For the identified potential impacts, do you agree that the combination of methods described (which now include both new numerical modelling and evidence-based assessments) are sufficient to inform a robust impact assessment?

Comment 1 - Section 4 Methods and Techniques
We welcome the decision to undertake new numerical modelling to support the assessment of potential changes to the wave and hydrodynamic regime.

Comment 2 - Table 2 Proposed Assessment Approaches
Construction - Potential changes to suspended sediment concentrations, bed levels and sediment type/ character arising from construction related activities including dredging, drilling and cable installation.
We note that the proposed approach does not consider it necessary to undertake new numerical modelling of suspended sediment plumes, but to combine evidence built from analogous projects including the existing numerical modelling of sediment plumes undertaken for the adjacent Gwynt Y Mor wind farm ES. We have reviewed the details and examples of the spread-sheet based tools used to provide estimates of plume extent, concentration and associated changes in bed level for Hornsea 3 OWF from the link provided in the table. We note the intention to use standard empirical equations describing the relationship between hydrodynamic forcing (peak current, water depth, Hs) and sediment transport or settling and mobilisation characteristics of sediment particles (sands, gravels and fines) released during construction activities (e.g. Soulsby, 1997). The spread-sheet based modelling approach only provides assessment of SSC horizontal advection distance in relation to flow speed and the sediment properties and is more suited for sands and gravels. For fines, however, the spread-sheet based approach does not take into account the lateral dispersion of fine particulates (mud, silt and fine sand) caused by turbulent diffusion or does it provide the quantitative spatial extent and direction of the sediment plume over a given tidal cycle. This is best described using plume dispersion modelling.

It is further noted from the review that the existing evidence base from Hornsea Project One and Hornsea Project Two was used to validate and corroborate the findings of the independent quantitative analyses carried out for Hornsea Three. For instance, plume dispersion modelling was carried out to inform understanding of construction related impacts associated with Hornsea Project One and Hornsea Project Two and was used to validate the findings of the independent spreadsheet based models used to inform the Hornsea Three sediment plume assessments. Clarification is needed for Awel y Mor OWF, if it is proposed to validate the proposed spread-sheet based model outputs with earlier modelling carried out for Gwynt y Mor OWF (pre 2005)? We cannot agree with this approach as we have not seen any of the modelled outputs from Gwynt y Mor OWF. We do not know what type of models were used or the level of confidence derived from the model outputs (particularly as modelling techniques have advanced significantly since 2005), and whether the maximum design scenarios conducted for Gwynt y Mor ES are representative of what is proposed for Awel y Mor (e.g. the nature of the sediment disturbance, the sediment type and environmental conditions) and if the outputs can provide direct relevant evidence for Awel y Mor OWF.

An evidence-based approach to impact assessment relies upon it being demonstrated that the aspect of the proposed development being assessed (or other developments in a cumulative sense) remains of a sufficiently similar character (e.g. operation type, foundation type and number etc.) to an existing consented development or other close analogies, located in a similar environmental context (elevations, currents, waves, bathymetry, geology and seabed sediments, SSC and sediment transport). Clear demonstration is required that the sourced data is fit for purpose and still valid to characterise present day conditions.

In light of our concerns highlighted above, We are not comfortable ruling out the potential need for new numerical modelling of suspended sediment plumes to inform the Awel y Mor OWF assessment at this time.

Comment 3 - Table 2 Proposed Assessment Approaches
Construction - Potential changes to suspended sediment concentrations, bed levels and sediment type/ character arising from construction related activities including dredging, drilling and cable installation.
It is not clear at this stage how much material will be dredged/disposed of during construction or if the material will be disposed of at a designated disposal site (which is presently unknown) and potentially outside the study area or is within the study area and will be returned to the seabed nearby to the dredging location. We acknowledge that, in relation to SSC and bed levels, an assessment will be included at the disposal site, as required in relation to construction activities (table 1). We are again not comfortable in ruling out the requirement to undertake new numerical modelling of suspended sediment plumes to inform the disposal site assessment at this time, particularly as the spread sheet modelling requires validation using existing numerical sediment plume modelling of a similar environmental setting as stated for the Hornsea 3 example provided.

Comment 4 -Table 2 Construction - Potential changes to suspended sediment concentrations, bed levels and sediment type/ character arising from construction related activities including dredging, drilling and cable installation.
It is stated that "*Instead, spreadsheet assessments will be developed to quantitatively inform the assessment of potential changes to suspended sediment concentrations and bed levels caused by construction activities. Results will be provided for a range of hydrodynamic conditions and sediment types, capturing the realistic worst case (in terms of plume extent, concentration and sediment deposition). The available baseline information and the planned site-specific surveys will provide the data inputs for this assessment*." Can you please clarify what planned site-specific surveys will be carried out to provide the data inputs for this assessment and the other assessment namely Potential changes to the coast arising from cable installation at the landfall?

Comment 5 - Table 2 Construction
Potential changes to Constable Bank/ Rhyl Flats owing to the combined influence of sediment removal activities e.g. dredging and sandwave clearance
Can you please clarify how you will assess the rate of recovery of Constable Bank following sand wave clearance (if export cables are routed through the feature) when you only intend to use existing outputs from marine aggregate EIA studies (including hydrodynamic, wave and sediment transport modelling of other dredging related seabed modification scenarios).
Please note: To compare sand wave recovery assessments of other windfarms, there must be similarities between the morphodynamics in each area and seabed characteristics e.g. sediment mobility and migrating bedform features.

In order to carry out a sand wave recovery assessment you need to know the following:
- Water Depth
- Sand wave migration, direction and rate, symmetry, wavelength and crest orientation.
- Sediment transport potential and direction of net transport.
- Quantity of sand levelled (e.g. partial removal of sand wave crest or levelled down to seabed – base of sand wave).

It is estimated that recovery rates for sand waves are in the order of several years based on representative forcing conditions at a single water depth. Transport rates will vary along a cable corridor and as a result, bedform response will also be variable with larger flow speed or greater transport rates resulting in faster recovery.

Comment 6 - Table 2 Construction
Potential changes to the coast arising from cable installation at the landfall
States "*The short-term physical impact of cable installation at the landfall will be assessed as a desktop analysis, considering available relevant coastal processes data (e.g. LiDAR, inter-tidal topographic data, coastal monitoring reports etc.). The assessment will also draw upon observational evidence from other suitably analogous projects. The available baseline information and the planned site-specific surveys will provide the data inputs for this assessment."*

If the cable installation at landfall requires cable protection across the intertidal area, then the impacts on physical processes will not be short-term as is stated above. The potential impacts to the morphodynamics, hydrodynamics and sediment transport processes caused by the cable protection at landfall will need to be assessed for the life-time of the project and as a result we cannot agree with the approach to assessing the impacts relating to cable installation at landfall. It is not clear at this time how the cable will be installed at landfall (HDD or cable protection).

Which analogous projects will be used to inform the assessment process? We reiterate that an evidence-based approach to impact assessment relies upon it being demonstrated that the aspect of the proposed development being assessed (in this case cable installation at landfall) remains of a sufficiently similar character to an existing consented development or other close analogies, located in a similar environmental context (elevations, currents, waves, bathymetry, geology and seabed sediments, SSC and sediment transport). What planned site-specific surveys will be conducted to provide the data inputs for this assessment?

Comment 7 -Table 2 Operation
Potential for changes to the coast arising from any modification of Constable Bank
States "*Expert Geomorphological Assessment will subsequently be used to identify the potential for any changes to the bank to impart a morphological response to the adjacent coast*. *If a particular likely morphological impact on Constable Bank is identified, then this scenario would also be more explicitly modelled"*. If a particular morphological impact on Constable Bank is identified, how will the scenario be more explicitly modelled to determine the impacts on the coast if sediment transport modelling is not proposed to be undertaken?

Comment 8 - Table 2 Operation
Potential for changes to the coast arising from cable protection within inter-tidal/ nearshore areas.
States "*A semi quantitative assessment of sediment transport blockage by cable protection will be undertaken using desk-based techniques, drawing upon findings from analogous projects where possible. A similar approach to that described above has previously been undertaken by ABPmer to inform the Hornsea THREE physical processes EIA."*

We have reviewed the Hornsea 3 OWF Appendix 6 to Deadline I submission – Cable Protection in Designated Sites - Clarification Note. This report was written in response to comments made by the regulatory authorities regarding the maximum design scenario for the extent of cable protection within designated sites (Cromer Shoal Chalk Beds MCZ and North Norfolk Sandbank and Saturn Reef SAC) and the impacts that this will have on marine processes (i.e. potential for sediment transport blockage) and benthic habitats. The report draws on laboratory experiments and field observations (site specific quantitative information). There were concerns from the regulatory authorities that there was limited empirical (observational) evidence presented to support the assumptions and conclusions made.

If a similar assessment is to be conducted for Awel y Mor OWF , then it is critical that the aspect of the cable protection measures being assessed alone and cumulatively is of a sufficiently similar character (berm height, slope, method of protection) to existing consented development or other close analogies and located in a similar environmental context. Sufficient observational evidence must be presented to support any assumptions and conclusions made. The report for Hornsea 3 only considers the sediment transport blockage impacts in the nearshore environment and there is no reference to impacts on marine processes across the intertidal zone which also needs to be included in the MDS principle. What evidence will be used to assess the impacts across the intertidal associated with cable protection if it is proposed to use analogous projects as an evidence base?

Comment 1 – Section 5 Numerical Modelling Approach
5.2 General approach to modelling and design scenarios
Page 13 paragraph 1 states "*The results of the numerical model will be used to underpin the physical processes baseline understanding and various impact assessments described in Table 1. It is important to note that the modelling will not be used to assess the effects of very localised blockage effects of cable protection/crossings, dredging or dredge spoil disposal etc. These local effects will be semi quantitatively assessed using desk-based techniques, drawing upon findings from analogous projects where possible".* Please note our concerns detailed in comment 2 that we are not comfortable ruling out the potential need for new numerical modelling of suspended sediment plumes to inform the Awel y Mor OWF assessment at this time.

Comment 2 - Section 5 Numerical Modelling Approach
Page 14 states "*The wave direction and return periods above will be run for each of the four design scenarios described in Section 5.2. A single representative water level will be used for all model runs".* Please clarify if scenario model runs will be carried out to assess the naturally occurring variability in, or long-term changes to marine processes during the Awel y Mor OWF lifetime. This will encompass seasonal change as well as climate change (e.g. sea level rise). As noted in the Hornsea 3 ES, this assessment is important as it enables a reference level to be established against which the potentially modified marine processes can be compared, throughout the lifecycle of the wind farm.

Q. Do you agree with the principals behind the maximum design scenarios established for the identified potential impacts?

Comment 1 - Table 2 Construction - Potential changes to suspended sediment concentrations, bed levels and sediment type/ character arising from construction related activities including dredging, drilling and cable installation.
MDS Principle states *"For each activity type, the greatest rate of sediment disturbance (volume/time) will be assessed with respect to suspended sediment concentrations. Consideration will be given to the likely relative timing and proximity of multiple occurrences of such activities. Changes to bed levels as a result of sediment settlement or deposition will be assessed with respect to the largest sediment volumes from individual activities".* Please clarify that it is intended to model the worst case scenarios where multiple occurrences of different activities are occurring at the same time.

Comment 2 Table 2 Operation - Potential for changes to the coast arising from cable protection within inter-tidal/ nearshore areas.
MDS Principle states "*The assessment will consider the largest potential dimensions and extent of cable protection that might be realistically applied in nearshore areas".* We advise that the MDS Principle should also include both the nearshore and intertidal areas.

Comment 3 - Decommissioning
Potential changes to the coast arising from cable removal at the landfall
MDS Principle states "*The nature and scale of the activities are reasonably assumed to be similar to or no worse than those described above for Construction (installation of the cable at the landfall)".*

Please see comment 6 above in relation to short term effects. If cable protection is the preferred choice to install the cable at landfall, then there would be much longer-term effects on the coastal morphodynamics, which could have altered significantly over the lifetime of the OWF. We cannot agree at present with the assumption that removal of the cable protection will result in a short-term effect. More likely it will take much longer for the coastal morphodynamics to stabilise to a new equilibrium post removal.

Awel y Mor Array Boundary Options Consultation

Adam Cooper
Senior Marine Advisor
15 April 2021

Introduction

This advice is provided in response to the Awel y Mor Water Framework Directive Assessment – Scoping Paper, March 2021, Revision 1.

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Advisors consulted:

WFD (marine)
WFD (Freshwater)
Groundwater
Marine Water Quality

Advice

WFD (Marine)

Key Issues

WFD Compliance Assessment:

- We advise that the 2018 Interim WFD Classifications can only be used if provided alongside the 2015 Final Classifications for context. Please see below for further detail.
- We advise that detail on scoping the fish element is provided in the guidance (OGN72) and should be included in the Scoping Methodology (4.3.2.).
- We advise that the Screening step of the WFD Assessment has not been completed: the Directive requires a statement of which designated waterbodies could be affected and why.
- We advise that there are Sabellaria reefs within the ZOI that have not been identified or scoped into this assessment. (See below) Data should be procured from Lle.
- We do not agree that Hydromorphology can be scoped out at this stage.
- We advise that more clarity is required in the HMWB section of the scoping table.
- The HMWB Mitigation Measures for the North Wales Coastal waterbody are currently being reviewed, and will need to be incorporated into the WFD Compliance Assessment.
- We advise that the aforementioned Sabellaria reefs be scoped in under Biology – Habitats.
- We await the cumulative and in combination effects within the ZOI for comment.

Detailed comments

2.2. 10. Please note this paragraph taken from 'WFD Cycle 2 Interim Classifications FAQs English' from the Water Watch Wales website when referring to the 2018 interim WFD classification:
"How robust was the quality assurance of the estuarine and coastal classification compared to previous years?
Due to limited resources it was not possible to carry out a full quality assurance of the estuarine and coastal classification as undertaken in previous years. Where there is a change in status, the interim classification result must be used alongside the 2015 classification to provide context. Any decisions based on the interim classification will need to be carefully considered and will need to be informed by any investigations into the status change."

3.2. Consultation to Date: Table 1.
We welcome the inclusion of this table addressing out previous comments.

Table 1
Typo: the name of the resource is Water Watch Wales, not Wales Watch Water.

4. Proposed methodology
We welcome the use of the OGN72 guidance which has been provided in previous advice from NRW.

4.3.2., 40. We advise that key aspects of assessing whether the fish biological element is affected and must be scoped in include:

- whether the activity could impact on normal fish behaviour and movement/migration/spawning
- whether the activity could impact on species composition and abundance
- whether the activity could impacts on sensitive species and/or age structure of fish populations
- whether mechanical injury or death could occur as a result of the activity

These aspects should be included when scoping, in addition to the impacts proposed in section 40 by the Applicant. Please refer to OGN72 (section 3. Scoping) which has been provided to the Applicant previously.

4.3.3, 50. Further information is needed on the statement "the monitoring period (…) is understood to be six years". Many elements are monitored at intervals of less than 6 years and interim classification is provided at the mid-point of the cycle as well (3 years).

5. AyM WFD Screening.
The purpose of the Screening Stage of the WFD Compliance Assessment is to ensure that activities that may cause deterioration or prevent a waterbody from meeting its objectives are assessed further. The Directive requires that waterbodies that are likely to be impacted by the project are identified and screened in, so that the potential impacts can be scoped in the next stage. A statement is needed to show which waterbodies have been screened in and why.

For example, a sentence such as those regarding the North Wales Coastal and Clwyd Transitional waterbodies in paragraph 68 would suffice to address the Screening Stage of the Assessment. Detail of how each aspect of the project (detailed in the Screening Section (5)) could cause an impact would be useful as well.

6. AyM WFD Scoping

Fig. 5. We advise that there are Sabellaria reefs within 2km of the proposed cable route which have not been presented in this figure and which must be scoped in. In addition, we advise the presentation of the map is not clear and could be improved. In future, we advise that Lle be used to procure data and GIS layers rather than Magic.

The Lle layers for Sabellaria can be found here: Lle - Environment (Wales) Act Section 7 and OSPAR: Marine Habitats (gov.wales)
(Section 7 Honeycomb Worm Sabellaria alveolata Reef Point)

Table 7:

Hydromorphology
We do not agree that hydromorphology can be scoped out at this stage as we do not yet know for certain what cable protection will be used or how it might affect hydromorphology

in the waterbody. Cable protection would be a permanent alteration to the coastal form, and therefore changes to hydromorphology cannot be scoped out until more detail of the potential changes to the seabed are known.

HMWB

We advise that the justification for 'no impact' could be misinterpreted. The Applicant is correct in stating that the waterbodies are not Modified for renewable energy, however this means that the potential impacts of the project on the Mitigation Measures or potential Mitigation Measures of the HMWB do not need to be considered, and the project "should be treated as a new modification". It does not mean that no further consideration needs to be taken of all potential impacts within the waterbody. Section A1.4. of the OGN72 provides more detail.

On Water Watch Wales, the Mitigation Measures for the HMWB North Wales Coastal waterbody (GB641011650000) are recorded as "not applicable - not required in this waterbody". However we advise that we are currently reviewing these, and will keep the Applicant apprised of any developments. Any updated Mitigation Measures for the HMWB will need to be taken into account in the WFD Compliance Assessment to ensure that the project does not compromise the improvement of the waterbody.

Biology – Habitats

We advise that the comment above (Section 6, Figure 5) regarding Sabellaria reef be revisited in this section as they constitute a protected habitat under the WFD.

Biology - Fish

We agree that entrainment/impingement of fish can be scoped out as although possible, these are unlikely to be at a level of concern.

INNS

We await the further detail provided in the detailed impact assessment to comment further.

6.6. Cumulative and in combination effects.

We await the cumulative and in combination effects within the ZOI for comment.

Table 10:

We do not agree that hydromorphology can be scoped out at this stage. See above.

We welcome being consulted at each stage of the WFD Assessment, as well as the Applicant's willingness to address the advice we provide to ensure their compliance with the WFD.

WFD (Freshwater/Onshore)

Section 1

1.2 para 3 The purpose of the assessment is wider than potential for deterioration, it is also about ensuring that activities do not jeopardise the attainment of good status or of good ecological potential and good chemical status by the date laid down by the directive. A better description is already provided in the last sentence of section 2.5 para 22 and could also be used here?

Section 2

2.1 para 6 We note recognition of the changed legislative context since leaving the European Union - please note that there may be different legislative positions in England and Wales so this section needs to reflect that. The draft updated river basin management plan currently out for consultation includes some information on exit from the European Union on page 6 section 1.1.1.

2.2 para 8 We advise that NRW now refers to "WFD Regulations 2017" since EU exit. WFD regulations 2017 is a shortened version of Water Environment (Water Framework Directive) (England & Wales) Regulations 2017.

2.4 Daughter directives - these are usually referred to as Protected Areas rather than daughter directives. Shellfish directive was repealed by the Water Framework Directive (2000/60/EC) in December 2013. There are other protected areas (that were formerly directives) that are applicable to the terrestrial environment that aren't mentioned here, reason for singling out these two is unclear.

Section 4 Proposed assessment methodology

4.3.2 para 26 and para 42 - invertebrates are missing from the list of freshwater receptors.

Please note that eels are included within "fish" element.

Macrophytes and diatoms - we advise while nutrient enrichment is the primary pressure indicated by these elements, there are other pressures that can affect these elements. For example, macrophytes can be affected by hydromorphology and pollution by toxic chemicals.

Para 43 Groundwater - we advise that there are other aspects for impacts on groundwater body, as groundwater status is assessed via quantitative as well as qualitative elements. Groundwater can be a pathway and a receptor.

Para 46 We advise that there is also a section on Temporary Works in the NRW internal guidance, OGN 72, section 4.1.

Para 50 – "*In this assessment, the monitoring period interval is aligned with that of the RBMP, which is understood to be six years*." Please can further explanation of this statement be provided. Monitoring frequencies are different for different elements of the classification, many are less than 6 years. An interim classification is provided at the mid point of the cycle as well. This relates to the point made above about para 46 and the definition of temporary.

Section 6 AyM WFD scoping

6.1.2 Relevant river water bodies

- We agree with the scoping in of the 5 river water bodies identified.
- We also advise that the project area also crosses "non-reportable water bodies" – the area of land between the coast and the Gele and Glandfyddion water body catchments.

The small water courses in the Prestatyn and Rhyl areas were water bodies in their own right in cycle 1 but removed following a review of water body delineation for the current cycle 2 plan (2015-2021). Any potential impacts on these non-reportable water bodies from the onshore works should be assessed in terms of the impact on the downstream receiving transitional or coastal water courses. The flow is managed in these water bodies with flood risk management structures. Further advice can be provided as required.

- There is a further advice on non-reportable water bodies in OGN 72 section 3.1 reproduced below, with particularly relevant points boldened:

"Small non reportable water bodies

Some stretches of water are too small to be a formal WFD water body, or are too small to show up on a map of the water body such as reens, ditches, streams or brackish lagoons. These are still legally protected from pollution, modification and abstraction and where an environmental issue is identified, it can still be improved where local actions and assessments deem it a priority. ***Where a new activity or project is planned then assessment and licensing should be made to protect, and where necessary improve them to the extent needed to achieve the Directive's objectives for water bodies to which they are directly or indirectly connected****. It is likely that these stretches of water are not monitored by NRW and their status will not be reported.* ***In the absence of any classification it should be assumed that they are at 'good' status and any deterioration from 'good status' be assessed as a result of a new activity.*** *Some of the published WFD assessment tools may not be appropriate for these stretches of water due to their unique nature and you should contact the NRW UK Technical Advisory Group (WFD team) to discuss appropriate standards and tools.* ***In the absence of any monitoring or classification data, or for more complex situations, an expert judgement assessment of the potential impact of an proposed activity against the normative definitions of status in Annex V of the WFD would be appropriate."***

6.2 para 75. Although Prestatyn bathing water is outside of the 2km WFD buffer zone, the tidal currents in that area will push any suspended sediment concentrations arising from the cabling works towards the shore. We therefore advise that Prestatyn bathing water should be scoped into the WFD assessment.

Table 8 WFD freshwater water bodies scoping and then summary in Table 10 WFD freshwater water bodies scoping:

Physical habitat (hydromorphology) - Although trenchless crossings are "proposed", until it is confirmed that all water course crossings will be undertaken using trenchless techniques, we advise this should be scoped in.

Water quality scoping – it is unclear from the table if "accident spills and pollution events" scoping in include the potential impact on water clarity from soil being leached into water courses. We advise that there is not yet sufficient information evidenced to support scoping out risk of turbid run-off from the assessment. Such evidence needs to be signposted from this document. There may be different risks in different freshwater water bodies depending on, for example, the exact cabling route, length of cabling, proximity to watercourses, duration/timing of works. Turbid run-off from the freshwater environment

also has the potential to also affect protected area (bathing waters), particularly if there were microbial contaminants associated with this.

Invertebrates are currently missing from the assessment (as noted for 4.3.2 para 26 and para 42).

Macrophytes and diatoms. We advise these should be scoped in until further information is available on mitigating risks to water clarity (see comment on water quality scoping).

Freshwater scoping table does not have any information on protected areas or INNS, unlike the marine Table 7, although we note that Table 10 has potential impact scoped in for Protected areas.

Physical habitat is duplicated in freshwater section of Table 10

NRW will publish an updated 2021 WFD classification in the final river basin plan, due December 2021.

Groundwater

Table 9

We note this only considers the risk of contamination during excavations and trenching of cables – mainly form leaks and spills of plant as work is undertaken (land contamination from historical contaminative land uses is not considered – but this is generally dealt with via conditions). We advise that the effect of dewatering of the excavation and trenches during the construction phase (which could potentially be cumulative along the cable corridor) should be considered.

More detail is needed regarding which parts of the cable corridor will need dewatering and for how long. An abstraction licence would be required for dewatering over 6 months or within set distances from sensitive receptors.

The operational phase should be very low risk and dewatering may only be needed during maintenance of cable failures etc..

Marine Water Quality

The comments provided herein relate to the marine water quality specialism, where we are typically interested in suspended sediment (typically of fines for long time periods), nutrients, oxygen, bacterial concentrations, temperature and salinity, and contaminants such as heavy metals and other substances.

2.2 .10

We reiterate the WFD (Marine) comment on this paragraph.

Table 1

Typo- it should read Water Watch Wales not Wales Watch Water

6.1.1 para 69
We refer you to the '2009-2015 Classification Data' and '2018 Cycle 2 Interim Classification Data' which can be downloaded from the Water Watch Wales menu. These spreadsheets show that the chemical fail for the North Wales waterbody is driven by a mercury fail. This failure first occurred in the 2015 classification and was 'rolled over' into the 2018 interim classification. The data used for the 2015 chemistry classification would have been collected in 2012, 2013 and 2014.

NRW apply a classification 'one out all out' methodology for chemistry. This means that if one component fails, e.g. Mercury, that waterbody would fail for chemistry.

The below excerpt is from NRW's internal Rules Document for WFD chemical classifications. Point iii explains why the term 'Fail' is used. The term 'Fail' in this instance can be used interchangeably with 'Moderate'. In relation to a chemistry classification Fail=Moderate which means less than Good.

"1.1.1 Chemical Status
i. Chemical Status classification should be derived from individual chemical substances assessed under the Environmental Quality Standards Directive (EQSD).
ii. Chemical Status should be reported for both natural and A/HMWBs.
iii. Chemical Status should be reported as Good/Pass or Not Good/Fail Status. For classification purposes these are reported as High or Moderate. This helps clarify how they align with the other elements when combined for reporting of overall classification. (Note that there is no definition of Chemical Potential even for A/HMWBs).
iv. Individual elements used in Chemical Status are only assessed in water bodies where there are concentrations of appropriate pollutants present in the water column.
v. If no Chemical Status assessment is made in a water body, it should be assumed to be "Good or better"."

6.1.2
We cannot comment on the river and groundwater WFD waterbodies as this is out of our remit as marine specialist advisors. We defer to NRW Environment Team for comment.

6.2 Para 75
There are two Rhyl bathing waters. Rhyl and Rhyl East. Clarification on whether both are included in the bathing water polygon is requested.

Although Prestatyn bathing water is outside of the 2km WFD buffer zone, the tidal currents in that area will push any suspended sediment concentrations arising from the cabeling works towards the shore. We therefore advise that Prestatyn bathing water should be scoped into the WFD assessment.

Table 7 Water Quality
We agree that effects on temperature or salinity as a result of export cable installation activities can be scoped out. We welcome the scoping in of the effects of increased suspended sediment concentrations as a result of construction activities, particularly due to the proximity of Rhyl and Rhyl East bathing waters which could be impacted by changes in microbiological patterns.

Phytoplankton status in the North Wales waterbody is Moderate and as such must be scoped in. We note that this is the case in Table 7.

We agree to scope out bentonite as a separate impact pathway however we would expect any increase in SSC loads caused by the drilling to be included in the ‘could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbiological patterns’ section. We welcome the scoping in of the potential for accidental spills and pollution events.

Due to proposed methodology design no sediments will be disturbed in the Clwyd waterbody. If this is the case and this methodology is chosen going forward, then we agree that the activity ‘disturbance of sediments with contaminants above Cefas Action Level 1’ can be scoped out for the Clywd waterbody.

We welcome the provision of the document Post ETG Note – Sediment Contaminant Results following the ETG meeting on 31st March 2021. With regards to the North Wales waterbody, Table 7 of the WFD Scoping Paper discusses project specific surveys which confirmed grain size as being predominantly sand with limited gravel fractions, metals below Cefas AL1 and PAHs below ERL values. Having reviewed the Post ETG Note – Sediment Contaminant Results alongside the WFD Scoping paper we can agree to scope out the activity ‘disturbance of sediments above Cefas Action Level 1’.

Awel y Mor Marine Mammal Comments - RIAA

Adam Cooper
Senior Marine Advisor
14 January 2021

Introduction

This advice is provided in response to the Awel y Mor RIAA Comments Log (received 8 December 2021). Advice is provided here on the Marine Mammal comments.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

The customer acknowledges that the content of any advice or assistance provided by NRW is advisory only and that it shall not be deemed to bind or in any other way restrict NRW in performing its statutory functions.

The recipient acknowledges that:

- any advice given or materials or documentation provided by NRW do not constrain or bind NRW in respect of its statutory functions or its role as a statutory consultee or any decision NRW may make in relation to any application for a licence or permit;
- any advice given by NRW does not bind NRW in respect of any future representations it may make as statutory consultee or any decision NRW may make in relation to any application for a licence or permit;
- any views or opinions expressed by NRW are without prejudice to the consideration NRW may be required to give to any application or any future representations as statutory consultee or any decision NRW may make in relation to any application for a licence or permit;
- the final decision as to any representations made by NRW as statutory consultee will be based on all the relevant information available to NRW at the time it makes such representations;
- NRW cannot and does not give any guarantee as to the representations it may make as statutory consultee; and,
- any advice given by NRW may be overtaken by changes in available information, law, policy and guidance relevant to the subject matter of the advice.

Advisors consulted:
Marine Mammals

Advice

Key comments

- We have no objections to addressing comments via the Expert Topic Group (ETG)
- We acknowledge the intention to refine the project design "to reduce concurrent piling as far as practicable" but judgements on the level and impacts of disturbance cannot be made before the revised project design is provided
- We welcome the intention to minimise the risk of collisions and adopt best practise, however as per our advice on the PEIR, we believe the potential for a Likely Significant Effect cannot be ruled out

Detailed comments

Topic; Marine mammals, Page 15 onwards

Stakeholder comment; concerns over increased disturbance from concurrent piling.

We acknowledge the intention to refine the project design "*to reduce concurrent piling as far as practicable*". The outcomes of this revision in terms of addressing this comment will depend upon the detail of the revised project design and so while we are content with the approach to reduce concurrent piling, any advice on the impacts of activities or the ultimate suitability of the approach taken to address disturbance from concurrent piling cannot be provided without this new detail.

Stakeholder comment; Annex II marine mammal features need to be considered – due to functional linkage to SAC's

We welcome the intention to *"assume that all animals in the MMMU are functionally linked to the SAC"*, which follows NRW's position on the use of Marine Mammal Management Units for screening and assessment in Habitats Regulations Assessments for Special Areas of Conservation with marine mammal features. For completeness, we highlight that it should be that all animals in the MMMU are functionally linked to the SAC's within the MMMU, as there are multiple SAC's for each Annex II species in each MMMU. If the approach taken follows NRW's MMMU position, then we can agree that the approach is acceptable.

Stakeholder comment; There is a possibility for LSE at some (identified) sites from vessel collisions or disturbance from vessel activity from either construction, operation & maintenance, or decommissioning.

We welcome the intention to minimise the risk of collisions and adopt best practise, and to agree these codes of conduct with NRW and JNCC. We agree this approach is acceptable.

However as per our advice on the PEIR, we believe the potential for a Likely Significant Effect cannot be ruled out. So while we agree to the approach to use best practise and codes of conduct is appropriate, our position on the potential for LSE remains. The information provided would likely be sufficient to inform an Appropriate Assessment, which

we would anticipate would be able to rule out an Adverse Effect on Site Integrity based on the mitigating actions described regarding best practise and codes of conduct.

Stakeholder comment; NRW has reservations on the approach taken regarding use of EDRs. However, at this stage NRW do not consider it likely that the conclusions of the RIAA on the impacts of disturbance from underwater noise sources in-combination would change should the approach be updated to follow NRW's recommendations to make it more robust.

EDR for UXO

Detailed comments will be provided in response to the relevant clarification note. We have no objections to addressing this comment via the ETG.

EDR for piling

We welcome the intention to apply the dose-response curve in the RIAA as per our recommendation, and are content this is acceptable. Advice on the content and conclusions of the assessment in light of this inclusion cannot be provided without sight of the revised RIAA.

Stakeholder comment; NRW are not content with the approach to assume that Annex IV European Protected Species are offered sufficient protections by this legislation such to conclude no impact on Annex II sites is possible from PTS onset. These assessments are conducted separately, and the assumptions of the protections of one piece of legislation should not be used to justify conclusions regarding the other.

We have no objections to addressing this comment via the ETG.

Stakeholder comment; NRW do not consider there to be sufficient detail in the outline MMMP to consider it effective mitigation of PTS as a pathway.

The approach to provide additional detail to the MMMP to be reviewed and agreed by the ETG is acceptable, but a judgement on whether the revised MMMP will be sufficient to mitigate the impacts cannot be made before a revised version is provided. We also note that the appropriateness of the conclusions of the RIAA, which rely on the MMMP to reach conclusions of no Adverse Effect on Site Integrity, will also depend on the content of the revised MMMP. Additional comment on the MMMP approach will also be provided in response to the cumulative PTS clarification note.

Stakeholder comment; NRW do not sign up to the use of EDRs in assessments. NRW recommend a more evidenced approach is taken to assess disturbance. Insufficient evidence has been provided at this time for NRW to reach a conclusion regarding the impact of disturbance from UXO.

EDR for UXO

Detailed comments will be provided in response to the relevant clarification note. We have no objections to addressing this comment via the ETG.

EDR for piling

We welcome the intention to apply the dose-response curve in the RIAA as per our recommendation, and are content this is acceptable. Advice on the content and conclusions of the revised assessment cannot be provided without sight of the revised RIAA.

Stakeholder comment; NRW do not agree with the statement that "works outside that period would effectively be subject to EPS licensing requirements and not HRA." The works would still meet the criteria such to be subject to HRA, but the content of the assessment will vary depending on the timing of the works.

We have no objections to addressing this comment via the ETG.

Stakeholder comment; NRW do not consider a sufficient argument is currently presented to justify the conclusion of low cetacean sensitivity to PTS.

Detailed comments will be provided in response to the relevant clarification note. We have no objections to addressing this comment via the ETG.

Awel y Mor Marine Mammal and Ecology ETG - Actions

Adam Cooper
Senior Marine Advisor
22 December 2021

Introduction

This advice is provided in response to the Awel y Mor Marine Mammal and Marine Ecology Expert Topic Group Actions (ETG held on 01/11/202, Actions shared on 26/11/2021). Advice is provided on the following clarification notes:

- Marine Mammal PTS Sensitivity to Piling
- Marine Mammal UXO Disturbance Assessment
- Fish Noise Sensitivity Weighting Justification
- Fish Spawning Potential

Advice on the following clarification notes will be provided by 14 January 2022:

- Marine Mammal Baseline Report
- Marine Mammal Cumulative PTS Onset

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

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- the final decision as to any representations made by NRW as statutory consultee will be based on all the relevant information available to NRW at the time it makes such representations;
- NRW cannot and does not give any guarantee as to the representations it may make as statutory consultee; and,

- any advice given by NRW may be overtaken by changes in available information, law, policy and guidance relevant to the subject matter of the advice.

Advisors consulted:
Marine Mammals
Fish

Marine Mammal Advice

Key Issues
Document; ETG Clarification Note: Marine Mammal PTS Sensitivity to Piling
- We are content with the revised sensitivity definitions.
- We still consider the appropriate PTS sensitivity score for grey seal to be 'low'
- We still consider the appropriate PTS sensitivity score for bottlenose dolphin to be 'medium.'

Document; ETG Clarification Note: Marine Mammal UXO Disturbance Assessment, Date: 26th November 2021, Revision: A

- A number of options have been omitted from the list of "*potential threshold options*". A broader review should be undertaken and options either demonstrated to be unsuitable or taken forward into the assessment.

Detailed comments

Document; ETG Clarification Note: Marine Mammal PTS Sensitivity to Piling Date: 26th November 2021 Revision: A

Background, page 1
It is stated that the purpose of the note is to "*Provide additional information on the results of the expert elicitation*" and "*Update the definitions for marine mammal sensitivity*". It is not clear if the additional information is intended to support the original sensitivity scores under the new definitions and seek agreement on these. We have provided comment on recommended PTS sensitivity scores in context of the new definitions.

PTS expert elicitation
Given the nature of the elicitation and the variety of responses, we consider it appropriate to consider the upper and lower percentiles of the elicited probability distribution for context in addition to the median. For some responses this range is small (0 - 0.23% for adult harbour porpoise survival, with a median of 0.01%) whereas for others it is much larger (0 - 14.79% for bottlenose dolphin calf survival, with a median of 2.96%). This demonstrates the degree of uncertainty in the response as well as in the conclusions of a process such as expert elicitation, which should be taken into account when applying such information.

Updated definition of sensitivity
We are content with the approach to revise the sensitivity definitions "*in order to adapt them from simple descriptions of the presence/absence of effect, to consider the likelihood of a significant effect instead.*"

Table 8 Updated sensitivity definitions to take forward to the AyM marine mammal ES, page 14

The revised definitions appear suitable for use in the AyM ES chapter. Ambiguity remains regarding what would be considered '*significant*', and this should be expanded upon based on contextual population information for each species as there is unlikely to be an appropriate single quantified definition.

Sensitivity scores
As stated, it is not clear if the additional information is intended to support the original sensitivity scores under the new definitions. Based on the content of the clarification note, our position on the sensitivity scores is as follows.

Harbour porpoise sensitivity score
Based on the revised definitions, and the information provided in the clarification note, we are content with a sensitivity score of 'low' for PTS from piling for harbour porpoise.

Grey seal sensitivity score
We consider the appropriate sensitivity score for grey seal for PTS from piling to be 'low'. Table 6 of the EE describes a "*very low*", but present impact from PTS caused by piling, which aligns better with "*individual vital rates (survival and reproduction) may be affected, but not at a significant level*" for 'low' than with "*Receptor is able to adapt behaviour so that individual vital rates (survival and reproduction) are not affected*" for 'negligible', as the ability of grey seals to compensate for PTS with behavioural adaptations is unknown and unverified, and the EE does not suggest an absence of effect based on this compensation mechanism, which would be required to conclude that vital rates "are not affected."

Bottlenose dolphin sensitivity score
We consider the appropriate sensitivity score for PTS from piling for bottlenose dolphin to be 'medium.'

Ability to adapt behaviour
There is insufficient evidence presented to support the position that bottlenose dolphin would be capable of using behavioural adaptation to compensate for PTS, which means a conclusion of 'medium' "*Limited ability to adapt behaviour"* is more applicable than 'low' "*Receptor is able to adapt behaviour so that individual vital rates (survival and reproduction) are not affected*" in the context of behavioural adaptation.

Tolerance
As stated above, the degree of uncertainty in the conclusions of a process such as expert elicitation should be taken into account when applying such information. The EE probility distribution varies widely. It is not necessarily a requirement to consider the 90th percentile as the worst case scenario, but rather than basing assessments on the median result only the range of responses should provide context. The upper range for calf survival, for example, was 14.79% whereas the median is only 2.96% (Table 5). This suggests to that there is debate and uncertainty as to the degree of impact, but that it may be possible it would reach a significant level. A conclusion of 'medium' does not require certainty of a significant impact, only that it "*may cause a significant change*", and thus would seem appropriate in the context of tolerance, whereas 'low' rules out any possibility of significant

impact "*individual vital rates (survival and reproduction) may be affected, but not at a significant level.*"

Recoverability
There is no evidence that bottlenose dolphins could recover from any impact to vital rates caused by PTS from piling. The threshold shift is by definition permanent, so without any evidence to support the possibility of another mechanism by which animals would be able to recover given that behavioural adaptation is considered separately, a conclusion that there would be "*Limited ability for the animal to recover*" for 'medium' would be more appropriate than stating that they would be able to "*recover from any impact on vital rates*" as is stated in the 'low' definition in the context of recoverability.

Document; ETG Clarification Note: Marine Mammal UXO Disturbance Assessment, Date: 26th November 2021, Revision: A

Available thresholds

EDR - 26 km

While our acknowledged position on EDRs remains, we do not object with EDRs being presented "*in the AyM EIA for context and for comparison*", but it is likely we would have reservations about applying EDRs in any final assessment.

Summary

The approach to review and present a range of possible disturbance assessment methods in the absence of agreed thresholds and base the conclusions of the assessments on this range of evidence, or potentially any agreed 'preferred' option, is acceptable.

However, other options for assessing disturbance should be considered and presented to complete the intended approach, such as the Lucke et al (2009) 145 SEL disturbance threshold listed in the 1st November 2021 Marine ecology and marine mammal evidence plan meeting slides, alongside the Soloway & Dahl (2014) method highlighted by us during the meeting (Marine ecology and marine mammal ETG meeting minutes, 2/11/21).

While it may be the case that conclusions regarding noise generation from UXO detonation are "*subject to uncertainty,*" the acoustics of underwater explosions are well-documented, with direct measurements and/or empirical equations having been made for example by Arons (1954), Weston (1960), Gaspin et al (1979), and most recently Soloway & Dahl (2014), alongside the phase 2 NPL UXO project (Cheong et; al., 2020). The existing equations given in the above literature are already conservative since they assume a mid-water charge, which has been verified in NPL's recent measurements and modelling work at Neart na Gaoithe and Moray East wind farms (NNG 2021, NPL 2021).

It may be possible to combine these disturbance assessment methods and the direct measurements, empirical equations, or applying models such as EDGAR part II (Brand 2021), to present a quantitative method for assessing disturbance, rather than relying on EDRs. If it is the case that any of these methods are not appropriate for any reason, the justification for this should be clearly presented to ensure all possible options have been

considered and the most suitable methods have been taken forward into the assessment to ensure a suitably robust approach has been used given the options available.

Fish Advice

Clarification note: Fish Spawning potential

Methodology – We welcome the further clarification of the methodology used to calculate spawning potential. While we agree that some aspects of the assessment represent conservative assumptions, there are a number of assumptions we consider serve to minimise the potential impacts and leads to the assessment overall not reflecting a worst case scenario.

Construction time: In our comments on the PEIR we noted that the 'overall piling period is given as approximately 65 days over three construction years. However, in Vol 2, Chapter 1 Offshore Project Description, Figure 2: Indicative construction programme Foundation Installation has an indicative duration of 12 months in Year 3. It therefore seems that the piling activity has potential to occur during one spawning season, rather than three, as assessed in paragraph 83.'
In the Clarification note it appear that the spawning period (t) is the sum of possible spawning days over 3 years and this would serve to maximise the Spawning potential $S_{(pot)}$ and hence minimise the calculation of spawning potential impacted. NRW would advise that in the final ES it is clarified whether construction piling is likely to takes place over a 12-month period as indicated in the Project description, and if so that the impacted spawning potential impacted is recalculated to represent a realistic worst case scenario.

Spawning area for sandeel: In the clarification note the spawning area for the whole of the Irish sea is used for the assessment based on information from Ellis *et al* (2010). We advise that using this large spawning across all of the Irish sea in the assessment would lead to an underestimation of possible impacts. It is also not clear whether the total figure includes both low and high intensity spawning grounds. Recent studies of sandeel populations on fishing grounds in the North Sea suggest the North Sea stocks consist of smaller localised aggregations with limited mixing between them. For instance, Wright *et al* (2019) used oceanographic information and various North Sea datasets for sandeel to modelled larval transport between fishing grounds in the North Sea and found that larval mixing between grounds were common at grounds <67 km apart, whereas the probability of mixing was very low amongst grounds >200km apart. Analysis of available evidence suggested that for adults mixing between banks separated by >30km is unlikely. Given that sandeel population structure in the Irish sea is likely to be similar to the North Sea we consider it more likely that the piling impact will potentially affect a smaller subpopulation of sandeel local to the AyM development site and that due to the limited home ranges and larval dispersion the population may take some time to recover. We advise that in the final ES the potential for a smaller total spawning area (e.g., the northern Irish Sea) is assessed and considered further in view of the ability of the stock to recover and the relative importance of the species as Section 7 listed species and important forage fish.

Spawning area for Sole: The assessment appears to have taken the same approach as for sandeel and we advise that the final ES clarifies whether both high intensity and low

intensity spawning grounds have been used in the calculation of total spawning area for sole in the Irish sea.

Fleeting speed: We furthermore advise that the ES specifies for each fish VER whether it is being considered as a feeing or static receptor, and if considered as fleeting, the scientific literature including alignment with mean swim speeds used to support this is cited.

Clarification note: Fish Noise Sensitivity Weighting Justification

We welcome the clarification note and the further detail on how the assessment has weighted the vulnerability, importance and recoverability. We note that both cod and whiting have been modelled as fleeing receptors. While we agree that as pelagic spawners adult cod and whiting may be regarded as capable of the assumed fleeing speed, developing eggs and juveniles should be regarded as stationary and we note the overlap between the AyM site and high intensity nursery grounds as described by Ellis *et al* (2010) for both species. We advise that in the final ES potential impacts to cod and whiting should be considered further in assessing the impacts to Group 3 receptors.

Furthermore, we advise that the differences between '*vulnerability*' and '*recoverability*' need to be further clarified in the ES. In paragraph 8, p 8, it states: '*The determination of a receptor's vulnerability to an impact is based on the ability of a receptor to accommodate a temporary or permanent change*.', and in paragraph 12, p 9 on Recoverability it states '*The recoverability of the receptor is defined as the extent to which a receptor will recover following an impact. The rate of recovery is also taken into consideration in this criterion*.' It therefore seems that both criteria considers the resilience of the receptor species, but neither the clarification note, nor the Fish and Shellfish Ecology Chapter discuss this in the context of individual species or the impact to the population. We advise that specifically the resilience of a population is considered further in the ES.

Concluding comments (Fish):

We recognise the further work undertaken by the applicant to clarify aspects of the assessment of fish impacts from the AyM development and the work which has been done in producing the Fish and Shellfish baseline report and Chapter 6 of the PEIR.

We consider that, subject to the advice and comments detailed above being resolved, the submitted reports presents a thorough assessment and we would be able to agree with an overall conclusion in the ES of negligible effects on fish VERs.

References:

Awel y Mor Offshore Wind Farm Application Marine ecology and marine mammal ETG meeting minutes, 2/11/21

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November 24th 2021

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Sent by email

Date: 14 January 2022

Dear Sean,

Awel y Môr – Clarification Notes

Thank you for requesting our advice on the Awel y Môr Offshore Wind Farm ETG Clarification Note: Marine Mammal PTS Sensitivity to Piling and Marine Mammal Cumulative PTS Onset (both dated 26 November 2021).

Clarification note: Cumulative PTS onset (26 Nov 2021, revision A)

While we agree that SEL cumulative calculations provide likely over-precautionary injury ranges for the reasons provided, currently there is no agreed alternative method of considering these factors when predicting injury and no alternative is provided in this document. Therefore, using both the peak SPL and cumulative metrics is still the most precautionary approach in impact assessments. Subsequently, we do not agree with the suggestion to rule out using cumulative SEL when identifying mitigation requirements.

The document does not consider factors that could result in underestimating injury range, for example assuming an animal flees away from the noise source in a single direction. While there is data to suggest animals flee at speeds higher than those typically used in impact assessments, the use of slower swim speeds can provide headroom in the estimate for variable movement.

In addition, Martin et al 2020[1] suggest the distance at which impulsive sounds change to none-impulsive is not relevant when assessing hearing injury as sounds retain their character when sound pressure levels are above an effective quiet threshold and therefore able to accumulative to result in auditory injury. So it seems that this is an area needing further investigation and as a precaution, the thresholds for impulsive sounds should be used.

We will review this position once we have seen the outputs of the impact assessment which should use both metrics when assessing potential impacts to marine mammals from piling and determine what mitigation is needed.

[1] Martin, S.B., Lucke, K and Barclay, D.R. 2020. Techniques for distinguishing between impulsive and non-impulsive sound in the context of regulating sound exposure for marine mammals. J. Acoust. Soc. Am. 147, 2159-2176

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Clarification note: PTS sensitivity to piling (26 Nov 2021, revision A)

JNCC are content with the sensitivity assessment for harbour porpoise as low, however we agree with NRWs recommendation that the sensitivity for seals be increased from negligible to low. Given the changes to how sensitivity is defined (Table 8), we also suggest the sensitivity for bottlenose dolphins is increased to medium as their coastal behaviour limits their ability to adapt behaviour in response to anthropogenic noise and a significant effect on individual vital rates cannot be ruled out at this stage.

Clarification note: UXO disturbance assessment (26 Nov 2021, revision A)

JNCC agree with the use of EDRs when assessing disturbance during UXO clearance although note that current EDR for UXO clearance is based on observations during piling.

Southall et al 2021 highlight the challenges in assessing disturbance, and potential differences in response between species, individuals, across situational context and across different temporal/spatial scales over which exposure may occur. Consequently, a wider range of conditions in addition to received sound levels should ideally be considered when assessing potential behavioural responses. Until alternative methods are available for UXO clearance (for example, species specific dose response data), we recommend the use of EDRs.

There are several projects currently underway which may help refine the UXO clearance EDR and we will update as appropriate. The current EDR for UXO clearance is 26km. This assumes the device is cleared using what is referred to as a 'high-order' clearance method.

A position statement[2] was recently published highlighting regulatory and SNCB preference for low-noise methods of clearance when planning UXO clearance campaigns. Appropriate EDRs will be agreed at time however JNCC highlight we currently advice the MMO that a 5km EDR can be applied for UXOs cleared using the low-order deflagration method. This advice will be refined further once the outputs of noise monitoring planned for January 2020 are available. We would, however, recommend that multiple EDRs are assessed to allow for high-order clearance to be included in the assessment as a contingency. We agree that the worst-case scenario is that a device is sitting on the seabed and not buried, and for high-order clearance, that it will detonate to its intended capacity.

[2] Marine environment: unexploded ordnance clearance joint interim position statement - GOV.UK (www.gov.uk)

Clarification note: Marine Mammal baseline report (26 Nov 2021, revision B)

A key change to this document is the inclusion of Sea Watch Data, which is welcomed. This includes additional density estimates for some species including harbour porpoise.

The Sea Watch density estimate (0.5-1.5/km^2) is a magnitude higher than that estimated by either SCANS (0.086/km^2) or the JCP (0.13/km^2) however SMRU consulting still propose to take the SCANS/JCP estimates forward to the impact assessment. Justification is needed as to why the more precautionary density is not being taken forward, for example, clarification regarding the quality of the newly added data compared to the SCANS III and JCP data, and consideration of the resolution of all datasets. Any previous agreements to the proposed densities need to be re-evaluated to consider this new information.

JNCC agree to still use the SCANS III (block E) density estimate for Risso's dolphins in the impact assessment and note no Sea Watch density estimates were available for minke whales; JNCC defer to NRW re comments on bottlenose dolphins.

JNCC welcome the inclusion of common dolphins to the baseline and consider sufficient information is provided to describe the likely occurrence of this species in the development area. JNCC agree with the recommendation to use the SCANS II density estimate, as this is the most precautionary estimate available.

Please contact me with any questions regarding the above comments.

Yours sincerely,

[redacted]

Jillian Whyte

Offshore Industries Adviser

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The Joint Nature Conservation Committee (JNCC) is the statutory adviser to Government on UK and international nature conservation, on behalf of the Council for Nature Conservation and the Countryside, Natural Resources Wales, Natural England and Scottish Natural Heritage. Its work contributes to maintaining and enriching biological diversity, conserving geological features and sustaining natural systems.

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Awel y Mor Marine Mammal and Ecology ETG - Actions

Adam Cooper
Senior Marine Advisor
14 January 2021

Introduction

This advice is provided in response to the Awel y Mor Marine Mammal and Marine Ecology Expert Topic Group Actions (ETG held on 01/11/202, Actions shared on 26/11/2021). Advice is provided on the following clarification notes:

- Marine Mammal Baseline Report
- Marine Mammal Cumulative PTS Onset

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Advisors consulted:
Marine Mammals
Fish

Advice

Key Issues

Document; ETG Clarification Note: Marine Mammal Cumulative PTS Onset Date: 26th November 2021 Revision: A

- Whether mitigation of a pathway is required will be determined by the assessments, and this may include the potential to require mitigation of cumulative nosie exposure.
- Without a suitable alternative, use of SELcum remains the appropriate means to assess this impact, particularly given its use in the RIAA and PEIR.
- The RIAA states that "*this outline MMMP focuses on mitigating only the "cumulative" SELcum PTS-onset impact ranges"* which contradicts the content of the clarification note which states the MMMP will cover "*only instantaneous PTS-onset and not cumulative PTS-onset*". Clarity on this should be provided, and applied consistently throughout the documentation.

Document; ETG Clarification Note: Marine Mammal Baseline Report Date: 26th November 2021 Revision: B

- Justification is required for not using the higher, and potentially more precautionary Sea Watch Foundation density estimate for harbour porpoise.
- NRW welcome the inclusion of common dolphin in the baseline. We note that to fully resolve NRW's concerns regarding common dolphin, they should also be scoped into assessments.

Detailed comments

Document; ETG Clarification Note: Marine Mammal Cumulative PTS Onset Date: 26th November 2021 Revision: A

The document makes reference to criteria included ***"****In the draft version of the NMFS (2018) guidance that was released in 2015 for public consultation.****"*** The context that these criteria were then not included in subsequent published versions is important to note, given the lack of a robust evidence base to support and define them.

Conclusion

While there is reason to support the position that "SELcum PTS-onset impact ranges are highly precautionary" NRW do not believe that the equal energy hypothesis which underpins SELcum is sufficiently inaccurate to make it "not valid" and are not content with the decision to consider "*only instantaneous PTS-onset and not cumulative PTS-onset*". There are insufficient direct measures of injury-onset from different exposure intermittency patterns in marine mammals to define an explicit duration of intermittency between exposures, after which they should be considered discrete exposures (Southall et al 2019). Furthermore, NRW advisory believes that there is still significant uncertainty over how

precautionary the equal energy assumption is, and further data is needed to quantify to what extent this could affect injury predictions in different hearing groups.

Whether mitigation of a pathway is required will be determined by the assessments, and this may include the potential to require mitigation of cumulative nosie exposure. Without a suitable alternative, use of SELcum remains the appropriate means to assess this impact, particularly given its use in the RIAA and PEIR. The sources cited do not support the absence of a cumulative noise exposure pathway, and thus depending on the outcomes of the environmental assessments if the MMMP does not cover cumulative PTS-onset then impacts from this pathway may be impactful but unmitigated. While it may be the case that ultimately any pre-piling mitigation in the MMMP either cannot mitigate SELcum impacts or is not required, NRW cannot agree to rule it out wholesale at this stage.

Of relevance to this is the reliance of the RIAA on the MMMP to justify no Adverse Effect on Site Integrity. If cumulative noise exposure will not be mitigated by the content of the MMMP, this should be clear in the assessments and conclusions reached regarding the unmitigated impacts of cumulative noise exposure.

The RIAA also states that "*this outline MMMP focuses on mitigating only the "cumulative" SELcum PTS-onset impact ranges. As the cumulative SELcum ranges are the largest calculated (see Table 4), they are considered to be the most precautionary and conservative measures and are therefore considered appropriate for this assessment,"* which condradicts the content of the clarification note which states the MMMP will cover "*only instantaneous PTS-onset and not cumulative PTS-onset*". Clarity on this should be provided, and applied consistently throughout the documentation.

Document; ETG Clarification Note: Marine Mammal Baseline Report Date: 26th November 2021 Revision: B

3 Harbour porpoise

3.13 Summary, page 44

It is not clear if the statement that "*local density estimates are all very coastal and in highly tidal habitats and do not necessarily represent densities at the AyM site or further offshore*" refers to the Sea Watch Foundation data. Figure 14 demonstrates effort within the AyM project area and further offshore, which suggest that this statement should not apply to this dataset. The most precautionary and thus likely the highest density value should be used for impact assessment. In light of this new data which presents densities an order of magnitude higher than the SCANS or JCP estimates, in the absence of any quality assessment in section 3.4 which would justify not using the data, it is not clear on what basis *"SMRU Consulting recommends that both the SCANS III and the JCP III density estimates are taken forward."* NRW "*agreed with the recommended approach to use both the SCANS III and the JCP III density estimates in the quantitative impact assessment (correspondence dated 27/03/2020 and their s42 comments)*" prior to the availability of the Sea Watch Foundation data.

4 Bottlenose dolphin

4.11 Summary

Given the range of density estimates presented in the Sea Watch Foundation data (~0.005 - 0.010/km^2) and the current recommended approach to use the wider Cardigan Bay density estimate (0.035 dolphins/km^2) within the 20m depth contour and the SCANS III estimate beyond this (0.008 dolphins/km^2) NRW are content that applying the wider Cardigan Bay density estimate within 20m remains appropriate and applying the Sea Watch Foundation data beyond the 20m contour is not likely to make a material difference to the assessment when the variation in the Sea Watch density estimates is taken into account and thus proceeding with the current preferred options is appropriate.

5 Rissos dolphin

5.10 Summary

Given the range of density estimates presented in the Sea Watch Foundation data (~0.02-0.05 vs 0.031/km^2) and the current recommended approach to use SCANS III block E (0.031/km^2). NRW are content that applying the Sea Watch Foundation data is not likely to make a material difference to the assessment when the variation in the Sea Watch density estimates is taken into account thus proceeding with the current preferred options is appropriate.

Section 6 Common dolphin

NRW welcome the inclusion of common dolphin. The baseline chapter appears to be comprehensive, and we are content that the use of the preferred SCANS II Block O estimate of 0.0081 dolphins/km^2 as the density value is suitable. We note that to fully resolve NRW's concerns raised regarding the inclusion of common dolphin, they should also be scoped into and assessed within the EIA and in other assessments as appropriate.

References

Southall, B. L., Finneran, J. J., Reichmuth, C., Nachtigall, P. E., Ketten, D. R., Bowles, A. E., & Tyack, P. L. (2019). Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. Aquatic Mammals, 45(2).

Awel-y-Môr Offshore Wind Farm:
Revised Draft Outline Marine Mammal Protocol, January 2022 (Application Reference: 6.4.7.2)

Nia Phillips
Senior Marine Advisor

11th February 2022

Introduction

The advice provided herein is given in response to the updated *Draft Outline Marine Mammal Mitigation Protocol (MMMP) dated January 2022, Revision: B (Application Reference 6.4.7.2)* and with respect to the Awel-y-Môr offshore wind farm.

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Advisors Consulted:
Marine Mammals

Advice

Key Matters:

- NRW Advisory (A) are content with the provision of a '*draft outline*' Marine Mammal Mitigation Protocol (MMMP) which will be finalised post consent as a condition of the relevant permissions
- NRW (A) are satisfied with the content with regards to concurrent piling - on the understanding that the only possibility for concurrent piling is for two pin piles at the same location, which will be re-modelled, with no possibility of concurrent pin piling at two locations or pin piling and mono-piling.
- If noise modelling suggests a Permanent Threshold Shift (PTS) range larger than the 500m suggested in the JNCC piling guidance, we advise that the larger value be used as the mitigation zone.
- NRW recommend following JNCC guidance for all pre-piling mitigation actions, including Acoustic Deterrent Device (ADD) deployment, except in circumstances where an alternate method is identified to offer greater precaution
- While there is reason to support the position that "*SEL_{cum} PTS-onset impact ranges are precautionary*" NRW (A) disagrees that the equal energy hypothesis which underpins $SEL_{cum,}$ is sufficiently inaccurate to conclude it is "*not valid*"
- Whether mitigation of a pathway is appropriate will be informed by the assessments, and this may include the potential to require mitigation of cumulative noise exposure
- Without a suitably robust and evidence-based alternative, NRW considers SEL_{cum} the appropriate means to assess cumulative noise exposure
- The sources cited do not support the absence of a cumulative noise exposure pathway, and thus depending on the outcomes of the environmental assessments, if the MMMP does not cover cumulative PTS-onset then the potential for impacts from this pathway to be impactful if left unmitigated, should not be discounted.

Detailed comments:

Document; 6.4.7.2 ES Volume 4 Annex 7 MMMP 19 01 2022

NRW (A) are content with the provision of a '*draft outline'* MMMP which will be finalised in line with the provision of final constructions designs, with delivery and agreement of a final MMMP to be secured via conditions associated with relevant permissions such as the marine licence.

Table 1

NRW (A) are satisfied with the content on the understanding that the only possibility for concurrent piling is for two pin piles at the same location, which will be re-modelled, with no possibility of concurrent pin piling at two locations or pin piling and mono-piling.

Table 4

The caption to table 4 refers to cumulative PTS-onset, although this content has been removed from the table. Reference to cumulative PTS should be included or removed consistently throughout the document.

3.2 Summary of impacts

Advice has been provided on PTS sensitivity in detailed comments on the relevant clarification note.

4.2 Mitigation zone
If noise modelling suggests a PTS range different than the 500m suggested in the JNCC piling guidance, we advise that the larger and more precautionary value be used to determine the size of the mitigation zone. For example, based on the current estimates a minimum of 640m would be recommended. Alternative approaches would leave 'unmitigated' regions with a PTS exceedance, which would result in unmitigated risk.

4.5.2 Duration of ADD Deployment
The JNCC piling guidance recommends that "*ADDs should be switched on throughout the pre-piling search and turned off immediately after the piling activity has started"* and that the *"the pre-piling search duration should be a minimum of 30 minutes."* NRW recommend following this guidance for all pre-piling mitigation actions, including ADD deployment, except in circumstances where an alternate method is identified to offer greater precaution such as the extent of the mitigation zone as mentioned previously.

Cumulative PTS
The lack of inclusion of cumulative PTS mitigation in the MMMP should be accurately reflected in the assessments. NRW cannot currently make any judgements about the degree of impact associated with unmitigated cumulative noise exposure in the absence of an assessment of such, as the Report to Inform Appropriate Assessment (RIAA) currently considers all PTS to be mitigated by the MMMP - which is not accurate at this stage. Any updated assessments should separate mitigated and unmitigated pathways and clearly use an evidenced and precautionary method to assess any unmitigated impacts. The potential for these impacts to be at levels of concern; result in an adverse effect, or potentially require mitigation, cannot be ruled out at this stage. Detailed comments on the approach to cumulative PTS were provided in comments on the relevant clarification note, but additional comments have been provided below.

Equal energy hypothesis
While there is reason to support the position that "*SEL_{cum} PTS-onset impact ranges are precautionary*" NRW (A) disagrees that the equal energy hypothesis which underpins SEL_{cum} is sufficiently inaccurate to conclude it is "*not valid*" and are not content with the decision to consider "*only instantaneous PTS-onset and not cumulative PTS-onset*" based on this reasoning alone. NRW agrees that prior work exposing bottlenose dolphins, harbour porpoise, and pinnipeds to octave band noise and pure tones in captivity (e.g. Kastak et al., 2007; Mooney et al., 2009; Finneran et al., 2010; Finneran and Schlundt, 2010; Kastelein et al., 2013 etc) demonstrated that hearing loss does not solely depend upon the total amount of energy, but on the interaction of several factors such as the level and duration of the exposure; the rate of repetition, and; the susceptibility of the animal.

While empirical studies often conclude that the trade-off between exposure time and energy is not necessarily linear, their overall conclusions are directed towards developing more accurate methods. e.g., Mooney et al., 2009 found that for bottlenose dolphins, higher SELs were required to induce Temporary Threshold Shift (TTS) in shorter duration exposures and proposed using a logarithmic relationship between sound energy and exposure duration. Kastelein et al., 2013 made several research suggestions to help meet the needs of policy makers setting criteria for allowable levels of environmental noise, including the effect of intervals between fatiguing sounds on the level of TTS which could be used to find a factor that can be subtracted from the cumulative SEL, to integrate hearing recovery between sound events in when predicting TTS caused by discontinuous sounds. In their paper on injury criteria, Southall et al., 2019 explicitly mention that there are insufficient direct

measures of injury-onset from different exposure intermittency patterns in marine mammals to define an explicit duration of intermittency between exposures, after which they should be considered discrete exposures.

Impulsive characteristics
NRW agree that impulsive noise loses its impulsive characteristics with range. Work by Hastie et al., 2019; Amaral et al., 2020; Martin et al., 2020 showed that changes to impulsive signals include less rapid signal onset, longer total duration, reduced crest factor, reduced kurtosis, and reductions in high-frequency content. Range dependent changes varied depending on the metric selected. Martin et al., 2020 proposed that the range at which impulsive noise loses its impulsive characteristics is not relevant for assessing injury since sounds retain impulsive character when SPLs are above the effective quiet threshold, although this conclusion may be somewhat premature (Southall., 2021).

While developing a method to account for changes in impulsive character would avoid overly precautionary conclusions, present studies have assessed changes in the acoustic signal with range but not direct hearing data. There is a need for comprehensive, comparative studies evaluating TTS for marine mammal species to determine the best metric to use and define an explicit threshold with which to delineate impulsiveness (Hastie et al., 2019; Southall 2021).

Conclusion
Whether mitigation of a pathway is appropriate will be informed by the assessments, and this may include the potential to require mitigation of cumulative noise exposure. Without a suitable alternative, use of SEL_{cum} remains the appropriate means to assess this impact, particularly given its use in the RIAA, PEIR and underwater noise assessment. The sources cited do not support the absence of a cumulative noise exposure pathway, and thus depending on the outcomes of the environmental assessments, if the MMMP does not cover cumulative PTS-onset then impacts from this pathway may be impactful but unmitigated. NRW (A) cannot agree to rule out the need for mitigation of cumulative noise exposure (SEL_{cum}) at this stage, particularly as no impact assessment has been presented using this approach. Whilst it may be the case that any pre-piling mitigation in the MMMP either cannot mitigate SEL_{cum} impacts, or assessments ultimately determine that mitigation of this pathway is not required, NRW (A) cannot agree to this at present without further information.

Of relevance to this is the reliance of the RIAA on the MMMP to justify no Adverse Effect on Site Integrity. If cumulative noise exposure will not be mitigated by the content of the MMMP, this should be clear in the assessments and conclusions reached regarding the unmitigated impacts of cumulative noise exposure.

The RIAA also states that "*this outline MMMP focuses on mitigating only the "cumulative" SEL_{cum} PTS-onset impact ranges. As the cumulative SEL_{cum} ranges are the largest calculated (see Table 4), they are considered to be the most precautionary and conservative measures and are therefore considered appropriate for this assessment,"* – this contradicts the content of the clarification note which states the MMMP will cover "*only instantaneous PTS-onset and not cumulative PTS-onset*". Clarity on this should be provided and applied consistently throughout the documentation.

Reference List

Amaral JL, Miller JH, Potty GR, Vigness-Raposa KJ, Frankel AS, Lin YT, Newhall AE, Wilkes DR, Gavrilov AN. 2020. *Characterization of impact pile driving signals during installation of offshore wind turbine foundations*. The Journal of the Acoustical Society of America 147, 2323-2333.

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JNCC Reference: OIA-08519

Date: 10 February 2022

Dear Ryan,

Awel y Môr: Draft Outline Marine Mammal Mitigation Protocol

Thank you for consulting JNCC on the RWE Renewables UK Draft Outline Marine Mammal Mitigation Protocol (Revision B, dated January 2022) for the Awel y Môr project.

The JNCC advice contained within this minute is provided as part of our advisory role relating to nature conservation in UK offshore waters (beyond territorial limit). We have subsequently concentrated our comments on aspects of the documents that we believe relate to offshore waters.

JNCC consider this document to be an appropriate start for discussing mitigation options, and we expect the final MMMP will reflect resultant discussions.

JNCC are content with the proposed mitigation when using the PTS onset peak SPL metric to define potential injury ranges, however, we do not agree to ruling out use of the SEL cumulative metric at this stage. Subsequently, the measures proposed will need to be revised should it be determined the PTS cumulative metric be used to identify potential injury ranges. Based on noise modelling presented in the PEIR, we highlight those measures may require the use of noise abatement technology, for example, bubble curtains.

Minor comments:

- Section 1.3 states '*specific details regarding mitigation can be found in the Schedule of Mitigation (document reference 8.1)*': we would expect all detail relevant to mitigation to be included in a single document i.e. the final MMMP, making it easily accessible to all those involved in implementing the plan.
- Paragraph 24: This should be rephrased as delaying the soft start is the primary action that should be taken if a marine mammal in observed within the mitigation zone. The current text suggests this is done after checking the ADD is working correctly.

The Joint Nature Conservation Committee (JNCC) is the statutory adviser to Government on UK and international nature conservation, on behalf of the Council for Nature Conservation and the Countryside, Natural Resources Wales, Natural England and NatureScot. Its work contributes to maintaining and enriching biological diversity, conserving geological features and sustaining natural systems.

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- Section 4.5.1 ADD choice: We agree that the final decision on whether to deploy an ADD and the choice of device be identified in the final MMMP, once the final impact assessment has been submitted as this will determine the required mitigation zone.
- Section 4.5.2 Duration of ADD deployment: we agree with the swim speeds proposed. While there is some evidence of faster swim speeds, using these more precautionary speeds will allow for variation in individual response behaviour which may result in them taking longer to leave the mitigation zone.
- Section 4.7 Noise abatement: We agree with the rationale for not using noise abatement for injury ranges predicted using the PTS onset peak SPL metric however this will need to be reviewed should mitigation zones be identified using the PTS cumulative SEL metric.
- Section 4.9 Delays in the commencement of piling: In addition to the action described, we recommend the MMO undertake visual searches during this period.
- Appendix 1. Cumulative PTS onset: The final MMMP will be determined by the impact assessment therefore information such as this needs to be included in that assessment. We also note the RIAA only refers to instantaneous PTS whereas the MMMP divides this into PTS instantaeous and PTS cumulative; this will also need amending.
- JNCC highlight that new mitigation guidelines for piling will be published in the next few months. They will be available on the JNCC webpage.

Please contact me with any questions regarding the above comments.

Yours sincerely,

Jillian Whyte

Offshore Industries Adviser

Email: [redacted]

Telephone: 01224 083521

The Joint Nature Conservation Committee (JNCC) is the statutory adviser to Government on UK and international nature conservation, on behalf of the Council for Nature Conservation and the Countryside, Natural Resources Wales, Natural England and NatureScot. Its work contributes to maintaining and enriching biological diversity, conserving geological features and sustaining natural systems.

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3.3 Appendix F4: Onshore Ecology

Awel y Môr Terrestrial Ecology Assessment Scoping Consultation

Chris Jones
Senior Advisor, Development Planning
24 February 2021

Introduction

This advice is provided in advance of the Awel y Môr – Terrestrial Ecology ETG Meeting on 26 February 2021.

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- NRW cannot and does not give any guarantee as to the representations it may make as statutory consultee; and,
- any advice given by NRW may be overtaken by changes in available information, law, policy and guidance relevant to the subject matter of the advice.

Specialists Consulted:

Matthew Ellis (Senior Advisor, Species Casework)
Heledd Jones (Officer, Environment Team)
Nathan Owen (Officer, Environment Team)
Richard Pierce (Senior Officer, Fisheries)
Neil Smith (Senior Officer, Environment Team)

Advice:

We have reviewed the following document and supporting plans in compiling this advice:

- Awel y Môr offshore wind farm: Preliminary Ecological Appraisal (Onshore) by SLR, Ref: 414.05356.00009, Version No: 2, February 2021.

General:

The EIA for this proposal should include sufficient information to enable the relevant decision makers to determine the extent of any environmental impacts arising from the proposed scheme on legally protected species, including those which may also comprise notified features of designated sites affected by the proposals.

Evaluation of the impacts of the scheme should include: direct and indirect; secondary; cumulative; short, medium and long term; permanent and temporary; positive and negative, and construction, operation and decommissioning phase and long-term site security impacts on the nature conservation resource, landscape and public access.

Description of the Project

Within the EIA, the proposed scheme should be described in detail in its entirety. This description should cover construction, operation and decommissioning phases as appropriate and include detailed, scaled maps and drawings as appropriate.

Illustrations within the Environmental Statement

Any maps, drawings and illustrations that are produced to describe the project should be designed in such a way that they can be overlaid with drawings and illustrations produced for other sections of the EIA such as biodiversity.

Description of Biodiversity

The EIA must include a description of all the existing natural resources and wildlife interests within and in the vicinity of the proposed development, together with a detailed assessment of the likely impacts and significance of those impacts.

Significance and Favourable Conservation Status

We advise that the EIA considers significance (both alone and in combination) and, where applicable, conservation status. In respect of conservation status, we advise consideration is given to current conservation status (CCS), and demonstration of no likely detriment to maintenance of favourable conservation status (FCS) during construction, operation and decommissioning phases of the scheme.

Key Habitats

Any habitat surveys should accord with the NCC Phase 1 survey guidelines (NCC (1990) Handbook for Phase 1 habitat survey. NCC, Peterborough). We advise that Phase 1 surveys are undertaken and completed during the summer to ensure the best chance of identifying the habitats present. We also advise that Habitats Directive Annex 1 habitats are identified as part of this assessment.

Protected Species

We advise the site is subject to assessment to determine the likelihood of protected species and that targeted species surveys are undertaken for all species scoped in. These should comply with current best practice guidelines and in the event that the surveys deviate or there are good reasons for deviation, full justification for this should be included within the EIA.

Should protected species be found during the surveys, information must be provided identifying the species-specific impacts in the short, medium and long term together with any mitigation and compensation measures proposed to offset the impacts identified. We advise that the ES sets out how the long-term site security of any mitigation or compensation will be assured, including management and monitoring information and long term financial, tenure, and management responsibility. Where the potential for significant impacts on protected species is identified, we advocate that a Conservation Plan is prepared for the relevant species and included as an Annex to the EIA.

Where a European Protected Species is identified and the development proposal is predicted to likely contravene the legal protection they are afforded, a licence should be sought from NRW. The EIA must include consideration of the requirements for a licence and set out how the works will satisfy the three requirements as set out in the Conservation of Habitats and Species Regulations 2017 (as amended). One of these requires that the development authorised will 'not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status (FCS) in their natural range'. These requirements are also translated into planning policy through Planning Policy Wales (PPW) December 2018, section 6.4.22 and 6.4.23 and Technical Advice Note (TAN) 5, Nature Conservation and Planning (September 2009). The local planning authority will take them into account when considering the EIA where a European Protected Species is present.

Local Biodiversity Interests

We recommend that the developer consults the local authority ecologist/s on the scope of the work to ensure that regional and local biodiversity issues are adequately considered, particularly those habitats and species listed in the relevant Local Biodiversity Action Plan, and areas that are considered important for the conservation of biological diversity in Wales.

NRW would expect the developer to contact other relevant people/organisations for biological information/records relevant to the site and its surrounds. These include the

relevant Local Records Centre and any local ecological interest groups (*e.g.* bat groups, mammal groups).

Legislation and Policy Compliance Review

We advise that provisions of the EIA audit compliance in respect of relevant nature conservation legislation (UK and Wales) together with relevant local and national policies including BS 42020:2013.

1) Do you agree that the scope of additional survey work set out in Section 4.2 of the PEA will be sufficient to inform the EIA process? If no, please put forward a justified alternative, that we may discuss during the ETG and hopefully come to agreement.

Great Crested Newt (GCN):

- We advise modelling for the purposes of informing temporary severance.
- Please clarify why GCN population sizes are not being assessed.
- Please clarify what is proposed in respect of terrestrial habitat assessment, and how subterranean assessments will be carried out.
- We advise that GCN compensation will likely be required and would advocate an approach consistent with that adopted for the Burbo Bank and Gwynt y Môr projects.

Bats:
We concur with the observations and approach in respect of bats.

Dormouse:
We concur with the observations and approach in respect of dormouse.

Otter:
We concur with the observations and approach in respect of otter.

Water vole:
We concur with the observations and approach in respect of water vole.

Fish (including Atlantic salmon, brown trout, European eel and bullhead):
We are content with the scope and proposals for fish. We consider that fisheries input will be more valuable when methods are being discussed for specific waterway crossings.

2) Do you agree with the Important Ecological Features that have been "scoped out" of further assessment in Table 4-1 now that the preferred route is known?

Liverpool Bay SPA: we agree that the main interest of the preferred onshore 'landing site' is relatively close to, but unlikely to affect, the little tern nesting colony at Gronant. The SPA was extended recently to encompass feeding areas for little tern offshore of Prestatyn, so although not relevant to the onshore route, the offshore aspect may affect their feeding areas and should therefore be considered by the offshore ecology ETG.

Dee estuary SPA/SAC/Ramsar/SSSI: we agree that the preferred onshore route is unlikely to be an issue for these sites and they can be scoped out of further assessment. However, we advise consideration of these sites by the offshore ecology ETG in relation to the offshore aspect of the proposals.

Llwyn SAC/SSSI: we agree that these sites can be scoped out of further assessment.

Elwy Valley Woods SAC/Coedydd ac Ogofau Elwy a Meirchion SSSI: we agree that these sites can be scoped out of further assessment.

Traeth Pensarn SSSI: we agree that this site can be scoped out of further assessment.

Graig Fawr SSSI: we agree that this site can be scoped out of further assessment.

For the other, local designations we advise that you contact the relevant local authority.

3) Do you have any additional comments or questions on the PEA report?

Section 3.4.4: In our view the St. Asaph Business Park (SABP) great crested newt (GCN) population could be described as of national importance. Land in the environs of the SABP is within a high ponds density landscape. Historic fauna guides from c.1907 identify a large GCN population at St Asaph.

Please clarify how invasive non-native species (INNS) will be considered in the assessment.

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

Bat Survey of Trees

Background

This note relates to bat survey at trees that may be affected by the proposed onshore element of Awel y Môr Offshore Wind Farm. The proposed scope of these surveys has been revised subsequent to the recommendations made in the PEA. As a result of the number and context of trees potentially affected by onshore elements of the project, there is considered to be justification in differing from the BCT Guidelines. For clarity, the scope of bat activity surveys remains unchanged to that detailed in the PEA that was shared with NRW in Jan 2021.

The rationale has been informed by professional judgement, gained through direct experience on other large linear infrastructure projects involving landscape level tree loss and is based upon the following:

1. Tree roosting bats swap roosts a lot. This means that survey results in terms of roost locations are only as good as the day they were completed (this is much different to building roosts).
2. Sufficient survey will be undertaken for EIA; i.e. to determine the impacts to local bat populations, know where and how to avoid/mitigate/compensate for those impacts, and have confidence that an EPSL would be obtained (if necessary).
3. The results used to inform the EIA would be redundant at the time of construction: the survey would need to be re-scoped and undertaken in view of the final scheme design and footprint. Bat use of the landscape will likely have also changed in the interim/population trends may have altered such that impacts have changed.

The method proposed is based upon appropriate and proportionate techniques to inform the EIA, and focussed upon:

- accurately determining the potential roost resource that would be directly affected by the scheme. Potential impacts would be couched in terms of loss of potential roost features and a commitment made to mitigate for every/a very high proportion of moderate or high potential PRF lost.
- Determining the likely presence of locally significant bat roost(s) (i.e. locally rare species, or maternity colonies etc) within groups or lines of trees (if possible, but not necessarily identifying precise roost locations). Accepting that roosts used by small numbers of bats will occur, but may not be identified (at this stage) but would be mitigated (see first bullet).
- In combination with desk study data, and detail from the bat activity surveys already underway, enable robust assessment of impacts to the conservation status of local bat populations.

To be clear, the proposed method does not seek to pinpoint every small roost; this is because such roosts are highly dynamic (see point 1 above), with bats using a suite of potential roost features in any given season.

If the project is granted consent, a commitment would be made to resurvey every tree affected as part of pre-construction work, the season prior to work commencing, in accordance with BCT Guidelines or other best practice in place at that time. EPSL/mitigation requirements would then be determined as a result of those surveys, but ensured via the commitments made in the ES and secured through DCO Requiurement.

Proposed Method to Inform EIA

All trees with bat roost potential which could potentially be affected by the project are shown on the attached plan. The trees on the attached plan are colour coded according to the ground-based assessment of bat potential already completed (red= high roost potential, orange = moderate, yellow = low, white = large tree difficult to assess from the ground, assumed high potential). Proposed survey methods for moderate and high potential trees are as follows:

1. Climbing inspection at all moderate or high potential trees (where safe to do so). This survey will be used to robustly determine the number and location of potential roost features.
2. Dusk emergence and dawn re-entry survey, with groups or lines of trees surveyed as discrete blocks. These are identified on the attached plan. All blocks would receive two visits, with those containing high potential trees receiving three. Surveyors will be equipped with full spectrum bat detectors and thermal imaging cameras in order to maximise the chances of detecting bats, record evidence of bat presence and identify bat species.

Outputs from Survey

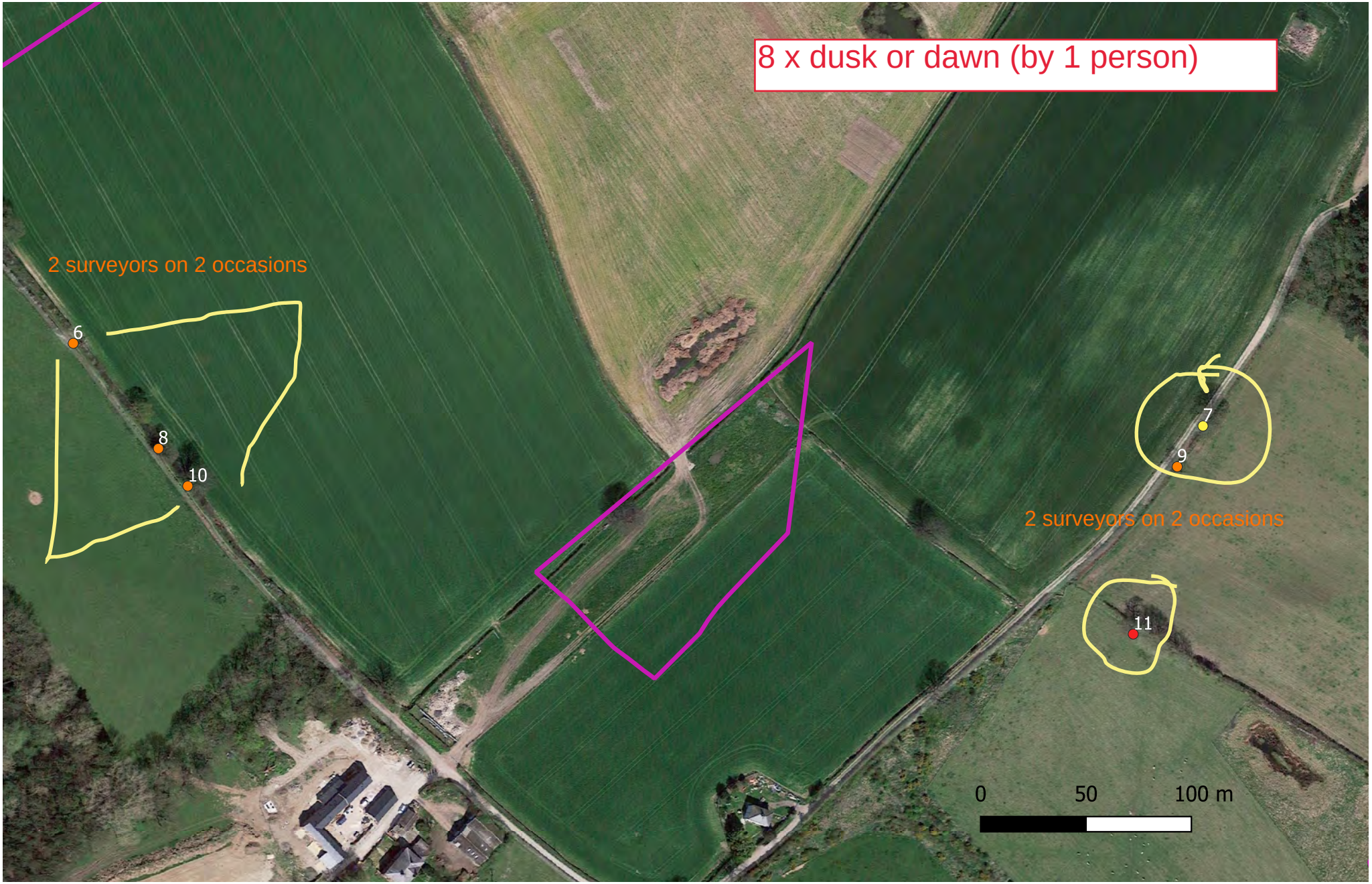
The results would be used in combination with all other available bat data, including existing records and bat activity survey data, to:

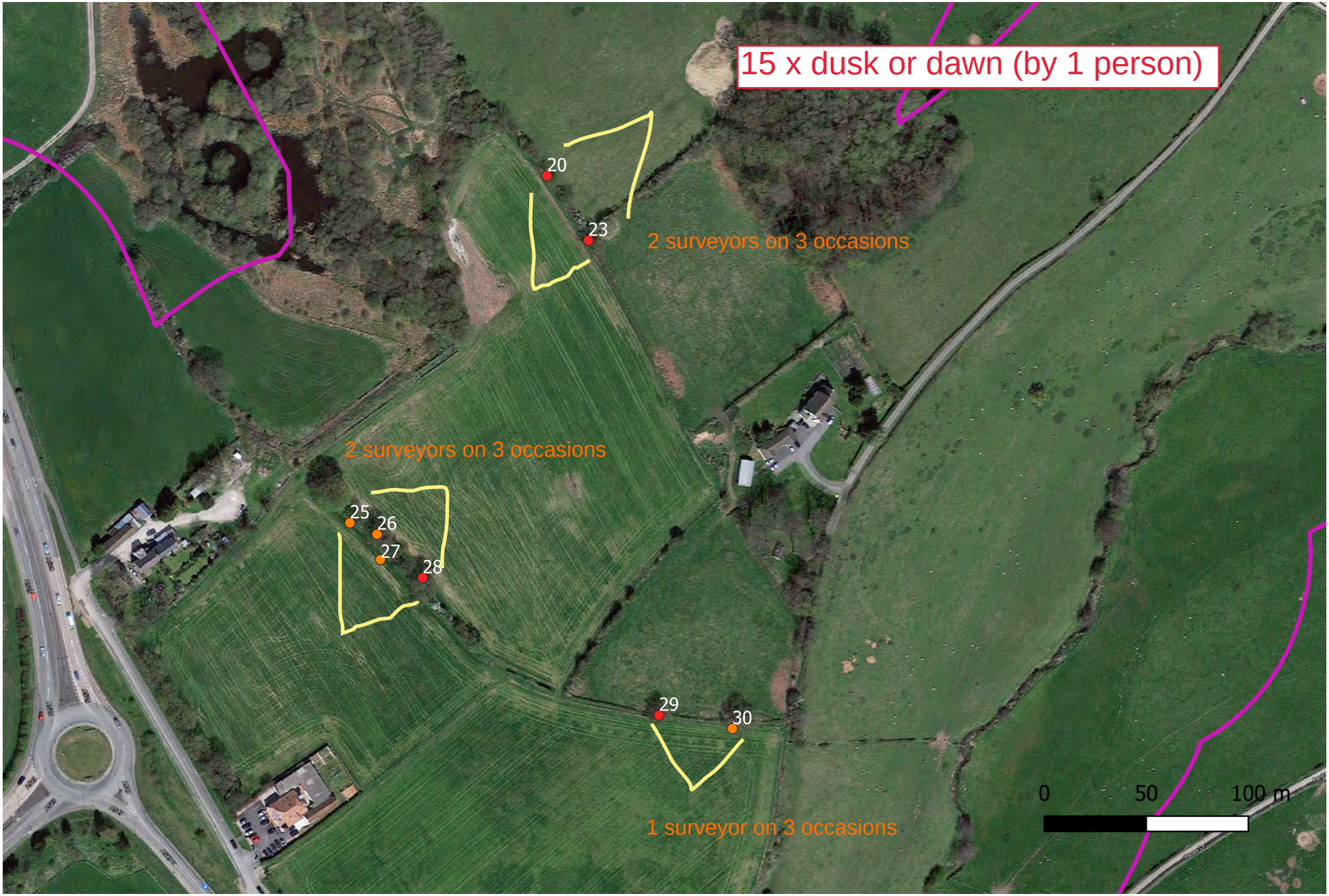
- identify presence or likely absence of a locally significant bat roost that may be affected by the project.
- Determine the number of potential roost features that would be affected, in order that the loss of these can be adequately compensated/mitigated for.
- Enable an assessment of the potential impact of the scheme on the conservation status of the local bat populations.

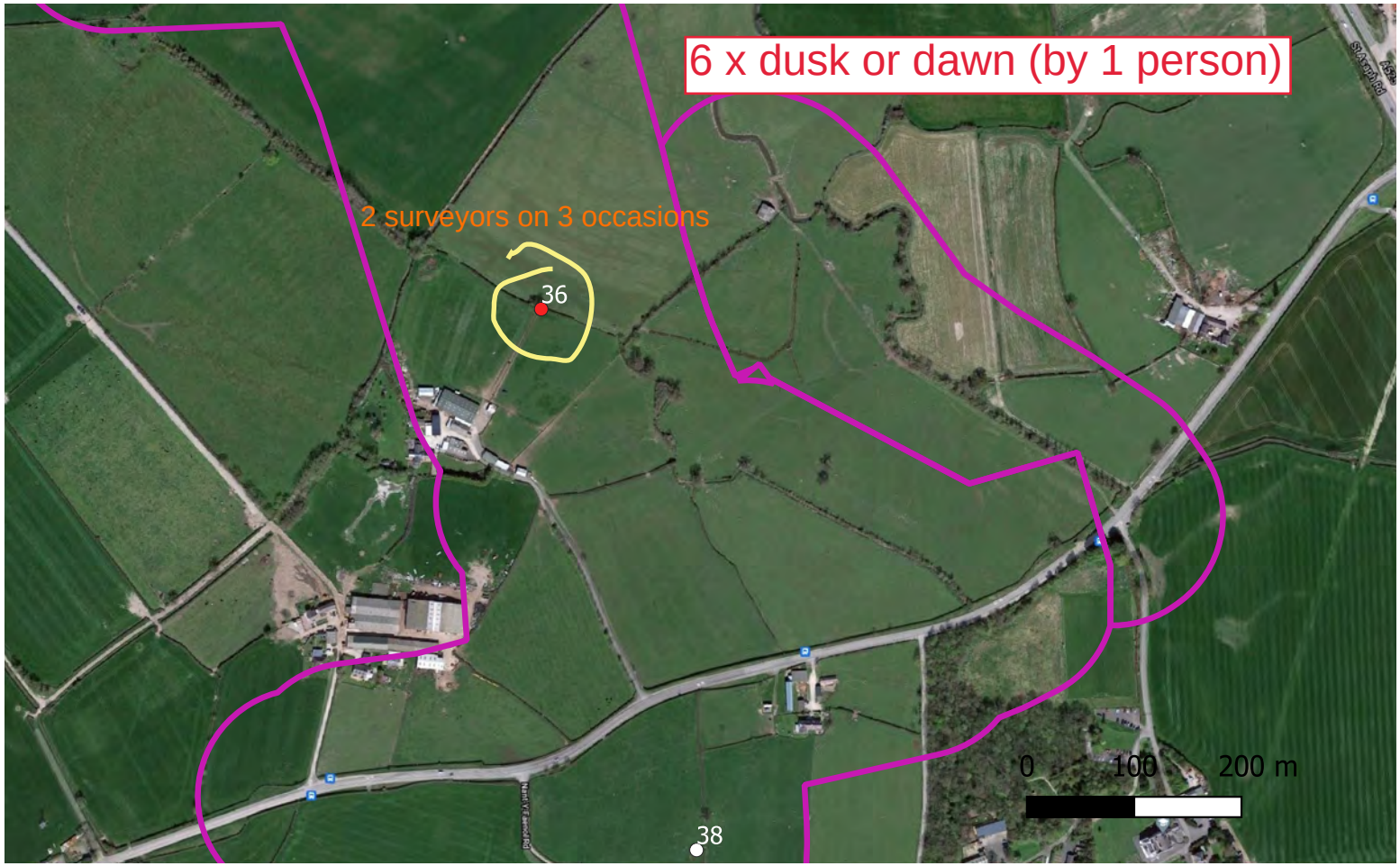
Ongoing Review of Survey Methodology

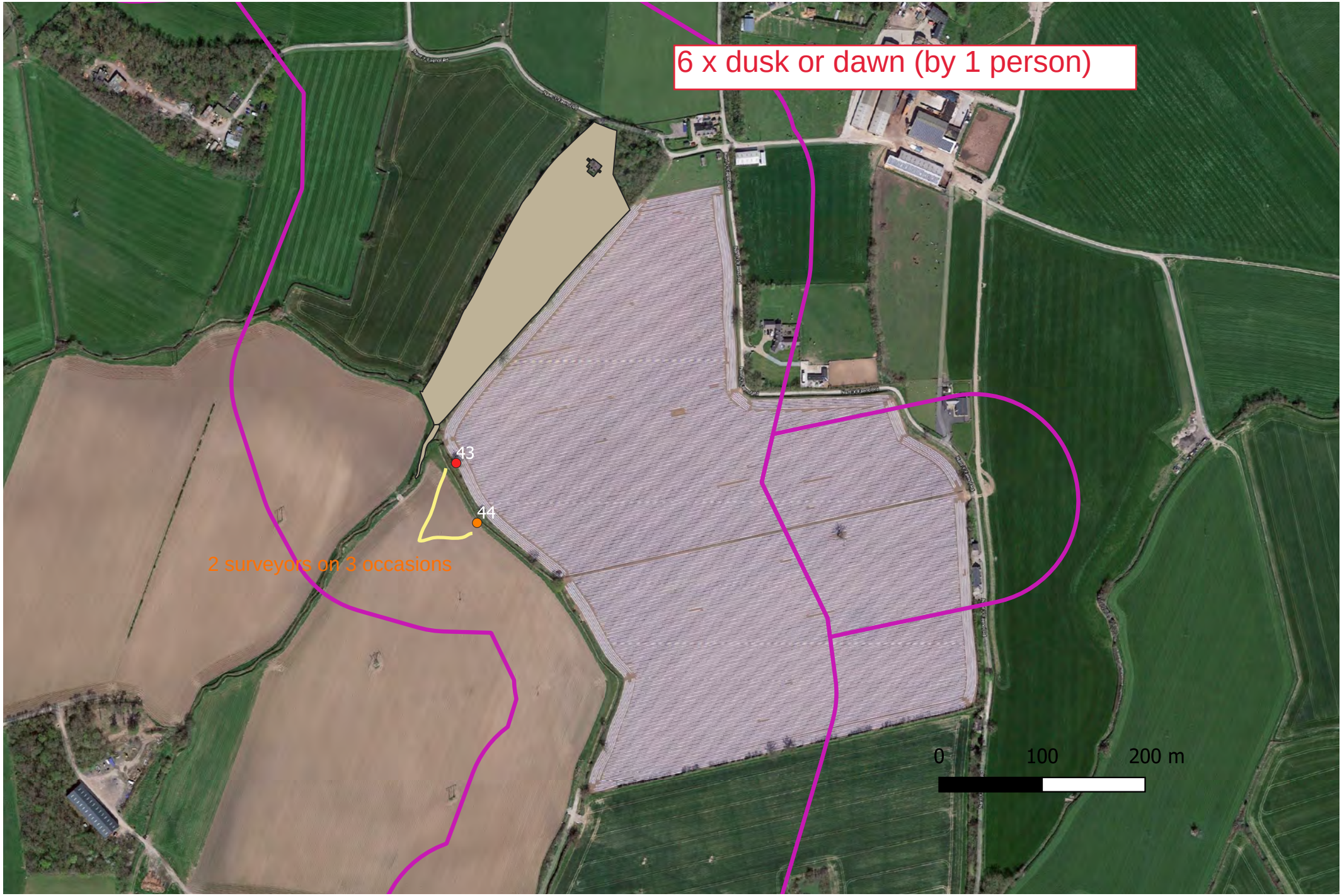
An important part of the proposed method is the ability to adapt the method depending on the results as we go. Instances that would trigger review of the survey method (which may increase or decrease survey effort) include:

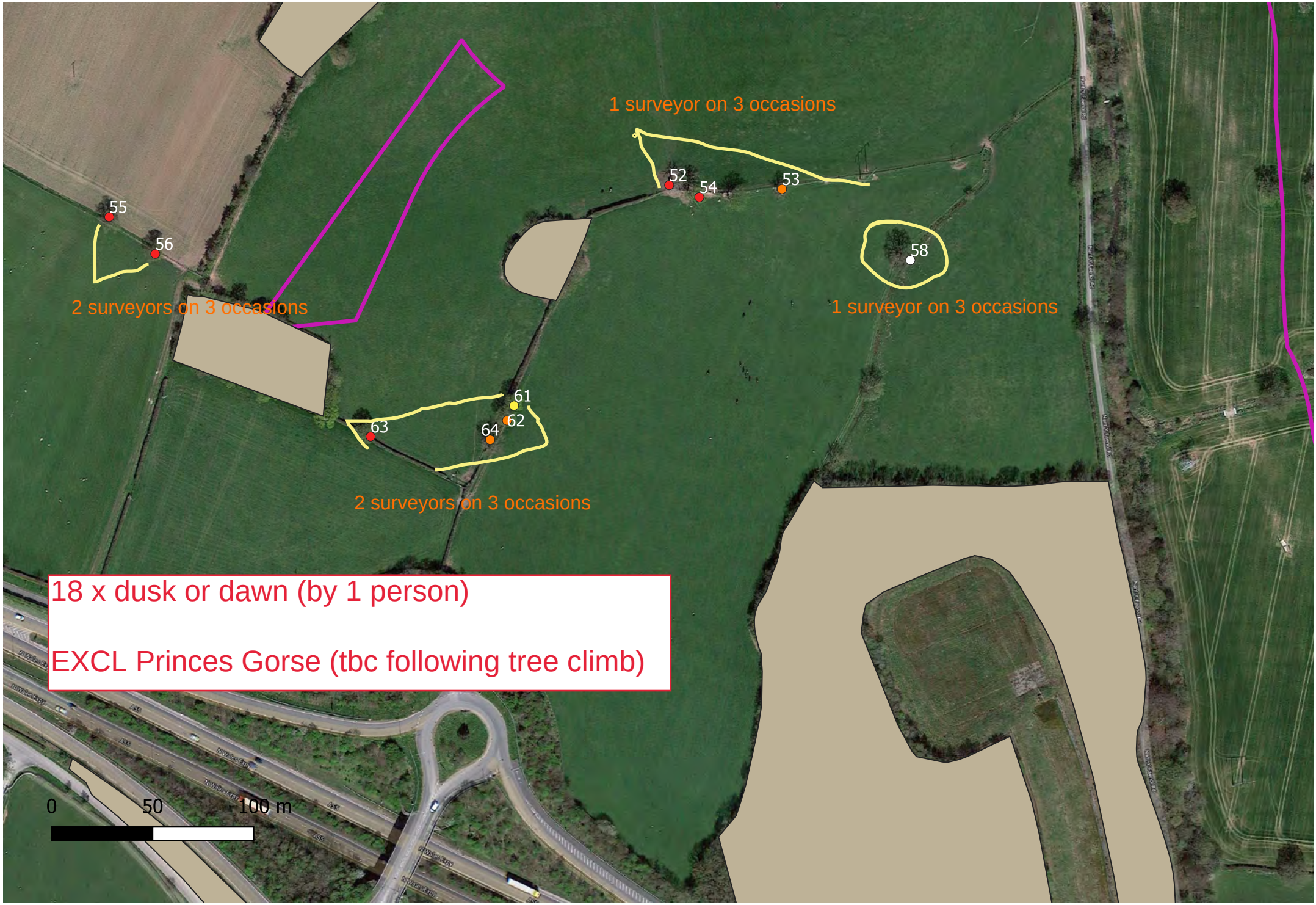
1. Re-evaluation of bat potential of a PRF following climbing inspection;
2. If the climbing inspection proves exhaustive such that bat absence/presence is conclusively known (in which case repeat climbs may be more appropriate than dusk or dawn visits); and/or
3. Suspected or confirmed presence of a significant roost.

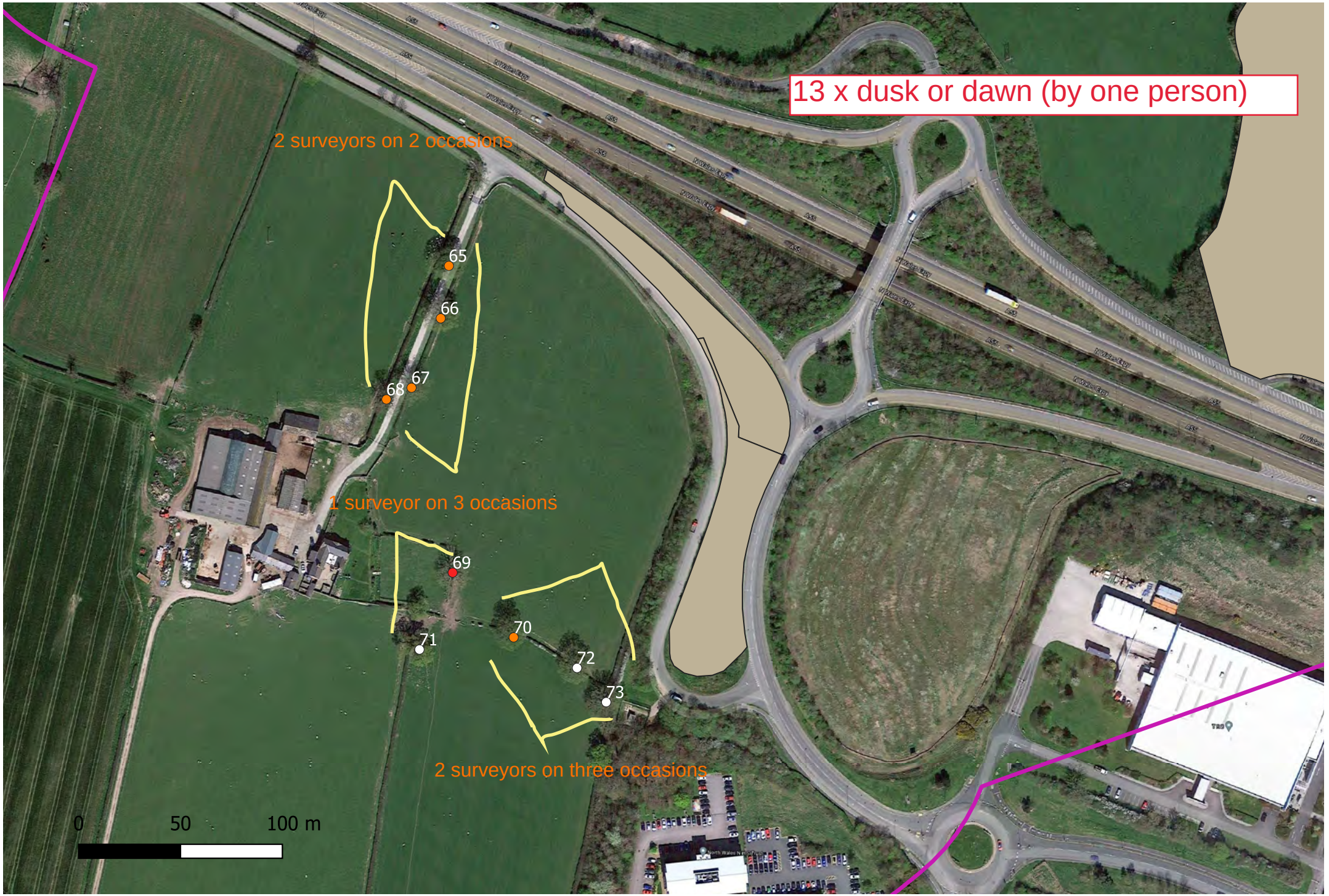

8 x dusk or dawn (by 1 person)
2 surveyors on 2 occasions
6
8
10
7
9
2 surveyors on 2 occasions
11
0
50
100 m


15 x dusk or dawn (by 1 person)
20
23
2 surveyors on 3 occasions
2 surveyors on 3 occasions
25
26
27
28
29
30
1 surveyor on 3 occasions
0
50
100 m

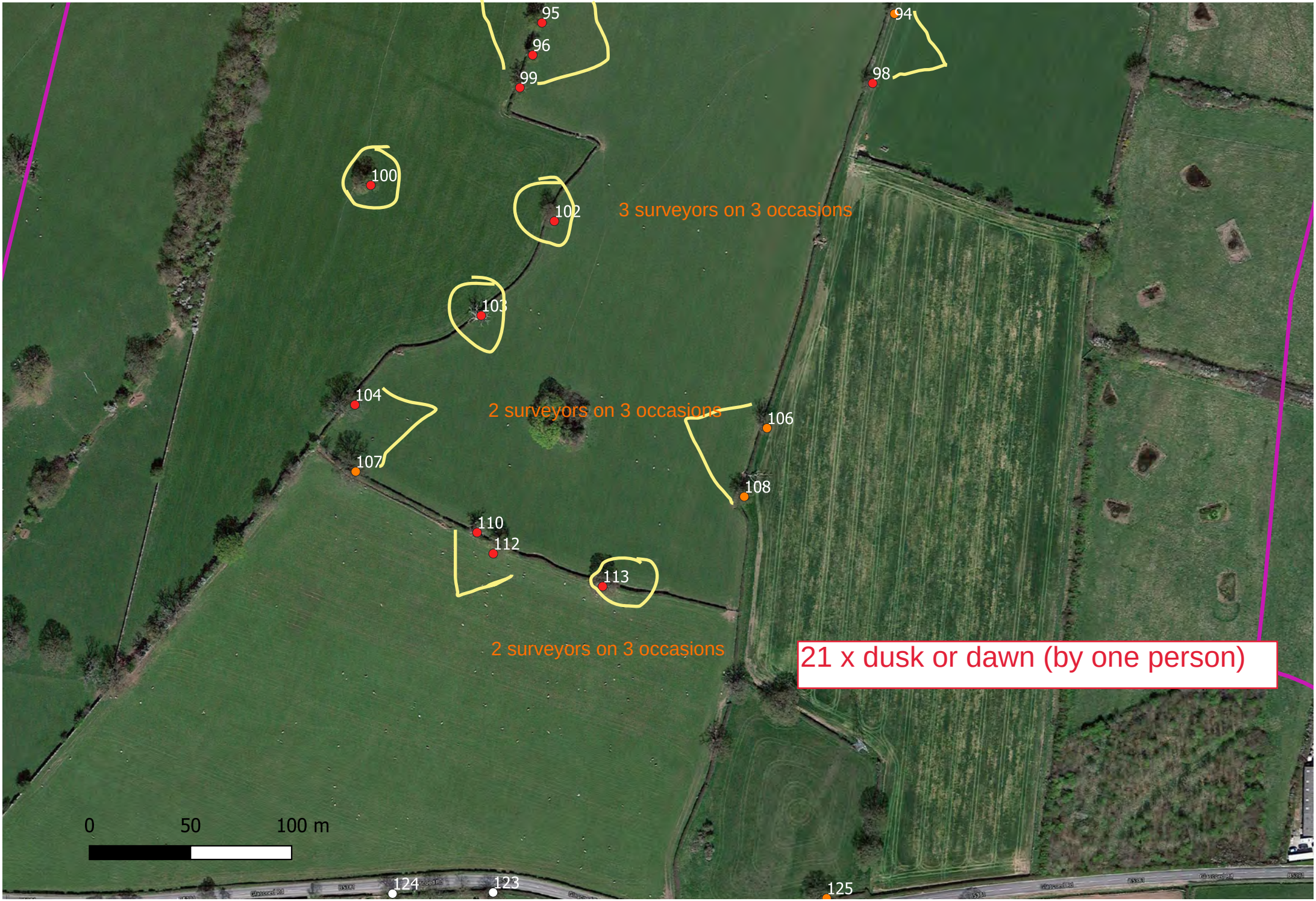

6 x dusk or dawn (by 1 person)
2 surveyors on 3 occasions
36
38
0
100
200 m

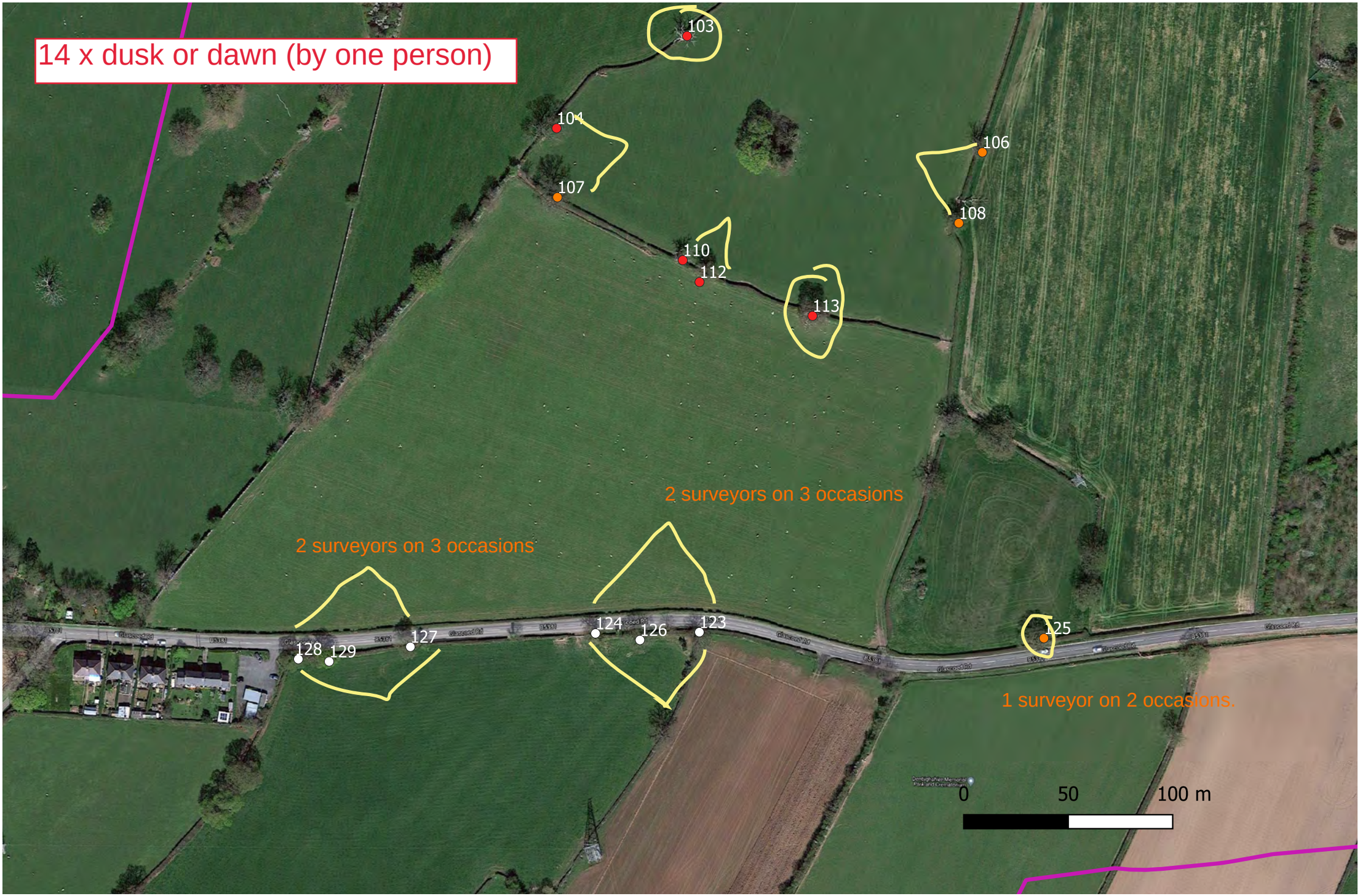

6 x dusk or dawn (by 1 person)
43
44
2 surveyors on 3 occasions
0
100
200 m

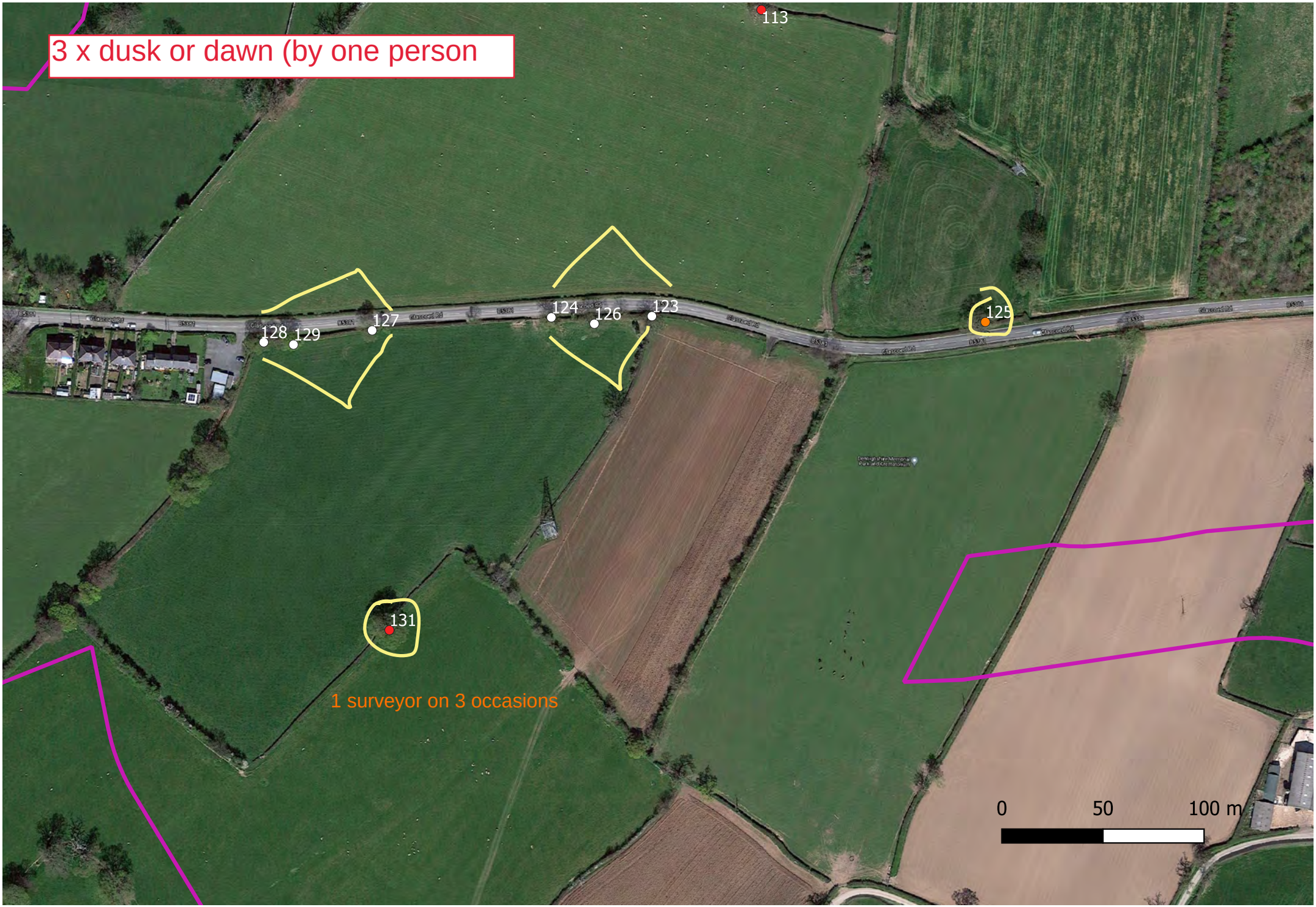

1 surveyor on 3 occasions
52
54
53
55
56
2 surveyors on 3 occasions
58
1 surveyor on 3 occasions
61
62
63
64
2 surveyors on 3 occasions
18 x dusk or dawn (by 1 person)
EXCL Princes Gorse (tbc following tree climb)
0
50
100 m

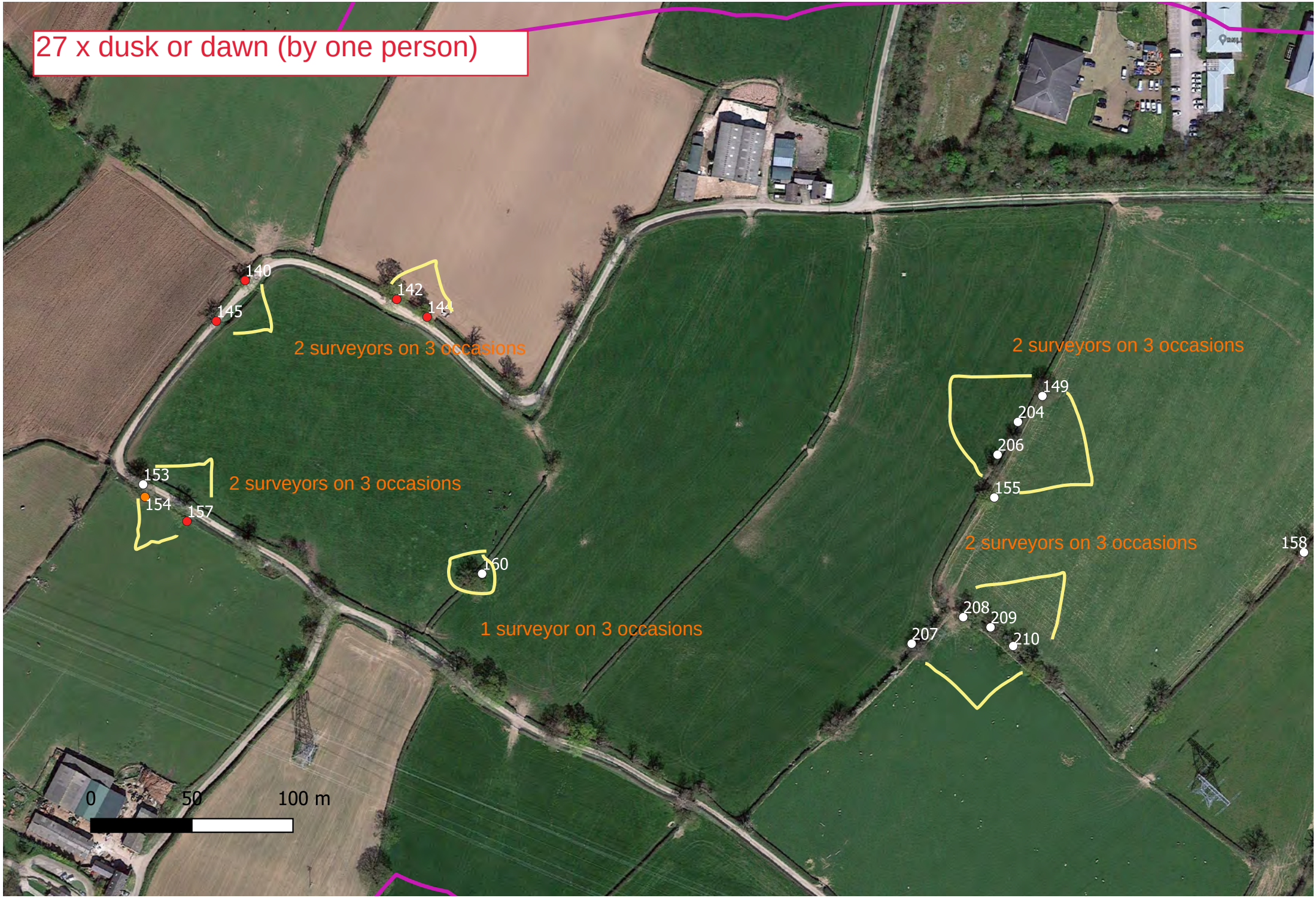

13 x dusk or dawn (by one person)
2 surveyors on 2 occasions
65
66
67
68
1 surveyor on 3 occasions
69
70
71
72
73
2 surveyors on three occasions
0
50
100 m

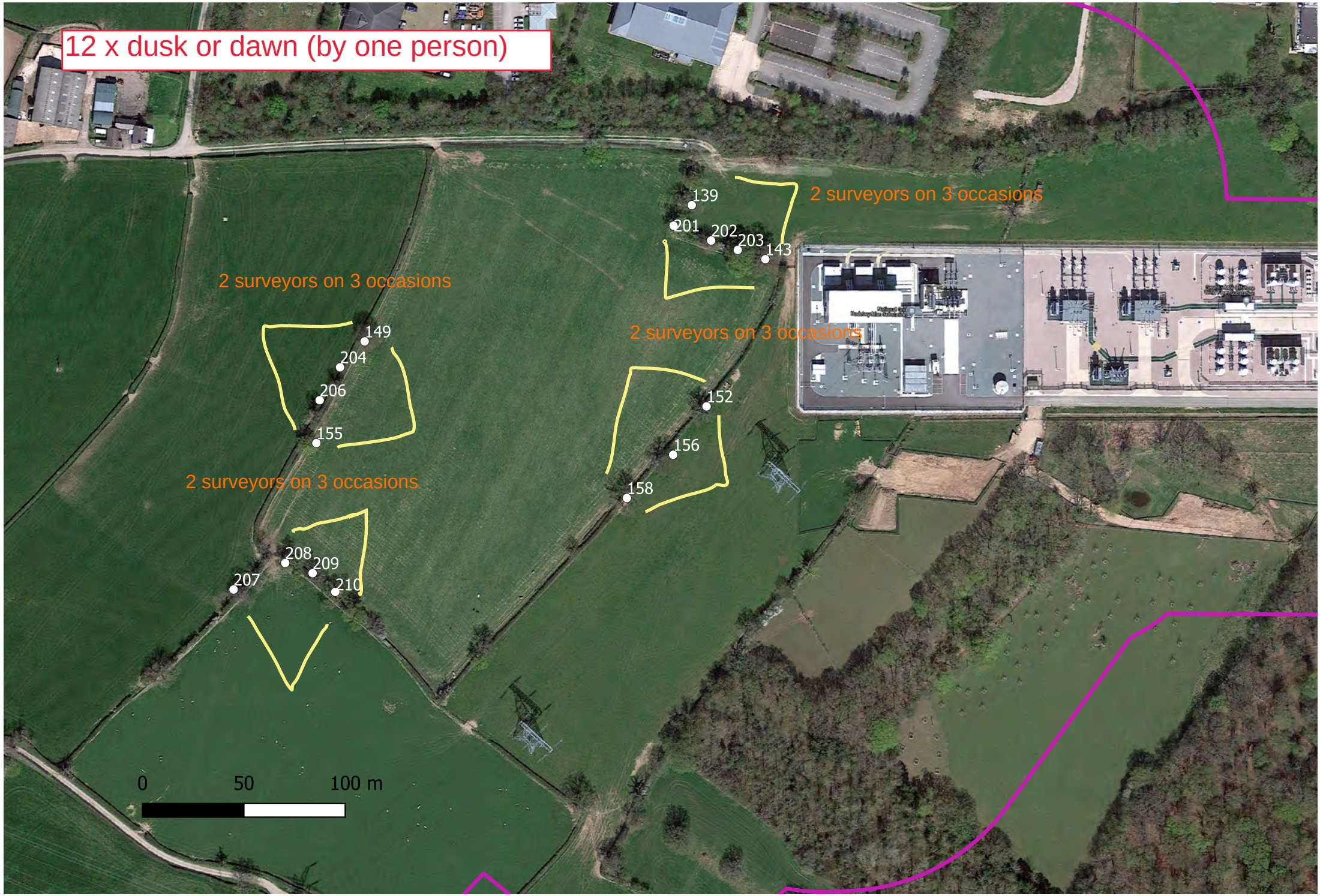
42 x dusk or dawn (by one person)
1 surveyor on 3 occasions
1 surveyor on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
2 surveyors on 3 occasions
73
74
75
76
77
78
79
80
82
84
85
86
87
88
89
90
91
92
93
94
95
96
98
99
0
50
100 m


95
96
99
94
98
100
102
3 surveyors on 3 occasions
103
104
2 surveyors on 3 occasions
106
107
108
110
112
113
2 surveyors on 3 occasions
21 x dusk or dawn (by one person)
0
50
100 m
124
123
125


14 x dusk or dawn (by one person)
103
104
107
106
108
110
112
113
2 surveyors on 3 occasions
2 surveyors on 3 occasions
128
129
127
124
126
123
125
1 surveyor on 2 occasions.
0
50
100 m


3 x dusk or dawn (by one person
113
128
129
127
124
126
123
125
131
1 surveyor on 3 occasions
0
50
100 m


27 x dusk or dawn (by one person)
140
145
142
144
2 surveyors on 3 occasions
153
154
157
2 surveyors on 3 occasions
160
1 surveyor on 3 occasions
2 surveyors on 3 occasions
149
204
206
155
2 surveyors on 3 occasions
158
208
209
210
207
0
50
100 m


12 x dusk or dawn (by one person)
2 surveyors on 3 occasions
139
201
202
203
143
2 surveyors on 3 occasions
149
204
206
155
2 surveyors on 3 occasions
152
156
158
2 surveyors on 3 occasions
208
209
207
210
0
50
100 m

3.4 Appendix F4: SLVIA

Awel y Mor Array Boundary Options Consultation

Adam Cooper
Senior Marine Advisor
23 February 2021

Introduction

This advice is provided in response to the Awel y Mor - Cultural Heritage/SLVIA ETG - Meeting 2 - offshore array maximum design scenario on 10 February 2021 and email regarding actions from the meeting sent on 17 February 2021.

NRW advice in this document is provided (under a Discretionary Advice Service agreement) in respect of a proposal which will require an application for which Natural Resources Wales is a Statutory Consultee.

The customer acknowledges that the content of any advice or assistance provided by NRW is advisory only and that it shall not be deemed to bind or in any other way restrict NRW in performing its statutory functions.

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Specialists consulted:
Olwen Maidment, Senior Advisor (Landscape)

Advice

Viewpoint Spreadsheet & Night-time Viewpoints

Having reflected on the issue of night-time viewpoints NRW request an additional night-time Visualisation from **Viewpoint 37 Cefn Coch Stone Circle** to represent views from Snowdonia National Park. The viewpoint is just outside the National Park but would be representative of views northwards towards the western part of the array, which would lie within a dark area of seascape and edged by the comparatively dark landscapes of the Great Orme and Anglesey. The National Park itself is an International Dark Sky Reserve. The main sources of light pollution visible from the National Park lie to the north east (Conwy/Llandudno & settlements further east). Although there may be some light pollution along the coastal strip around Penmaenmawr & Llanfairfechan, this is likely to be separated from new light sources out to sea.

Viewpoint 24 Graig Fawr – NRW advise that alternative scenarios should be included with this viewpoint in the table, as wirelines have now been produced for this viewpoint.

Maximum Design Scenario

With reference to the presented wirelines for areas A & H variants and the 300mRD (49 turbines) & 220mRD (92 turbines) in regular and perimeter layout:

We have reviewed the differences in effects from Viewpoints 2, 7 & 8 (Anglesey AONB); Viewpoints 10, 36 & 12 (Snowdonia National Park) & Viewpoint 24 (Clwydian Range & Dee Valley AONB).

Overall, we consider the differences between areas A & H to be very marginal, with A perhaps having the slightly larger horizontal extent in more views.

The regular layout is slightly worse from more viewpoints than the perimeter layout. The 300mRD turbines are more visually prominent in nearly all views, especially when seen against the landform and existing windfarms. However the smaller turbines often appear more dense, presumably due to the greater number.

Therefore the worst case scenario of the variants presented are likely to be area A, regular layout & 300mRD turbines. However the differences in terms of the areas and layouts are marginal and the potential reduction in effects from a reduction in size of turbine is limited by their greater number.

This worst case scenario is highly likely to lead to significant adverse effects on Designated Landscapes, and as previously, we advise a substantial reduction in the area and scale of the proposal to minimise adverse visual effects on National Parks and AONBs.

Anglesey AONB
Area H has a slightly narrower horizontal extent from VP 2, but there is very little difference between the 2 areas from Anglesey. The regular layout is slightly worse visually from Vp 2 & 8, whereas the perimeter layout is slightly worse in Vp 7. The difference between the

size of turbines is not very noticeable from Vp 2, but from Vp 7 & 8 the 300mRD turbines are more visually prominent, especially where seen against the landform. However, the 220mRD turbines appear more dense in all views.

Snowdonia National Park
Area H has a slightly narrower horizontal extent from all VPs. The regular layout is slightly worse from Vp 12, whereas the perimeter layout is slightly worse from Vps 10 & 36. The 300mRD turbines are noticeably more prominent in all views, however the 220mRD turbines tend to appear more dense.

Clwydian Range & Dee Valley AONB
There is very little difference between areas A & H in Vp24. The regular layout is slightly worse. The 300mRD turbines are noticeably more prominent in relation to the existing wind farms, however the smaller turbines tend to appear more dense.

Denbighshire County Council

Awel y Môr Offshore Wind Farm
Onshore Substation Review

Draft report
Prepared by LUC
March 2022

Denbighshire County Council

Awel y Môr Offshore Wind Farm
Onshore Substation Review

Project Number
11625

Version	Status	Prepared	Checked	Approved	Date
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Appendix 1
Summary of Predicted Operational Effects

Chapter 1
Introduction

1.1 LUC has been appointed by Denbighshire County Council (The Council) to undertake a review of the proposed onshore substation (OnSS) associated with Awel y Môr Offshore Wind Farm (AyM OWF). AyM OWF is a proposed by RWE (the Developer).

1.2 This appointment follows our previous work, on behalf of the seven North Wales Planning Authorities, to undertake a review of the Preliminary Environmental Information Report (PEIR) for onshore and offshore elements of AyM OWF. This review includes consideration of the assessment of potential effects identified in the Landscape and Visual Impact Assessment (LVIA) and proposed mitigation measures. The LVIA and mitigation measures have been prepared by the Developer's consultants, Optimised Environments (OPEN).

Purpose of the Review

1.3 The PEIR was prepared in August 2021 and the consultation period ended on 11th October 2021. The Developer intends to submit applications for necessary development consents (Development Consent Order and Marine Licence) later in 2022.

1.4 This review considers design developments since the consultation period ended. It is intended to help The Council consider the potential landscape and visual effects which would arise from the OnSS, and to consider how comments and concerns raised in response to the PEIR have been addressed.

Structure of the Review

1.5 Our approach to undertaking the review has been informed by the guidance contained within the Landscape Institute's Technical Guidance Note 1/20[1]. The review is structured as follows:

- Chapter 2 presents a review of the principles and process, covering methodology, scope, baseline, mitigation, and visualisations;
- Chapter 3 reviews the impact assessments;
- Chapter 4 provides a summary and conclusions.

[1] Landscape Institute's Technical Guidance Note 1/20: Reviewing Landscape and Visual Impact Assessments (LVIAs) and Landscape and Visual Appraisals (LVAs) (10 Jan 2020)

- Appendix A presents a tabulated summary of impacts; and
- Appendix B presents selected figures for ease of reference.

Approach to the Review

1.6 An online meeting was held on 7th February 2022, with attendees from LUC, The Council, OPEN, SLR[2] and RWE. During this meeting, representatives from OPEN, SLR and RWE presented an update to the proposals for the OnSS, a description of key landscape and visual receptors and an overview of proposed mitigation measures. The presentation was later forwarded to LUC to assist with this review.

1.7 LUC has also been able to review The Council's 'Response to the Pre-Application Consultation under Section 42 of the Planning Act 2008'.

1.8 A desk-based review was carried out by landscape architects (CMLI) at LUC. No field work was undertaken. The review refers to:

- PEIR Volume 3, Chapter 1 – Onshore Project Description;
- PEIR Volume 3, Chapter 2 – Landscape and Visual Impact Assessment;
- PEIR Volume 3, Chapter 13 – Onshore Conclusions; and
- PEIR Volume 6, Figures 2.1 to 2.25.

The Proposed Development

1.9 The OnSS is proposed to be sited on agricultural land, between Bodelwyddan Castle Registered Historic Park & Garden (HPG) and St Asaph Business Park. A bridlepath passes to the north of the site and the B5381 (Glascoed Road) is south of the site. The site location is shown on PEIR **Figure 2.1** (appended).

1.10 The OnSS will be connected to AyM OWF, via the proposed landfall at Rhyl, and to an electricity distribution site south of St Asaph Business Park by underground cable. This review relates to the OnSS and associated mitigation measures only. Works and potential effects associated with the proposed landfall and underground cable are not considered here.

1.11 The design of the OnSS is not fixed. RWE indicate that this is because of flexibility required. The design presented and assessed is therefore a 'design envelope approach', based on the maximum design scenario. Outline proposals are shown on PEIR **Figure 2.16** (appended)[3]. The final design is to be approved by The Council (including layout, materials and mitigation).

1.12 The OnSS will include either air-insulated switchgear (AIS) or gas-insulated switchgear (GIS). An AIS solution is likely require a larger footprint, with infrastructure placed outside. A GIS solution would require a large building, up to 15m in height, with some infrastructure inside. Indicative layouts for AIS and GIS substations, prepared by RWE consultants, are shown in PEIR, Chapter 1, **Figure 29** and **Figure 30** (both appended).

1.13 In terms of timing of decision, the PEIR states that the *"choice of AIS or GIS will be part of the detailed design process and a decision will be made post-consent prior to construction commencing"* (PEIR, Chapter 2, Para. 173).

1.14 Further components required as part of the OnSS identified by RWE include equipment up to 8m height, lightning rods up to 18m height and lighting to be employed only during operation and maintenance activities.

1.15 Because of the flexibility required for the OnSS, including the location of import and export cables, the landscape and visual mitigation proposals have not been finalised. The design presented by OPEN, as part of an outline landscape and ecology management plan (OLEMP), therefore represents a series of design principles.

1.16 The basis of the effects during construction assessed in the LVIA are (from PEIR, Chapter 2, Table 7):

- Indicative OnSS construction compound dimensions 250 x 150, with an area of 37,500m^2.
- 2 construction compound options are included at PEIR. Including construction activities associated with OnSS access options to the north and south of the OnSS zone.
- 12 hour working day (7am-7pm Monday to Saturday), 27 months for OnSS.

1.17 The basis of the effects during operation assessed in the LVIA are (from PEIR, Chapter 2, Table 7):

- Maximum area of AIS OnSS – 50,000m^2, maximum GIS OnSS – 30,000m^2. OnSS zone – 297,000m^2, OnSS zone platform – 273000m^2 (the area in which the OnSS can be located allowing 20m buffer for earthworks). Including OnSS access options to the north and south of the OnSS zone.

[2] SLR is the AyM OWF lead environmental and planning consultants.

[3] Note that the version of Figure 2.16 appended was shared by RWE/OPEN on 7th February 2022. This supersedes the version presented as part of the PEIR.

- OnSS infrastructure maximum height 15m located on the OnSS zone platform at 33m AOD indicative platform level for PEIR.

Outline Landscape and Ecology Management Plan

1.18 The outline landscape mitigation proposals are shown on **Figure 2.16** (appended).

1.19 The OLEMP includes elements which are intended to mitigate potential landscape and visual impacts. The main components of this which are relevant to the LVIA are areas of native woodland and hedgerow species around the OnSS. The stated aims of these are:

- *"To provide visual screening to residential properties, road users, and visitors to the Crematorium on Glascoed Rd to the south;*
- *To provide visual screening to users of the Bridleway immediately north (of the) substation;*
- *To provide a woodland context to the substation site that compliments the long-established woodland of the area, including woods found within Bodelwyddan Park and Garden; and,*
- *To provide greater connectivity between the existing woodlands, retained hedgerows, field boundary trees and nearby Nature Reserve"*[4].

1.20 It is intended that woodland would contain a mix of faster growing nurse species and slower growing core species. It is also suggested that planting could be spaced to maximise growth rate and ultimate screening potential.

[4] This information is taken from the RWE presentation from 7th February 2022.

Chapter 2
Review of the PEIR LVIA and Recommendations

2.1 This section presents a brief summary of the relevant sections of the onshore LVIA, in terms of the overall scope, approach and potential impacts.

Methodology, Scope and Process

2.2 The LVIA was carried out by experienced practitioners using a robust methodology based on established good practice. The methodology for the onshore LVIA is set out in Volume 3, Chapter 2 of the PEIR, in Sections 2.4 and 2.5. The methodology is clearly set out and based on GLVIA3 principles, with detailed explanations of the components of each judgement.

2.3 Several figures have been prepared which are relevant to the LVIA scope. The following selection is appended to this report:

- **Figure 2.3b**: Landscape Character (Regional);
- **Figure 2.4**: Landscape Designations; and
- **Figure 2.5**: Principal Visual Receptors.

2.4 Elements scoped out with reference to the Scoping Opinion include:

- Operational effects of the landfall and onshore cable route;
- Effects resulting from operational lighting of the OnSS; and,
- Effects on the Clwydian Range and Dee Area of Outstanding Natural Beauty (AONB).

2.5 Receptors scoped out following 'Preliminary Assessment' (Sections 2.11, 2.12 and 2.14) include:

- Regional landscape character areas A3, A4, A6, B2 and D1 (see PEIR **Figure 2.3b**);
- Betws yn Rhos and Elwy & Aled Valley Special Landscape Areas (SLAs) (see PEIR **Figure 2.4**);
- Kinmel Park, Bodrhyddan, Llannerch Hall, Plas Heaton and Plas Uchaf, Llannefydd Registered Historic Parks and Gardens (RHPGs) (see PEIR **Figure 2.4**);

- All conservation areas (CAs) in the Study Area (see PEIR **Figure 2.4**);
- People in settlements of Rhyl, Rhuddlan, Prestatyn, St Asaph and Bodelwyddan (see PEIR **Figure 2.5**);
- People using the A55, A525 and A547 roads (see PEIR **Figure 2.5**); and
- People using various PRoW including along the River Clwyd (including NCR 84), between the A547 and Sarn Lane and to the north of the A55 (see PEIR **Figure 2.5**); and,
- Cumulative effects (see PEIR, **Section 2.14.2**).

2.6 The scope generally appears sufficient to capture all potentially significant effects. There is a clear record of consultation that indicates agreement with stakeholders on key points of the scope and approach.

2.7 Operational lighting has potential to result in landscape and visual effects. While it is agreed that, in this context, these are unlikely to be significant, it would be appropriate to request details of lighting proposals as design of the OnSS progresses and to agree the final design.

2.8 There has been communication with consultees regarding whether effects on the Clwydian Range and Dee AONB should be considered, or whether a viewpoint should be included to illustrate potential effects (PEIR Table 2). Reasons provided as justification for scoping this out are considered appropriate.

2.9 Residents in the settlement of St Asaph have been scoped out of the LVIA, and reference is made to Viewpoint 7 (see PEIR Figure 2.24) to support this. There would be no view of the proposed OnSS from Viewpoint 7, but this is because of the screening effect of intervening properties. There is potential for visibility of the OnSS from properties and open areas north and west of the viewpoint. Visibility may or may not result in significant effects upon residents, but an alternative viewpoint should be presented with the Environmental Statement to illustrate this.

Baseline information

2.10 The baseline for the LVIA is set out in Volume 3, Chapter 2 of the PEIR, in Section 2.7. The relevant national and local landscape character assessments are referenced. A detailed review of LANDMAP aspect areas is included in Annex 2.1 to the LVIA. Relevant designations noted include Registered Historic Parks and Gardens (RHPG).

2.11 Table 4 lists eight representative viewpoints for assessment of the OnSS, and these represent a range of receptors across the study area.

2.12 The detailed baseline of the physical landscape, including sensitivity judgements, is provided within the assessment of landscape effects (Section 2.10.2).

2.13 The LVIA includes a review of relevant documentation on landscape and visual baseline. Relevant receptors appear to have been identified. The majority of baseline detail, including sensitivity judgements, is presented within the impact assessments, and this approach is reasonable.

Mitigation and design

2.14 The approach to mitigation for the onshore works is set out in Volume 3, Chapter 2 of the PEIR, in Section 2.9 of the LVIA. This discusses primary mitigation, construction phase mitigation, and operational mitigation.

2.15 Primary mitigation relates to site selection and embedded design, through the avoidance of sensitive landscapes and features. The location of the OnSS site in proximity to existing electrical infrastructure is stated to be part of the embedded mitigation of the proposal.

2.16 There is little information as to how design and layout of the OnSS has been developed to reduce impacts on the landscape through, for example, building design or finished ground levels. It was recommended in our previous review that this should be explored further but, during our meeting of 7th February 2022, it was explained that this has not been done.

2.17 We continue to recommend that the design of the OnSS should be developed with the purpose of minimising potential landscape and visual effects. This should include consideration of appropriate colours and materials for elements such as cladding and fencing.

2.18 Construction phase mitigation refers to management plans and codes of practice that will regulate construction works. These documents have yet to be developed, though a Landscape and Ecology Design Principles Plan (LEDPP) is provided in Annex 5.4 of the LVIA, which presents principles that will be developed further. This appears to present limited additional information to that included in the LVIA itself, in relation to construction phase mitigation. It does however usefully present both landscape and ecology measures together, which should help facilitate a coordinated response at ES stage.

2.19 Operational mitigation refers to proposed woodland and other planting around the OnSS. Indicative mitigation measures are shown on **Figure 2.16** (appended). Although subject to change as the design of the OnSS progresses, the measures shown appear reasonable. The final mitigation proposals should be provided and agreed with The Council.

Conclusion

2.20 The PEIR LVIA presented some information on mitigation, and this has been developed further since PEIR submission.

2.21 It is recognised that the design of the OnSS is at a relatively early stage and that this limits the extent to which mitigation proposals can be developed. Some clarification of this section will be required for the ES, but the planting principles set out are sound and appear capable of being developed into an effective mitigation scheme.

2.22 The Developer should provide detail on the appearance of non-technical elements of the OnSS, such as lighting, cladding and fencing and these should be agreed with the Council.

Visualisations

2.23 The methodology for photography and production of visualisations is included in the Section 2.5.8 of the LVIA, referencing good practice guidance as appropriate.

2.24 With reference to Landscape Institute (LI) guidance[5], visualisations can be one of four types:

- Type 1 – annotated viewpoint photographs;
- Type 2 – 3D wireline / model;
- Type 3 – photomontage / photowire;
- Type 4 – photomontage / photowire (survey / scale verifiable).

2.25 All visualisations included in the LVIA (see Figures 2.18 to 2.25) are labelled as Type 3. Where there is no view of the proposed OnSS, notes have been added to photographs. Technically, these are closer to Type 1 visualisations; however, this error does not affect the findings of the LVIA.

2.26 Baseline photography has been captured in good weather conditions. There are examples (e.g. Viewpoint 8) of atmospheric haze, but this is representative of the area and does not limit understanding of the baseline context or the proposed development.

2.27 Type 3 visualisations can offer an appropriate level of detail and accuracy for a range of projects, but there are different levels of graphical approach which can be used (see Appendix 6.4 of LI guidance). The visualisations prepared for PEIR show an outline block indicating the maximum design parameters, with further annotation identifying the potential extent of mitigation planting. This approach equates to Accurate Visual Representation (AVR) Level 1, which is appropriate to the current design stage.

2.28 For viewpoints representing most sensitive receptors subject to significant effects, we recommend that AVR Level 3 visualisations are produced (once the design has been progressed to a suitable stage). These would be fully rendered photomontages, showing architectural form with texture, shading and reflections as appropriate.

Conclusion

2.29 The LVIA is supported by good quality visualisations, produced and presented in line with the relevant good practice guidance. These provide an appropriate level of detail at this stage. However, these should be developed further as designs for the OnSS and mitigation progress.

Recommendations

2.30 The Developer should develop design of the OnSS and mitigation further, and agree this with the Council. It is acknowledged that a maximum design envelope or worst-case approach has been taken, and this is appropriate for PEIR stage. However, we suggest that further detail is required to allow consideration and illustration of potential effects on most sensitive landscape and visual receptors.

2.31 It is acknowledged that assessment of effects resulting from operational lighting have been scoped out of the LVIA, but the Developer should develop details of the operational lighting for the OnSS with a view to minimising effects, and agree these with the Council.

2.32 Using more detailed design information, the Developer should provide visualisations from viewpoints which represent the most sensitive receptors (e.g. VP1, VP3 and VP5) to AVR Level 3.

[5] Landscape Institute (2019) Technical Guidance Note 06/19: Visual Representation of Development Proposals

Chapter 3
Review of LVIA Assessments

3.1 This section presents a review of the LVIA findings (PEIR Volume 3, Chapter 2 and its supporting appendices and figures).

Effects on Physical Landscape

3.2 The detailed assessment of physical effects is presented in PEIR, Chapter 2, Table 9 (during construction). The table appears only to consider those effects on physical landscape which would result from the landfall and underground cable.

3.3 There does not appear to be consideration of effects on physical landscape elements (e.g. loss of farmland and hedgerow) as a result of the OnSS.

Effects on Landscape Character

3.4 The detailed assessment of landscape character effects resulting from the OnSS is set out in Table 11 of the PEIR LVIA (Volume 3, Chapter 2, Page 108) and summarised in Table 1.1 appended to this review. Character areas scoped in are shown on PEIR **Figure 2.3b** (appended):

- LCA A1 – Eastern Lowlands.
- LCA C4 – Limestone Farmlands.

3.5 It is agreed that there would be significant effects on LCA A1 (the host landscape) during construction and operation at Year 1. It is also agreed that effects would reduce to not significant at Year 15.

3.6 The LVIA finds that there would be no significant effects on LCA C4 during construction or operation, and this is agreed.

Effects on Landscape Designation

3.7 The detailed assessment of effects on landscape designation as a result of the OnSS is set out in Table 11 of the PEIR LVIA and summarised in Table 1.1. All designated areas other than Bodelwyddan Park RHPG are scoped out. The location of Bodelwyddan Park RHPG relative to the OnSS is shown on PEIR **Figure 2.4** (appended).

3.8 The LVIA states that changes *"to this RHPG would potentially be experienced as indirect visual effects from areas of theoretical visibility shown on the ZTV. These areas are limited in number and extent due the woodlands along the eastern boundary of Bodelwyddan Park and small woodlands*

and parkland trees providing existing visual screening from much of the parkland landscape" (PEIR, Chapter 2, Table 11).

3.9 The Draft Order Limits (see PEIR **Figure 2.4**) extend into the RHPG, indicating potential for direct effects upon the designated area. The LVIA does not explain the potential implications of this.

3.10 Without explanation of the full potential for direct effects upon the RHPG, it is not possible to fully consider the potential for significant effects upon this designated landscape.

Effects on Visual Receptors

3.11 A preliminary assessment was made as to which visual receptors to consider in the PEIR LVIA (Chapter 2, Table 13). The detailed assessment of visual effects resulting from the OnSS is set out in Table 15 of the PEIR LVIA (Volume 3, Chapter 2, Page 139).

3.12 Eight viewpoints (VPs) were established within the onshore study area and, as part of the preliminary assessment, it was determined that six of these would be used to inform the assessment of visual effects.

3.13 There is no view from VP6 (Bodelwyddan Park) or VP7 (St Asaph) and so receptors at these locations have not been included in the detailed assessment. It is acknowledged that there is no view from these locations, but it is likely that there would be visibility of the OnSS from other locations. The ES should use alternative VP locations to inform of potential visual effects upon receptors at Bodelwyddan Park and St Asaph.

3.14 VP2 (St Asaph Business Park) is used to illustrate potential change and inform assessment of effects on users of the business park and visitors to Glascoed Nature Reserve (Chapter 2, Table 13). It is agreed that foreground screening and differences in elevation would result in the visual effect within the business park being not significant. However, visitors to the nature reserve would be at lower elevation and would not have views screened by the boundary treatments shown at this VP. It is considered likely that visual effect on visitors to the nature reserve could be significant.

3.15 The sensitivity, magnitude of change and resulting visual effect at the other 5 VPs is agreed, and it is considered that these have identified the receptors most likely to experience significant effects as a result on the OnSS.

3.16 Significant effects have been assessed, and are agreed, during construction of the OnSS on people using the bridlepath near Faenol-Bropor (VP1), on residents and road users at Glascoed Road (VP3) and on people near the minor road at Groessfordd (VP5). Significant effects would result for the same receptors during Year 1 of operation of the OnSS.

3.17 Although mitigation measures have not been finalised, it is considered that the outline proposals have potential to successfully reduce visual effects over time. However, the LVIA has identified that potential significant effects would continue for users of the bridlepath near Faenol-Bropor (VP1) and residents on Glascoed Road (VP3). This is agreed.

Cumulative Effects

3.18 A list of projects which may contribute to cumulative effects with the onshore elements of AyM OWF is provided in Table 5 (PEIR, Volume 3, Chapter 2, Page 76). The PEIR LVIA *"has determined that there are no future cumulative development scenarios that require detailed assessment in a Cumulative Landscape and Visual Assessment (CLVIA)"* (PEIR, Volume 3, Chapter 2, Page 155).

3.19 Based on the reasoning provided in Table 16 (PEIR, Volume 3, Chapter 2, Page 153), the decision not to include detailed assessment in a CLVIA appears reasonable. However, the Council should inform the Developer of any planning applications which are submitted, prior to submission of the ES, which would require consideration.

Recommendations

3.20 The Developer should identify an alternative VP location, from which there would be visibility of the OnSS, within the Bodelwyddan Park RHPG. The Developer should also explain the implications of the Draft Order Limits extending into the RHPG and clarify the potential for direct effects, in addition to indirect visual effects, upon this designated landscape.

3.21 The Developer should identify an alternative VP location, from which there would be visibility of the OnSS, within St Asaph. The Developer should also describe the potential for visual effects upon residents of, and visitors to, the settlement.

3.22 With reference to VP1, the Developer should provide an assessment of potential visual effects on the residents of the Faenol-Bropor farmstead.

3.23 With reference to VP2 (but acknowledging the difference in elevation and foreground screening), the Developer should provide an assessment of potential visual effects on visitors to the Glascoed Nature Reserve.

3.24 The Council should inform the Developer of planning applications which would require consideration as part of a CLVIA prior to submission of the ES.

Chapter 4
Summary and Conclusions

4.1 This review focuses on the potential landscape and visual impacts which may result from the proposed OnSS which would be part of the AyM OWF. The review includes reference to the LVIA findings presented in the PEIR and subsequent design development. It follows our earlier review of the PEIR S/LVIA.

4.2 Design for the OnSS and associated mitigation measures are not fixed. The proposals shown on **Figure 2.16** represent a worst-case scenario. Final designs will be presented to the Council for approval in due course. As part of the design development process, the Developer should consider the appearance of non-technical elements of the OnSS, such as lighting, cladding and fencing. This information should be used to develop more detailed visualisations, which allow for a more thorough evaluation of landscape and visual effects.

4.3 The PEIR LVIA accurately identifies significant potential landscape and visual effects for several receptors during construction and operation of the OnSS. However, the assessment of potential effects on Bodelwyddan Park RHPG does not consider the extent of the Draft Order Limits and does not use an appropriate viewpoint location. Similarly, the LVIA uses a viewpoint location within St Asaph from which the OnSS would be screened by residential property and an alternative location should be used.

4.4 Potential visual effects on residents at the Faenol-Bropar farmstead and visitors to the Glascoed Nature Reserve have not been considered. This should be carried out, with reference to VP1 and VP2 respectively.

4.5 The PEIR does not include a CLVIA. The reasoning for this appears to be sound, but the Council should make the Developer aware of more recent planning applications which require considerations.

4.6 Notwithstanding the above, the PEIR LVIA of the OnSS, and the associated mitigation design, have been prepared with reference to appropriate guidance, by suitably qualified consultants using a clear and robust methodology.

Appendix 1

Summary of Predicted Operational Effects

Table 1.1: Predicted operational effects on landscape and visual receptors from the OnSS

Receptor	Sensitivity	Year 1		Year 15		Review Comments (LUC)
		Magnitude of Change	Effect	Magnitude of Change	Effect	
Landscape Character						
A1. Eastern Lowlands (Cefn Meiriadog Vale Slopes)	Medium	Medium – High	Significant	Medium	Not Significant	Agreed. This is the host LCA, but it is likely that mitigation planting will mature over time and that effects will reduce to be not significant by Year 15.
C4. Limestone Farmlands (Abergele to Denbigh Coastal/Vale Hills)	Medium	Medium – Low	Not Significant	Low	Not Significant	Agreed. Given the intervening distance and landscape character context, indirect effects here would be not significant.
Designated Area						
Bodelwyddan Park RHPG	Medium – High	Medium – Low	Not Significant	Low	Not Significant	**Not Agreed.** The LVIA considers that changes would be experienced as indirect visual effects. However, the Draft Order Limits are shown to extend into the designated area (see **Figure 2.4**). The LVIA should describe what direct effects would result here.
Viewpoint Assessment						
Viewpoint 1 – Bridlepath nr Faenol-Bropor	Medium	High	Significant	Medium – High	Significant	Agreed. The OnSS would be visible across a wide extent of the view and at close proximity.
Viewpoint 2 – St Asaph, Business Park	Medium – Low	Medium	Not Significant	Medium	Not Significant	Agreed. The OnSS would be largely screened from view by intervening vegetation within the adjacent nature reserve.
Viewpoint 3 – Glascoed Road	Road Users: Medium – Low	Medium – High	Significant	Medium	Not Significant	Agreed. It is likely that mitigation planting will mature over time and that effects will reduce to be not significant for transient road users.
	Residents: Medium – High	Medium – High	Significant	Medium	Significant	Agreed. Although mitigation planting will mature over time, it is likely that effects will continue to be significant for residential receptors.

Receptor	Sensitivity	Year 1		Year 15		Review Comments (LUC)
		Magnitude of Change	Effect	Magnitude of Change	Effect	
Viewpoint 4 – A55	Medium – Low	Medium	Not Significant	Medium – Low	Not Significant	Agreed. The OnSS would be visible beyond agricultural buildings and intervening vegetation. However, it is likely that effects on these transient receptors would not be significant.
Viewpoint 5 – Minor Road, Groesffordd	Medium – High	Medium	Significant	Medium – Low	Not Significant	Agreed. Given the intervening distance and relative elevation, it is likely that visual effects here would not be significant once mitigation planting has matured.

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