



# Awel y Môr Offshore Wind Farm

## Category 6: Environmental Statement

### Non-Technical Summary

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# Glossary of terms

TERM	DEFINITION
Array area	The offshore area where the Wind Turbine Generators (WTGs) will be located.
Design envelope	A description of the range of possible elements that make up the Awel y Môr Offshore Wind Farm (AyM OWF) design options under consideration. The envelope is used to define Awel y Môr Offshore Wind Farm (AyM) for Environmental Impact Assessment (EIA) purposes when the exact final engineering parameters are not yet known. This is often referred to as the 'Rochdale Envelope' approach.
Development Consent Order (DCO)	An Order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating the magnitude of an impact with the importance or sensitivity of a receptor in accordance with defined criteria.

TERM	DEFINITION
Environmental Impact Assessment (EIA)	A process by which certain planned projects must be assessed before a decision to proceed can be made. It involves the collection and consideration of environmental information which fulfills the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
Horizontal Directional Drilling (HDD)	Method for the installation of cables underground using a drilling rig. HDD is an established example of a trenchless cabling installation technique.
Impact	The change upon a receptor that is caused, either directly or indirectly, by an action resulting from the construction, Operation and Maintenance (O&M) or decommissioning of the project being assessed.
Magnitude	The degree of change on the receiving environment determined by considering the extent, duration, frequency and reversibility of an impact.
Marine licence	A licence under the Marine and Coastal Access Act (MCAA) 2009 for certain works in the marine environment.
National Policy Statement (NPS)	A series of documents setting out national (UK) policy against which proposals for NSIPs are assessed and decided upon.
Nationally Significant Infrastructure Project (NSIP)	Large scale development (including offshore wind farms in Welsh waters with a generating capacity of over 350 Megawatts (MW)) which requires a DCO under the Planning Act 2008.
(Onshore and offshore) Export Cable Corridor (ECC)	The corridor within which the export cables will be located, allowing connection of the wind farm array offshore to the National Grid network onshore.

TERM	DEFINITION
Receptor	A component of the physical, biological or human environment that is affected by an impact.
Sensitivity	The extent to which a receptor can accept an impact based on consideration of its value, importance, vulnerability and recoverability.
Significance	The significance of an effect combines the magnitude of an impact with the sensitivity of the receptor being affected.
Statement of Community Consultation (SoCC)	A document explaining how consultation is planned to be conducted with the local community.

## Abbreviations and acronyms

TERM	DEFINITION
AEZ	Archaeological Exclusion Zone
AONB	Area of Outstanding Natural Beauty
AQO	Air Quality Objective
AyM	Awel y Môr Offshore Wind Farm
AyMOWFL	Awel y Môr Offshore Wind Farm Limited
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
CoCP	Code of Construction Practice
DCO	Development Consent Order
ECC	Export Cable Corridor

TERM	DEFINITION
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Field
ES	Environmental Statement
ETG	Expert Topic Group
GVA	Gross Value Added
GyM	Gwynt y Môr Offshore Wind Farm
HDD	Horizontal Directional Drill
HRA	Habitats Regulations Assessment
INNS	Invasive and Non-Native Species
LVIA	Landscape and Visual Impact Assessment
MCAA	Marine and Coastal Access Act
MHWS	Mean High-Water Springs
MLWS	Mean Low-Water Springs
NGET	National Grid Electricity Transmission
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
OLEMP	Outline Landscape and Ecological Management Plan
O&M	Operation and Maintenance

TERM	DEFINITION
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Management Plan
PINS	The Planning Inspectorate
PPEIRP	Project Pollution and Emergency Incident Response Plan
PRoW	Public Right of Way
RD	Rotor Diameter
RSPB	Royal Society for the Protection of Birds
SABP	St. Asaph Business Park
SAR	Search and Rescue
SLVIA	Seascape, Landscape and Visual Impact Assessment
SoS	Secretary of State
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
SUDS	Sustainable Urban Drainage Systems
TCC	Temporary Construction Compound
TCE	The Crown Estate
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
WTG	Wind Turbine Generator

# Units

UNIT	DEFINITION
km	Kilometre
km <sup>2</sup>	Square kilometre
kv	Kilovolt
m	Metre
mg/l	Milligram per litre
MW	Megawatt
nm	Nautical mile
%	Percent

# Non-Technical Summary

## 1 Introduction

### 1.1 The Non-Technical Summary

- 1 This document is a Non-Technical Summary (NTS) of the Environmental Statement (ES) for the Awel y Môr Offshore Wind Farm (hereafter referred to as AyM). The NTS provides summary details of AyM, as well as a description of the existing environment in and around the development area. The NTS also presents a summary of the key findings of the Environmental Impact Assessment (EIA) undertaken for AyM.
- 2 Mae cyfieithiad Saesneg o'r Crynodeb Annhechnegol yma ar gael drwy wefan y prosiect ([www.awelymor.cymru](http://www.awelymor.cymru)).
- 3 The ES sets out the findings of the EIA to support the Development Consent Order (DCO) and marine licence applications. The focus of the EIA is on the assessment of the environmental impacts which are likely to have significant effects on the environment. The NTS is intended to act as a standalone document providing an overview of the environmental effects of the proposed development using non-technical language. For more detailed information, the full ES should be referred to, which will be published on the project page of the Planning Inspectorate's website.

### 1.2 Introduction to the Awel y Môr offshore wind farm

- 4 AyM is a proposed sister project to the operational Gwynt y Môr Offshore Wind Farm (hereafter referred to as GyM) off the coast of North Wales (Figure 1). GyM has been operational since 2015 and has invested £90m in Wales during construction, and has since created more than 100 long-term, skilled jobs at the Port of Mostyn.

- 5 In February 2017, The Crown Estate (TCE) announced the opportunity for developers to apply for project extensions to operating offshore wind farms. Eight applications were received, including AyM, which met the specified criteria. In August 2019, TCE published a plan-level Habitats Regulations Assessment (HRA) which assessed the potential impacts of the proposed projects on relevant nature conservation sites of the National Site Network. Seven of the eight extension projects, including AyM, proceeded to the award of leasing rights as part of the 2017 extensions round. The Agreement for Lease for AyM was awarded in Summer 2019.
  
- 6 AyM will comprise an array of offshore Wind Turbine Generators (WTGs) in Welsh waters with an overall capacity greater than 350 Megawatts (MW) and therefore constitutes a Nationally Significant Infrastructure Project (NSIP) under Section 15(3B) of the Planning Act 2008. Such projects require a DCO to be granted by the relevant UK Secretary of State (SoS); in this case, the SoS for Business, Energy and Industrial Strategy (BEIS). Marine planning is a matter which is devolved to the Welsh Government, and therefore a marine licence is also required under the Marine and Coastal Access Act 2009. The Applicant is seeking these consents through parallel applications to the SoS for BEIS and Welsh Government, respectively.

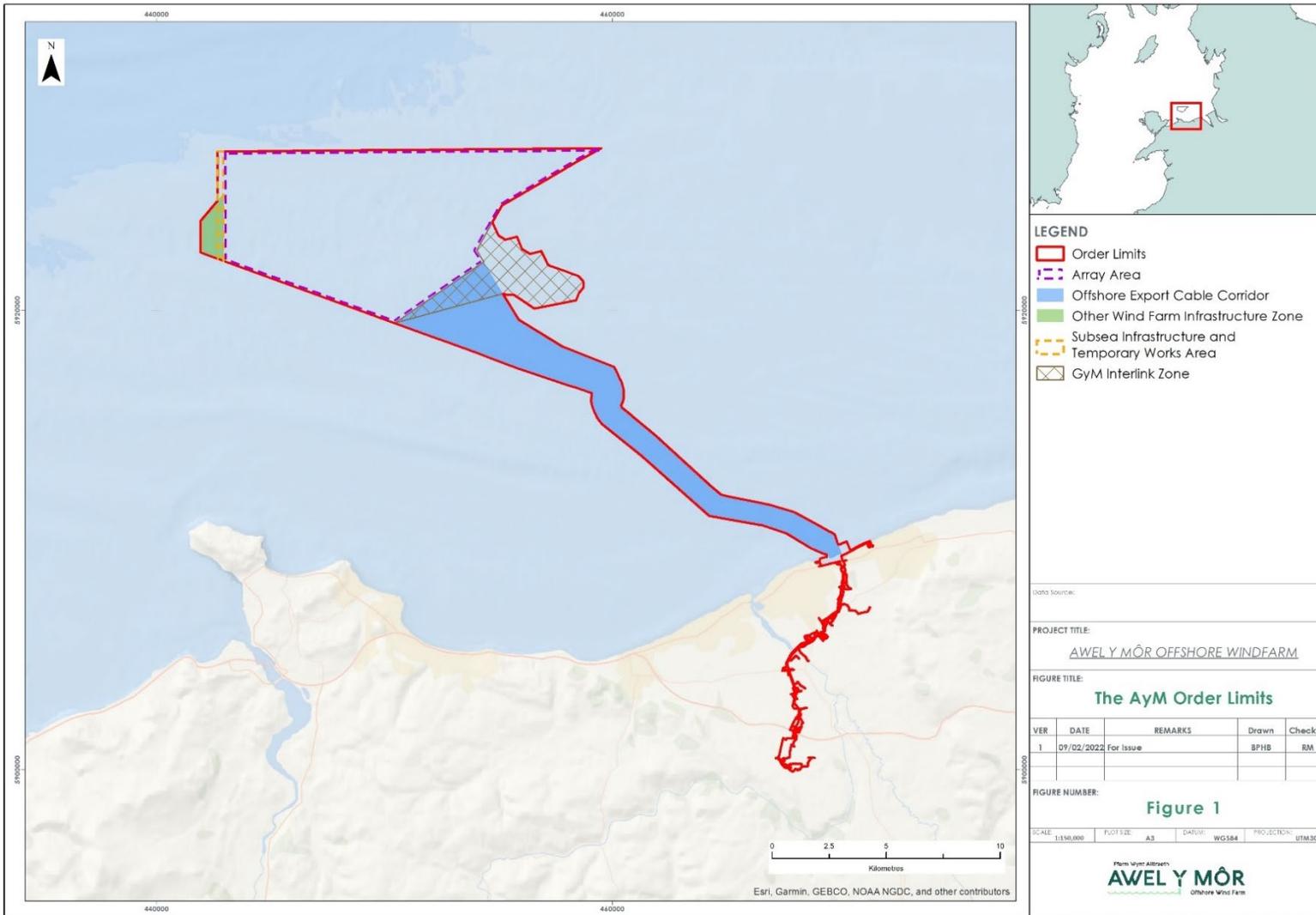


Figure 1: The AyM Order Limits.

## 1.3 Purpose of the Environmental Statement

- 7 The ES sets out the findings of the EIA to support the DCO and marine licence applications. The ES has been informed by, and its scope is based upon, a Scoping Opinion received from the Planning Inspectorate (PINS). It also builds on, and updates information provided in the Preliminary Environmental Information Report (PEIR). Feedback from the PEIR consultation has been considered and has informed both the final design of AyM as well as the content of this ES. Further details on the requirements of the DCO and marine licence applications are provided in Volume 1, Chapter 2: Policy and Legislation (application ref: 6.1.2).

## 1.4 About the Applicant

- 8 The project partners of Awel y Môr Offshore Wind Farm Limited (AyMOWFL) ('the Applicant') are RWE (60%), Stadtwerke München (30%) and Siemens Financial Services (10%). RWE is leading the development of the project on behalf of the project partners.
- 9 RWE generates one third of all Wales' renewable energy, making it the largest renewable energy operator in Wales. RWE aims to make a significant contribution towards Welsh Government targets to generate 70% of electricity needs from renewable energy sources by 2030 and to reach net-zero carbon emissions by 2050.
- 10 As a responsible developer, RWE has also looked to upskill the future generation through creation of its Wind Turbine Apprenticeship Programme in partnership with Grŵp Llandrillo, which officially opened in 2012. The course has trained a number of new apprentices producing high quality technicians who are primarily deployed on offshore and onshore wind farms, both locally and across the United Kingdom (UK).

## 1.5 Consultation

- 11 It is a statutory requirement for promoters of NSIPs to engage in pre-application consultation with local communities, local authorities, and anyone who may be directly affected by the proposals. AyM produced a Preliminary Environmental Information Report (PEIR) to inform consultees about AyM and the likely significant effects associated with the construction, operation, maintenance and decommissioning phases of the project.
- 12 The publication of the PEIR represented the start of the formal consultation process required under the Planning Act 2008. The process concluded on 11 October 2021, after which the Applicant was obliged to review feedback and have due regard to it, as the assessments were finalised in the ES. A full description of how feedback has been incorporated into the EIA and DCO and marine licence applications is presented in the Consultation Report (application ref: 5.1).

## 2 Policy and legislation

- 13 This section of the NTS summarises the consents framework and key legislation and policies that are relevant to the development of AyM within the EIA process. A full description of relevant policy and legislation is described within Volume 1, Chapter 2: Policy and Legislation of the ES (application ref: 6.1.2).

### 2.1.1 Climate change and the role of renewable energy

- 14 UK legislation relating to climate change and renewable energy is underpinned by a number of international agreements. The United Nations Framework Convention on Climate Change (UNFCCC) commits its parties to setting binding targets for reductions in greenhouse gas emissions. The UK is a signatory to the Kyoto Protocol, an international agreement linked to the development and implementation of the UNFCCC, which came into effect in 2005, and was transposed into UK law via the Climate Change Act 2008. A series of regular meetings of the UNFCCC has been held, resulting in several important and binding agreements, including the Copenhagen Accord 2009, the Doha Amendment 2012, and the Paris Agreement 2015.

- 15 The Climate Change Act 2008 places a duty on the UK Government to ensure its net carbon account and greenhouse gas emissions are reduced by 80%, relative to 1990 levels, by 2050. In 2019, the UK Government increased its target reduction to 100% (net zero carbon emissions).
- 16 The central objective of UK Government policy is to ensure the security of energy supply, whilst responding to the challenge of climate change by reducing carbon emissions. To meet its objectives, more renewable energy infrastructure is required, with an increased emphasis on generation from renewable and low-carbon sources, including offshore wind. The UK's commitment to renewable energy generation is captured through the publication of the National Policy Statements (NPSs) for Energy, Renewable Energy and Electricity Networks Infrastructure (NPS EN-1, 3 and 5, respectively).
- 17 In 2019, the Welsh Government declared a climate emergency with the hope of triggering a wave of action to tackle climate change in Wales, and internationally. Several local authorities in North Wales have also declared climate emergencies since. AyM is being developed with the aim of contributing to Welsh Government targets to generate 70% of electricity needs from renewable sources by 2030.
- 18 UK Government targets for offshore wind have been noted as 40GW by 2030 within the draft National Policy Statements (NPS). A revision has been introduced in the April 2022 UK Government Energy Security Strategy to increase this from 40GW to 50GW by 2030, 45GW of which is targeted to be provided by offshore wind.

### 2.1.2 Consent framework and the EIA

- 19 AyM is defined as an NSIP. The Planning Act 2008 sets out a comprehensive statutory framework for the principal consents required to construct, operate and decommission NSIPs, together with associated infrastructure.

- 20 Permission to build and operate an NSIP is provided through a DCO which, in the case of energy infrastructure, is granted by the SoS for BEIS. Marine planning in Wales is a devolved process, and a separate marine licence is also required from the Welsh Government under the Marine and Coastal Access Act 2009 (MCAA).
- 21 In support of these processes, applicants are required to undertake an EIA for certain types of development, including offshore wind farms. The legislative framework for EIA was provided by European Directive 2011/92/EU (the 'EIA Directive'), which is transposed into UK law through the Infrastructure Planning (EIA) Regulations 2017 and the Marine Works (EIA) Regulations 2007 (as amended), as relevant to the DCO and marine licensing processes, respectively. In the ES, these are collectively referred to as 'the EIA Regulations'.

### 3 EIA methodology

- 22 This section presents an outline of the EIA methodology that has been employed for AyM in the preparation of the ES. The EIA for AyM describes the potential effects on the environment arising from the construction, Operation and Maintenance (O&M), and decommissioning of the project. If significant effects are predicted, it identifies mitigation to reduce the significance of these effects (where practicable). A full description of the EIA methodology used is described within Volume 1, Chapter 3: EIA Methodology (application ref: 6.1.3).
- 23 The EIA process can broadly be summarised as consisting of three main elements:
- ▲ **Scoping:** The Applicant can request a formal Scoping Opinion from the relevant authority, setting out what the EIA should consider in broad terms;
  - ▲ **Consultation:** The Applicant is required to conduct pre-application consultation (including community consultation) in accordance with the Planning Act 2008 and associated guidance. The PEIR formed the basis of this statutory consultation and was prepared in the format of a draft ES;
  - ▲ **ES preparation:** The ES is prepared in consideration of the responses received during the formal consultation and is submitted as part of the suite of application documents.

### 3.1.1 Consultation and scoping

- 24 Scoping is the process of identifying the issues to be addressed during the EIA process. On 11 June 2020, the Applicant submitted a Scoping Report for AyM to the Planning Inspectorate (PINS). This document specified which environmental assessments would be conducted for the proposed development and provided rationale for assessments that would not be undertaken. In response, AyM received a Scoping Opinion from PINS on behalf of the SoS on 22 July 2020, that highlighted a number of areas that consultees wished to see addressed within the EIA. These responses, together with other consultation responses provided throughout the EIA process, have been taken into account in identifying the scope for the EIA. The scope has also been informed by the nature, size and location of the proposed development.
- 25 Following scoping, Expert Topic Group (ETG) meetings were held via an Evidence Plan process: a series of regular consultation meetings with key stakeholders on technical matters included within the EIA process.

### 3.1.2 The PEIR

- 26 The Applicant produced a PEIR, adopting a draft ES format, that formed the basis of statutory consultation. The PEIR was published on 31 August 2021 and open to feedback from consultees, including the community, for a period of six weeks, until 11 October 2021. The PEIR provided an early assessment of predicted environmental impacts potentially brought about by AyM, using the data available at the time. The PEIR provided sufficient information for consultation with the public, statutory and non-statutory consultees, and provided information on the predicted impacts arising from the construction, O&M and decommissioning of the development and the assessment methodologies to be used within the ES.

27 The potential environmental effects of AyM have been assessed for each relevant topic area (as agreed during the scoping phase), by comparing the baseline environment with the expected conditions that would prevail should the development go ahead. The baseline environment is determined through desk studies and surveys and was agreed through the Scoping Report, the Evidence Plan process, and other formal consultation processes.

### 3.1.3 Approach to EIA

28 The assessment of each topic forms a separate chapter within the ES, with interlinkages clearly identified, such as the link between fish ecology and fish as a prey resource for marine mammal ecology. Each chapter addresses:

- ▲ Policy and statutory context;
- ▲ Consultation responses related to that topic to date;
- ▲ The scope and methodology of the assessment;
- ▲ A description of the relevant existing environment;
- ▲ Key parameters for assessment, based on the project design that defines the maximum worst-case scenario, known as the 'Rochdale Envelope' or 'design envelope';
- ▲ Identification of embedded mitigation that has already been adopted as part of the project design to date;
- ▲ An assessment of potential environmental effects related to that topic;
- ▲ Identification of residual impacts (taking into account embedded and further mitigation);
- ▲ Identification of cumulative, transboundary and inter-related effects; and
- ▲ Identification of any requirements for further mitigation and/ or monitoring to date.

### 3.1.4 Existing environment

29 The description of the existing environment describes the baseline condition upon which the assessments have been made, forming the foundation of the evidence-based approach. The existing environment of the site and study area form the basis of each assessment, enabling the likely significant effects of the project to be identified. The description of the existing environment draws on site-specific data collected for the purposes of the assessment, as well as information and data from sufficiently similar investigations to inform the understanding of the baseline and/ or impact assessments. As AyM sits adjacent to the existing GyM, extensive data from the EIA, baseline and monitoring for GyM are available which provide both raw data and modelling that are relevant to the assessments for AyM. Where possible, appropriate and agreed with the relevant stakeholders, RWE has used this existing data to aid in the EIA process.

### 3.1.5 The 'Design Envelope' approach

30 The design envelope is a term used to identify the range of possible options within the project which characterise the maximum parameters, such as the maximum wind turbine blade tip height or longest length of cable that may be developed. In practice, these maximum design parameters act as an envelope which can be assessed, whilst also limiting the developer by defining maximum parameters, replicated in any consent, which cannot be exceeded.

31 Within the maximum extents, the approach gives the developer a certain amount of flexibility to respond to future best practice and changes in technology. Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of submitting the application. PINS guidance recognises that in these circumstances it is appropriate for the maximum design scenario to be assessed.

32 In order to ensure the developer does not exceed the assessed parameters, the parameters used for the assessment need to be clearly defined in the DCO and therefore in the accompanying ES. This provides confidence that the Proposed Development within the DCO (as built) would not result in significant effects beyond those assessed in the ES.

### 3.1.6 Embedded mitigation

33 The EIA process is an integral and ongoing part of the project appraisal and design process. During the EIA, the likely significant effects have been considered and have been taken into account within the ongoing design process. The EIA has therefore been used as a means of informing and improving the project design. The project assessed within the ES consequently includes a range of measures that have been designed to reduce or prevent significant adverse effects from occurring; these measures are called mitigation.

34 The assessment has taken into account both 'embedded' (or designed-in) mitigation measures and 'applied' mitigation measures.

### 3.1.7 Assessment of effects

35 The ES sets out an assessment of the likely effects during all phases of the project life cycle (construction, O&M, and decommissioning) based on the likely magnitude of the predicted impacts, and the sensitivity of the receptor(s). The magnitude of impact takes into account its spatial extent, duration, frequency and severity, and can be designated as 'high', 'medium', 'low' or 'negligible'. Impacts are also identified as 'adverse' (negative), or 'beneficial' (positive). The sensitivity of a receptor is also assessed as 'high', 'medium', 'low' or 'negligible'. The assigning of these criteria to impacts and receptors are based on current understanding, expert knowledge and guidance, which are defined and presented within the ES chapters. It is important to note that, where individual assessments differ from the methodology presented here based on industry guidance, these are clearly defined within the relevant chapters.

36 Once the magnitude and sensitivity have been assessed, these are combined in a matrix to give the significance of the effect (Table 1). Effects of 'moderate' or 'major' are deemed to be 'significant' in EIA terms, whereas effects of 'minor' or 'negligible' are deemed to be 'not significant' in EIA terms.

Table 1: Matrix used to determine the significance of effect.

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

### 3.1.8 Cumulative, transboundary and inter-related effects

37 The EIA Regulations require a consideration of cumulative effects, which are effects on a receptor that may arise when the project is considered together with other proposed developments in the area. Cumulative effects are assessed and reported within each topic chapter of the ES, using the methodology outlined in Volume 1, Annex 3.1: Cumulative Effects Assessment (application ref: 6.1.3.1).

38 A consideration of transboundary effects is also given in each topic chapter, based on the outcome of the transboundary screening presented in Volume 1, Annex 3.2: Transboundary Screening (application ref: 6.1.3.2). Transboundary effects are those that may impact the interest of territories outside the UK Exclusive Economic Zone (EEZ).

39 There is also a requirement to consider inter-related effects between topics and across multiple project phases which may lead to environmental effects of greater significance than when they are considered in isolation. A consideration of inter-related effects is given in Volume 2, Chapter 14: Inter-related effects (application ref: 6.2.14).

## 4 Site selection

40 This section summarises the site selection process and approach undertaken for AyM to identify the various elements of the site and the alternatives (both onshore and offshore) which have been considered as the project has been developed.

41 The approach taken for the development of AyM has been based on early engagement with a range of stakeholders, together with a range of electrical, engineering, environmental, and socio-economic appraisals. Stakeholder engagement has been a key aspect of the project design, with each phase of consultation undertaken being designed to provide opportunities for stakeholders to review and provide information in order to influence the relevant project design decisions.

42 A full description of the site selection process is provided in Volume 1, Chapter 4: Site Selection and Alternatives (application ref: 6.1.4).

43 An overview of the process of site selection and the associated consultation that has informed the project design, is illustrated in Figure 2 below. It is important to note that, whilst the site selection process is illustrated and described as a linear approach in this document 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.

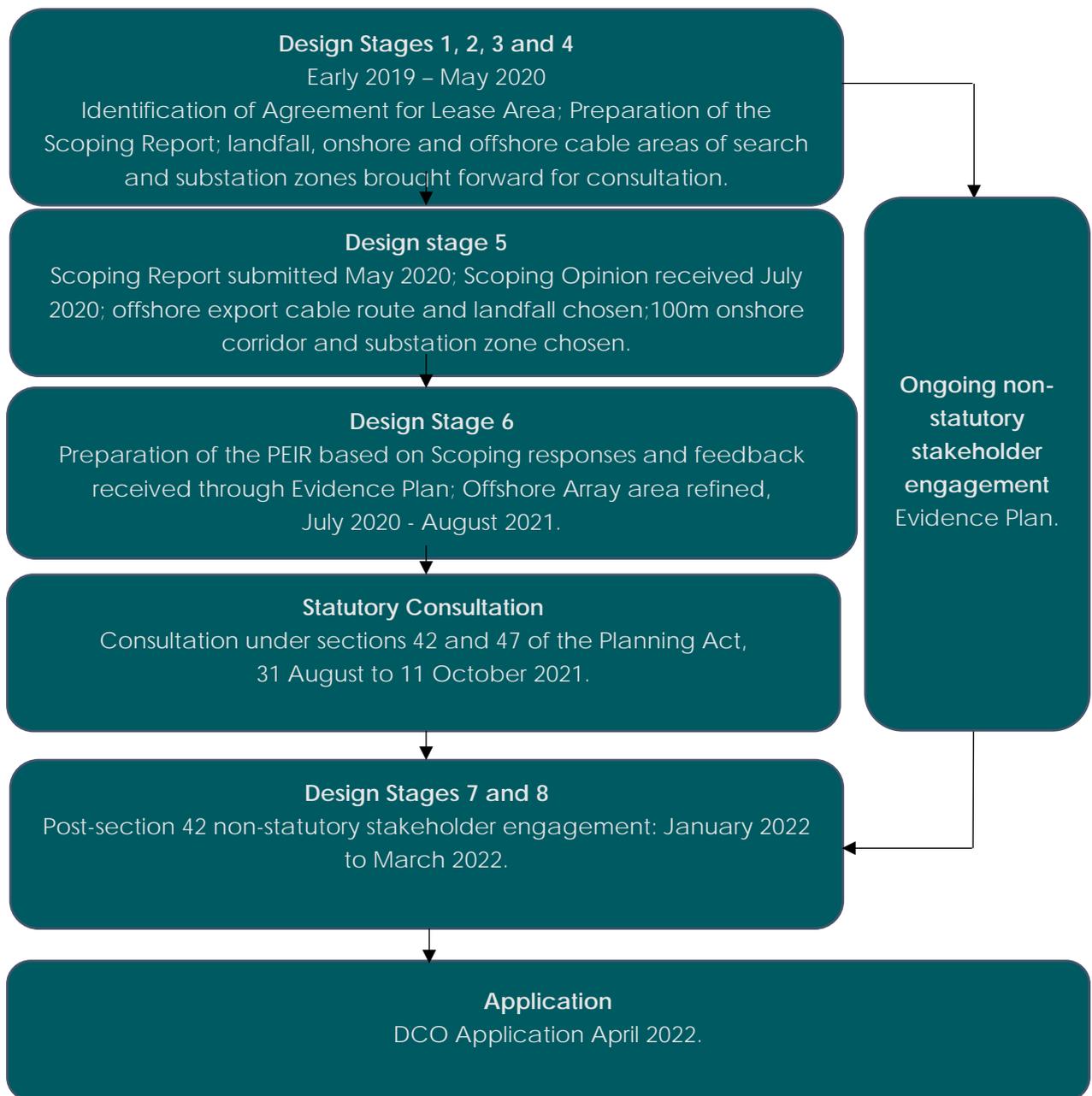


Figure 2: Summary of the AyM site selection process.

## 4.1 Stage 1 – Identification of the Array area

- 44 Further to the Welsh and UK Government’s confirmed policies in support of offshore wind, there is a need to identify the best sites around the UK for a rapid increase in offshore wind development to occur and for renewable energy targets to be met. Given the presence of GyM, AyM’s sister project, the region is identified as a good site for wind resource; confirmed by the operational output of GyM.
- 45 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.
- 46 Following an initial consideration of environmental parameters and constraints, an area of search was determined as a preliminary offshore boundary to delineate the location of offshore WTGs. The initial boundary was identified through an analysis of engineering, environmental, economic and consenting risks and subject to further feasibility studies for key areas of interest.
- 47 In parallel with this, existing environmental ‘hard constraints’ were considered, based on spatial data and an understanding of the likely constraints. The initial study considered an extension of GyM with a longer extension to the north-west on the basis of wind resource availability.

48 Following more detailed feasibility studies including shipping and navigation, offshore ornithology, underwater noise, and seascape, landscape and visual impacts, consultation was held with members of the EIA Evidence Plan ETG for Seascape, Landscape and Visual Impact Assessment (SLVIA) and Cultural Heritage<sup>i</sup>. The conclusion of the design process noted in Figure 2 against Stages 1-6, stakeholder consultation and public consultations, was therefore to revise the proposed boundary, reducing the north-westerly spread of the proposed development.

## 4.2 Stage 2 – Identification of Grid Connection Location

49 The connection of energy generating stations (such as OWF projects) to the National Grid, is managed through a controlled process by National Grid Energy Transmission Ltd (NGET). Initial proposals were made to make a grid connection at Bodelwyddan, the National Grid substation where the existing GyM connects into the National Grid. Since AyM is located in close proximity to GyM, a grid connection at the same location in Bodelwyddan is both practical and logical, given the previous work in determining a suitable and consentable grid connection.

50 Following on from the NGET offer of grid connection in Q2 2020, an initial desk-based assessment of potential landfall options on the North Wales coast was undertaken. This assessment looked into several environmental and technical constraints. Further engineering feasibility studies considered aspects such as construction space, ground conditions and access. The result was that an offshore cable route area of interest was delineated alongside the wind farm boundary, incorporating options for cable routing and landfall at three locations along the North Wales coast.

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<sup>i</sup> The EIA Evidence Plan is formed of a range of expert statutory, government, and non-governmental organisations providing advice on topics such as ecology, SLVIA, human environment, and offshore ornithology. Representatives on the Evidence Plan include Denbighshire County Council, NRW, and RSPB.

### **4.3 Stage 3 and 4 – Identification of Project for Scoping, and Consultation**

- 51 Stage 3 of the AyM design process involved the identification of the offshore Export Cable Corridor (ECC) and landfall zone(s). During Stage 3 of the route design work, existing infrastructure such as railways, roads, ports, recreational areas and built-up areas were considered in an initial search area. The initial search area encompassed the North Wales coast. Following an initial appraisal, six options were brought forward for consideration.
- 52 Following a grid connection application, further onshore cable routing work, a site walkover, input from electrical design and construction specialists, and consultation with stakeholders via the EIA Evidence Plan process, individual areas of search were identified for the offshore ECC landfall.
- 53 Stage 4 involved the identification of the onshore cable corridor and substation zone. In parallel with the Scoping phase of the AyM project, in May-July 2020, a long list of onshore cable corridors within the overall area of search was identified.
- 54 The substation area of search was defined as a 3 km buffer around the grid connection point at Bodelwyddan National Grid substation; this buffer distance was considered appropriate in order to minimise the works associated with an onward 400kV connection between the AyM OnSS and the National Grid substation. The boundary of the 3 km buffer was further refined to avoid the area of Bodelwyddan, existing settlements and environmental designations where possible. In May-July 2020, a longlist of substation zones within the overall search area was identified in parallel with the AyM project's Scoping phase.

### **4.4 Stages 5 and 6 – Refinement of Project for PEIR; statutory consultation**

- 55 Following the scoping phase, further consideration was given to the consideration of the areas of search and a detailed appraisal was undertaken of the offshore and onshore export cable options, and the landfall options.

- 56 The offshore ECC, landfall, onshore cable corridor, and onshore substation, were subject to a process of multi-criteria analysis alongside a longlisting and shortlisting process, in order to identify a preferred route for the purposes of PEIR. Each longlist comprised up to 20 options and was reduced to a shortlist of around five to eight options, which was consulted on with the ETG membership through the Evidence Plan process, including Natural Resources Wales (NRW), local councils and the Welsh historic environment authority, Cadw.
- 57 For the offshore cable route, it was determined that the preferred option for offshore routeing would avoid the Constable Bank feature and route to the east, cross the existing GyM cable and make landfall to the east of Rhyl. The easterly offshore ECC, and associated landfall option offered considerably less risk from a technical, consenting and commercial perspective, and followed the advice provided by the ETG membership.
- 58 Following the identification of the landfall area of search six zones along the coastal stretch were identified. 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. As a result of the analysis and consultation feedback, the landfall location at Ffrith beach was progressed.
- 59 For the onshore cable route, a series of sixteen routes were identified. Following an appraisal of these options, eight were discounted on a variety of environmental and engineering grounds, as well as consideration of land interests. The remaining eight options were therefore taken forward for further consultation with the EIA Evidence Plan panel. Following consultation, it was determined that the chosen onshore route would be progressed for the purposes of PEIR.
- 60 For the onshore substation identification, the initial area of search was refined to 14 possible substation zones. The zones were each analysed, with an eventual six possible substation zones put forward for consultation through the Evidence Plan process. Of the possible six zones, three were discounted directly as a result of stakeholder feedback. Of the remaining three, it was determined that one of the options would be discounted due to potential impacts to traffic, stakeholder feedback on archaeological risk, and ecological considerations.

- 61 Of the remaining two options, 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 one zone provided a greater availability of land for potential mitigation to be implemented. Another zone 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 the chosen zone identified that this was significantly less constrained, with multiple options that could improve choice, and involve less highway works and the associated construction disruption. As a result, the chosen zone was brought forward for the current phase of consultation.
- 62 The Applicant considers that these options and refinements were sufficiently justified and refined to enable stakeholders (through the consultation process) to meaningfully comment on the proposed scheme and its potential effects on the receiving environment.

## 4.5 Stage 7 – Refining of the Project Between PEIR and ES/ DCO Application Submission

- 63 Following publication of the PEIR, a number of modifications were made to AyM as a result of consultee feedback, 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.
- 64 These include:
- ▲ A refinement of the proposed offshore array footprint, reduced from 88 km<sup>2</sup> to 78 km<sup>2</sup>;
  - ▲ A refinement of the maximum number of turbines, reduced from 91 to 50;
  - ▲ A commitment to install cables by way of trenchless techniques such as Horizontal Directional Drilling (HDD) under the Rhyl golf course;
  - ▲ Refined landfall access and Temporary Construction Compound (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.

- 65 A revision was made to the westerly extent of the array boundary as a result of concerns raised with regards to 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 recognised the benefits of reducing impacts as far as practicable. In reducing the array boundary and seeking to minimise harm to designated sites (protected areas) as far as practicable, the Applicant also reduced the array design by reducing the total number of turbines. As such, the Applicant has reduced the number of turbines from 107 as proposed during scoping, to 91 within the PEIR and a final maximum design of 50 turbines for the purposes of the final application; a reduction of 53% across the phases.
- 66 A design decision was made to commit to no above-ground works within the grounds of Rhyl Golf Club. This means that cables will be installed by HDD (or other trenchless technique) entirely underneath the golf course, with no need for above-ground works. It may be necessary to enter the golf course to monitor drill progress, but there will be no requirement for intrusive works.
- 67 As a result of this refinement, and the need to coordinate construction of AyM with the operation of the Central Prestatyn Coastal Defence Scheme, a new, alternative landfall/ beach access route was introduced, with an associated TCC. The access route and TCC location were determined following through consultee feedback engagement, and consideration of the technical and environmental constraints.
- 68 Other refinements have been introduced to minimise traffic- and noise-related impacts to residential properties, minimise habitat loss and distance work from nearby residential and commercial receptors.

## 4.6 Stage 8 – submission of final preferred option(s) as part of the DCO and ML(s) application.

69 The final boundaries and routes for the AyM application can be seen in detail within the plans that accompany the application for development consent. The final boundaries and routes are considered to balance environmental and technical constraints, whilst taking into account feedback from landowners and other stakeholders wherever feasible.

# 5 Project description

70 This section of the NTS provides an outline description of the potential design of both the onshore and offshore project infrastructure, as well as the activities associated with the construction, O&M and decommissioning of AyM. A full project description is provided in Volume 2: Chapter 1: Offshore Project Description and Volume 3: Chapter 1: Onshore Project Description, (application ref: 6.2.1 and 6.3.1, respectively)

71 The Applicant is planning the development of AyM, located off the coast of North Wales, immediately west of and adjacent to the existing GyM, along with associated offshore and onshore infrastructure. The proposed development boundary encompasses:

- ▲ **The array area:** where the OWF will be located, which will include the WTGs, Offshore Substation Platforms (OSPs) and subsea cables;
- ▲ **The ‘other wind farm infrastructure zone’:** where a single meteorological mast, Permanent Vessel Moorings and subsea cables may be located;
- ▲ **The GyM interlink area:** which facilitates a single cable connection to the existing GyM;
- ▲ **The offshore Export Cable Corridor (ECC):** where up to two offshore export cable circuits will be located to bring the power generated to shore;
- ▲ **Landfall:** where the offshore cables are brought ashore east of Rhyl and are connected to the onshore cable circuits;
- ▲ **The onshore ECC:** where the onshore cable circuits will be located;
- ▲ **The onshore substation:** where the onshore substation will be located to facilitate transfer of electricity to the National Grid network; and

- ▲ **The National Grid substation:** where the 400 kV onward connection from the onshore substation will connect to the National Grid transmission network.

## 5.1 Offshore

- 72 At this stage in the AyM development process, decisions on exact locations of infrastructure and the precise technologies and construction methods employed cannot be made. Therefore, the project description at this stage sets out the main components and parameters of the project and the design envelope approach (often referred to as the ‘Rochdale Envelope’) has been used to provide certainty that the final project as built will not exceed these parameters, whilst providing the necessary flexibility to accommodate further project refinement during the detailed design phase post-consent.
- 73 The number of WTGs will not exceed 50. The two indicative WTG scenarios are as follows:
- ▲ **Larger WTGs:** The largest WTGs within the design envelope. For the purposes of assessment, this is assumed to be up to 34 of the largest possible WTGs with a Rotor Diameter (RD) of up to 306 m; and
  - ▲ **Smaller WTGs:** The greatest number of WTGs within the design envelope. For the purposes of assessment this is assumed to be up to 50 smaller WTGs with a RD of up to 250 m.
- 74 Foundation structures are needed to securely support the WTGs, OSPs and met mast to the seabed, and will also provide safe access for O&M activities. A range of foundation types is being considered:
- ▲ **Piled foundations:** comprising either a single pile, or a steel lattice jacket structure supported by multiple smaller piles, which are driven into the seabed;
  - ▲ **Suction caisson foundations:** comprising either a single suction caisson, or a steel lattice jacket structure supported by multiple caissons, which penetrate the seabed via suction; and
  - ▲ **Gravity-based foundations:** comprising either a single foundation, or a steel lattice jacket structure supported by multiple legs, which sit on the seabed surface.

- 75 In terms of offshore cabling, the project will require array cables to connect the WTGs to each other and to the OSPs, as well as a single cable to connect the project to GyM. Up to two OSPs may be required, which would act as collection points for a network of array cables from individual strings of WTGs and then transmit the electricity generated to shore via up to two offshore export cables. The offshore cables will be buried, with cable protection required wherever burial is not possible.
- 76 Up to one meteorological mast (met mast) may be installed within the array area or within the 'other wind farm infrastructure zone' for the purposes of collecting detailed site-specific measurements of wind speed and other meteorological conditions.
- 77 Offshore construction is anticipated to take up to three years, after which the project is expected to be operational for approximately 25 years. Decommissioning of the project is anticipated to involve full removal of all project infrastructure, although some elements such as buried cables may be left *in situ*, should it be deemed more environmentally damaging to remove them closer to the time.

## 5.2 Onshore

- 78 The onshore aspects of the development will comprise all infrastructure required to transmit the energy from the landfall to the National Grid connection at Bodelwyddan. All cable infrastructure will be buried. The key onshore components of AyM include:
- ▲ Transition Joint Bays at the landfall location to connect the offshore cables to the onshore cable circuits;
  - ▲ Up to two onshore cable circuits; and
  - ▲ One substation and associated infrastructure to connect the project to the National Grid.
- 79 The landfall location is at Ffrith beach east of Rhyl and adjacent to Rhyl golf club. The works at landfall will include:
- ▲ Construction of the landfall temporary construction compound; and
  - ▲ Works associated with trenchless techniques (such as HDD) or other suitable, alternative techniques to install cables under the beach and/ or trenching in the intertidal zone.

- 80 Onwards of the landfall location, cables will be buried by open trenching, with trenchless techniques used to install cables under obstacles such as roads and watercourses where appropriate. Once the cables are installed, the trenches will be backfilled using excavated material.
- 81 The onshore substation will be located within a compound to the west of St. Asaph Business Park (SABP), including landscaping to ensure visibility of the structure is minimised. An onward connection and works to connect to the National Grid substation at Bodelwyddan are also required.

## 6 Potential environmental effects

- 82 The EIA process has assessed the potential for the construction, O&M and decommissioning of AyM to create impacts upon the physical, biological and human environments, as characterised by a review and analysis of data collected via site-specific surveys, desk-based studies, peer reviewed literature, as well as modelling of specific parameters. This section of the NTS provides a summary of the assessments undertaken for AyM to date. Further, more detailed information is available within the topic-specific chapters found within the offshore and onshore volumes of the ES (Volumes 2 and 3 respectively).

### 6.1 Marine geology, oceanography and physical processes

- 83 The assessment of potential effects on the marine physical environment considers the potential for changes in tides, currents, waves and sediment transport as a result of the proposed development during construction, O&M and decommissioning. The assessment describes the existing physical environment and is supported by existing data as well as site-specific surveys to assess the predicted effects. The full marine physical processes assessment can be found in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes of the ES (application ref: 6.2.2).

- 84 AyM lies in an area with a typical spring tidal range of approximately 6.5 m, with tidal current speeds of between 0.75 and 1.0 m/s. The array area is open to north-westerly offshore waves that are generated within the Irish Sea. Locally-generated waves related to the prevailing winds come from westerly, north-westerly and northern sectors. To the north-east of the array, lies the permanent Liverpool Bay front which expands northwards from the River Dee. Stratification related to this front is predominantly associated with differences in salinity, although temperature gradients can also have a seasonal effect.
- 85 The seabed within the array area and offshore ECC is mostly comprised of sand, with varying proportions of gravel. Net sediment transport along the north Wales coast at the seabed level is easterly, with some transport of finer material in suspension. The geology of the AyM site has been shaped by a series of glacial events during the retreat of the British Isles ice sheet and Irish sea ice stream. Overlaying the bedrock is an extensive sequence of Quaternary coarse and fine-grained sediments.
- 86 Water depths in the array vary between 15.2 and 41.9 m, increasing towards the north-west. Water depths in the offshore ECC generally decrease with proximity to shore.
- 87 The impact assessment considers a range of features, processes and pathways that may be affected by the proposed development, such as changes to Suspended Sediment Concentration (SSC), tidal and wave regimes and sandbanks. The impacts considered include changes to the marine physical environment brought about both directly (as a result of the presence of infrastructure), as well as indirectly (through changes to physical processes themselves). Embedded mitigation measures such as scour protection and cable armouring have been adopted into the project design in order to mitigate potential effects.
- 88 During construction, effects due to changes to SSC, sandwave clearance and seabed preparation, impacts to sandbanks and the coastline were assessed as being of **minor adverse** significance, which is not significant in EIA terms.

- 89 During O&M, the assessment concluded that effects due to changes to the tidal and wave regime, sediment transport pathways and impacts due to seabed scour would also be of **minor adverse** significance, which is not significant in EIA terms.
- 90 In the decommissioning phase, the assessment concluded that effects as a result of potential changes to SSC, as well as changes to the coastline would be of **minor adverse** significance, which is not significant in EIA terms.
- 91 In terms of cumulative effects, the assessment considered that additional effects from AyM in combination with other plans, projects and activities such as aggregate extraction, dredge and disposal activities, would not result in any significant effects. No significant transboundary effects were predicted with regard to marine physical processes on the interests of non-UK states.

## 6.2 Marine water and sediment quality

- 92 The assessment of potential effects to marine water and sediment quality covers the marine and coastal areas within 18 km of the proposed development boundary, which is approximately equivalent to the maximum theoretical spring tidal excursion. The assessment considers the potential changes in marine water and sediment quality as a result of the proposed development during the construction, O&M and decommissioning phases of the proposed development, using existing data and site-specific survey data. A full description of the assessment can be found in Volume 2, Chapter 3: Marine Water and Sediment Quality (application ref: 6.2.3).
- 93 The offshore ECC lies within the North Wales coastal waterbody and the Clwyd transitional waterbody. The proposed development boundary is also within 2 km of five designated bathing waterbodies.

- 94 The sediments throughout the array area and wider study area are generally highly heterogeneous, although site-specific surveys showed that sediments in the south-west are generally coarser, with finer, sandier sediments being found further offshore. To assess the sediment quality and presence of contaminants within the array area and offshore ECC, two site-specific surveys have been undertaken. Sediment type is an important factor when considering the potential presence of contaminants; sediments with a finer particle size provide a higher surface area to volume ratio for adsorption of contaminants which may be released when sediment is disturbed. Sediments with larger particle sizes (e.g. sands) are not associated with anthropogenic contaminants.
- 95 Contaminant analysis revealed that metal concentrations in sediment samples were below the marine sediment quality guidelines within the array area, apart from arsenic, concentration levels of which were elevated, as a result of geological inputs from the north Wales coast region but remained below Action Levels 1 and 2 as set by the Centre for Environment, Fisheries and Aquaculture Science.
- 96 In terms of SSC, monthly averaged satellite imagery of Suspended Particulate Matter (SPM) suggests that within the AyM array area, average (surface) SPM is generally greater than 10 mg/l, increasing markedly throughout winter months. SSC increases with proximity to the coast and is at its highest within inshore and nearshore areas of the offshore ECC due to a combination of enhanced re-suspension from wave activity within shallow water and fluvial input of sediment.
- 97 The impact assessment considers the deterioration of water quality as a result of effects including increases in SSC, the release of sediment-bound contaminants and the accidental release of pollutants. Mitigation measures such as scour and cable protection, and the production of a Project Environmental Management Plan (PEMP) have been incorporated into the project to mitigate against potential effects.
- 98 In the construction phase, the assessments concluded that potential effects as a result of deterioration in water quality due to resuspension of sediments, release of sediment-bound contaminants and the accidental release of pollutants would be of *negligible* to *minor adverse* significance, which is not significant in EIA terms.

- 99 During the O&M phase, it was concluded that deterioration in water quality due to the resuspension of sediments, release of sediment-bound contaminants and accidental release of pollutants would be of *negligible* to *minor adverse* significance, which is not significant in EIA terms.
- 100 During decommissioning, deterioration in water quality as a result of resuspension of sediments, release of contaminants from sediment-bound contaminants and accidental release of pollutants would be of *negligible* to *minor adverse* significance, which is not significant in EIA terms.
- 101 The cumulative effects assessment considered effects on water and sediment quality from AyM in combination with other projects and activities, including aggregate dredging and cable installation, and concluded that potential effects due to the release of contaminants from disturbed sediments would be of *negligible* to *minor adverse* significance, which is not significant in EIA terms. The assessment concluded that there would be no transboundary effects in terms of marine water and sediment quality receptors.

### 6.3 Offshore ornithology

- 102 The assessment of potential impacts to offshore ornithology is focused on individual bird species and populations, rather than sites designated for birds. Only where likely significant effects on bird species are predicted, are associated designated sites taken into account, with a full , submitted separately within Report 5.1: Report to Inform Appropriate Assessment (application ref: 6.5.1).
- 103 The offshore ornithology study area includes the proposed AyM array area with a 4 km buffer around it; an 8 km buffer to the south of the array to cover coastal areas, as well as the offshore ECC up to the Mean Low Water Springs (MLWS) mark. The assessment considers potential effects on offshore ornithology in the construction, O&M and decommissioning phases of the proposed development, using existing data, site-specific survey data as well as results from collision risk modelling and displacement analysis. A full description of the assessment can be found within Volume 2, Chapter 4: Offshore Ornithology (application ref: 6.2.4).

- 104 Species included within the assessment are those recorded during site-specific aerial surveys that are considered to be at potential risk from the proposed development due to being present in high abundances and those considered to be at risk due to species-specific characteristics such as flight height. The assessment is also informed by monitoring at the existing GyM site. Consequently, the species considered include red-throated diver, common scoter, guillemot, razorbill and gannet. The numbers and distribution of species identified within the array are presented in full within Volume 2, Chapter 4.
- 105 The impact assessment considers potential effects on offshore ornithology receptors as a result of the construction, O&M and decommissioning phases of the proposed development. The key issues for the assessment are disturbance and/ or displacement of foraging seabirds and collision of individual seabirds with offshore infrastructure leading to injury or mortality. Embedded mitigation includes a commitment to a minimum wind turbine blade tip height of 22 m above Mean High Water Springs (MHWS), which reduces collision risk since the majority of birds fly below this height.
- 106 During construction, the assessments concluded that potential effects as a result of direct disturbance and displacement, as well as indirect effects through impacts to habitats and prey species, would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 107 In the O&M phase, the assessments concluded that potential effects due to direct disturbance and displacement, indirect effects through impacts to habitats and prey species, collision risk, and barrier effects would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 108 During decommissioning, the conclusions of the assessments were that potential effects due to direct disturbance and displacement, and indirect effects through impacts to habitats and prey species would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.

109 In terms of cumulative effects, the assessment considered the combined effects of AyM together with other plans, projects and activities, considering the cumulative effects of direct disturbance and displacement and the operational collision risk. Cumulative effects were concluded to be of *negligible* to *minor adverse* significance, which is not significant in EIA terms.

## 6.4 Benthic subtidal and intertidal ecology

110 Benthic ecology refers to seabed habitats (including intertidal) and associated animals that live on and within the seabed together with the way these interact with each other and with the wider marine system. The assessment of potential impacts to benthic subtidal and intertidal ecological receptors considers the potential effects of AyM on the subtidal and intertidal benthic ecology as a result of the construction, O&M and decommissioning of the proposed development within the study area. The study area encompasses the array area and offshore ECC, as well as an 18 km buffer around the array and an 8.5 km buffer around the offshore ECC. The assessment draws on existing data where relevant, as well as site-specific benthic characterisation surveys undertaken for the project, and an intertidal habitat survey. The full assessment can be found within Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (application ref: 6.2.5).

111 The AyM benthic ecology study area is categorised by coarse sediments, broadly lacking in hard substrate, with mobile sand wave features in the eastern part of the array area and the offshore ECC. The sedimentary characteristics of AyM show a spatial pattern linked to the geophysical characteristics of the seafloor, where particle size distribution is linked to the degree of sediment mobility. Isolated patches of coarser gravel, pebble and cobble were identified in the offshore ECC, characterised by species which have an affinity to coarser sediments. The site-specific surveys identified several habitat types, biotopes, biotope complexes and communities consisting of species of polychaetes, bivalves and annelids.

- 112 Within the intertidal, the foreshore is predominantly comprised of sand, with areas of muddy sand interspersed across the mid shore. Areas of consolidated mud are present in the mid and upper shore, as well as anthropogenic structures including an outfall pipe and sea defences, where the honeycomb worm *Sabellaria alveolata* was present.
- 113 The impact assessment considers the potential effects on benthic subtidal and intertidal ecology as a result of impacts including direct disturbance and temporary habitat loss, indirect effects from increases in SSC and sediment deposition, and effects due to the colonisation of seabed infrastructure. Mitigation measures include definition of the proposed development boundary to minimise environmental impacts, the burial of cables where practicable, and adherence to best practice guidelines to minimise the introduction and spread of marine Invasive and Non-Native Species (INNS).
- 114 In the construction phase, the assessment concluded that potential effects as a result of temporary habitat disturbance, temporary increases in SSC and sediment deposition, and marine INNS would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 115 During the O&M phase, it was concluded that potential effects due to long-term habitat loss/ change, colonisation of subsea infrastructure, disturbance due to maintenance activities, disturbance due to Electromagnetic Fields (EMF), and changes as a result of changes to physical processes would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 116 In the decommissioning phase, the assessment concluded that potential effects due to temporary disturbance, temporary increases in SSC and sediment deposition, loss of habitat due to removal of seabed infrastructure, and permanent habitat loss due to infrastructure left *in situ* would be of **minor adverse** significance, which is not significant in EIA terms.
- 117 Potential cumulative effects considering AyM alongside other plans, projects and activities in the region, were predicted to be of **minor adverse** significance, which is not significant in EIA terms.

## 6.5 Fish and shellfish ecology

- 118 The assessment of potential effects on fish and shellfish ecology considers the impacts as a result of the construction, O&M and decommissioning of AyM. The assessment has drawn on extensive existing data, monitoring programmes as well as regional studies and the distribution data of spawning and nursery grounds. The assessment has also drawn upon results from underwater noise modelling undertaken to investigate the impacts of underwater noise from piling during construction. The full assessment is presented in Volume 2, Chapter 6: Fish and Shellfish Ecology (application ref: 6.2.6).
- 119 Based on existing datasets, including surveys, a wide range of species are known to inhabit the fish and shellfish study area, including cod, whiting, plaice, common sole, herring, mackerel, sandeel, spotted ray, thornback ray, dab and common dragonet. Shellfish known to occur include edible crab, queen scallop and king scallop.
- 120 The Irish Sea also provides important spawning and nursery grounds for a variety of species including spurdog, herring, whiting, cod and sole.
- 121 Several species of conservation importance have also been recorded, designated under the Habitats Regulations, including Atlantic salmon, European eel, allis shad, twaite shad, and river and sea lamprey. Other species protected under the Environment (Wales) Act include sea trout, smelt, basking shark and angel shark.
- 122 The impact assessment considers the potential effects on fish and shellfish ecology from impacts including direct damage and disturbance, increases in SSC and sediment deposition, noise due to piling, the release of pollutants, long-term habitat loss from the presence of seabed infrastructure, and EMF effects. Mitigation measures include the use of soft-start piling, pollution control measures such as the following of a PEMP, and the burial of cables where practicable to reduce effects from EMFs.
- 123 During construction, potential effects from direct damage and disturbance, temporary increases in SSC and sediment deposition, release of sediment-bound contaminants, and underwater noise and vibration were concluded to be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.

- 124 In the O&M phase, the assessment concluded that potential effects as a result of long-term habitat loss from the presence of seabed infrastructure, increased presence of hard substrate and structural complexity, operational underwater noise, EMFs, disturbance from maintenance activities, indirect disturbance from the accidental release of pollutants, and displacement of fishing pressure would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 125 In terms of decommissioning activities, the assessment concluded that potential effects would be of no greater significance than for the construction phase, if project infrastructure is completely removed during decommissioning. If it is deemed closer to the time of decommissioning that removal would result in greater environmental impacts than leaving certain components *in situ*, then leaving *in situ* may be preferable, in which case potential effects would be of no greater significance than for the O&M phase (**negligible** to **minor adverse**, which is not significant in EIA terms).
- 126 The assessment considered cumulative effects of AyM in combination with other OWFs, cable installations, and dredge and disposal areas. The assessment concluded that potential cumulative effects from habitat loss, increases in SSC and sediment deposition, underwater noise and vibration, long-term habitat loss and EMFs would be of **minor adverse** significance, which is not significant in EIA terms. It was also concluded that there would be no transboundary effects on other states as a result of the proposed development.

## 6.6 Marine mammal ecology

- 127 The assessment of potential effects on marine mammal ecology describes the potential impacts on marine mammal species that may arise from the construction, O&M and decommissioning of AyM. It considers effects within the marine mammal study area, which varies according to the management unit of the individual species in question. The marine mammal assessment has been based on existing data and site-specific aerial surveys, as well as underwater noise modelling to assess impacts associated with construction piling noise. The full assessment can be found in Volume 2, Chapter 7: Marine Mammals (application ref: 6.2.7).

- 128 A number of marine mammal species have been identified as being present within the marine mammal study area, including harbour porpoise, bottlenose dolphin and grey seal.
- 129 The impact assessment considers the potential effects on marine mammals as a result of impacts including underwater noise, vessel interactions, disturbance and seal haul-out sites, changes in water quality, and the loss of prey resources due to changes in benthic habitats and the fish and shellfish community. Mitigation measures include a Marine Mammal Mitigation Protocol for piling, soft-start piling, and pollution prevention measures including the production of a PEMP.
- 130 During the construction phase, the assessment concluded that potential effects due to underwater noise, vessel interactions, changes to water quality and prey abundance would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 131 In the O&M phase, the assessment concluded that potential barrier effects, vessel interactions, changes to water quality and prey abundance would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 132 During decommissioning, effects would be similar to or less than those occurring in the construction phase. Therefore, the assessment concluded that potential effects due to underwater noise, vessel interactions, changes to water quality, and indirect impacts on prey species would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 133 In terms of cumulative effects, the assessment considered effects from AyM together with other plans, projects and activities and concluded that potential effects would be of **negligible** to **minor adverse** significance (not significant in EIA terms) for all species. With regard to transboundary effects, the assessment concluded that impacts from AyM would be localised and of **negligible** to **minor** significance, and transboundary effects were not considered further. The potential for significant effects on European designated sites in other states is specifically addressed within the HRA.

## 6.7 Commercial fisheries

- 134 The assessment of potential impacts to commercial fisheries considers impacts to commercial fishing activity, which is defined as the activity by licensed fishing vessels undertaken for the legitimate sale of finfish and shellfish. The assessment was based on multiple data sources including UK fisheries statistics, Vessel Monitoring System data, as well as information obtained through industry consultation with local fishermen. The full assessment is presented in Volume 2, Chapter 8: Commercial Fisheries (application ref: 6.2.8).
- 135 The key fleets operating across the commercial fisheries study area include UK vessels targeting shellfish species, in particular whelk, king and queen scallop, lobster, common prawn and crab, as well as UK vessels targeting mixed demersal species, in particular bass, flounder and thornback ray.
- 136 Larger vessels, including dredgers and potters, target particular species all year round, but a portion of vessels will form part of a local UK multi-purpose fleet comprised typically of vessels under 10 m in length which switch between gears to adapt to seasonal variations in fisheries.
- 137 Landings from the fleets in the study area in terms of landed volume and value are dominated by shellfish species; over 90% of landings between 2015 and 2019 were shellfish, whilst the remainder is accounted for by demersal species.
- 138 The impact assessment considers potential effects to commercial fisheries due to changes to fish and shellfish populations, safety issues, increased steaming times to fishing grounds, interference to static and mobile fishing gear, and displacement of fishing activity due to the presence of infrastructure. These potential impacts are considered in the context of different types of fishing activity (e.g. potting and beam trawling), and in the context of the country of origin. Mitigation measures include liaison with commercial fisheries stakeholders, the burial of cables where practicable to prevent damage to fishing gear, regular WTG spacing and layout, and the following of a dropped objects procedure.

- 139 During construction, potential effects as a result of displacement of activity leading to gear conflict, disturbance to commercially important fish species, increased vessel traffic and increases in steaming times to established fishing grounds would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms. Impacts as a result of reduction in access to fishing grounds were predicted to have moderate adverse (significant in EIA terms) effects on the potting fleet in the absence of mitigation. With the application of mitigation through the Fisheries Liaison Plan, which may include co-operation agreements, the effect is concluded to be of **minor adverse** significance, which is not significant in EIA terms.
- 140 During the O&M phase, potential effects due to impacts to fishing activities, safety issues, interference with fishing gear, increased steaming times to fishing grounds, and displacement of fishing activity were assessed as being of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 141 In the decommissioning phase, potential effects were predicted to be of no greater significance than in the construction phase.
- 142 In terms of cumulative effects, the assessment considered that the effects of AyM in-combination with other plans, projects and activities would be of no greater significance than **negligible** to **minor adverse**. The assessment of transboundary effects forms an integral part of the assessment and no significant transboundary effects were predicted.

## 6.8 Shipping and navigation

- 143 The shipping and navigation assessment considers the potential impacts arising from the construction, O&M and decommissioning of AyM on shipping and navigation receptors within the study area, which includes the array area plus a 10 nm buffer, as well as the offshore ECC plus a 5 nm buffer. The assessment involves a Navigation Risk Assessment (NRA), which identifies hazards and the likelihood of those hazards occurring, to give a conceptual understanding of navigational risk to vessels including recreational craft, commercial traffic and fishing vessels. The full assessment is presented in Volume 2, Chapter 9: Shipping and Navigation (application ref: 6.2.9). The assessment is underpinned by a risk-based approach which differs slightly from the broader EIA methodology but aligns with industry best practice.
- 144 In terms of the existing environment, the key navigational feature in the area is considered to be the Liverpool Bay Traffic Separation Scheme International Maritime Organisation adopted routeing measure, given that it dictates the majority of vessel routeing in the area. Liverpool is the busiest port in the study area, which has between 6,000 and 7,000 vessel arrivals per year. There are also five pilot boarding stations associated with the nearby ports. Two chartered anchorage areas are located to the east and north-east of the array, associated with the port of Liverpool.
- 145 The main vessel types recorded in the 2020 winter vessel traffic survey were cargo vessels, tankers and wind farm vessels. Fishing vessels, marine aggregate dredgers, tugs, passenger vessels, recreational vessels and oil and gas vessels were also recorded.
- 146 The impact assessment considers potential effects on shipping and navigation receptors due to collision risk between vessels, collision risk between vessels and wind farm infrastructure, traffic routeing, pilotage and recreational activities. Mitigation includes appropriate lighting and marking, the promulgation of information to the relevant stakeholders and marking of the wind farm on navigational charts.

- 147 In the construction phase, the assessment concluded that effects from increased collision and allision risk, restriction of adverse weather routeing, reduced access to ports and reduction in Search and Rescue (SAR) capabilities would be **broadly acceptable to tolerable** (not significant in EIA terms).
- 148 During O&M, the assessment concluded that effects from increased collision and allision risk, restriction of adverse weather routeing, reduced access to local ports, reduction in SAR capabilities, reduction in under-keel clearance and anchor interactions would be **broadly acceptable to tolerable** (not significant in EIA terms).
- 149 Effects during decommissioning are assessed as being no greater than those during the construction phase.
- 150 In terms of cumulative effects, the assessment considered that effects on shipping and navigation receptors from AyM alongside other plans, projects and activities would be **broadly acceptable**, which is not significant in EIA terms. Transboundary effects are considered inherently within the NRA and no significant transboundary effects were predicted.

## 6.9 Seascape, landscape and visual impacts

- 151 The SLVIA considers the effects of the offshore components of AyM as a result of changes to the seascape/ landscape as an environmental resource in its own right, as well as on people's views and visual amenity. The assessment considers potential effects within a 50 km radius study area (the area that the tips of the WTGs are theoretically visible from) and uses a combination of landscape/ seascape character assessment, and computerised visual representations from a variety of sensitive viewpoints within the Zone of Theoretical Visibility through a site-specific survey to assess the potential effects. More detailed information is available in Volume 2, Chapter 10: SLVIA (application ref: 6.2.10).

- 152 The majority of the study area is covered by the sea, characterised by a number of Seascape Character Areas and Marine Character Areas. The southern part of the Irish Sea is a busy area, with multiple offshore activities including fishing, main shipping routes, oil and gas extraction and dredging. Offshore wind farms extend into the north-west of the study area. These activities also influence the night-time character with lighting on the main offshore platforms and wind turbines across the area. The sea is shallow, generally less than 40 m deep, and is sheltered with low tidal flows.
- 153 The landscape character of the study area is highly varied and derived largely from its diverse underlying geology and resulting landform. In the west lies Anglesey which is characterised by a diverse scenic coastal strip in the east with relatively little development, cliffs and bays. Separating the Isle of Anglesey and the Menai Strait from the Snowdonia foothills lies the Arfon lowland area that runs from the north-east to the south-west. To the east of the Snowdonia upland area lies the landscape of the Conwy Valley, which is the valley of Wales' longest tidal river. The valley effectively forms the border between the north-east and the north-west of Wales. To the north, the North Wales Coast extends from the prominent headland of the Great Orme in the west to the Point of Ayr in the east. This stretch of coastline is indented by a number of bays, many of which are characterised by towns and villages that are popular with tourists. Further inland, the land rises providing containment to the coast and less developed uplands. This is with the exception of the lower lying Vale of Clwyd which runs away from the coast set below the Clwydian Range.
- 154 In terms of landscape designations, of particular importance to the SLVIA are the Anglesey Area of Outstanding Natural Beauty (AONB), Clwydian Range and Dee Valley AONB, and Snowdonia National Park, which are located at distances of 16.9 km, 23.4 km and 16.6 km from the AyM array area at their closest points, respectively. There are also several areas within the study area that have been defined as Heritage Coast. On the Isle of Anglesey, these coincide with northerly parts of the Isle of Anglesey AONB coastline.

- 155 A number of viewpoint locations have been agreed with the SLVIA and Cultural Heritage consultees through the scoping and consultation process. These include both representative and illustrative seascape, landscape and visual viewpoints, viewpoints that are associated with the effects on the settings of cultural heritage features and assessed in Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage (application ref: 6.2.11) and locations of interest in relation to the tourism assessment included in Volume 3, Chapter 4: Tourism and Recreation (application ref: 6.2.4).
- 156 Views of offshore wind farms can evoke a range of responses from the people who view them, with some describing them as 'intrusive', 'ugly' or 'imposing'. Others report positive visual effects of offshore wind farms, describing them as anything from 'grand' to 'inspiring' or 'beautiful'. Although the SLVIA considers visual effects as a worst-case to be negative, it should be noted that equally, many find the visual effects to be beneficial.
- 157 Consultation with regards to SLVIA has been undertaken via an Expert Topic Group, with numerous meetings held between December 2019 (pre-scoping) and January 2022 with representatives from the SLVIA ETG, including NRW, Cadw, Snowdonia National Park and the various local planning authorities in attendance. Public consultation was also undertaken online.
- 158 Publication of the AyM OWF Scoping Report and the section 42 consultation process also provided opportunities for feedback which have been considered in preparing the ES.

- 159 The effect that results from the additional turbines of smaller size (max tip height of 282 m WTGs) in the MDS smaller WTG scenario, is considered to be outweighed by the larger height and scale of the max tip height of 332 m WTGs in MDS larger WTG scenario, and it is therefore MDS larger WTG scenario that informs the main assessment of seascape, landscape and visual effects. In the construction, O&M and decommissioning phases, a range of effects on seascape character, landscape character, designated areas and viewpoints have been predicted, ranging from **non-significant** to **significant**, in EIA terms. The effect of the construction, operation and decommissioning of the offshore elements of AyM has been assessed as Minor (Non-significant) on all seascape, landscape and visual receptors within England and the English Marine Plan Areas. In addition, there will be no significant effects on the seascape, landscape and visual resource of Flintshire, Denbighshire or the Clwyddian Range and Dee Valley AONB. Significant seascape, landscape and visual effects of the offshore elements of AyM are contained within the areas of the Isle of Anglesey, Gwynedd, Snowdonia National Park and Conwy.
- 160 It has been assessed that there is potential for significant cumulative effects to arise in the south-eastern coastal areas of the Isle of Anglesey and in the north-eastern part of Snowdonia National Park and the north-western area of Conwy. No other significant cumulative or transboundary effects have been identified. The full assessment can be found in Volume 2, Chapter 10: SLVIA.

## 6.10 Offshore archaeology and cultural heritage

- 161 The assessment of potential effects on offshore archaeology and cultural heritage receptors considers the effects as a result of the construction, O&M and decommissioning of the offshore components of AyM. Data sources include existing data and maps, as well as site-specific data obtained through geophysical and geotechnical surveys. The offshore archaeology and cultural heritage baseline was assessed in relation to seabed prehistory and seabed features. The full assessment is presented in Volume 2, Chapter 11: Offshore Archaeology and Cultural Heritage (application ref: 6.2.11).

- 162 During the seabed features assessment, a total of 494 anomalies of archaeological potential were found in the array area plus a 500 m buffer, and six known wrecks, including the SS Albanian and the Dublin. A total of 132 anomalies of archaeological potential were identified within the offshore ECC, none of which are designated. The fuselage of an Avro Anson bomber aircraft was located in 1993 near Rhyl Buoy, the engines of which are thought to have already been removed, however the date and circumstance of this is unknown. A survey in 2000 did not locate any more aircraft wreckage and the record was amended to 'dead'. The findspot is located within the cable route and it is recorded by the UK Hydrographic Office as an obstruction.
- 163 There are no designated or known palaeogeographic sites within the array or offshore ECC. However, there is potential for archaeological material of prehistoric origin to exist within the study area.
- 164 The impact assessment considered effects as a result of permanent loss or disturbance of known or potential shallow seabed receptors and prehistory receptors, and indirect effects such as those from changes in sedimentation and erosion patterns. Mitigation includes the production of a Written Scheme of Investigation, which will outline mitigation measures, and the implementation of Archaeological Exclusion Zones (AEZs) around features of archaeological interest, in which no works will be undertaken.
- 165 During construction, the assessment concluded that potential effects due to the loss/ disturbance of seabed and archaeological receptors, as well as indirect effects due to changes in physical processes, would be of **negligible to minor adverse**, which is not significant in EIA terms. **Minor to moderate beneficial** (significant) effects were also concluded in some cases where appropriate pre-construction archaeological investigation on seabed and prehistory receptors takes place.
- 166 During O&M, potential effects as a result of permanent physical loss of or disturbance of archaeological receptors, and indirect effects from changes to physical processes would be of **negligible to minor adverse** significance, which is not significant in EIA terms. **Minor to moderate beneficial** (significant) effects were also predicted where appropriate archaeological investigation on archaeological receptors takes place.

- 167 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.
- 168 In terms of cumulative effects, the assessment considered the potential effects of AyM together with other plans, projects and activities. The assessment concluded that potential cumulative effects on known and unknown archaeological receptors would be of **negligible** to **minor adverse** significance. In some cases, **minor** to **moderate beneficial** (significant) effects were also predicted where appropriate archaeological investigation on archaeological receptors takes place. No transboundary effects are predicted to arise outside the UK EEZ.

## 6.11 Other marine users and activities

- 169 The assessment considers potential effects to offshore infrastructure as a result of the construction, O&M and decommissioning of AyM, including other OWFs, cables and pipelines and recreational fishing. The assessment draws on existing data, as well as industry consultation with charter anglers. The full assessment can be found in Volume 2, Chapter 12: Other Marine Users and Activities (application ref: 6.2.12).
- 170 There are a number of operational offshore wind farms in the Irish Sea region, including the adjacent GyM, North Hoyle, Rhyl Flats, as well as Burbo Bank and Burbo Bank Extension further east. There are also numerous subsea cables in the study area associated with these projects, as well as the Eirgrid East-West Interconnector that connects the UK to the Republic of Ireland. Several of these assets will need to be crossed by the AyM offshore export cables in order to reach shore.
- 171 To the north of AyM and GyM, a series of manned and unmanned oil and gas platforms are located. A pipeline runs south through the existing GyM site. Extensive sand and gravel extraction operations have taken place in Liverpool Bay. Currently, there are three licenced aggregate areas in close vicinity to the project, however none overlap with the array or ECC. Historically, significant quantities of material have been disposed of in Liverpool Bay.

- 172 Recreational fishing in the areas includes shore anglers, private boat anglers and charter boat operators. Private boat angling is widespread across Liverpool Bay but centres on or around launch sites, moorings and marinas. Private boat angling tends to be trailer launched with boat owners using moorings, marinas and harbour facilities that enable quick launching and safe storage during the months of more frequent fishing activity.
- 173 The assessment considered potential effects from the construction, O&M and decommissioning of AyM on other offshore wind farms, subsea cables and charter angling. Mitigation measures include the implementation of safety zones around active construction activities, advisory safety distances, promulgation of information to relevant stakeholders, the establishment of cable crossing agreements with relevant cable operators and the use of standard industry techniques to ensure no operational impacts to other subsea cables.
- 174 During construction, it was concluded that effects on other offshore wind farms, cables and pipelines and charter angling would be of **minor adverse** significance, which is not significant in EIA terms.
- 175 During O&M, it was concluded that effects on cables and pipelines and charter angling would be of **minor adverse** significance, which is not significant in EIA terms.
- 176 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.
- 177 In terms of cumulative effects, the assessment considered that effects from AyM in combination with other plans, projects and activities in the study area on charter angling would be **minor adverse**, which is not significant in EIA terms. No transboundary effects outside the UK EEZ were predicted to arise.

## 6.12 Aviation and radar

- 178 The aviation and radar assessment considers the potential effects on military, aviation and radar receptors as a result of the presence of offshore wind farm infrastructure during the construction, O&M and decommissioning phases of the development. The full assessment is presented in Volume 2, Chapter 13: Aviation and Radar (application ref: 6.2.13).
- 179 A number of aviation and radar receptors were identified, including National Air Traffic Services radar systems and Ministry of Defence operational sites at British Aerospace Engineering Warton and Royal Air Force Valley. Other stakeholders included Chester Airport and the Ronaldsway Airport on the Isle of Man.
- 180 The assessment considered the potential for effects as a result of interference to radar systems, the presence of infrastructure as obstructions, as well as impacts to flight operations. Mitigation includes the notification of aviation stakeholders of the locations and specifications of infrastructure and associated construction and O&M activities, and the fitment of obstacle lighting to WTGs.
- 181 During construction, the assessment concluded that effects from the creation of an aviation obstacle would be of **minor adverse** significance, which is not significant in EIA terms.
- 182 During O&M, the assessment concluded that effects from the creation of an aviation obstacle, interference on military and civil aviation radar systems and impacts on offshore helicopter operations would be of **minor adverse** significance, which is not significant in EIA terms.
- 183 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.
- 184 In terms of cumulative effects, the assessment considered that effects from AyM in combination with other plans, projects and activities in the study area on charter angling would be **minor adverse**, which is not significant in EIA terms. No transboundary effects outside the UK EEZ were predicted to arise.

## 6.13 Landscape and Visual

- 185 The onshore Landscape and Visual Impact Assessment (LVIA) considers the potential effects to the landscape and visual receptors as a result of the construction, O&M and decommissioning of the onshore components of AyM. The assessment was informed by desk-based study, site-specific photography, modelling and photographic visualisations (photomontages) of the proposed onshore infrastructure. The study area comprises a 1 km buffer around the landfall and onshore cable route, as well as a wider 5 km buffer around the onshore substation. A full description of the assessment can be found within the ES Volume 3, Chapter 2: Landscape and Visual Impact Assessment (application ref: 6.3.2).
- 186 The part of North Wales in which the proposed project is to be installed has a distinct coastal landscape, broadly characterised by the coastal towns and resorts which span its coastline of extensive beaches and dune landscapes. Inland from the coastline, the landscape of the study area is largely characterised by agricultural lowland landscapes which provide a rural backdrop to the coast. Further inland, the landscape tends to be characterised by the more elevated rolling hills of Rhos which transition to the more upland areas of the Denbigh Hills further to the south.
- 187 The landscape character of the landfall, onshore cable route, and proposed onshore substation is defined according to the National Landscape Character Area 'Colwyn and Northern Coastline', which is primarily coastal in character. The onshore cable route and onshore substation are not located within any designated areas.
- 188 Principle sensitive visual receptors within the study area include roads, settlements, recreational routes and other features from which visual receptors would experience views. The assessment identified several viewpoint locations which are described within the onshore LVIA chapter.

- 189 The assessment considered potential changes to physical landscape and landscape character, and effects on visual receptors. Embedded mitigation incorporated into the project design has included the site selection process, which considered landscape character and visual amenity alongside other technical and environmental constraints. For example, existing tree planting around the proposed substation area will provide visual screening for the majority of visual receptors in the area.
- 190 In the construction and decommissioning phases, it was concluded in the LVIA assessment that potentially significant short-term, reversible effects may occur on the physical landscape. Both **non-significant** and **significant** short-term, reversible effects were predicted to occur on landscape character, as well as on visual receptors. The predicted significant effects were predicted to occur as a result of the landfall, onshore cable route, and as a result of construction/ decommissioning of the substation.
- 191 During the O&M phase, the assessment concluded that there would be **non-significant** effects on physical landscape, landscape character and visual receptors related to the onshore cable route. With regards the onshore substation **non-significant** effects were predicted on landscape character after year 1, with **significant** and **non-significant** effects predicted on visual receptors in close proximity to the proposed substation zone. The assessment was undertaken on an outline worst case approach, in which a substation zone was assessed through identification of the worst-case location within the substation zone.
- 192 Cumulative effects were considered as part of the LVIA, with no significant effects predicted for the construction, O&M and decommissioning phases of the development.

## 6.14 Socioeconomics

- 193 The assessment of potential effects on socioeconomics considers effects as a result of the construction, O&M and decommissioning of AyM, examining the interaction between the proposed development and the local and wider economy within two study areas. It also considers the potential for the local labour force to absorb new employment opportunities in terms of capacity and skills profile. The baseline description has been informed using data from the study areas using existing relevant datasets from the Office for National Statistics (ONS), which provides data on population, labour market and employment conditions, and is described in detail within the socioeconomics chapter. A full description of the assessment can be found within the ES Volume 3, Chapter 3: Socioeconomics (application ref: 6.3.3).
- 194 Specifically, the assessment considers potential effects as a result of direct and indirect employment creation, Gross Value Added (GVA) creation, the potential for displacement of workers currently employed in other industries, and demand for housing. Measures to mitigate potential adverse effects include ensuring access for local businesses and supply chains to local employment opportunities.
- 195 The assessment concluded that potential effects during construction, O&M and decommissioning as a result of the impacts of direct and indirect employment creation, direct and indirect GVA creation, local employment, employment displacement, and impacts on demand for housing and accommodation would range from **minor adverse** to **minor beneficial**, which are **not significant** in EIA terms. Beneficial effects are expected in terms of employment and GVA creation, as well as through local employment. No significant adverse effects are anticipated with the construction and operation of the project.
- 196 Cumulative effects as a result of AyM combined with other plans and projects in the region were concluded to be of **negligible significance** across all receptors, which is not significant.

## 6.15 Tourism and Recreation

- 197 The assessment considers the potential effects on tourism and recreational activities within the study area, including both onshore and offshore receptors, during the construction, O&M and decommissioning phases of AyM. The assessment of impacts to tourism and recreation identified four main study areas, focusing on direct and indirect onshore and offshore receptors, depending on the nature of the receptor assessed. The description of the existing environment draws on a review of existing data and includes maps, relevant legislation and policy and internet searches, as well as site-specific walkover surveys to identify additional features and levels of public use. A full description of the assessment can be found within the ES Volume 3, Chapter 4: Tourism and Recreation (application ref: 6.3.4).
- 198 The study identified onshore recreational resources including the tourism economy, Public Rights of Way (PRoW) and promoted trails and footpaths as resources that could potentially be affected by AyM. The study noted that nearly all of the resources identified appeared to be moderately used, however operating within their carrying capacity and aided by good levels of maintenance.
- 199 In terms of offshore recreational resources, the study identified bathing waters, water sports activities, sailing and recreational angling (as well as bait collection) as potential receptors. A full description of these offshore resources is provided within the tourism and recreation chapter.
- 200 The tourism economy is largely seasonal and is based on the more traditional seaside destinations, however the area benefits from all-weather attractions which encourage tourism all year round and varies considerably across the wider study area. Data suggests that tourism contributes over £1.47 billion to the Welsh Economy, although employment supported directly by tourism within the wider study area is comparable to that found nationally (around 14%).

- 201 The assessment considers potential effects on onshore and offshore recreational receptors, as well as on the tourism economy, as a result of restriction of access, modifications to rights of way, restrictions on parking, restriction of access to marine recreation, and visual intrusions arising from the proposed project. Mitigation includes keeping PRoW and promoted trails and footpaths open where practicable and reinstating disturbed PRoW following construction activities, as well as careful routing of the onshore cable to avoid key areas of sensitivity.
- 202 During construction, potential effects due to direct and indirect effects on onshore and offshore recreation and utility users, were concluded to be of **negligible** to **minor adverse significance**, which is not significant.
- 203 In the O&M and decommissioning phases, potential direct and indirect effects on onshore and offshore recreational users, as well as effects on the tourism economy, with the exception of the impact on onshore recreation, were concluded to be of **negligible** to **minor adverse significance**, which is not significant in EIA terms.
- 204 Given that the onshore infrastructure is being designed to require no repairs, the assessment on operational activity having an impact on onshore recreation receptors is generally **negligible/ minor adverse (not significant)**. In the case where repairs are required, which is extremely rare (indicatively one to two events per lifetime) the impact of operational activity on onshore recreation increases to **moderate adverse (temporarily significant)**. In such cases, the overall nature of the impact will be localised (to the area of repair), temporary and limited to no more than a few months until the necessary repairs are completed.
- 205 The assessment concluded that there were limited projects that would contribute to cumulative effects for onshore or offshore tourism and recreation receptors, and hence no significant effects were identified.

## 6.16 Biodiversity and Nature Conservation

- 206 The assessment of potential effects on onshore biodiversity and nature conservation considered the impacts to sensitive onshore ecological receptors as a result of the construction, O&M and decommissioning activities associated with AyM, including terrestrial ecology and ornithology. For onshore biodiversity, the study area was based on a 2 km zone around the onshore project boundary. The assessment draws on existing data sources to identify nature conservation sites, as well as site-specific ecological surveys to identify the habitats and species present that could potentially be affected by AyM. A full description of the assessment can be found in Volume 3, Chapter 5: Onshore Biodiversity and Nature Conservation (application ref: 6.3.5).
- 207 The onshore elements of AyM are located on the North Wales coastline on low-lying, predominantly agricultural land, situated between the towns of Rhyl, Rhuddlan and the SABP. The River Clwyd bisects the study area, flowing from St Asaph northward into Rhyl.
- 208 There are a number of designated sites close to the study area, including Local Wildlife Sites, Special Protection areas, Special Areas of Conservation, Ramsar sites, Local Nature Reserves and Sites of Special Scientific Interest.
- 209 Habitats in the study area include cropland, fen marsh and swamp, neutral and modified grassland, hedgerows, scrub, standing and open water, rivers and streams, woodland, urban areas and beach sediments at the landfall.
- 210 Within the mosaic of habitats, there is the potential to support several notable and protected species, including bats, Great Crested Newts (GCN), water vole, badger, breeding and over-wintering birds, terrestrial and aquatic invertebrates, and vascular plants.

- 211 The assessment considered potential effects on ecological receptors as a result of direct damage and disturbance, habitat loss and pollution effects. Mitigation measures include the use of existing field access points where possible, the storage of topsoil (including the seedbank) in affected areas for re-instatement, protected species licensing and the implementation of an Outline Landscape and Ecology Mitigation Plan (OLEMP) (application ref: 8.4). The OLEMP provides summary details of mitigation and compensation measures incorporated into the onshore elements of AyM, as well as proposals for biodiversity enhancement. These proposals seek to address the requirement to promote the resilience of ecosystems, for example, woodland planting proposals.
- 212 The assessment concluded that following the implementation of appropriate mitigation measures, potential effects from accidental lethal or non-lethal injury, habitat loss, disturbance and accidental pollution would be *non-significant* in EIA terms.

## 6.17 Ground Conditions and Land Use

- 213 The assessment considers the potential effects on ground conditions, flood risk and land use due to activities associated with the construction, O&M and decommissioning of the onshore components of AyM. The study was based on a review of existing data sources such as the British Geological Survey (BGS) and NRW, as well as the findings of site-specific walkover surveys. The study area comprised the proposed onshore development boundary as well as a 1 km buffer around the proposed onshore substation at Bodelwyddan, and a 250 m buffer around the landfall and cable route. A full description of the assessment can be found within Volume 3, Chapter 6: Ground Conditions, Flood Risk and Land Use (application ref: 6.3.6).

- 214 Land use within the Ground Conditions and Land Use study area is predominantly agricultural, situated between the settlements of Rhyl, Rhuddlan and St Asaph. The River Clwyd crosses the study area, flowing from St Asaph northward to the west of Rhyl. A number of other NRW designated main rivers also cross or are evident within the onshore ECC and the wider Ground Conditions and Land Use study area. Land to the south-west of the River Clwyd crossing is predominantly agricultural, with flat, low-lying land within the Clwyd valley, close to the estuary. Further south towards the A55 and beyond, land begins to rise up with more undulating topography. Field boundaries are typically well-established hedgerows and sometimes drystone walls. Woodlands and hedges are more common in this area.
- 215 There are no geological designations within the study area, and also no groundwater special protected zones. The majority of the study area is classified as of grade 3a or 3b good to moderate, or moderate, quality agricultural land. The superficial geology is generally classified as Glacial Till, with Marine Beach Deposits at the landfall location.
- 216 The assessment identified several sensitive receptors including soil land quality receptors. It considers the potential effects of AyM on ground conditions, and land use as a result of works. Mitigation includes implementation of a Pollution Prevention and Emergency Incident Response Plan (PPEIRP), a Soil Management Plan, adherence to a Code of Construction Practice (CoCP) (application ref: 8.13), and the effective design of site drainage to ensure that flood risk is minimised (including utilising Sustainable Urban Drainage Systems (SUDS) principles).
- 217 During construction, the assessment concluded that potential effects on soil and land quality would be of **negligible adverse** to **minor adverse significance**, which are not significant in EIA terms.
- 218 In the O&M phase, it was concluded that potential effects on soil resource and land quality, in particular at the proposed substation, would be of **negligible** to **minor adverse significance**, which is not significant in EIA terms.
- 219 In the decommissioning phase, it was concluded that potential effects on soil and land quality would be of **negligible** to **minor significance**.

220 The cumulative effects assessment considered AyM alongside other planned and proposed projects and concluded that there were no significant effects.

## 6.18 Hydrology and Flood Risk

221 The assessment considers the potential effects on hydrology, hydrogeology and flood risk, due to activities associated with the construction, O&M and decommissioning of the onshore components of AyM. The study was based on a review of existing data sources such as the BGS and NRW flood risk data, as well as the findings of site-specific walkover surveys. The study area comprised the proposed onshore development boundary plus a 1 km buffer around the proposed onshore substation, and a 250 m buffer around the landfall and the onshore ECC (including access routes and TCC areas). A full description of the assessment can be found in Volume 3, Chapter 7: Hydrology, Hydrogeology and Flood Risk (application ref: 6.3.7).

222 The coastal area at the proposed landfall is between the relatively densely populated settlements of Rhyl and Prestatyn. Pedestrian footpaths are present directly adjacent to the beach, as is a golf course and caravan park. Man-made sea-defences including imported rocks are present, along with groynes which serve shingle and sand beaches.

223 Land use within the hydrology, hydrogeology and flood risk study area is predominantly agricultural, situated between the towns of Rhyl, Rhuddlan and St Asaph. The Afon Clwyd bisects the onshore ECC study area, flowing from St Asaph northward into Rhyl. A number of other NRW designated main rivers also cross or are present within the onshore ECC and the wider hydrology, hydrogeology and flood risk study area.

224 Land to the east and south of Rhyl is predominantly agricultural, low-lying land with a network of drainage ditches. Hedgerows and woodland are relatively scarce and limited to field boundaries.

- 225 Land to the south-west of the Clwyd crossing is predominantly agricultural, with relatively flat, low-lying land within the Clwyd Valley, close to the Clwyd Estuary. Further south, towards the A55 and beyond, land begins to rise with more undulating topography. Field boundaries are typically well-established hedgerows and sometimes drystone walls. Woodlands and hedges are more common in this area.
- 226 The assessment identified several sensitive receptors including surface water quality, groundwater, and flood risk receptors. It considered the potential effects of AyM as a result of works. Mitigation includes implementation of a PPEIRP, preparation of a Flood Response Plan (FRP), adherence to an FRP, and the effective design of site drainage to ensure that flood risk is minimised (including utilising SUDS principles).
- 227 During construction, the assessment concluded that potential effects on surface water, groundwater, and flood risk would be of **negligible** to **minor adverse** significance, which are not significant in EIA terms.
- 228 In the O&M phase, it was concluded that potential effects on surface water, groundwater, and flood risk, in particular at the proposed substation, would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 229 In the decommissioning phase, it was concluded that potential effects on soil and land quality would be of **negligible** to **minor adverse** significance.
- 230 The cumulative effects assessment considered AyM alongside other planned and proposed projects and concluded that there were no significant effects.

## 6.19 Archaeology & Cultural Heritage

- 231 The onshore historic environment assessment considered the potential for the construction, O&M and decommissioning of AyM to have effects on the archaeology and cultural heritage of the study area, which included the proposed onshore development boundary, as well as a 500 m buffer in all directions, and potential effects from offshore (wind turbines) on onshore receptors (historic setting). This was to allow information on heritage assets in close proximity to AyM to be collected in order to fully understand the potential for as-yet unrecorded assets. In order to understand the significance of potential effects, baseline data has been reviewed to identify known or suspected archaeological sites within the site boundary, and to characterise the heritage resource from the study area. A full description of the assessment can be found within Volume 3, Chapter 7: Onshore Historic Environment (application ref: 6.3.7).
- 232 The study area for the onshore historic environment reveals the coastline and onshore cable route to have potential interest that ranges from early prehistoric populations at Prestatyn and Rhyl, through to potential bronze age finds at landfall, and The Castles and Town Walls of King Edward in Gwynedd (a United Nations Educational, Scientific and Cultural Organisation (UNESCO) designated World Heritage Site). Whilst there is limited evidence of Romano-British influence and limited medieval settlement, evidence indicates small medieval settlements present at Cefn Du and Rhyd Orddwy, and a possible Romano-British enclosure at Bryn Cwnin.
- 233 The assessment considers the results of a combination of desk-based study and site-specific geophysical survey. The assessment identified evidence of prehistoric settlement near the River Clwyd, with the desk top study reporting finds from the Rhuddlan area noted as including flint, and a Neolithic axe. There is also evidence of bronze age activity in the area, and iron age settlement to the north of the onshore cable route.

- 234 More recent Historic Assets of interest identified in the study area, include Pengwern Hall, the Chain Radar Station at Rhuddlan, and Bodelwyddan Registered Park and Gardens. Further afield, sites considered for the potential effect on historic setting that may occur as a result of the offshore wind turbines, include Beaumaris Castle, the Menai Bridge, and The Castles and Town Walls of King Edward in Gwynedd World Heritage Site.
- 235 Within the wider region outside of the study area, there are a number of designated heritage sites along the north coast, comprising mainly Grade I and Grade II listed buildings, scheduled monuments, and the World Heritage Site.
- 236 The assessment considers potential direct and indirect effects on archaeological receptors, as well as effects due to changes in setting as a result of the proposed development. Mitigation includes careful routing of the onshore cable route to avoid key areas of sensitivity, and the production of an agreed programme of archaeological work as identified through further work.
- 237 In the construction/ decommissioning phases, the assessment concluded that potential effects as a result of disturbances would be of **negligible to minor adverse significance**, which is not significant in EIA terms.
- 238 During the O&M phase, potential effects resulting from changes in setting of the identified Heritage Assets, including Conservation Areas and listed buildings, were concluded to be of **negligible to moderate adverse significance**. The only effect considered to be of moderate significance and therefore significant for purposes of the EIA regulations, is the visibility of WTGs alongside the pier from some viewpoints in Llandudno, and the change in some key views from the Llandudno Pier.
- 239 The cumulative effects assessment concluded that no adverse cumulative effects were anticipated.

## 6.20 Traffic and Transport

- 240 The assessment of potential effects on traffic and transport as a result of the construction, O&M and decommissioning activities associated with AyM within an identified study area defined as the highway network around the proposed project boundary. The study was informed by an initial desktop study to identify potential construction access routes, highway infrastructure and transport facilities within the proximity of the proposed development. Review of existing data, as well as the undertaking of surveys including automated and manual traffic counts, also informed the assessment.
- 241 In order to assess the potential effects of the construction phase of AyM on driver severance and delay, the peak hours on the highway network have been identified using the existing Department for Transport and Automatic Traffic Count data. A correction factor, agreed with statutory advisers, has been applied to account for changes in baseline traffic numbers associated with the outbreak of COVID-19, and the associated downturn in general activity. A full description of the assessment can be found within the ES Volume 3, Chapter 8: Traffic and Transport (application ref: 6.3.8).
- 242 The local highway network includes the A548, the A525 between Rhyl and the A55 Junction 27, Sarn Lane, and Glascoed Road. The A525 and A55 are dual carriageways subject to the national speed limit (70 mph). The A525 acts as the main connection between Rhyl and Newcastle-under-Lyme in England. The A55, also known as the North Wales Expressway, connects Chester to Holyhead carrying a significant amount of traffic on a daily basis.
- 243 Detailed vehicle, cyclist and pedestrian counts are presented within the traffic and transport chapter, however light goods vehicles make up the majority of the baseline vehicle flows. Accident trends or clusters were identified within the study area, on the Rhyl Coast Road (A548), the A525 between Rhyl and Rhuddlan, and the A547. The baseline environment also includes pedestrian, cycle, and bus routes within the local area.

- 244 The assessment considered the potential effects on traffic and transport receptors due to construction traffic associated with AyM. As part of the mitigation, a Traffic Management Plan to manage and control vehicle movements will be developed, and certain key roads will have the cables installed underneath them via use of a trenchless method such as horizontal directional drilling, rather than trenching.
- 245 In the construction, O&M and decommissioning phases of the development, the assessments identified that there would be no significant effects due to impacts including delays to drivers, public transport or pedestrian amenity, PRow crossings, or accidents and safety. The assessment concluded that all potential effects would be of **negligible** to **minor adverse** significance, which is not significant in EIA terms.
- 246 The cumulative effects assessment concluded that no adverse cumulative effects were anticipated.

## 6.21 Airborne Noise and Vibration

- 247 The noise and vibration assessment examines the potential effects that may be generated through the construction, O&M and decommissioning of AyM upon sensitive areas or premises used by people. To inform the study, calculations were made based on the attenuation of noise from various activities including construction noise associated with excavation and cable laying, piling at the substation, noise from construction traffic, and noise from the operational substation. A full description of the assessment can be found within Volume 3, Chapter 10: Noise and Vibration (application ref: 6.3.10).
- 248 The existing baseline has been characterised by a baseline sound survey undertaken in 2021 at multiple locations that were representative of noise sensitive receptors in the vicinity of AyM. The existing environment currently comprises a mix of rural, industrial, commercial and recreational uses. The existing ambient noise environment at each of the locations is described in detail within the noise and vibration chapter.

- 249 The assessment considered potential effects as a result of impacts due to temporary construction noise, construction traffic, offshore piling, and the operation of the onshore substation. Mitigation measures include the production of a Noise and Vibration Management Plan within the CoCP, which would set out requirements for construction such as the use of additional acoustic screens.
- 250 It was concluded that potential effects in the construction phase as a result of construction noise, traffic noise, vibration and offshore piling noise would be of **minor adverse** significance with mitigation, which is not significant in EIA terms.
- 251 In the O&M phase, it was concluded that potential effects from operational fixed plant (the substation) would be of **minor adverse** significance with mitigation, which is not significant in EIA terms.
- 252 In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases. The cumulative effects assessment considered the potential effects of AyM in combination with other plans and projects in the area. No significant cumulative effects are predicted.

## 6.22 Air Quality

- 253 The air quality assessment has assessed the potential effects on air quality as a result of the onshore construction, O&M and decommissioning activities of AyM, including the landfall, onshore cable route, and substation. The assessment draws on existing data and air quality management reports by local authorities, as well as predicted traffic counts defined by the project description. A full description of the assessments can be found within Volume 3, Chapter 11: Air Quality (application ref: 6.3.11).
- 254 AyM is not located within any Air Quality Management Areas. The nearest (non-automatic) air quality monitoring stations are located around 0.7 and 2.5 km to the south of the proposed development boundary. Data from these stations between 2015 and 2019 showed that there have been no exceedances of Air Quality Objectives (AQOs for NO<sub>2</sub> or PM10).

- 255 The assessment considered the potential effects on air quality as a result of impacts due to construction dust and construction vehicle and plant emissions on human and ecological receptors. Mitigation measures include implementing a traffic management plan and adhering to standard guidance measures and good practice principles, as outlined in the CoCP.
- 256 During construction, the assessment concluded that potential effects due to increases in road traffic generated pollutant concentration and impacts from dust on human and ecological receptors would be of **negligible** significance, which is not significant in EIA terms.
- 257 In the O&M phase, potential effects due to increases in traffic-generated air quality pollutant concentrations on human and ecological receptors would be of **negligible** significance, which is not significant in EIA terms.
- 258 During decommissioning, potential effects due to dust impacts on human and ecological receptors would be of **negligible** significance, which is not significant in EIA terms.
- 259 The cumulative effects assessment considered the onshore elements of AyM alongside other planned projects and developments in the area, including residential development, and solar farms, and concluded that potential cumulative effects would be of **negligible** significance, which is not significant in EIA terms.

## 6.23 Public Health

- 260 The Public Health assessment chapter draws primarily on other assessments such as air quality, traffic, noise, hydrology, and tourism to understand the implications of AyM on public health. In addition to these topics, the public health chapter considers the potential effects associated with electromagnetic fields that may be emitted by AyM. A full description of the assessment can be found within Volume 3, Chapter 12: Public Health (application ref: 6.3.12).

261 As the onshore ECCs will be buried, potential impacts from electric fields have been scoped out from detailed assessment as burial is recognised as mitigating the potential effects. Further to this, all infrastructure built will comply with the government guidelines on electromagnetic radiation emission. During construction and O&M phases, the assessment concluded that potential effects would be of *negligible* to *minor adverse* significance, which is not significant in EIA terms. In the decommissioning phase, effects were concluded to be of no greater significance than in the construction and O&M phases.

## 7 Next steps and further information

262 The submission of the ES and application for the DCO and ML(s) marks the end of the pre-application period under the Planning Act. Upon receipt of the application, PINS will have 28 days to decide whether or not to accept the application. If accepted, the pre-examination phase will begin, and members of the public will be able to register to share their views on the project.

263 Once the examination of AyM commences, the appointed Examining Authority has six months to examine the application and a further three months to make a recommendation to the SoS. The SoS then has three months to determine the application. In the event that a DCO is granted, the design and development of the project will continue to be progressed as the project moves further towards construction.

264 Key consultation documents will include the ES and details of the principles that would be applied to the design and construction of AyM. These documents will be available during the examination of the application, which will give members of the public an opportunity to engage with the examination process.

265 The marine licence application will be made separately to the Welsh Government, in parallel with the DCO application process. The responsibility for marine licensing in Wales lies with the Welsh Government, but the marine licence is administered by the NRW Marine Licensing Team on behalf of the Welsh Ministers.



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