



# **Awel y Môr Offshore Wind Farm**

## **Category 6: Environmental Statement**

### **Volume 1, Chapter 4: Site Selection and Alternatives**

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# Contents

4.1	Introduction .....	6
4.2	Need for Renewable Energy .....	10
4.2.1	The need to reduce greenhouse gas emissions.....	11
4.2.2	The role of offshore wind.....	12
4.2.3	The need for energy security .....	13
4.2.4	Benefits of Offshore Wind Energy .....	15
4.3	Statutory and policy context.....	16
4.3.1	Planning Inspectorate Advice Note Seven.....	20
4.3.2	Welsh Policy .....	21
4.3.3	Crown Estate Extension Round .....	23
4.3.4	Climate Emergency.....	23
4.3.5	Offshore Transmission Network Review .....	24
4.4	Horlock Rules .....	25
4.5	Stakeholder engagement .....	30
4.6	Other considerations .....	32
4.7	Stage 1 – identification of the array area .....	35
4.8	Stage 2 – identification of proposed grid connection point .....	42
4.9	Stage 3 – identification of offshore export cable and landfall zone .....	43
4.9.1	Stage 3a Identification of offshore cable corridor Area of Search .....	43
4.9.2	Stage 3b Identification of Landfall Area of Search .....	61
4.10	Stage 4 – identification of onshore cable and substation zone .....	63
4.10.1	Stage 4a – Identification of onshore cable corridor AoS .....	63
4.10.2	Stage 4b Identification of onshore substation AoS.....	66
4.11	Stage 5 and 6 - Refinement of Project for PEIR; statutory consultation (phase 2 consultation).....	70
4.11.1	Stage 5 and 6 - Site selection methodology.....	70
4.11.2	Array refinement .....	72
4.11.3	Offshore export cable refinement .....	79
4.11.4	Landfall refinement .....	87
4.11.5	Onshore cable refinement.....	98

4.11.6	Substation refinement .....	118
4.11.7	Identification of potential temporary construction compounds .....	148
4.12	Summary of Stages 1-6 .....	148
4.13	Stage 7 – Further refinement of project design following review of statutory consultation responses, and EIA studies .....	149
4.13.1	Refinement of the offshore array boundary .....	150
4.13.2	Refinement of the offshore array design .....	151
4.13.3	HDD under the Rhyl Golf Club, and refined landfall access/TCC; .....	153
4.13.4	Refinement of the onshore export cable route, associated infrastructure, and optionality .....	154
4.13.5	Refinement of substation zone and associated accesses .....	155
4.13.6	Refinement of the 400kv route .....	156
4.14	Stage 8 – submission of final design for the DCO and ML(s) application. ...	161
4.15	Conclusion .....	163

## Figures

Figure 1: Design stage overview .....	9
Figure 2: Project Component Site Selection process .....	34
Figure 3: Shipping and Navigation constraints.....	38
Figure 4: Awel y Môr designated site and other marine user constraints.....	39
Figure 5 Awel y Môr offshore Scoping boundary.....	41
Figure 6: Offshore export cable corridor AoS with indicative zones. ....	60
Figure 7: Landfall AoS. ....	62
Figure 8: Relationship with Landfall AoS and onshore constraints.....	64
Figure 9: Onshore cable corridor AoS.....	65
Figure 10: Onshore substation AoS. ....	68
Figure 11: Sketch figure taken from Annex 1 RH site selection note. ....	69
Figure 12: White Consultants Sensitivity Zones, reproduced showing Awel y Môr's original array area.....	74
Figure 13: Awel y Môr array options for consultation, with indicative viewpoints.....	75
Figure 14: Awel y Môr array options for consultation. ....	76
Figure 15: Offshore cable corridor Longlist of Options.....	81
Figure 16: Offshore cable corridor shortlist refinement. ....	85
Figure 17: Landfall Longlist Options. ....	91
Figure 18: Landfall shortlist options. ....	94



Figure 19: Onshore Cable Corridor Longlist of Options.....	99
Figure 20: Onshore cable corridor following consultation with DCC.....	117
Figure 21: Longlisted onshore substation zones.....	139
Figure 22: Onshore substation shortlist options. ....	144
Figure 23: Awel y Môr PEIR and final boundary - Array and Offshore Export Cable Corridor. ....	157
Figure 24: Awel y Môr PEIR and final boundary - Onshore infrastructure. ....	158
Figure 25: Awel y Môr PEIR and final boundary – landfall. ....	159
Figure 26: Awel y Môr PEIR and final boundary - A55 optionality and onshore substation.....	160
Figure 27: Order Limits.....	165
Figure 28: Order Limits.....	166
Figure 29: Order Limits.....	167
Figure 30: Order Limits.....	168

## Tables

Table 1: AyM application of Horlock Rules. ....	25
Table 2: Crown Estate Extensions round criteria. ....	36
Table 3: AyM Cable Route Protocol adherence.....	44
Table 4: BRAG analysis constraints. ....	71
Table 5: Summary of Awel y Môr array site selection and design feedback. ....	77
Table 6: Informal site selection consultation feedback.....	83
Table 7: Landfall Options and outline description.....	87
Table 8: Summary of Landfall BRAG.....	92
Table 9: Consultation feedback – landfall.....	95
Table 10: Onshore cable corridor summary of longlist options. ....	101
Table 11: Onshore cable corridor shortlist consultation feedback.....	110
Table 12: Onshore substation longlist overview.....	119
Table 13: Onshore substation preliminary review of longlist constraints and LVIA risks. ....	130
Table 14: Onshore substation shortlist consultation responses. ....	140

## Acronyms and abbreviations

TERM	DEFINITION
AfL	Agreement for Lease

TERM	DEFINITION
AoS	Area of Search
AyM	Awel y Môr
CION	Connection and Infrastructure Options Note
CRP	Cable Route Protocol
ES	Environmental Statement
MDS	Maximum Design Scenario
PEIR	Preliminary Environmental Information Report
ZTV	Zone of Theoretical Visibility

## Glossary of terms

TERM	DEFINITION
Horlock Rules	National Grid Guidelines to assist those responsible for siting and designing substations to mitigate the environmental effects of such developments.

# 4 Site Selection and Alternatives

## 4.1 Introduction

- 1 This chapter of the Environmental Statement (ES) provides a description of the site selection process and the approach undertaken by the Applicant (Awel y Môr Offshore Wind Farm Limited) to refine the design of the proposed Awel y Môr Offshore Wind Farm (hereafter referred to as AyM) to identify the various elements of the site and the alternatives which have been considered as the project has developed. This chapter provides information on the need for new renewable energy generation, followed by detail regarding the alternatives considered for both the onshore and offshore elements of the project.
- 2 This chapter outlines the chronological staged approach to defining the spatial boundaries and constituent parts of AyM. It also explains and details the main alternatives considered for the project, including location and infrastructure options, in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations); the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended); the Conservation of Habitats and Species Regulations 2010 (as amended) (the 'Habitats Regulations'); and the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended) (the 'Offshore Habitats Regulations').
- 3 Whilst there is no legal requirement to consider alternatives, where they have been considered the environmental statement should set out the alternatives considered for a proposed development and explain the main reasons for the choice between alternative options (including for example, relevant environmental, social, and economic factors). The Overarching National Policy Statement for Energy (NPS EN-1) highlights the approach to consideration of alternatives under the applicable Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) regulations. More detail on the legislative obligations and the information to be provided is set out in the following sections.

- 4 The approach taken to the development of AyM has been shaped by early engagement with a wide range of stakeholders, landowners and people with interests in the land, together with a range of technical disciplines, including but not limited to electrical, engineering, heritage, human environment, ecological and socio-economic appraisal studies. Stakeholder engagement has been a key aspect of the project design, each phase of consultation undertaken being designed to provide opportunities for stakeholders to review and provide information to the Applicant in the development of AyM, influencing the relevant spatial and project design decisions that have been taken to date. This ES represents an important component in this consultation process, and includes optionality that was refined following receipt of the statutory consultation responses.
- 5 Alternative options for methods of construction, Operations and Maintenance (O&M) and decommissioning have been considered alongside different technologies and materials in this ES in order to assess, so far as possible, the potential environmental effects.
- 6 This chapter is set out in chronological order to describe the stages of the design iteration from inception to the point of submission of the application for a DCO and Marine Licence(s) (ML(s)). Accordingly, the following structure is adopted:
  - ▲ Stage 1 – identification of the array area (May 2018);
  - ▲ Stage 2 – identification of proposed grid connection location;
  - ▲ Stage 3 – identification of offshore export cable and landfall zones;
  - ▲ Stage 4 – identification of onshore cable and substation zones;
  - ▲ Stage 5 – refinement of project for informal community consultation events (phase 1 consultation), Scoping and EIA preparation (inclusive of EIA evidence plan meetings);
  - ▲ Stage 6 – refinement of project for PEIR; statutory consultation (phase 2 consultation);
- 7 The final two stages of the site selection process, which have taken place since formal consultation on the PEIR, are as follows:
  - ▲ Stage 7 – further refinement of project design following review of statutory consultation responses, and EIA studies; and

- ▲ Stage 8 – submission of final preferred option(s) as part of the Development Consent Order (DCO) and ML(s) application.
- 8 AyM is currently at Stage 8 in this iterative process. Refinement of the project has continued following receipt of consultation responses during consultation on the PEIR and a subsequent phase of further onshore consultation. The Consultation Report (application ref: 5.1) provides a record of how the Applicant has had regard to the responses received to consultation at all stages.
- 9 An overview of the process of site selection, and the associated consultation that has informed the project design, is illustrated in Figure 1 below, with further design-specific illustration provided in Section 4.6 of this document.
- 10 It is important to note that whilst the site selection process is illustrated and described as a linear approach in this chapter for ease of presentation, the reality of any project development is that site selection is a complex, iterative process with decisions made having considered multiple factors. Decisions on site selection are required at various stages to enable the project to progress and are based on the best information available at the time.

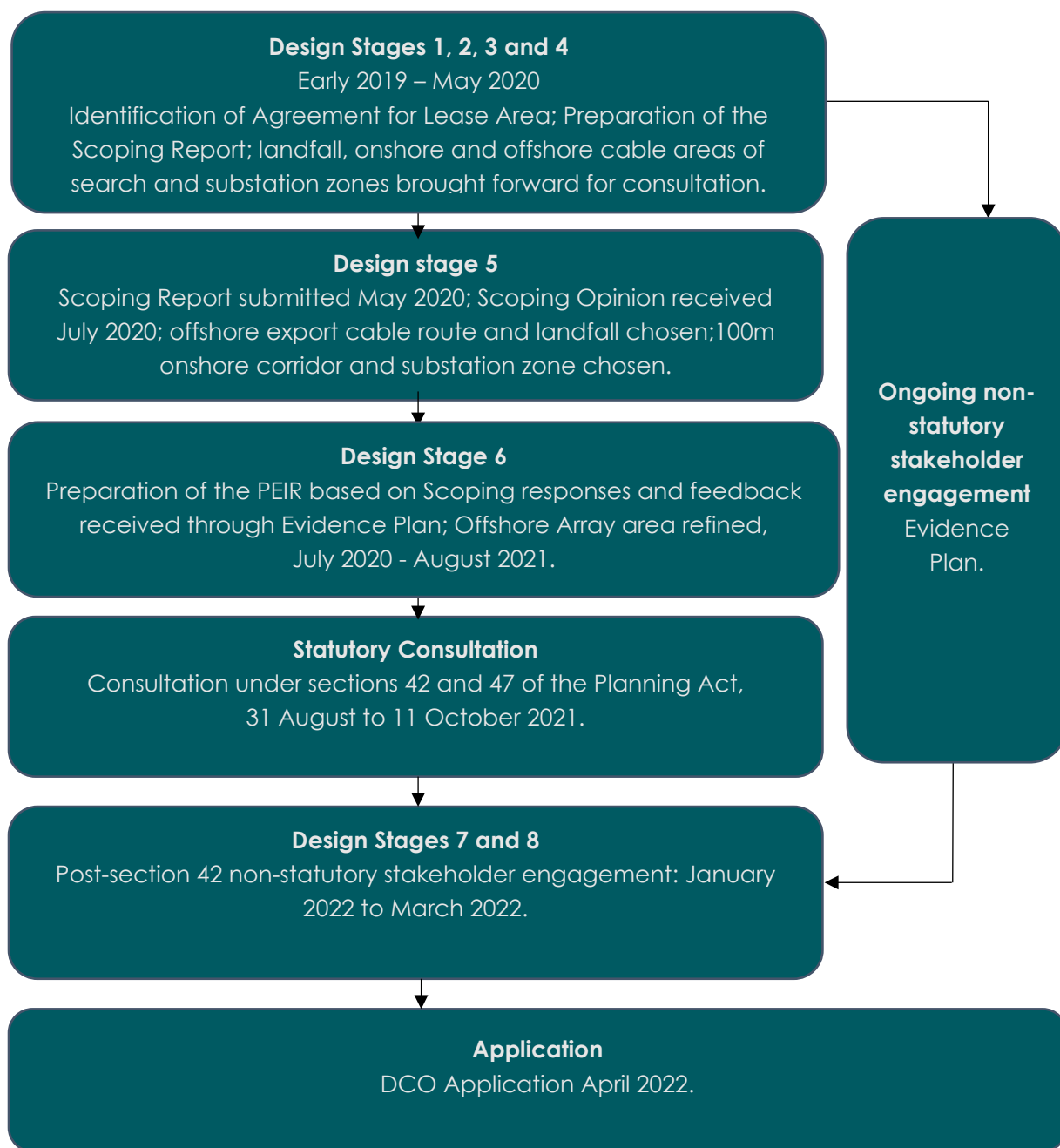


Figure 1: Design stage overview.

## 4.2 Need for Renewable Energy

- 11 The UK requires a range of energy generation infrastructure in order to ensure it has a secure and affordable energy supply and can meet its binding commitments to addressing climate change through the adoption of renewable technologies as a significant proportion of our energy generation mix. Offshore wind, as a source of renewable energy, offers the UK a wide range of benefits from an economic growth, energy security and decarbonisation perspective, and is anticipated to contribute up to 40 GW by 2030, enough to power every home in the UK. AyM would make a significant contribution to UK renewable energy supply and consequently help provide these benefits to the UK and globally.
- 12 At a strategic Welsh scale, it has been anticipated that an additional 2 GW of offshore wind power could be delivered by just 2-3 projects in Wales<sup>i</sup>, inclusive of site extensions. When combined with existing infrastructure, such as Gwynt y Môr, the 2 GW would bring the total offshore wind capacity to 2.8 GW which could meet nearly all (68%) of Wales' 70% renewable energy target by 2030.
- 13 The following section explains the importance of offshore wind energy, including AyM, in meeting global, and UK policy commitments for renewable energy and wider policy objectives for UK energy security, decarbonisation and economic growth.
- 14 The key drivers underpinning the need for renewable energy are:
  - ▲ The need to reduce greenhouse gas emissions, including increasing energy generation from low carbon sources to replace high carbon energy sources such as burning coal, oil and gas;
  - ▲ The need for energy security, including:
    - The need to secure safe, affordable, reliable energy, preferably generated in the UK for the UK market;

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<sup>i</sup> Future Potential for Offshore Wind in Wales; 2018 (Carbon Trust) [future-potential-for-offshore-wind.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/684441/future-potential-for-offshore-wind.pdf) (gov.wales)

- The need to replace existing ageing energy generation infrastructure;
- The need to meet expected electricity demand whilst meeting climate change commitments; and
- The need to maximise social and economic opportunities for the UK from energy infrastructure investment.

#### 4.2.1 The need to reduce greenhouse gas emissions

15 In the Overarching National Policy Statement for Energy EN 1 (Department of Energy and Climate Change (DECC), 2011), predictions were made that a continuation of global emission trends, including emissions of greenhouse gases such as carbon dioxide, could lead average global temperatures to rise by up to 6°C by the end of this century. The potential impacts associated with such a global temperature rise include (DECC, 2014):

- ▲ Increased frequency of extreme weather events such as floods and drought;
- ▲ Reduced food supplies;
- ▲ Impacts on human health;
- ▲ Increased poverty; and
- ▲ Ecosystem impacts, including species extinction.

16 More recently in the UK Government's Ten Point Plan for a Green Industrial Revolution, it is recognised that action is necessary to avoid catastrophic climate change. The government target is to reduce 180 million tonnes of carbon dioxide equivalent between 2023 and 2032, with the overall national priority target of net zero by 2050<sup>ii</sup>. The first of the ten points specifically focusses on the contribution of offshore wind, through advancing offshore wind development and increasing production to 40 GW by 2030, with the predicted impact of the proposed offshore wind target contributing £20 billion of private investment, and £6 billion in consumer savings.

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<sup>ii</sup> The Ten Point Plan for a Green Industrial Revolution ([publishing.service.gov.uk](https://publishing.service.gov.uk)) November 2020



- 17 This follows on from a commitment by the UK during the 21st Conference of the Parties (COP) in Paris in 2015 to pursue efforts to limit the global temperature increase to within 2°C of the pre-industrial average temperature, with an aspiration for an improved limit of 1.5°C. This commitment was further underlined during a meeting of the G7 Ministers responsible for climate and environment held in May 2021 in which the commitment was made for ambitious and accelerated efforts to reduce emissions to keep a limit of 1.5°C temperature rise within reach, and to achieve net zero as soon as possible.
- 18 The draft NPS EN-1 also notes the change in target and focus since the original iteration of EN-1 which had a target of 80% reduction in greenhouse gases by 2050, by highlighting the more ambitious target to reach Net Zero by 2050. This is also framed in paragraph 3.3.22 of EN-1 with the need for 40 GW of offshore wind by 2030; this policy commitment itself requires 5 GW of offshore wind per year to be built, to which AyM would make a critical contribution.

#### 4.2.2 The role of offshore wind

- 19 Power sector emissions fell in the period 2012-2018 by 58%, with overall electricity generation emissions in 2018 68% below 1990 levels. This follows an average annual decrease of 5% in the years between 2009 and 2014. This reduction is largely due to an increase in renewable and nuclear generation, with low carbon electricity generation accounting for over half of the UK's electricity demand in 2018 (Committee on Climate Change (CCC), 2020<sup>iii</sup>).
- 20 The UK CCC, in its advice on the Sixth Carbon Budget, identifies that the amount of renewable electricity generated in the UK must double by 2037 if we are to meet our legally-binding climate change targets. The role of offshore wind in delivering this additional capacity of low carbon energy is highlighted by the committee reports recognising the sector is now maturing and showing very significant cost reductions.

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<sup>iii</sup> Sector-summary-Electricity-generation.pdf (theccc.org.uk)

- 21 In order to achieve necessary ongoing reductions in emissions, the UK CCC recommended that the UK government should set out an intention to support 1-2 GW of offshore wind per year, forming the backbone of the proposed net zero system by providing 265 TWh of generation in 2035, and 430 THw in 2050. This represents a notable increase in growth from the previous Fifth Carbon Budget Report CCC report (2015), and requires a significant deployment of both new and extension offshore wind projects.
- 22 In addition, the UK Government's 'Build Back Better: our plan for growth' strategy (March 2021) further iterates the commitments made in the *Ten Point Plan for a Green Industrial Revolution* by committing to delivery of enough offshore wind to generate more power than all UK homes use today, quadrupling output to 40 GW by 2030.

### 4.2.3 The need for energy security

- 23 The UK has been a net importer of electricity since 2010, importing a total 21.2 TWh in 2019<sup>iv</sup>, representing 6% of total electricity. Whilst energy imports fell by 2.4% in 2019 the UK remains a net importer of energy at 35% of gross energy.
- 24 Key issues associated with energy security in the UK are:
- ▲ The decline in fossil fuel reserves (in particular North Sea oil and gas)
  - ▲ The required ongoing closure and decommissioning of existing elderly fossil fuel and nuclear electricity generating infrastructure, and
  - ▲ The need for replacement sources.
- 25 Many of the UK's older fossil-fuelled and nuclear plants have either reached the end of their operational life span, are no longer economical to run, and/ or do not meet legal air quality limits. The UK Energy Security Strategy estimated that around a fifth of the energy capacity available in 2011 will close by 2020 (DECC, 2012).

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<sup>iv</sup> DUKES\_2020\_Press\_Notice\_.pdf (publishing.service.gov.uk)

- 26 Reliance on global markets for imported energy leaves the UK vulnerable to spikes in world energy market prices, political pressure and potentially, to physical supply disruptions. The DECC (2012) Energy Security Strategy outlines the approach to ensuring that consumers have access to energy to meet their demand, and security requirements at prices which are resilient to volatile prices such as those experienced for fossil fuels (price security).
- 27 The CCC identifies the amount of energy capacity that will be needed to fill the future predicted generation gaps, taking into consideration retirement of high-carbon energy sources and some nuclear sources.
- 28 If there was no growth in demand during the 2020s, around 25 GW of new capacity would be needed, however as demand grows, more capacity will be needed. CCC suggests that if demand grows by 50% by 2035 (as in the CCC Balanced Pathway for demand growth), a total of 40 GW of de-rated capacity will be needed (*ibid*).
- 29 The proposed AyM project would make a valuable contribution to the attainment of the 40 GW target, in an area of evidently reliable wind resource and positive seabed conditions.
- 30 The UK is able to continue growth in the offshore wind sector by maximising domestic energy resources and utilising the vast offshore wind resource that the UK has access to. An assessment in June 2017 of Europe's offshore wind resources found that the UK has the greatest potential for offshore wind out of all assessed EU member states in the Atlantic, North Sea and Baltic Sea areas. The assessment looked at gross resource potential, technical resource potential and economically attractive resource potential, and found that the UK topped all other countries in all three categories (Wind Europe, 2017).
- 31 A key commitment within the UK's 2021 Industrial Strategy (Build Back Better: Our Plan for Growth (2021)) is to continue in its position as a world leader in clean growth, with a commitment to invest £12 billion in achieving net zero, producing enough offshore wind to generate 30 GW by 2030, and in so doing support up to 60,000 jobs in the offshore wind sector.

- 32 The Centre for Economics and Business Research (CEBR, 2012) estimated that by 2030, offshore wind could increase the Gross Domestic Product (GDP) value by 0.6% and support 173,000 jobs at the UK scale. In the regional context it is important to note that the Nearth na Gaoithe offshore wind farm in Scotland is anticipated to generate an economic equivalent to 0.6% of Scotland's GDP with a lower capacity than that of the proposed Awel y Môr (Nearth na Gaoithe is a potential 450MW capacity project generated by up to 54 WTGs); the opportunity AyM represents to Welsh GDP is therefore evident. In contrast, the Stern Report (Stern, 2006) concludes that if no action is taken to prevent climate change, the economic impacts could be equivalent to losing at least 5% of global GDP each year.
- 33 The offshore wind industry presents an opportunity to utilise and further develop the UK's maritime engineering skills as other industries decline (such as shipbuilding, North Sea oil, and within the region Liverpool Bay gas fields) in order to secure supply chain and other employment opportunities in the UK. The importance of maximising opportunities for the involvement of local businesses and communities in offshore wind has been highlighted as a key success factor for the sector in the UK (The Crown Estate, 2014).
- 34 The replacement of existing infrastructure with new technologies also represents significant investment in the UK economy.

#### 4.2.4 Benefits of Offshore Wind Energy

- 35 The UK is well-placed to lead the deployment of offshore wind with an estimated 40% of the total 2020 projected European potential offshore wind generation capacity (Green Alliance, 2014; Wind Europe, 2016), and over a third of the total European potential offshore wind resource (Energy Technologies Institute, 2013) making it one of the most globally attractive locations.

- 36 In 2016, the UK Government announced a strike price for offshore wind for the period 2021-22 of £105/MWh over a contract period of 15 years. This represented the maximum price that would be paid, however with competitive bidding between developers, the final winning Contract for Difference (CfD) price was less than the strike price, and indeed less than that of nuclear power. The equivalent CfD for nuclear was £92.5/MWh over a longer contract of 35 years. As widely expected, the results of the latest CfD auctions announced on 11 September 2019 showed a further dramatic fall in the cost of offshore wind. The cost of offshore wind, as measured by the CfD auction prices, has reduced by more than 50% (from £105 to £57.50/MWh during the period 2016 to 2017, and £45/MWh by 2020), making offshore wind one of the most attractive and cost-effective methods of generating large quantities of low carbon energy.
- 37 The cost of offshore wind has therefore reduced from £150/MWh to £45/MWh over the period 2010-2020 and is now cheaper than gas generation (£50/MWh) and nuclear (35-year CfD of £105/MWh for Hinkley Point C). Offshore wind will continue to be one of the lowest-cost sources of new power generation in the 2020s and beyond. This is particularly important in the context of the 2022 Ofgem price cap increase (from £1277 to £1971) which has been driven by a record rise in global gas prices. It is crucial in delivering affordable energy and supporting the Welsh Government in delivering its 'Prosperity for all' ambitions in providing a low carbon economy in parallel with making society fairer and healthier.

### 4.3 Statutory and policy context

- 38 Schedule 4 of the EIA Regulations requires that Environmental Statements include *"a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*
- 39 Furthermore, under the Habitats Regulations and Offshore Habitats Regulations, a consideration of alternatives to the proposed project may be required where the development is likely to have a significant effect on a European Site that may adversely affect the integrity of the site.

- 40 This chapter of the ES therefore provides a description of the reasonable spatial and geographical alternatives that have been considered in the current AyM project and, where appropriate, presents a comparison of the environmental effects between different options. In some cases (for example, the array layout) alternative options form part of the proposal at this stage and assessment of the range of development detail proposed within the design envelope has been considered in detail in the relevant chapters of this ES.
- 41 From a policy perspective, the National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) does not contain a general requirement to consider alternatives or to establish whether the proposed project represents the best option.
- 42 Consideration is also given in paragraph 4.4.2 of NPS EN-1 to the requirements under the EIA Regulations, Habitats Regulations and Offshore Habitats Regulations regarding the consideration of alternatives, notably:
- “applicants are obliged to include in their Environmental Statement, as a matter of fact, information about the main alternatives they have studied. This should include an indication of the main reasons for the applicant’s choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility”; and*
- “in some circumstances, there are specific legislative requirements, notably under the Habitats Directive, for the [Secretary of State] to consider alternatives. These should also be identified in the Environmental Statement by the applicant.”*
- 43 Requirements under the Habitats Regulations and the Offshore Habitats Regulations are addressed in the draft Report to Inform Appropriate Assessment (application ref: 5.1) which forms part of the applications for development consent and ML(s)
- 44 Where there is a policy or legal requirement to consider alternatives, paragraph 4.4.3 of NPS EN-1 highlights other guiding principles that the Secretary of State should consider when deciding what weight should be given to alternatives, specifically:

the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner;

the [Secretary of State] should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security and climate change benefits) in the same timescale as the proposed development;

where (as in the case of renewables) legislation imposes a specific quantitative target for particular technologies or (as in the case of nuclear) there is reason to suppose that the number of sites suitable for deployment of a technology on the scale and within the period of time envisaged by the relevant NPSs is constrained, the [Secretary of State] should not reject an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and [he] should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals;

alternatives not among the main alternatives (noting that as required under the 2017 EIA Regulations reasonable alternatives are described within this chapter\_ studied by the applicant (as reflected in the Environmental Statement) should only be considered to the extent that the [Secretary of State] thinks they are both important and relevant to [his] decision;

as the [Secretary of State] must decide an application in accordance with the relevant NPS (subject to the exceptions set out in the Planning Act 2008), if the [Secretary of State] concludes that a decision to grant consent to a hypothetical alternative proposal would not be in accordance with the policies set out in the relevant NPS, the existence of that alternative is unlikely to be important and relevant to the [Secretary of State's] decision;

alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the [Secretary of State's] decision;



*alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the [Secretary of State's] decision; and*

*it is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made to the [Secretary of State] in respect of it (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives which are particularly relevant). Therefore, where an alternative is first put forward by a third party after an application has been made, the [Secretary of State] may place the onus on the person proposing the alternative to provide the evidence for its suitability as such and the [Secretary of State] should not necessarily expect the applicant to have assessed it."*

- 45 'The National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) states at paragraph 2.6.81 that the applicant should include an assessment of the effects of installing cable across the intertidal zone which should include information, where relevant, about:

*"any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice"; and*

*"any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice."*



- 46 It is noted that the NPS EN-3 is subject to revision, with a draft suite of NPSs, including EN-3, produced for consultation in November 2021. At the time of writing the NPSs have not been amended however the revised drafts include key elements of relevance to the site selection for the proposed Awel y Môr project. Notably the draft NPS, in the consideration of offshore wind extension projects notes at paragraph 2.23.10 that *'The Crown Estate may offer new leases in areas adjacent to existing consented wind farms. This could be to either the owner/operator of the existing site or to a different company from that operating the existing wind farm. These leases will form extensions to existing wind farms.'* The implications of the lease areas forming extensions to existing wind farms is taken further in acknowledging, at paragraph 2.23.12, that *'The Secretary of State should be aware of the potential for applications for extensions to existing wind farms and that there may be constraints on such leases over which the applicant will have little or no control.'*

#### 4.3.1 Planning Inspectorate Advice Note Seven

- 47 The Planning Act 2008 (as amended), and related secondary legislation, establishes the legislative requirements in relation to applications for orders granting development consent for Nationally Significant Infrastructure Projects (NSIPs) (for further detail refer to Volume 1, Chapter 2 Policy and Legislation).
- 48 The Planning Inspectorate (PINS) Advice Note Seven (PINS, 2020) suggests that the EIA needs to explain:

*"the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment".*

### 4.3.2 Welsh Policy

- 49 The AyM site selection process has been cognisant of the relevant policy and legislation as applicable to the proposed project. Further to the policies and legislation already considered, the project has had regard to the Welsh National Marine Plan, and the Welsh Government conclusion that whilst alternatives to the need for large scale deployment of marine technologies will make a contribution to climate change mitigation, there is a strategic need to support the development of marine renewable energy generation capacity (Sector Policy – Energy – Low Carbon, Welsh National Marine Plan, paragraph 335). Furthermore, the site selection process has, as far as applicable, been cognisant of, and placed weight on, the aspirations presented in Future Wales: The National Plan 2040.
- 50 Future Wales is the Welsh national development framework, setting the direction for development in Wales to 2040. It recognises and acknowledges a climate and ecological emergency, and the impact of climate change being actively experienced across the environment, and communities. Future Wales specifically identifies support for a low carbon economy and the decarbonisation of industry, and the growth of sustainable and renewable energy. It also recognises that renewable energy is an issue of such significance that national ambitions require national policies and frameworks, and that Welsh planning policy is well placed to support the renewable sector and to be a world leader through utilisation of Welsh wind resources. Whilst primarily focussed on terrestrial development, specific policies of relevance in Future Wales in the context of renewable energy are contained in Policy 17, with support for offshore wind captured in the context of the terrestrial-focussed Policy 18 and 24:

▲ Policy 17 – Renewable and Low Carbon Energy and Associated Infrastructure

- In determining planning applications for renewable and low carbon energy development, decision-makers must give significant weight to the need to meet Wales' international commitments and our target to generate 70% of consumed electricity by renewable means by 2030 in order to combat the climate emergency.

▲ Policy 18 – Renewable and Low Carbon Energy Developments of National Significance

- The Welsh Government is supportive of offshore proposals and sees them as an important part of our future energy mix but they do not fall within the remit of Future Wales.

▲ Policy 24 – North West Wales and Energy

- Onshore developments associated with offshore renewable energy projects will be supported in principle; and
- There are a number of opportunities for offshore renewable energy developments in this area and the role of development plans is to enable appropriate onshore development, including cable landfall sites.

51 Whilst Future Wales is focussed primarily on terrestrial, rather than marine renewable energy, it is evident that significant weight should be given to projects contributing towards meeting Wales' renewable targets. At a strategic planning level, the north coast of Wales is recognised as having the potential for world-leading marine renewable developments, with a general support for offshore renewable energy recognised, and planning being seen as an enabler of onshore infrastructure such as landfall locations.

52 The Welsh National Marine Plan specifically recognises the need for offshore wind, in recognition that other technologies such as wave and tidal remain in relative infancy. Whilst there is limited specific reference to consideration of alternatives in site selection, it is recognised that proposals should have due regard to environmental, social and cumulative impacts, and, in relation to Policy SOC\_07 it is:

*“accepted that the development of marine renewable energy infrastructure will result in changes to the seascape character of Wales and that these changes are an inevitable result of our ambition for marine renewable energy to make an increasingly significant contribution to the overall energy mix.”*

53 This therefore underpins the site selection process for AyM in seeking to strike the balance between identifying a site that has due regard to environmental and social impacts, acknowledging that the ability to identify sites that avoid seascape character impacts is limited.

### 4.3.3 Crown Estate Extension Round

- 54 In 2017, The Crown Estate defined application criteria for the leasing of sites for offshore wind project extensions. Whilst not specifically 'site selection policy' the criteria form critical components in the site selection process of the AyM project; this is also reflected in the draft NPS EN-3. In addition to criteria relating to the applicants which are not directly relevant here, the criteria applied by The Crown Estate necessarily constrain elements of the project site selection process. The process, and how the AyM project has sought to fulfil them, is presented in section 4.7.
- 55 The 2017 Extension Round criteria, which were also used to inform a strategic plan level HRA, therefore limit the spatial opportunity to extend the existing wind farm. The opportunity to extend the wind farm and realise the recognised wind energy potential at the site, exists only to the west of the operating Gwynt y Môr wind farm in the area leased by TCE.

### 4.3.4 Climate Emergency

- 56 In 2019, the UK Parliament declared a national Climate Emergency, setting a net zero carbon emission target, and highlighting the need for decarbonisation of the UK economy. The Welsh Government formally made a climate emergency declaration on 29 April 2019 and committed to achieving a carbon neutral public sector by 2030, with a series of policies and proposals to achieve published carbon budgets and emission reduction targets.
- 57 In the March 2019 '*Prosperity for all – a low carbon Wales*', the Welsh Government set out a vision of reducing greenhouse gas emissions by at least 80% against the 1990 baseline, with interim targets of 45% reduction by 2030. These targets are underpinned by a further target to generate 70% of Wales' electricity from renewables by 2030, and a recognition that the Welsh Government is working alongside the Crown Estate to ensure Welsh offshore wind sites are competitive with those elsewhere in UK waters, such as the North Sea. In identifying opportunities for future wind deployment in Wales, the low carbon Wales policy identifies an extension to the Gwynt y Môr project could represent a significant increase of renewable energy.

58 There is, therefore, a clear policy driver to develop competitive, offshore renewable energy to bring about decarbonisation of the Welsh economy and in order to meet the ambitious Welsh Government 2030 targets; the need for renewable energy is further described below in Section 4.10.

#### 4.3.5 Offshore Transmission Network Review

59 In its 2020 report to Parliament, the Committee on Climate Change called for government to '*Develop a strategy to coordinate interconnectors and offshore networks for wind farms and their connections to the onshore network and bring forward any legislation necessary to enable coordination*'. The Offshore Transmission Network Review (OTNR) aims to identify near-term actions and opportunities for offshore windfarm projects to coordinate and thereby address the barriers that the existing offshore transmission regime presents to deployment of offshore wind; the intention being to develop an offshore transmission network that facilitates coordination between offshore wind developments, in particular in the context of projects on the East coast of the UK.

60 The desire to 'coordinate wherever possible' forms a central tenet of the OTNR and is also captured within the draft NPS issued for consultation (Nov 2020). At present there is no viable offshore transmission network existing or planned for AyM to connect to. Coordination of the offshore transmission network with other offshore generation or transmission projects is therefore not possible for AyM at this time, and the Applicant has instead sought to identify, through consultation, the most appropriate and best environmental option for its transmission system and connection to the National Grid (further information on the associated processes is presented in section 4.8 *et seq*).

## 4.4 Horlock Rules

- 61 The relevance of planning and environmental considerations in the siting of onshore substations was originally set out by the Central Electricity Generating Board and more recently reviewed and adopted by National Grid in the 'Horlock Rules'. The Horlock Rules are a set of guidelines produced by National Grid to assist those responsible for siting and designing substations to mitigate the environmental effects of such developments (National Grid, 2003). They are still referred to and used by National Grid (and endorsed in ministerial decisions and at public inquiry) when undertaking planning studies for new infrastructure although they now have to be considered alongside the relevant policy set out in National Policy Statements, the National Planning Policy Framework, Development Plan documents and other sources. In the Horlock Rules, National Grid states that it will encourage generators to adopt the guidelines when working with National Grid on proposals for substations, sealing end compounds or line entries. These guidelines also confirm that consideration must be given to environmental issues at the earliest stage in order to keep adverse effects to a reasonably practical minimum in the planning of new substations. The principles embodied in the Horlock Rules are relevant to the infrastructure at the proposed onshore substation (OnSS).
- 62 Table 1 below summarises the Horlock Rules, (National Grid, 2003), and AyM's approach to them.

Table 1: AyM application of Horlock Rules.

OVERALL SYSTEM OPTIONS AND SITE SELECTION	AYM'S APPROACH (ONSHORE)
In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the	Environmental issues have been considered throughout the development phase to date, from initial desktop research to detailed EIA studies.

OVERALL SYSTEM OPTIONS AND SITE SELECTION	AYM'S APPROACH (ONSHORE)
consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.	
Amenity, cultural or scientific value of sites	
The siting of new National Grid Company (NGC) substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.	All internationally and nationally designated sites have been avoided for the new onshore HVAC substation.
Local context, land use and site planning	
Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.	All areas of local amenity value in the location of the new onshore HVAC substation site have been protected as far as reasonably practicable. In addition, consideration has been given to important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas when considering sites for the onshore HVAC substation. Where impacts cannot be avoided, they are addressed through appropriate mitigation and design, the principles for which are captured in the

OVERALL SYSTEM OPTIONS AND SITE SELECTION	AYM'S APPROACH (ONSHORE)
	Outline Landscape and Ecological Management Plan, and Design Principles Plan (application ref: 8.4 and 8.8 respectively).
The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.	<p>The new onshore HVAC substation siting exercise has considered the availability of sites that benefit from existing screening, looking at existing landscaping, landform, and existing built development.</p> <p>The view to the new onshore HVAC substation from surrounding areas will be partly screened by existing vegetation and visual mitigation such as the planting of supplementary trees will assist in this screening over time. Further detail on potential additional planting is presented in the outline Landscape and Ecology Management Plan</p>
The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.	Visual, noise and other environmental effects have been minimised as far as possible through the selection of the onshore HVAC substation location. For example, consideration has been given to existing screening and sites were chosen away from built-up areas. In addition, the assessment considers further mitigation of environmental effects as detailed in Volume 3, Chapter 10: Noise and Vibration (application ref: 6.3.10).



OVERALL SYSTEM OPTIONS AND SITE SELECTION	AYM'S APPROACH (ONSHORE)
<p>The land use effects of the proposal should be considered when planning the siting of substations or extensions.</p>	<p>Existing land use, planning policies and planning history within and adjacent to the potential site locations considered in the options appraisal have been taken into account and form an integral part of the selection of the final onshore HVAC substation site.</p> <p>The selected site is characterised by agricultural fields, with ongoing design continuing to minimize effect on land use, agriculture, and recreation. The site complies with planning policy in the area (see Volume 3, Chapter 6: Ground Conditions, and Land Use; and Volume 3, Chapter 4: Tourism and Recreation (application ref: 6.3.6 and 6.3.4 respectively).</p>
Design	
<p>In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.</p>	<p>The effects of likely equipment, building layouts and the cable routes into and out of the site have been taken into account in the development of the site proposals and through the assessment of environmental effects.</p>
<p>Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures</p>	<p>The area required for the onshore substation site was determined with reference to past developer experience (Gwynt y Môr Offshore Wind Farm), an</p>

OVERALL SYSTEM OPTIONS AND SITE SELECTION	AYM'S APPROACH (ONSHORE)
and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.	initial assessment of relevant information available from technology suppliers together with the Applicant's current expectations regarding land required for access, landscape works and other mitigation for the components required for the proposed project substation. The design of the onshore HVAC substation is at an early stage and will be subject to ongoing refinement as the project progresses, as informed through further consultation and project design work.
The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.	The provision of access roads and the existing road infrastructure in the vicinity, perimeter fencing etc. has been taken into account through the selection and design of the onshore HVAC substation site.
Line entry	
In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.	Awel y Môr will not employ overhead lines. All cables will be buried underground where practicable, or banded and landscaped appropriately where burial is not practicable due to underlying ground conditions.
The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the	The onshore HVAC substation site developments will not include any additional overhead line towers.

OVERALL SYSTEM OPTIONS AND SITE SELECTION	AYM'S APPROACH (ONSHORE)
<p>prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.</p>	

## 4.5 Stakeholder engagement

- 63 Stakeholder consultation and engagement have played a fundamental role in shaping the project. Stakeholder engagement is an integral part of the site selection process from an early stage and ensures that the views and recommendations of stakeholders are incorporated into the development of a preferred option for the project.
- 64 Stakeholder engagement has taken place at regular intervals throughout the site selection process, through the circulation of site selection information, holding of evidence plan meetings, and consultation events. Whilst it has not always been feasible to undertake face-to-face consultation, online events have been undertaken alongside regular stakeholder liaison with interest groups to ensure community feedback is incorporated within the design process.
- 65 Stakeholder engagement primarily took place under the EIA Evidence Plan Process (EPP). The EPP is a non-statutory, voluntary process and agreements are non-binding, however it provides a useful stakeholder engagement approach on key elements and outcomes of the EIA process which allows continued dialogue in between the formal (statutory and non-statutory) consultation processes. The EPP does not replace or duplicate existing requirements and is formulated to fit with the Planning Act 2008 DCO application process, including the formal pre-application consultation processes.

- 66 The EPP aims to improve and formalise the consultation process for the consent application by the discussion, agreement and documentation of issues relating to the EIA and Habitat Regulations Assessment (HRA) regulations during the pre-application stages of a proposed DCO application, by:
- Enabling the establishment of areas of common ground;
  - Giving greater certainty to all parties on the quality and use of existing data along with the range of new data and evidence that is required to support the site selection process and considerations of alternatives;
  - Focusing the evidence requirements to be proportionate to the project's potential impacts; and
  - Optimising time and resource requirements for all parties
- 67 In the case of AyM, stakeholder engagement in the site selection process has also facilitated discussion on the design of the project for the ES and the design parameters which form the Maximum Design Scenario (MDS) for assessment. This dialogue, and dialogue more broadly, has been held through the EPP and a number of Expert Technical Groups (ETGs) comprising relevant stakeholders.
- 68 Site selection (and especially the Areas of Search (AOS) used to inform Scoping) was discussed initially with stakeholders as part of the Scoping ETG meeting (the first ETG meeting held within the EPP). All datasets and feedback raised during that meeting and subsequent site selection ETGs were used to inform the site selection process and are presented in the Evidence Plan report and associated annexes (application ref 8.2 (annexes 8.2.1 et seq)).
- 69 Site selection formed the primary focus of the second ETG meeting which comprised:
- Presentation and discussion of the AOS and the background information used to inform the decision-making process to this date;
  - Presentation of the indicative initial longlist of options; and

- ▲ Agreement of site selection methodology, request for any missing datasets/ baseline data, and the opportunity for stakeholders to identify and particular preferences for longlist options.
- 70 In addition to the site selection ETG held prior to Scoping, a further round of stakeholder consultation was undertaken to seek comments on the shortlist of offshore and onshore options, which were developed through reference to stakeholder feedback received up to that point. Consultation took the form of a document summarising the shortlist of options, and inviting stakeholders to comment on the suitability of the approach taken. A teleconference meeting and individual calls as necessary were also held in order to provide stakeholders with an opportunity to ask for clarification on the consultation material provided. The consultation is described in further detail in Section 4.11.
- 71 Following scoping, a series of ETGs were held, each of which included project and site selection updates as the design evolved in response to Scoping feedback received. A particular area of focus identified was the need to consider more fully the array area and identify any opportunities to refine it. This process is described in further detail in Section 4.7.

## 4.6 Other considerations

- 72 In addition to the specific constraints discussed in other sections of this chapter, a number of fundamental principles are applied to the site selection process. These are drawn from the experience of the Applicant and technical expertise of consultants supporting the process and comprise:
- ▲ Shortest route preference for cable routing to reduce impacts by minimising footprint for the offshore and onshore cable routes as well as considering cost (hence ultimately reducing the cost of energy to the consumer) and minimising transmission losses;
  - ▲ Avoidance of key sensitive features where possible and where not, seek to mitigate impacts;
  - ▲ Minimise the disruption to populated areas; and

- ▲ The need to accommodate the range of technology sought within the design envelope, such as air insulated or gas insulated switchgear for the onshore substation, and exclude those options outwith the envelope (i.e. ruling out overhead lines).
- 73 The site selection process for the project is an iterative one taking account of key locational decisions. This process began with the identification of the offshore wind farm array location and, with the identification by National Grid of the onshore connection point, which in turn informed the placement of the onshore infrastructure. The iterative process, of constraints mapping, assessment and continued consultation on the work undertaken was key in the identification of project design for the offshore cable corridor, landfall, onshore cable corridor and onshore substation which was then taken forward to the next stage of the EIA process.
- 74 Prior to starting each stage of the site selection process, a series of transparent design principles and engineering assumptions were identified, which governed the decisions made at each stage. These design principles and engineering assumptions covered environmental, physical, technical, commercial and social considerations and opportunities, and are set out against each project component in the following sections. Each step of the process involved gathering data from a number of different sources to define and assess the options for each component of project infrastructure. Internal project workshops were then held at key stages of the site selection process to collate and review the data gathered to date, and to reach cross-discipline decisions about refining the site selection options before testing them through consultation.
- 75 Figure 2 provides a schematic of the main steps for the project's site selection process for each of the primary project components. It also provides an outline of the various formal, statutory and informal (ETG) consultation processes that have informed the site selection process and should be read alongside the dates presented in Figure 1.

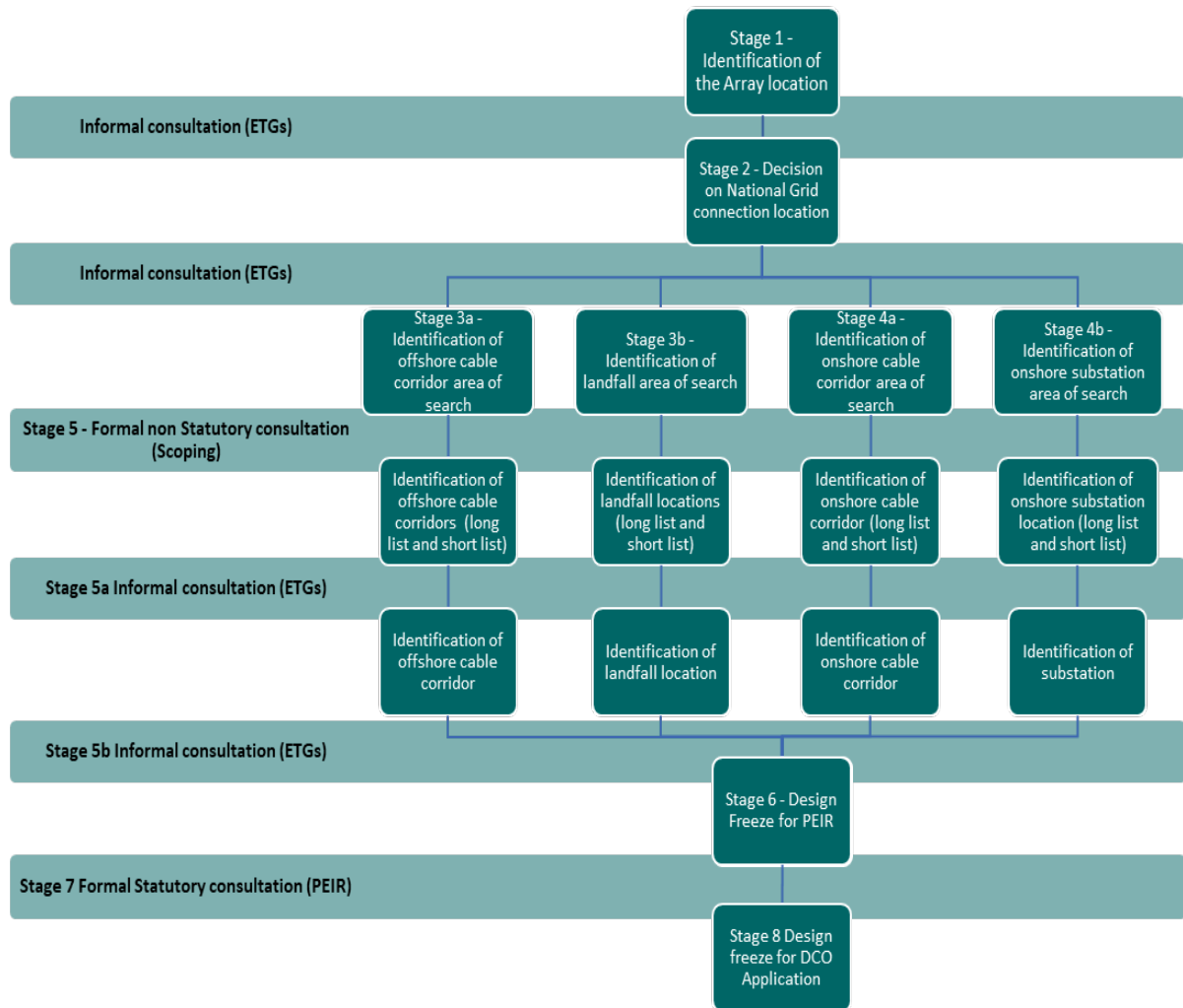


Figure 2: Project Component Site Selection process.

## 4.7 Stage 1 – identification of the array area

- 76 As noted previously, the design process is often illustrated as a linear or multi-linear process for the purposes of presentation. It is however important to note that the AyM project has undergone an iterative design and site selection process, in order to define a project that makes the greatest contribution to renewable energy targets whilst minimising environmental impacts and following principles of good design. The following section therefore describes the process of identifying the array boundary for the scoping phase and initial consultation. Section 4.11 describes further the process of refining the design for the purposes of this ES.
- 77 Further to the UK Government's confirmed policy in support of offshore wind, there is a need to identify the best sites around the UK for a rapid increase in offshore wind deployment to occur and renewable energy targets to be met. As previously referred to within this chapter there is a recognised Welsh policy need for maximising the opportunities within a region identified as a good site for wind resource. That policy need specifically refers to the operational output associated with the existing Gwynt y Môr, which is clear evidence of the presence of good resource.
- 78 Further to, and associated with, the recognised policy need for offshore wind The Crown Estate launched an opportunity in 2017 for existing wind farms to apply for project extensions. The projects were required to meet specific criteria, including who may make applications, and the siting requirements. The Applicant has met the requirements for 'who' may make an application. Therefore only the siting requirements, and how AyM has met them are provided in Table 2.
- 79 The siting of a proposed extension to the Gwynt y Môr project is necessarily spatially limited. It is not feasible to site an extension to the north, without either blocking the international vessel routeing measure into the newly confirmed (2021) Freeport of Liverpool or failing to meet the shared boundary criteria. Similarly, it is not possible to site an extension project to the east, without interfering with constraints such as the Burbo Bank Extension project and existing seabed leases for aggregate extraction. It is further not feasible to extend to the south and avoid constraints such as the existing nearshore wind farms of Rhyl Flats and North Hoyle.



Table 2: Crown Estate Extensions round criteria.

CROWN ESTATE EXTENSIONS ROUND SITING CRITERIA	AYM COMPLIANCE
The wind farm which is proposed to be extended must be constructed and fully operational at the date of the application.	Awel y Môr's sister project, Gwynt y Môr, began first power production in 2013 before being fully commissioned in 2015.
The proposed extension must share a boundary with the existing wind farm.	Awel y Môr shares its eastern boundary with the Gwynt y Môr project.
Other than the existing wind farm, the proposed extension must not encroach within a radius of 5 km of any other wind farm unless the tenant of any such wind farm confirms its agreement in writing to The Crown Estate.	The nearest wind farm to the proposed Awel y Môr project is the Rhyl Flats offshore wind farm, which is greater than 5 km away and is also operated by RWE.

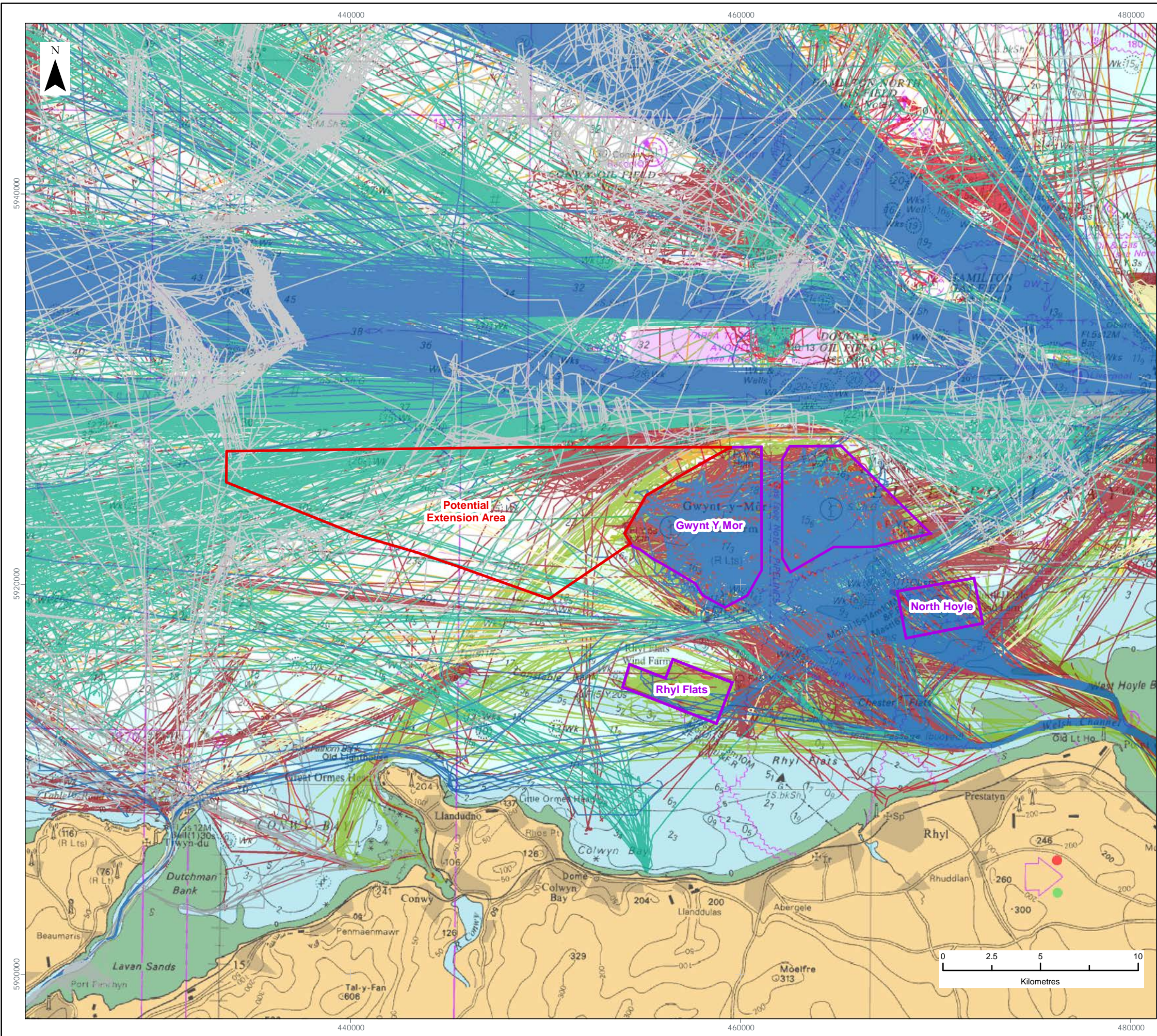
80 Prior to submitting an application to The Crown Estate an initial consideration of environmental parameters and constraints was undertaken and an area of search determined. The area of search formed a preliminary offshore boundary to delineate the location of offshore Wind Turbine Generators (WTGs). The initial boundary for AyM was identified through an analysis of engineering, environmental, economic and consenting risks and subject to further feasibility analysis for key issues such as shipping routes (Figure 3), conservation areas and other offshore industry (Figure 4).

81 In addition to shipping routes and conservation areas, further key feasibility concerns for the array included an analysis of existing environmental 'hard constraints', based on spatial data and an understanding of the likely constraints, including:

- ▲ Military disposal sites;

- ▲ Suspended oil and gas wells;
- ▲ Completed, drilled, plugged and abandoned wells;
- ▲ Active subsurface structures;
- ▲ Surface structures with helipads;
- ▲ International Maritime Organisation (IMO) shipping routes;
- ▲ Bathymetric contours (5 m intervals);
- ▲ Consented developments;
- ▲ Wrecks;
- ▲ Active pipelines; and
- ▲ Active cables.





#### LEGEND

- Potential Extension Area
- Existing Round 1 and 2 Offshore Wind Farms
- 2015 OGL AIS Track Data
  - Unknown Vessels
  - Non-Port Service Craft
  - Port Service Craft
  - Dredging Vessels
  - High Speed Craft
  - Military or LE Vessels
  - Passenger Vessels
  - Cargo Vessels
  - Tanker Vessels
  - Fishing Vessels
  - Recreational Vessels

Data Source: This product has been derived in part from material obtained from the UK Hydrographic Office with the permission of the Controller of Her Majesty's Stationary Office and UK Hydrographic Office ([www.ukho.gov.uk](http://www.ukho.gov.uk))

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Shipping and  
Navigation Constraints

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

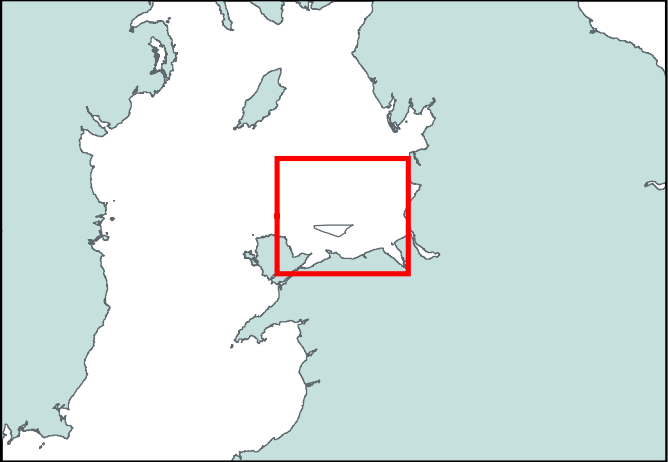
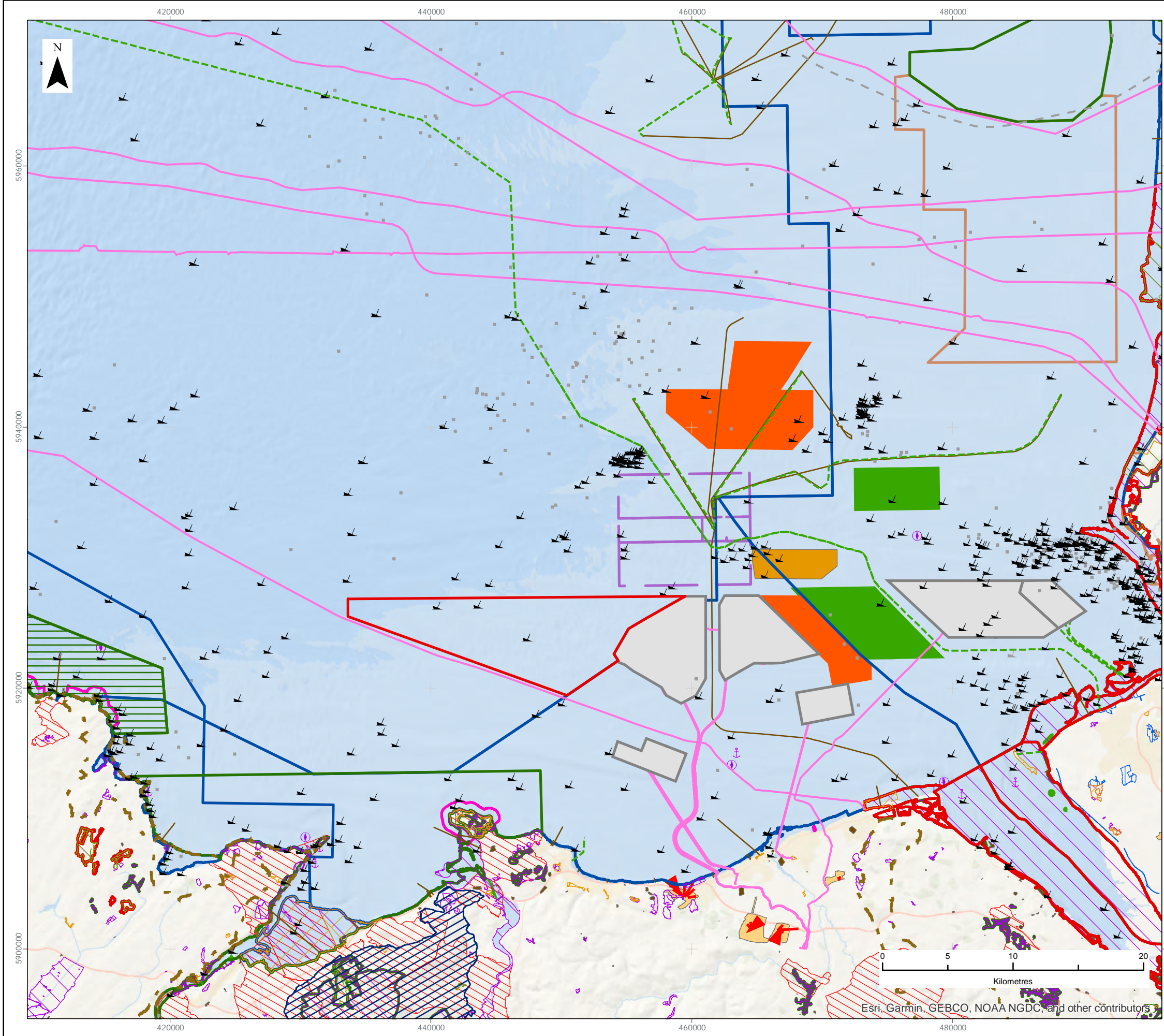
FIGURE NUMBER:

Figure 3

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:200,000	A3	WGS84	UTM30N

Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm





LEGEND

- AyM AfL Boundary
- TCE Wind Farm Leases
- UKHO Cables - In service
- UKHO Cables - Out of service
- UKHO Cables - Unknown
- UKHO Pipelines
- Assumed Dee and Clwyd River
- Authority Outfall identified by TCE
- Obstruction
- Wreck
- Anchorage area
- Pilot boarding place
- Dredging Option Area
- Dredging Production Area
- Anchoring Area
- Traffic separation
- Historic Landfill Site
- CADW Historic Landscapes
- National Parks
- AONB
- LNR
- NNR
- RAMSAR
- SSSI
- SPA
- SAC
- cSAC
- Protected Views
- Parks and Gardens
- Heritage Coast
- NE MCZ
- Country Parks

Data Source: Contains UKHO Law of the Sea data © Crown Copyright and database right.

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

**Awel y Môr designated sites  
and other marine user constraints**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

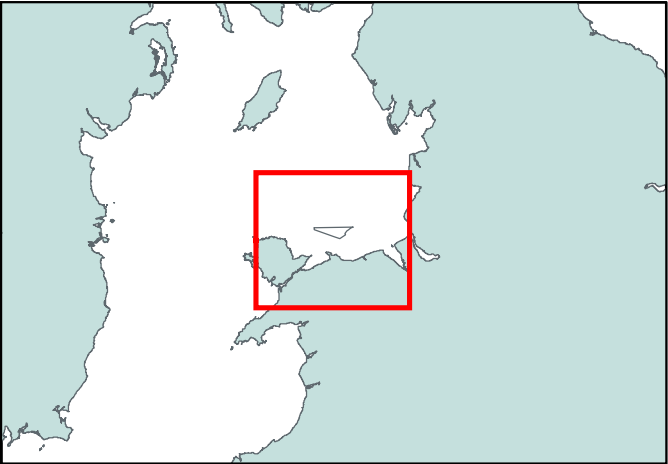
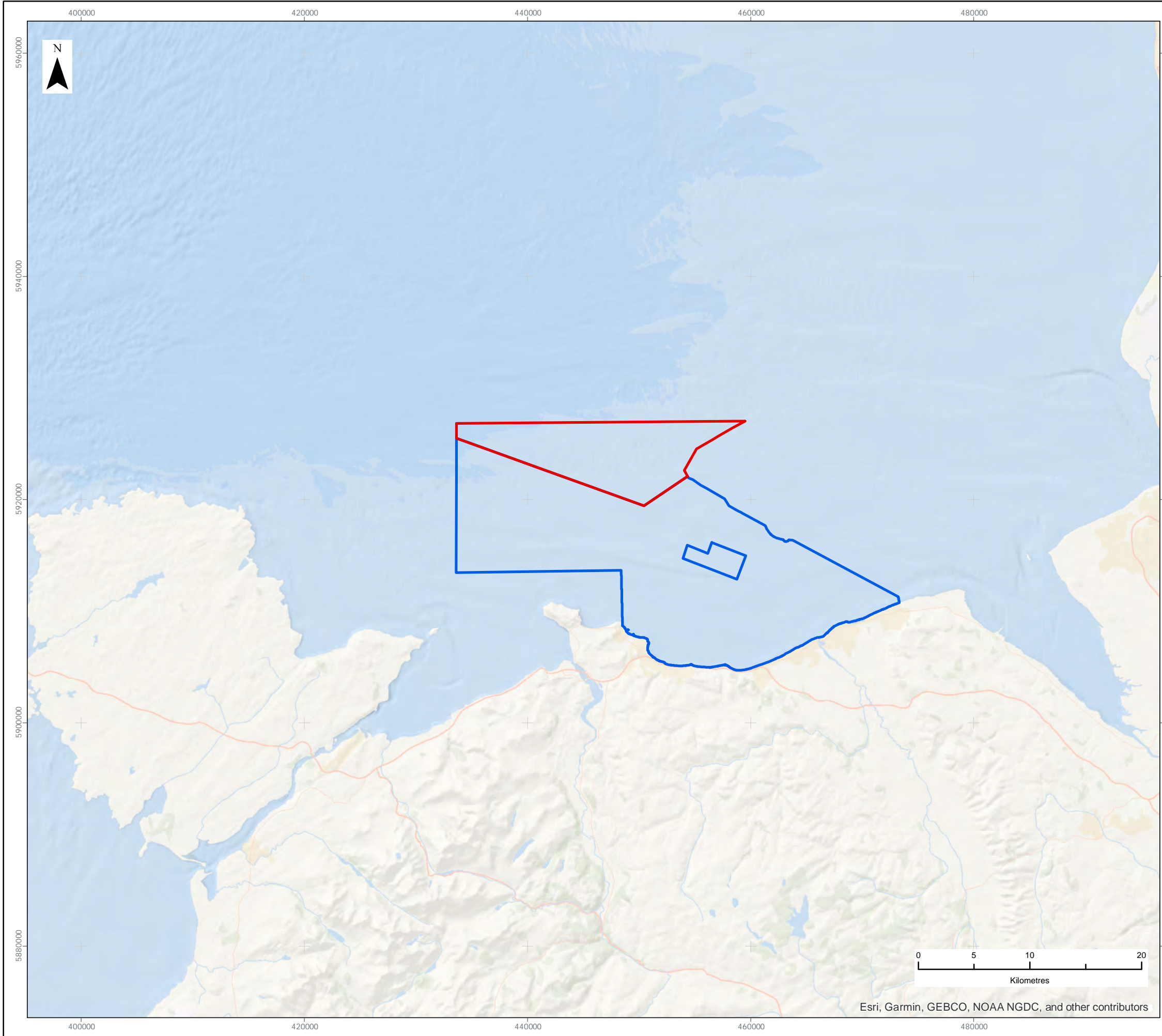
**Figure 4**

SCALE:	1:300,000	PLOT SIZE:	A3	DATUM:	WGS84	PROJECTION:	UTM30N
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm

- 82 Prior to confirming the award of the necessary rights to develop the extensions projects, TCE undertook a plan-level Habitats Regulations Assessment (HRA) to assess the possible impact of the proposed windfarm extensions on relevant nature conservation sites of European importance. In August 2019, TCE formally announced the conclusion of the plan-level HRA and confirmed that an extension to Gwynt y Môr could progress to an award of development rights.
- 83 The proposed area at that stage can be seen below (Figure 5). This area was carried forward to the EIA Scoping phase.





LEGEND

AyM Scoping Boundary

Offshore Export Cable Route Search Area

Data Source:

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Awel y Môr Offshore Scoping boundary**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 5**

SCALE: 1:350,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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## 4.8 Stage 2 – identification of proposed grid connection point

84 Following establishment of the array location and boundary, the next step in the site selection process was the identification by National Grid of a preferred grid connection point for the project.

85 Identification of the onshore point of connection for the proposed project was undertaken by National Grid, with a number of locations initially considered. The framework used to identify and agree the connection point with the National Grid is termed the CION process (Connection and Infrastructure Options Note), which is defined as:

*an optioneering process to identify the overall economic and efficient connection option. It provides a clear, transparent, repeatable and non-discriminatory process to ensure all relevant developers are treated in a consistent manner.*

86 In practice, whilst the primary objective of the CION process is to ensure that the most economic and efficient connection option is developed for the overall benefit of the UK consumer, the selection of a connection point also considers environmental impact, cost benefit analysis, deliverability, technology risk, planning risks amongst a suite of other criteria that may be brought into consideration depending on the project.

87 During Q2 2020, following the CION process, National Grid advised RWE that its preferred grid location would be at the existing National Grid substation at Bodelwyddan.

88 Following the identification of the offshore wind farm location and the proposed National Grid connection point, an Area of Search (AoS) was defined, encompassing potentially suitable locations for the four elements of transmission infrastructure (offshore cable corridor, landfall, onshore cable corridor, onshore substation). This broad AoS could then be narrowed down into infrastructure-specific AoS as part of the refinement process. The following sections describe the process adopted for selection of the location of each of the elements of the transmission infrastructure.

## 4.9 Stage 3 – identification of offshore export cable and landfall zone

89 The following sections describe the evolution of the offshore cable corridor and landfall design, from conception through to EIA Scoping.

### 4.9.1 Stage 3a Identification of offshore cable corridor Area of Search

90 The 2017 Crown Estate '*Cable Route Protocol*' (CRP) comprises a set of principles and requirements for offshore wind developers in the planning of export cable routes, which are explicitly linked to HRA aspects. Compliance with these principles and requirements is advisory for onshore cable routes, but for offshore routes it is enforced and secured through TCE's transmission assets Agreement for Lease (AfL). The Applicant has sought to align with the CRP throughout the site selection process, as set out below in Table 3. The Applicant's accordance with the CRP, as demonstrated through the agreement reached with TCE on the Corridor Identification and Approval for Linear Activities (CIAL) in February 2022.



Table 3: AyM Cable Route Protocol adherence.

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
Principle 1	It is anticipated that planning of cable routes offshore and onshore will be undertaken concurrently. Use of the approach set out in the Cable Route Protocol for onshore cable planning is strongly encouraged. Onshore cable planning should have regard to relevant National Policy Statements and national and local terrestrial planning policy frameworks.	The Applicant confirms that the planning of the onshore and offshore cables routes has been undertaken concurrently. Consultation was undertaken informally on an AoS for the offshore cable corridor and onshore cable corridor before undertaking consultation through the submission of a Scoping report and subsequent formal consultation under Section 42 of the Planning Act (PEIR).
Principle 2	Where elements of offshore cable route planning take place before a developer enters into an offshore array AfL with TCE, the use of the approach to offshore cable route planning set out in the Cable Route Protocol is strongly encouraged. This applies to all stages of cable route planning including the submission of high-level environmental information to NGE SO in the CION process.	The offshore cable route planning was commenced following the agreement of the AfL for the AyM OWF array area. However, the Cable Route Protocol (both the principle and requirements) have been a material consideration throughout all stages to date in the development of the offshore cable corridor and will continue to be so as throughout its refinement.

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
Principle 3	The Cable Route Protocol applies specifically to Habitats Regulations Sites. However, as a matter of best practice the approach set out in the Cable Route Protocol may also be applied to other protected sites (both marine and terrestrial) and known sensitive habitats, and this is strongly encouraged. This includes (inter alia) MCZs and SSSIs.	The Cable Route Protocol has been applied by the Applicant to both Habitat Regulations Sites, other protected sites, and habitats classified as Annex I outwith Special Areas of Conservation. See Principle 5 for further detail.
Principle 4	Planning of cable routes should be undertaken in close consultation with Statutory Nature Conservation Bodies (SNCBs) (Natural England, Natural Resources Wales and, where appropriate, the Joint Nature Conservancy Council (JNCC)). Other non-statutory consultees should also be included in the consultation where considered appropriate (including, but not limited to, The Wildlife Trusts and RSPB). Consultation should continue from the earliest stages of route planning through to consent application. It may be helpful to agree an	<p>The Applicant has undertaken extensive consultation since 2019, with both SNCBs and non-statutory consultees, during the development of the cable corridor to date.</p> <p>Consultation has taken place via Scoping and through an EPP, which represents the primary forum for non-statutory consultation.</p> <p>During the Scoping phase and subsequent Evidence Plan meetings, the Applicant received feedback noting concern at potential impacts to the Constable Bank, an</p>

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	engagement plan at the outset to set expectations and ensure that required timescales are met, but the fundamental requirement is for consultees to be given the opportunity to provide advice. All consultees must ensure that information about cable route planning is kept confidential where requested (particularly in the early stages before public consultation).	Annex I sandbank feature not located within a designated site. The Applicant opted to adopt an alternative cable route which has been agreed with stakeholders as avoiding the Annex I feature.  The Applicant will continue to use the EPP alongside the formal consultation processes to ensure sensitive features are avoided or suitably mitigated where practicable.
Principle 5	In planning the cable route, the emphasis should be on avoiding impacts on protected sites. If this is not possible, effects should be reduced to a minimum through design, and mitigation should be the last resort following the 'avoid, reduce, mitigate' hierarchy. The Crown Estate encourages non-Habitats Regulations sites to be treated as importantly as Habitats Regulations sites. However, if it is not possible to avoid all protected sites developers should be able to	The Applicant has sought to avoid protected sites and features wherever practicable.  Whilst the Constable Bank has been avoided, as described in response to Principle 4, it has not been possible to fully avoid the Liverpool Bay SPA. The route chosen has opted to avoid sandbanks, a recognised supporting feature of the SPA, and to ensure any disturbance is managed to mitigate as far as practicable.

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	demonstrate that they have selected the least damaging route.	
Principle 6	Where it is necessary to mitigate effects of cabling at project level, appropriate measures should ideally be agreed with statutory stakeholders and be capable of being secured within project design and/or consents. Mitigation measures will also need to be acceptable to competent authorities.	The requirement for mitigation has been identified during the EIA process and the identified measures are secured within the project design (as embedded mitigation) or within appropriate documentation to support this application for ML(s) and DCO. Examples include securing provision of a vessel management plan, post-consent, which will reduce interaction with the designated features of the Liverpool Bay SPA; the principles that will inform the vessel management plan are presented in the RIAA (application ref: 5.2).
Principle 7	Developers should have regard to the current best practice cabling environmental considerations provided by SNCBs. Developers should also have regard to other cabling	The Applicant continues to apply lessons learned from all aspects of the consenting and development processes, in particular

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	guidance and advice produced by SNCBs from time to time, including 'lessons learned' reports, cabling sensitivity documents and research reports from projects relevant to the impacts of cables on the environment.	those lessons learnt through the adjacent sister project Gwynt y Môr.  In addition, it is intended those lessons learned from SNCBs (and other stakeholders) will be shared and applied as a result of consultation including but not limited to the EPP.
Requirement 1	Where elements of offshore cable route planning have taken place before a developer has entered into an offshore array AfL with The Crown Estate, these must be clearly set out (since The Crown Estate can only enforce compliance with the Requirements of the CRP after the developer has entered into the array AfL).	The Applicant has entered into an offshore array AfL with The Crown Estate. The cable route planning process commenced alongside the AfL process and has begun refinement since award of the array AfL.
Requirement 2	Under this CRP, developers must undertake consultation with SNCBs throughout the corridor selection and refinement process. The nature of this consultation will vary from project to project,	Consultation has been held via the Scoping phase, and through the parallel EPP.  Prior to Scoping commencing, the Applicant undertook Evidence Plan meetings in 2019 to

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	<p>but to be effective the consultation should be ongoing throughout the process and both parties must provide clear information and advice within the agreed timeframes.</p> <p>Developers must demonstrate within that clear information on the offshore export cable corridor has been provided for SNCBs at appropriate stages in cable corridor planning, and that SNCB advice has been sought at appropriate stages (whether through formal or informal consultation). It is acknowledged that some elements of the cable planning process are time-constrained, and that delays in receiving input from consultees can result in difficulties for developers. Development of an engagement plan is strongly encouraged. If difficulties have been encountered in engagement these should be clearly stated, and this will be taken into consideration by The Crown Estate.</p>	<p>introduce the project zones, including the offshore and onshore cable zones, to stakeholders. Feedback was received at that time with regards potential cable and landfall constraints, including the Constable Bank, a regional feature considered to provide storm defence in addition to the designated status already described.</p> <p>During Scoping, further feedback was received that the cable route should avoid Constable Bank where practicable. During the refinement of the cable zones, stakeholders were offered informal updates up to and including the point that the offshore cable route was defined for the purposes of the PEIR, and this final application for a DCO and ML(s). The offshore cable corridor was refined to avoid the Constable Bank. Further consultation was held to confirm subsequent refinement of the</p>

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
		array area, which brought further refinement of the export cable corridor.
Requirement 3	When submitting high level environmental information to National Grid Electricity System Operator (NGESO) as part of the CION process, developers must have considered a comprehensive picture of all offshore/coastal SACs, SPAs and Ramsar sites for the various possible offshore transmission connection corridors, and identified the sensitivities of each of these to impacts from export cabling (either through consultation with SNCBs or by use of the information available from conservation advice packages for sites).	Details on the offshore and coastal Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites and their identified sensitivities to the impacts from the installation export cabling are provided in accompanying chapters to this ES.
Requirement 4	In planning survey work on potential cable corridors (or exploratory works within a cable route Area of Search), developers must consult with SNCBs to ensure that they have the	During the planning of the survey work for the potential cable corridor, the Applicant undertook consultation via the EPP, and with NRW in particular. This consultation included discussions on the sufficiency of the

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	opportunity to provide feedback on the scope and adequacy of the overarching survey plan.	proposed survey methodology, sample numbers and analysis of samples. The survey scope and layouts were subsequently agreed as appropriate with NRW.
Requirement 5	Developers must demonstrate that planned offshore cable corridors are in alignment with the relevant policies and principles within the applicable National Policy Statements and relevant marine plan(s) (including draft marine plans).	<p>The Applicant has demonstrated alignment to the relevant policies and principles detailed within the relevant Marine Plans throughout the application in relation to each relevant topic area and more broadly in Volume 1, Chapter 2 Policy and Legislation (application ref: 6.1.2).</p> <p>The Applicant has demonstrated alignment to the relevant policies and principles detailed within the relevant National Policy Statements (NPS) throughout the Preliminary Environmental Information and this final application which also considers the implications of the draft NPS.</p>



PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
Requirement 6	Developers must demonstrate that planned cable corridors have taken into account the outcomes of the 2017 Offshore Wind Extensions Plan-level HRA as described in the Report to Inform Appropriate Assessment.	The AyM cable corridor has had regard to the findings of the 2017 Offshore Wind Extensions Plan-level HRA through active avoidance of designated sites and features, where practicable and where there is a risk of significant effect. As such, the final route is demonstrably compliant with the 2017 Offshore Wind Extensions Plan-level HRA, with conclusions presented in the Report to Inform Appropriate Assessment (application ref: 5.2)
Requirement 7	Developers must demonstrate that they have had regard to documents and advice produced by SNCBs in relation to offshore export cabling, including current best practice guidance.	The Applicant can confirm that feedback received via the Scoping phase and EPP has informed the design of the project, and the final cable route in particular. As noted previously, feedback received specifically with regards the Constable Bank feature has resulted in an alternative cable route being progressed through to PEIR, and this formal application.

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
Requirement 8	The developer must request a Crown Estate GIS proximity check of its proposed AoS and have regard to the findings of this check in cable route planning. This includes identification of any requirement for minimum separation distances from existing assets, and any potential requirement to negotiate proximity agreements with other tenants.	A full proximity check was undertaken in discussion with The Crown Estate. Further, Volume 2, Chapter 12 Other Marine Users (application 6.2.12) provides a comprehensive account of the proximity to other cable infrastructure and assets. Cable crossings were avoided where practicable during the planning phases, with a standard 500m separation distance applied from existing assets wherever crossings are not necessary.
Requirement 9	<p>Within the offshore AoS the developer must identify (and map where possible) the following, which are to be given significant weight in cable route planning:</p> <p>Habitats Regulations sites (SACs, SPAs and Ramsar sites, whether fully designated or not);</p> <p>Features of the Habitats Regulations sites (including priority habitats and species);</p>	<p>The Scoping report illustrated the Area of Search, which is replicated in Figure 5 for completeness.</p> <p>As noted previously, feedback received specifically with regards the Constable Bank feature has resulted in an alternative cable route being progressed through to the final application.</p>

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	<p>Habitats Regulations sites with conservation objectives to recover features to favourable condition;</p> <p>Areas of known Annex I habitat outside protected areas but within the AoS; and</p> <p>Habitats that are known to be irreplaceable or very difficult to replace (e.g. chalk reef).</p>	
Requirement 10	<p>Developers must prepare an outline view of the possible cabling infrastructure requirements (acknowledging that this may change as the design of the project evolves). The outline should include the potential number and capacities of the export cables with their indicative spacing requirements and the additional structures (e.g. substations and converter stations) which the project is likely to require.</p> <p>Within the AoS, developers must identify (and where possible, map) hard engineering constraints such as existing infrastructure/</p>	<p>Details of the possible cable infrastructure requirements including spacing, cable protection and likely preparation works are presented in the Project Description Chapters of this ES. The project design is currently in an early stage and is expected to be refined during the design process.</p>

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	licence areas, challenging ground conditions and sections of the coast where landfall is not possible. Developers should also form an initial view on the likely areas within the AoS where cable preparation works and/or cable protection may be needed (noting that this information is likely to change as survey work is undertaken).	
Requirement 11	Developers must demonstrate that they have undertaken regular consultation with SNCBs as the cable route selection process progresses. The consultation must encompass the entire process from AoS to final corridor selection.	Details of the consultation held to date with statutory and non-statutory stakeholders are provided in Appendix A. Ongoing consultation throughout the pre-application process was undertaken, including consultation on the corridor selection which has informed its refinement.
Requirement 12	Where SNCBs provide advice and guidance during the cable route planning process this must be clearly documented and considered in cable route decision-making.	As presented in Section 4.11, SNCBs (and other stakeholders) advice and guidance has been critical to the refinement of the cable corridor.

PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
Requirement 13	The expectation (set out in Requirement 5) is that the cable corridor should avoid the risk of harm to Habitats Regulations sites. Where this is not possible and a developer seeks to rely on mitigation measures for engineering or commercial reasons, the developer must be able to demonstrate that appropriate weight has been given to environmental considerations in the cable corridor evaluation process.	As noted previously, feedback received specifically with regards the Constable Bank feature has resulted in an alternative cable route being progressed through to the final application. The risk of harm to designated sites, with regards the Annex I Constable Bank feature and its status as supporting habitat within the Liverpool Bay SPA is therefore mitigated.
Requirement 14	<p>Within the CIAL the Developer must either demonstrate that the following activities have been undertaken, or present a coherent programme for their completion:</p> <ul style="list-style-type: none"> <li>• a Regulation 12 consultation on a Preliminary Environmental Information Report (PEIR) which includes the cable corridor or wider area of search; and</li> </ul>	This document represents the final ES for formal application, following consultation on the PEIR for Regulation 12. Following formal consultation, the ES has been updated to account for several design changes made as a result of consultee feedback. In addition, a Report to Inform Appropriate Assessment and a Water Framework Directive assessment accompanies the DCO application (application ref: 5.2 and 6.4.3.1 respectively).

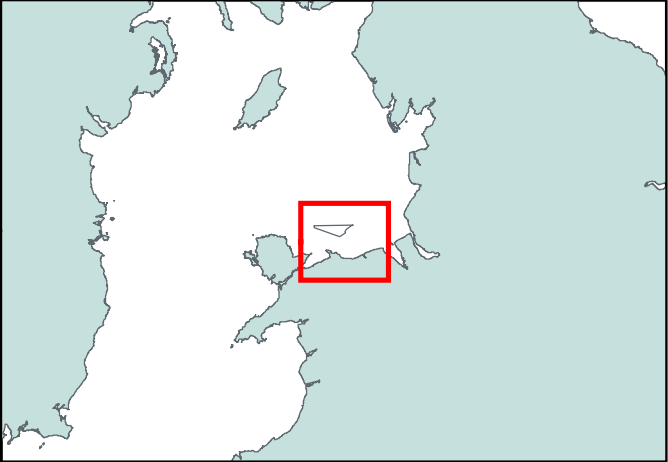
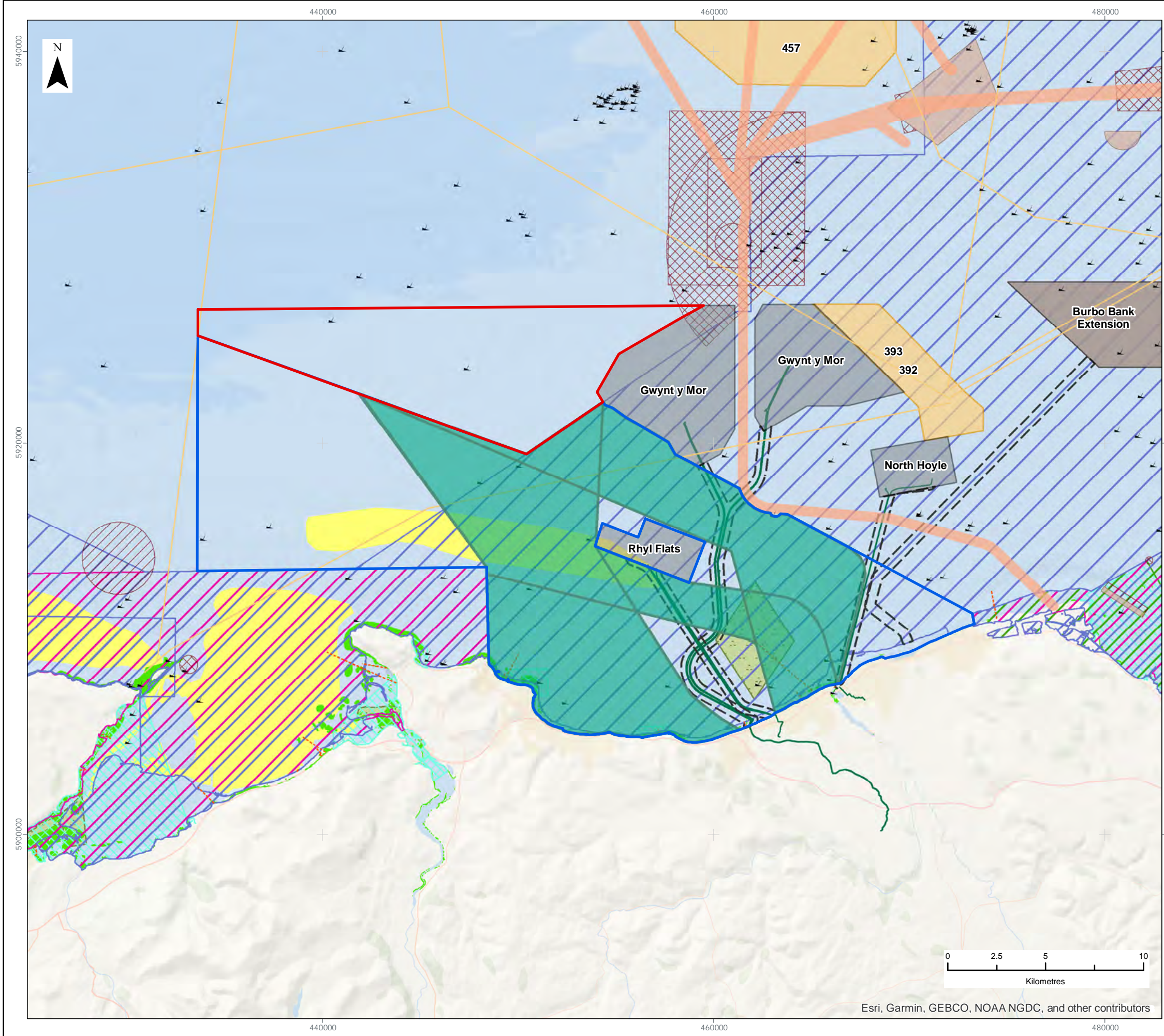
PRINCIPLE/ REQUIREMENT NUMBER	REQUIREMENT DETAIL	SECTION OF THIS DOCUMENT WHERE THE PRINCIPLE/ REQUIREMENT HAS BEEN ADDRESSED
	<ul style="list-style-type: none"> <li>a full assessment of the environmental impacts of the cable corridor within an Environmental Statement and/or separate report to inform HRA.</li> </ul>	

- 91 The identification of potential offshore cable corridors also adhered to a series of 'design principles' that were defined by the Applicant and formed the basis of consultation prior to the Scoping phase of the project. The principles were:
- Routing options need to be able to connect to viable landfall locations;
  - Routing options should be as short as possible;
  - Minimise number of crossings of existing offshore cables and pipelines, where crossing is required, cables and pipelines to be crossed at 90°;
  - Maintain required separation distances with other offshore cables and pipelines;
  - Maintain sufficient space for offshore cable installation (including anchor spread of installation vessels) whilst maintaining an appropriate safety buffer with existing sub-sea cables and pipelines;
  - Avoid historic wrecks as far as possible;
  - Seabed take in aggregate dredging areas to be minimised;
  - Avoid direct significant impacts to sites designated for nature conservation as far as possible; and
  - Avoid direct significant impacts to ecologically important sandbanks and potential reefs as far as possible.
- 92 Following application of TCE's CRP and these design principles, the process of cable route planning began with an identification of a broad Area of Search (AoS) for the possible onshore and offshore cable corridors from the identified wind farm location to the grid connection point. These broad AoS were identified by following the design principles, and using high-level engineering and environmental development considerations, for example the application of international designations and existing key offshore and onshore infrastructure to define the boundaries of the AoS.
- 93 The key driver for the identification of the offshore cable corridor was the location of the AyM AfL area awarded by the Crown Estate and the positioning of the key ecological designations present along the coastline to the south of this area, which are:

- ▲ Dee Estuary SAC and SPA;
- ▲ Liverpool Bay/ Bae Lerpwl SPA;
- ▲ Y Fennai a Bae Conwy/ Menai Strait and Conwy Bay SAC;
- ▲ Anglesey Terns / Morwenoliaid Ynys Môn SPA; and
- ▲ Traeth Lafan/ Lavan Sands, Conwy Bay SPA

- 94 The Applicant has sought to keep the offshore cable corridor as short as possible to reduce overall potential impacts and also to minimise interaction with the current operating windfarms (Gwynt y Môr, North Hoyle and Rhyl Flats), an Aggregate Production Area and a closed disposal site. This therefore created an AoS from the southern extent of the AyM AfL area (as defined during pre-Scoping), to the Welsh coastline, specifically avoiding the ecological designations listed above, with the exception of the Liverpool Bay SPA, which covers a large extent to the south-east of the AfL. Due to the proximity of other operational windfarms in the area, other infrastructure (such as cable corridors) was unavoidably located within the defined AoS (Figure 6).
- 95 The AoS identified during this stage of the process was used as the basis of the EIA Scoping assessment, which was conducted in parallel to the site selection process and submitted to the SoS on 11 June 2020 (innogy, 2020).
- 96 In parallel with the Scoping phase of the AyM project, in May-July 2020, a longlist of indicative cable corridors within the overall AoS was identified.





LEGEND

- AyM Scoping Boundary
- Offshore Export Cable Route Search Area
- Indicative Export Cable Corridor Zones
- Existing Offshore Wind Farm
- Offshore Wind Export Cable Agreements
- Offshore Wind Farm Export Cable
- Pipeline 250m Buffer
- Outfall Pipe
- UKHO Wreck
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar
- Shellfish Waters
- Annex 1 Reefs
- Annex I Sandbanks
- Marine Farm (oyster/mussels)
- Dredger Transit Route
- Aggregate Production Area
- Disposal Sites (status)
  - Closed
  - Disused
  - Open

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Offshore Export Cable Corridor  
AoS with indicative zones

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1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

Figure 6

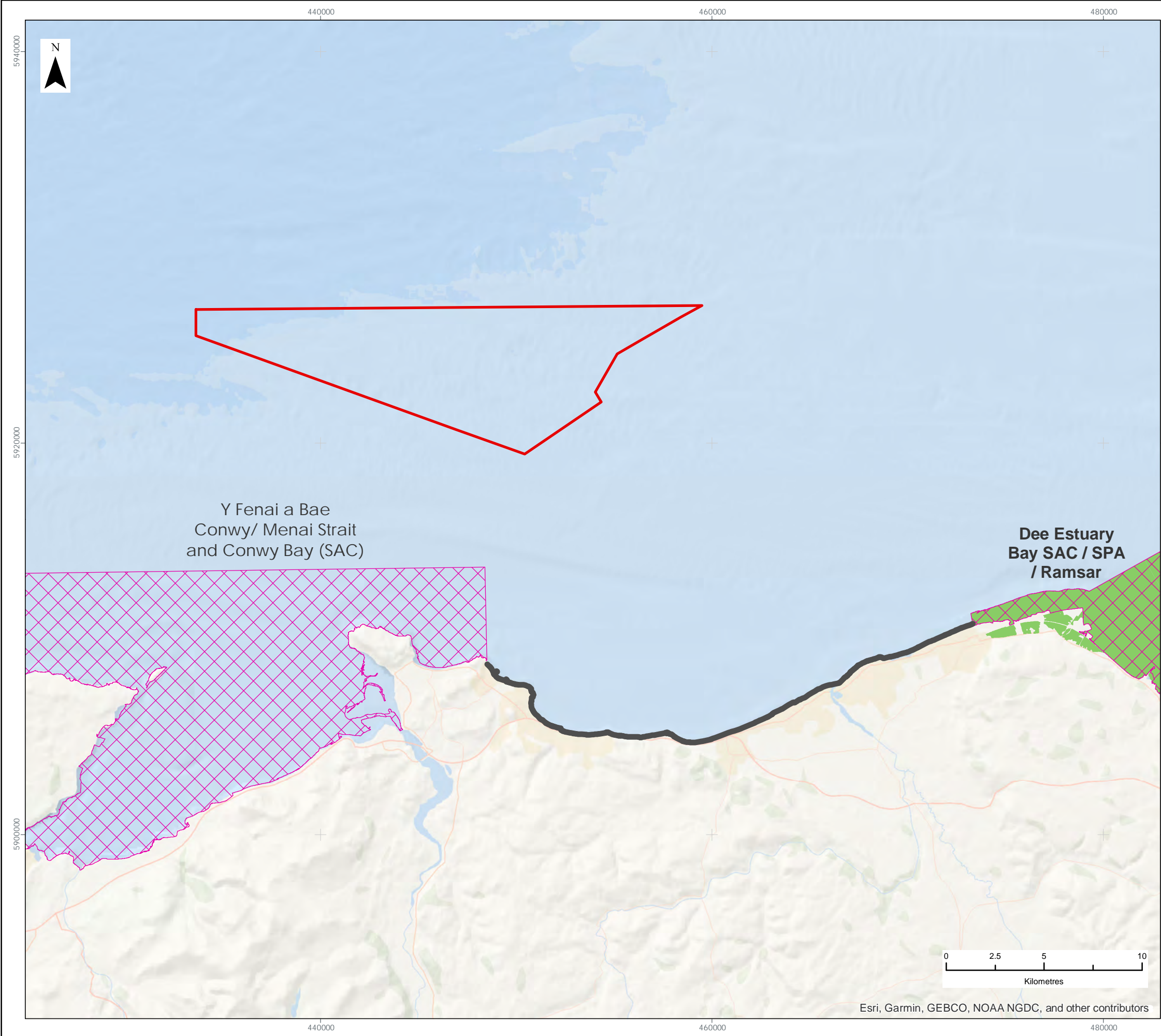
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**AWEL Y MÔR**  
Offshore Wind Farm



## 4.9.2 Stage 3b Identification of Landfall Area of Search

- 97 Through the pre-Scoping consultation, and the Scoping phase itself, a landfall AoS was identified. A key driver for the identification of the landfall AoS was the location of the offshore export cable corridor AoS along the Welsh coastline and avoiding the ecological designations of the Dee Estuary SAC, SPA and Ramsar to the east, and the Menai Strait and Conwy Bay SAC to the west. The landfall AoS (approximate length of coastline 29.3 km) was therefore positioned to avoid any direct impacts to these designations and the features protected within them (Figure 7).
- 98 The landfall AoS identified during this stage of the process was used as the basis of the EIA Scoping assessment, which was conducted in parallel to the site selection process.
- 99 In parallel with the Scoping phase of the AyM project, in May-July 2020, a longlist of landfall locations within the overall AoS was identified.



- LEGEND
- AyM Scoping Boundary
  - Landfall Area of Search
  - Special Area of Conservation (SAC)
  - Ramsar

Data Source:

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Landfall AoS**

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1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 7**

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## 4.10 Stage 4 – identification of onshore cable and substation zone

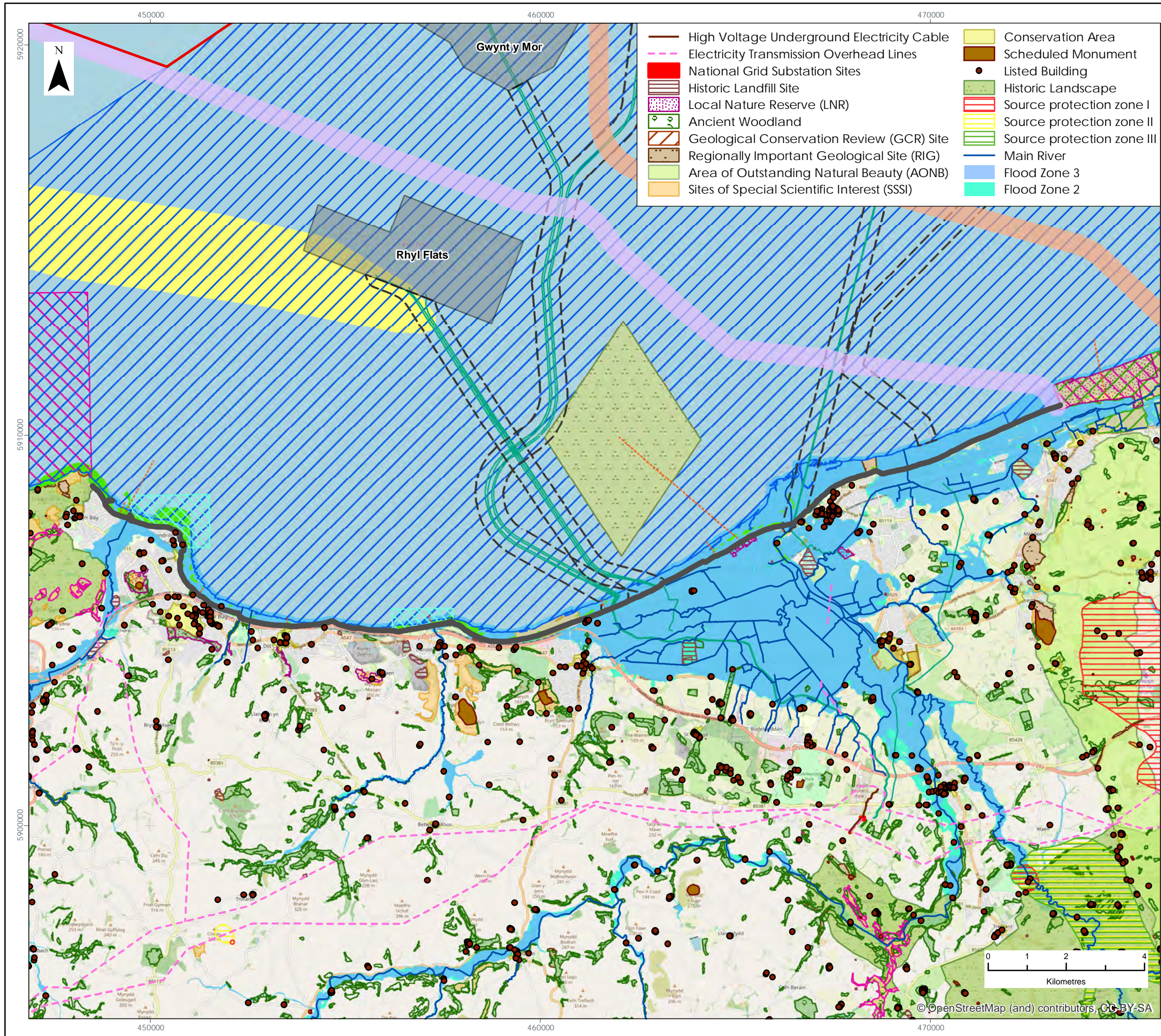
100 The following sections describe the evolution of the onshore project design, from conception through to Scoping.

### 4.10.1 Stage 4a – Identification of onshore cable corridor AoS

101 Following on from the landfall AoS, an AoS for the onshore cable corridor was defined for the purposes of consultation and the Scoping phase of the project. The key influences on the onshore cable corridor AoS (Figure 8) were the landfall AoS along the Welsh coastline and an initial 3 km AoS placed around the identified National Grid connection point at the Bodelwyddan substation (see Section 4.11.6). A broad area of land was then identified to join these two geographical areas, which was then further refined to avoid the Bryniau Clwyd A Dyffryn Dyfrdwy/ Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB) (Figure 9).

102 In parallel with the Scoping phase of the AyM project, in May-July 2020, a longlist of onshore cable corridors within the overall AoS was identified.





#### LEGEND

- AyM Scoping Boundary
- Landfall Area of Search
- Existing Offshore Wind Farm
- Offshore Wind Export Cable Agreements
- Offshore Wind Farm Export Cable
- Pipeline 250m Buffer
- Interconnector Cable 250m Buffer
- Outfall Pipe
- Shellfish Waters
- Marine Farm (oyster/mussels)
- Annex 1 Reefs
- Annex I Sandbanks
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar

Data Source: The Crown Estate, 2019; Oil & Gas Authority, 2019; UKHO, 2019; Cefas, 2019; JNCC, 2019; BMAPA, 2009; Marine Themes © Crown Copyright, 2019. All Rights reserved. Licence no. EK001-526094. Not to be used for navigation.  
Natural Resources Wales, 2019; Welsh Government, 2019; Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

**Relationship with Landfall  
AoS and Onshore constraints**

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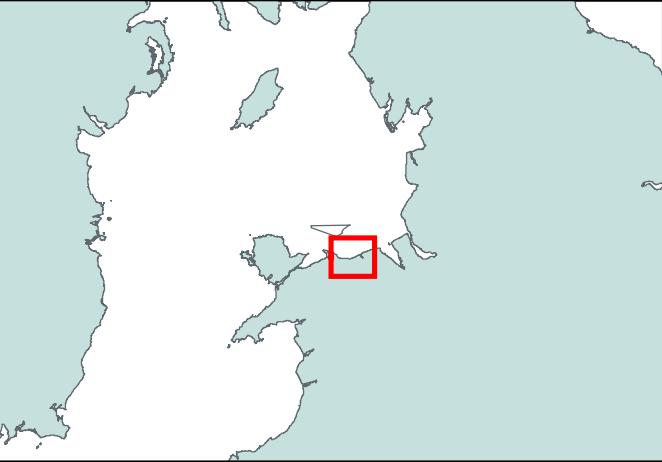
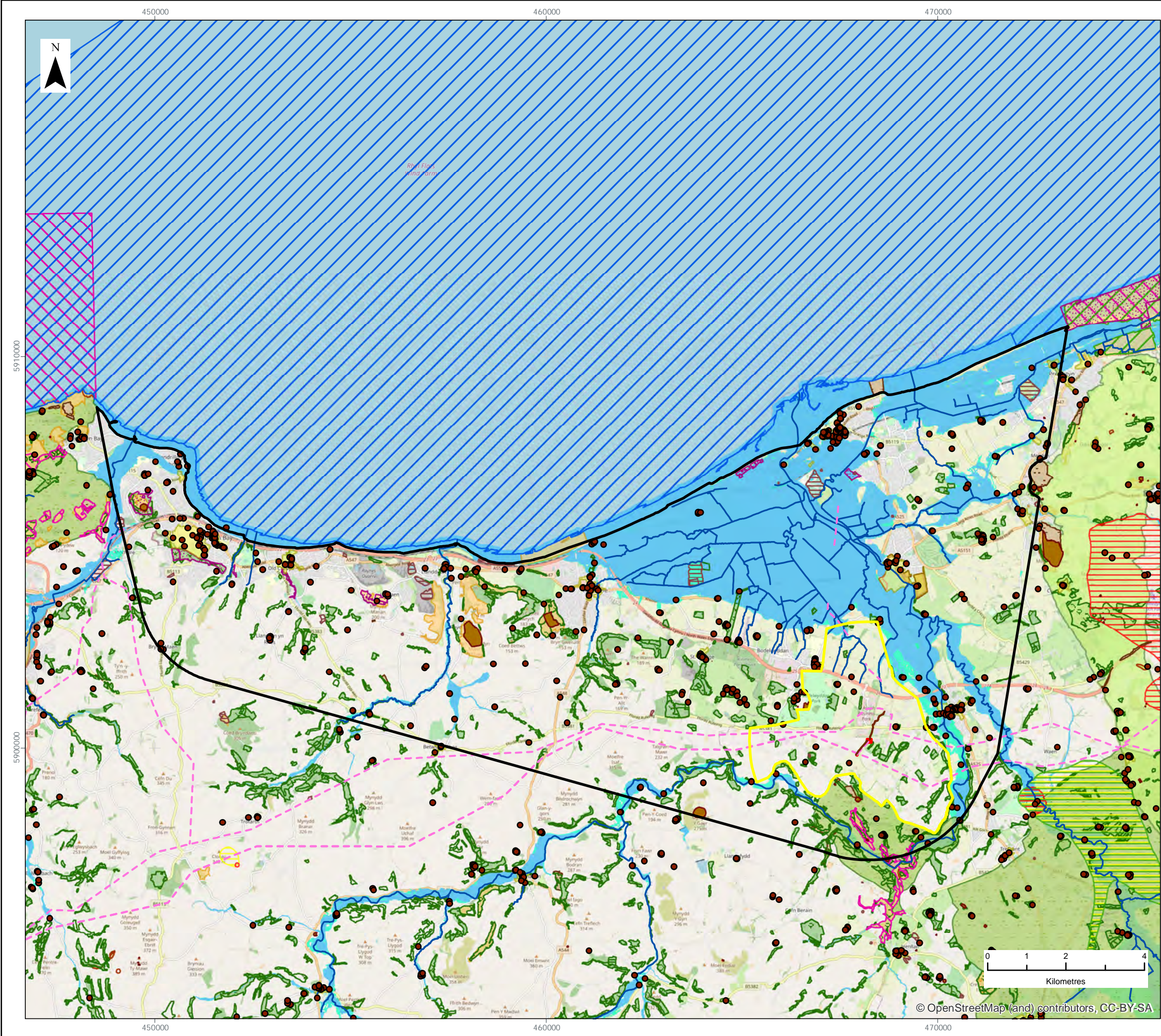
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**Figure 8**

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**AWEL Y MÔR**  
Offshore Wind Farm





LEGEND

- Onshore Cable Corridor Area of Search
- Substation Search Area
- High Voltage Underground Electricity Cable
- Electricity Transmission Overhead Lines
- National Grid Substation Sites
- Historic Landfill Site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar
- Local Nature Reserve (LNR)
- Ancient Woodland
- Geological Conservation Review (GCR) Site
- Regionally Important Geological Site (RIG)
- Area of Outstanding Natural Beauty (AONB)
- Sites of Special Scientific Interest (SSSI)
- Conservation Area
- Scheduled Monument
- Listed Building
- Historic Landscape
- Source protection zone I
- Source protection zone II
- Source protection zone III
- Main River
- Flood Zone 3
- Flood Zone 2

Data Source:  
Natural Resources Wales, 2019; Welsh Government, 2019;  
Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Onshore Cable Corridor AoS**

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1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 9**

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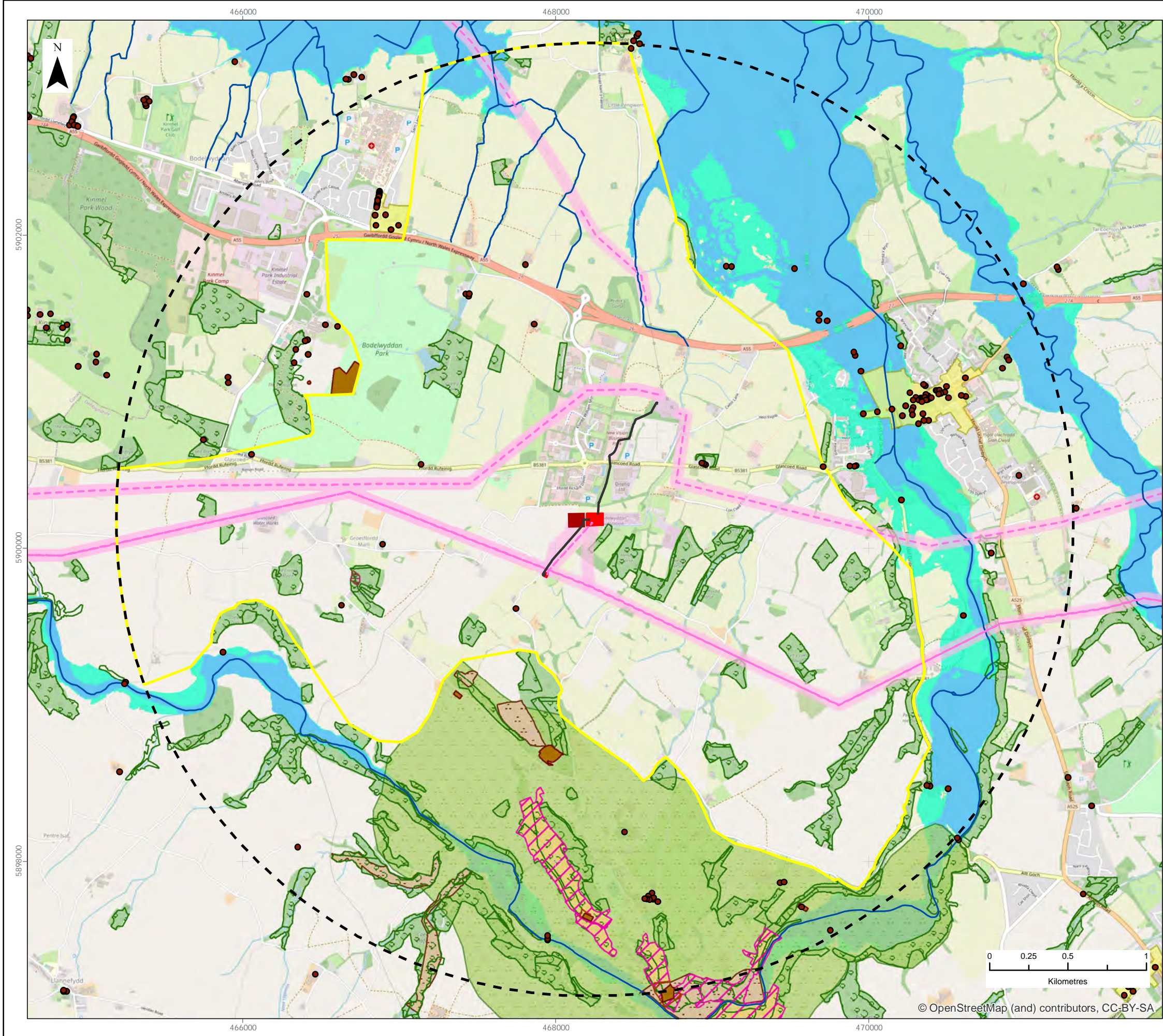


#### 4.10.2 Stage 4b Identification of onshore substation AoS

- 103 The guiding principles for locating the project's onshore substation are to achieve an economic and efficient connection (i.e. as close as possible to the National Grid connection point) whilst taking into account environmental constraints including siting principles in the Horlock Rules. The substation AoS (Figure 10) was therefore broadly defined as a 3 km buffer around the grid connection point at Bodelwyddan National Grid substation. As noted in Section 4.4 the Horlock Rules state "*Consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum... Consideration at an early point of the study should be given to placing the electrical infrastructure as close as possible to the existing National Grid connection point (if feasible) in order to minimise the landscape and visual effects associated with introducing new electricity infrastructure to the environment.*"
- 104 The 3 km buffer was subsequently refined with due consideration of the overarching guidelines outlined within the Horlock Rules to avoid existing settlements and environmental designations where possible.
- 105 Key areas removed from the AoS were St Asaph with its associated Conservation Area and Listed Buildings, as well as the Main River (Elwy), and its associated Flood Zones 2 and 3 to the east. The southern boundary was refined to avoid a further stretch of the River Elwy and its associated flood zones, along with the Coedwigoedd Dyffryn Elwy / Elwy Valley Woods SAC, Coedydd Ac Ogofau Elwy A Meirchion SSSI and the Lower Elwy Valley Historic Landscape, which encompasses scattered listed buildings and Scheduled Monuments.

- 106 The boundary to the north-west of the original 3 km buffer was refined to avoid the area of Bodelwyddan, including the area to the north of the A55, which includes Glan Clywd Hospital, mixed residential and commercial areas and the Bodelwyddan Conservation Area. The area to the south of the A55 was also refined, which includes First World War Practice Trenches at Bodelwyddan Park Scheduled Monument, scattered listed buildings including Bodelwyddan Castle and patches of ancient woodland.
- 107 The Area of Search (Figure 10) then formed the basis for the Scoping phase consultation.
- 108 In parallel with the Scoping phase of the AyM project, in May-July 2020, a longlist of substation zones within the overall AoS was identified.





LEGEND

- Onshore Substation Area of Search
- 3km Refined Substation Search Area
- Proposed National Grid Substation Footprint
- National Grid Substation Sites
- High Voltage Underground Electricity Cable
- Overhead Line 40m Buffer
- Electricity Transmission Overhead Lines
- Historic Landfill Site
- Special Area of Conservation (SAC)
- Ancient Woodland
- Sites of Special Scientific Interest (SSSI)
- Geological Conservation Review (GCR) Site
- Regionally Important Geological & Geomorphological Site (RIG)
- Listed Building
- Conservation Area
- Scheduled Monument
- Historic Landscape
- Main River
- Flood Zone 3
- Flood Zone 2

Data Source:  
Natural Resources Wales, 2019; Welsh Government, 2019;  
Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Onshore Substation

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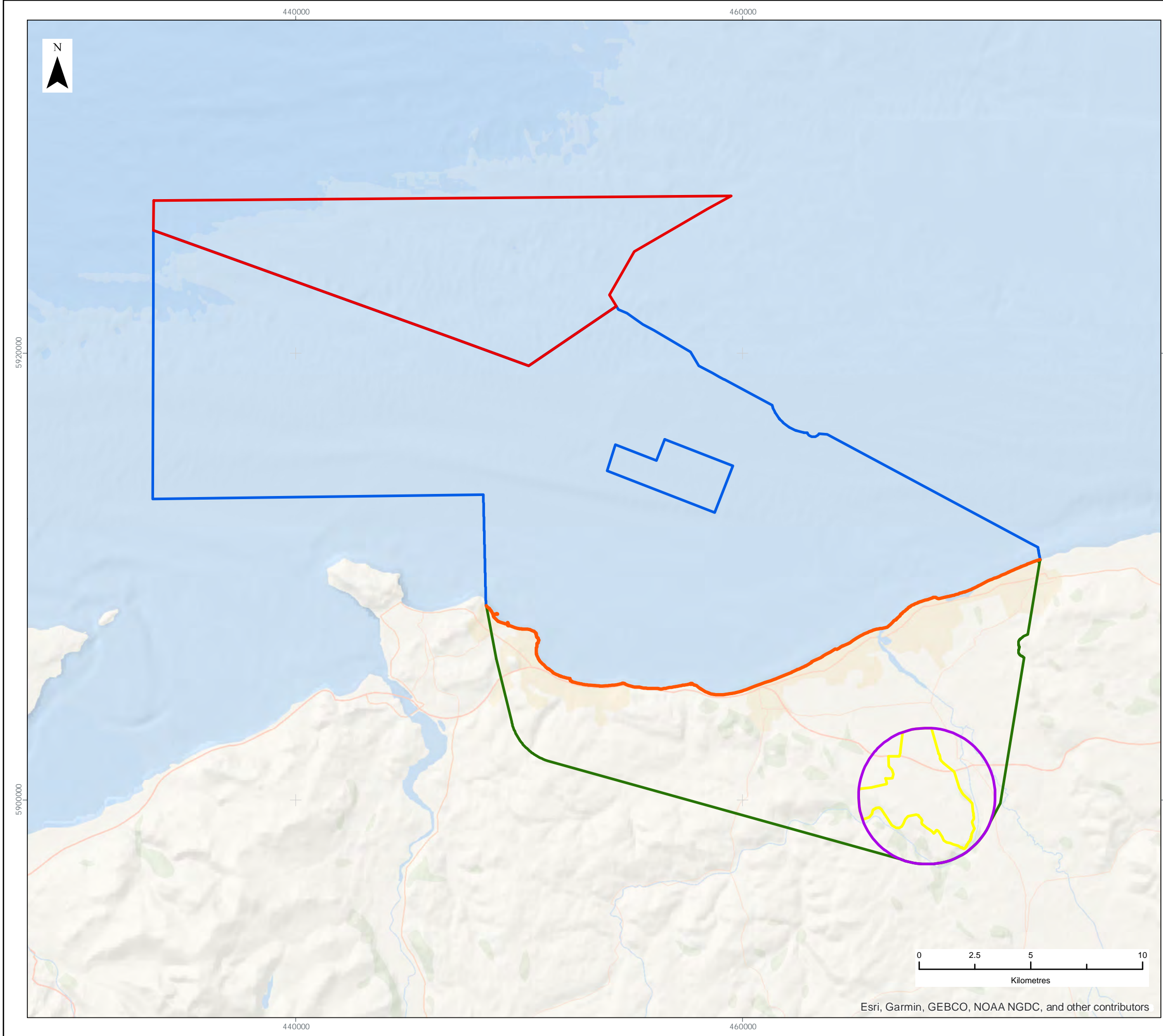
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Figure 10

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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm





#### LEGEND

- AyM Scoping Boundary
- Offshore Export Cable Route Search Area
- Landfall Area of Search
- Onshore Cable Corridor Area of Search
- Substation Search Area
- 3km Refined Substation Search Area

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

**Awel y Môr  
Scoping boundary**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

**Figure 11**

SCALE: 1:175,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm

## 4.11 Stage 5 and 6 - Refinement of Project for PEIR; statutory consultation (phase 2 consultation)

109 The following sub-sections describe the process in evolution of the project design from the Scoping phase, through to the design for the purposes of Statutory formal consultation.

### 4.11.1 Stage 5 and 6 - Site selection methodology

110 Once environmental constraints, engineering assumptions and the framework provided by relevant guidance had been applied to the AoS, the next step in the site selection process was to identify defined options for each element to take forward for further assessment and consultation.

111 No limit on the number of viable options for inclusion in the longlist was set prior to the onset of the site selection process. However, as a guide, a longlist was sought of approximately 5-10 options for the offshore cable corridor and landfall, and approximately 10-20 options for the onshore cable corridor and the onshore substation. Ultimately however, all potentially viable options were considered for inclusion in the longlist.

112 With regards the offshore export cable corridor, landfall, onshore cable corridor, and onshore substation, a BRAG analysis<sup>v</sup> was undertaken alongside the longlisting and shortlisting process, in order to identify a preferred route for the purposes of PEIR. The primary constraints considered in the BRAG analysis are presented below in Table 4. With regards the Array area, the process of refinement was subject to a parallel process with a number of options considered in consultation with stakeholders; the process and relevant factors are presented in Section 4.11.2 below.

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<sup>v</sup> BRAG analysis considers constraints and classifies them according to a series of criteria, 'Black' meaning hard constraint, through to Red, Amber, and Green with the latter meaning no material constraint.

Table 4: BRAG analysis constraints.

OFFSHORE EXPORT CABLE CORRIDOR	LANDFALL	ONSHORE EXPORT CABLE CORRIDOR	ONSHORE SUBSTATION
Traffic and Transport	Onshore Ecology	Onshore Ecology	Onshore Ecology
Tourism and Socio Economics	Onshore Water Resources	Onshore Water Resources	Onshore Water & Sediment Quality
Engineering	Onshore Archaeology	Onshore Archaeology	Onshore Archaeology
Benthic and Intertidal Ecology	Traffic and Transport	Traffic and Transport	Traffic and Transport
Other Marine Users	Land Use	Land Use	Land Use
Shipping and Navigation	Noise and Vibration	Noise and Vibration	Noise and Vibration
Offshore Ornithology	Tourism and Socio Economics	Landscape and Visual	Landscape and Visual
Commercial Fisheries	Engineering	Tourism and Socio Economics	Tourism and Socio Economics
Offshore Archaeology	Benthic and Intertidal Ecology	Engineering	Engineering
Offshore Water & Sediment Quality	Other Marine Users	Land	Land
Physical Processes	Shipping and Navigation		
	Offshore Ornithology		

OFFSHORE EXPORT CABLE CORRIDOR	LANDFALL	ONSHORE EXPORT CABLE CORRIDOR	ONSHORE SUBSTATION
	Offshore Water & Sediment Quality		
	Physical Processes		

#### 4.11.2 Array refinement

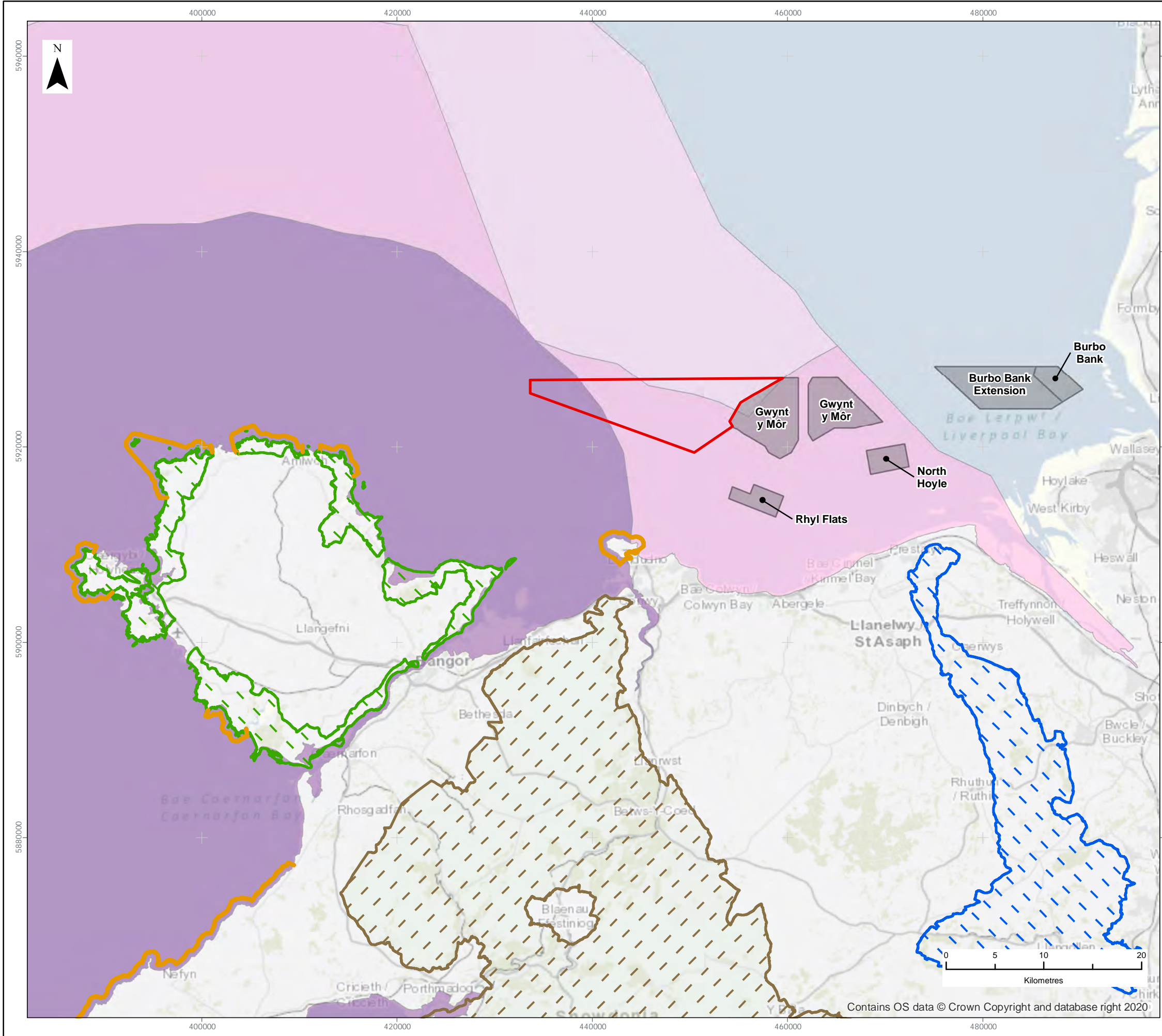
113 Following Scoping consultation, and in parallel with consultation via the EPP in Q4 of 2020, the Applicant undertook further analysis and refinement of the Array area to bring forward an improved design which took account of several factors raised during the consultation process. The primary factors reviewed were:

- ▲ Underwater noise and marine mammals/ fish;
- ▲ Shipping and navigation;
- ▲ Seascape/ Landscape and Cultural Heritage;
- ▲ Technical – Wind resource; and
- ▲ Technical – Bathymetry and ground conditions;

114 It was identified that any change to the western boundary of the proposed project would result in a loss of primary wind resource and favourable ground conditions, but would result in a likely reduction in impact magnitude for sensitive receptors, including shipping routes, marine mammal designations, and seascape receptors to the west. Further consultation was undertaken on the seascape landscape (SLVIA) interactions via the EPP, with the SLVIA/ Cultural Heritage ETG members.

- 115 This analysis identified five viable options. Consultation was then undertaken to identify which of the viable options would result in the greatest reduction in impacts and would represent an optimal design for the purposes of statutory consultation. During consultation it was recognised that any of the options would still result in some effect, but there was the opportunity to reduce the effect on the most sensitive areas, including those identified in the NRW Guidance note on siting offshore wind farms (White *et al.*, 2019a, 2019b, 2019c).
- 116 The guidance notes that, whilst neither the design nor scale of individual wind turbines can be changed without significantly affecting the output of the development, the layout should be designed appropriately to minimise harm.
- 117 The alternatives brought forward for consultation therefore sought to minimise the horizontal spread of the project from key representative viewpoints, whilst also seeking to balance the need to deliver renewable energy in order to meet the Welsh Government's objectives to address the climate emergency.
- 118 Consultation was therefore undertaken in Q1 of 2021 against viable options which included the sensitivity assessment zones illustrated in the Stage 2 assessment (White *et al.*, 2019b), reproduced in Figure 12 for ease of reference. The options considered are illustrated in Figure 13 and Figure 14.





LEGEND

- AyM Scoping Boundary
- Existing Offshore Wind Farm
- Heritage Coast
- Clwydian Range and Dee Valley AONB
- Anglesey AONB
- Snowdonia National Park

Seascape and visual sensitivity assessment zones sensitivity levels\*

- High
- High/medium
- Medium
- Medium/low

Data Source:  
\* Derived from Figure 9 of NRW Report No 331 Seascape and visual sensitivity to offshore wind farms in Wales: Strategic assessment and guidance Stage 3- Seascape and visual sensitivity assessment for offshore wind farms

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

White Consultants Sensitivity Zones,  
reproduced with Awel y Môr

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

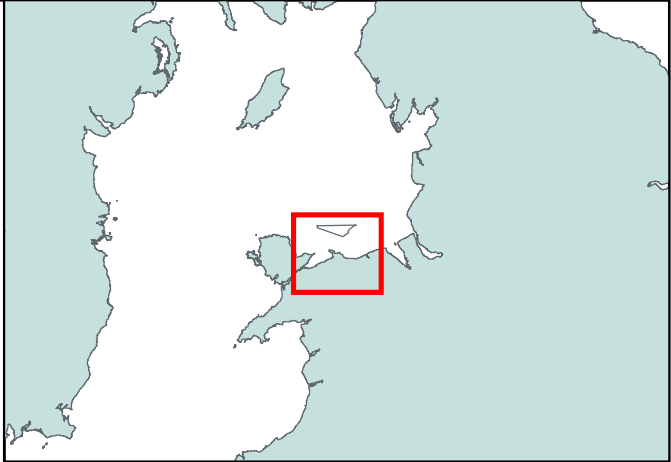
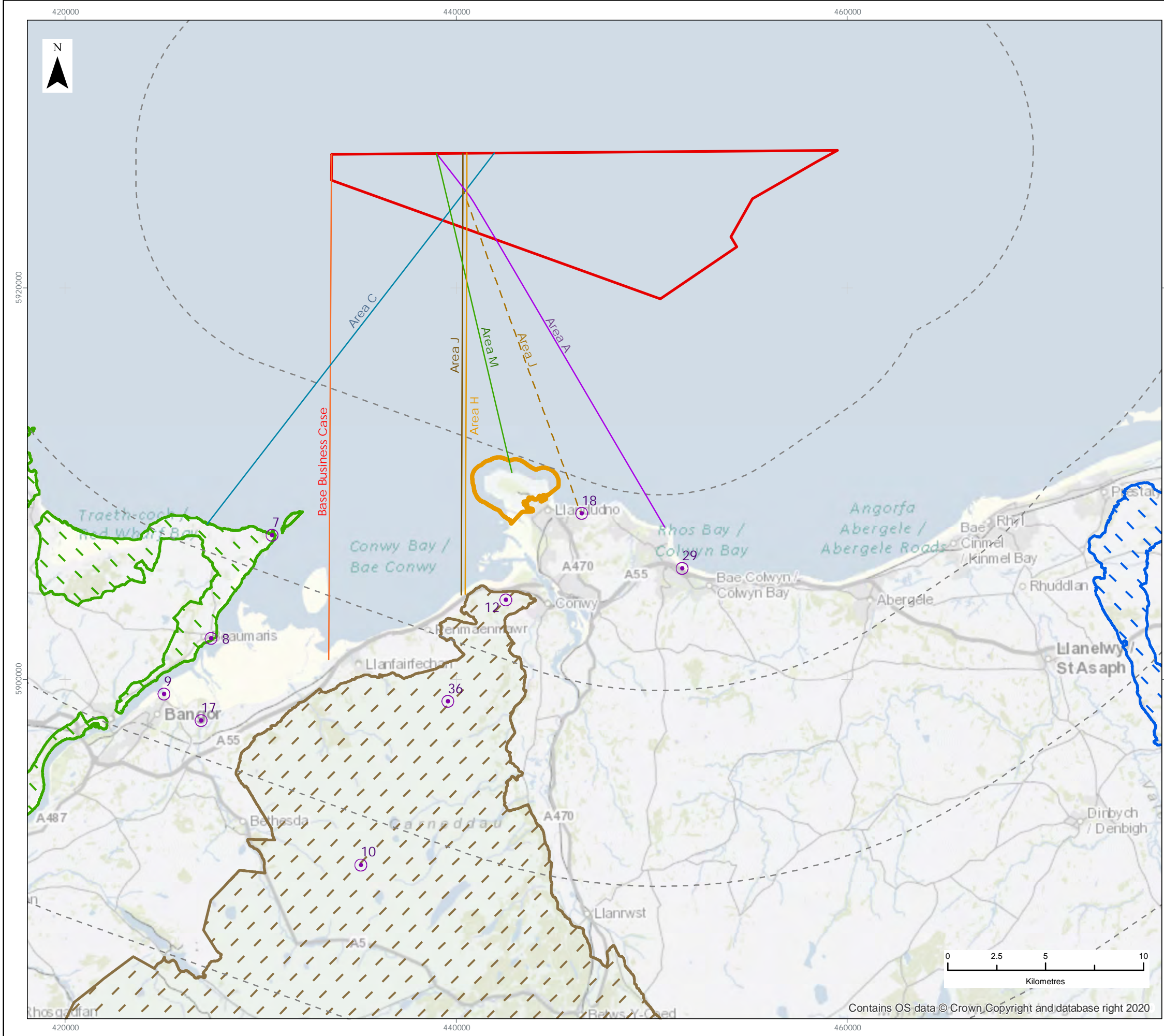
FIGURE NUMBER:

Figure 12

SCALE: 1:400,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm





#### LEGEND

- AyM Scoping Boundary
- 10km buffers from Scoping Boundary
- Viewpoints
- Great Orme Heritage Coast
- Clwydian Range and Dee Valley AONB
- Anglesey AONB
- Snowdonia National Park
- Area A
- Area C
- Area H
- Area J, Option 1
- - - Area J, Option 2
- Area M
- Base Business Case

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

**Awel y Môr Array options for  
consultation, with indicative vpts**

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1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

**Figure 13**

SCALE: 1:200,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm



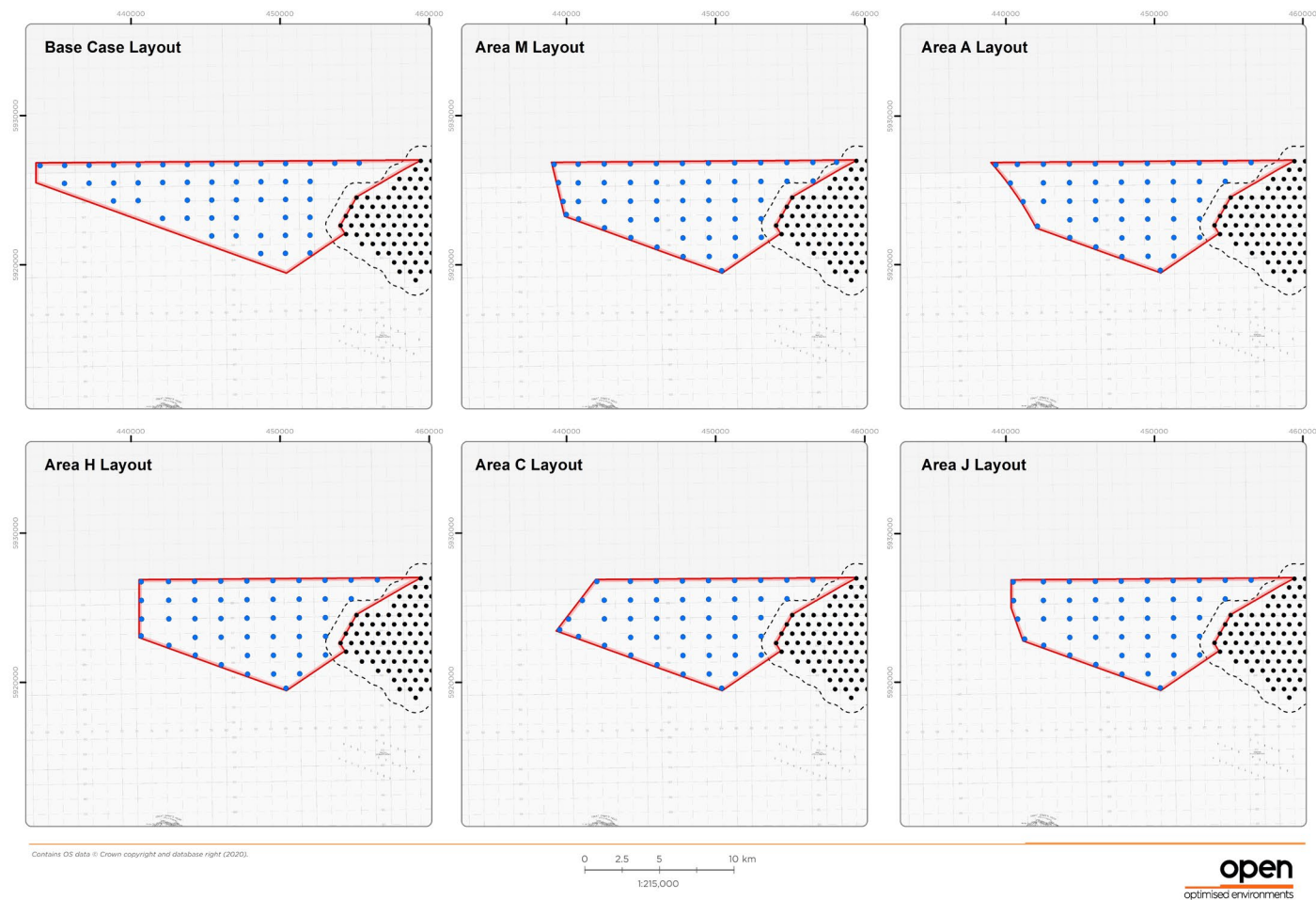


Figure 14: Awel y Môr array options for consultation.

119 Consultation feedback received following the SLVIA/ Cultural Heritage ETG meeting indicated that Areas H and M were likely to result in the greatest reduction in effects when compared to the 'base case' or Scoping boundary.

120 A summary of the feedback received is presented in Table 5.

**Table 5: Summary of Awel y Môr array site selection and design feedback<sup>vi</sup>.**

RECOMMENDATION	STAKEHOLDER
The worst-case scenario of the variants presented are likely to be Area A. However, the differences in terms of the areas and layouts are marginal. 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.	NRW
Differences between Area A and H are marginal, with a slightly narrower horizontal extent at Anglesey AONB and Snowdonia National Park, but very little difference at the Clwdian Range and Dee Valley AONB.	NRW
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.	Conwy
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	Isle of Anglesey Council

<sup>vi</sup> Feedback relates to array boundary site selection only. Further feedback was also received with regards the layouts for assessment and general concerns with regards the potential impact of the indicative layout and illustrated WTGs. Feedback is presented in the relevant chapter (Volume 2, Chapter 10, Seascape and Landscape Visual Impact Assessment).

RECOMMENDATION	STAKEHOLDER
appears to represent the best (potentially least harmful) of the 'worse case scenarios' under consideration for the ES.	
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.	Snowdonia National Park
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.	Gwynedd (Clwyd-Powys Archaeological Trust (CPAT) on behalf of Gwynedd)

121 Following further consideration of the SLVIA consultation responses received, alongside internal BRAG analysis of other risks including shipping and navigation, and underwater noise Area J was progressed for the purposes of the PEIR assessment.

122 Area J was considered to offer the optimum design in combining the individual benefits of Area H and Area M, as identified by stakeholders. A further meeting was then held to determine which of the MDS would form the basis of assessment, the largest turbines or the most numerous (smallest) turbines. This outcome of the latter MDS consultation is presented in Volume 2 Chapter 10 Seascape Landscape Visual Impact Assessment, with agreement reached that two MDS (termed MDS A and MDS B) would be used for representative viewpoints.

123 In undertaking the consultation on the possible alternative boundary options for the array, it was recognised that any extension to the existing Gwynt y Mor (GyM) windfarm would likely result in significant effects. The potential for significant visual effects from offshore wind is recognised in both the NPS, and Welsh National Marine Plan document, the latter of which recognises that *“offshore wind has significant potential to contribute to renewable energy targets during the lifetime of this Plan whereas other technologies may take time to develop and may make a more limited contribution”*. The Plan also recognises specifically that, having considered all alternatives, the Welsh Government considers there to be a strategic need to support the development of marine renewable energy generation capacity, and as such Policy ELC\_01 notes that proposals for offshore wind energy generation will be supported where they contribute to the objectives of the plan.

*Developments in the inshore marine planning region may change the character around the Welsh coastline. Such changes are already happening. Over the lifetime of this Plan there is likely to be ongoing change to the seascape character of Wales, resulting most prominently from further marine renewable infrastructure, particularly off the North Wales and South Wales coasts. These changes are an inevitable result of our aspirations to derive greater benefits from our seas for current and future generations.*

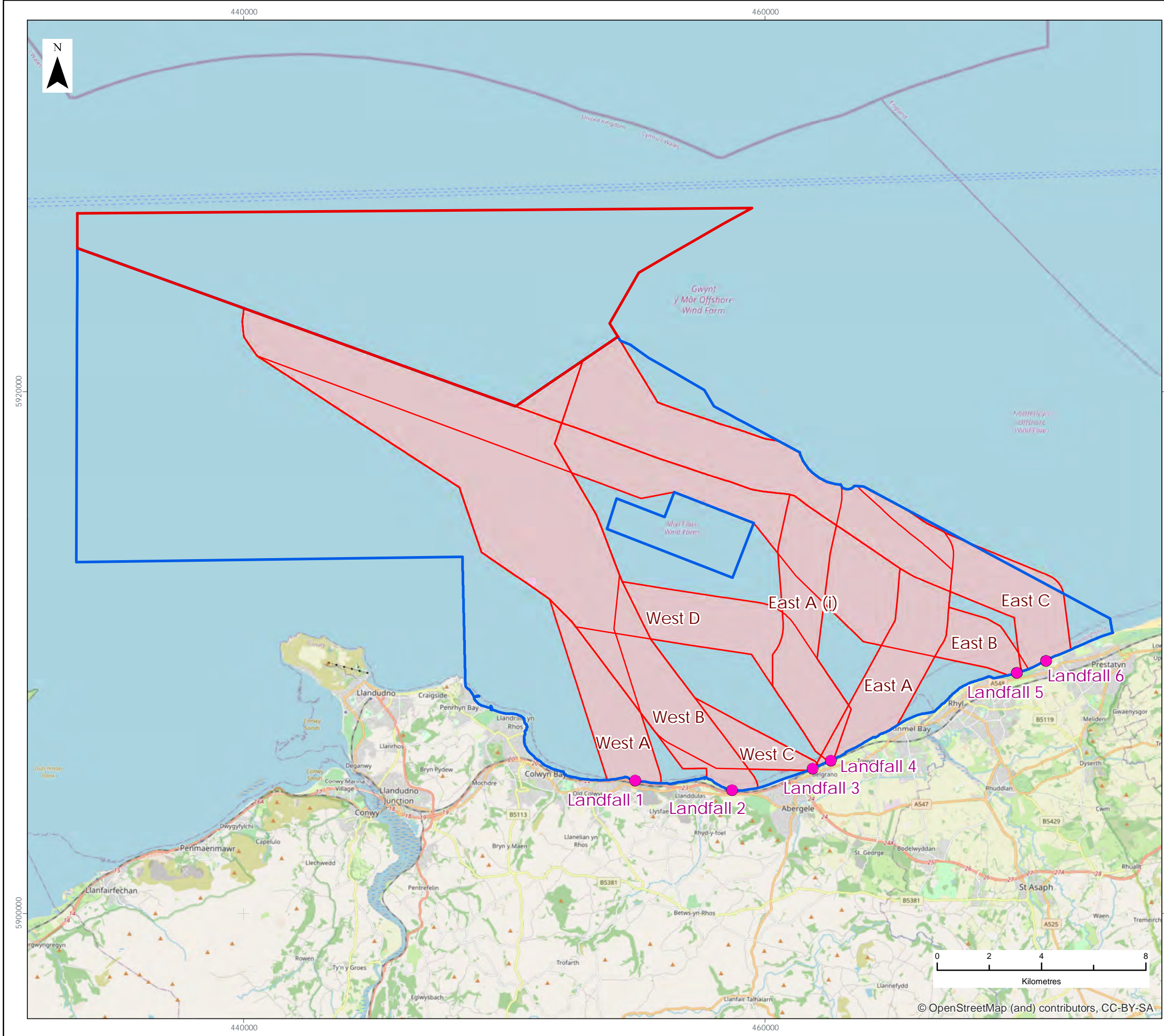
124 With regards to seascapes, the Wales National Marine Plan requires that proposals demonstrate how potential impacts have been taken into consideration and avoided, minimised or mitigated impacts. AyM cannot, by its nature, avoid impacts to seascape, and design refinement has therefore focused on minimising and mitigating these as far as practicable. AyM design has evolved further as a result of additional feedback received during the statutory consultation; the changes are presented in Section 4.12.

### 4.11.3 Offshore export cable refinement

125 In advance of and in parallel with the Scoping phase, constraints analysis was undertaken on the offshore export cable AoS with a view to refinement down to a suite of options that could be consulted upon.

- 126 Initial refinement took place taking account of constraints such as the need to route around the Rhyl Flats Offshore Wind Farm, which resulted in two broad groups of corridors, referred to as the West and East corridors. Each group of corridors started together at the AfL area and then were split into different options to join the different landfall longlist options as they approached the coast.
- 127 Following further analysis, an initial longlist was drawn up, identifying six broad 2 km-wide cable corridors. These were identified by taking into account environmental, physical, technical, commercial, and social considerations, along with the design principles, engineering assumptions, and CRP listed in Section 4.9.1.
- 128 The routes identified, which were subject to further refinement before consultation are as illustrated in Figure 15, and below.
- ▲ Eastern A;
  - ▲ Eastern B
  - ▲ Eastern C;
  - ▲ Western A;
  - ▲ Western B; and
  - ▲ Western C.





- LEGEND**
- AyM Scoping Boundary
  - Offshore Export Cable Route Search Area
  - Potential Offshore Cable Corridor (2km)
  - Indicative Landfall Location

Data Source: The Crown Estate, 2019; UKHO, 2019; Cefas, 2019; JNCC, 2019; Marine Themes © Crown Copyright, 2019. All Rights reserved. Natural Resources Wales, 2019; Welsh Government, 2019; Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Offshore Cable Corridor  
Long List of Options**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 15**

SCALE: 1:150,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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129 Following the BRAG assessment and engineering feasibility studies, it was concluded that landfall Options 1, 2, and 6 would not be taken forward to the shortlist of options, primarily due to HDD constraints (Annex 1 and 2). As such, the offshore cable corridors associated with the landfall areas (West A, West B, East C (Figure 15)) were not progressed further into the site selection process.

130 The remaining shortlist of offshore routes was then subject to consultation with the project's ETG members in May 2020.

131 The shortlist at that stage comprised the following:

- ▲ East A(i);
- ▲ East B;
- ▲ West C; and
- ▲ West D

## Offshore cable corridor consultation

132 Following stakeholder consultation undertaken in May 2020, responses were reviewed and added to the project BRAG assessment. Consultees were provided with a report (*Annex 1.4.1 and 1.4.2*), an online mapping tool, an electronic survey link and an opportunity for the ETG members to discuss the options with the AyM team in more detail on either a group or individual call.

133 The following stakeholders provided feedback on the shortlist options via the questionnaire:

- ▲ NRW;
- ▲ Gwynedd Council;
- ▲ Conwy Council;
- ▲ Cadw;
- ▲ North Wales Wildlife Trust;
- ▲ Welsh Government;
- ▲ CPAT;
- ▲ Trinity House;
- ▲ Royal Yachting Association;

- ▲ RSPB; and
- ▲ North and Mid Wales Trunk Road Agency (NMWTRA).

134 A teleconference call was subsequently held on 1st June 2020 with stakeholders to discuss the details and process outlined within “*The Site Selection Process: Identification of a Shortlist of Options*”. The following stakeholders were represented on the call:

- ▲ Sefton Council;
- ▲ Conwy Council;
- ▲ NRW;
- ▲ RSPB; and
- ▲ Denbighshire County Council.

135 The feedback received in relation to the offshore cable corridor made the following recommendations (Table 6).

Table 6: Informal site selection consultation feedback.

RECOMMENDATION	STAKEHOLDER
All offshore cable corridors crossing the Constable Bank sandbank feature should be avoided	NRW and North Wales Wildlife Trust
Potential for “gravelly stony ground” in nearshore under cable corridors East A(i) and East B, as identified during the Gwynt y Môr Offshore Wind Farm post-construction monitoring.	NRW
Protected wreck of Resurgam is located immediately to the east of corridors Eastern A and B. Need to ensure that tidal currents will not be affected in area of wreck.	Cadw

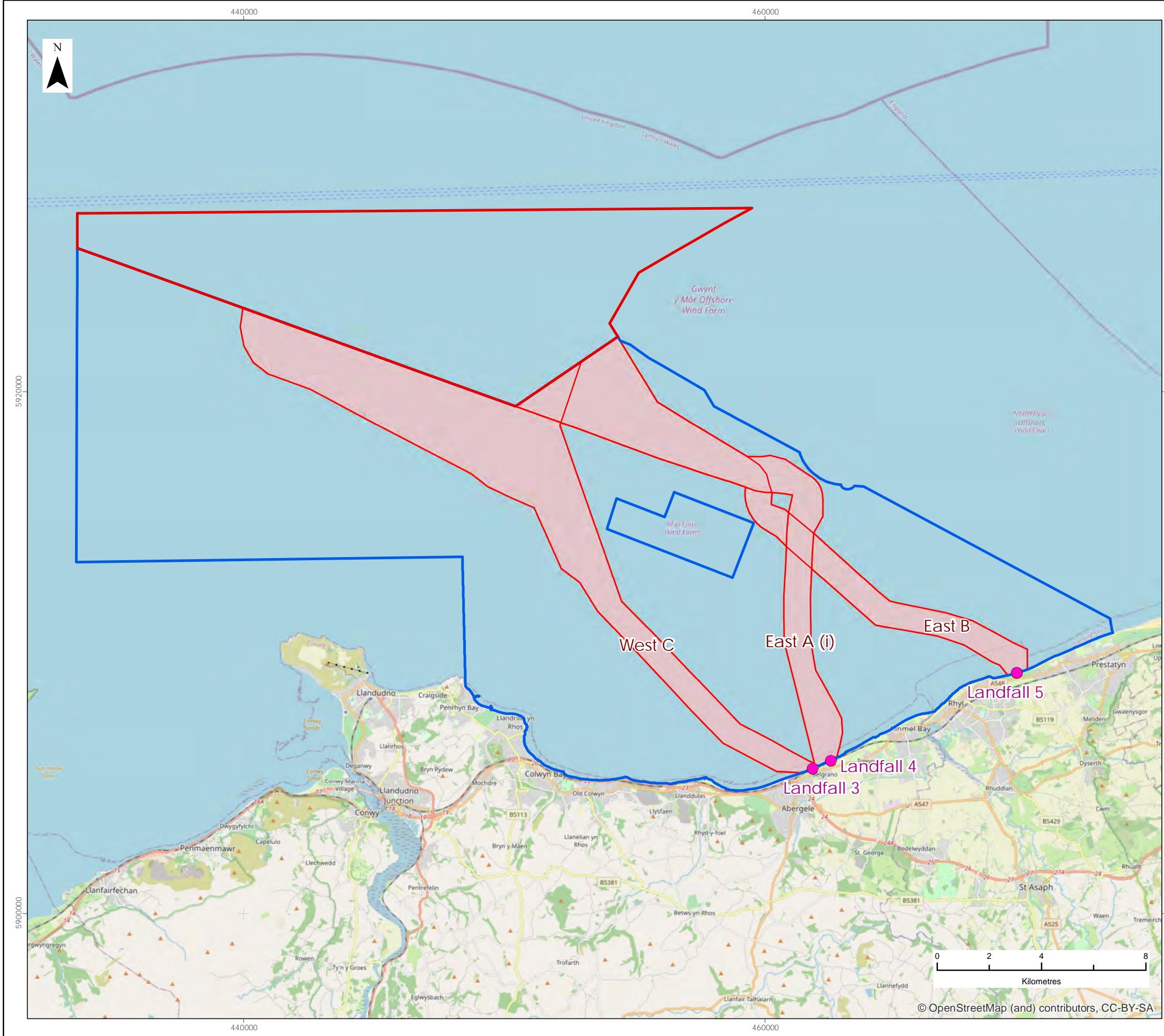
136 Scoping phase consultation also iterated the need to understand in detail the risks associated with works within the Constable Bank sandbank feature, specifically with regards the risks associated with sandwave clearance, morphological change, and in the context of potential habitat damage:



*The Constable Bank sandbank should be identified as Habitats Directive Annex I habitat [...]; and*

*NRW advise the applicant that the export cable route should avoid the feature.*

- 137 Following the Scoping phase, consultation was undertaken during September to October 2020 and three indicative cable corridors were presented to stakeholders. The three routes, named West C, East A and East B were each of approximately 1 km width, with some variation to allow flexibility for the purposes of crossing other linear assets. This represented a design refinement by seeking to reduce the overall potential cable corridor from 2 km to 1 km, except where design flexibility is required in approaching the array AfL area. The three options are presented in Figure 16.



LEGEND

- ▭ AyM Scoping Boundary
- ▭ Offshore Export Cable Route Search Area
- ▭ Potential Offshore Cable Corridor
- Indicative Landfall Location

Data Source: The Crown Estate, 2019; UKHO, 2019; Cefas, 2019; JNCC, 2019; Marine Themes © Crown Copyright, 2019. All Rights reserved. Natural Resources Wales, 2019; Welsh Government, 2019; Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Offshore Cable Corridor  
Short List Refinement

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

Figure 16

SCALE: 1:150,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm

- 138 During consultation, Stakeholders expressed concern with regards the impact of sandwave clearance and cable protection on the Constable Bank feature, crossed by route West C. This feedback was incorporated within the ongoing design work being undertaken by the Applicant.

## Offshore export cable corridor design conclusion

- 139 During 2020, RWE also undertook a number of technical studies to support the refinement including further work on the engineering solutions required for the project, understanding constraints presented by existing utilities, seabed mobility, and other crossings. During the same period, in response to feedback received with regards gravel and stone habitats, the characterisation surveys were designed to ensure any areas of this habitat were adequately accounted for with the associated benthic ecology chapter.
- 140 The BRAG assessment was updated with new information in December 2020 to identify the potential implications of the shortlisted cable route and landfall options, during which it was concluded that whilst route West C had a favourable landfall (Landfall 3) the route would be removed from the proposed options.
- 141 The decision was made as a result of the stakeholder consultation received and the desire to avoid potential impacts to the Constable Bank itself.
- 142 Following the refinement of the routes from three offshore options to two, further consideration was given to the constraints present at East A and B, and the associated landfall and onshore routes.
- 143 With regard to offshore constraints, the cable routes were both considered broadly comparable. Both routes avoided the Constable Bank feature, and both transited the Liverpool Bay SPA. It was noted that East A potentially routed through an area of greater red throated diver density, a primary feature of the Liverpool Bay SPA, but the increased density was marginal and based on a single source (the data used to inform the extension of the Liverpool Bay SPA, and in turn used to inform the Plan-level HRA) 4.9.1.

144 At this stage therefore two routes were progressed for further consideration. These were:

- ▲ East A; and
- ▲ East B.

#### 4.11.4 Landfall refinement

145 The process for identifying a longlist of options began with the landfall. Offshore and onshore cable corridors can only connect via viable landfall sites. Broad zones where a viable landfall site could be located, outside of key environmental constraints were therefore identified. Following the identification of the landfall AoS, six zones along this coastal stretch were identified as areas where the offshore cables could be brought onshore and where the landfall works to connect to the onshore cabling could occur. The six options, with associated initial constraints are described in outline in Table 7, and illustrated in Figure 17.

Table 7: Landfall Options and outline description.

LANDFALL OPTION	OUTLINE DESCRIPTION	INITIAL ENVIRONMENTAL CONSTRAINTS ANALYSIS
Landfall Option 1	<p>The most westerly zone identified within the landfall AoS.</p> <p>Situated near the coastal settlement of Penmaen Rhos, with key infrastructure concentrated along coastal strip including A55 dual carriageway, railway line and the A547. This landfall option is in close proximity to the CEMEX Raynes Quarry.</p>	<p>Nearshore constraints identified from the mapping are the Annex 1 Reefs.</p> <p>Onshore, along with the infrastructure identified above restricting the potential room for bringing cables onshore, are the presence of a small area of historic landfill, ancient woodland and Mynydd Marian (Local Nature Reserve (LNR) and Site of Special Scientific Importance (SSSI)).</p>
Landfall Option 2	<p>Situated between the coastal settlements of Llandulas to the west and Abergele to the</p>	<p>Nearshore constraints identified from the mapping are the Annex 1 Reefs and the</p>



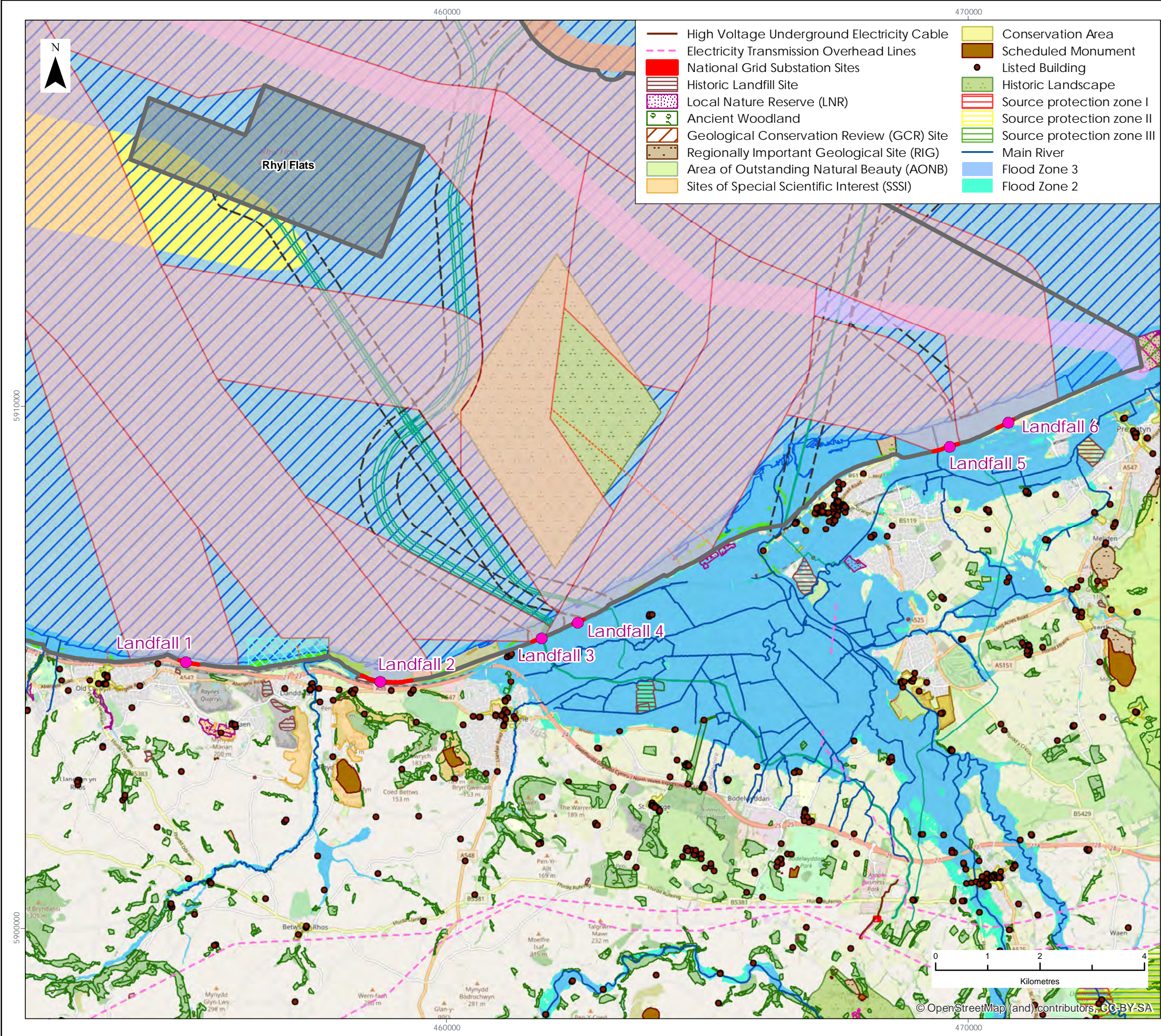
LANDFALL OPTION	OUTLINE DESCRIPTION	INITIAL ENVIRONMENTAL CONSTRAINTS ANALYSIS
	East. Key infrastructure concentrated along coastal strip includes A55, Railway line and the A547 Abergele Road.	Traeth Pensarn (SSSI). Onshore, along with the infrastructure identified above, was the presence of an historic landfill along the shoreline area, ancient woodland and historic landscape associated with Gwrych Castle (a Grade I listed country house, which stands in 250 acres of gardens and grounds and has extensive views over former parkland including a deer park). The area also contains the Llanddulas Limestone and Gwrych Castle Wood (SSSI) and Coed y Gopa (SSSI)).
Landfall Option 3	Situated between the coastal settlements of Pensarn and Belgrano, which are suburbs of Abergele. This landfall location is where the existing Gwynt y Môr Offshore Wind Farm cables reach land. Key infrastructure concentrated along coastal strip in this location include the A548 Towyn Road and the railway line.	Nearshore constraints identified from the mapping are the Annex 1 Reefs and the presence of Gwynt y Môr Offshore Wind Farm cables and possible sewage effluent outfalls offshore. Also, the Traeth Pensarn SSSI to the west. Onshore, along with the infrastructure identified above, are the onshore Gwynt y Môr Offshore Wind Farm cables, a possible sewage effluent pumping station facility and the built-up settlements of Pensarn and Belgrano. There is also a cluster of Listed Buildings

LANDFALL OPTION	OUTLINE DESCRIPTION	INITIAL ENVIRONMENTAL CONSTRAINTS ANALYSIS
		to the west in Pensarn. There is also the presence of a large Flood Zones 2 and 3 area associated with the Main Rivers.
Landfall Option 4	Situated between the coastal settlements of Belgrano and Towyn. This landfall location is to the east of where the existing Gwynt y Môr Offshore Wind Farm cables reach land and west of the current Rhyl Flats OWF come onshore. Key infrastructure concentrated along coastal strip in this location include the A548 Towyn Road and the railway line, long with static caravan site to the north of the A548.	Nearshore constraints identified from the mapping are the Annex 1 Reefs, although more in closer proximity to landfall 3 than 4. Also, the presence of Gwynt y Môr Offshore Wind Farm and Rhyl Flats OWF cables. Onshore, along with the infrastructure identified above, are the onshore Rhyl Flats OWF cables to the east. There is also the presence of a large flood Zones 2 and 3 area associated with the Main Rivers.
Landfall Option 5	Situated between the coastal settlements of Rhyl and Prestatyn at Ffrith Beach. This landfall option, along with Zone 6, are located in the most easterly stretch of the landfall AoS. Key infrastructure concentrated along the coastal strip in this location include the Rhyl Coastal Road (A548) and the railway line.	Nearshore constraints identified from the mapping are the Annex 1 Reef, RIGs Site to the west and the presence of the North Hoyle OWF cables. Onshore, along with the infrastructure identified above, is the presence of a large flood Zones 2 and 3 area associated with the Main Rivers.



LANDFALL OPTION	OUTLINE DESCRIPTION	INITIAL ENVIRONMENTAL CONSTRAINTS ANALYSIS
Landfall Option 6	<p>Situated between the coastal settlements of Rhyl and Prestatyn at Ffrith Beach. This option, along with Landfall Option 5, are located in the most easterly stretch of the landfall AoS. Key infrastructure concentrated along coastal strip in this location include the Rhyl Coastal Road (A548) and the railway line, along with the presence of built development along Victoria Road West.</p>	<p>Nearshore constraints identified from the mapping are the presence of the North Hoyle OWF cables. Onshore, along with the infrastructure identified above, is the presence of a large flood Zones 2 and 3 area associated with the Main Rivers. Along with a small cluster of listed buildings and patch of ancient woodland located at Pydew.</p>





LEGEND

- Offshore Export Cable Route Search Area
- Potential Offshore Cable Corridor (2km)
- Indicative Landfall Location
- Landfall Zone
- Existing Offshore Wind Farm
- Offshore Wind Export Cable Agreements
- Offshore Wind Farm Export Cable
- Pipeline 250m Buffer
- Interconnector Cable 250m Buffer
- Outfall Pipe
- Shellfish Waters
- Marine Farm (oyster/mussels)
- Annex 1 Reefs
- Annex I Sandbanks
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar

Data Source: The Crown Estate, 2019; Oil & Gas Authority, 2019; UKHO, 2019; Cefas, 2019; JNCC, 2019; BMAPA, 2009; Marine Themes © Crown Copyright, 2019. All Rights reserved. Licence no. EK001-526094. Not to be used for navigation.  
Natural Resources Wales, 2019; Welsh Government, 2019; Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Landfall Long List Options**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 17**

SCALE: 1:75,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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146 The longlist of landfall options was then subject to further detailed analysis. A BRAG analysis was undertaken, the summary of which is presented in Table 8, with a more detailed presentation in Figure 18.

Table 8: Summary of Landfall BRAG.

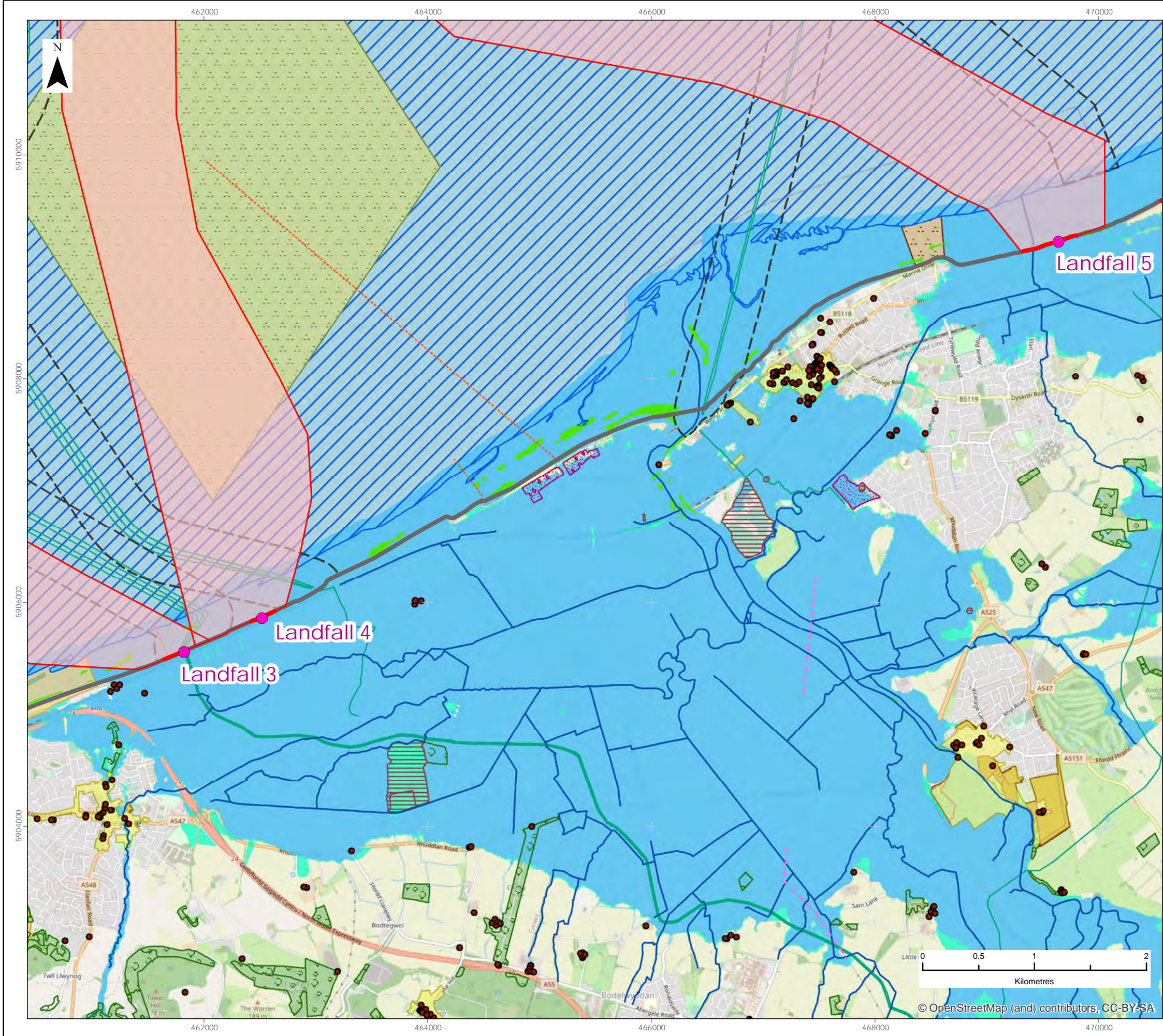
LANDFALL OPTION	SUMMARY OF BRAG
Landfall Option 1	BRAG assessments concluded medium and low potential impacts for this option (with the exception of temporary noise impacts), due to the close proximity to CEMEX Raynes Quarry, and the results of the Horizontal Directional Drilling (HDD) feasibility indicating the elevations involved would not allow a feasible HDD to be undertaken, Landfall Option 1 was not recommended to be taken forward to the shortlist of options.
Landfall Option 2	BRAG assessments concluded overall a risk of medium and low impacts for this option, and the results of the HDD feasibility study which indicated the elevations involved would not allow a feasible HDD to be undertaken. As a result of the lack of HDD option, the Landfall Option 2 was not recommended to be taken forward to the shortlist.
Landfall Option 3	A number of constraints including Welsh Water outfall, Gwynt y Môr Offshore Wind Farm cables, along this section of the coastline. Feasible engineering options at this landfall location, along with low to medium impacts identified during the environmental BRAG assessments. Landfall Option 3 to be taken forward into the shortlist of options for further assessment.
Landfall Option 4	A number of constraints from an engineering perspective, this option is feasible from an engineering viewpoint based on the information obtained to date, and along with the low to medium impacts (with the exception of temporary noise impacts) identified during the environmental BRAG

LANDFALL OPTION	SUMMARY OF BRAG
	assessments. Landfall Option 4 be taken forward into the shortlist of options for further assessment.
Landfall Option 5	A number of constraints including Burbo Bank Extension offshore wind farm and North Hoyle offshore wind farm landfall cables, and other key infrastructure along this section of the more populated and designated coastal strip (including that of the Lyons Robin Hood Holiday Park Caravan Park). Feasible elevations for engineering at this landfall location and the predominantly medium impacts identified during the environmental BRAG assessments. Landfall Option 5 be taken forward into the shortlist of options for further assessment.
Landfall Option 6	The environmental BRAG assessments concluded a range of potential impact scorings, from low for water, ecology and archaeology, to medium/high for tourism, recreation and traffic. The complexity and impact of the long HDD required at the residential properties at Prestatyn drew the final conclusion that Landfall Option 6 was not recommended to be taken forward to the shortlist.

147 As a result of the analysis presented in Table 7, three shortlisted landfalls, were progressed for consultation, and further analysis. The three landfalls progressed (Figure 18) were:

- ▲ Landfall 3;
- ▲ Landfall 4; and
- ▲ Landfall 5.





**LEGEND**

- Offshore Export Cable Route Search Area
- Potential Offshore Cable Corridor
- Indicative Landfall Location
- Landfall Zone
- Offshore Wind Export Cable Agreements
- Offshore Wind Farm Export Cable
- Outfall Pipe
- Marine Farm (oyster/mussels)
- Annex 1 Reefs
- Special Protection Area (SPA)
- Historic Landfill Site
- Local Nature Reserve (LNR)
- Ancient Woodland
- Regionally Important Geological Site (RIG)
- Sites of Special Scientific Interest (SSSI)
- Conservation Area
- Scheduled Monument
- Listed Building
- Main River
- Flood Zone 3
- Flood Zone 2

Data Source: The Crown Estate, 2019; Oil & Gas Authority, 2019; UKHO, 2019; Cefas, 2019; JNCC, 2019; BMAPA, 2009; Marine Themes © Crown Copyright, 2019. All Rights reserved. Licence no. EK001-526094. Not to be used for navigation.  
Natural Resources Wales, 2019; Welsh Government, 2019; Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Landfall Short List Options**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 18**

SCALE: 1:35,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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148 The consultation feedback received is summarised in Table 9.

Table 9: Consultation feedback – landfall.

RECOMMENDATION	STAKEHOLDER
Avoid Landfall option 4 and route 4a as route is likely to have an adverse impact on historic environment. Landfall 3 is OK as long as route 3c is avoided.	Cadw
We take note that Landfall 3 and 4 lie closer to Pensarn Beach SSSI and therefore may cause disruption at this site however we believe that onshore Cable Route 3b is likely to be the least disruptive to terrestrial habitats.	NRW
<p>Landfall 3 (connected via West C) crosses Constable Bank &amp; interconnector cable. Only an option if cable can be buried below sandwave field sufficiently enough to avoid cable exposure and sand wave clearance is avoided. Landfall 3 avoids cable crossings in the nearshore zone. West C should be avoided if feasible due to crossing marine farm and Constable Bank.</p> <p>Landfall 4 could be suitable from a benthic ecology perspective but should be avoided if connecting from West D and East A due to crossing Constable Bank, RF, GyM, and interconnector cables. The requirement for cable crossings in the nearshore cannot be avoided and will have potential to influence coastal processes. There is also potential that cable protection measures in shallow water will be a navigation hazard (at crossing of RF cable).</p> <p>Landfall 5 (connected via East B). Avoids oyster/mussel farm and Constable bank SAC. Requires cable crossings for NH, GyM &amp; interconnector. East B is preferred based on hydromorphological aspects and biological elements.</p>	NRW
Undefined potential for palaeolandscapes deposits between MHW and MLW on the shore for all three landfall	CPAT

RECOMMENDATION	STAKEHOLDER
options. Needs prior assessment/ evaluation of deposits by walkover survey and core transect along beach, sampling and reporting by specialists	
Route 5a (Associated with landfall 5) passes through the Clwyd main river, of significance for salmon and sea trout spawning. Both routes also run directly through Maes Gwilym Nature Reserve.	NRW
<p>All three short-listed cable landfall site options will pass beneath coastal flood defences. Whilst the installation would be via directional drilling the assets are owned and maintained by the respective local authorities. We could request a FRAP for these crossings since EPR advises that a FRAP application should be made if: <i>“An activity is carried out within 16 metres of the base of a sea defence which is likely to: ° endanger the stability of, cause damage to or reduce the effectiveness of that sea defence”</i>.</p> <p>However, we may (in agreement with Conwy/ Denbighshire LPAs depending on the preferred cable landfall location) agree that the method of installation is unlikely to cause damage and therefore not require a FRAP. This would need to be determined once further details about the preferred cable landfall location are available.</p>	NRW
We note that Abergele (Pensarn) Bathing Water is < 1 km from Landfall 3 and this, as a minimum, will need to be included in an environmental impact assessment if this option is chosen. Note that there is a 2 km search radius for Water Framework Directive (WFD) Compliance Assessment around marine works for Protected Areas (which include BWs, Shellfish Waters and water dependent Natura 2000 sites. The other BWs in the area appear to fall outside of this criterion based on our rough	NRW

RECOMMENDATION	STAKEHOLDER
estimations though this will need to be confirmed by Innogy.	

- 149 Following informal consultation, and receipt of the Scoping opinion, a further technical analysis and BRAG assessment review and update were undertaken. Of the shortlisted options, Landfall 4 was considered the most challenging, due to proximity to other assets. It was noted that Landfall 4 had challenging constraints as a result of the presence of the Rhyl Flats and Gwynt y Môr cables offshore and the associated need for complex HDD to cross Rhyl Flats cables in the nearshore. The resulting 'long HDD', included the crossing of a railway asset and limited opportunity for successive 'short HDD' to mitigate the risk of HDD failure in the alluvial/ tidal flat deposits resulted in Landfall 4 performing less favourably when compared to Landfalls 5 or 3.
- 150 It was further recognised that Landfall 4 was less than 200m from noise sensitive residential receptors, and was the landfall in closest proximity to the boundary of the Liverpool Bay SPA. It was also recognised through reference to the received feedback that Landfall 4 was also associated with a likelihood of crossing the Constable Bank feature, which NRW in particular had requested be avoided. Landfalls 3 and 5 therefore performed most favourably.
- 151 Landfall 4 was considered in greater detail, with consideration given in particular to the potential need for nearshore/ shallow water crossings of the Rhyl Flats and Gwynt y Môr cable crossings. As a result of the strong recommendation to avoid the westerly offshore export routes which would interact with the Constable Bank, it was considered that Landfall 4 would inherently need shallow water crossings of Rhyl Flats and Gwynt y Môr; the only alternative being an unfeasibly long HDD with significant risk of failure.

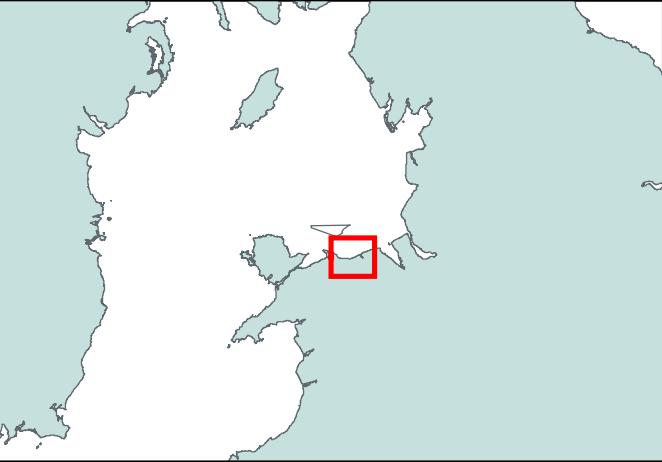
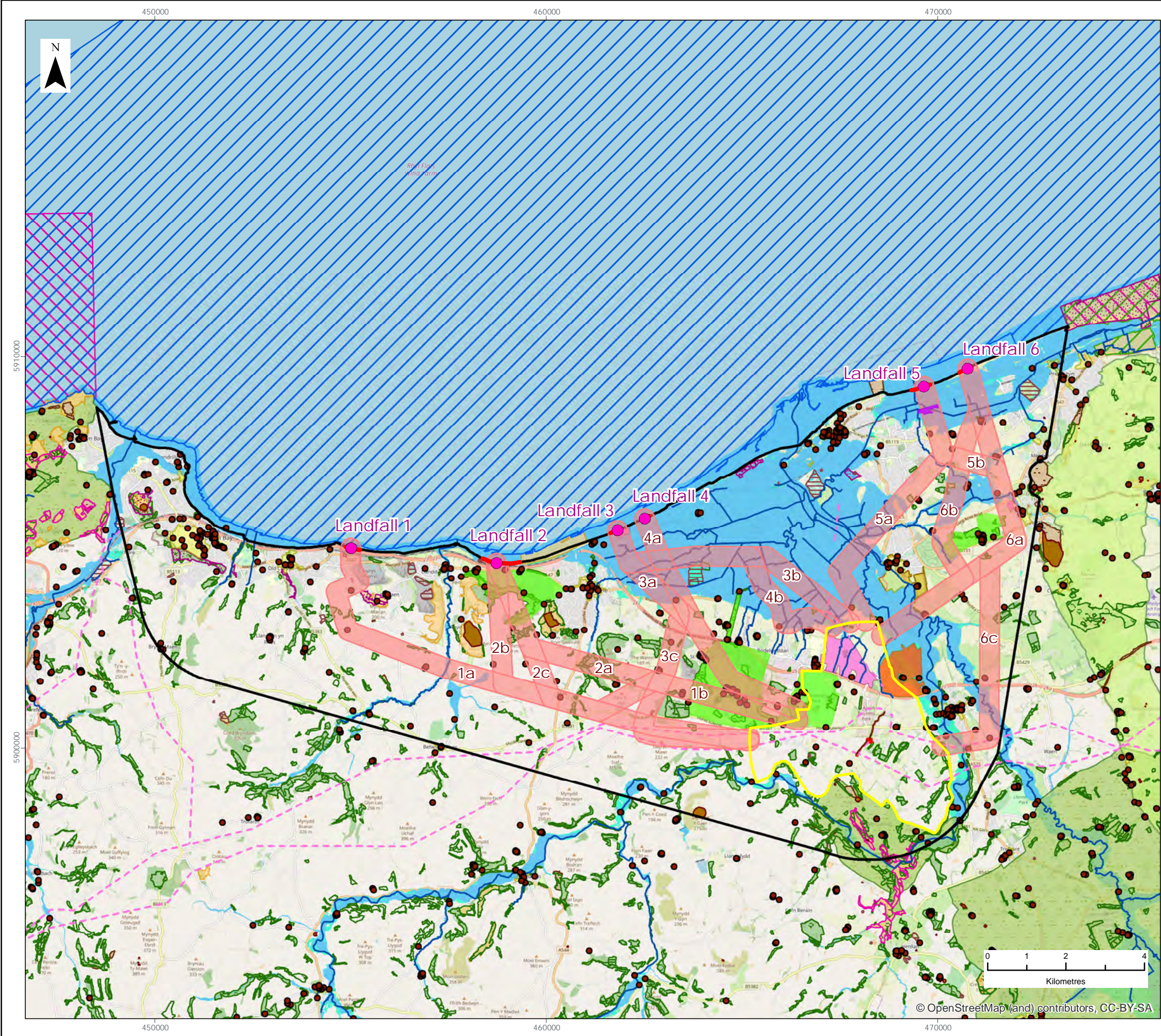


- 152 By comparison it was recognised that, whilst Landfall 5 would also need an HDD, there were multiple options available, including an HDD between a transition joint bay to the south of a National Rail line and the beach, or a longer HDD from a transition joint bay within the coastal golf course to an offshore location. The presence of sensitive noise receptors was recognised, but mitigation would be available to manage the short-term effect. Furthermore Landfall 5 was recognised as having limited sensitive ecological receptors within the intertidal and nearshore.
- 153 Further analysis was also undertaken for the onshore cable routes, to understand potential constraints and risks which may further influence the balance of Landfall options 4 and 5 (Landfall 3 having been removed to minimise interaction with the Constable Bank feature. As a result of the analysis and consultation feedback, Landfall 3 and 4 were removed from the design options, and Landfall 5 was progressed. The project design has evolved further as a result of additional feedback received during the statutory consultation; these changes are presented in Section 4.12.

#### 4.11.5 Onshore cable refinement

- 154 Through reference to the identified AoS, combined with constraints analysis, a longlist of possible onshore options was identified.
- 155 Following the identification of the longlist of landfall options, a number of broad, 500m-wide onshore cable corridors were identified, to create a longlist of potential options. These onshore corridors were designed to connect the longlist of landfall options to the substation AoS (Figure 19, and Table 12).
- 156 Due to the width of these cable corridors, a number of constraints were identified within these broad areas, but during the process of refinement the constraints would be avoided where possible.





LEGEND

- Onshore Cable Corridor Area of Search
- Substation Search Area
- Indicative Landfall Location
- Potential Onshore Cable Corridor (500m width)
- Landfall Zone
- High Voltage Underground Electricity Cable
- Electricity Transmission Overhead Lines
- National Grid Substation Sites
- Historic Landfill Site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar
- Local Nature Reserve (LNR)
- Maes Gwyilm Nature Reserve
- Ancient Woodland
- Regionally Important Geological Site (RIG)
- Area of Outstanding Natural Beauty (AONB)
- Sites of Special Scientific Interest (SSSI)
- Registered Historic Parks & Gardens
- Conservation Area
- Scheduled Monument
- Listed Building
- Historic Landscape
- Main River
- Flood Zone 3
- Flood Zone 2
- Planning Permission
- Elwy Solar Energy Farm

Data Source:  
Natural Resources Wales, 2019; Welsh Government, 2019;  
Historic Environment Service (Cadw), 2019; National Grid UK, 2019.

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Onshore Cable Corridor  
Long List of Options**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 19**

SCALE: 1:100,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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157 As with the offshore export cable corridor and landfall processes, the initial longlist was subject to technical analysis to further refine the options and identify a shortlist for the purposes of consultation. Table 10 provides a summary of the onshore cable corridor options, with an initial appraisal.

Table 10: Onshore cable corridor summary of longlist options.

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
1a	13.4	Most westerly corridor option, making landfall at Option 1, heading in a south easterly direction near Raynes Quarry, passing key areas of Llysfaen, River Dulas, and Moelfre and entering the substation AoS from the westerly side near Glascoed.	Option not progressed following parallel analysis screening Landfall 1 from further consideration.
1b	14.7	Most westerly corridor options, making landfall at option 1, heading in a south easterly direction, passing key areas of Llysfaen, River Dulas, and Moelfre and entering the substation AoS from the westerly side near to Bodelwyddan Park, slightly further north than Option 1a.	Option not progressed following parallel analysis screening Landfall 1 from further consideration.
2a	9.4	Making landfall at Option 2 at Llanddulas Beach, heading in a south easterly direction, passing key areas south of Abergele, crossing the River Gele and south of Kimmel Park entering the substation AoS from the westerly	Option not progressed following parallel analysis screening Landfall 2 from further consideration.



CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
		side near to Bodelwyddan Park, at the same location as Option 1b.	
2b	9.5	Making landfall at Option 2 at Llanddulas Beach, heading in a southerly direction, passing key areas east of Abergele, before heading in a south easterly direction crossing the River Gele, Moelfre and entering the substation AoS from the westerly side near Glascoed, at the same location as Option 1a.	Option not progressed following parallel analysis screening Landfall 2 from further consideration.
2c	9	Making landfall at Option 2 at Llanddulas Beach, heading in a south easterly direction, passing key areas south of Abergele, crossing the River Gele slight north of Option 2b, south of Moelfre and entering the substation AoS from the westerly side near Glascoed, at the same location as Option 1a.	Option not progressed following parallel analysis screening Landfall 2 from further consideration.

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
3a	6.7	Making landfall at Option 3 at Pensarn Beach, heading in a south easterly direction, passing key areas of Belgrano and Pensarn to the east and west, heading south through Kimmel Park and entering the substation AoS from the north westerly side near Bodelwyddan Park, slightly further north than Option 1b.	<p>Cable option taken forward to shortlist of options.</p> <p>BRAG assessment indicated that cable corridor Option 3a resulted in high risk of potential impacts for archaeological considerations, due to designated assets present (including Kimmel Park Historic Park and Garden and Bodelwyddan Castle) with limited or no options for micro-siting and for the potential for archaeological remains to survive with mitigation options likely available.</p> <p>Further receptor groups subject to potential high impacts included ecology (ancient woodland), setting of designated assets, with potentially moderate impacts to land use, and socioeconomic/tourism.</p>
3b	7	Making landfall at Option 3 at Pensarn Beach, heading in a south easterly direction,	Cable option taken forward to shortlist of options.

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
		passing key areas of Belgrano and Pensarn to the east and west, before heading east, south of Towyn, then south easterly direction entering the substation AoS from the north side near Pengwern, slightly further east than Option 4b.	BRAG assessment indicated that cable Option 3b represents potential high impact risk for ecology, due to potential direct impacts to ancient woodland located along the cable corridor, and land use, due to presence of planning allocation and Elwy Solar Energy Farm which may potentially need to be crossed to access the onshore substation AoS.  Other potential impacts were generally considered to be moderate, as a result of potential impacts to archaeology, water quality, and LVIA, or low for receptor groups such as traffic.
3c	7.1	Making landfall at Option 3, this cable corridor heads south, and to the west of Kinmel Park, before making a right turn east toward the substation AoS.	Cable option taken forward to shortlist of options.  BRAG assessment indicated that cable Option 3c was of moderate potential archaeological impact, due to designated assets present with options to micro-site.

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
			<p>Potential for archaeological remains to survive with mitigation options likely available. Further potential moderate impacts associated with the setting of designated assets were predicted. Moderate impacts were also concluded for most other receptor groups, including ecological constraints, due to potential indirect impacts to ancient woodland, and potential for impacts on an extensive range of protected species.</p>
4a	6.5	<p>Making landfall at Option 4 at Ty Gwyn Caravan Park, heading in a southerly direction, passing key areas of Belgrano before heading in a south easterly direction past Terfyn and Kimmel Park, entering the substation AoS from the north westerly side near Bodelwyddan Park, at the same location as Option 3a.</p>	<p>Cable option taken forward to shortlist of options.</p> <p>BRAG assessment findings comparable with cable corridor Option 3a.</p>



CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
4b	6.7	Making landfall at Option 4 at Ty Gwyn Caravan park, heading in a southerly direction, passing key areas of Belgrano before heading in a easterly direction south of Towyn, then south, entering the substation AoS from the north, northwest of Bodelwyddan, slightly further west than Option 3b.	Cable option taken forward to shortlist of options.  BRAG assessment findings comparable with cable corridor Option 3b.
5a	7.2	Making landfall at Option 5 at Rhyl Golf Club, heading in a southerly direction between key areas of Prestatyn and Rhyl to the east and west, before heading in a south westerly direction between Rhyl and Rhuddlan, entering the substation AoS from a north easterly direction near Pengwern, slightly further east than Option 3b.	Cable option taken forward to shortlist of options.  BRAG assessment indicated that this cable option had potentially higher impacts associated with receptor groups such as land use, due to presence of a planning allocation and Elwy Solar Energy Farm which may potentially need to be crossed to access the onshore substation AoS, and also for noise and vibration due to the temporary residential receptors at the holiday park who will be subject to close

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
			<p>range noise effect during landfall construction (although these effects are temporary).</p> <p>All other receptor groups were predominantly considered to be subject to potentially moderate impacts, due to <i>inter alia</i> archaeological potential, tourism, and ecology, all of which were identified as having mitigation measures feasible such as micro-siting or other design controls.</p>
5b	9.3	Making landfall at Option 5 at Rhyl Golf Club, heading in a southerly direction between key areas of Prestatyn and Rhyl to the east and west, before heading further south east near Meliden, then heading in a south westerly direction near Dyserth, entering the substation AoS from a north easterly direction at Pengwern, south east of Option 5a.	Option not progressed following parallel analysis screening this route from further consideration.

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
5c	11.7	Making landfall at Option 5, this corridor heads in a southerly direction, passing to the west of keys areas of Dyserth and east and then south of St Asaph where it enters the substation AoS.	<p>Cable option taken forward to shortlist of options.</p> <p>BRAG assessment indicated that this cable option scored moderately for archaeology, due to designated assets present with options to micro-site. It scored moderately for a number of assessment considerations, including land use, due to potential impacts to PRowS, close proximity to settlements including Dyserth, housing allocation, and traffic and transport.</p>
6a	8.8	Most easterly corridor option, making landfall at Option 6 at Ffrith Beach, heading in a southerly direction, passing keys areas of Prestatyn, Meliden and Dyserth before heading in a south westerly direction south of Rhuddlan and entering the substation AoS to the north east at the same location as Option 5b.	Option not progressed following parallel analysis screening landfall option 6 from further consideration.

CABLE CORRIDOR OPTION	LENGTH (KM)	GENERAL DESCRIPTION	SUMMARY OF ANALYSIS
6b	8.2	Most easterly corridor option, making landfall at Option 6 at Ffrith Beach heading in a south westerly direction, passing keys areas of Rhyl and Rhuddlan entering the substation AoS to the north east at the same location as Option 5b.	Option not progressed following parallel analysis screening landfall option 6 from further consideration.
6c	11	Most easterly corridor option, making landfall at Option 6 at Ffrith Beach, heading in a southerly direction, passing keys areas of Prestatyn, Meliden, Dyserth and St Asaph entering the substation AoS to the east near Pen-rhewl.	Option not progressed following parallel analysis screening landfall option 6 from further consideration.



158 The BRAG analysis resulted in the following routes being put forward for the shortlist consultation process:

- ▲ Cable corridor Option 3a;
- ▲ Cable corridor Option 3b;
- ▲ Cable corridor Option 3c;
- ▲ Cable corridor Option 4a;
- ▲ Cable corridor Option 4b;
- ▲ Cable corridor Option 4c;
- ▲ Cable corridor Option 5a; and
- ▲ Cable corridor Option 5c.

159 Following shortlisting, the options were provided for consultation. The consultation feedback received focussed primarily on the potential environmental sensitivities, a summary of which is presented in Table 11.

Table 11: Onshore cable corridor shortlist consultation feedback.

RECOMMENDATION	STAKEHOLDER
Routes 3a and 4a are likely to have significant effects on registered historic parks and gardens. Whilst mitigation measures could be put in place there will still be adverse impacts. There is also a strong likelihood that World War 1 practice trenches, which are of National Importance, could be located inside the RHP&G boundaries.	Cadw
<p>[...] believe that Onshore Cable Route 3b is likely to be the least disruptive to terrestrial habitats. It is clear that the most acceptable Offshore Cable Routes may not necessarily allow for the least disruptive Landfall Site and Onshore Cable Route options. Therefore, whichever Onshore Cable Route is chosen action needs to be taken so that:</p> <p>1) Significant damage to Local Wildlife Sites is avoided.</p> <p>2) Significant damage to woodland and park-woodland sites is avoided.</p>	NRW

RECOMMENDATION	STAKEHOLDER
<p>3) Mitigation and site repair are fit for purpose and given due consideration as routes are refined</p> <p>4) Potential harm to bird species can be avoided. We would welcome the opportunity to work with Innogy as more detailed information about Cable Corridor siting emerges to avoid potential impact on localised sites and species.</p>	
Onshore cables preferred are 3a, 3c, 4a and 5c (based on flood risk and hydrology)	NRW
Route 5a (Associated with landfall 5) passes through the Clwyd main river, of significance for salmon and sea trout spawning. Both routes also run directly through Maes Gwilym Nature Reserve.	NRW
At this stage route 5a is possibly the best route as it crosses a relatively smaller area of former marshland with palaeo landscape potential and is possibly the shortest route leading to less sub-surface impact. The caveat is that the sub-surface potential is currently undefined. It partly follows the route of the Burbo Bank windfarm onshore cable route at the start where Bronze Age and later archaeology was located in the fields between the shoreline and Dyserth with former palaeochannels. The potential for prehistoric and later sub-surface archaeology is good north of Rhuddlan and west of the town. The river crossings have palaeo landscape potential and will need specialist input. The fields between Abergele Road and St Asaph Business Park have a high archaeological potential for prehistoric and later sub-surface archaeology.	CPAT
Along with 4a route 3a is probably the most sensitive corridor option as it passes through two registered parks and gardens & their associated archaeology. A lot of	CPAT

RECOMMENDATION	STAKEHOLDER
<p>WWI/WWI army camp and practice trench archaeology in the grounds of both. Unknown subsurface potential that needs detailed assessment/evaluation.</p> <p>Potential for palaeolandscape in former marsh area between the shore and Rhuddlan Road</p>	
<p>Route 5c is the longest and therefore potentially the most damaging route in terms of currently undefined subsurface archaeology. It partly follows the route of the Burbo Bank windfarm onshore cable route at the start where Bronze Age and later archaeology was located in the fields between the shoreline and Dyserth with former palaeochannels. Potential for palaeo landscape deposits at river crossings which will need specialist input. Potential for Roman road impacts south of St Asaph and west of the town.</p>	CPAT
<p>Route 3a and 4a cross Kimmel Park RHP&amp;G and ends in Bodelwydden RHP&amp;G. Route to substation will have to continue across Bodelwydden RHP&amp;G. Strong likelihood that World War 1 practice trench systems (of National Importance) will be found in both RHP&amp;G especially Bodelwydden where sections are already designated as scheduled monuments. There are also 15 Listed Buildings in corridor.</p>	Cadw
<p>Route 3b has no designated heritage assets in the corridor;</p> <p>Route 3c has 5 Listed Buildings in the corridor</p> <p>Route 5a has 3 listed buildings in the corridor;</p> <p>Route 5c has 6 Listed Buildings in the corridor;</p>	Cadw
<p>Significant Damage to woodland sites may Prove difficult to avoid with Onshore Cable Routes 3a, 3c and 4a. If this</p>	North Wales Wildlife Trust

RECOMMENDATION	STAKEHOLDER
is indeed the case, we recommend removing these options.	
Onshore Cable Corridor Route 5a must cross the River Clwyd and will cross the Clwyd Estuary and Adjacent Fields LWS (D001).	North Wales Wildlife Trust
Cable Corridor Route 5c could affect Vale of Clwyd Grassland LWS (D022), Ty Isa and Pen Palmant valley LWS (D014) and possibly Coed Fron and Eryl Hall Woodland LWS (D033).	North Wales Wildlife Trust
Route 3a or 5a preferred as they do not involve a required crossing of the A55	NMWTRA

- 160 Route 3a/4a was discounted as a result of stakeholder feedback, which included reference to the potentially significant effects on designated heritage assets. Alongside the stakeholder feedback received it was recognised that these options were considered of a higher engineering risk due to ground conditions, given the potential for soft bedrock, faulting and lead mining shafts in selected areas along the corridor. Route 3a/4a was therefore not progressed further.
- 161 As identified in Table 10, Routes 3c/4c resulted in a number of potential constraints, including proximity to protected areas and ancient woodland, multiple Public Rights of Way (ProW) and the Wales Coast Path, and engineering constraints with regards availability of construction compounds and potential HDD constraints associated with the underlying geology. Combined with the generally moderate potential impact associated with other receptors, and the need for HDD of woodlands in areas of shallow geology this route was not progressed further.



- 162 The onshore cable site selection therefore focussed on the constraints associated with Route 3b/4b and Route 5a. The key differentiating feature between Route 3b/4b and Route 5a was the requirement to undertake a crossing of the Clwyd River using HDD for Route 5a. Route 5a also crosses the North Wales Coast Path, and a greater number of PRoWs when compared to 3b/4b. With regards all other considerations, such as ecological receptors, flood risk, heritage assets, construction noise, and landscape and visual receptors both routes performed broadly comparably, with Route 5a performing marginally better, with the exception of the HDD under the River Clwyd, which was considered less favourable from a cost and engineering perspective due to the need for HDD.
- 163 As a result of the broad comparability across the range of receptors considered, the engineering risk at landfall 4 was further considered as the greatest potential constraint to development. Landfall 4 represented a challenge due to the presence of Rhyl Flat cables in the near shore, which would preclude a beach HDD exit, therefore requiring a shallow water surface crossing, with associated surface protection and reduction in navigable depth. There would therefore be a need for a longer HDD, which would be required to cross not only the existing offshore infrastructure but also onshore infrastructure including holiday parks and railway lines, in geological conditions which would likely result in settling of the overlying substrata and therefore a risk to the railway lines. As a result of the engineering risk at Landfall 4, and the marginally better performance of Landfall 5 and the associated Route 5a it was therefore decided to progress Landfall 5 and Route 5a for the purposes of PEIR.
- 164 Prior to the publication of the PEIR, Route 5a continued to evolve as a result of stakeholder feedback.
- 165 Stakeholder feedback included responses received with regards interaction with Local Development Plan candidate sites to the east and south of Rhyl. Following consultation with DCC, and recognition that development opportunities in Rhyl were constrained by flood zones, RWE incorporated an offset into the project design resulting in an eastward shift from the LDP candidate sites at the south-east of Rhyl (Figure 20).

- 166 At this stage it was also identified that there were two suitable alternatives that could be considered in proximity to Bryn Cwnin Farm. An option that included an HDD under woodland to the north of Bryn Cwnin Farm, and a further option that ran to the south of the Farm. The option to the south runs adjacent to the North Wales Path, whilst the option to the north requires HDD under existing woodland and runs closer to Rhyl. Both options were retained for the purposes of PEIR consultation and stakeholder feedback.
- 167 Additional optionality was also identified at this stage elsewhere along the route, including a widening of the cable corridor at three locations, each associated with the need for HDD:
- ▲ River Clwyd;
  - ▲ Pengwern;
  - ▲ A55 crossing.
- 168 With regards the River Clwyd a widening of the cable corridor was introduced to allow consideration of further site investigation work, required to ensure the final HDD alignment is in stable geology.
- 169 With regards Pengwern it was recognised that the woodland contains an RAF Rhuddlan (early warning RADAR station) bunker from the second world war of currently unknown depth. Optionality was therefore required, subject to further site investigation planned for summer 2021, to ensure that HDD was feasible, at an alignment that avoids any damage to either the woodland or the historic RADAR installation. Optionality was subsequently reduced, as described in section 4.13 *et seq.*
- 170 In relation to a requirement to cross the A55 at Bodelwyddan via HDD, further studies during the site selection and development process indicated a need to widen the corridor in this location to allow for several different HDD alignments in response to several factors, including uncertainty on ground conditions around the A55 junction, and uncertainty over land use in St Asaph Business Park.

- 171 The optionality was therefore retained subject to ongoing design and site investigation work. The result of the changed alignment is an interaction with the eastern edge of the existing allocation for a Key Strategic Site (KSS) at Bodelwyddan. Optionality was subsequently reduced, as described in section 4.13 *et seq.*
- 172 Acknowledging the presence of the KSS in this area of Bodelwyddan, AyM would seek to minimise any loss of developable area in the KSS, for example by routing the cable parallel to an existing water main that runs through the site and already places easement restrictions on development (i.e. an existing easement through the site would be widened rather than introduce an additional restriction). Such development would not be mutually exclusive to the installation of cable infrastructure and as such the options are brought forward for formal consultation to understand the feasibility of co-location at this site.
- 173 The introduction of underground cable is not considered to materially reduce the quantum of development within the KSS. Indeed, if a small part of the KSS were required for the AyM cable connection this most easterly section could be used to provide public open space provision, as required under DCC Policy BSC11 – Recreation and Open Space.
- 174 At the PEIR stage of the proposed development of AyM, it was noted that the consent that was granted for mixed development within the KSS area expired earlier in 2021, and as such it is considered that any future proposal would not necessarily follow previous masterplan proposals for the KSS site.
- 175 As such, the onshore cable route as assessed in the PEIR, as illustrated in Figure 20, contained optionality that was refined following formal consultation.
- 176 The project design has evolved further as a result of additional feedback received during the statutory consultation; these changes are presented in Section 4.12.





**LEGEND**

- Offshore Export Cable Corridor
- Onshore Export Cable Corridor
- Onshore Substation Zone

Data Source:

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Onshore Cable Corridor following consultation with DCC**

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:  
**Figure 20**

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:50,000	A3	WGS84	UTM30N

Fferm Wynt Alltraeth

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#### 4.11.6 Substation refinement

- 177 To support the evaluation process, a number of potential substation footprint locations were identified which followed the design principles and engineering assumptions set out in Section 4.10.2.
- 178 In order to ensure that the substation options could also viably connect up with the onshore cable corridors, a number of indicative onshore cable corridor connections between the longlist of substation options and the onshore cable corridor options were identified.
- 179 Longlisting of the OnSS took place through reference to the substation AoS, combined with application of the design principles, engineering assumptions, and the relevant guidance relating to the siting of above-ground electrical infrastructure (e.g. Horlock Rules). At this stage, 14 substation zones (Table 12) was identified for further consideration.

Table 12: Onshore substation longlist overview.

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
1	Adjacent to the east of Glan Clwyd Hospital and Sam Lane in Bodelwyddan, north of junction 26 of the A55 within the northern extent of the AoS.	Located within agricultural fields. Flat / slight gradient to the north. Listed building to the south, footpaths and overhead line to the north. Temporary construction compound within 250m buffers, but the operational footprint is not. Small areas of woodland around the north west and south east of the option which could be used for screening/mitigation.	New access required from west (near Glan Clwyd Hospital) across agricultural land. Very close to minor watercourse / drainage in the area. Sited over existing agricultural access track. Cable corridor route to National Grid substation approximately 2.5-3 km from this location.	Small number of residential properties to north-west and north-east. PRoW to the east.
2	Adjacent to the east of Glan Clwyd	Located within agricultural fields. Flat /	New access required from the west (near	Proximity to single storey housing on

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
	Hospital and Sarn Lane in Bodelwyddan north of the A55 within the northern extent of the AoS.	slight gradient to the north. This option slightly clips the 250m buffer placed around sensitive/residential properties in its north west corner. Main rivers present to the east, and associated flood risk zones. The Bodelwyddan Conservation Area and associated Listed Buildings are present to the south of this option. Woodland to the north and east which could be used for screening/mitigation. Room for temporary	Glan Clwyd Hospital) across agricultural land. Very close to or potentially encroaching on minor watercourse / drainage in the vicinity. Cable corridor to National Grid substation approximately 2.5-3 km from this location.	Marble Church Grove approximately 250m. Very little intervening screening. Proximity to 4 storey housing on Sarn Lane although there is screening by roadside planting. Proximity to Public Rights of Way (PRoW) immediately to west of site and compound. Clear views from grounds and cemetery around Marble Church and Conservation Area. Views from Bodelwyddan Castle (Hotel). Looks to be an aligned avenue to north through arboretum/garden

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
		construction compound to the south.		which will require further investigation as well as other views from park/castle. 2/3 houses at close proximity to the north-west but largely screened by intervening vegetation.
3	Adjacent to the east of Glan Clwyd Hospital and Sam Lane in Bodelwyddan, north of junction 26 of the A55 within the northern extent of the AoS.	Located within agricultural fields. Flat / slight gradient to the north. Listed building to the south, footpaths and overhead line to the north. Temporary construction compound within 250m buffers, but the operational footprint is not. Small areas of woodland around the north west	New access required from west (near Glan Clwyd Hospital) across agricultural land. Very close to minor watercourse / drainage in the area. Sited over existing agricultural access track. Cable corridor to National Grid substation approximately 2.5-3 km from this location.	Small number of residential properties to north-west and north-east. PRow to the east.



SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
		and south east of the option which could be used for screening/mitigation.		
4	Adjacent to the east of Glan Clwyd Hospital and Sarn Lane in Bodelwyddan, north of junction 26 of the A55 within the northern extent of the AoS.	Located within agricultural fields. Flat / slight gradient to the north. Area of flood risk and associated Main Rivers to the north, overhead line to the eastern edge, and areas of woodland to the south which could be extended to use as screening/mitigation.	New access required from west (near Glan Clwyd Hospital) across agricultural land. Very close to minor watercourses / drainage. Construction compound 'remote' from location due to space constraints/presence of woodland.	Small number of residential properties to north-west and north-east. Clear views from grounds and cemetery around Marble Church and Conservation Area. Views from Bodelwyddan Castle (Hotel). Looks to be parkland to north through arboretum/garden which will require further investigation as well as other views from park/castle. If

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
				compound is as for Option 2 then similar views also apply from houses and Bodelwyddan Castle and park.
5	Located between Bodelwyddan Park and New Vision Business Park, situated between the A55 and the B5381.	Located within agricultural fields. Slight gradient to the north / north east. Due to smaller field parcel sizes to the central/southern end of the AoS, this option crosses field boundaries. It does however have areas of woodland to the north and west which could be extended to use as screening/mitigation.	New access required from south from B5381 or from north east off link road to A55.	Two storey properties at close proximity to the south-south-west facing towards Option 5. PRow to the north.

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
6	Located to the west of the AoS, south of the Ffordd Rufeinig Road near Glascoed, located between two sets of overhead lines.	Located in agricultural fields. Slight slope to the north east. Due to smaller field parcel sizes to the central/West And eastern end of the AoS, this option crosses field boundaries. It does however have areas of woodland to the east which could be extended to use as screening/mitigation.	New access required from north from B5381. Construction compound 'remote' from location due to space constraints. Cable corridor route to National Grid substation approximately 3 km from this location.	Two storey properties at close proximity to the west and north in farm clusters. Kinmel Hall and Park may have visibility from the north-west. Appears to be derelict however.
7	Located to the south of Option 6, and south of both sets of overhead lines in the Glascoed area.	Located in agricultural fields. Slight slope to the north east. Due to smaller field parcel sizes to the central/southern end of the AoS, this	New access required from north from B5381 or from B5381 via minor (singletrack) roads. Cable corridor route to National Grid substation	Two storey property at close proximity to east as part of farm cluster. Kinmel Hall and Park may have visibility from the north-west. Appears to be derelict. Will appear to sit

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
		option crosses field boundaries.	approximately 3 km from this location.	above the River Elwy and may impinge upon its character.
8	Located near to Groesffordd Marli	Located in agricultural fields. Gradient to the north east, in an elevated position. This option does clip the edges of the 250m buffer. Due to smaller field parcel sizes to the central/southern end of the AoS, this option crosses field boundaries. It does however have areas of ancient woodland to the east and west which could be extended to use as screening/mitigation. A small area of historic	Potential access from north from B5381 via minor (singletrack) roads, likely to be difficult or unsuitable.	Will appear on land sitting above height of properties located at close proximity to the north which may make it more apparent. Close proximity properties also to the south. PRoW to north-east.



SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
		landfill is situated to the west of this option within the ancient woodland. There are also Listed Buildings to the north, west and east.		
9	Located in the south west corner of the AoS, to the north of the Coedwigoedd Dyffryn Elwy / Elwy Valley Woods (SAC).	Located in agricultural fields. Gradient to the south west above steeper slope down to Afon Elwy. Although outwith the AoS, this option is in close proximity to a number of designated areas associated with the Coedwigoedd Dyffryn Elwy / Elwy Valley Woods (SAC).	Potential access from north from B5381 via minor (singletrack) roads, likely to be difficult or unsuitable.	Residential properties to south-east and north-east at close proximity. Overlooked by higher ground to south. Will appear to sit above the River Elwy and may impinge upon its character. Direct impact on small scale field pattern and hedgerow trees.

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
10	Located in the more central area of the AoS, current Bodelwyddan National Grid and existing GyM substations to the north, along with associated overhead lines.	Located in agricultural fields. Slight gradient to the north east. Clipped by the 250m buffer to the southern portions of the footprint. Option is in close proximity to small watercourse/drainage in the area and to areas of ancient woodland to the north, which could be used as screening/mitigation.	Potential access from north via B5381 and then minor (singletrack) roads. New access road may be required from B5381 to avoid singletrack roads. Or extend access for existing GyM substation from the north.	Residential properties to west and south at close proximity.
11	Located in the East Corner of the AoS, near to Pen-rhewl.	Located in agricultural fields. Slight gradient to the north. In close proximity to watercourses / drainage and ponds in this location. Areas of ancient woodland to	Potential access from north via B5381 and then minor road (narrow / singletrack). Cable corridor route to National Grid substation	Proximity of caravan site to the south-east. Relatively close proximity residential property to the north-east.

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
		the east, could be used as screening/mitigation.	may be difficult for this location.	
12	Located in the south East Corner of the AoS, near to Nant-y-Patrick.	Located in agricultural fields. Slight gradient to the north east. In close proximity to watercourses / drainage and ponds in this location. Areas of ancient woodland in all directions, could be used as screening/mitigation.	Potential access from east from B5381 but requires a new access track >0.5 km long. Cable corridor route to National Grid substation may be difficult. Construction compound 'remote' from location due to space constraints.	Residential properties to the south-west at relatively close proximity. Potential for visibility from Wigfair Hall (country house hotel to south) and its grounds at relatively close proximity.
13	Located in the south east Corner of the AoS, near to Nant-y-Patrick.	Located in agricultural fields. Very slight gradient to the north east. Encroaching on ponds (as does construction compound). Areas of	Potential access from east from B5381 but requires a new access track >0.8 km long. Access from minor road (narrow / singletrack) to west unlikely to be	Residential properties to the south-west at relatively close proximity. Potential for visibility from Wigfair Hall (country house hotel to south) and its

SUBSTATION ZONE	LOCATION	GENERAL DESCRIPTION	FEASIBILITY	LVIA – PRELIMINARY OUTLINE REVIEW
		ancient woodland in all directions, could be used as screening/mitigation.	viable. Cable corridor to National Grid substation may be difficult from this location.	grounds at relatively close proximity.
14	<p>Located in the south east Corner of the AoS, near to Nant-y-Patrick.</p> <p>Zone 14 extends from the overhead lines to the north, ancient woodland to the east and west, and roads to the south.</p>	<p>Farmland with some irregular and some enlarged fields - some with intact hedges and mature hedgerow trees. On low lying land above lower valley, which it is separated from by a wooded scarp slope.</p>	<p>Medium risk from gentle site gradient (1 in 49). Potential access from B5381 to east of site (or via minor road to south).</p>	<p>Woodland blocks offer some containment of views particularly to the east and west.</p> <p>Visibility at multiple residential properties, with some intervening trees and hedgerows.</p>



180 During the preliminary longlisting BRAG assessment, it was recognised that there were potentially significant constraints present for several of the substation zones, with associated engineering feasibility challenges. Table 13 presents the conclusions of the analysis, with the justification for each of the substation zones taken forward for further consultation.

Table 13: Onshore substation preliminary review of longlist constraints and LVIA risks.

SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
1	<p>LVIA constraint (high), with other constraints such as archaeology, designated asset setting, considered at moderate risk of impact. Traffic and transport, water quality, ecology generally lower risk of impact.</p> <p>Few likely engineering risks aside from higher risk for drainage.</p>	Based upon the engineering feasibility and the BRAG assessment work, this option is proposed to be taken forward to the shortlist of options for further assessment.
2	<p>LVIA constraint (high) with potential impacts associated with the setting of designated assets. Moderate risk of impact for other receptor groups such as ecology (designated sites), traffic and transport, Planning application present for 1,700 dwellings.</p> <p>Few notable engineering risks.</p>	Due to the outline planning application for 1,700 dwellings on the land around this option (as identified during ETG meeting) and the number of high-risk BRAG scores, Option 2 was not taken forward to the shortlist.

SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
3	<p>LVIA constraint (high) with potential impacts associated with the setting of designated assets. Moderate impact potential for other receptor groups such as ecology (designated sites), traffic and transport, Planning application present for 1,700 dwellings.</p> <p>Few notable engineering risks.</p>	<p>Due to the outline planning application for 1,700 dwellings on the land around this option, Option 3 was not taken forward to the shortlist.</p>
4	<p>LVIA constraint (high) with potential impacts associated with dwellings and the setting of designated assets. High risk of potential impacts existing for archaeology and ecology. Moderate risk of potential impacts to other receptor groups such as traffic and transport, Planning application present for 1,700 dwellings.</p> <p>Higher engineering risk associated with presence of flood zone (2/3) and ground conditions.</p>	<p>Due to the outline planning application for 1,700 dwellings on the land around this option, Option 4 was not taken forward to the shortlist.</p>
5	<p>Lower LVIA impact risks due to capacity to accommodate development and potential</p>	<p>Based upon the engineering feasibility and the BRAG assessment work, this option is proposed to be taken</p>

SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
	<p>to mitigate visibility with planting and earthworks. Potential high archaeology impacts due to designated asset setting, ecology and tourism both considered subject to potential moderate impacts, other receptor groups such as traffic considered subject to lower impact potential.</p> <p>Engineering risk generally low-medium, with new access noted as being required.</p>	<p>forward to the shortlist of options for further assessment.</p>
6	<p>Large scale modification of levels required and visibility and landform changes difficult to mitigate due to lower levels of surrounding land. This was therefore considered of highest potential LVIA Impact due to topography being highly unsuitable for accommodating development.</p> <p>Archaeology indicated potentially high impacts due to high potential for impacts associated with the setting of designated assets. Other receptor groups such as</p>	<p>Due to the location of this option on a ridgeline with steep gradients, this is not preferable from an engineering, access or landscape perspective. Due to this, Option 6 was not taken forward to the shortlist of options.</p>

SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
	<p>ecology and traffic considered at risk of moderate impacts.</p> <p>Engineering risk considered high to moderate due to lack of suitable drainage, ground conditions, new accesses required, and construction compounds likely subject to spatial constraints.</p>	
7	<p>LVIA constraint considered high due to landscape unsuitable to accommodate development. potential risk of high impacts also considered to exist for archaeology (setting of designated assets), land use (proximity to school and landfill). Other receptor groups such as ecology and traffic/transport considered at risk of moderate impacts.</p> <p>Engineering risk considered high due to ground conditions (made ground and distance from watercourse), and moderate due to accesses</p>	<p>Due to the location of this option on a ridgeline with steep gradients, this is not preferable from an engineering, access or landscape perspective. Due to this, Option 7 was not taken forward to the shortlist of options.</p>
8	<p>Large scale modification of levels required and visibility</p>	<p>Due to the location of this option on a ridgeline with</p>



SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
	<p>and landform changes difficult to mitigate due to lower levels of surrounding land. LVIA considered to be of higher risk of impact, due to topography highly unsuitable for accommodating development.</p> <p>Other receptor groups such as traffic, ecology (ancient woodland), and land use (proximity to school) also considered high risk of impact.</p> <p>Engineering risk considered High due to moderate (1 in 9) site gradient and drainage challenges. Moderate access risk.</p>	<p>steep gradients, this is not preferable from an engineering, access or landscape perspective. Due to this, Option 8 is not taken forward to the shortlist of options.</p>
9	<p>LVIA considered high risk of impact as visual effects on nearby properties highly likely, with mitigation challenging as landscape is unsuitable to accommodate development.</p> <p>High risk of impact also for traffic.</p>	<p>Due to the location of this option on a ridgeline with steep gradients, this is not preferable from an engineering, access or landscape perspective. Due to this, Option 9 is not taken forward to the shortlist of options.</p>
10	<p>Large area around for mitigation although views from above would be more</p>	<p>Based upon the engineering feasibility and the BRAG assessment work, this option</p>

SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
	<p>problematic to mitigate. LVIA therefore considered high risk of impact due to visual effects on nearby properties likely. Also considered higher risk of impact for traffic, archaeology (impacts associated with setting of designated assets). Generally moderate risk of impact for other receptor groups including ecology.</p> <p>No high-risk engineering constraints were identified for this option. Medium risks are associated with local topography (a 1:30 drop across the site), local utilities connections, possibility of local geology issues from limestone dissolution and historic lead mining, vehicular access.</p>	<p>is proposed to be taken forward to the shortlist of options for further assessment.</p> <p>Further consideration of access will be required during the site selection process to ensure this option is viable.</p>
11	<p>Some tree copses offering visual containment, with site overall relatively flat, allowing mitigation in the form of screening. LVIA therefore relatively moderate risk of impact, with some capacity to accommodate development.</p>	<p>Based upon the engineering feasibility and the BRAG assessment work, this option was taken forward to the shortlist of options for further assessment.</p> <p>Further consideration of access will be required during the site selection</p>

SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
	<p>Other receptor groups such as archaeology considered moderate risk of impact (designated asset setting), with traffic considered higher risk of impacts due to access challenges.</p> <p>Engineering risk high, reflecting uncertainty and challenge associated with access.</p>	<p>process to ensure this option is viable.</p>
12	<p>Some tree copses and lines provide visual containment. Small number of rural properties and minor road provide a degree of settled character. Relatively flat with some room for screen planting if moved back from road. Therefore, low risk of impact for LVIA. Low risk of impact also for land use, tourism and socioeconomics and water and sediment quality (no identified constraints). Archaeology and ecology considered moderate risk of impact (setting, and indirect effects on nationally designated sites, respectively).</p> <p>Moderate engineering risk, associated with access and</p>	<p>Due to the location of this option within the same area as Option 13, only one of the two options was considered relevant to take forward to the shortlist, as further micro-siting of the option would take place following the LVIA modelling. When compared against option 13, Option 12 has similar risks, although has a more settled rural character and as such was identified as less favourable at this stage from a LVI perspective. As such, Option 12 was not taken forward to the shortlist of options.</p>

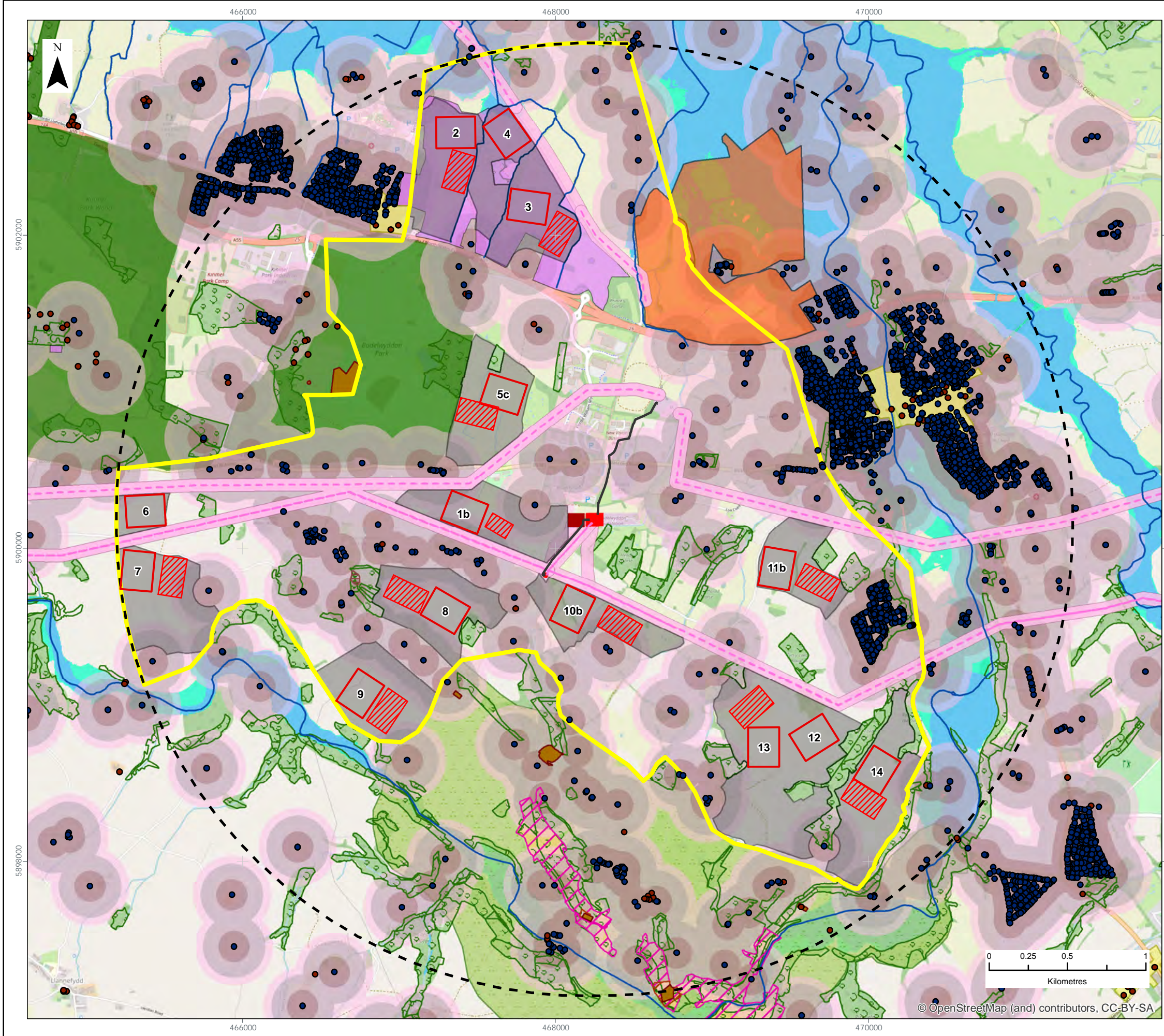
SUBSTATION ZONE	SUMMARY OF ANALYSIS	RECOMMENDATION FOR TAKING FORWARD TO SHORTLIST OF OPTIONS
	remote construction compound options.	
13	<p>Relatively flat with good area to be able to add linked woodland belts to improve containment. Therefore, low LVIA risk of impact as some interaction with visual receptors and valued local landscapes, but capacity to accommodate development exists. High risk of impact for ecology (ancient woodland). Moderate risk of impact for archaeology (setting) Low risk of impact also for land use, tourism and socioeconomics and water and sediment quality (no identified constraints).</p>	<p>Based upon the engineering feasibility and the BRAG assessment work, this option was taken forward to the shortlist of options for further assessment.</p> <p>Further consideration of access was noted as required during the site selection process to ensure this option is viable.</p>
14	<p>Low LVIA risk of impact as some interaction with visual receptors and valued local landscapes, but capacity to accommodate development exists.</p>	<p>Based upon the engineering feasibility and the BRAG assessment work, this option was taken forward to the shortlist of options for further assessment.</p> <p>Further consideration of access was noted as required during the site selection process to ensure this option is viable.</p>



181 The following zones were then put forward for consultation (Figure 21):

- ▲ Option 1;
- ▲ Option 5;
- ▲ Option 10;
- ▲ Option 11;
- ▲ Option 13;
- ▲ Option 14.





LEGEND

- Onshore Substation Area of Search
- 3km Refined Substation Search Area
- Onshore Substation Zones
- Project Operational Compound
- Project Construction Compound
- Proposed National Grid Substation Footprint
- National Grid Substation Sites
- High Voltage Underground Electricity Cable
- Overhead Line 40m Buffer
- Electricity Transmission Overhead Lines
- Historic Landfill Site
- Special Area of Conservation (SAC)
- Ancient Woodland
- Sites of Special Scientific Interest (SSSI)
- Geological Conservation Review (GCR) Site
- Registered Historic Parks & Gardens
- Listed Building
- Conservation Area
- Scheduled Monument
- Historic Landscape
- Main River
- Flood Zone 3
- Flood Zone 2
- Planning Permission
- Elwy Solar Energy Farm
- OS AddressBasePlus (Residential)
- OS AddressBasePlus (Residential) - 100m Buffer
- OS AddressBasePlus (Residential) - 200m Buffer
- OS AddressBasePlus (Residential) - 250m Buffer

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Long Listed Onshore  
Substation zones

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

Figure 21

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:25,000	A3	WGS84	UTM30N

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182 Consultation responses were received via the EIA EPP from the following consultees:

- ▲ CPAT;
- ▲ Cadw;
- ▲ NRW; and
- ▲ North and Mid Wales Trunk Road Agency (NMWTRA).

183 The consultation responses on the short-listed substation options, are presented in Table 14.

Table 14: Onshore substation shortlist consultation responses.

ONSHORE SUBSTATION ZONE OPTION	RECOMMENDATION	STAKEHOLDER
All options	Require crossing of the A55	NMWTRA
1	Undefined sub-surface potential. Potential for impact to Roman road on north boundary by access and cable works. A large number of recorded non-designated sites in this area (field system earthworks)	CPAT
	There are no designated heritage assets in this zone	Cadw
5	Lies immediately to east of Bodelwyddan Park Registered Park and Gardens (RPG) but possibly screened by trees – would need a setting impact assessment. Undefined sub-surface archaeological potential. Possible WWI practice trench earthworks or related sub-surface archaeology. Roman road on southern	CPAT

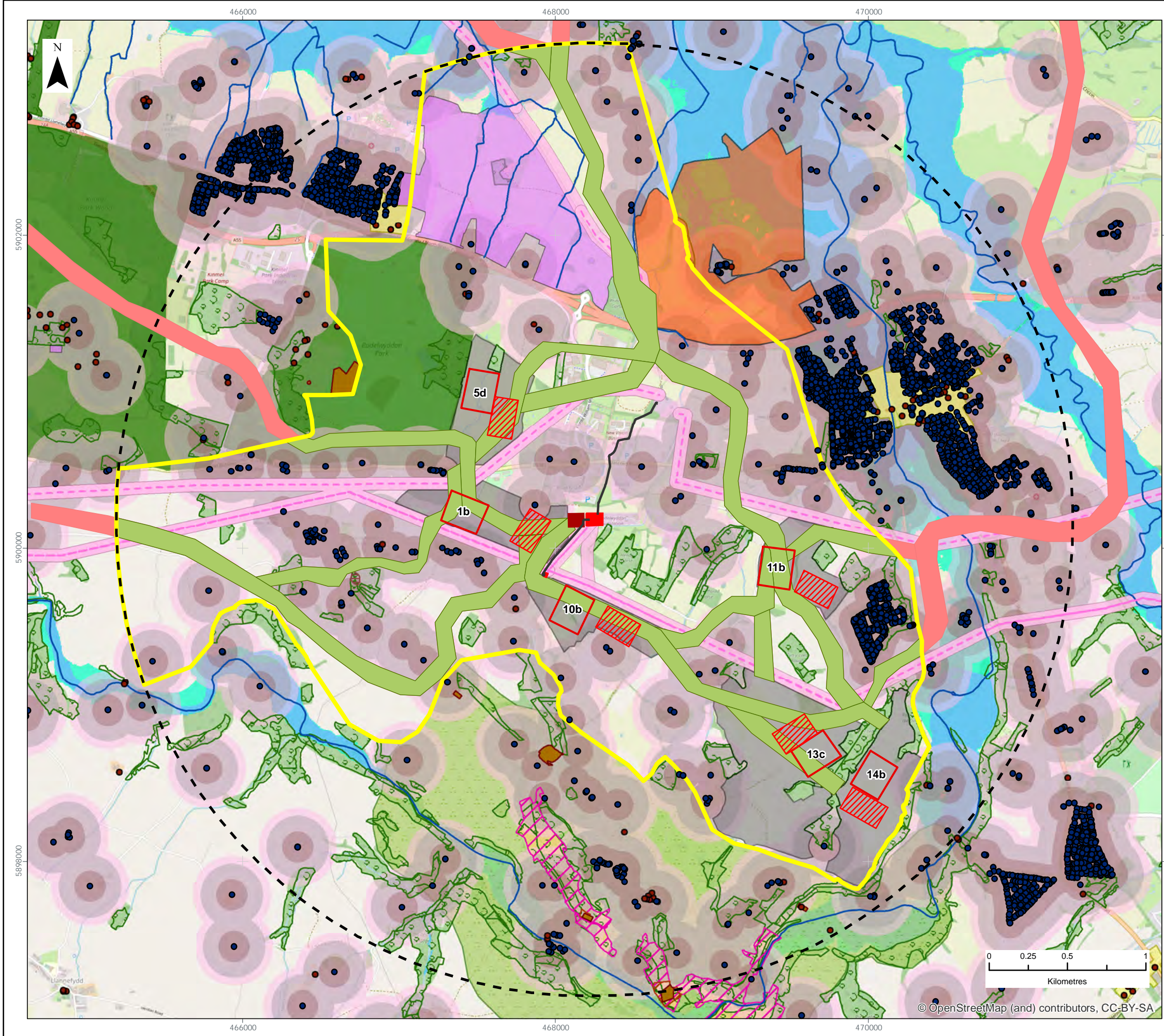
ONSHORE SUBSTATION ZONE OPTION	RECOMMENDATION	STAKEHOLDER
	boundary which may be affected by access works	
	There are no designated heritage assets in this zone	Cadw
10	An area of generally undefined surface and subsurface archaeological potential. Few recorded sites here and no prior surveys. Potential indirect visual impact on Lower Elwy Registered Historic Landscape - may need ASIDOHL2 assessment.	CPAT
	There are no designated heritage assets in this zone but could have adverse impact on setting of listed building Pentre	Cadw
11	An area of generally undefined surface and subsurface archaeological potential. Few recorded sites here and no prior surveys.	CPAT
	There are no designated heritage assets in this zone	Cadw
13	An area of generally undefined surface and subsurface archaeological potential. Few recorded sites here and no prior surveys. Non-designated sites recorded are limited to a number of ponds recognised on early OS mapping. Potential indirect visual impact on Lower Elwy Registered Historic	CPAT



ONSHORE SUBSTATION ZONE OPTION	RECOMMENDATION	STAKEHOLDER
	Landscape – may need ASIDOHL2 assessment.	
	There are no designated heritage assets in this zone	Cadw
	Zones 13 could have an impact on the Elwy Valley Woods SAC and Coedydd ac Ogofau Elwy a Meirchion SSSI to the south. This would need to be determined once further details about the preferred substation location are available.	NRW
14	An area of generally undefined surface and subsurface archaeological potential. Few recorded sites here and no prior surveys.  Potential setting impacts for listed buildings to east which would need to be assessed. Potential indirect visual impact on Lower Elwy Registered Historic Landscape - may need ASIDOHL2 assessment.	CPAT
	There are no designated heritage assets in this zone	Cadw
	Zones 14 could have an impact on the Elwy Valley Woods SAC and Coedydd ac Ogofau Elwy a Meirchion SSSI to the south. This would need to be determined once further details about the preferred substation location are available.	NRW

- 184 Following consultation, and further engineering analysis, Zone 1 was not taken forward primarily due to the potential impact on nearby residential receptors in terms of visual amenity, and the likelihood that mitigation would not be achievable given the local topography constraints.
- 185 Onshore substation zones Options 13 and 14 were also not taken forward, primarily due to consultee feedback with regards designated site impacts, combined with access constraints.
- 186 The remaining zones were all considered potentially viable options for the onshore substation. Therefore, following the discounting of the options outlined above, the following three options comprise the preferred option(s) for the onshore substation:
- Option 5d;
  - Option 10b; and
  - Option 11b.





LEGEND

- Onshore Substation Area of Search
- 3km Refined Substation Search Area
- Onshore Substation Zones
- Onshore Substation Cable Corridors
- Potential Onshore Cable Corridor
- Project Operational Compound
- Project Construction Compound
- Proposed National Grid Substation Footprint
- National Grid Substation Sites
- High Voltage Underground Electricity Cable
- Overhead Line 40m Buffer
- Electricity Transmission Overhead Lines
- Historic Landfill Site
- Special Area of Conservation (SAC)
- Ancient Woodland
- Sites of Special Scientific Interest (SSSI)
- Geological Conservation Review (GCR) Site
- Registered Historic Parks & Gardens
- Listed Building
- Conservation Area
- Scheduled Monument
- Historic Landscape
- Main River
- Flood Zone 3
- Flood Zone 2
- Planning Permission
- Elwy Solar Energy Farm
- OS AddressBasePlus (Residential)
- OS AddressBasePlus (Residential) - 100m Buffer
- OS AddressBasePlus (Residential) - 200m Buffer
- OS AddressBasePlus (Residential) - 250m Buffer

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Onshore Substation  
Short List Options

VER	DATE	REMARKS	Drawn	Checked
1	10/08/2021	For Issue	BPHB	SL

FIGURE NUMBER:

Figure 22

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:25,000	A3	WGS84	UTM30N

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## Substation Zone 10b

187 At this stage of the site selection process, further consideration was also given to the likely onshore cable routes connecting the landfall location with the proposed onshore substation zones. Connectivity with the emerging preferred route therefore influenced the decision with regards Substation Zone 10b, as the associated onshore cable routes (3c/4c) had been identified as less optimal, due to offshore interactions and landfall challenges. Combined with the anticipated high risk of potentially significant impacts for LVIA due to visual effects on nearby properties likely, with the closest property approximately 130m to the southeast, and mitigation opportunities being more limited when compared to the available alternatives; stakeholder feedback had also indicated a potential impact on historic landscapes. In addition, as referenced in Table 13, Substation Zone 10b has higher risk of potentially significant impacts for traffic, archaeology, and a generally moderate risk of potential impacts for ecology receptor groups. Substation Zone 10b was considered to perform least optimally when compared to 5 and 11.

## Substation Zone 11

188 For Substation Zone 11, stakeholder feedback was broadly positive, with limited constraints identified. The LVIA and wider receptor analysis indicated the substation zone benefitted from some tree copses offering visual containment in an overall relatively flat setting, with site overall relatively flat, allowing mitigation in the form of screening. During the initial appraisal Substation Zone 11 was therefore considered to be moderate-lower risk of potentially significant impacts, with capacity to accept some development. Following further analysis, including preliminary ZTV analysis, it was considered to have two higher potential impacts in relation to landscape receptors. The preliminary ZTV assessment, noted views from a cluster of 18 properties within 400-500m of the option which could represent a high risk of impact to those receptors, given their proximity. Furthermore, visibility of the option from the St Asaph cathedral would also present a high risk of impact to the cathedral setting.



- 189 Substation Zone 11 was noted as subject to a degree of natural screening from surrounding trees and woodland, although there is limited space around the option to provide mitigation which was considered likely to be required in the context of good design.
- 190 In addition to these potentially high impacts, numerous 'medium' environmental constraints were also identified for this zone, including: being located within 500 m of an ancient woodland; interacting with small areas of undesignated potential species habitat (hedgerows); presence of listed buildings nearby (0.6 km away) which may be subject to setting impacts; a need for the creation of a new transport access route to access the site; proximity to one PRoW; and proximity to a caravan park and country club.
- 191 No high-risk engineering constraints were identified for this zone. Medium risks were identified, associated with local topography (a 1:41 drop across the site), local drainage connections, local utilities connections, the need for one utility diversion and vehicular access.

## Substation Zone 5

- 192 With regards to Substation Zone 5, stakeholder feedback was broadly positive, although feedback was noted with regards the need to undertake a settings assessment for potential impacts to the setting of Bodelwyddan Park.
- 193 Substation Zone 5 was considered to have three 'high' risks of potential impact, in relation to flood risk, heritage and landscape receptors. Following initial ZTV assessment, views from nine properties within 350-400m of the option presented a high potential impact, given their proximity and the views they would have of the substation in that option location, although all views identified would be partially obscured by vegetation.
- 194 Potential impacts on the heritage setting of Bodelwyddan Park were also identified, although through consultation with Cadw undertaken by RWE, this has been established as not creating a high risk of significant impact for this option. It is considered possible that views would be entirely screened by the nearby woodland to the west, or screening could be enhanced.

- 195 As with other substation zones, a preliminary ZTV analysis concluded that woodland and landform would restrict visibility across large parts of the study area, including large parts of areas within a 2 km radius from the site such that close range and more distant theoretical visibility would be reduced. Theoretical visibility of the substation zone exists from Bodelwydan Castle. The level of theoretical visibility was considered to be possibly due to an under-estimate of intervening woodland height used in the ZTV analysis. The conclusion was drawn that views would be likely albeit as partially filtered and screened by intervening woodland and layering of hedgerow trees in intervening landscape, which could be extended as part of a landscape mitigation plan.
- 196 Zone 5 was also noted as being subject to 'medium' environmental constraints, including: being located within 500m of an ancient woodland; interacting with small areas of undesignated potential species habitat (hedgerows and drains) and proximity to the great created newt mitigation area west of St Asaph; and proximity to St Asaph Business Park. Environmental constraints were considered to have mitigation a being feasible.
- 197 One high-risk engineering constraint was identified for zone 5, which is the distance from potential suitable utilities connections, although this risk will be assessed in detail at a later date in the process. Medium risks are associated with local topography (a 1:37 drop across the site), local faulting in the underlying geology and the need for one utility diversion. The risks associated with topography were also considered to offer good potential to mitigate visibility of the onshore substation through planting and earthworks.

## Substation conclusions

- 198 Zones 11 and 5 were considered, relative to one another, to determine a preferred option. Further consideration was given to matters such as topography, access, landscape framework/screening, hydrology and ground conditions, with a particular focus on heritage, ecology, and LVIA assessment.

- 199 The constraints on the physical availability of the land at the two substation options fed into the assessment of mitigation and access. It was determined that Zone 5 provided a greater availability of land for potential mitigation to be implemented. Zone 11 was comparatively constrained by existing woodland, properties to the east, and overhead lines to the north. In addition, an assessment of the potential access to Zone 5 identified that this was significantly less constrained, with multiple options that could offer optionality, and involve less highway works and the associated construction disruption.
- 200 It was concluded that onshore substation Zone 5 was the preferred option for AyM. The indicative substation area provided for the purposes of PEIR has since been further refined, as a result of stakeholder feedback, further site investigation, technical design work, and EIA analysis; these changes are presented in Section 4.12

#### 4.11.7 Identification of potential temporary construction compounds

- 201 Construction activities will need to be supported by a series of temporary construction compounds along the route close to the cable corridor. Further development of the onshore cable route corridor search area allowed for the identification of several potential locations within Denbighshire. These areas are incorporated in Figure 24, Figure 25, Figure 26 and illustrated in detail in Volume 3 Chapter 1 Onshore Project Description (application ref: 6.3.1). The TCCs, as presented in the PEIR, have been refined following consultation feedback received during the statutory consultation; these changes are presented in Section 4.12.

### 4.12 Summary of Stages 1-6

- 202 The AyM site selection work (as informed through stakeholder engagement, landowner discussions and technical studies) enabled the refinement of AyM to the point of PEIR assessment. The following aspects of the proposed project were identified and refined:

- ▲ A refined array boundary area (See Figure 23 for a comparison of the PEIR and final application boundary);

- A single preferred offshore cable corridor search area of ~1 km in width (See *ibid*);
- A refined landfall at Rhyl (See *ibid* and Figure 25 for a comparison of the PEIR and final application boundary);
- A single preferred onshore cable corridor of 100 m in width with emerging preferred route of ~40m (See Figure 24 for a comparison of the PEIR and final application boundary); and
- A single preferred onshore HVAC substation site (See Figure 26 for a comparison of the PEIR and final application boundary).

203 These options and refinements were sufficiently justified and narrowed down to enable stakeholders (through the consultation process) to meaningfully comment on the proposed scheme and its potential effects on the receiving environment. The following sections describe the process of project design evolution, following receipt of stakeholder feedback on the PEIR.

#### **4.13 Stage 7 – Further refinement of project design following review of statutory consultation responses, and EIA studies**

204 Following the PEIR and statutory consultation, a number of modifications were made to Awel y Môr as a result of consultee feedback, formal and informal consultation with landowners, further design refinements and engineering optimisation, and findings from additional environmental appraisals and surveys that were ongoing at the time of PEIR publication. The Applicant reviewed the responses from the AyM consultation and appropriate revisions to project design and environmental studies were implemented as detailed in the following sections.

205 The refinements are illustrated in Figure 23 to Figure 26, and include:

- A refinement of the proposed array footprint, reducing it from 88 km<sup>2</sup> to 78 km<sup>2</sup>;
- A refinement of the maximum number of turbines, reducing it from 91 to 50;
- A commitment to use trenchless techniques under the Rhyl Golf Club;



- Refined landfall access and TCC;
- Refined onshore cable corridor from 100 m with an emerging preferred route, to a 40-60 m final route;
- Reduction in onshore cable optionality at the A55 crossing and south of Rhyl;
- A reduced onshore substation zone;
- Refined O&M accesses for the substation; and
- Refined 400 kv cable route.

206 Some of the alterations (which had not been consulted on at PEIR or within the Statutory Consultation documentation) required one of the proposed accesses and TCC associated with landfall beach works to fall outside of the PEIR stage DOL. Further focused consultation was therefore held to consult on these changes and to inform stakeholders of the proposed alternative route options and design adjustments.

207 Further consultation related to:

- Construction access route as a consequence of s42 feedback; and
- Relocation of temporary construction compound associated with landfall.

208 Feedback received noted concerns with regards traffic access and interaction with public rights of way (PROW). No further design refinement was made following the consultation, however a number of mitigation measures were incorporated within the proposed design to manage potential impacts associated with construction traffic, and public rights of way; these are presented in the outline Code of Construction Practice and associated appendices (application ref: 8.13 *et seq*).

#### 4.13.1 Refinement of the offshore array boundary

209 A number of representations received in response to PEIR consultation requested that the project consider reducing the offshore array parameters, either in the context of reducing the spread of the array, reducing the number of turbines, or reducing the dimensions of the turbines themselves.

- 210 A revision was made to the westerly extent of the array boundary as a result of concerns raised with regards seascape impacts, and through consideration of the ability to reduce further the risks associated with shipping and navigation, and underwater noise; whilst limited feedback was received on these latter concerns the Applicant has sought to reduce impacts as far as practicable.
- 211 The reduction in the westerly extent reduced interaction with viewpoints in the west of the Isle of Anglesey and therefore minimised the potential harm to designated sites as far as practicable. The array boundary has progressively and iteratively been reduced in response to feedback received during the Scoping, EPP, and PEIR consultations, from an overall area of 107 km<sup>2</sup> during Scoping to 88 km<sup>2</sup> in the PEIR, and 78 km<sup>2</sup> for the final application design; a total reduction of 27%

#### 4.13.2 Refinement of the offshore array design

- 212 In reducing the array boundary, and seeking to minimise harm to designated sites as far as practicable, the Applicant also reduced the array design by reducing the total number of turbines. The design has been refined iteratively in response to stakeholder feedback received during the Scoping, EPP, and PEIR consultations and in response to likely available turbine models in the rapidly evolving market. As such, the Applicant has reduced the number of the smaller turbines from 107 as proposed during Scoping, to 91 within the PEIR and a final maximum design of 50 turbines; a reduction of 53%. Whilst the total number of turbines has decreased, it has been necessary to increase the size of the smaller turbines.

- 213 It has not been possible to reduce the maximum tip height of the turbines. Turbine sizes have increased significantly over time, with those installed for the Blyth OWF (the first in the UK) in 2000 being 95 m tip height, whilst those currently being installed for the Sofia OWF (consented 2015) measure 252 m tip height (which is the same as the smaller turbine design for AyM included within the PEIR and subsequently removed as it is not anticipated to be available by the point of AyM's construction). Furthermore, current projects within the consenting process include turbines at a greater scale, the maximum design reaching 370 m (LAT) in some cases. This principle is captured within both the extant and draft NPS EN-3 which notes (at paragraph 2.7.22) that *'flexibility will be needed in relation to the dimensions of the turbines, including tip height, hub height and rotor diameter.'*
- 214 It is anticipated that this linear growth in turbine size will continue for the foreseeable future, with construction vessels following the same trajectory. There is a real risk that restricting the tip height for Awel y Môr would result in a project that is not only limited in its economic viability, but ceases to be deliverable; further information regarding the development of turbine technology is at ANNEX.
- 215 The layouts used to inform the assessment are reflective of a MDS, and as such represent the greatest potential for a significant effect. It is not considered that there is an alternative layout which would meaningfully minimise harm whilst also providing the significant benefits of the scheme, particularly when considered in the context of meeting climate change targets and seeking to address the Climate Emergency which is recognised by all relevant local planning authorities and by the Welsh Government.
- 216 As noted previously, when considered in the context of the need for design flexibility, and the self-imposed restriction already placed on the project in not seeking consent for the largest potential turbines, it is not considered at this stage that there is a feasible alternative layout whilst maintaining economic viability. Further to this, it is not anticipated that there is a layout comprising turbines that are sufficiently small to materially alter the conclusions of the EIA, that will be commercially or economically deliverable.

217 The benefits of an offshore wind farm are evident, and reflected in national and international policy, the benefits of using larger turbines, beyond simple deliverability and economics include:

- ▲ A lower cost of energy to the end consumer;
- ▲ Greater reliability of the wind resource;
- ▲ Fewer turbines and therefore foundations (reducing environmental effects on the seabed and archaeological resources);
- ▲ Greater sea room and therefore a reduced interaction with shipping and navigation interests;
- ▲ Reduced bird collisions; and
- ▲ Fewer piling events, reducing the effects of underwater noise on marine mammals, fish, and shellfish.

218 The Applicant has not therefore been able to reduce the individual turbine parameters, but considers that all reasonable and feasible other changes have been implemented to minimise harm during the operational phase of the scheme, after which the effect, and any associated harm, is reversed following decommissioning.

#### 4.13.3 HDD under the Rhyl Golf Club, and refined landfall access/TCC;

219 Following receipt of the PEIR phase consultation responses, the option of transition joint bays within the Rhyl Golf Club was removed, and instead a commitment was made to HDD under the Rhyl Golf Club. HDD was brought forward to avoid interaction with the golf course, to mitigate disturbance as far as practicable. Whilst there will remain a need for access to the golf course during construction, to monitor drill progress, there will be no physical or direct impact to the operation of it. This option was in particular brought forward to address Denbighshire County Council's concerns with regards the viability of the golf course in the event TJBs were installed within it.



220 As a result of this refinement, and the need to coordinate construction of Awel y Môr with the operation of the Central Prestatyn Coastal Defence Scheme, a new landfall/ beach access route was introduced, with an associated temporary construction compound. The access route and TCC location were determined through consultee engagement, and consideration of the technical and environmental constraints. As the areas were outwith the boundary proposed within the PEIR, a further targeted consultation was undertaken, as described in paragraph 207 *et seq* and reported in the Consultation Report (application ref: 5.1).

#### 4.13.4 Refinement of the onshore export cable route, associated infrastructure, and optionality

221 Taking on board the PEIR phase consultee feedback, the entire cable route was also reviewed by the same multidisciplinary team assessing every request for a change to the route, and seeking to reduce the DOL where possible, re-route and select between alternatives put forward for consultation. The following text summarises why those modifications were implemented:

- The need for further refinement of the landfall;
- The need to define a final route corridor, and reduce the broad corridor down to a final narrow corridor that accommodates the cable width, plus working areas either side;
- Avoiding ecologically sensitive ponds;
- Reducing the requirement to cross PRow;
- Responding to consultation feedback and requests. This has influenced many of the post PEIR route refinements;
- The desire to reduce optionality at key crossing points including a marked reduction associated with the crossing of the A55 area;
- The requirement for construction compounds and cable construction access routes;
- Proactive changes to the onshore cable corridor route using the results of detailed ecological and archaeological surveys to inform the detailed route selection; and
- Design refinements to the HVAC substation.

222 The final route for the Awel y Môr application is considered to balance environmental and technical constraints whilst taking into account feedback from landowners and other stakeholders wherever feasible.

#### 4.13.5 Refinement of substation zone and associated accesses

223 Following the decision to locate the onshore substation within Zone 5, a process of micro-siting was undertaken to refine the best location for the substation, taking into account s42 consultee feedback, technical input, and ongoing ecological and archaeological surveys.

224 It is the Applicant's position, in accordance with the policies set out in both the extant and draft NPS EN-1, and based on extensive input from the multidisciplinary project team and stakeholder engagement, that the proposed onshore substation site awest of St Asaph's Business Park offers the most appropriate option for the siting of the Awel y Môr onshore substation.

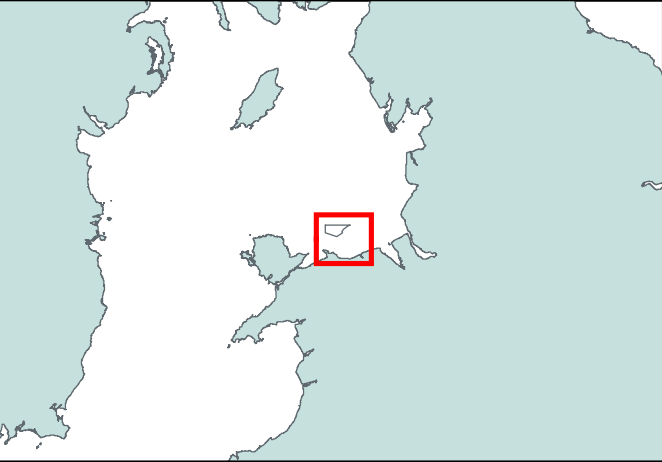
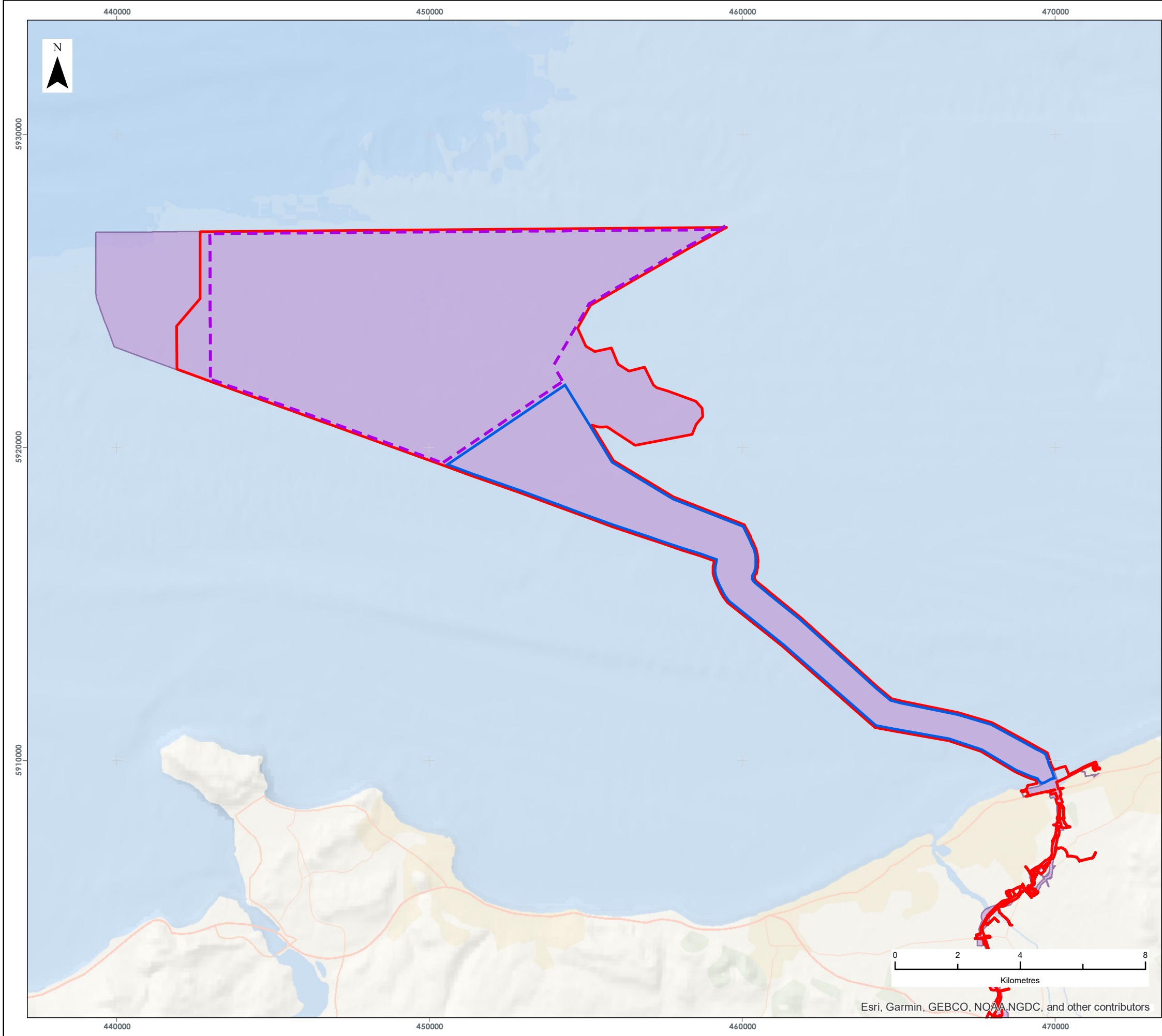
225 Following further electrical substation design, the location of the onshore substation has been refined when compared to the zone presented within the PEIR. The alignment of the substation was chosen to place it as far away from residential receptors as practicable, whilst maintaining appropriate distances from the nature reserve to the east. Further to this, the temporary construction compound was similarly located, to the northwest of the substation site, to place it as far as practicable from residential receptors whilst also utilising the available screening of the woodland to the west at Bodelwyddan to screen works from Bodelwyddan RPG.

226 Areas to the south and west of the proposed substation, within the former substation zone and construction compound zone, have been identified as suitable for strategic landscape screening, inclusive of tree planting to complement the surrounding woodland and tree species to the east and west of the zone. The preferred substation site benefits from existing topography such that appropriate planting will enable residential properties to the southwest to be screened over the lifetime of the project.

227 For the purposes of the PEIR, a number of potential operational and construction phase access zones were identified that have also been refined. The refinements, which include a lateral reduction in the width of the construction access zone and location as far east as possible in the zone, have been introduced to minimise traffic and noise-related impacts to residential properties on Glascoed Road, and through consultation with stakeholders, including DCC, Glascoed Road residents, councillors, and the landowner of Faenol Bropor, the preferred substation site.

#### 4.13.6 Refinement of the 400kv route

228 In line with the approach taken for the broader onshore export cable, the 400kv route was similarly refined to generally reduce the corridor from the 100m route to a preferred 40m route, and to minimise tree and hedgerow loss. Where practicable the final route has also been sited to distance works from nearby residential and commercial receptors. The route retains necessary flexibility in the approach to the National Grid substation by opening into a bell-mouth which will allow a suitable connection point to be identified by National Grid.



**LEGEND**

- Order Limits
- Array Area
- Offshore Export Cable Corridor
- PEIR Draft Order Limits

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

**PEIR and Order Limit boundary  
- Array and Offshore ECC**

VER	DATE	REMARKS	Drawn	Checked
1	20/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:

**Figure 23**

SCALE: 1:125,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm

Esri, Garmin, GEBCO, NOAA, NGDC, and other contributors





- LEGEND
- Order Limits
  - PEIR Draft Order Limits

Data Source:

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**PEIR and Order Limit boundary  
- Onshore Infrastructure**

VER	DATE	REMARKS	Drawn	Checked
1	19/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:  
**Figure 24**

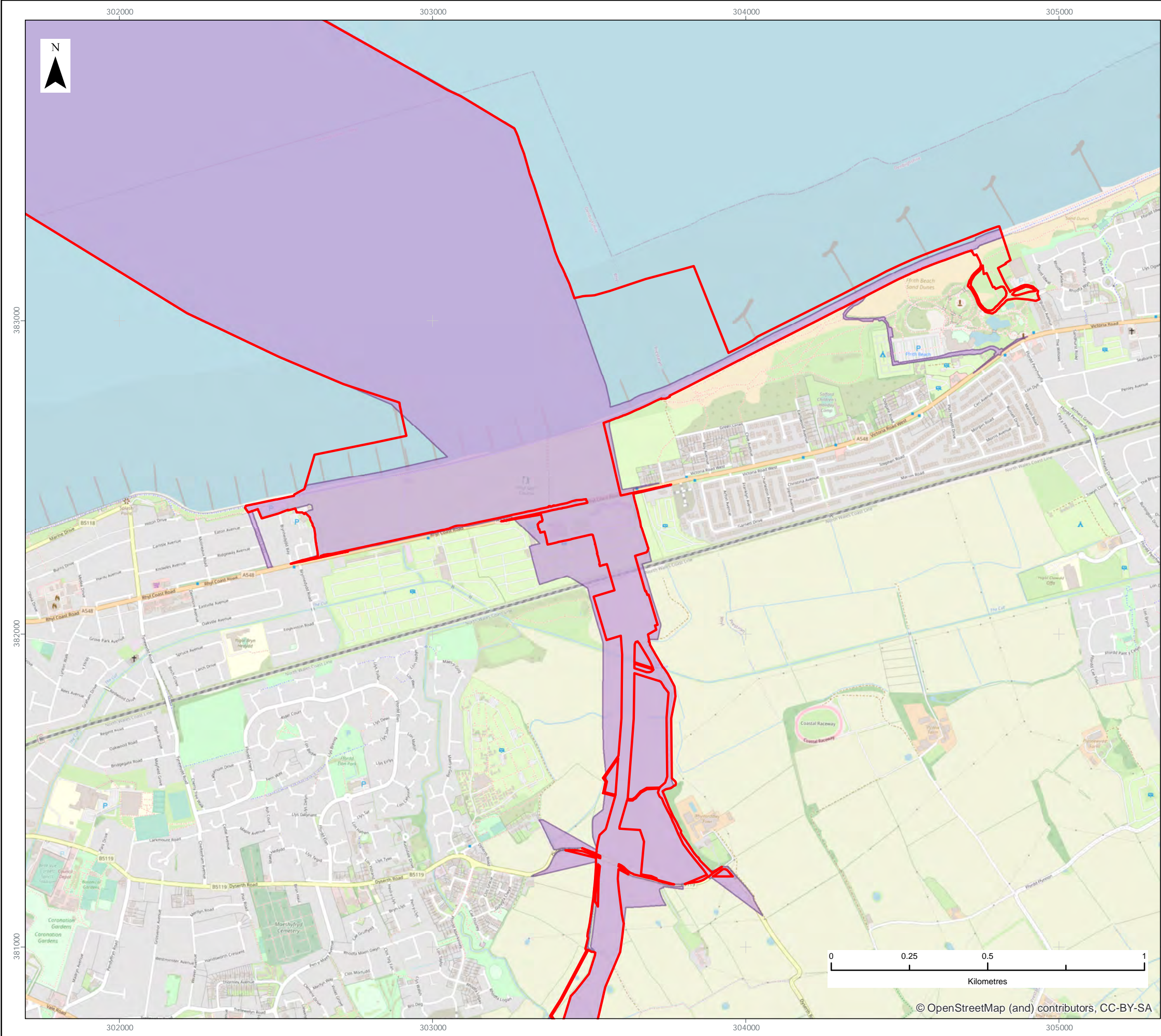
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Fferm Wynt Alltraeth

**AWEL Y MÔR**

Offshore Wind Farm





LEGEND

Order Limits

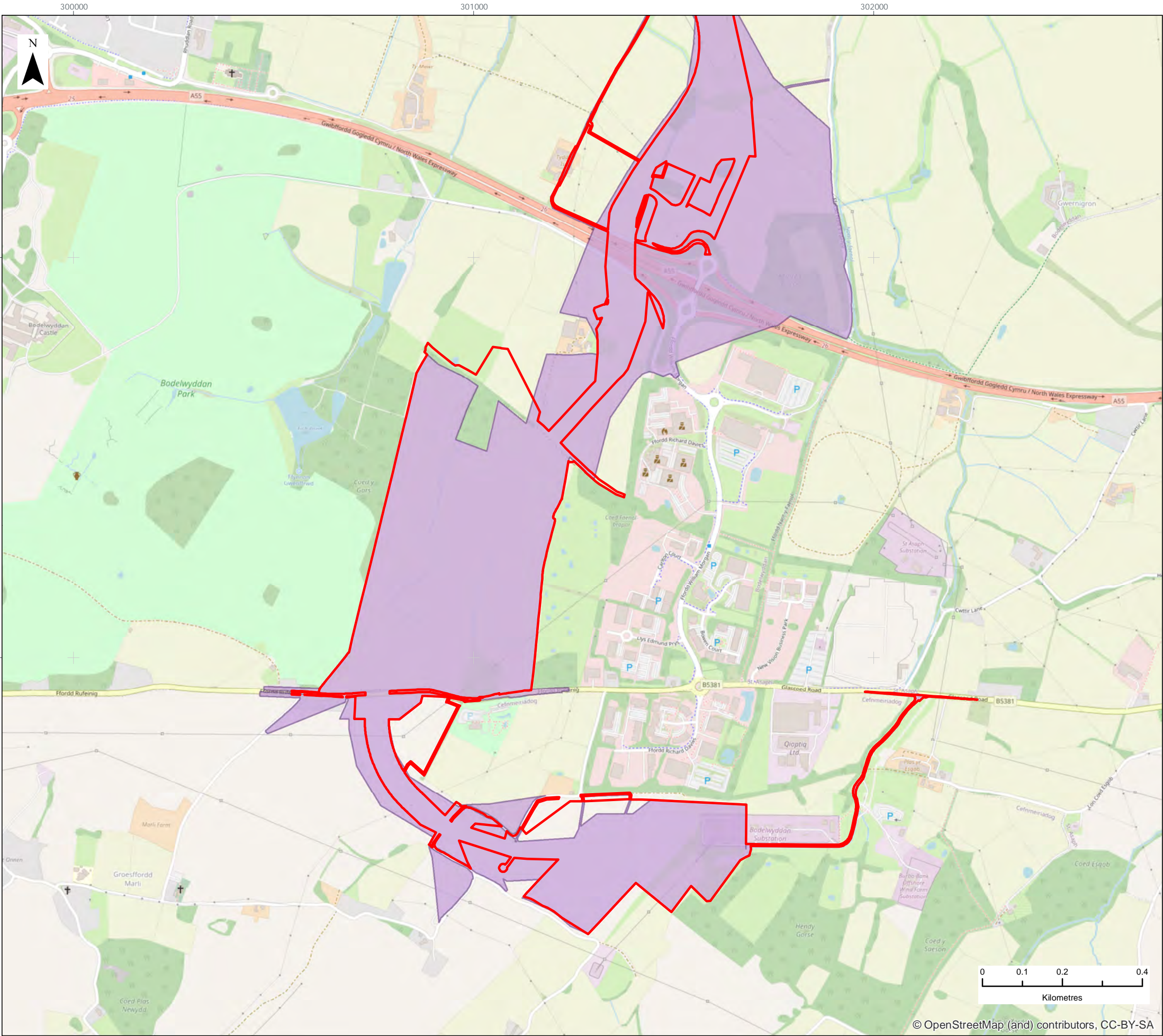
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Data Source:				
PROJECT TITLE:				
AWEL Y MÔR OFFSHORE WINDFARM				
FIGURE TITLE:				
PEIR and Order Limit boundary - Landfall				
VER	DATE	REMARKS	Drawn	Checked
1	19/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:				
Figure 25				
SCALE:	1:12,500	PLOT SIZE:	A3	DATUM:
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LEGEND

- Order Limits
- PEIR Draft Order Limits

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

**PEIR and Order Limit boundary  
A55 Optionality & Onshore substation**

VER	DATE	REMARKS	Drawn	Checked
1	19/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:

**Figure 26**

SCALE: 1:10,000	PLOT SIZE: A3	DATUM: ODN	PROJECTION: British National Grid
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm

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## 4.14 Stage 8 – submission of final design for the DCO and ML(s) application.

229 The Awel y Môr site selection work (as informed through stakeholder engagement, landowner discussions and technical studies) enabled the refinement of the project to the point of a final application that has benefited significantly from stakeholder feedback and the associated iterative design process. The following aspects of the proposed project have been refined to the details that are included within the application for DCO and ML(s):

- A refined array boundary area (See Figure 27) which reduces the total footprint from 88 km<sup>2</sup> within the PEIR to 78 km<sup>2</sup> for this formal application;
- A markedly reduced number of turbines, reducing the maximum number of larger turbines from 50 to 34, and the maximum number of smaller turbines from 91 to 50;
- An adaptive lighting management plan to reduce night-time impacts during periods of clear weather;
- A single preferred offshore cable corridor search area of ~1 km in width;
- A refined landfall at Rhyl (See Figure 28) which includes a commitment to HDD under the Rhyl Golf Club, and new TCC location to minimise interaction with the Rhyl Golf Club;
- A refined location for the landfall Transition Joint Bay to minimise interaction with Network Rail operations;
- A single preferred onshore cable corridor route of 40 to 60 m with associated accesses and TCCs (See Figure 29);
- Commitment to a number of trenchless crossings at waterbodies and other obstructions;
- A refined zone of crossing the A55, which has reduced the interaction with ecological receptors, and sought to align with strategic planning allocations;
- A single preferred and refined onshore HVAC substation site (See Figure 30), with associated accesses and TCCs; and



- ▲ A number of mitigation and compensation areas to adequately mitigate for ecological and landscape related impacts.

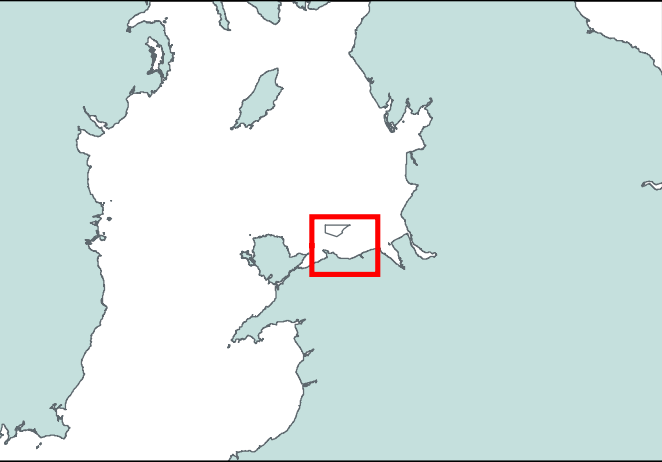
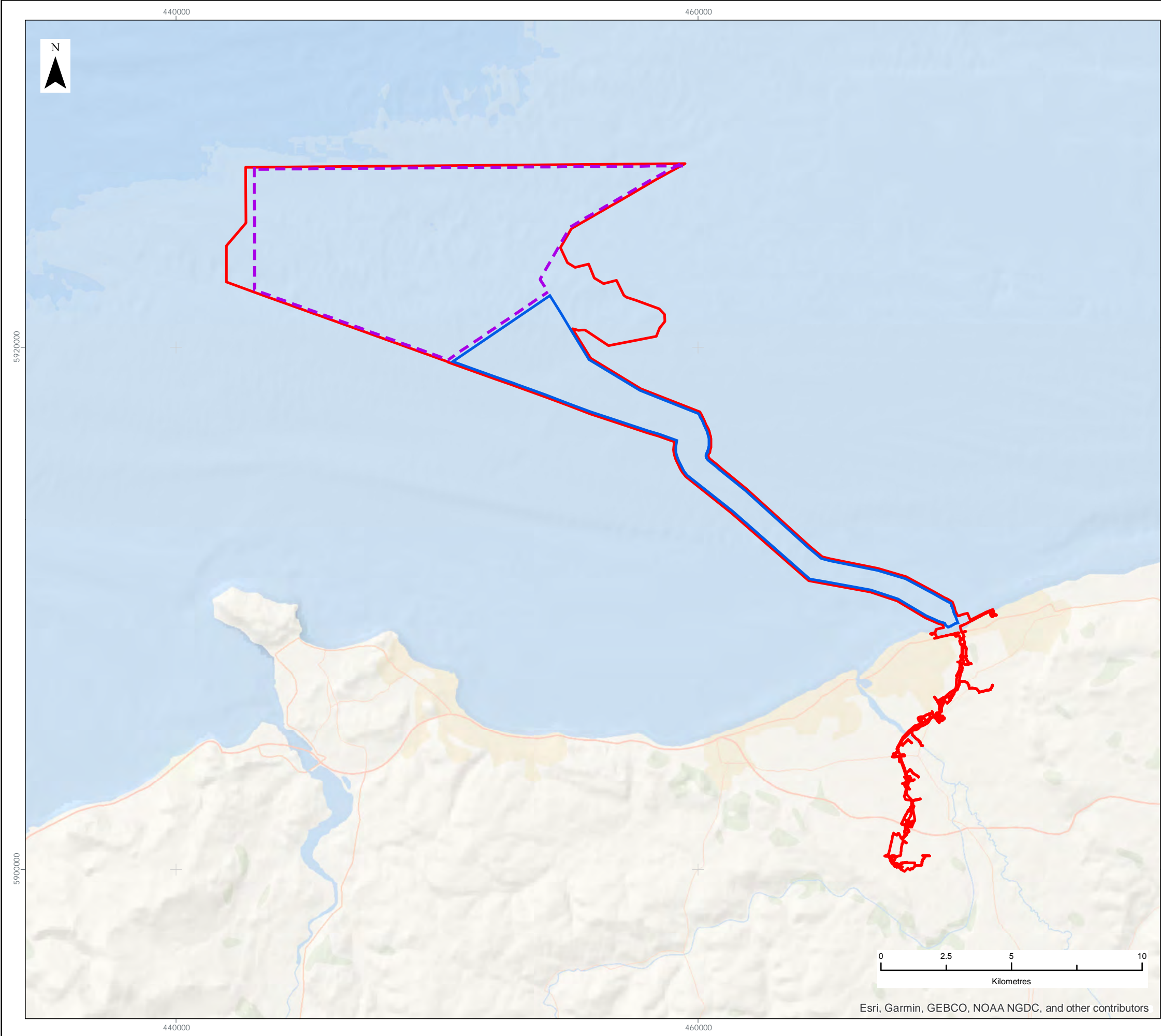
- 230 The offshore array boundary has decreased from a total lease area of 107 km<sup>2</sup> during the Scoping phase, to a maximum area of 78 km<sup>2</sup> for the final application. The process of refinement has been driven by regular and comprehensive consultation through both the statutory and non-statutory processes recorded in the Consultation Report and Evidence Plan Report respectively (application ref: 5.1 and 8.2 respectively). The area is now considered to balance the environmental, economic, and technical constraints, whilst taking into account feedback from stakeholders as far as practicable.
- 231 The offshore cable route and landfall area was informed by a number of technical and environmental factors, and similarly informed by consultee feedback through the statutory and non-statutory processes. The offshore route has avoided interaction with the Constable Bank sandbank feature, in response to stakeholder feedback received during and after the Scoping phase of the project. The landfall design has been modified to mitigate potential interaction with the Rhyl Golf Club and is considered to now balance environmental and technical constraints, and stakeholder feedback received during the PEIR consultation process as far as feasible.
- 232 The optimum route for an onshore grid connection can be considered to be the shortest route from A to B from landfall to the main NGET substation. The final route presented within this ES is considered to effectively achieve this optimisation, within the environmental, technical and social constraints that have been identified along the proposed cable route corridor.
- 233 Decisions made by the multi-disciplinary team in response to consultee comments and feedback, detailed technical, commercial and environmental studies, have directly informed the final route alignment and selection of the HDD locations. The final route includes, for example, an HDD under the woodland at Pengwern and a further HDD under woodland south of Rhyl to minimise potential ecological impacts and address landowner concerns. Similarly, the crossing of the A55 features a route that minimises ecological impacts at Princes Gorse whilst also minimising interaction and potential sterilisation of land identified as a key strategic allocation by aligning with existing infrastructure.

- 234 The final route for the Awel y Môr application can be seen in detail within the plans that accompany the application for Development Consent. This route is considered to balance environmental and technical constraints whilst taking into account feedback from landowners and other stakeholders wherever feasible.
- 235 The onshore substation footprint and associated compound were substantially reduced in extent from the larger search areas identified at PEIR, through refining the OnSS location. In addition, the alignment of the substation was adjusted slightly to optimise the location and increase the distance from residential receptors as far as practicable. The substation is also sited to reduce the overall visual effect and provide the greatest opportunity for screening possible. Strategic landscaping areas were identified to allow for additional tree planting and visual screening, in addition to that provided by the existing woodland around the site. Throughout the site selection process, these and previous refinements were made in an effort to take account of landowner and other stakeholder concerns and environmental constraints whilst providing a viable technical solution for the project by maintaining a site for an onshore substation.

## 4.15 Conclusion

- 236 The site selection process undertaken for Awel y Môr has concluded in the application for development consent for the areas and works assessed throughout this Environmental Statement. Wherever possible and practicable, the Applicant has sought to accommodate preferences and concerns raised by stakeholders through the site selection process whether by adjustments to the development boundary, areas of works, or designs being considered.

- 237 Examples of this regard to stakeholder comments are set out in the ES. The site selection process and alternatives considered have been through a process of detailed analysis of environmental, social, and engineering constraints, with key feasible alternatives taken forward for consultation either through the Scoping process, the Evidence Plan, or through the formal consultation undertaken on the PEIR. The consultation processes undertaken are summarised in this document and provided in full detail within the Consultation Report (application ref: 5.1) and the Evidence Plan Report (application ref: 8.2).
- 238 As detailed in Volume 1, Chapter 3: EIA Methodology (application ref: 6.1.3), the project has employed a MDS approach. Therefore, it is recognised that whilst the site selection process undertaken to date has included a number of refinements to the project envelope so far as practical, there remain some areas of flexibility in the final project design.
- 239 Whilst the detailed design of the offshore array and onshore substation has not yet been undertaken and is dependent on a number of factors including pre-construction baseline surveys, Site Investigation data, and further engineering studies, various documents within the application require subsequent agreement with the relevant authorities constrain how these project components could be built out in future. These include:
- ▲ The Draft DCO (application ref: 3.1), Volume 2 and Volume 3, Chapter 1: Project Description (offshore and onshore respectively (application ref: 6.2.1 and 6.3.1)) - prescribe the MDS which must be complied with for each component;
  - ▲ The outline Landscape and Ecological Mitigation Plan (application ref: 8.4) and the Design Principles document (application ref: 8.8) – provides commitments on the detailed design of key components, namely the principles that will guide the design of the OnSS and associated landscaping, including specifying which body is responsible for confirming that Awel y Môr complies with these requirements; and
  - ▲ The Works Plan(s) – Onshore works plans (Document Ref: 2.5) details the total area within which works associated with each component.



- LEGEND
- Order Limits
  - Array Area
  - Offshore Export Cable Corridor

Data Source:

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Final Order Limits  
- Array and Offshore ECC**

VER	DATE	REMARKS	Drawn	Checked
1	19/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:  
**Figure 27**

SCALE: 1:150,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM30N
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Esri, Garmin, GEBCO, NOAA NGDC, and other contributors





LEGEND

Order Limits

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:				
Final Order Limits - Onshore Infrastructure				
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1	19/04/2022	Issued for Site Selection Report	BPHB	SL

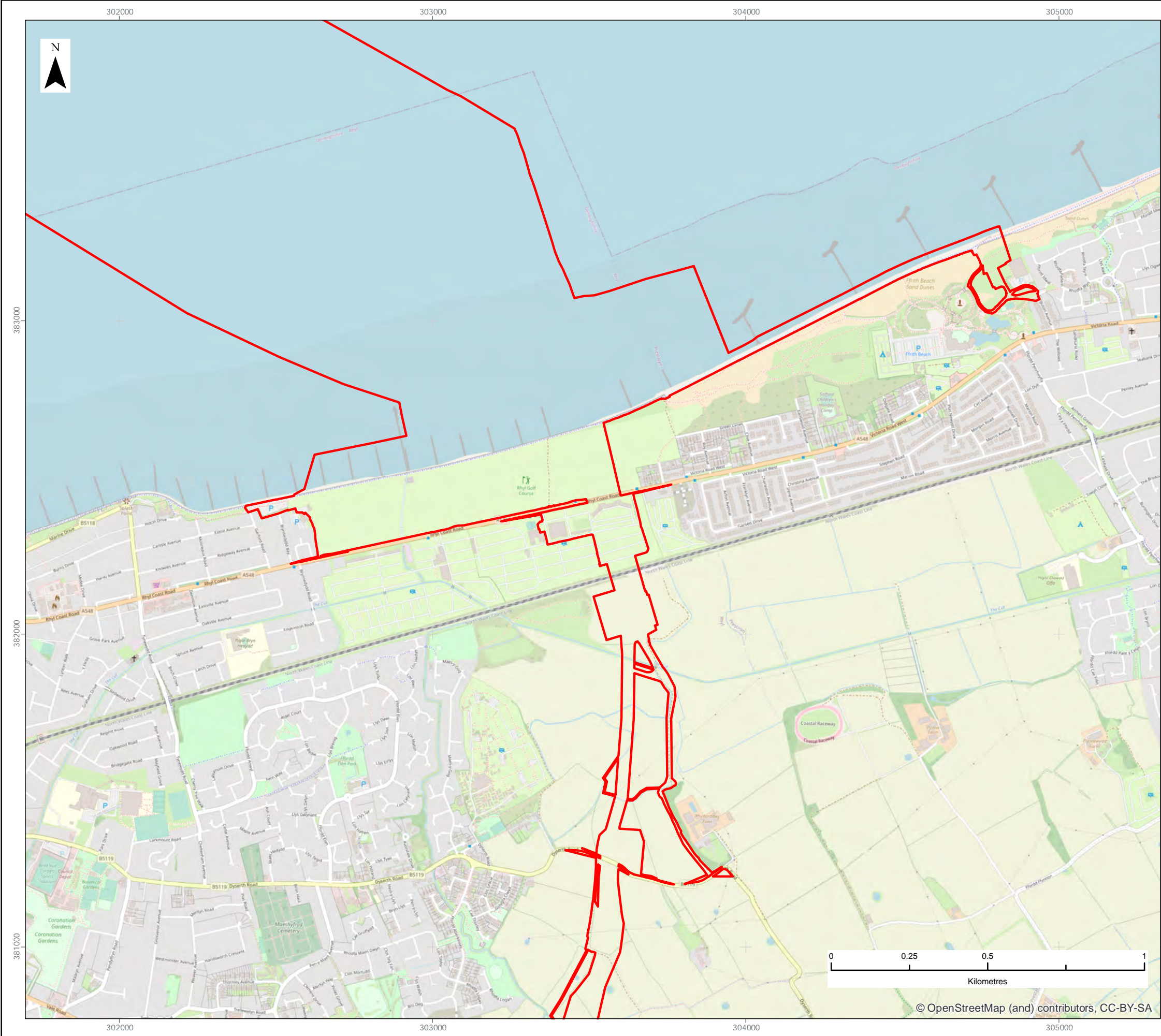
FIGURE NUMBER:

Figure 28

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LEGEND

Order Limits

Data Source:

PROJECT TITLE:  
*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:  
**Final Order Limits  
- Landfall**

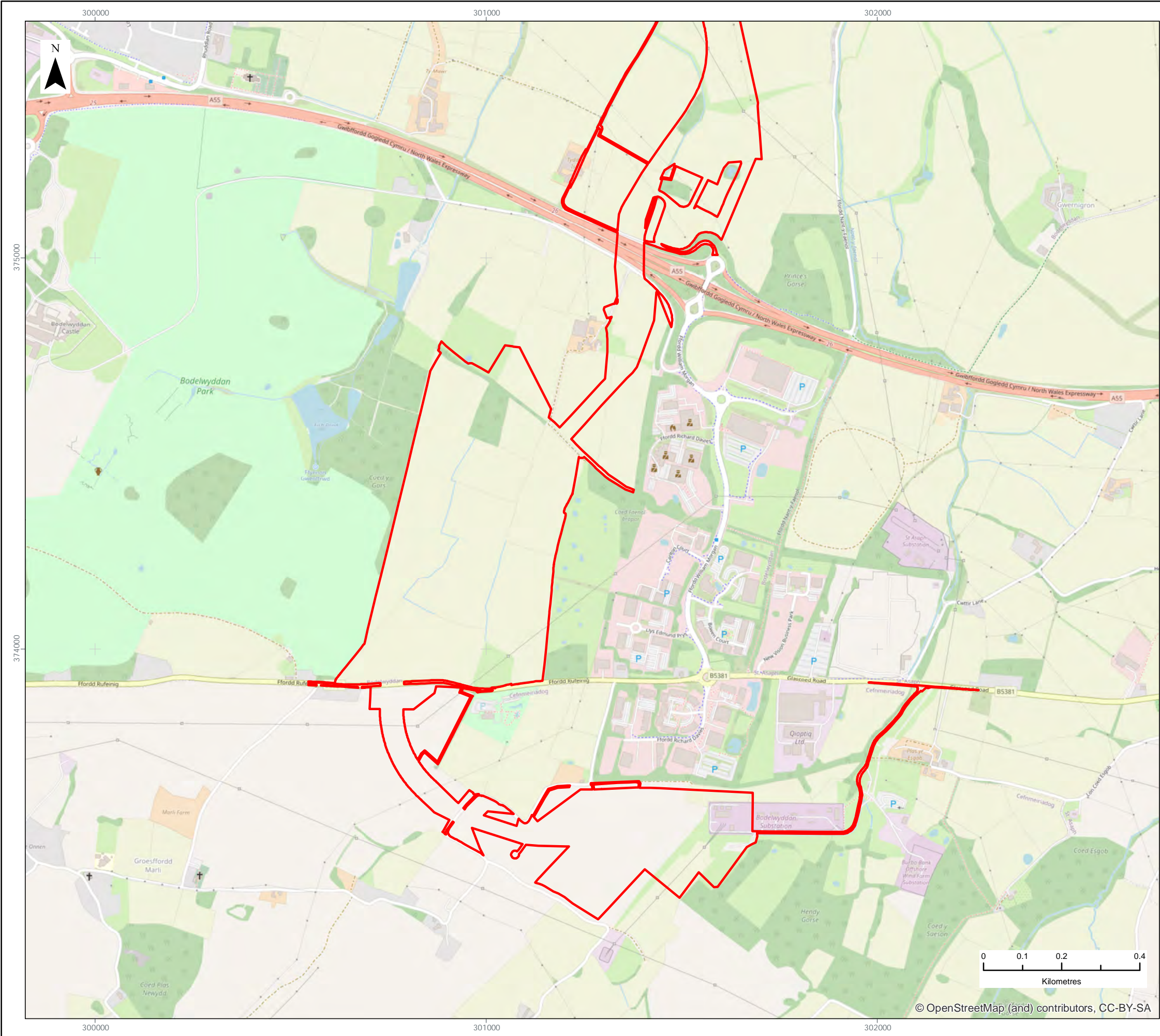
VER	DATE	REMARKS	Drawn	Checked
1	19/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:  
**Figure 29**

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LEGEND

Order Limits

Data Source:

PROJECT TITLE:

*AWEL Y MÔR OFFSHORE WINDFARM*

FIGURE TITLE:

Final Order Limits  
- Onshore substation

VER	DATE	REMARKS	Drawn	Checked
1	19/04/2022	Issued for Site Selection Report	BPHB	SL

FIGURE NUMBER:

Figure 30

SCALE: 1:10,000	PLOT SIZE: A3	DATUM: ODN	PROJECTION: British National Grid
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Fferm Wynt Alltraeth  
**AWEL Y MÔR**  
Offshore Wind Farm



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