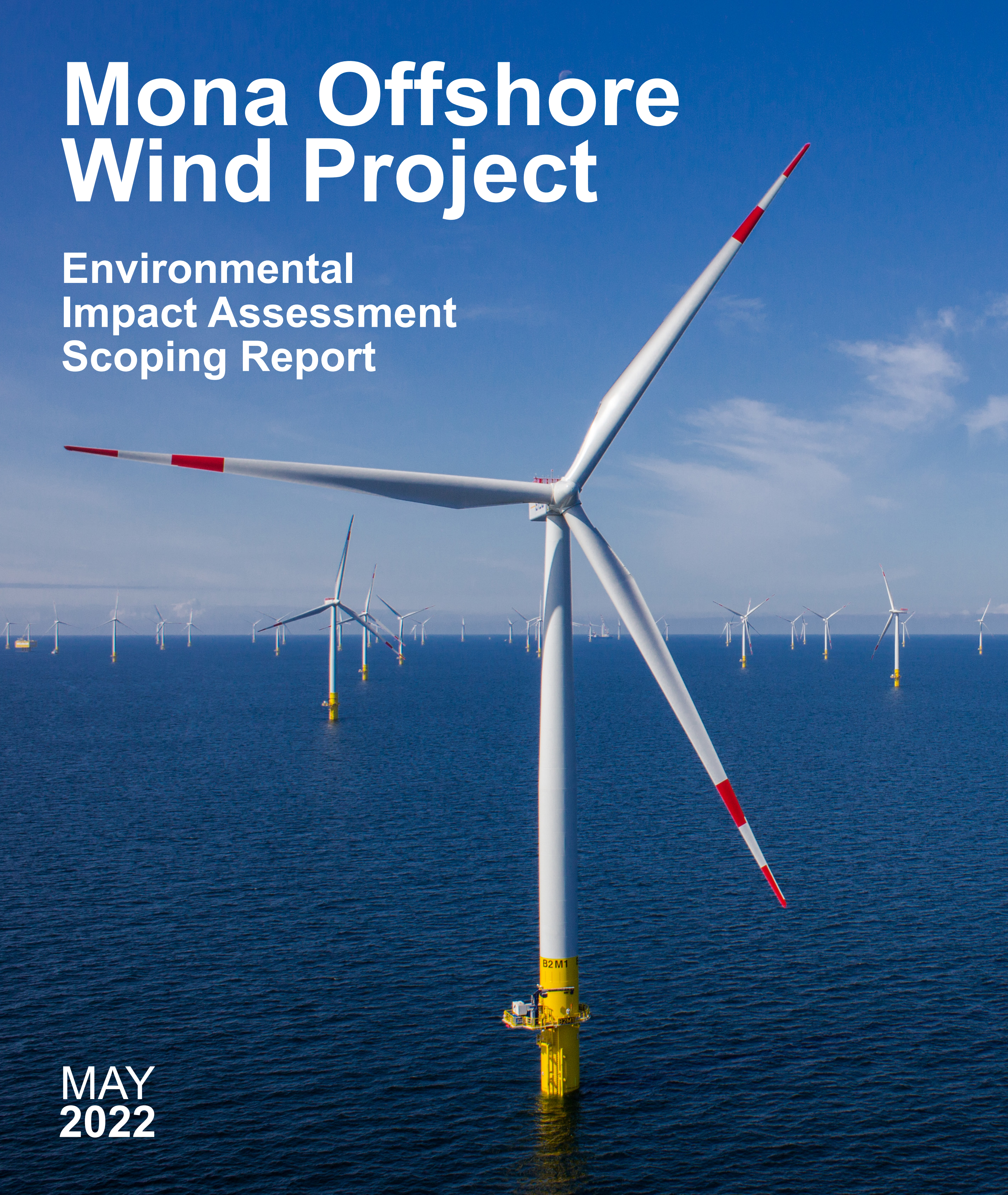
Mona Offshore Wind Project

Environmental Impact Assessment Scoping Report

MAY
2022



MAKING COMPLEX EASY

Partners in UK offshore wind

Mona
Offshore Wind Project

Partners in UK offshore wind

MAKING COMPLEX EASY

Mona Offshore Wind Project EIA Scoping Report

Part 1: Introduction
Part 2: Generation assets
Part 3: Transmission assets
Part 4: Annexes

FINAL	Final	RPS	05/05/2022	bp/EnBW	05/05/2022	bp/EnBW	05/05/2022
Rev	Reason for Issue	Author	Date	Checked	Date	Approved	Date

Document Code

MO_4000051_01-00_MM_CNS_AEA_Mona-Scoping-Report

Part 1: Introduction

Table of Contents

1. Introduction 16
1.1 Background 16
1.2 The Applicant and the EIA team 17
1.3 Project overview 18
1.4 Purpose, approach and structure of the EIA Scoping Report 21
1.4.1 Purpose 21
1.4.2 Approach 22
1.4.3 Structure 23
2. Policy and legislation 33
2.1 Climate change policy and need for the project 33
2.1.1 International commitments 33
2.1.2 European legislation and policy 33
2.1.3 UK energy legislation and policy 34
2.1.4 Welsh planning policy and legislation 37
2.2 The consenting process 39
2.2.2 The Planning Act 2008 40
2.2.3 The Development Consent Order (DCO) 40
2.2.4 Marine and Coastal Access Act 2009 41
2.2.5 The Environmental Impact Assessment (EIA) process 41
2.3 Other consents and legislation 42
2.3.2 Habitats Regulations Assessment 42
2.3.3 European protected species (EPS) licencing 43
3. Project description 44
3.1 Introduction 44
3.2 Project location 44
3.3 Project design envelope approach 47
3.4 Offshore infrastructure 49
3.4.2 Wind turbines 49
3.4.3 Foundations and support structures 51
3.4.4 Seabed preparation 57
3.4.5 Scour protection for foundations 58
3.4.6 Offshore substation platforms (OSPs) 59
3.4.7 Inter-array cables 61
3.4.8 Interconnector cables 62
3.4.9 Offshore export cables 63
3.4.10 Landfall 64
3.5 Onshore infrastructure 64
3.5.2 Onshore export cables 64
3.5.3 Grid connection export cables 65
3.5.4 Onshore substation 66

3.6 Construction 67
3.6.1 Offshore construction 67
3.6.2 Onshore construction 68
3.7 Operation and maintenance 68
3.8 Decommissioning and repowering 69
3.9 Measures adopted as part of the project 70
4. EIA methodology 71
4.1 Introduction 71
4.2 Scoping 71
4.3 Legislation and guidance 72
4.4 Key principles of the assessment 74
4.4.1 Overview 74
4.4.2 Proportionate EIA 75
4.4.3 Evidence-based approach 75
4.4.4 Maximum design scenario approach 75
4.5 Identification of impacts and assessment of significance 76
4.5.1 Definitions of impact and effect 76
4.5.2 Defining magnitude of impact 77
4.5.3 Defining sensitivity of receptor 77
4.5.4 Evaluation of significance of effect 77
4.6 Mitigation and enhancement measures 79
4.6.2 Measures adopted as part of the project 79
4.6.3 Further mitigation 80
4.6.4 Monitoring 81
4.7 Addressing uncertainty 83
4.7.2 Future baseline and assessment years 83
4.7.3 Forecasting and modelling 83
4.8 Cumulative effects assessment 84
4.8.2 Offshore components 84
4.8.3 Onshore components 84
4.8.4 Screening stage 85
4.8.5 Assessment stage 88
4.9 Transboundary impacts 88
4.9.1 Legislation and guidance 88
4.9.2 Screening 89
4.10 Inter-related effects 89
5. Consultation process 91
5.1 Pre-application consultation 91
5.2 Statement of Community Consultation (SoCC) 91
5.3 Evidence plan process 92
5.4 Timing of consultation 93
5.4.2 Scoping 93
5.4.3 Phase 1 consultation 94
5.4.4 Phase 2 consultation 94

5.4.5 Application for development consent and marine licence 95
6. References 96
6.1 Introduction 96
6.2 Policy and legislation 96
6.3 Project description 97
6.4 EIA methodology 98
6.5 Consultation process 99

Table of tables

Table 1.1: Scoping requirements of the 2017/2007 EIA Regulations and where the information is included in the EIA Scoping Report 22
Table 1.2: Topics within the EIA Scoping Report 27
Table 3.1: Tidal levels within the Mona Array Scoping Boundary 47
Table 3.2: Design envelope: key parameters for wind turbines 50
Table 3.3: Design envelope: key parameters for monopile foundations 53
Table 3.4: Design envelope: key parameters for jacket foundations (wind turbines). 54
Table 3.5: Design envelope: key parameters for jacket foundations (OSPs/offshore booster substation) 55
Table 3.6: Design envelope: key parameters for suction bucket jacket foundations (wind turbines) 57
Table 3.7: Design envelope: key parameters for suction bucket jacket foundations (OSPs and offshore booster substation) 57
Table 3.8: Design envelope: key parameters for offshore substation platforms 60
Table 3.9: Design envelope: key parameters for the offshore booster substation ... 61
Table 3.10: Design envelope: key parameters for inter-array cables 62
Table 3.11: Design envelope: key parameters for interconnector cables 62
Table 3.12: Design envelope: key parameters for offshore export cables 63
Table 3.13: Design envelope: key parameters for onshore export cables 65
Table 4.1: Matrix used for assessment of significance, showing the combinations of receptor sensitivity and the magnitude of impact 78
Table 4.2: Definition of significance levels 78

Table of figures

Figure 1.1: Mona Array Scoping Boundary and Mona Potential Array Area 20
Figure 1.2: Extent of the onshore and offshore technical topic study areas 26
Figure 3.1: Mona Offshore Wind Project location 46
Figure 3.2: Illustrative wind turbine design 50
Figure 3.3: Illustrative monopile foundation design 52
Figure 3.4: Illustrative jacket (pin pile) foundation design 54
Figure 3.5: Illustrative jacket (suction bucket) foundation design 55
Figure 3.6: Illustrative scour protection types (Left: delivery of rock to EnBW's Hohe See offshore wind farm; Right: concrete mattresses) 59
Figure 3.7: Illustrative offshore substation platform 60
Figure 4.1: Overview of the scoping process 72
Figure 4.2: Proposed iterative approach to mitigation within the Mona Offshore Wind Project EIA 82

Figure 4.3: Proposed methodology for the Mona Offshore Wind Project for the screening of potential projects/plans to provide cumulative effects. 87

Revision history

Amendment Date	Revision Number	Amender Initials	Amendment

Executive summary

Energie Baden-Württemberg AG (EnBW) and bp are jointly developing the Mona Offshore Wind Project through their project company Mona Offshore Wind Limited (the Applicant). The Mona Potential Array Area (i.e. the area within which the offshore wind turbines will be located) is located in the east Irish sea, 28.2km (15.2 nautical miles (nm)) from the north coast of Wales and 39.9km (21.5nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1.5 Gigawatts (GW). This document supports the Applicant's request for a Scoping Opinion from the Secretary of State and Natural Resources Wales (NRW) for the development of the Mona Offshore Wind Project.

The Mona Offshore Wind Project is a Nationally Significant Infrastructure Project (NSIP) requiring an application for development consent to be made to the Planning Inspectorate and, due to the location of the offshore export cables and related works in Welsh inshore waters, an additional marine licence application to be made to NRW. The applications for development consent and marine licence will comprise full details of the Mona Offshore Wind Project and will be accompanied by an Environmental Statement (ES), which will present the results of the Environmental Impact Assessment (EIA) for the Mona Offshore Wind Project. The EIA will be prepared in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and The Marine Works (Environmental Impact Assessment Regulations) 2007 (as amended) (the 2007 EIA Regulations). This EIA Scoping Report considers the generation and transmission (offshore and onshore) assets of the Mona Offshore Wind Project.

This EIA Scoping Report is presented in four parts. This includes separate parts for the generation assets and the transmission assets, however the Applicant is seeking a Scoping Opinion from the Secretary of State in respect of the Mona Offshore Wind Project as a whole. This structure has been necessary to accommodate the uncertainty over the grid connection during the development of the EIA Scoping Report, which has been subject to a separate process led by National Grid. The four parts are described below:

- Part 1 (Introduction) provides an introduction to the Mona Offshore Wind Project, sets out the policy and legislative context, provides an indicative project description, sets out the proposed EIA methodology and details the pre-application consultation process.
- Part 2 (Generation assets) provides an introduction to the generation assets of the Mona Offshore Wind Project, considerations for site selection and alternatives, and identifies the main aspects of the offshore physical, biological and human environment likely to be significantly affected by the generation assets.
- Part 3 (Transmission assets) provides an introduction to the transmission assets, considerations for site selection and alternatives, and identifies the main aspects of the offshore and onshore physical, biological and human environment likely to be significantly affected by the transmission assets.
- Part 4 (Annexes) contains the transboundary impacts screening, Water Framework Directive (WFD) screening and Marine Conservation Zones (MCZs) screening annexes.

Each of parts 1 to 3 provide an introduction and overview of the structure of the relevant part in order to help guide the reader, and parts 2 and 3 are structured consistently to enable comparison and cross-reference between topic sections. It should be noted that this structure has introduced an element of repetition between parts 2 and 3 which has been necessary to provide comprehensive scoping for the generation assets and transmission assets separately. The above structure has been designed for the EIA Scoping Report only and the Preliminary Environmental Information Report (PEIR) and ES will be presented in offshore and onshore (and where relevant, combined) volumes considering the generation assets and transmission assets as a whole, with each topic assessment forming a separate chapter.

This EIA Scoping Report has identified potential topics and impacts to be scoped into the EIA based upon an understanding of the environmental conditions likely to be encountered within Mona Offshore Wind Project technical topic study areas. The EIA Scoping Report also identifies those potential topics and impacts that are proposed to be scoped out of the EIA, based on an understanding of the nature of the Mona Offshore Wind Project (including measures adopted as part of the project) and the proposed location.

The site selection process for all elements of the Mona Offshore Wind Project infrastructure is ongoing. The generation and transmission infrastructure will be located within the Scoping boundaries identified within the EIA Scoping Report, however the refined locations of the offshore infrastructure, landfall and onshore infrastructure have not yet been determined.

Extensive consultation with relevant statutory and non-statutory consultation bodies is required before an application for development consent is submitted to the Planning Inspectorate, which will help to inform the development of the Mona Offshore Wind Project.

Consultees are invited to consider the information provided in this EIA Scoping Report and to advise on whether they agree with the conclusions reached. Broad questions have been presented at the end of part 2 and part 3 of the EIA Scoping Report to encourage reflection on the key elements of the Mona Offshore Wind Project.

Following receipt of the Scoping Opinion from the Secretary of State and NRW, a PEIR is planned to be produced and consulted on during Q4 2022/Q1 2023. The PEIR will provide an initial statement of the environmental information available for the Mona Offshore Wind Project, including descriptions of the likely environmental effects, measures adopted as part of the project, and relevant enhancement, mitigation and monitoring commitments. The PEIR is intended to allow those taking part in the consultation to understand the nature, scale, location and likely significant environmental effects of the Mona Offshore Wind Project, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process. In parallel to the EIA process, the Habitats Regulations Assessment (HRA), including the HRA Screening Report and subsequent Report to Inform Appropriate Assessment (RIAA), will be consulted upon during the pre-application consultation process. A plan level HRA is currently in preparation by The Crown Estate which assesses the potential impact of the Round 4 Preferred Bidding Areas on the UK’s National Site Network and protected habitats and species. The plan level HRA is due to be published in spring 2022.

The Applicant expects it will further refine the design of the Mona Offshore Wind Project in response to the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the applications for development consent and marine licence which are planned to be submitted in 2023.

Crynodeb gweithredol

Mae Energie Baden-Württemberg AG (EnBW) a bp yn datblygu Prosiect Gwynt ar y Môr Mona ar y cyd drwy gwmni prosiect Mona Offshore Limited (yr Ymgeisydd). Mae Ardal Aráe bosibl Mona (sef yr ardal lle bydd y tyrbinau gwynt ar y môr yn cael eu lleoli) yn nwyrain Môr Iwerddon, 28.2km (15.2 milltir forol (nm)) o arfordir gogledd Cymru a 39.9km (21.5m) o arfordir gogledd orllewin Lloegr (pan gaiff ei fesur o Benllanw Cymedrig y Gorllanw (MHWS)). Yn unol â chais Rownd 4,1.5 Gigawat (GW) yw capasiti arfaethedig Prosiect Gwynt ar y Môr Mona. Mae’r ddogfen hon yn cefnogi cais yr Ymgeisydd am Farn Gwmpasu gan yr Arolygiaeth Gynllunio a Cyfoeth Naturiol Cymru ar gyfer datblygu Prosiect Gwynt ar y Môr Mona.

Mae Prosiect Gwynt ar y Môr Mona yn Brosiect Seilwaith o Arwyddocâd Cenedlaethol sy’n mynnu bod cais am gydsyniad datblygu yn cael ei wneud i’r Arolygiaeth Gynllunio ac, oherwydd lleoliad y ceblau allforio ar y môr a gwaith cysylltiedig yn nyfroedd glannau Cymru, bydd cais am drwydded forol ychwanegol yn cael ei wneud i Gyfoeth Naturiol Cymru. Bydd y ceisiadau am gydsyniad datblygu a thrwydded forol yn cynnwys manylion llawn Prosiect Gwynt ar y Môr Mona, ynghyd â Datganiad Amgylcheddol, a fydd yn cyflwyno canlyniadau’r Asesiad o’r Effaith Amgylcheddol ar gyfer Prosiect Gwynt ar y Môr Mona. Bydd yr Asesiad o'r Effaith Amgylcheddol yn cael ei baratoi yn unol â Rheoliadau Cynllunio Seilwaith (Asesu Effeithiau Amgylcheddol) 2017 (Rheoliadau Asesiad o’r Effaith Amgylcheddol 2017) a Rheoliadau Gwaith Morol (Rheoliadau Asesiad o'r Effaith Amgylcheddol) 2007 (fel y’u diwygiwyd) (Rheoliadau Asesiad o’r Effaith Amgylcheddol 2007). Mae’r Adroddiad Cwmpasu Asesiad o’r Effaith Amgylcheddol hwn yn ystyried asedau cynhyrchu a thrawsyrru (ar y môr ac ar y tir) Prosiect Gwynt ar y Môr Mona.

Cyflwynir yr Adroddiad Cwmpasu Asesiad o'r Effaith Amgylcheddol hwn mewn pedair rhan. Mae hyn yn cynnwys rhannau ar wahân ar gyfer yr asedau cynhyrchu a’r asedau trawsyrru, ond mae’r Ymgeisydd yn gofyn am Farn Gwmpasu gan yr Arolygiaeth Gynllunio ynglŷn â Phrosiect Gwynt ar y Môr Mona yn ei gyfanrwydd. Mae’r strwythur hwn wedi bod yn angenrheidiol oherwydd yr ansicrwydd ynghylch y cysylltiad â’r grid wrth ddatblygu Adroddiad Cwmpasu’r Asesiad o’r Effaith Amgylcheddol, sydd wedi bod yn destun proses ar wahân dan arweiniad y National Grid. Disgrifir y pedair rhan isod:

- Mae Rhan 1 (Cyflwyniad) yn rhoi cyflwyniad i Brosiect Gwynt ar y Môr Mona. Mae’n nodi’r polisi a’r cyd-destun deddfwriaethol, yn rhoi disgrifiad dangosol o’r prosiect, yn nodi methodoleg arfaethedig yr Asesiad o’r Effaith Amgylcheddol ac yn rhoi manylion y broses ymgynghori cyn ymgeisio.
- Mae Rhan 2 (Asedau cynhyrchu) yn rhoi cyflwyniad i asedau cynhyrchu Prosiect Gwynt ar y Môr Mona, gan gynnwys yr asesiad o ddewis safle a dewisiadau amgen, ac mae’n nodi’r prif agweddau ar yr amgylchedd ffisegol, biolegol a dynol ar y môr sy’n debygol o gael eu heffeithio’n sylweddol gan yr asedau cynhyrchu.
- Mae Rhan 3 (Asedau trawsyrru) yn rhoi cyflwyniad i’r asedau trawsyrru, gan gynnwys yr asesiad dewis safle a dewisiadau amgen, ac yn nodi’r prif agweddau ar yr amgylchedd ffisegol, biolegol a dynol ar y môr ac ar y tir sy’n debygol o gael eu heffeithio’n sylweddol gan yr asedau trawsyrru.
- Mae Rhan 4 (Atodiadau) yn cynnwys y sgrinio effeithiau trawsffiniol, sgrinio’r Gyfarwyddeb Fframwaith Dŵr ac atodiadau sgrinio Parthau Cadwraeth Morol.

Mae pob rhan o rannau 1 i 3 yn rhoi cyflwyniad a throsolwg o strwythur y rhan berthnasol er mwyn helpu i arwain y darllenydd, ac mae rhannau 2 a 3 wedi’u strwythuro'n gyson er mwyn gallu cymharu a chroesgyfeirio rhwng adrannau pwnc. Dylid nodi bod y strwythur hwn wedi cyflwyno elfen o ailadrodd rhwng rhannau 2 a 3 sydd wedi bod yn angenrheidiol er mwyn darparu gwaith cwmpasu cynhwysfawr ar gyfer yr asedau cynhyrchu ac asedau trawsyrru ar wahân. Mae'r strwythur uchod wedi cael ei ddylunio ar gyfer Adroddiad Cwmpasu'r Asesiad o'r Effaith Amgylcheddol yn unig a bydd y PEIR a'r Datganiad Amgylcheddol yn cael eu cyflwyno mewn cyfrolau ar y môr ac ar y tir (a, lle bo'n berthnasol, gyda'i gilydd) gan ystyried yr asedau cynhyrchu a'r asedau trawsyrru yn eu cyfanrwydd, gyda phob asesiad pwnc yn ffurfio pennod ar wahân.

Mae'r Adroddiad Cwmpasu'r Asesiad o'r Effaith Amgylcheddol hwn wedi nodi pynciau ac effeithiau posibl i'w cwmpasu yn yr Asesiad o'r Effaith Amgylcheddol ar sail dealltwriaeth o'r amodau amgylcheddol sy'n debygol o ddod ar eu traws yn ardaloedd astudiaeth pwnc technegol Prosiect Gwynt ar y Môr Mona. Mae Adroddiad Cwmpasu'r Asesiad o'r Effaith Amgylcheddol hefyd yn nodi'r effeithiau a'r pynciau posibl hynny y bwriedir eu cwmpasu y tu allan i'r Asesiad o'r Effaith Amgylcheddol, ar sail dealltwriaeth o natur Prosiect Gwynt ar y Môr Mona (gan gynnwys mesurau sy'n cael eu mabwysiadu fel rhan o'r prosiect) a'r lleoliad arfaethedig.

Mae'r broses o ddewis safle ar gyfer pob elfen o seilwaith Prosiect Gwynt ar y Môr Mona yn mynd rhagddi. Bydd y seilwaith cynhyrchu a thrawsyrru o fewn y ffiniau Cwmpasu a nodir yn Adroddiad Cwmpasu'r Asesiad o'r Effaith Amgylcheddol. Fodd bynnag, nid yw lleoliadau penodol y seilwaith ar y môr, y lanfa na'r seilwaith ar y tir wedi cael eu pennu eto.

Mae angen ymgynghori'n helaeth â chyrff ymgynghori statudol ac anstatudol perthnasol cyn cyflwyno cais am gydsyniad datblygu i'r Arolygiaeth Gynllunio, a fydd yn helpu i lywio datblygiad Prosiect Gwynt ar y Môr Mona.

Gwahoddir ymgyngoreion i ystyried yr wybodaeth a ddarperir yn yr Adroddiad Cwmpasu'r Asesiad o'r Effaith Amgylcheddol hwn ac i roi cyngor ynghylch a ydynt yn cytuno â'r casgliadau a gyrhaeddwyd. Mae cwestiynau eang wedi cael eu cyflwyno ar ddiwedd rhan 2 a rhan 3 Adroddiad Cwmpasu'r Asesiad o'r Effaith Amgylcheddol er mwyn annog myfyrio ar elfennau allweddol Prosiect Gwynt ar y Môr Mona.

Ar ôl derbyn y Barn Gwmpasu gan yr Arolygiaeth Gynllunio a Cyfoeth Naturiol Cymru, bwriedir cynhyrchu PEIR ac ymgynghori arno yn ystod Ch4 2022/Ch1 2023. Bydd y PEIR yn rhoi datganiad cychwynnol o'r wybodaeth amgylcheddol sydd ar gael ar gyfer Prosiect Gwynt ar y Môr Mona, gan gynnwys disgrifiadau o'r effeithiau amgylcheddol tebygol, y mesurau sy'n cael eu mabwysiadu fel rhan o'r prosiect, ac ymrwymiadau perthnasol o ran gwella, lliniaru a monitro. Bwriad y PEIR yw galluogi'r rheini sy'n cymryd rhan yn yr ymgynghoriad i ddeall natur, graddfa, lleoliad ac effeithiau amgylcheddol sylweddol tebygol Prosiect Gwynt ar y Môr Mona, er mwyn iddyn nhw allu cyfrannu'n ddoeth at y broses o ymgynghori cyn ymgeisio o dan Ddeddf Cynllunio 2008 ac at broses yr Asesiad o'r Effaith Amgylcheddol. Ochr yn ochr â'r broses Asesiad o'r Effaith Amgylcheddol, byddwn yn ymgynghori ar yr Asesiad Rheoliadau Cynefinoedd, gan gynnwys Adroddiad Sgrinio'r Asesiad Rheoliadau Cynefinoedd ac Adroddiad dilynol i Hysbysu Asesiad Priodol, yn ystod y broses ymgynghori cyn ymgeisio. Mae Asesiad Rheoliadau Cynefinoedd lefel cynllun yn cael ei baratoi ar hyn o bryd gan Ystâd y Goron sy'n asesu effaith bosibl yr Ardaloedd Cynnig a Ffafrir Rownd 4 ar Rwydwaith Safle Cenedlaethol y DU a chynefinoedd a rhywogaethau gwarchodedig. Bydd Asesiad Rheoliadau Cynefinoedd lefel y cynllun yn cael ei gyhoeddi yng ngwanwyn 2022.

Mae’r Ymgeisydd yn disgwyl y bydd mireinio dyluniad Prosiect Gwynt ar y Môr Mona ymhellach mewn ymateb i'r ymgynghoriad a gafwyd o’r ymgynghoriad cyn ymgeisio yn ogystal â’r cyfyngiadau amgylcheddol a nodwyd yn ystod proses yr Asesiad o’r Effaith Amgylcheddol. Bydd canlyniadau terfynol yr Asesiad o’r Effaith Amgylcheddol yn cael eu cyflwyno mewn Datganiad Amgylcheddol a bydd crynodeb o’r holl ymatebion i’r ymgynghoriad yn cael ei gyflwyno mewn Adroddiad Ymgynghori, a bydd y ddau yn cyd-fynd â’r ceisiadau am gydsyniad datblygu a thrwydded forol sydd i fod i gael eu cyflwyno yn 2023.

Glossary

Term	Meaning
Mona Array Scoping Boundary	The Preferred Bidding Area that the Applicant was awarded by The Crown Estate as part of Offshore Wind Leasing Round 4.
Mona Offshore Transmission Infrastructure Scoping Search Area	The Mona Offshore Transmission Infrastructure Scoping Search Area is the area encompassing and located between the Mona Potential Array Area and the landfall up to Mean High Water Springs (MHWS), in which the offshore export cables and any offshore booster substation will be located.
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets and offshore and onshore transmission assets and associated activities.
Mona Onshore Transmission Infrastructure Scoping Search Area	The Mona Onshore Transmission Infrastructure Scoping Search Area is the area located between the landfall landwards of Mean Low Water Springs (MLWS) and the onshore National Grid substation, in which the onshore export cables, onshore substation and other associated onshore transmission infrastructure will be located.
Mona Potential Array Area	The Mona Potential Array Area is the area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) is likely to be located.
Study Area	For each environmental topic, the baseline environment will be characterized and the potential environmental impacts will be described within a topic-specific study area. The topic-specific study areas are defined for each topic in part 2 and part 3 of the EIA Scoping Report and are based on the maximum spatial extent across which potential impacts of the Mona Offshore Wind Project may be experienced by the relevant receptors (i.e. Zone of Influence).

Acronyms

Acronym	Meaning
BEIS	Department of Business, Energy and Industrial Strategy
CCC	Committee on Climate Change
CEA	Cumulative Effects Assessment
CfD	Contracts for Difference
CIEEM	Chartered Institute of Ecology and Environmental Management
COWRIE	Collaborative Offshore Windfarm Research Into the Environment
CPA	Coast Protection Act
cSAC	Candidate Special Area of Conservation
DCO	Development Consent Order
DECC	Department of Energy and Climate Change (now BEIS)
Defra	Department for Environment, Food and Rural Affairs
EC	European Commission
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMR	Electricity Market Reform
EPS	European Protected Species
ES	Environmental Statement
EU	European Union
FEPA	Food and Environment Protection Agency
GHG	Greenhouse Gas
HRA	Habitats Regulations Assessment

Acronym	Meaning
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IEP	Industry Evidence Programme
JNCC	Joint Nature Conservation Committee
LCCC	Low Carbon Contracts Company
LSE	Likely Significant Effect
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPS	Marine Policy Statement
NPS	National Policy Statement
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
OSP	Offshore Substation Platform
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PS	Permitting Service
pSPA	Potential Special Protection Area
RED	Renewable Energy Directive
RES	Renewable Energy Strategy
ROC	Renewables Obligation Certificate
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCI	Site of Community Importance
SEA	Strategic Environmental Assessment
SNCB	Statutory Nature Conservation Body
SoCC	Statement of Community Consultation
SPA	Special Protection Area
TCA	Trade and Cooperation Agreement
TCE	The Crown Estate
UK	United Kingdom
UKCP	UK Climate Projections
WFD	Water Framework Directive

Units

Unit	Description
GW	Gigawatt
km	Kilometres
kV	Kilovolt

Unit	Description
MW	Megawatt
nm	Nautical miles

1. Introduction

1.1 Background

1.1.1.1 In February 2021, Energie Baden-Württemberg AG (EnBW) and bp Alternative Energy Investments Limited were selected by The Crown Estate (TCE) as Preferred Bidder for two 60-year leases in Offshore Wind Leasing Round 4. The projects to be developed in the two Preferred Bidding Areas, located in the east Irish Sea, have been named as the Morgan Offshore Wind Project and the Mona Offshore Wind Project. In accordance with the Round 4 bid, the proposed capacity of each project is 1.5GW. Separate consent applications will be submitted by Morgan Offshore Wind Limited and Mona Offshore Wind Limited (the 'Applicants') for each project, each accompanied by a separate Environmental Statement (ES). This Environmental Impact Assessment (EIA) Scoping Report has been prepared for the Mona Offshore Wind Project only; a separate EIA Scoping Report supports the Morgan Offshore Wind Project. The Mona Offshore Wind Project includes both the offshore and onshore infrastructure required to generate and transmit electricity from the offshore wind turbines to an onshore National Grid substation.

1.1.1.2 The Mona Potential Array Area (i.e. the area within which the offshore wind turbines will be located) is 449.97km^2 in area and is located 28.2km (15.2nm) from the Anglesey coastline, 39.9km (21.5nm) from the northwest coast of England and 42.6km (23nm) from the Isle of Man (when measured from Mean High Water Springs (MHWS)). The Mona Potential Array Area is predominantly located in Welsh offshore waters (beyond 12nm from the Welsh coast), with parts of the boundary located within English offshore waters (beyond 12nm from the English coast). The offshore export cables and related works located within and between the Mona Potential Array Area and the landfall will be routed through the Mona Offshore Transmission Infrastructure Scoping Search Area, which overlaps with both Welsh offshore and Welsh inshore waters in addition to English waters. The onshore export cables and onshore substation will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area, which overlaps with Conwy and Denbighshire, in north Wales.

1.1.1.3 As the Mona Offshore Wind Project is an offshore generating station with a capacity of greater than 350MW located in both Welsh and English waters, it is a Nationally Significant Infrastructure Project (NSIP)[1] requiring a Development Consent Order (DCO) under the Planning Act 2008. The application for development consent for the Mona Offshore Wind Project will cover all offshore aspects of the project located within Welsh offshore waters and English offshore waters as well as all onshore aspects of the Mona Offshore Wind Project.

1.1.1.4 A marine licence is required before carrying out any licensable marine activity under the Marine and Coastal Access Act 2009. Marine licences can

1 As defined by Section 15(3) of the Planning Act 2008, as amended.

be deemed under the DCO for licensable activities in English waters and Welsh offshore waters. It is therefore anticipated that the marine licence for all licensable activities related to the offshore wind farm infrastructure located within the Mona Potential Array Area will be deemed under the DCO. However, licensable activities within 12nm of the Welsh coast require a separate marine licence from NRW. A separate application will therefore be made to NRW for a marine licence for the offshore export cables and related works located within and between the Mona Potential Array Area and the landfall at MHWS. This EIA Scoping Report has been prepared in support of both the DCO and marine licence applications.

1.1.1.5 The applications for development consent and marine licence will comprise full details of the Mona Offshore Wind Project and will be accompanied by an ES, which will present the findings of the EIA process and will be prepared in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and The Marine Works (Environmental Impact Assessment Regulations) 2007 (as amended) (the 2007 EIA Regulations).

1.1.1.6 This EIA Scoping Report is presented in four parts as follows (as further described in section 1.4.3):

- part 1: Introduction
- part 2: Generation assets
- part 3: Transmission assets
- part 4: Annexes.

1.1.1.7 This EIA Scoping Report supports a request for formal Scoping Opinions from the Secretary of State and NRW under the 2017 EIA Regulations and 2007 EIA Regulations, respectively, in relation to the Mona Offshore Wind Project.

1.2 The Applicant and the EIA team

1.2.1.1 The Applicant is a joint venture between two leading energy companies which are working together as partners to deliver offshore wind projects in both Offshore Wind Leasing Round 4 and ScotWind Leasing.

1.2.1.2 EnBW is one of the largest energy supply companies in Germany and supplies electricity, gas, water and energy solutions and energy industry services to around 5.5 million customers with a workforce of more than 23,000 employees. EnBW aims to strengthen its position as a sustainable and innovative infrastructure partner for customers, citizens and local authorities to an even greater extent. The repositioning of EnBW with a focus on renewable energies and smart infrastructure solutions is a key component of its strategy. With a focus on renewable energy and smart infrastructure solutions, EnBW's objective is for half of the electricity it supplies to be from renewable sources by the end of 2025. This is already having a noticeable effect on the reduction of CO_2 emissions, which EnBW aims to halve by 2030. EnBW is aiming for climate neutrality by 2035. EnBW has been involved in the operation of hydro power plants in the Black Forest for more than 100 years, and has a large and continuously growing number of onshore wind farms and solar PV in Germany, France and Sweden. In addition, EnBW developed, constructed and operates four offshore wind farms in Germany (EnBW Baltic 1, Baltic 2, Hohe See and Albatros) with a total installed capacity of 945MW, commissioned between 2011 and 2020. A further 900MW offshore wind farm is currently under development.

1.2.1.3 bp has set out an ambition to be a net zero company by 2050, or sooner. This strategy will see bp transform from an international oil company producing resources, to an integrated energy company providing solutions to customers. bp already has a significant onshore wind business in the US with a gross generating capacity of 1.7GW, operating nine wind assets across the country. Since setting its new strategy in August 2020, bp has already formed a partnership with Equinor to develop offshore wind projects in the US, including the Empire Wind and Beacon Wind projects off the East Coast that have a planned potential 4.4GW generating capacity. To date, these projects have been selected by New York to supply 3.3GW of power to the State, underpinning the commercial attractiveness of the investments.

1.2.1.4 RPS has been contracted by the Applicant to undertake the EIA for the Mona Offshore Wind Project. This includes an initial review of the key environmental issues associated with the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project to inform the EIA Scoping Report. The EIA team is comprised of a number of RPS in-house and subcontracted topic specialists, as set out in Table 1.2.

1.2.1.5 In accordance with Regulation 14(4) of the 2017 EIA Regulations and Regulation 12(2) of the 2007 EIA Regulations, the ES will be prepared by competent experts and will outline the relevant expertise of those experts.

1.3 Project overview

1.3.1.1 Offshore Wind Leasing Round 4 was instigated by TCE in September 2019, and four Bidding Areas were identified for the development of offshore wind. As part of a competitive tender, EnBW and bp were awarded Preferred Bidder status for two 60-year leases within the Northern Wales and Irish Sea Bidding Area (Figure 1.1). The Bidding Areas are areas of the seabed, identified by TCE, that offer the least constrained (most technically favourable) areas for offshore wind development. The site selection process for the Mona Offshore Wind Project generation assets and transmission assets is presented in part 2, section 2: Site selection and alternatives, of the EIA Scoping Report and part 3, section 2: Site selection and alternatives, of the EIA Scoping Report, respectively.

1.3.1.2 The Mona Potential Array Area is presented in Figure 1.1 and part 2, section 1: Introduction, of the EIA Scoping Report. The Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area are presented in part 3, section 1: Introduction, of the EIA Scoping Report.

1.3.1.3 A description of the Mona Offshore Wind Project is presented in part 1, section 3: Project description, of the EIA Scoping Report. Key components of the Mona Offshore Wind Project include:

- offshore wind turbines
- foundations and support structures
- scour and cable protection
- inter-array cables
- interconnector cables
- offshore substation platforms
- offshore export cables
- offshore booster substation
- transition joint bays
- onshore export cables
- onshore substation.

1.3.1.4 In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1.5GW. The Mona Offshore Wind Project will include all associated offshore infrastructure (including up to 107 offshore wind turbines) and onshore infrastructure. The Mona Offshore Transmission Infrastructure Scoping Search Area extends from the Mona Potential Array Area to the selected landfall location on the north coast of Wales. It should be noted however that the Mona Offshore Wind Project transmission assets will be located within both the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area; the EIA Scoping for the Mona Potential Array Area is presented in part 2 of the EIA Scoping Report and the EIA Scoping for the Mona Offshore Transmission Infrastructure Scoping Search Area is presented in part 3 of the EIA Scoping Report. Within the Mona Onshore Transmission Infrastructure Scoping Search Area, the onshore transmission infrastructure will connect the offshore wind farm to an existing National Grid substation.

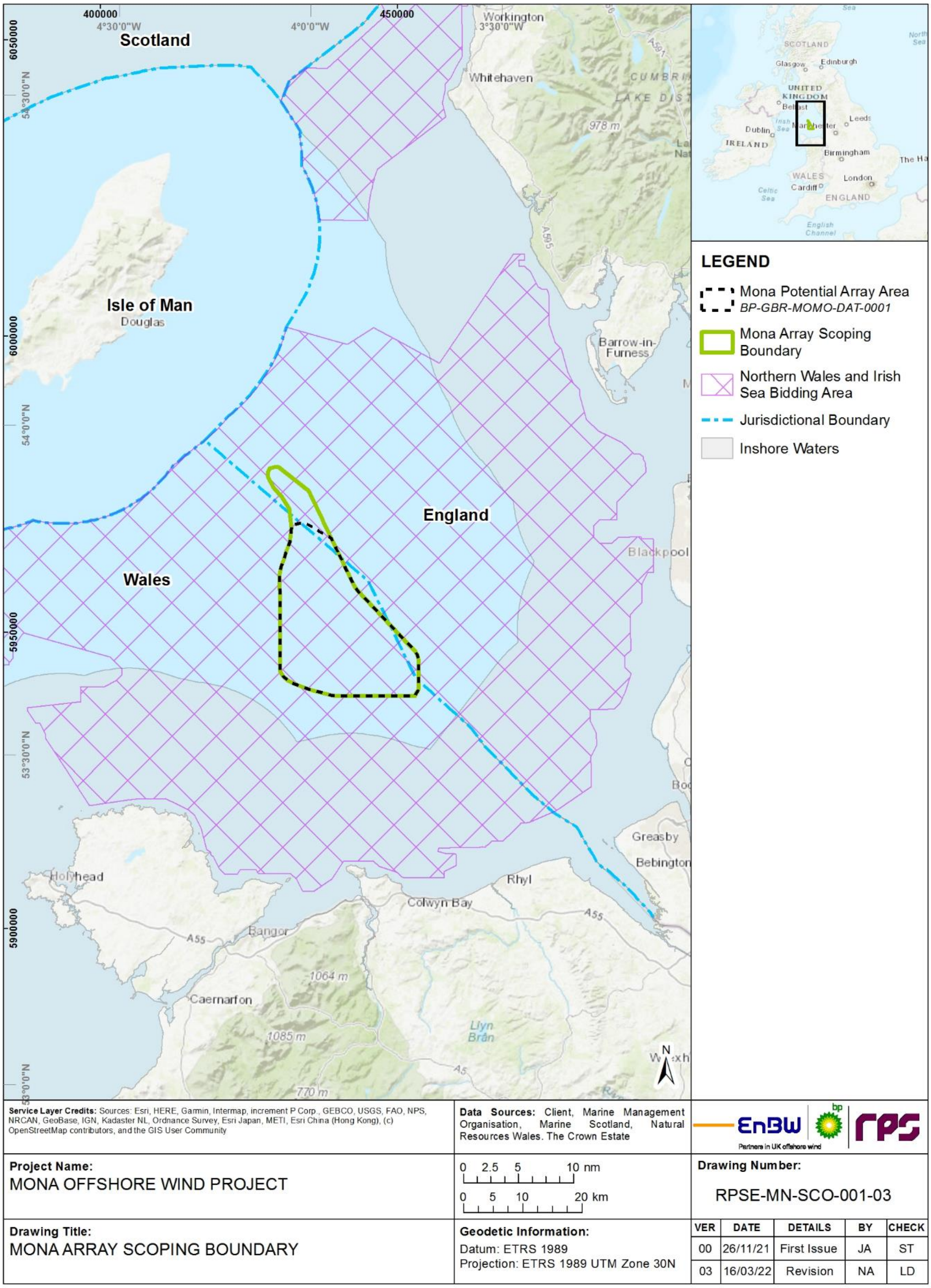


Figure 1.1: Mona Array Scoping Boundary and Mona Potential Array Area.

1.4 Purpose, approach and structure of the EIA Scoping Report

1.4.1 Purpose

1.4.1.1 The purpose of the EIA Scoping Report is to provide information on the Mona Offshore Wind Project and to allow for engagement with stakeholders on the key topics to be addressed in the EIA. In addition, scoping can be used to present the baseline data sources and assessment methodologies to be used to inform the EIA. Guidance on EIA scoping from the European Commission sets out the following benefits of scoping (EC, 2017):

- Scoping ensures that key environmental issues to be addressed are identified at an early stage.
- Scoping ensures resources are focused on the key environmental issues and further information is not required to be requested after the application for development consent is submitted.
- Scoping ensures consultation with relevant consultees occurs at an early stage.
- Scoping aids effective management and planning of resources and timescales for the production of the EIA.
- Scoping allows identification of initial alternatives and mitigation measures being considered by the developers.

1.4.1.2 The Mona Offshore Wind Project EIA Scoping Report has been prepared in support of a request for Scoping Opinions from the Secretary of State in respect of the DCO application and NRW in respect of the offshore export cable and related works marine licence application in accordance with Regulation 10 of the 2017 EIA Regulations and Regulation 13 of the 2007 EIA Regulations, respectively. In compliance with these regulations, this EIA Scoping Report provides:

- A plan sufficient to identify the land/a chart, plan or map sufficient to identify the location of the regulated activity and of other activities to be carried out in the course of the project.
- A description of the proposed development, including its location and technical capacity/a brief description of the specific characteristics of the regulated activity and the project, including their nature, purpose, location and technical capacity.
- An explanation of the likely significant effects of the development/regulated activity and the project on the environment.
- Such other information or representations as the person making the request/applicant may wish to provide or make.

1.4.1.3 Table 1.1Table 1.1 summarises the information requirements set out in the 2017 EIA Regulations and 2007 EIA Regulations respectively and where these can be found in this EIA Scoping Report.

Table 1.1: Scoping requirements of the 2017/2007 EIA Regulations and where the information is included in the EIA Scoping Report.

EIA Regulation requirement	Summary content
A plan sufficient to identify the land/a chart, plan or map sufficient to identify the location of the regulated activity and of other activities to be carried out in the course of the project	Part 1, section 3: Project description, of the EIA Scoping Report includes a plan/map of the location of the Mona Offshore Wind Project
A description of the proposed development, including its location and technical capacity/a brief description of the specific characteristics of the regulated activity and the project, including their nature, purpose, location and technical capacity	Part 1, section 3: Project description, of the EIA Scoping Report includes a description of the Mona Offshore Wind Project
An explanation of the likely significant effects of the development/regulated activity and the project on the environment	Part 2, Generation assets and Part 3, Transmission assets, of the EIA Scoping Report, include a description of the potential likely significant effects on the environment arising from the Mona Offshore Wind Project generation assets and transmission assets respectively
Such other information or representations as the person making the request may wish to provide or make	Further information on the Mona Offshore Wind Project is provided in part 2, Generation assets, part 3, Transmission assets and part 4, Annexes, of the EIA Scoping Report.

1.4.2 Approach

1.4.2.1 The approach taken in the preparation of this EIA Scoping Report has aimed to achieve the following objectives:

- To provide an overview of the baseline environment and the data collection and survey methodologies that will be implemented to inform the EIA baseline characterization for each technical assessment.
- To propose topics and impacts to scope into the Mona Offshore Wind Project EIA, drawing upon the existing evidence base where appropriate, and presenting topic-specific assessment methodologies where appropriate.
- To propose topics and impacts to be scoped out of the Mona Offshore Wind Project EIA, drawing upon the existing evidence base where appropriate, where there is clear justification for doing so.

1.4.2.2 This approach will allow the EIA to focus on those potential impacts which either have the potential to lead to a significant effect, or where uncertainty exists in relation to a potential effect, thereby supporting the development of a proportionate ES.

1.4.2.3 The ES, which will present the findings of the EIA for the Mona Offshore Wind Project, will be informed by the Scoping Opinions provided by the Secretary of State and NRW, including responses from relevant statutory and non-statutory consultation bodies. Details of the proposed approach to stakeholder consultation are outlined in part 1, section 5: Consultation process, of the EIA Scoping Report. The applications for development consent and the marine licence, which will be accompanied by the ES, are planned to be submitted to the Planning Inspectorate (on behalf of the Secretary of State) and NRW in autumn 2023.

1.4.2.4 The Applicant welcomes the opportunity for engagement with consultees and feedback on the Mona Offshore Wind Project and the scope (proposed content) of the ES.

1.4.3 Structure

1.4.3.1 This EIA Scoping Report is presented in four parts. This includes separate parts for the generation assets and the transmission assets, however the Applicant is seeking a Scoping Opinion from the Secretary of State in respect of the Mona Offshore Wind Project as a whole. This structure has been necessary to accommodate the uncertainty over the grid connection during the development of the EIA Scoping Report, which has been subject to a separate process led by National Grid. The four parts are described below:

- Part 1 of the EIA Scoping Report (Introduction) provides an introduction to the Mona Offshore Wind Project, sets out the policy and legislative context, provides an indicative project description, sets out the proposed EIA methodology and details the pre-application consultation process.
- Part 2 of the EIA Scoping Report (Generation assets) provides an introduction to the generation assets of the Mona Offshore Wind Project, considerations for site selection and alternative, and identifies the main aspects of the offshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance, and decommissioning of the generation assets.
- Part 3 of the EIA Scoping Report (Transmission assets) provides an introduction to the transmission assets, considerations for site selection and alternatives, and identifies the main aspects of the offshore and onshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance, and decommissioning of the transmission assets.
- Part 4 of the EIA Scoping Report (Annexes) contains the transboundary impacts screening, Water Framework Directive (WFD) screening and Marine Conservation Zone (MCZ) screening annexes.

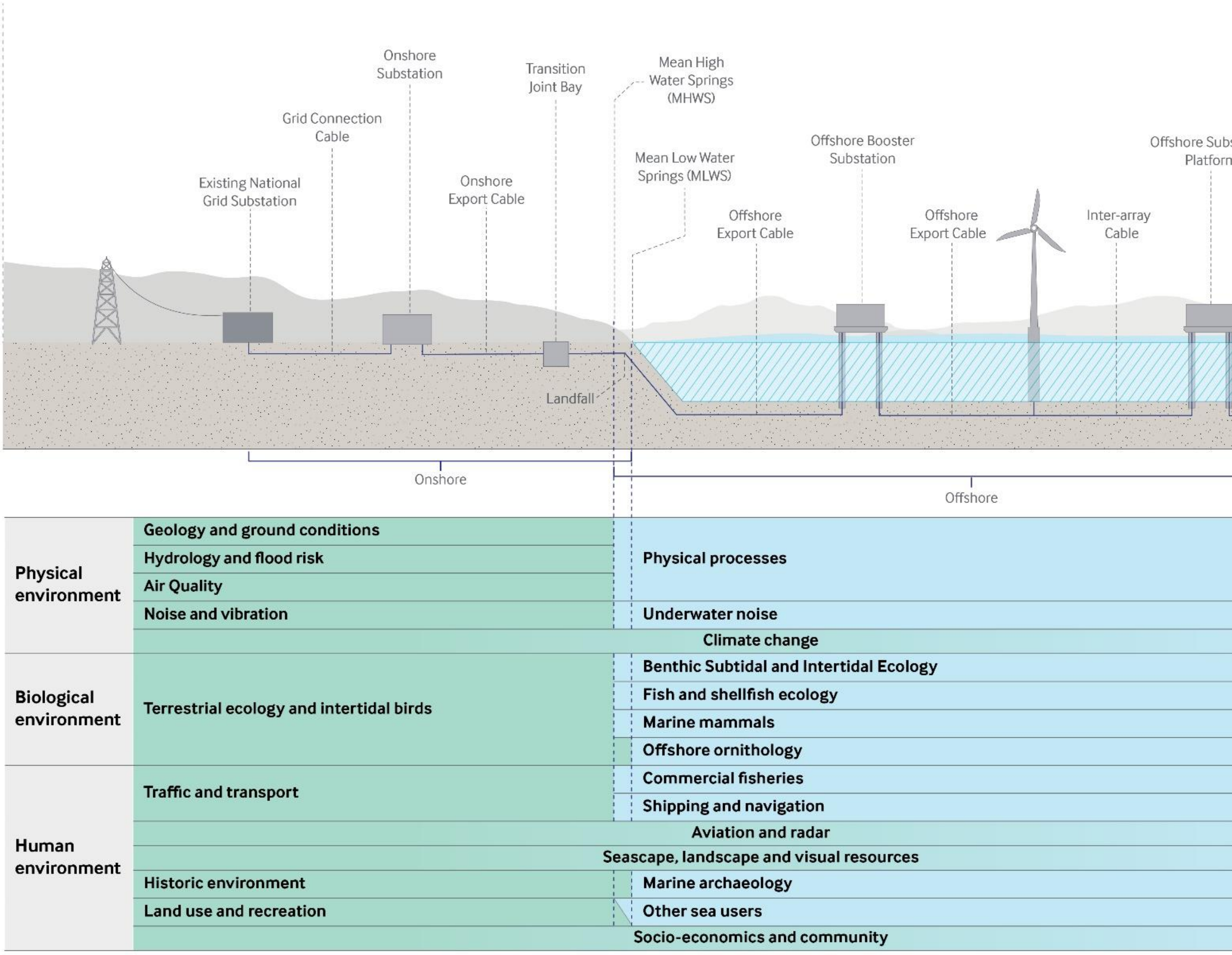
1.4.3.2 Each of parts 1 to 3 provide an introduction and overview of the structure of the relevant part in order to help guide the reader, and parts 2 and 3 are structured consistently to enable comparison and cross-reference between topic sections. It should be noted that this structure has introduced a degree of repetition between parts 2 and 3 which has been necessary to provide comprehensive scoping for the generation assets and transmission assets separately. The above structure has been designed for the EIA Scoping Report only and the Preliminary Environmental Information Report (PEIR) and ES will be presented in offshore and onshore (and where relevant, combined) volumes considering the generation assets and transmission assets as a whole, with each topic assessment forming a separate chapter.

1.4.3.3 The structure of this EIA Scoping Report is set out in Table 1.2. The parts of the EIA Scoping Report of relevance to NRW and the separate marine licence application for the offshore export cables and related works are listed below, with further detail presented in Table 1.2. All parts of the EIA Scoping Report are of relevance to the Planning Inspectorate.

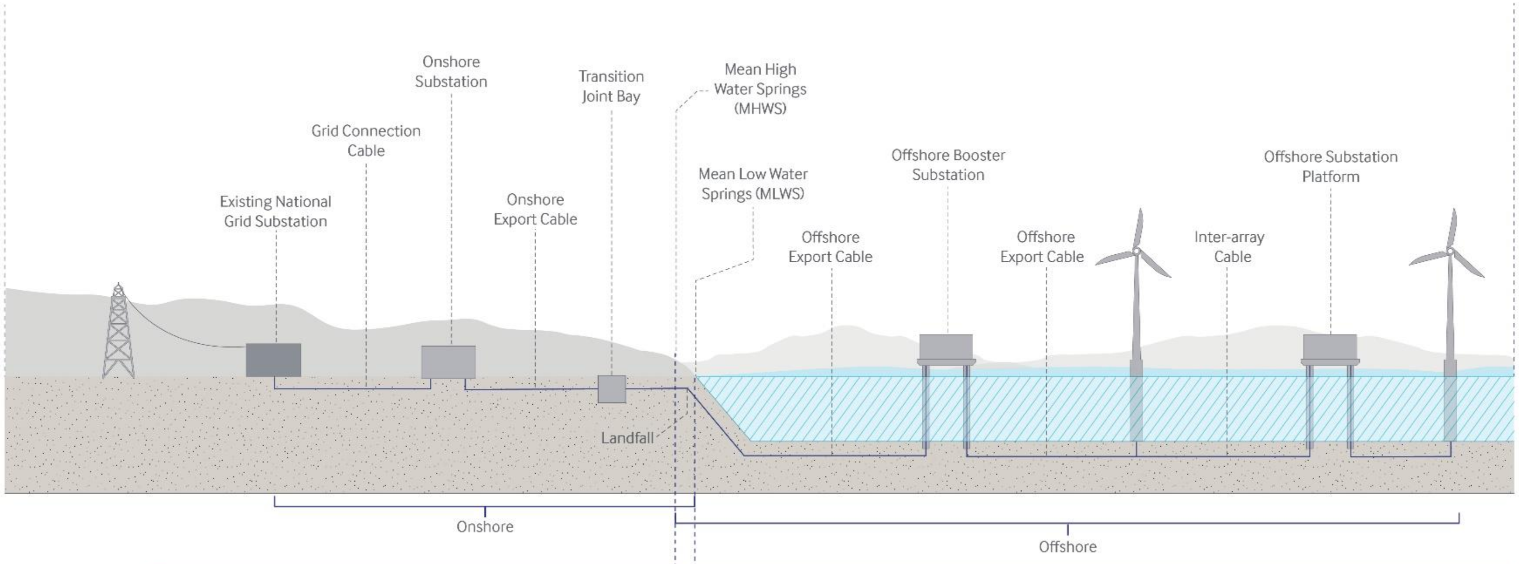
- part 1, section 1: Introduction
- part 1, section 2: Policy and legislation
- part 1, section 3, Project description
- part 1, section 4: EIA methodology
- part 1, section 5: Consultation process
- part 3, section 1: Introduction
- part 3, section 2: Site selection and alternatives
- part 3, section 3: Offshore physical environment
- part 3, section 4: Offshore biological environment
- part 3, section 5: Offshore human environment
- part 3, section 9: Offshore and onshore combined topics
- part 3, section 10: Other environmental topics
- part 3, section 11: Summary
- part 4: Annexes.

For the purposes of the EIA, including this EIA Scoping Report, 'offshore' generally refers to the receptors on the seaward side of Mean High Water Springs (MHWS) and 'onshore' refers to the receptors on the landward side of MHWS however there are exceptions. There is an overlap of jurisdiction in the intertidal area between MHWS and Mean Low Water Springs (MLWS) of the marine and terrestrial consenting and regulatory regimes. The remit of each

topic is defined in



1.4.3.4 Figure 1.2.



	Onshore	Offshore
Physical environment	Geology and ground conditions	Physical processes
	Hydrology and flood risk	
	Air Quality	
	Noise and vibration	Underwater noise
	Climate change	Climate change
Biological environment	Terrestrial ecology and intertidal birds	Benthic Subtidal and Intertidal Ecology
		Fish and shellfish ecology
		Marine mammals
		Offshore ornithology
Human environment	Traffic and transport	Commercial fisheries
		Shipping and navigation
	Aviation and radar	Aviation and radar
	Seascape, landscape and visual resources	Seascape, landscape and visual resources
	Historic environment	Marine archaeology
	Land use and recreation	Other sea users
	Socio-economics and community	Socio-economics and community

Figure 1.2: Extent of the onshore and offshore technical topic study areas.

Table 1.2: Topics within the EIA Scoping Report.

Topic	Summary of content	Section	Author
Part 1: Introduction			
Introduction	Background to the Mona Offshore Wind Project and outlines the purpose and approach of the EIA Scoping Report.	Part 1, section 1	RPS
Policy and legislation	Description of the policy and legislative context relevant to the Mona Offshore Wind Project.	Part 1, section 2	RPS
Project description	Description of the design for the Mona Offshore Wind Project, based on preliminary conceptual design information and current understanding of the environment from initial site investigation studies.	Part 1, section 3	RPS and bp/EnBW
EIA methodology	Description of the proposed principles of the EIA process and the approach that will be applied in the ES to identify and evaluate the likely impacts and, subsequently, evaluate the significance of effects, associated with the Mona Offshore Wind Project.	Part 1, section 4	RPS
Consultation process	Description of the consultation that has been carried out at the time of submission of the EIA Scoping Report and the consultation that will be carried out in the pre-application phase.	Part 1, section 5	RPS
Part 2: Generation assets			
Section 1: Introduction			
Introduction	Background to the generation assets and what is considered within Part 2 of the EIA Scoping Report.	Part 2, section 1	RPS
Section 2: Site selection and alternatives			
Site selection and alternatives	Description of the site selection process for the generation assets and the approach undertaken by the Applicant to identify the siting of the Mona Offshore Wind Project generation assets and reasonable alternatives considered to date.	Part 2, section 2	RPS and bp/EnBW
Section 3: Offshore physical environment			
Physical processes	Overview of the offshore physical environment (tidal elevations, currents, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the Mona Potential Array Area. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Part 2, section 3.1	RPS
Underwater noise	Overview of approach to the assessment of underwater noise arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project generation assets. Required for understanding of potential impact to underwater noise sensitive receptors such as marine mammals and fish.	Part 2, section 3.2	RPS and Seiche
Section 4: Offshore biological environment			
Benthic subtidal and intertidal ecology	Overview of the ecology of the seabed within the Mona Potential Array Area. Required for understanding of potential impacts to seabed ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.1	RPS

Topic	Summary of content	Section	Author
Fish and shellfish ecology	Overview of the fish and shellfish ecology of the seabed within the Mona Potential Array Area. Required for understanding of potential impact to fish and shellfish ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.2	RPS
Marine mammals	Overview of the marine mammals within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Part 2, section 4.3	RPS
Offshore ornithology	Overview of the ornithology features within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Part 2, section 4.4	RPS
Section 5: Offshore human environment			
Commercial fisheries	Overview of commercial fisheries within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Part 2, section 5.1	RPS and Marine Space
Shipping and navigation	Overview of the baseline shipping and navigation within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Part 2, section 5.2	RPS and NASH Maritime
Marine archaeology	Overview of marine archaeology within the vicinity of the Mona Potential Array Area. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Part 2, section 5.3	RPS
Other sea users	Overview of other sea users within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to other sea users from construction, operation and maintenance and decommissioning.	Part 2, section 5.4	RPS
Section 6: Offshore and onshore combined topics			
Seascape, Landscape and Visual resources	Overview of seascape, landscape and visual resources within the Mona Potential Array Area and Mona Offshore and Onshore Transmission Infrastructure Scoping Search Areas. Required for understanding of potential impacts to seascape, landscape and visual resources from construction, operation and maintenance and decommissioning	Part 2, section 6.1	RPS
Socio-economics and community	Overview of socio-economics and community within the vicinity of the Mona Offshore Wind Project. Required for understanding of potential impacts to socio-economics and community from construction, operation and maintenance and decommissioning.	Part 2, section 6.2	RPS and Hardisty Jones
Aviation and radar	Overview of aviation and radar receptors within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to aviation and radar from construction, operation and maintenance and decommissioning.	Part 2, section 6.3	RPS and Osprey

Topic	Summary of content	Section	Author
Climate change	Overview of climate change receptors for the Mona Potential Array Area.	Part 2, section 6.4	RPS
Section 7: Other Environmental Topics			
Topics with supporting information	Overview of topics of relevance to the Mona Offshore Wind Project generation assets where a technical appendix only will be provided to support the relevant technical chapters of the ES.	Part 2, section 7.1	RPS
Topics proposed to be scoped out	Justification for scoping out relevant topics for the Mona Offshore Wind Project generation assets.	Part 2, section 7.2	RPS
Topics covered elsewhere in the ES	Overview of topics of relevance to the Mona Offshore Wind Project generation assets that will be covered in other technical chapters of the ES and are not proposed to be subject to standalone chapters or appendices within the ES.	Part 2, section 7.3	RPS
Section 8: Concluding section			
Summary	Presents a summary of the potential impacts which are proposed to be scoped into and out of the EIA relevant to the generation assets.	Part 2, section 8	RPS
Part 3: Transmission assets			
Section 1: Introduction			
Introduction	Background to the transmission assets and what is considered within part 3 of the EIA Scoping Report.	Part 3, section 1	RPS
Section 2: Site selection and alternatives			
Site Selection and Alternatives	Description of the site selection process relevant to the transmission assets, including the approach proposed by the Applicant to identify the siting of the Mona Offshore Wind Project transmission assets and to the approach to reasonable alternatives.	Part 3, section 2	Wood
Section 3: Offshore Physical Environment			
Physical processes	Overview of the offshore physical environment (tidal elevations, currents, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Part 3, section 3.1	RPS
Underwater noise	Overview of approach to the assessment of underwater noise arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project transmission assets. Required for understanding of potential impact to underwater noise sensitive receptors such as marine mammals and fish.	Part 3, section 3.2	RPS and Seiche
Section 4: Offshore Biological Environment			
Benthic subtidal and intertidal ecology	Overview of the ecology of the seabed within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to seabed ecology	Part 3, section 4.1	RPS

Topic	Summary of content	Section	Author
	from construction, operation and maintenance and decommissioning.		
Fish and shellfish ecology	Overview of the fish and shellfish ecology of the seabed within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impact to fish and shellfish ecology from construction, operation and maintenance and decommissioning.	Part 3, section 4.2	RPS
Marine mammals	Overview of the marine mammals within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Part 3, section 4.3	RPS
Offshore ornithology	Overview of the ornithology features within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Part 3, section 4.4	RPS
Section 5: Offshore Human Environment			
Commercial fisheries	Overview of commercial fisheries within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Part 3, section 5.1	RPS and Marine Space
Shipping and navigation	Overview of the baseline shipping and navigation within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Part 3, section 5.2	RPS and NASH Maritime
Marine archaeology	Overview of marine archaeology within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Part 3, section 5.4	RPS
Other sea users	Overview of other sea users within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to other sea users from construction, operation and maintenance and decommissioning.	Part 3, section 5.5	RPS
Section 6: Onshore Physical Environment			
Geology and ground conditions	Overview of geology and ground conditions within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to geology and ground conditions from construction, operation and maintenance and decommissioning.	Part 3, section 6.1	RPS
Hydrology and flood risk	Overview of hydrology and flood risk within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to hydrology and flood risk from construction, operation and maintenance and decommissioning.	Part 3, section 6.2	RPS

Topic	Summary of content	Section	Author
Section 7: Onshore biological environment			
Terrestrial ecology and intertidal birds	Overview of terrestrial ecology and intertidal birds within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to terrestrial ecology and intertidal birds from construction, operation and maintenance and decommissioning.	Part 3, section 7.1	RPS
Section 8: Onshore human environment			
Historic environment	Overview of historic environment within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to historic environment from construction, operation and maintenance and decommissioning.	Part 3, section 8.1	RPS
Land use and recreation	Overview of land use and recreation receptors within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to land use and recreation from construction, operation and maintenance and decommissioning.	Part 3, section 8.2	RPS
Traffic and transport	Overview of traffic and transport within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to traffic and transport from construction, operation and maintenance and decommissioning.	Part 3, section 8.3	RPS
Noise and vibration	Overview of noise and vibration receptors within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to noise and vibration receptors from construction, operation and maintenance and decommissioning.	Part 3, section 8.4	RPS
Air quality	Overview of air quality within of the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to air quality from construction, operation and maintenance and decommissioning.	Part 3, section 8.5	RPS
Section 9: Offshore and onshore combined topics			
Seascape, landscape and visual resources	Overview of seascape, landscape and visual resources within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to seascape, landscape and visual resources from construction, operation and maintenance and decommissioning.	Part 3, section 9.1	RPS
Socio-economics and community	Overview of socio-economics and community within the vicinity of the Mona Offshore Wind Project. Required for understanding of potential impacts to socio-economics and community from construction, operation and maintenance and decommissioning.	Part 3, section 9.2	RPS and Hardisty Jones
Aviation and radar	Overview of aviation and radar receptors within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area and Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts	Part 3, section 9.3	RPS and Osprey

Topic	Summary of content	Section	Author
	to aviation and radar from construction, operation and maintenance and decommissioning.		
Climate change	Overview of climate change receptors for the Mona Offshore and Onshore Transmission Infrastructure Scoping Search Areas	Part 3, section 9.4	RPS
Section 10: Other Environmental Topics			
Topics with supporting information	Overview of topics of relevance to the Mona Offshore Wind Project transmission assets where a technical appendix only will be provided to support the relevant technical chapters of the ES.	Part 3, section 10.1	RPS
Topics proposed to be scoped out	Justification for scoping out relevant topics for the Mona Offshore Wind Project transmission assets.	Part 3, section 10.2	RPS
Topics covered elsewhere in the ES	Overview of topics of relevance to the Mona Offshore Wind Project transmission assets that will be covered in other technical chapters of the ES and are not proposed to be subject to standalone chapters or appendices within the ES.	Part 3, section 10.3	RPS
Section 11: Summary			
Summary	Presents a summary of the potential impacts which are proposed to be scoped into and out of the EIA relevant to the transmission assets.	Part 3, section 11	RPS
Part 4: Annexes			
Transboundary screening	Includes a screening assessment of potential transboundary impacts arising from the Mona Offshore Wind Project.	Annex A	RPS
WFD screening	Includes a screening assessment of potential impacts on WFD waterbodies arising from the Mona Offshore Wind Project.	Annex B	RPS
MCZ screening	Includes a screening assessment of potential impacts on Marine Conservation Zones arising from the Mona Offshore Wind Project	Annex C	RPS

2. Policy and legislation

2.1 Climate change policy and need for the project

2.1.1 International commitments

2.1.1.1 The UK is a signatory to the Kyoto protocol, which committed industrialized countries and economies to limit and reduce greenhouse gas emissions in accordance with agreed individual targets. The protocol came into effect in 2005 and its commitments were transposed into UK law by the Climate Change Act 2008. This placed a duty on the UK to ensure that the net UK carbon account for the year 2050 is 80% lower than the 1990 baseline. This was revised to a 'net zero target' of greenhouse gas emissions for the year 2050 to be 100% lower than the 1990 levels by The Climate Change Act 2008 (2050 Target Amendment) Order 2019.

2.1.1.2 In December 2015, 195 countries adopted the first ever universal, legally binding global climate deal at the Paris climate conference (COP21). The Paris Agreement (2016) sets out a global action plan towards climate neutrality with the aims of stopping the increase in global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit global warming to 1.5°C. In November 2021, the UN Climate Change Conference (COP26) was held in Glasgow. The Glasgow Climate Pact, agreed by all parties, ensures the 1.5°C warming limit remains achievable but only with accelerated action on climate. Guidelines for how the Paris Agreement will be delivered were also completed at COP26.

2.1.2 European legislation and policy

2.1.2.1 The UK formally left the European Union (EU) on 31 January 2020 after triggering article 50 of the Lisbon Treaty. Subsequently, the UK entered a transition period until 31 December 2020, during which all EU policies and legislation were required to be implemented by the UK.

2.1.2.2 The UK/EU Trade and Cooperation Agreement (TCA) requires 'non regression' in the level of environmental protection that was in place on 31 December 2020 by the UK from the end of the transition period. Further, environmental targets through EU environment law will continue to be bound to the UK even where the attainment of the target is envisaged for a later date. On this basis, the existing EU renewable energy targets for the UK, including the Renewable Energy Directive 2018/2001/EU will remain applicable.

2.1.2.3 The Renewable Energy Directive (Directive 2018/2001/EU) recasts and repeals previous Directives 2009/28/EC, 2015/1513/EU and 2013/18/EU. It set a target that by 2030, at least 32% of energy production should come from renewable sources.

2.1.2.4 The 2030 Energy Strategy framework proposed by the European Commission (EC) in October 2014 builds on the 2020 climate and energy framework. The EC has proposed new climate and energy targets to be achieved by 2030 (European Commission, 2020a), including:

- at least 40% cuts in greenhouse gas (GHG) emissions compared to 1990 levels
- at least 27% of energy used in EC countries to be from renewable sources
- at least 27% improvement in energy efficiency.

2.1.2.5 The EU aims to be climate-neutral by 2050 (i.e. an economy with net-zero GHG emissions). This objective is at the heart of the European Green Deal and in line with the EU's commitment to global climate actions under the Paris Agreement (European Commission, 2020b). In 2011, the EC presented 'The roadmap for transforming the EU into a competitive, low-carbon economy by 2050' (European Commission, 2011). This report sets the following goals for domestic EU action to keep global warming below 2°C:

- reducing GHG emissions by 40% in 2030 when compared to 1990 levels
- by 60% in 2040
- by 80% in 2050.

2.1.2.6 In order to achieve this, the roadmap suggests the need for all economic sectors to contribute to reducing GHG emissions and the need for increased investments in low-carbon energy (European Commission, 2011).

2.1.3 UK energy legislation and policy

The Climate Change Act 2008

2.1.3.1 Under the Climate Change Act 2008, the UK has committed to a net reduction in GHG emissions of 80% by 2050 against the 1990 baseline. In June 2019, secondary legislation was passed that extended that target to at least 100% against the 1990 baseline. The Climate Change Act 2008 also established the Committee on Climate Change (CCC) which advises the UK government on emissions targets, and reports to Parliament on progress made in reducing GHG emissions. The CCC has produced five four-yearly carbon budgets, covering 2008 to 2032. These carbon budgets represent a limitation on the total quantity of GHG emissions to be emitted over the five-year period. The sixth carbon budget advice to government, covering 2033 to 2037, was published in December 2020.

2.1.3.2 The UK has met the target set in the first two carbon budgets, with GHG emissions being lower between 2008 and 2017 (HM Government, 2020a). The Institute for Government states that the UK is on track to meet its third carbon budget (covering 2018 to 2022) but is not on track to meet its fourth (2023 to 2027) and fifth (2028 to 2032) (Institute for Government, 2020).

2.1.3.3 The UK Government subsequently produced two carbon plans (in 2009 and then in 2011) which set out how the UK is planning to achieve decarbonisation within the framework of the energy policy and provide a vision for 2050. The importance of offshore wind generation is noted in the most recent plan published in 2011 (HM Government, 2011a).

The Energy Act 2013

2.1.3.4 The Energy Act 2013 includes provisions to incentivise investment in low carbon electricity generation, ensure security of supply, and help the UK meet its emission reduction and renewables targets.

2.1.3.5 The Energy Act contains provisions for Electricity Market Reform (EMR), which sets out the framework for replacing Renewables Obligation Certificates (ROCs) with Contracts for Difference (CfD) to provide stable financial incentives to encourage investment in low carbon electricity generation.

2.1.3.6 CfDs are private contracts between a low carbon electricity generator and the UK Government owned Low Carbon Contracts Company (LCCC). The aim of the CfDs is to give greater certainty and stability of revenues to electricity generators by reducing exposure to volatile wholesale prices, whilst protecting the consumer from paying for higher generation support costs when electricity prices are high (Business, Energy and Industrial Strategy (BEIS), 2020). CfDs aim to support development of renewable energy in the UK by incentivising development.

National policy statements

2.1.3.7 National Policy Statements (NPSs) were designated under the Planning Act 2008. They describe the national case and establish the need for certain types of infrastructure development including energy, as well as identifying key issues that should be considered by the Examining Authority and decision-maker when considering an application for a DCO.

2.1.3.8 There are six energy NPSs, three of which are relevant to offshore wind development, specifically: The Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure; The NPS for Renewable Energy Infrastructure (NPS EN-3); and The NPS for Electricity Networks Infrastructure (NPS EN-5) (DECC, 2011a; DECC, 2011b; DECC, 2011c). These NPSs are currently being updated and draft versions were published for consultation in September 2021 (BEIS, 2021a; BEIS, 2021b; BEIS, 2021c). Until revised NPSs are formally adopted, the existing NPSs continue to provide the proper basis for applications for development consent to be prepared and for decisions to be granted. However, the provisions of the draft NPSs undergoing consultation will be referred to within the Mona Offshore Wind Project ES where considered relevant.

2.1.3.9 The policy provisions within the NPS relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the ES.

UK Marine Policy Statement

2.1.3.10 The UK Marine Policy Statement (MPS) was published in March 2011, under Section 44 of the Marine and Coastal Access Act (MCAA) 2009, to provide a framework for marine spatial planning, specifically for the preparation of Marine Plans and to ensure that marine resources are used in a sustainable way (HM Government, 2011b). The MPS was jointly adopted by the Secretary of State, Welsh Ministers, Scottish Ministers and the Department of the Environment Northern Ireland.

2.1.3.11 The MPS states that 'Marine Plans should take into account and identify areas of potential for the deployment of different renewable energy technologies', and notes that as offshore wind is the most developed offshore renewable energy technology, it has the biggest potential to improve the UK's medium term energy security.

2.1.3.12 The MCAA 2009 requires all public authorities taking authorisation or enforcement decisions that affect or might affect the UK marine area, to do so in accordance with the MPS and the relevant Marine Plans.

North West Marine Plan

2.1.3.13 Part of the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area overlap with English offshore waters, covered by the North West Marine Plan. The North West Marine Plan was published in June 2021 and introduces a strategic approach to marine planning within the marine plan area. It is intended to inform decision-making by marine users and regulators on where, when or how activities may take place within the marine plan area.

2.1.3.14 The North West Marine Plan sets out the following four objectives in relation to achieving a sustainable marine economy:

- Infrastructure is in place to support and promote safe, profitable and efficient marine businesses.
- The marine environment and its resources are used to maximise sustainable activity, prosperity and opportunities for all, now and in the future.
- Marine businesses are taking long-term strategic decisions and managing risks effectively. They are competitive and operating efficiently.
- Marine businesses are acting in a way which respects environmental limits and is socially responsible. This is rewarded in the market place.

2.1.3.15 The policy provisions within the North West Marine Plan relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the ES.

The UK Offshore Wind Sector Deal

2.1.3.16 The UK Government published the Offshore Wind Sector Deal in 2019, which sets the key commitments and actions from the UK Government to support offshore wind energy development (HM Government, 2019). In 2020, the UK Government prepared a policy paper to reflect on the status of the offshore wind industry one year after the publication of the Offshore Wind Sector Deal (HM Government, 2020b). Since the launch of the Sector Deal in 2019, the UK Government and the offshore wind energy sector have made progress on delivering the commitments set out within the Sector Deal.

The Clean Growth Strategy 2017

2.1.3.17 The Clean Growth Strategy (2017) emphasised growing national income while cutting greenhouse gas emissions. It states the aim to achieve clean growth, while ensuring an affordable energy supply for businesses and consumers, is at the heart of the UK's Industrial Strategy.

2.1.4 Welsh planning policy and legislation

The Well-being of Future Generations (Wales) Act 2015

2.1.4.1 The Well-being of Future Generations (Wales) Act 2015 places a duty on public bodies to place the principles of sustainability and sustainable development at the heart of its decision-making processes. The relevant objectives of the Well-being of Future Generations (Wales) Act 2015 include:

- A Resilient Wales – contributing to the protection and improvement of the environment, to improve the quality of life and protect local and global ecosystems.
- A Healthier Wales – contribute to the protection and, where possible, the improvement of people's health and well-being as a core component of achieving the well-being goals and responding to climate change.
- A Globally Responsive Wales – support the need to tackle the causes of climate change by moving towards a low carbon economy.

The Environment (Wales) Act 2016

2.1.4.2 The Environment (Wales) Act 2016 puts in place the legislation needed to plan and manage Wales' natural resources in a more proactive, sustainable and joined-up way. A key part of The Environment (Wales) Act 2016 focuses on climate change with the aim to reduce emissions by 100% by 2050 and sets a clear path for decarbonisation.

2.1.4.3 The Environment (Wales) Act 2016 is supported by the Natural Resources Policy (NRP) which focuses on the sustainable management of Wales' natural resources to maximise their contribution to achieving goals within the Well-being of Future Generations (Wales) Act. The NRP sets out three National Priorities including 'increasing renewable energy and resource efficiency'.

Welsh National Marine Plan

2.1.4.4 The Welsh National Marine Plan was published in November 2019 and introduces a framework to support sustainable decision-making for the marine environment. It includes policies specific to the renewable energy sector.

2.1.4.5 The Welsh National Marine Plan represents the start of a planning process in order to shape Wales' seas to support economic, social, cultural and environmental objectives. The purpose of the plan is to '*guide the sustainable development of our marine area by setting out how proposals will be considered by decision makers*'.

2.1.4.6 The Welsh National Marine Plan sets out four key objectives in achieving a sustainable marine economy, namely:

- Contribute to a thriving Welsh economy by encouraging economically productive activities and profitable and sustainable businesses that create long-term employment at all skill levels.
- Support the opportunity to sustainably develop marine renewable energy resources with the right development in the right place, helping to achieve the UK's energy security and carbon reduction objectives, whilst fully considering other's interests, and ecosystem resilience.
- Provide space to support existing and future sustainable economic activity through managing multiple uses, encouraging the coexistence of compatible activities, the mitigation of conflicts between users and, where possible, by reducing the displacement of existing activities.
- Recognise the significant value of coastal tourism and recreation to the Welsh economy and well-being and ensure such activity and potential for future growth are appropriately safeguarded.

2.1.4.7 The policy provisions within the Welsh National Marine Plan relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the ES.

Future Wales: the national plan 2040

2.1.4.8 Future Wales is the national development framework, setting the direction for development in Wales to 2040. It addresses key national priorities, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of communities.

2.1.4.9 Regarding climate change, Future Wales recognises that changes to climate and weather patterns will have a significant impact on well-being for both current and future generations. Climate change is identified as an equality issue as it will disproportionately affect the most vulnerable communities in Wales and the wider world.

2.1.4.10 It is noted that it is vital that emissions are reduced to protect well-being and to demonstrate global responsibility. Future Wales together with Planning Policy Wales will ensure the planning system focuses on delivering a decarbonised and resilient Wales. Future Wales identifies that Wales can become a world leader in renewable energy technologies. Wales' wind and tidal resources, potential for solar generation, its support for both large and community scaled projects and commitment to ensuring the planning system provides a strong lead for renewable energy development means it is well placed to support the renewable sector, attract new investment and reduce carbon emissions.

Planning Policy Wales – Edition 11

2.1.4.11 Planning Policy Wales sets out the land use planning policies of the Welsh Government. The objective is to ensure the planning system contributes towards sustainable development and improves the social, economic, environmental land cultural well-being of Wales.

Local development plans

2.1.4.12 The following local development plans of the administrative areas within which the onshore transmission infrastructure associated with the Mona Offshore Wind Project is to be located (see part 1, section 5: Consultation process, of the EIA Scoping Report) are relevant to the determination of the application:

- Conwy Local Development Plan 2007 – 2022 (Adopted October 2013) (Emerging Local Plan: Conwy County Borough Council Replacement Local Development Plan (Preferred Strategy/Pre-Deposit stage)
- Denbighshire Local Development Plan 2006 – 2021 (Adopted June 2013) (Emerging Local Plan: Replacement Local Development Plan 2018 – 2033 (Preferred Strategy/Pre-Deposit stage).

2.2 The consenting process

2.2.1.1 The Mona Potential Array Area is predominantly located in Welsh offshore waters (beyond 12nm from the Welsh coast), with parts of the boundary located within English offshore waters (beyond 12nm from the English coast). The offshore export cable and related works located within and between the Mona Array Potential Array Area and the landfall will route through the Mona Offshore Transmission Infrastructure Scoping Search Area which overlaps with both Welsh offshore and Welsh inshore waters in addition to English waters. As set out in part 1, section 1: Introduction, of the EIA Scoping Report, the Mona Offshore Wind Project is a Nationally Significant Infrastructure Project (NSIP) and requires consent under the Planning Act 2008 (as amended by the Wales Act 2017). A separate licence under the Marine and Coastal Access Act 2009 from NRW is also required for licensable marine activities that are not wholly located within Welsh offshore waters. This section provides a summary of the consenting process and also describes the legal requirements for EIA.

2.2.2 The Planning Act 2008

2.2.2.1 The Planning Act 2008 (as amended) is the primary legislation that establishes the legal framework for the application, examination and determination of applications for Development Consent Orders (DCOs) for NSIPs. It sets out the consenting system for all NSIPs, including those in the energy sector.

2.2.2.2 Amendments have been made to the planning system that are applicable to the Planning Act 2008. Under the Localism Act 2011, the Planning Inspectorate became the executive agency responsible for the NSIP consenting process. Any developer wishing to construct a project that is classified as an NSIP must apply for a DCO. The Planning Inspectorate will examine the application submissions and make a recommendation to the Secretary of State for BEIS (in the case of energy projects) to grant or refuse consent. The Wales Act 2017 amended section 149A of the Planning Act 2008 to allow a DCO to include a deemed marine licence where the responsibility for licensing lies with NRW, where the activities are wholly within Welsh offshore waters.

2.2.3 The Development Consent Order (DCO)

2.2.3.1 Section 31 of the Planning Act 2008 states that a DCO is required for all NSIPs. The application for development consent for the Mona Offshore Wind Project will cover all offshore aspects of the project located within Welsh offshore waters and English offshore waters as well as all onshore aspects of the project.

2.2.3.2 An EIA will be required as part of the application for a DCO. As such, an Environmental Statement (ES) will be prepared, which is the report documenting the EIA process. The ES will be prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. These Regulations implement the EIA Directive (2011/92/EU, as amended by Directive 2014/52/EU) for consent applications made under the Planning Act 2008. The aim of the EIA Directive is to ensure that when a relevant authority giving consent for a particular project makes its decision, it does so in the knowledge of any likely significant effects on the environment.

2.2.3.3 The process for obtaining a DCO is divided into the following phases: pre-application, acceptance, pre-examination, examination, decision and post decision.

2.2.3.4 During the pre-application phase, Part 5 of the Planning Act 2008 requires promoters of a DCO application to engage in pre-application consultation with local communities, local authorities and those who would be directly affected by the proposals. The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 make provisions for various matters in connection with making an application for a DCO, including publicising a proposed application and consulting with local and statutory stakeholders. Further details regarding the consultation process are included in part 1, section 5: Consultation process, of the EIA Scoping Report.

2.2.3.5 The Mona Offshore Wind Project application will be submitted to the Planning Inspectorate with the prescribed forms and documents as required by the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. Regulation 5(2)(a) requires that, where applicable, an application must be accompanied by 'the environmental statement required pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations [2017] and any scoping or screening opinions or directions'. Other supporting documents required to be submitted include:

- Consultation Report
- Draft DCO and Explanatory Memorandum
- Habitats Regulations Assessment (HRA) Report.

2.2.4 Marine and Coastal Access Act 2009

2.2.4.1 As well as replacing consents under the Food and Environment Protection Act (FEPA) 1985 and the Coast Protection Act (CPA) 1949, the MCAA 2009 also introduced a new planning system for marine environmental management and a requirement to obtain marine licences for licensable marine activities.

2.2.4.2 Section 149A of the Planning Act 2008 allows an applicant for a DCO to apply for 'deemed marine licences' as part of the DCO process. As noted above, the Wales Act 2017 amended section 149A of the Planning Act 2008 to allow a DCO to include a deemed marine licence where activities are wholly within Welsh offshore waters. Natural Resources Wales (NRW) and the Marine Management Organisation (MMO) are the responsible authorities for deemed marine licences in Welsh and English waters respectively and work with the Planning Inspectorate to ensure that deemed marine licences are transposed into the DCO. NRW and the MMO remain the monitoring and enforcement bodies in respect of the conditions and restrictions contained within the deemed marine licences.

2.2.4.3 Licensable marine activities within 12nm of the Welsh coast require a separate marine licence from NRW. An application will be made to NRW for a marine licence for the offshore export cables and related works located within and between the Mona Potential Array Area and the landfall along the coast of north Wales.

2.2.4.4 This EIA Scoping Report has been prepared in support of both the DCO and marine licence applications.

2.2.5 The Environmental Impact Assessment (EIA) process

2.2.5.1 The EIA Directive has directed the assessment of effects of certain public and private projects on the environment in the UK. Following the UK's departure from the EU, the UK has no direct obligations under the Directive. However, through The Environmental Assessments and Miscellaneous

Planning (Amendment) (EU Exit) Regulations 2018 and The Environment, Food and Rural Affairs (Environmental Impact Assessment) (Amendment) (EU Exit) Regulations 2019, the requirements established under the Directive (as transposed into UK law) continue to apply subject only to minor changes. In the UK, the Directive is applied to offshore wind farm projects and associated onshore infrastructure through the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) for NSIP projects and The Marine Works (Environmental Impact Assessment) Regulations 2007 for activities requiring a marine licence in Welsh waters.

2.2.5.2 The EIA process can be broadly summarised as consisting of three main elements that take place prior to the submission of applications for development consent:

- Scoping: project promoters can request a formal Scoping Opinion from the Secretary of State.
- Consultation: the project promoter is required to conduct pre-application consultation in accordance with the Planning Act 2008 and associated guidance and regulations. The Statement of Community Consultation (SoCC) identifies the proposed consultation activities (see part 1, section 5: Consultation process, of the EIA Scoping Report, for further information).
- ES preparation: the ES is prepared taking account of the responses to the consultation process, responses on the Preliminary Environmental Information Report (PEIR) and the outcomes of the assessment of the likely significant effects of the proposed development on the environment.

2.2.5.3 The EIA process for the Mona Offshore Wind Project will be carried out to support both the DCO application and marine licence application to NRW in parallel.

2.3 Other consents and legislation

2.3.1.1 In addition to the principal consents for the Mona Offshore Wind Project, any supplementary consents and licences that are required will be identified during the development stage and through consultations with statutory bodies.

2.3.2 Habitats Regulations Assessment

2.3.2.1 Council Directive 92/43/EEC (the Habitats Directive) was adopted in 1992 and provided a means for the EU to meet its obligations under the Bern Convention. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status. This protection was granted through the designation of European Sites (Special Areas of Conservation (SAC)) and measures to protect European Protected Species (EPS). European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) affords rare and vulnerable species listed under Annex I of the Directive, and regularly occurring migratory species, protection through the identification and designation of Special Protection Areas (SPAs). Following the UK's Exit from the EU, the UK has no direct obligations under the Habitats Directive. However, The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 ensure that the UK is legally obliged to continue to maintain the standards required by the EU Habitats and Wild Birds Directives, subject to only minor (non-material) changes. As such, the Habitats and Birds Directive continue to provide the framework for the conservation and management of rare and vulnerable habitats and species and wild birds within Europe and the UK.

2.3.2.2 The Conservation of Habitats and Species Regulations 2017 (as amended) (the Habitats Regulations) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) require the assessment of any significant effects on qualifying features of internationally important nature conservation sites that are likely to arise as a result of a proposed project. These internationally important sites include SACs, or candidate SACs (cSACs), SPAs or potential SPAs (pSPAs), sites of community importance (SCI) and Ramsar sites. These have been traditionally referred to as European Sites or Natura 2000 sites; following the UK's departure from the EU they are now referred to as the National Site Network. The assessment is to be undertaken by the 'competent authority', which in the case of the Mona Offshore Wind Project is the Secretary of State for BEIS for the infrastructure located wholly within Welsh offshore waters and English offshore waters, and NRW for the offshore export cables and related works located within Welsh offshore and inshore waters.

2.3.2.3 In order to carry out the HRA the competent authority, under Regulation 5(2)(g) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, requires a report to be submitted alongside the ES. As such, the Report to Inform an Appropriate Assessment (RIAA) does not form part of the ES, although the baseline presented contains some of the same information.

2.3.2.4 In parallel to the EIA process, the HRA, including the HRA Screening Report and subsequent RIAA, will be consulted upon during the pre-application consultation process.

2.3.3 European protected species (EPS) licencing

2.3.3.1 EPS are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under the Habitats Regulations. EPS include both marine and terrestrial species, for example all cetacean species (whales, dolphins and porpoise) and bats. If any activity is likely to cause disturbance or injury to an EPS (for example, subsea noise disturbance due to piling activities) a licence is required to undertake the activity legally.

3. Project description

3.1 Introduction

3.1.1.1 This section of the Scoping Report provides a description of the potential design of the Mona Offshore Wind Project. The design has been informed by conceptual design information and current understanding of the environment from initial survey work. This section sets out the Mona Offshore Wind Project design and components for both the offshore and onshore infrastructure, as well as the activities associated with the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project. This section covers both the generation and transmission assets of the Mona Offshore Wind Project.

3.1.1.2 At this stage in the EIA process, the project description is indicative and the project design envelope has been designed to include sufficient flexibility to accommodate further project refinement. This section therefore sets out a series of options and parameters for which maximum (and where relevant, minimum) values are shown. These values constitute the realistic worst case scenario in relation to the Mona Offshore Wind Project. The final design may be refined later in the project development process. The Applicant will also, throughout the EIA process, seek to refine the proposed values and to provide more detailed realistic worst case scenarios where possible. The Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) will present a detailed project description, including a further refinement of the parameters where possible, on which the assessment will be based.

3.2 Project location

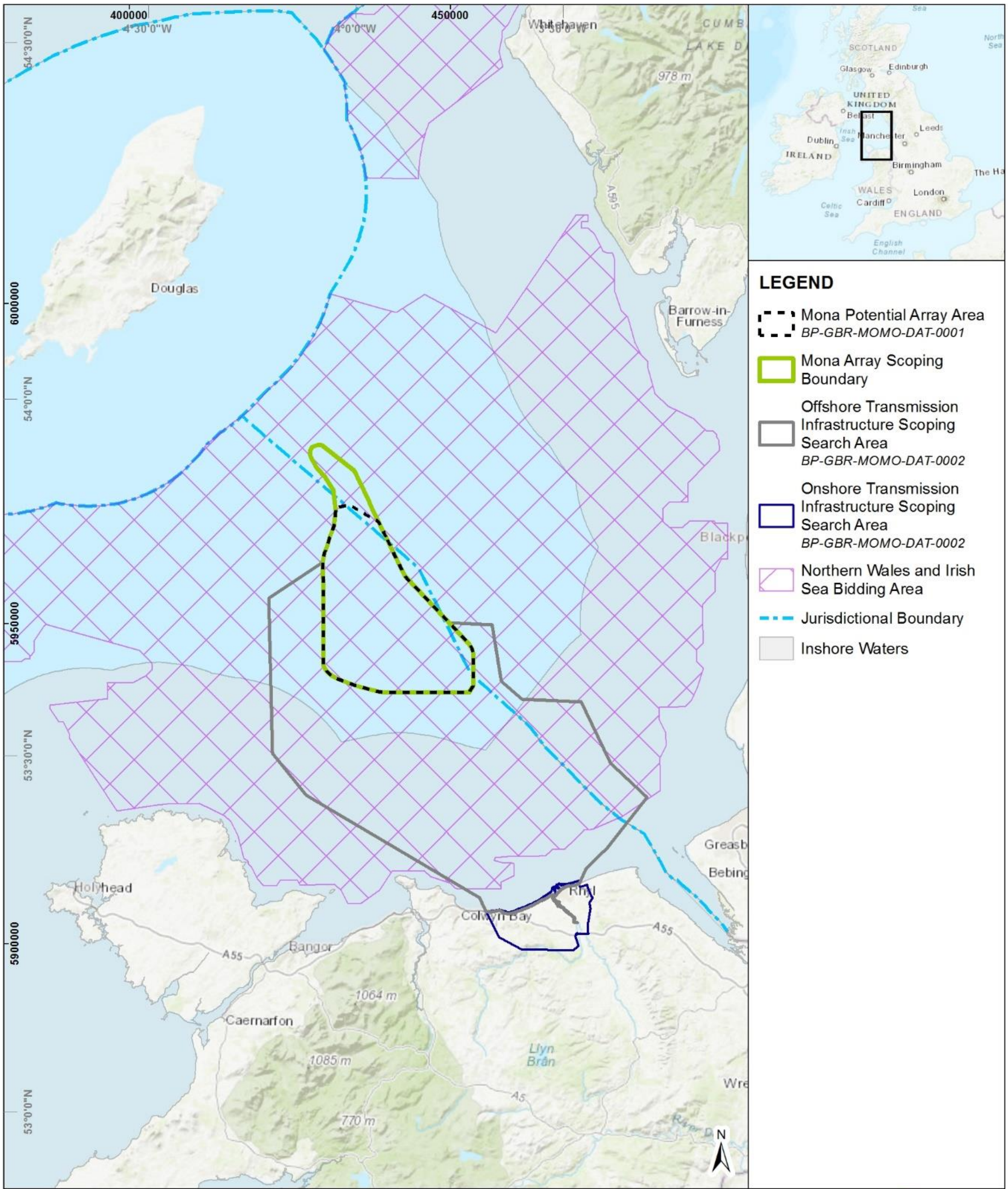
3.2.1.1 In September 2019, The Crown Estate (TCE) invited developers to bid for rights to be granted to develop offshore wind farms as part of Offshore Wind Leasing Round 4. The rights would be granted through Agreements for Lease (AfL). The AfLs awarded under Offshore Wind Leasing Round 4 will grant the rights to the respective developer to carry out investigations, such as survey activities, to inform the potential design of the offshore wind farm by understanding environmental and technical constraints in advance of submitting a consent application.

3.2.1.2 EnBW and bp were awarded Preferred Bidder status for two 60-year leases within the Northern Wales and Irish Sea Bidding Area. The application for the area to be leased provided flexibility and was sufficiently large to achieve the proposed capacity for the offshore wind farm. The AfL for the Mona Array Scoping Boundary is anticipated to be signed in 2022 following the conclusion of the TCE Plan Level Habitats Regulations Assessment (HRA) process. The AfL for the Mona Offshore Transmission Infrastructure Scoping Search Area will be applied for once an offshore export cable corridor has been defined following initial survey and design work. The detail of the final AfL areas will be included within the ES.

- The boundary of the Mona Offshore Wind Project encompasses the following areas, as shown in Figure 3.1: Mona Array Scoping Boundary:

The Applicant has identified the Mona Potential Array Area within the Mona Array Scoping Boundary, which is the area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) are likely to be located.

- Mona Offshore Transmission Infrastructure Scoping Search Area: This is the area encompassing and located between the Mona Potential Array Area and the landfall up to Mean High Water Springs (MHWS), in which the offshore export cables and any offshore booster substation will be located.
- Mona Onshore Transmission Infrastructure Scoping Search Area: This is the area located between the landfall landwards of Mean Low Water Springs (MLWS) and the onshore National Grid substation, in which the onshore export cables, onshore substation and other associated onshore transmission infrastructure will be located.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, Marine Management Organisation, Marine Scotland, Natural Resources Wales

EnBW bp rps — Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 nm
0 5 10 20 km

Drawing Number:
RPSE-MN-SCO-347-00

Drawing Title:
MONA OFFSHORE WIND PROJECT LOCATION

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	22/03/22	First Issue	NA	AB

Figure 3.1: Mona Offshore Wind Project location.

3.2.1.3 The Mona Potential Array Area is 449.97km^2 in area and is located in the east Irish Sea, 28.2km (15.2nm) from the Anglesey coastline, 39.9km (21.5nm) from the northwest coast of England, and 42.6km (23nm) from the Isle of Man (when measured from Mean High Water Springs (MHWS) (see Figure 3.1). In accordance with the Round 4 bid the proposed capacity of the Mona Offshore Wind Project is 1,500MW.

3.2.1.4 Initial data for the Mona Array Scoping Boundary identifies the water depth range from approximately 45m to 29m below Lowest Astronomical Tide (LAT). The Applicant has completed a geophysical survey across the Mona Potential Array Area, which provides greater accuracy of the water depths in this area, and site-specific geophysical and bathymetric data for the Mona Potential Array Area will be presented in the PEIR.

3.2.1.5 The tidal range within the Mona Array Scoping Boundary is estimated at approximately 8m from LAT to Highest Astronomical Tide (HAT). The estimated water level variation is presented in Table 3.1.

Table 3.1: Tidal levels within the Mona Array Scoping Boundary.

Water level	Value (m)	Reference datum
LAT	+0.0	LAT
HAT	+8.0	LAT
MSR (Mean Spring Tidal Range)	6.7	-
MLWS	+0.7	LAT
MSL (Mean Sea Level)	+4.0	LAT
MHWS	+7.4	LAT

3.2.1.6 The Mona Offshore Transmission Infrastructure Scoping Search Area is 1561km^2 in area and extends from the Mona Potential Array Area to the selected landfall location on the north coast of Wales (see Figure 3.1).

3.2.1.7 The Mona Onshore Transmission Infrastructure Scoping Search Area is 113km^2 in area and extends from the landfall to the onshore National Grid substation at Bodelwyddan (see Figure 3.1).

3.3 Project design envelope approach

3.3.1.1 The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Mona Offshore Wind Project, in accordance with current industry good practice. This approach allows for a project to be assessed on the basis of maximum project design parameters (i.e. the worst case scenario) in order to provide flexibility, while ensuring all potentially significant effects are assessed within the EIA process and reported in the ES. Those parameters include a range of potential values. The PDE concept allows for some flexibility in project design options, particularly for foundations and wind turbine type, where the full details of a project are not known at DCO application submission.

3.3.1.2 This approach will be taken for the EIA because it is not possible to provide precise final design details of the Mona Offshore Wind Project a number of years ahead of the time it will be constructed. Additionally, the Mona Offshore Wind Project has yet to undertake its consultation process and receive feedback from statutory and non-statutory stakeholders. This will allow the Applicant to fully understand any potential significant impacts that need to be mitigated/managed, which will aid the refinement of the final application. Offshore wind is a constantly evolving industry with a constant focus on cost reduction, therefore improvements in technology and construction methodologies occur frequently and an unnecessarily prescriptive approach could preclude the adoption of new technology and methods.

3.3.1.3 The use of the PDE approach has been recognised in the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (DECC, 2011a) and the NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC, 2011b), and within the draft NPS EN-1 and EN-3 (BEIS, 2021a; BEIS, 2021b). The PDE approach is also consistent with The Planning Inspectorate’s Advice Note Nine: Rochdale Envelope (The Planning Inspectorate, 2018).

3.3.1.4 For each of the impacts to be assessed in the topic-specific EIA chapters, the maximum design scenario will be identified from the range of potential options for each parameter in the PDE. The maximum design scenario assessed is therefore the scenario which would give rise to the greatest potential impact. For example, where several wind turbine options are included in the design, then the assessment of the Mona Offshore Wind Project would be based on the wind turbine option predicted to have the greatest impact. This may be the wind turbine option with the largest footprint, the greatest tip height or the largest area of seabed disturbance during construction, depending on the topic under consideration. By identifying the maximum design scenario for any given impact, it can therefore be concluded that the impact (and therefore the effect) will be no greater for any other design scenario than that assessed for the maximum design scenario. By employing the maximum design scenario approach, the Applicant retains some flexibility in the final design of the Mona Offshore Wind Project and associated infrastructure, but within certain maximum parameters, which are assessed in the ES.

3.3.1.5 All assumptions regarding the PDE will be clearly set out within the project description chapter of the PEIR and ES and within the topic chapters. The draft DCO will be prepared in conjunction with the ES in order to ensure that the key parameters applied for are consistent with those assessed through the EIA process.

3.3.1.6 Throughout this EIA Scoping Report (and subsequent PEIR and ES), the PDE approach is applied to allow meaningful assessments of the Mona Offshore Wind Project to proceed, whilst still allowing reasonable flexibility for future project design decisions.

3.4 Offshore infrastructure

3.4.1.1 The key offshore components of the Mona Offshore Wind Project are likely to include:

- Offshore wind turbines
- Foundations and support structures
- Scour protection and cable protection
- Inter-array cables
- Interconnector cables
- Offshore substation platforms
- Offshore export cables
- Offshore booster substation
- Cable landfall.

3.4.1.2 These key offshore components are briefly described in the following sections. Realistic worst case parameters (dimensions and numbers where appropriate) are provided to indicate the potential scale of the Mona Offshore Wind Project. A further refined and detailed project description will be provided in the PEIR and ES.

3.4.2 Wind turbines

3.4.2.1 The Mona Offshore Wind Project will be comprised of up to 107 wind turbines. The final number of wind turbines will be dependent on the capacity of individual wind turbines used and also environmental and pre-construction site investigation (geophysical and geotechnical) survey results. A range of wind turbine models will be considered, and it is possible that more than one may be selected, however, they will all follow the traditional offshore wind turbine design with three blades and a horizontal rotor axis. An illustration of this design is presented in Figure 3.2.

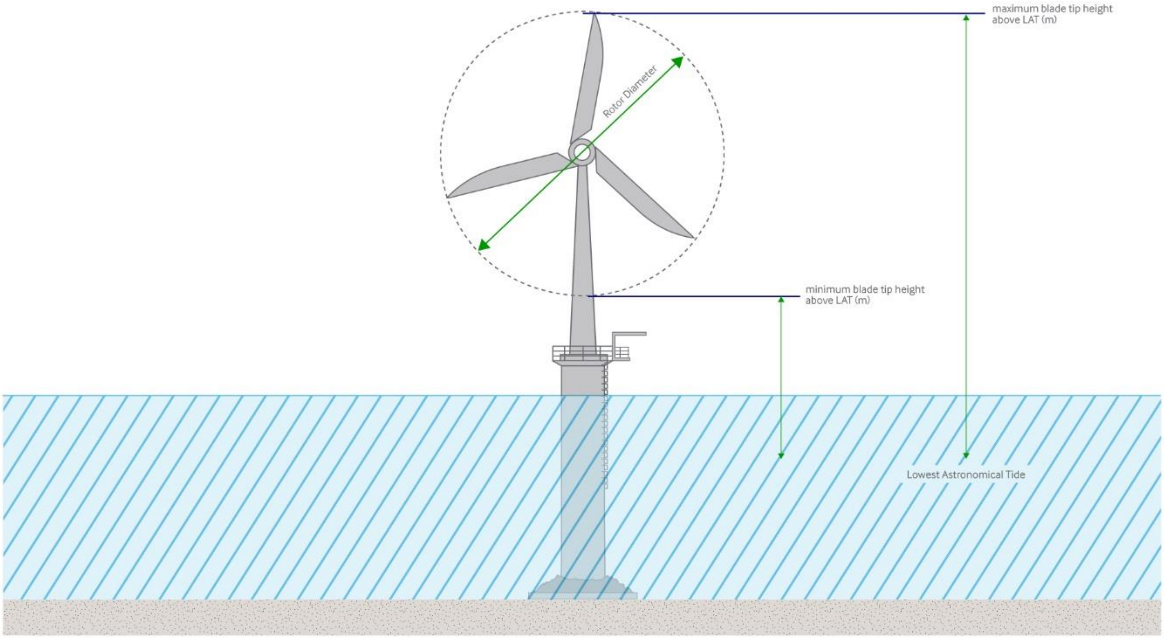


Figure 3.2: Illustrative wind turbine design.

3.4.2.2 The design envelope for the Mona Offshore Wind Project wind turbines is presented in Table 3.2. The wind turbines will have a maximum rotor diameter of up to 280m and a maximum blade tip height of up to 324m above LAT (highest point of the structure; 320m above MSL[2]). The minimum distance between the bottom of the blade and the sea surface (the 'air gap' or 'air draught') will be 34m above LAT (this exceeds the best practice requirement for a minimum air draught of 22m above MHWS, which is 29.4m above LAT at this location). The wind turbines will be lit and marked as required for aviation and navigation purposes.

3.4.2.3 The layout of the wind turbines will be developed to best utilise both the available wind resource and suitability of seabed conditions, while ensuring environmental effects and impacts on other marine users (such as shipping routes and fisheries) are minimised. Indicative layouts will be provided in the PEIR and ES to inform the assessment. The final layout of the wind turbines will be confirmed at the final design stage (post-application) informed by environmental and pre-construction site investigation survey results.

Table 3.2: Design envelope: key parameters for wind turbines.

Parameter	Maximum Design Envelope
Maximum number of turbines	107
Minimum lower blade tip height (air gap or air draught) above LAT (m)	34
Maximum upper blade tip height above LAT (m)	324

2 Parameters previously submitted as part of the Round 4 bidding process in MSL remain unchanged and have been converted to LAT for the purpose of this Scoping Report.

Parameter	Maximum Design Envelope
Maximum rotor diameter (m)	280

3.4.3 Foundations and support structures

3.4.3.1 A number of foundation types are being considered for the Mona Offshore Wind Project. The final selection of foundation type will depend on factors including wind turbine type, and environmental and pre-construction site investigation survey results.

3.4.3.2 The wind turbines, offshore substation platforms and offshore booster substation will be fixed to the seabed by foundation structures. There are a number of foundation types that can be used, and the types used will not be confirmed until the final design, post-consent. Consequently, the EIA will consider a range of foundation types, including monopile foundations, pin-pile jacket foundations and suction bucket jacket foundations. This section sets out the proposed foundation types and maximum parameters for the wind turbine, offshore substation platform and offshore booster substation foundations.

3.4.3.3 The foundations will be fabricated offsite, stored at a suitable port facility and transported to site as needed. Specialist vessels will be needed to transport and install foundations. A filter layer and/or scour protection layer (typically rock) may be needed on the seabed and will be installed either before and/or after foundation installation.

3.4.3.4 Further details on the foundation types that will be considered in the EIA are described in the following sections.

Monopile foundations

3.4.3.5 Monopile foundations typically consist of a single steel tubular section and a transition piece (TP) which may include boat landing features, ladders, a crane, and other ancillary components as well as a flange for connection to the wind turbine tower (Figure 3.3). The TP is usually painted yellow and marked according to relevant regulatory guidance and may be installed separately following the monopile installation. Instead of monopiles with a separate transition piece, so called TP-less monopiles (with the TP part being an integral section of the monopile) could also be used.

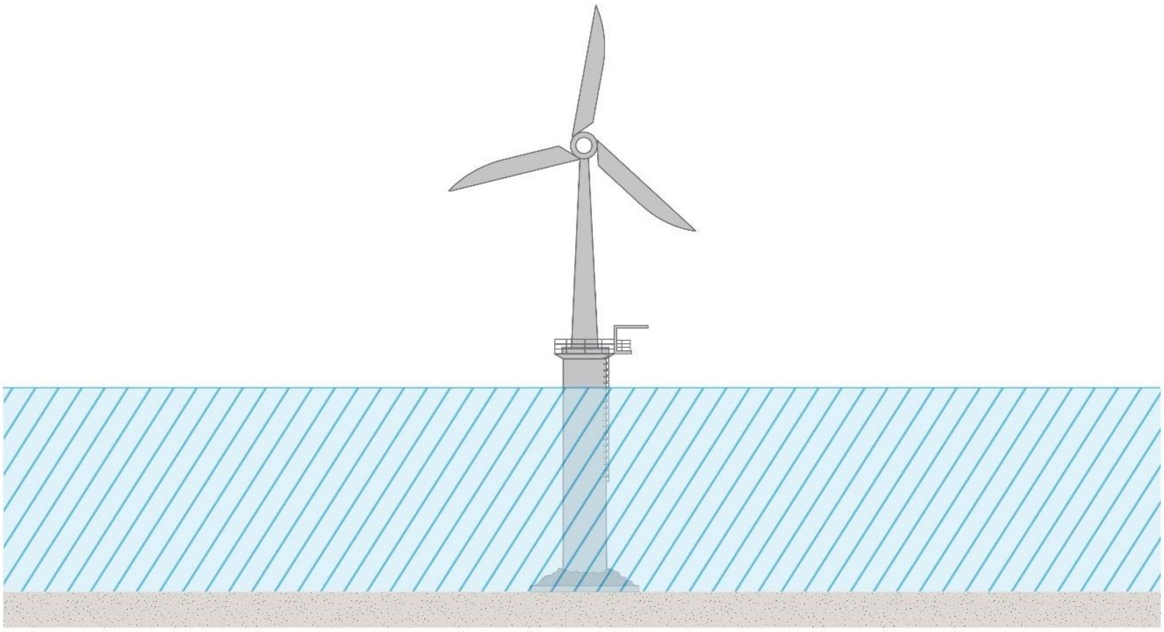


Figure 3.3: Illustrative monopile foundation design.

3.4.3.6 Monopiles can be used to support wind turbines, offshore substation platforms and offshore booster substations. Monopiles may be driven or 'piled' into the seabed using hydraulic hammers either above or below the sea surface, operated from a jack-up vessel or floating vessel/barge. The Applicant is also considering use of emerging alternative installation technologies, such as blue hammer, however hydraulic piling is considered to represent the maximum design envelope; further detail on any alternative technologies will be provided in the PEIR or ES if and when available. In areas of hard soil or bedrock close to the seabed surface, where piling is challenging, drilling may be used either instead of or in combination with piling. Drilling operations produce spoil which is typically disposed of at the drill site. Within the drilled hole, the monopiles may be secured in place using a cement-based grout.

3.4.3.7 During the construction phase of the Mona Offshore Wind Project there may be up to two monopiles being installed at the same time. Piling will commence with low hammer energies ('soft start') and maximum hammer energies (if required) will be attained after a predefined 'ramp up' and typically only used where ground conditions require. Subject to the findings of the impact assessment, the Applicant may consider the use of noise mitigation technology such as bubble curtains, which would be further explored in the PEIR.

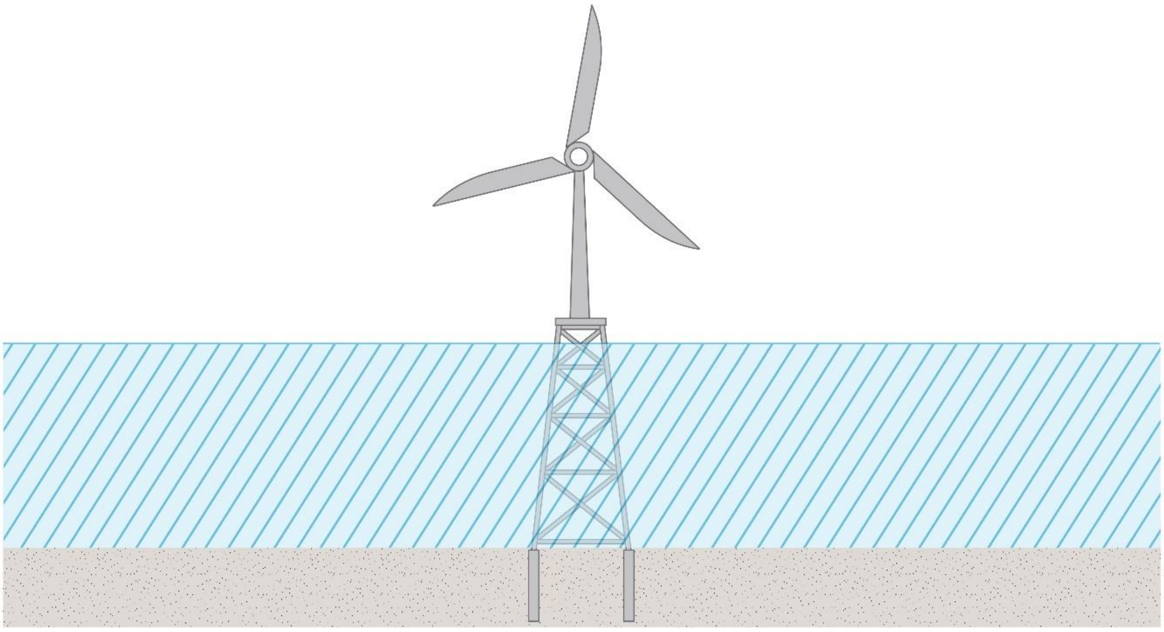
3.4.3.8 The design envelope for monopile foundations is shown in Table 3.3.

Table 3.3: Design envelope: key parameters for monopile foundations.

Parameter	Maximum Design Envelope (wind turbines)	Maximum Design Envelope (OSPs/offshore booster substation)
Number of monopiles	107	8 (OSPs) 2 (Offshore booster substation)
Pile diameter (m)	16	16
Seabed footprint per pile (without scour protection) (m^2)	201.1	201.1
Maximum hammer energy (kJ)	5,500	5,500
Number of concurrent piling events	Up to two monopiles installed at the same time.	

Jacket foundations on pin-piles

3.4.3.9 Piled jacket foundations are formed of a steel lattice construction (comprising steel tubular members and welded joints) secured to the seabed by pin piles attached to the jacket feet. Jacket structures can be used to support wind turbines, offshore substation platforms and offshore booster substations. Typically, the steel tubular pin piles are driven, drilled or vibrated into the seabed (and potentially grouted in place) relying on the frictional and end bearing properties of the seabed for support. There is no separate TP, as the TP and ancillary structure is fabricated as an integrated part of the jacket structure. Pin piles are typically narrower than monopiles (see



).

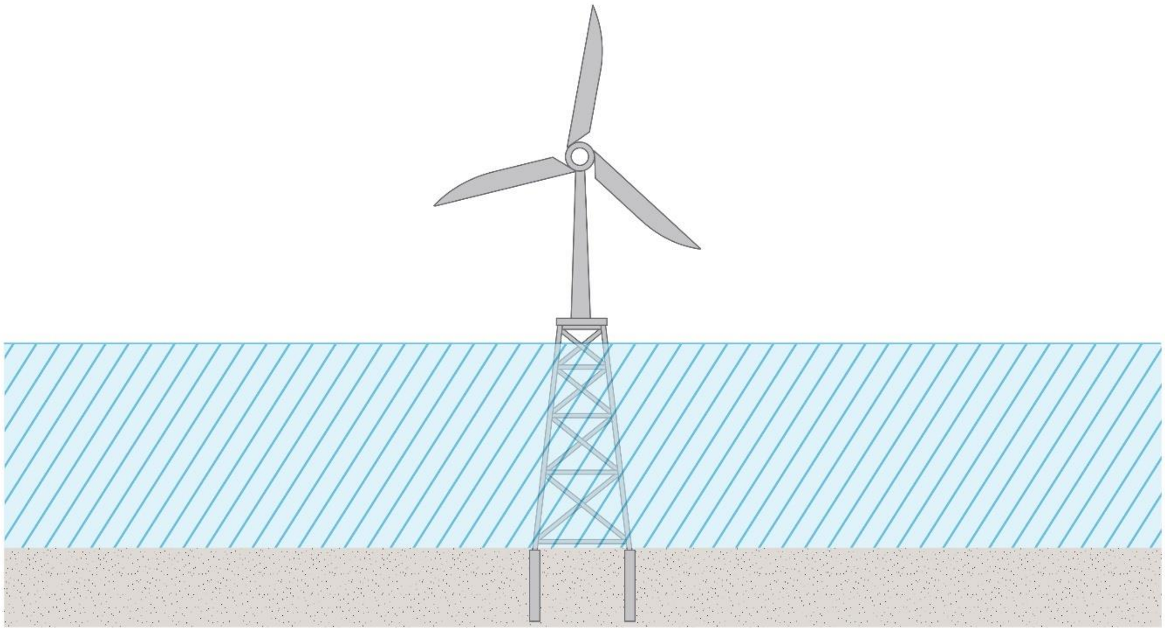


Figure 3.4: Illustrative jacket (pin pile) foundation design.

3.4.3.10 During the construction phase of the Mona Offshore Wind Project there may be pin piles being installed at up to two locations the same time. Piling will commence with low hammer energies (‘soft start’) and maximum hammer energies (if required) will be attained after a predefined ‘ramp up’ and typically only used where ground conditions require.

3.4.3.11 The Applicant has proposed up to 4-legged jacket foundation options in the design envelope for wind turbine foundations, as shown in Table 3.4. For offshore substation platforms and offshore booster substation foundations the design envelope is shown in Table 3.5.

Table 3.4: Design envelope: key parameters for jacket foundations (wind turbines).

Parameter	Maximum Design Envelope
Number of jacket foundations	107
Number of legs per foundation	4
Number of piles per leg	3
Diameter of jacket leg (m)	5
Jacket leg spacing (at seabed) (m)	50
Jacket leg spacing (at surface) (m)	40
Pin pile diameter (m)	5.5
Seabed footprint per jacket foundation (without scour protection) (m^2)	255
Maximum hammer energy (kJ)	2,800
Number of concurrent piling events	Up to two locations installed at the same time

Table 3.5: Design envelope: key parameters for jacket foundations (OSPs/offshore booster substation).

Parameter	Maximum Design Envelope
Number of jacket foundations	4 (OSPs) 1 (Offshore booster substation)
Number of legs per foundation	6
Number of piles per leg	3
Diameter of jacket leg (m)	5
Jacket leg spacing (at seabed) (length x width (m))	70x50
Jacket leg spacing (at surface) (length x width (m))	50x40
Pin pile diameter (m)	5.5
Seabed footprint per jacket foundation (without scour protection) (m^2)	428
Maximum Hammer Energy (kJ)	2,800
Number of concurrent piling events	Up to two locations installed at the same time

Jacket foundations on suction buckets

3.4.3.12 Jacket foundations on suction buckets are formed with a steel lattice construction (comprising tubular steel members and welded joints) fixed to the seabed by suction buckets installed below each leg of the jacket. The suction buckets are typically hollow steel cylinders, capped at the upper end. They do not require a hammer or drill for installation. As with piled jacket foundations, there is no separate TP as the TP and ancillary structure is fabricated as an integrated part of the jacket structure. An example of a suction bucket jacket foundation is provided in Figure 3.5.

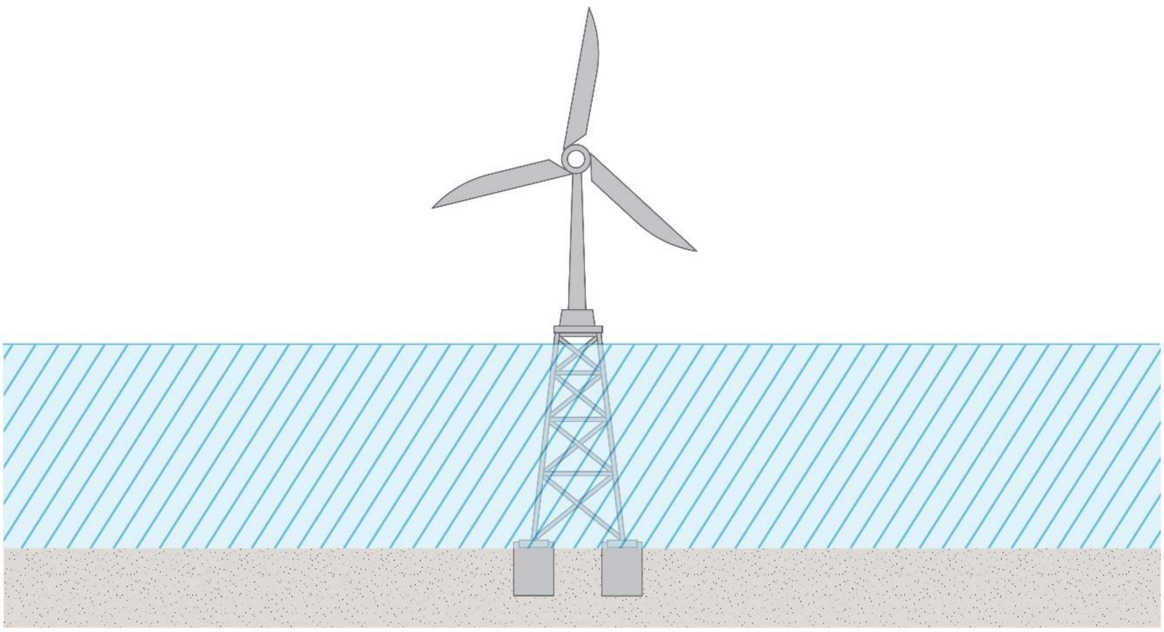


Figure 3.5: Illustrative jacket (suction bucket) foundation design.

3.4.3.13 Once at the installation site, the jacket foundation will be lifted by a crane onboard the installation vessel and lowered towards the seabed in a controlled manner. When the steel suction bucket reaches the seabed, a pipe running up through the stem above each suction bucket will begin to suck water out of each bucket. The buckets are pressed down into the seabed by the resulting suction force. When the bucket has penetrated the seabed to the desired depth, the pump is turned off. A thin layer of grout is then injected under the top side of the bucket to fill the void and ensure contact between the soil within the bucket, and the top of the bucket itself.

3.4.3.14 The Applicant has proposed up to 4-legged suction bucket jacket foundation options in the design envelope for wind turbine foundations, as shown in Table 3.6. For offshore substation platforms and offshore booster substation foundations, the design envelope is shown in Table 3.7.

Table 3.6: Design envelope: key parameters for suction bucket jacket foundations (wind turbines).

Parameter	Maximum Design Envelope
Number of suction bucket jacket foundations	107
Number of legs per foundation	4
Diameter of jacket leg (m)	5
Jacket leg spacing (at seabed) (m)	50
Jacket leg spacing (at surface) (m)	35
Bucket diameter (m)	18
Seabed footprint per jacket foundation (without scour protection) (m^2)	804

Table 3.7: Design envelope: key parameters for suction bucket jacket foundations (OSPs and offshore booster substation).

Parameter	Maximum Design Envelope
Number of suction bucket jacket foundations	4 (OSPs) 1 (Offshore booster substation)
Number of legs per foundation	6
Diameter of jacket leg (m)	5
Jacket leg spacing (at seabed) (length x width (m))	70x50
Jacket leg spacing (at surface) (length x width (m))	50x40
Bucket diameter (m)	18
Seabed footprint per jacket foundation (without scour protection) (m^2)	1,527

3.4.4 Seabed preparation

3.4.4.1 Seabed preparation may be required prior to foundation and cable installation. Seabed preparation may include seabed levelling, and removing surface and subsurface debris such as boulders, fishing nets or lost anchors. If debris is present below the seabed surface, then excavation may be required for access and removal.

3.4.4.2 Any unexploded ordnance (UXO) found with a potential to contain live ammunition may be detonated on site, with any remaining debris of sufficient size to present a snagging risk to commercial fishing activities removed. This will be carried out following consultation with Natural Resources Wales (NRW), the Marine Management Organisation (MMO) and the Ministry of Defence (MOD). The UXO risk mitigation strategy will be based on procedures following industry best practice (currently mainly according to CIRIA C754 guidelines). For future site investigation activities, mitigation measurements according to a respective UXO desktop analysis will be conducted for avoidance of encountering potential UXO by such activities. For the installation and construction phase of the Mona Offshore Wind Project, a dedicated UXO survey with subsequent identification and clearance campaign will be conducted prior to the construction works, taking into account potential seabed changes. As techniques for survey, identification and clearance operations are continuously evolving, respective assessments to select the optimum appropriate strategy and technology (e.g. low order deflagration or high order disposal) based on best industry practice and applicable stipulations and guidelines will be carried out at the given time, at the earliest one year ahead of the start of offshore construction works. The maximum design envelope for UXO removal will be included in the PEIR on the basis of a number of informed assumptions. As such, UXO removal is included as an activity in the PDE and is considered in the EIA Scoping Report.

3.4.5 Scour protection for foundations

3.4.5.1 Foundation structures for wind turbines, offshore substation platforms and offshore booster substations are susceptible to seabed erosion and ‘scour hole’ formation due to natural hydrodynamic and sedimentary processes. The development of scour holes is influenced by the shape of the foundation structure, seabed sedimentology and site-specific metocean conditions such as waves, currents, and storms. Scour protection may be deployed to mitigate scour around foundations. Commonly used scour protection types are illustrated in Figure 3.6 and described below:

- rock: either layers of graded stones placed on and/or around structures to inhibit erosion or rock filled mesh fibre bags which adopt the shape of the seabed/structure as they are lowered on to it
- concrete mattresses: several metres wide and long, cast of articulated concrete blocks which are linked by a polypropylene rope lattice which are placed on and/or around structures to stabilise the seabed and inhibit erosion
- artificial fronds: mats typically several metres wide and long, composed of continuous lines of overlapping buoyant polypropylene fronds that create a drag barrier which prevents sediment in their vicinity being transported away. The frond lines are secured to a polyester webbing mesh base that is itself secured to the seabed by a weighted perimeter or anchors pre-attached to the mesh base.

Figure 3.6: Illustrative scour protection types (Left: delivery of rock to EnBW's Hohe See offshore wind farm; Right: concrete mattresses).

3.4.5.2 The most frequently used scour protection method is 'rock placement', which entails the placement of crushed rock around the base of the foundation structure.

3.4.5.3 The amount of scour protection required will vary for the different foundation types being considered for the Mona Offshore Wind Project and the maximum design envelope will be presented in the PEIR and ES. The final choice and detailed design of a scour protection solution will be made after detailed design of the foundation structure, and informed by pre-construction site investigation survey data, meteorological and oceanographical data, and maintenance strategy.

3.4.6 Offshore substation platforms (OSPs)

Offshore substation platforms

3.4.6.1 The Mona Offshore Wind Project may require up to four offshore substation platforms within the Mona Potential Array Area. The offshore substation platforms will transform electricity generated by the wind turbines to a higher voltage allowing the power to be efficiently transmitted to shore. The size of the platform topsides will depend on the final electrical set up for the wind farm. Figure 3.7 shows a typical design of an offshore substation platform with the topside place on a jacket foundation. Alternatively the OSP topside could be placed on a monopile foundation.

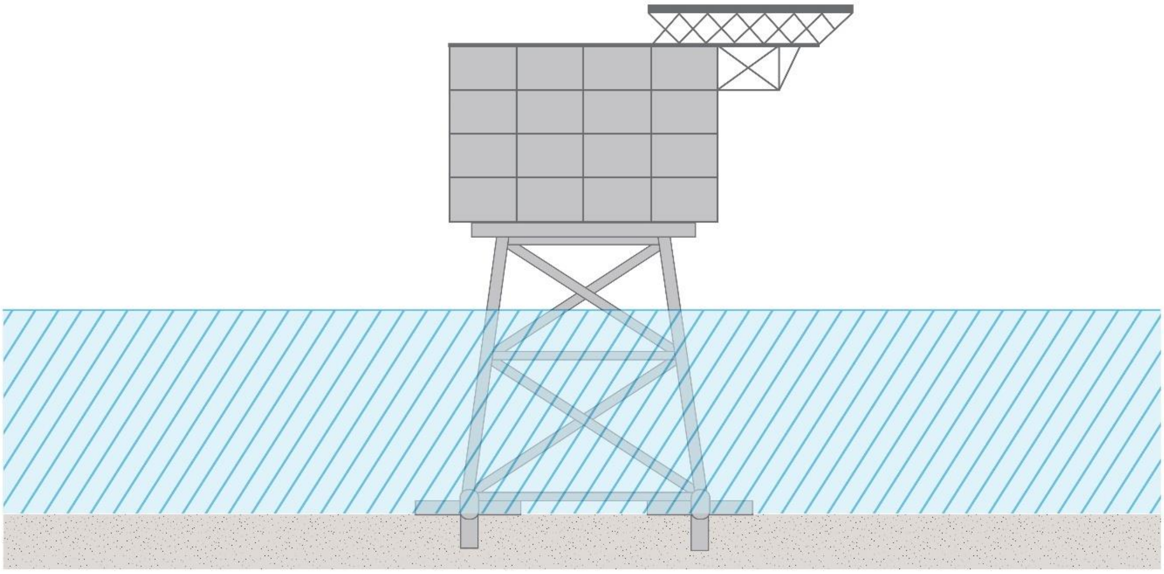


Figure 3.7: Illustrative offshore substation platform.

3.4.6.2 The exact location of the offshore substation platforms will be determined during the design phase (typically post-consent), informed by pre-construction site investigation data and cable routing among other considerations. All offshore substation platforms will be marked for aviation and navigation purposes.

3.4.6.3 The design envelope for offshore substation platforms is presented in Table 3.8.

Table 3.8: Design envelope: key parameters for offshore substation platforms.

Parameter	Maximum Design Envelope
Number of offshore substation platforms (OSPs)	4
Height of main structure (above LAT) (m)	70
Height of lightning protection (above LAT) (m)	85
Height of helideck (above LAT) (m)	80
Height of crane (above LAT) (m)	80
Height of top of antenna structure (above LAT) (m)	95
Topside length (m)	80
Topside width (m)	60

Offshore booster substation

3.4.6.4 The Mona Offshore Wind Project may require one offshore booster substation within the Mona Offshore Transmission Infrastructure Scoping Search Area. Offshore booster substations (also known as mid-point reactive power compensation substations) are required in High Voltage Alternating Current (HVAC) transmission systems only.

3.4.6.5 The exact location of the offshore booster substation will be determined during the design phase (typically post-consent), taking into account seabed conditions and cable routing among other considerations. At this stage it is anticipated that this infrastructure, if required, will be located within the Mona Offshore Transmission Infrastructure Scoping Search Area around the mid-point of the offshore export cable corridor. The offshore booster substation will be marked for aviation and navigation purposes.

3.4.6.6 The design envelope for the offshore booster substation is presented inTable 3.8Table 3.9 Table 3.9.

Table 3.9: Design envelope: key parameters for the offshore booster substation.

Parameter	Maximum Design Envelope
Number of offshore booster stations	1
Height of main structure (above LAT) (m)	70
Height of lightning protection (above LAT) (m)	85
Height of helideck (above LAT) (m)	80
Height of crane (above LAT) (m)	80
Height of top of antenna structure (above LAT) (m)	95
Topside length (m)	80
Topside width (m)	60

3.4.7 Inter-array cables

3.4.7.1 Inter-array cables will be installed to carry the electrical current produced by the wind turbines to the offshore substation platforms. A small number of wind turbines will typically be grouped together on the same cable 'string' connecting those wind turbines to an offshore substation platform, and multiple cable 'strings' will connect back to each offshore substation platform.

3.4.7.2 The inter-array cables will be buried wherever possible and protected with cable protection (such as rock or concrete mattresses) where burial is not achievable (for example, where crossing existing cables, pipelines or exposed bedrock). This will ensure that the cable remains secure, is not a hazard to other sea users and does not risk becoming exposed and damaged by tidal currents. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions.

3.4.7.3 Inter-array cables may be installed using methods such as ploughing, trenching or jetting. Each technique involves displacing seabed sediment using either mechanical tools or water jets deployed from remotely operated vehicles on or above the seabed to enable the cable to be lowered into a trench below the seabed. The inter-array cable installation methodology and potential cable protection measures will be described in the PEIR and ES and finalised at the final design stage (post-consent), informed by environmental and pre-construction site investigation survey results.

3.4.7.4 The design envelope for inter-array cables is shown in Table 3.10.

Table 3.10: Design envelope: key parameters for inter-array cables.

Parameter	Maximum Design Envelope
Total inter-array cable length (km)	500
Maximum external cable diameter (mm)	230
Burial technique	Prelay plough, plough, trenching, jetting
Target burial depth (m)	1 m (minimum 0.5 m)
Cable protection material type	Steel armour wire, rock, mattressing

3.4.8 Interconnector cables

3.4.8.1 Interconnector cables connect the offshore substation platforms (if more than one is required) to each other in order to provide redundancy in the case of cable failure elsewhere. The design envelope for interconnector cables is provided in Table 3.11.

Table 3.11: Design envelope: key parameters for interconnector cables.

Parameter	Maximum Design Envelope
Number of interconnector cables	3
Maximum external cable diameter (mm)	350
Maximum total length of interconnector cables (km)	50
Burial technique	Prelay plough, plough, trenching, jetting
Target burial depth (m)	1 m (minimum 0.5 m)
Cable protection material type	Steel armour wire, rock, mattressing

3.4.8.2 Interconnector cables will be buried wherever possible and protected with cable protection (such as rock or concrete mattresses) where burial is not achievable (for example, where crossing existing cables, pipelines or exposed bedrock). This will ensure that the cable remains secure, is not a hazard to other sea users and does not risk becoming exposed and damaged by tidal currents. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions.

3.4.8.3 Interconnector cables may be installed using methods such as ploughing, trenching or jetting. The interconnector cable installation methodology and potential cable protection measures will be described in the PEIR and ES and finalised at the final design stage (post-consent), informed by environmental and pre-construction site investigation survey results.

3.4.9 Offshore export cables

3.4.9.1 Offshore export cables are used for the transfer of power from the offshore substation platforms within the Mona Potential Array Area to the landfall. The offshore export cables will have a maximum total length of 360km, comprised of up to four cables.

3.4.9.2 The location of the offshore export cable corridor within the Mona Offshore Transmission Infrastructure Scoping Search Area will be presented in the PEIR following a process of route refinement (see also part 3, section 2: Site selection and alternatives, of the EIA Scoping Report). Flexibility is required in the location, depth of burial and protection measures for the offshore export cables to ensure physical and technical constraints, changes in available technology and project economics can be accommodated within the final design. The design envelope for the offshore export cables is described in Table 3.12.

Table 3.12: Design envelope: key parameters for offshore export cables.

Parameter	Maximum Design Envelope
Number of offshore export cables	4
Offshore export cable length (per cable) (km)	90
Maximum external cable diameter (mm)	350
Maximum total length of offshore export cables (km)	360
Burial technique	Prelay plough, plough, trenching, jetting
Target burial depth (m)	1 m (minimum 0.5 m)
Cable protection material type	Steel armour wire, rock, mattressing

3.4.9.3 Offshore export cables will be buried wherever possible and protected with cable protection (such as rock or concrete mattresses) where burial is not achievable (for example, where crossing existing cables, pipelines or exposed bedrock). This will ensure that the cable remains secure, is not a hazard to other sea users and does not risk becoming exposed and damaged by tidal currents. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions.

3.4.9.4 Offshore export cables may be installed using methods such as ploughing, trenching or jetting. The offshore export cable installation methodology and potential cable protection measures will be described in the PEIR and ES and finalised at the final design stage (post-consent), informed by environmental and pre-construction site investigation survey results.

3.4.10 Landfall

3.4.10.1 The landfall will be located along the north coast of Wales where the Mona Offshore Transmission Infrastructure Scoping Search Area meets the Mona Onshore Transmission Infrastructure Scoping Search Area. Its exact location is subject to a process of refinement and will be described in the PEIR. The offshore export cables will be installed through the intertidal zone using either trenchless methods (e.g. Horizontal Directional Drilling (HDD), where cables are pulled through pre-installed underground ducts) or open cut trenching (where cables are buried using mechanical tools at the ground level).

3.4.10.2 The offshore export cables will be jointed to the onshore export cables at transition joint bays (TJB). The TJBs are an underground concrete structure (accessed via a manhole cover at ground level) and will be located on the landward side of the landfall.

3.4.10.3 The works at landfall may require access to the beach for construction vehicles depending on the installation method and the location of the landfall. The landfall works will be supported by a construction compound.

3.5 Onshore infrastructure

3.5.1.1 The key onshore components of the Mona Offshore Wind Project are likely to include:

- onshore export cables
- grid connection export cable
- onshore substation.

3.5.1.2 These key onshore components are briefly described in the following sections. Realistic worst case parameters (dimensions and numbers where appropriate) are provided to indicate the potential scale of the Mona Offshore Wind Project. A further refined and detailed project description will be provided in the PEIR and ES.

3.5.2 Onshore export cables

3.5.2.1 Up to 12 onshore export cables will be required between the landfall and the onshore substation. The cables will be buried in up to four separate trenches each containing multiple cables. The cables may be installed directly into open trenches or pulled through pre-installed ducting. The onshore cable corridor will have a maximum width of 100m (including both the permanent installation area and temporary working area) and will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area. The width of the permanent and/or temporary areas may change where obstacles are encountered.

3.5.2.2 The onshore cable corridor will also include temporary access roads to allow the movement of construction vehicles and the installation of the onshore export cable, in addition to other related works such as construction compounds and laydown areas.

3.5.2.3 The design envelope for the onshore export cables is provided in Table 3.13.

Table 3.13: Design envelope: key parameters for onshore export cables.

Parameter	Maximum Design Envelope
Maximum number of export cables	12
Maximum cable voltage (kV)	275
Maximum number of cable trenches	4
Length of cable corridor (km)	18
Width of cable corridor (m)	100
Target trench depth (m)	1.6
Maximum number of joint bays	96
Width of haul road (m) excluding passing bays	6

3.5.2.4 The majority of the cable will be installed using open trenching methods, however where an open trench approach is not possible due to obstructions (e.g. roads and watercourses), trenchless techniques may be employed, such as HDD.

3.5.2.5 During construction of the cable trenches the topsoil and subsoil will be removed and stored on site within the temporary working corridor of the onshore cable corridor. Potential construction impacts will be managed through a Code of Construction Practice.

3.5.2.6 Joint bays will be located along the onshore export cable route where sections of the cable will be joined together. These will be accessible via manhole cover at ground level.

3.5.2.7 Full details of the proposed onshore cable corridor, jointing bays and installation methods (and parameters) will be included within the PEIR.

3.5.3 Grid connection export cables

3.5.3.1 Up to 12 onshore cables will be required between the onshore substation and the National Grid substation. The cables will be buried in up to four separate trenches each containing multiple cables. The cables may be installed directly into open trenches or pulled through pre-installed ducting. The onshore cable corridor will have a maximum width of 100m (including both the permanent installation area and temporary working area) and will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area. The width of the permanent and/or temporary areas may change where obstacles are encountered.

3.5.3.2 The onshore cable corridor will also include temporary access roads to allow the movement of construction vehicles and the installation of the grid connection export cables, in addition to other related works such as construction compounds and laydown areas.

3.5.3.3 The design envelope for the grid connection export cables is provided in Table 3.12.

Table 3.12: Design envelope: key parameters for grid connection export cables.

Parameter	Maximum Design Envelope
Maximum number of cables	12
Maximum cable voltage (kV)	400
Maximum number of cable trenches	4
Length of cable route (km)	6
Width of cable corridor (m)	100
Trench target depth (m)	1.6
Maximum number of joint bays	48
Width of haul road (m) excluding passing bays	6

3.5.3.4 The majority of the cables will be installed using open trenching methods, however where an open trench approach is not possible due to obstructions (e.g. roads and watercourses) trenchless techniques may be employed, such as HDD.

3.5.3.5 During construction of the cable trenches the topsoil and subsoil will be removed and stored on site within the temporary working corridor of the onshore cable corridor. Potential construction impacts will be managed through a Code of Construction Practice.

3.5.3.6 Joint bays will be located along the onshore cable route where sections of the cable will be joined together. These will be accessible via manhole cover at ground level.

3.5.3.7 Full details of the proposed onshore cable corridor, jointing bays and installation methods (and parameters) will be included within the PEIR.

3.5.4 Onshore substation

3.5.4.1 A purpose-built substation will be required to contain the electrical equipment required to adjust the power quality and power factor to meet the UK Grid Code as required to supply the National Grid. Two substation options are included in the design envelope; Air Insulated Switchgear (AIS) and Gas Insulated Switchgear (GIS). For an AIS option, the equipment is housed in an open yard. For a GIS option, the equipment is housed within single or multiple buildings. It is also possible to have a combination of the above. The substation site will also include landscaping and drainage mitigation.

3.5.4.2 The exact location of the onshore substation within the Mona Onshore Transmission Infrastructure Scoping Search Area will be identified through the EIA process and will take into account environmental and physical constraints as well as technical and commercial considerations. An overview of the site selection process is provided in part 3, section 2: Site selection and alternatives, of the EIA Scoping Report. A temporary construction compound and working area will be provided to facilitate the construction of the onshore substation.

3.5.4.3 The design envelope for the onshore substation is provided in Table 3.13. It should be noted that AIS and GIS substations are different in form and size, however the maximum parameters are presented here.

Table 3.13: Design envelope: key parameters for onshore substation.

Parameter	Maximum Design Envelope
Transmission type	HVAC
Permanent footprint of substation (m^2)	125,000
Working area (m^2)	250,000
Number of main buildings	4
Height of main structure/building (m)	15
Width of main building (m)	80
Length of main building (m)	140
Height of lightning protection (m)	30

3.6 Construction

3.6.1 Offshore construction

3.6.1.1 The Mona Offshore Wind Project components are likely to be fabricated offsite at manufacturing sites in the UK and/or abroad. A construction base (port facility) may be used to stockpile some components, such as foundations and wind turbine components, before delivery to the Mona Potential Array Area for installation. Other components, such as pre-fabricated offshore substation platforms, may be delivered directly to the Mona Potential Array Area.

3.6.1.2 The offshore components of the Mona Offshore Wind Project are likely to be installed over a period of up to four years. The general construction sequence is likely to include the following:

- pre-construction site investigation surveys
- seabed preparation activities
- foundation installation
- offshore substation installation and commissioning
- offshore export cable installation
- interconnector cable installation
- inter-array cable installation
- wind turbine installation
- wind turbine commissioning.

3.6.1.3 The offshore construction phase will be supported by various vessels including jack-up vessels or floating Heavy Lift Vessels (HLV), support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, Crew Transfer Vessels, scour protection installation vessels and cable protection installation vessels. Helicopters may also be used during the construction phase for equipment and personnel transfer.

3.6.1.4 Foundation structures, offshore substation topsides, cabling and wind turbines will be transported to the installation site by vessel from the pre-assembly harbour or from the fabrication yard. Foundations will be installed first in line with the methodology outlined in section 0. The offshore substation topside will then be placed on top of each offshore substation foundation structure and undergo commissioning. Inter-array, interconnector and offshore export cables will be installed, as described in section 3.4.7 to 3.4.9. Finally, each individual wind turbine tower, nacelle and blades will be installed on top of the wind turbine foundations. The blades are likely to be installed one at a time, or alternatively may be transported and installed as pre-assembled rotor stars (hub with blades attached). At the landfall, the offshore export cables will be installed through the intertidal zone using either trenchless methods or open cut trenching (as described in section 3.4.10). The offshore export cables will be jointed to the onshore export cables at a TJB, located on the landward side of the landfall. Following installation of the wind turbines and connection to the necessary cabling, a process of testing and commissioning will be undertaken.

3.6.2 Onshore construction

3.6.2.1 The onshore elements of the Mona Offshore Wind Project may be installed over a period of up to four years. The scope of construction may be subdivided into the following work packages, with works ongoing on multiple fronts during the construction period:

- Landfall works
- Onshore export cable installation
- Grid connection export cable installation
- Onshore substation construction and installation
- Onshore substation commissioning.

3.7 Operation and maintenance

3.7.1.1 The operational lifetime of the Mona Offshore Wind Project is expected to be up to 35 years[3]. The Mona Offshore Wind Project will require operation and maintenance activities to take place over the lifetime of the wind farm.

3.7.1.2 Routine maintenance activities offshore may include inspections, removal of marine growth build up, minor repairs, cleaning activities, and replacement of consumables and corrosion protection systems. Non-routine major maintenance activities may include component exchanges (e.g. wind

3 'Operational lifetime' means the cumulative period of time over which the Mona Offshore Wind Project is expected to be in operation. For the avoidance of doubt, the term 'operational lifetime' does not refer to the expected useful economic life of individual assets installed as part of the Mona Offshore Wind Project.

turbine blades, gearboxes), cable reburial and cable repair activities. Routine operation and maintenance activities may be carried out from Crew Transfer Vessels or Service Operation Vessels, with major maintenance activities (such as component exchanges) requiring jack-up vessels, HLV or specialist vessels such as cable repair and cable laying vessels. Occasionally, helicopters may also be used to transport personnel and equipment. Full details of the proposed operation and maintenance activities will be set out in the PEIR and assessed in the EIA.

3.7.1.3 An onshore operations and maintenance base will support the operational phase of the Mona Offshore Wind Project. The requirements for and location of the onshore operations and maintenance base will be informed by the final project design closer to the time of construction and will be subject to a separate consent application process.

3.7.1.4 Operation and maintenance requirements onshore may involve infrequent on-site inspections of the onshore transmission infrastructure. The onshore infrastructure will be consistently monitored remotely. However, in specific situations (e.g. regular maintenance, troubleshooting), operation and maintenance staff may be required to visit the onshore substation.

3.8 Decommissioning and repowering

3.8.1.1 It is anticipated that the Mona Offshore Wind Project will have an operational lifetime of up to 35 years. As part of the Offshore Wind Leasing Round 4, the Applicant will enter into a seabed lease for 60 years. At the end of the operational lifetime, the Mona Offshore Wind Project will be decommissioned or repowered in line with the regulations, requirements, guidance and best practice relevant at that time.

3.8.1.2 If decommissioning takes place, it is anticipated that all structures above the seabed or ground level will be completely removed. Following general UK practice, and as noted above, subject to regulations, requirements, guidance and best practice relevant at that time, it is anticipated that both offshore and onshore cables and any offshore cable protection would be left in-situ. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. The Energy Act 2004 requires that a decommissioning plan must be submitted to the Secretary of State for BEIS prior to the construction of the Mona Offshore Wind Project, and is typically prepared post-consent. The decommissioning plan and programme will be updated during the Mona Offshore Wind Project's lifetime to take account of changes in regulations, best practice and new technologies.

3.8.1.3 It is also possible that the lifetime of the Mona Offshore Wind Project is extended through repowering. NPS EN-3 states at paragraph 2.6.49 (and paragraph 2.23.13 in the draft NPS EN-3) that "given the likely change in technology over the intervening time period, any repowering of sites is likely to involve wind turbines of a different scale and nature. This could result in significantly different impacts as well as a different electricity generating capacity and a new consent application would be required" (DECC, 2011b; BEIS, 2021b).

3.9 Measures adopted as part of the project

3.9.1.1 Measures adopted as part of the project may include those developed as part of the project design, industry standard measures committed to by the Applicant, or measures which are required by law. These include modifications to location or design, industry standard measures committed to by the Applicant including lighting and marking, use of 'soft-starts' for piling operations etc, and commitment to implementing post-consent management plans, to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Measures adopted as part of the project are referred to in the relevant topic-specific sections within part 2: Generation assets, of the EIA Scoping Report, and part 3: Transmission assets, of the EIA Scoping Report.

4. EIA methodology

4.1 Introduction

4.1.1.1 This section presents an outline of the Environmental Impact Assessment (EIA) methodology to be employed for the Mona Offshore Wind Project. It outlines the methodology for the identification and evaluation of potential likely significant environmental effects and also presents the methodology for the identification and evaluation of potential cumulative and inter-related effects, and consideration of potential transboundary effects.

4.1.1.2 A systematic and auditable evidence-based approach is proposed to evaluate and interpret potential effects on physical, biological and human environment receptors.

4.1.1.3 As described in part 1, section 2: Policy and legislation, of the EIA Scoping Report, the EIA process can be broadly summarised as consisting of three main elements that take place prior to the submission of the application, namely scoping, consultation and ES preparation.

4.2 Scoping

4.2.1.1 Scoping is the process of identifying the issues to consider within an ES (establishing the scope of the assessment). As set out in part 1, section 1: Introduction, of the EIA Scoping Report, scoping is therefore an important preliminary procedure, which sets the context for the EIA process. Through scoping, the key environmental issues are identified at an early stage, which permits subsequent work to concentrate on those environmental topics for which significant effects may arise as a result of a proposed development.

4.2.1.2 The scoping process is informed by increasing knowledge acquired through the EIA process. Figure 4.1 highlights some of the key inputs to the scoping process. These inputs include the identification of an initial project description, including the key components of the Mona Offshore Wind Project and their likely maximum parameters. Taking this into account, alongside the characteristics of the environment in the vicinity of the project, the requirements of the relevant EIA regulations can be reviewed to provide an initial indication of the topics likely to be relevant to the project. From this point, the scope of assessment can be refined through the use of consultation and the findings of initial assessment by topic specialists.

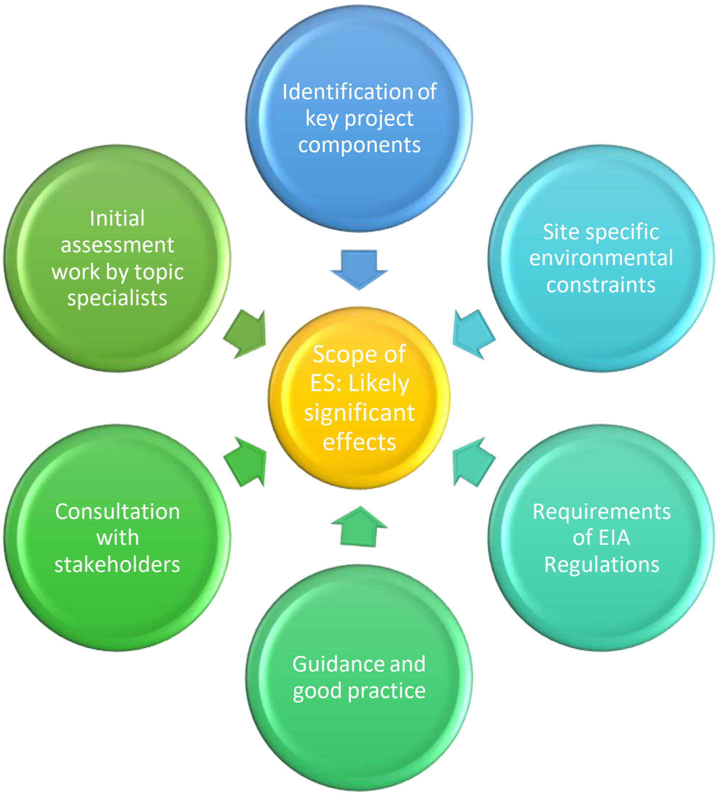


Figure 4.1: Overview of the scoping process.

4.2.1.3 This EIA Scoping Report presents the findings of the scoping process undertaken to date and sets out the proposed methodology for carrying out the EIA. Taking into account the work undertaken to date, it identifies the potential impacts that are proposed to be considered within the EIA process for the Mona Offshore Wind Project. Each topic area is considered, setting out the proposed scope of assessment and identifying any sub-topics that are proposed to be scoped out of the assessment (where no significant effects are considered likely).

4.2.1.4 A Scoping Opinion is requested from the Secretary of State and Natural Resources Wales (NRW) (for the offshore export cables and related works only), which will inform the scope of the EIA, to be reported in the ES. The ES must be based on the most recent Scoping Opinion adopted.

4.2.1.5 As assessment work continues and surveys are completed, new issues may arise, or it may become apparent that some potential impacts are not likely to result in significant effects. Where this is the case, the findings of the assessment process will be discussed with consultees in order that the scope of the assessment may be refined as appropriate throughout the EIA process.

4.3 Legislation and guidance

4.3.1.1 The impact assessment methodology will draw upon a number of EIA principles, regulations and guidance documents, including:

- Legislation
  - The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 2017 EIA Regulations) (relevant to the DCO application).
  - The Marine Works (Environmental Impact Assessment Regulations) 2007 (as amended) (the 2007 EIA Regulations) (relevant to the Marine Licence application to NRW).
  - The Planning Act 2008 (as amended) (relevant to the DCO application).
  - The Marine and Coastal Access Act 2009 (relevant to the Marine Licence application to NRW).
- Policy
  - Overarching NPS for Energy (NPS EN-1) (including draft NPS EN-1) (DECC, 2011a; BEIS, 2021a).
  - NPS for Renewable Energy Infrastructure (NPS EN-3) (including draft NPS EN-3) (DECC, 2011b; BEIS, 2021b).
  - NPS for Electricity Networks Infrastructure (NPS EN-5) (including draft NPS EN-5) (DECC, 2011c; BEIS, 2021c).
- Guidance
  - The Planning Inspectorate Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping (the Planning Inspectorate, 2020a).
  - The Planning Inspectorate Advice Note Nine: Rochdale Envelope (the Planning Inspectorate, 2018).
  - The Planning Inspectorate Advice Note Twelve: Transboundary Impacts and Process (the Planning Inspectorate, 2020b).
  - The Planning Inspectorate Advice Note Seventeen: Cumulative effects assessment (the Planning Inspectorate, 2019).
  - Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland (CIEEM, 2019).
  - Environmental Impact Assessment Guide to: Delivering Quality Development (IEMA, 2016).
  - Delivering Proportionate EIA, A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice (IEMA, 2017).
  - Cumulative Impact Assessment Guidelines, Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RenewableUK, 2013).
  - Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012).

4.3.1.2 Other topic-specific specialist methodologies and good practice guidelines will be drawn on as necessary. These are set out and described within the relevant topic sections of the EIA Scoping Report.

4.3.1.3 A full account of applicable legislation and guidance taken into account within the EIA methodology will be documented within the PEIR and ES.

4.4 Key principles of the assessment

4.4.1 Overview

4.4.1.1 The EIA will assess the potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Mona Offshore Wind Project. The assessment of each environmental topic (as listed in part 1, section 1: Introduction, of the EIA Scoping Report) will form a separate chapter of the ES. For each environmental topic, the following will be addressed:

- Identification of the study area[4] for the topic-specific assessments.
- Description of the planning policy and guidance context.
- Summary of consultation activity.
- Description of the environmental baseline conditions.
- Presentation of the impact assessment, including:
  - identification of the maximum design scenario (see section 4.4.4) for each impact assessment
  - a description of the measures adopted as part of the project, including design measures which seek to prevent, reduce or offset environmental effects
  - identification of likely impacts and assessment of the significance of identified effects
  - identification of any further mitigation measures required in respect of likely significant effects, together with consideration of any residual effects
  - identification of any future monitoring required
  - assessment of any cumulative effects with other major developments, including those that are proposed, consented and under construction (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was collected or that have an ongoing effect)
  - assessment of any transboundary effects (i.e. effects on other states).

4.4.1.2 Inter-related effects (i.e. inter-relationships between environmental topic areas) will be assessed in a separate standalone section.

4.4.1.3 Within each topic section a number of key principles will be applied, and these are detailed in the following sections.

4 For each environmental topic, the baseline environment will be characterized and the potential environmental impacts will be described within a topic-specific study area. The topic-specific study areas are defined for each topic in part 2 and part 3 of the EIA Scoping Report and are based on the maximum spatial extent across which potential impacts of the Mona Offshore Wind Project may be experienced by the relevant receptors (i.e. Zone of Influence).

4.4.2 Proportionate EIA

4.4.2.1 The aim of undertaking a proportionate EIA (as per IEMA, 2017; and the Industry Evidence Programme (IEP) (The Crown Estate *et al*., 2018)) has been a key consideration in the development of this EIA Scoping Report. A number of tools and processes will be used to aid the proportionality of the Mona Offshore Wind Project ES. This includes:

- development of consultation Evidence Plans, where applicable (see part 1, section 5: Consultation process, of the EIA Scoping Report)
- application of the existing evidence-base
- commitment to measures adopted as part of the project.

4.4.3 Evidence-based approach

4.4.3.1 The Mona Offshore Wind Project is located in the east Irish sea, a region where there exists significant data and knowledge regarding the baseline environment. This data/knowledge has been acquired through surveys, assessments and post-construction monitoring programmes undertaken for other proposed and existing offshore wind projects, much of which is available in the public domain. It is therefore the Applicant's intention to maximise, where possible, the use of these data and assessments to supplement the site-specific survey data acquired for the Mona Offshore Wind Project, in order to:

- characterise the baseline environment to inform the EIA where data is sufficient and appropriate to do so
- scope out impacts where there is a clear evidence-base
- where impacts are scoped in, to draw upon the pre-existing evidence-base where appropriate.

4.4.4 Maximum design scenario approach

4.4.4.1 As described in part 1, section 3: Project description, of the EIA Scoping Report, the Mona Offshore Wind Project EIA will use the Project Design Envelope (PDE) approach, also known as the Rochdale Envelope approach. This approach allows for a project to be assessed on the basis of maximum project design parameters (i.e. the worst case scenario) in order to provide flexibility, while ensuring all potentially significant effects are assessed within the EIA process and reported in the ES. Those parameters include a range of potential values.

4.4.4.2 This approach will be taken for the EIA because it is not possible to provide precise final design details of the Mona Offshore Wind Project a number of years ahead of the time it will be constructed. Additionally, the Mona Offshore Wind Project has yet to undertake its consultation process and receive feedback from statutory and non-statutory stakeholders. This will allow the Applicant to fully understand any potential significant impacts that need to be mitigated/managed, which will aid the refinement of the final application. Offshore wind is a constantly evolving industry with a constant focus on cost reduction, therefore improvements in technology and construction methodologies occur frequently and an unnecessarily prescriptive approach could preclude the adoption of new technology and methods.

4.4.4.3 For each of the impacts to be assessed in the topic-specific EIA chapters, the maximum design scenario will be identified from the range of potential options for each parameter in the PDE. The maximum design scenario assessed is therefore the scenario which would give rise to the greatest potential impact. For example, where several wind turbine options are included in the design, then the assessment of the Mona Offshore Wind Project would be based on the wind turbine option predicted to have the greatest impact. This may be the wind turbine option with the largest footprint, the greatest tip height or the largest area of seabed disturbance during construction, depending on the topic under consideration. By identifying the maximum design scenario for any given impact, it can therefore be concluded that the impact (and therefore the effect) will be no greater for any other design scenario than that assessed for the maximum design scenario. By employing the maximum design scenario approach, the Applicant retains some flexibility in the final design of the Mona Offshore Wind Project and associated infrastructure, but within certain maximum parameters, which are assessed in the ES.

4.4.4.4 All assumptions regarding the PDE will be clearly set out within the project description chapter of the PEIR/ES and within the topic chapters. The draft DCO will be prepared in conjunction with the ES in order to ensure that the key parameters applied for are consistent with those assessed through the EIA process.

4.5 Identification of impacts and assessment of significance

4.5.1 Definitions of impact and effect

4.5.1.1 The Mona Offshore Wind Project has the potential to create a range of impacts and effects with regard to the physical, biological and human environment. For the purposes of the EIA, ‘impact’ is used to define a change that is caused by an action. For example, the piling of wind turbine foundations (action) will result in increased levels of underwater noise (impact). Impacts can be defined as direct, indirect, secondary, cumulative and inter-related. They can also be either adverse or beneficial. In addition, for certain impacts, the reversibility of an impact is relevant to its overall effect. An irreversible (permanent) impact may occur when recovery is not possible, or not possible within a reasonable timescale. In contrast, a reversible (temporary) impact is one where natural recovery is possible over a short time period, or where mitigation measures can be effective at reversing the impact.

4.5.1.2 The term ‘effect’ will be used in the EIA to express the consequence of an impact. Considering the foundation piling example, the piling of wind turbine foundations (action) results in increased levels of subsea noise (impact), with the potential to disturb marine mammals (effect).

4.5.1.3 Each topic chapter will consider the magnitude of the impact alongside the sensitivity of the receptor in determining the significance of the effect, in accordance with defined significance criteria.

4.5.2 Defining magnitude of impact

4.5.2.1 For each of the impacts assessed in the EIA, a magnitude will be assigned. In assigning magnitude, the spatial extent, duration, frequency and reversibility of the impact will be considered (in line with Schedule 3, section 3, of the 2017 EIA Regulations). For each topic, the magnitude of impact will be categorised into the below scale:

- no change
- negligible
- low
- medium
- high.

4.5.2.2 Topic-specific definitions for each of these categories will be based on relevant guidance and specialist knowledge and will be provided in each of the topic chapters of the EIA.

4.5.3 Defining sensitivity of receptor

4.5.3.1 Receptors are defined as the physical or biological resource or human user group that would be affected by the impacts of a proposed development. Identification of receptors will be informed by available data and the baseline studies completed in the preparation of the EIA.

4.5.3.2 In defining the sensitivity of each receptor, the vulnerability, recoverability and value/importance will be taken into account. The determination of these factors will be specific to each environmental topic and defined within the corresponding chapters of the ES.

4.5.3.3 The sensitivity of each receptor to each impact will then be defined for each topic according to the below scale:

- negligible
- low
- medium
- high
- very high.

4.5.4 Evaluation of significance of effect

4.5.4.1 Effect is the term used to express the consequence of an impact (expressed as the ‘significance of effect’). The significance of an effect will be determined by the consideration of the magnitude of impact alongside the sensitivity of the receptor. In order to ensure a consistent approach throughout the EIA, a matrix approach will be adopted to guide topic-specific assessments. An example of such an EIA matrix is given below in Table 4.1.

Table 4.1: Matrix used for assessment of significance, showing the combinations of receptor sensitivity and the magnitude of impact.

Sensitivity of Receptor	Magnitude of impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major
Very High	No change	Minor	Moderate or Major	Major	Major

4.5.4.2 By cross-referencing the magnitude of impact with the sensitivity of the receptor, a significance of effect may be assigned for all potential impacts. The significance of effect may be one, or a range of:

- no change
- negligible
- minor
- moderate
- major.

4.5.4.3 These significance levels are defined in Table 4.2.

Table 4.2: Definition of significance levels.

Term	Definition (adapted from Highways England *et al.*, 2019)
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
Minor	These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
Moderate	These beneficial or adverse effects have the potential to be important and may influence the decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.

Term	Definition (adapted from Highways England *et al.*, 2019)
Major	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.

4.5.4.4 In general, a significance level of moderate or greater is considered to be a 'significant effect' in the context of the 2017 EIA Regulations and the 2007 EIA Regulations. However, this will be topic-specific and dependent on relevant practitioner guidance, and therefore for each topic chapter of the ES, what is considered 'significant' will be clearly defined. In cases where a range is suggested for the significance of effect, there remains the possibility that this may span the significance threshold (for example, if the range is given as minor to moderate). In such cases the final significance is based upon expert opinion as to which outcome delineates the most likely effect, with an explanation as to why this is the case.

4.6 Mitigation and enhancement measures

4.6.1.1 The 2017 EIA Regulations require that where potential significant effects are identified, 'a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment' should be included in the ES. Under the 2007 EIA Regulations, the requirement is to include 'a description of the measures envisaged to prevent, reduce and offset any significant adverse effects of the project and the regulated activity on the environment'.

4.6.1.2 Mitigation measures are measures developed to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. In some cases, measures are proposed that would create or enhance beneficial environmental or social effects; these are referred to as enhancement measures.

4.6.2 Measures adopted as part of the project

4.6.2.1 Measures adopted as part of the project may include those developed as part of the project design, industry standard measures committed to by the Applicant, or measures which are required by law. For the purposes of the EIA process, the term 'measures adopted as part of the project' is used to include the following measures (adapted from IEMA, 2016):

- Measures included as part of the project design. These include modifications to location or design, integrated into the application for consent. These measures are implemented through the consent itself (through the requirements of the DCO or the conditions within the deemed marine licences/marine licence) (referred to as primary mitigation in IEMA, 2016).

- Industry standard measures committed to by the Applicant. These include commitment to implementing post-consent management plans to reduce the significance or likelihood of adverse environmental effects, integrated into the application for consent. These measures are also implemented through the consent itself (through the requirements of the DCO or the conditions within the deemed marine licences/marine licence) (referred to as secondary mitigation in IEMA, 2016).
- Measures required to meet legislative requirements (referred to as tertiary mitigation in IEMA, 2016).
- Enhancement measures designed to provide an improvement or net gain, compared to existing baseline conditions.

4.6.2.2 The development of mitigation and enhancement measures is part of an iterative EIA process, whereby measures are developed throughout the EIA process in response to the findings of initial assessments. The proposed methodology involves a 'feedback loop' as illustrated in Figure 4.2. Impacts are initially assessed to evaluate the significance of environmental effects. If the effect is significant adverse, changes are made where practicable to the project design to reduce or offset the impact magnitude (i.e. primary mitigation). This process is repeated (as per Figure 4.2) until the EIA practitioner is satisfied that either:

- The effect is reduced to a level that is not significant in EIA terms, or
- No further primary or secondary mitigation can be applied to reduce the impact magnitude (and hence the significance of the effect). In these cases, an overall effect that is still significant in EIA terms may be presented.

4.6.2.3 Where appropriate, opportunities are explored within the EIA process to develop enhancement measures and to create beneficial effects.

4.6.2.4 The application for development consent for the Mona Offshore Wind Project will include a range of measures adopted as part of the project. The assessment of effects presented within each topic-specific chapter of the ES will take into account all measures adopted as part of the project to which the Applicant is committed.

4.6.2.5 All measures adopted as part of the project, together with the means of securing them (e.g. through submission of post-consent management plans), will ultimately form part of the requirements included in the DCO or the conditions within the deemed marine licences/marine licence.

4.6.3 Further mitigation

4.6.3.1 Where required, further mitigation will be identified within the topic-specific chapters of the ES. These are measures that could further prevent, reduce and, where possible, offset any significant residual adverse effects on the environment. This category of further mitigation is used, for example, where measures may not be industry standard, or where there is less certainty regarding the proven effectiveness of an emerging mitigation technique. For such measures, the significance of effect is assessed both with and without these measures in place.

4.6.4 Monitoring

4.6.4.1 In some cases, monitoring measures may be appropriate. Where appropriate, monitoring measures will be set out in the topic-specific chapters of the ES.

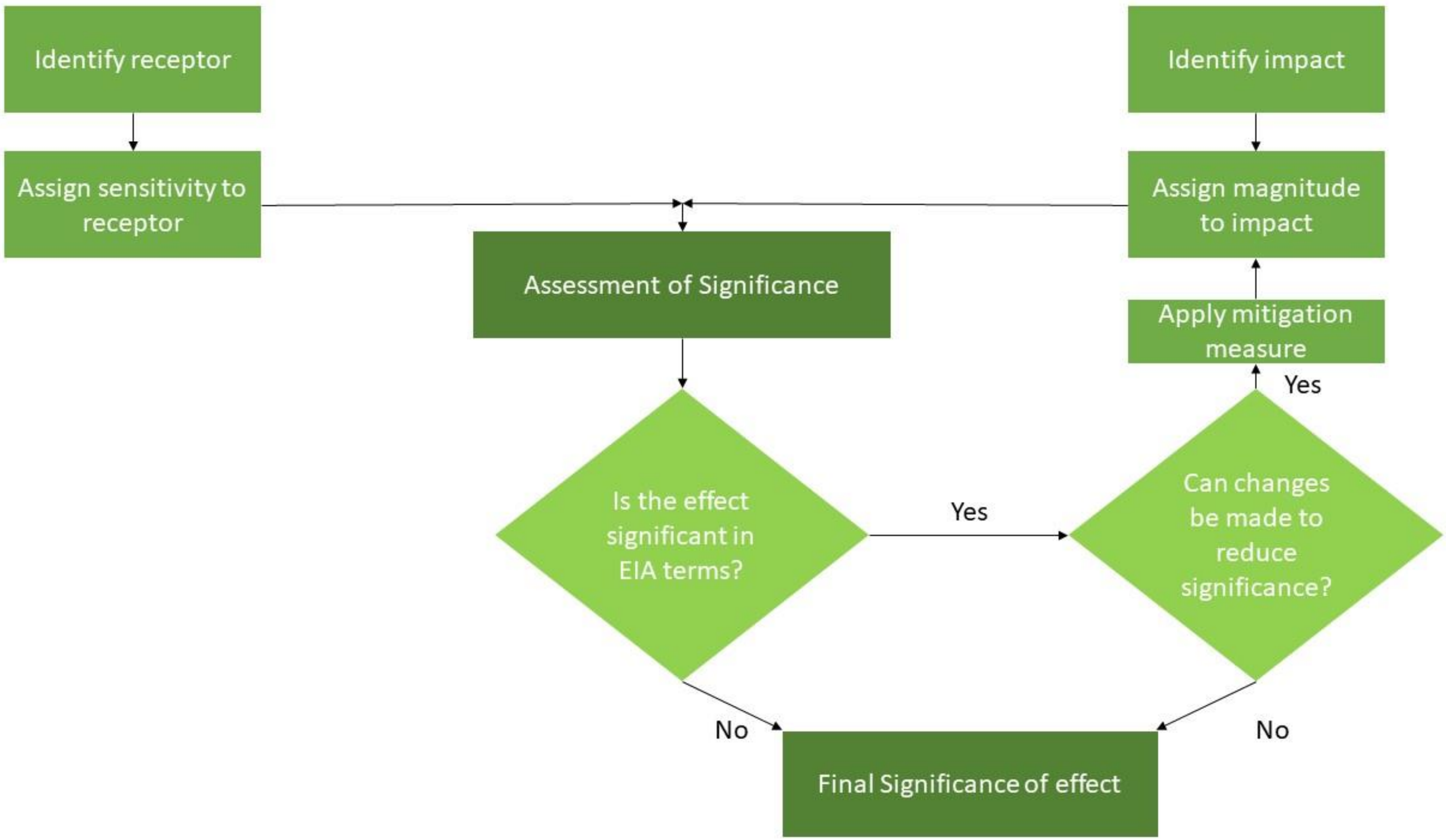


Figure 4.2: Proposed iterative approach to mitigation within the Mona Offshore Wind Project EIA.

4.7 Addressing uncertainty

4.7.1.1 There is some degree of inherent uncertainty within the EIA process. There is uncertainty in relation to future improvements to construction and design (see section 4.4.4). In addition, there is uncertainty in relation to future baseline conditions, such as the potential effects of climate change on existing receptors. There is also a degree of uncertainty in terms of the margin of error within forecasting or modelling tools. The following sections set out the proposed approach to addressing uncertainty. In all cases, where uncertainty exists, this will be identified (and quantified where possible) within the relevant chapter of the PEIR/ES, together with details of the measures that have been taken to reduce uncertainty as far as reasonably practicable.

4.7.2 Future baseline and assessment years

4.7.2.1 The baseline for the assessment of environmental effects will primarily be drawn from evidence collated during review of desktop data and any site-specific environmental surveys. Consideration will also be given to any likely changes between the time of data collection/survey and the future baseline for the construction and operation of the Mona Offshore Wind Project. In some cases, these changes may include the construction or operation of other planned developments in the area. Where such developments are built and operational at the time of writing and data collection, these will be considered to form part of the baseline environment. Where sufficient and robust information is available, such as expected traffic growth figures, other future developments will be considered as part of the future baseline conditions. In all other cases, planned future developments will be considered within the assessment of cumulative effects.

4.7.2.2 The consideration of future baseline conditions will also take into account the likely effects of climate change, as far as these are known at the time of writing. It is recognised that there will be some element of uncertainty regarding future trends in environmental conditions and climate. Where accepted methodologies for identifying the likely effects of climate change are available, these will be considered in the assessment. For example, information available from the UK Climate Projections project (UKCP18) provides information on plausible changes in climate for the UK (Environment Agency and Met Office, 2018) and in published documents such as the UK Climate Change Risk Assessment 2017 (HM Government, 2017b) and subsequent updates. Recent published research will also be reviewed to inform judgements on whether specific receptors are susceptible to the effects of climate change.

4.7.3 Forecasting and modelling

4.7.3.1 Where forecasting and modelling tools are used, care will be taken to ensure that the tool selected is appropriate for the assessment, taking into account topic-specific good practice and guidance. Model assumptions will be described, and calibration will be used to ensure a reasonable degree of accuracy in measurements. In addition, uncertainty will be addressed by undertaking modelling for a number of scenarios and at representative points across the Mona Offshore Wind Project, where applicable. Topic chapters within the PEIR/ES will set out measures taken to address any uncertainty with regard to modelling inputs and outputs.

4.8 Cumulative effects assessment

4.8.1.1 This section describes the proposed approach to the Cumulative Effects Assessment (CEA) for the Mona Offshore Wind Project. The approach to the CEA will be broadly similar for both offshore and onshore components of the Mona Offshore Wind Project; where differing approaches are needed this has been summarised in sections 4.8.2 and 4.8.3 below. Cumulative effects are defined as those that result from incremental changes caused by other reasonably foreseeable actions or other major developments alongside the project. Cumulative effects are therefore the combined effect of the assessed project cumulatively with the effects from a number of different projects, on the same single receptor/resource. A fundamental requirement of undertaking the CEA is to identify those foreseeable developments or activities with which the Mona Offshore Wind Project may interact to produce a cumulative effect. Interactions have the potential to arise during the construction, operation and maintenance, and decommissioning phases.

4.8.2 Offshore components

4.8.2.1 For the Mona Offshore Wind Project CEA, other proposed major developments in the area will be taken into account within the CEA, including but not limited to the Morgan Offshore Wind Project. The Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects (the Planning Inspectorate, 2019) recommends that, through consultation with local authorities and other relevant consenting bodies, other major developments (both onshore and offshore) in the area should be taken into account when conducting CEA, including those which are:

- under construction
- permitted application(s), but not yet implemented
- submitted application(s) not yet determined
- projects on the National Infrastructure Planning Portal's Programme of Projects
- projects identified in relevant development plans
- projects identified in other plans and programmes as may be relevant.

4.8.3 Onshore components

4.8.3.1 For onshore components of the Mona Offshore Wind Project, a check for other planning applications (in conjunction with the relevant local authorities) will be made as part of the consultation process, in order that any planned developments that are the subject of lodged planning applications are included within the assessment of cumulative effects.

4.8.3.2 Onshore plans or projects that may be considered include:

- other energy generation infrastructure
- building/housing developments
- installation or upgrade of roads
- installation or upgrade of cables and pipelines
- coastal protection works
- National Grid enabling works.

4.8.4 Screening stage

4.8.4.1 The CEA process is divided into a screening stage and an assessment stage. The proposed process is broadly illustrated in Figure 4.3.

4.8.4.2 An extensive list of plans, projects and activities will be prepared to inform the CEA, known as the CEA long list. A process will be followed to methodically and transparently screen the large number of projects and plans that may be considered cumulatively alongside the Mona Offshore Wind Project. This involves a stepwise process that considers the level of detail available for projects/plans, as well as the potential for interactions to occur on the following basis:

- Data confidence: data confidence is taken into account when screening projects, plans and activities into or out of the CEA. The premise here is that projects, plans and activities with a low level of detail publicly available cannot meaningfully contribute to a CEA and, as such, are screened out. The application of this screening step is consistent with Guiding Principle 7 of the RenewableUK Cumulative Impact Assessment Guidelines (RenewableUK, 2013).
- Conceptual overlap: for a conceptual overlap to occur it must be established that such an impact has the potential to directly or indirectly affect the receptor(s) in question. In EIA terms this is described as an impact-receptor pathway and is defined here as a conceptual overlap.
- Physical overlap: a physical overlap refers to the ability for impacts arising from the Mona Offshore Wind Project to overlap with those from other projects/plans on a receptor basis. This means that, in most examples, an overlap of the physical extents of the impacts arising from the two (or more) projects/plans must be established for a cumulative effect to arise. Exceptions to this exist for certain mobile receptors that may move between, and be subject to, two or more separate physical extents of impact from two or more projects.
- Temporal overlap: in order for a cumulative effect to arise from two or more projects, a temporal overlap of impacts arising from each must be established. It should be noted that some impacts are active only during certain phases of development, such as piling noise during construction. In these cases, it is important to establish the extent to which an overlap

may occur between the specific phase of the Mona Offshore Wind Project and other projects/plans. The absence of a strict overlap however may not necessarily preclude a cumulative effect, as receptors may become further affected by additional, non-temporally overlapping projects.

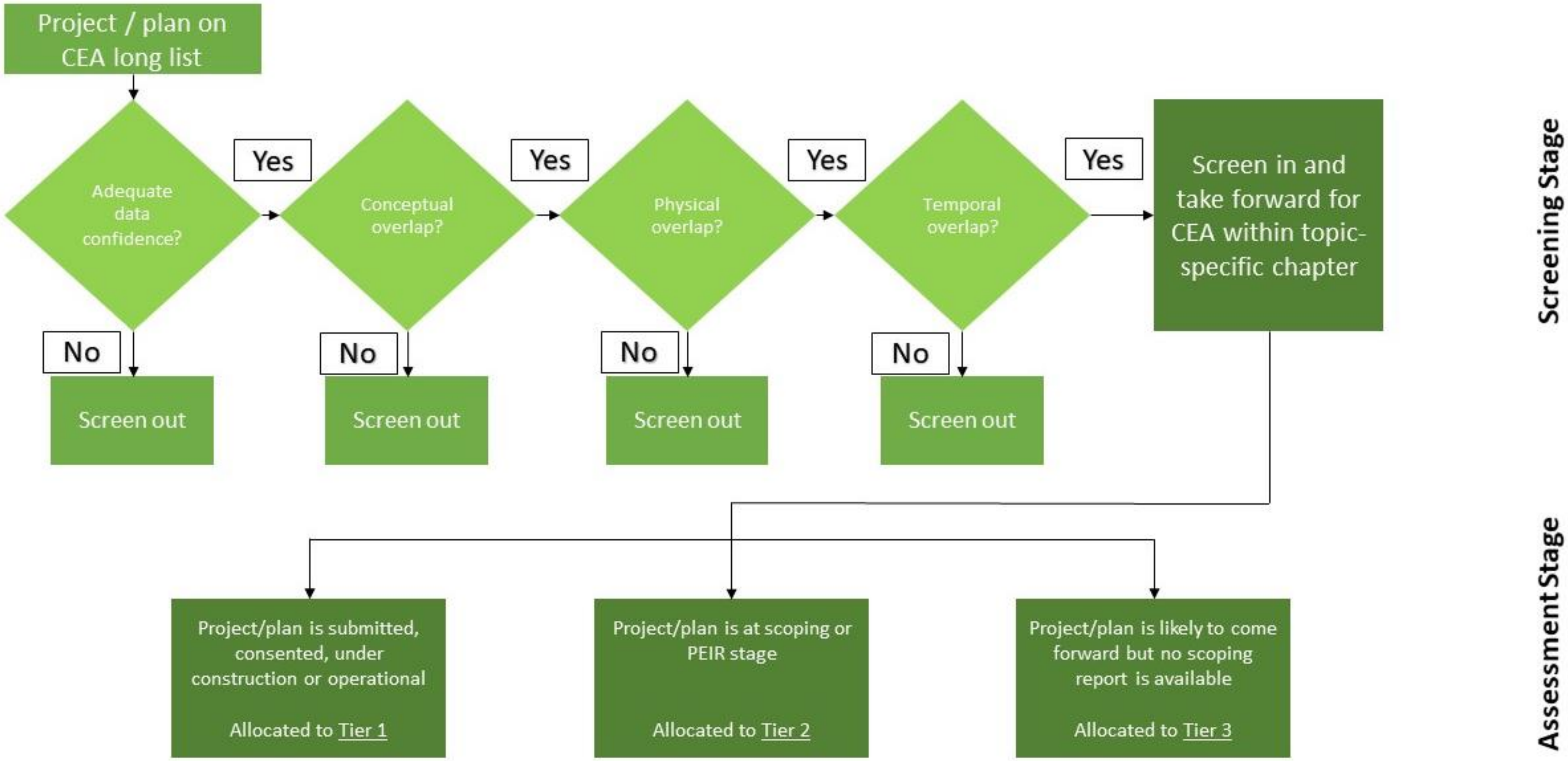


Figure 4.3: Proposed methodology for the Mona Offshore Wind Project for the screening of potential projects/plans to provide cumulative effects.

4.8.5 Assessment stage

4.8.5.1 Once a project has been taken forward to the assessment stage, a tiered approach is proposed for the CEA. The tiered approach provides a framework to assist the decision maker in placing relative weight upon the potential for each project/plan assessed cumulatively to ultimately be realised, based upon the project/plan's current stage of maturity. The allocation of projects/plans into tiers is not affected by the screening process; it is a categorisation applied to all projects/plans that have been screened in for assessment.

4.8.5.2 The definitions of the tiers to be used will be included in PEIR but they will be broadly consistent with the Planning Inspectorate's Advice Note Seventeen (the Planning Inspectorate, 2019) and the RenewableUK Cumulative Impact Assessment Guidelines, specifically Guiding Principle 4 and Guiding Principle 7 (RenewableUK, 2013).

4.8.5.3 All projects/plans that have been screened into the CEA via the screening process will be allocated into one of the Tiers and assessed for cumulative effect. Where practicable, the CEA methodology then follows the outline of the project-alone assessment methodology as described above in section 4.4. This approach allows consistency throughout the EIA and enables comparisons to be made.

4.9 Transboundary impacts

4.9.1 Legislation and guidance

4.9.1.1 Transboundary effects arise when impacts from a project within one state affect the environment of another state(s). The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts.

4.9.1.2 The Espoo Convention has been implemented in the UK by the 2017 EIA Regulations and the 2007 EIA Regulations. Regulation 32 of the 2017 EIA Regulations and Regulation 18 to 20 of the 2007 EIA Regulations set out a prescribed process of consultation and notification. In addition, the Planning Inspectorate's Advice Note Twelve: Transboundary Impacts (the Planning Inspectorate, 2020) sets out the procedures for consultation in association with an application for a DCO where such a development may have significant transboundary impacts.

4.9.1.3 The Planning Inspectorate's Advice Note Twelve (the Planning Inspectorate, 2020) also sets out the procedure for screening, consulting and assessing transboundary issues. This procedure involves the following broad steps which are divided into two stages:

- Stage 1:

  - Developer carries out pre-application consultation with other state(s).
  - Developer notifies the Planning Inspectorate of EIA potentially requiring transboundary assessment.
  - Developer prepares initial matrix to identify potential significant impacts on other state(s) and provides to the Planning Inspectorate.
  - The Secretary of State undertakes transboundary screening for potential significant impacts.
  - The Secretary of State notifies other relevant state(s), including London Gazette notice.
  - Other state(s) notify the Planning Inspectorate of their wish to participate in the consultation.
- Stage 2:
  - Developer submits DCO application, including translated non-technical summary and a consultation report summarising pre-submission transboundary consultation that took place.
  - Secretary of State undertakes consultation with other relevant state(s).
  - Other state(s) consult with their public and provide comments to the Secretary of State.
  - Consultation responses are taken account of by the Secretary of State in the decision-making process.

4.9.1.4 The Mona Offshore Wind Project will follow this broad process with regard to transboundary EIA, including any other guidance that may prevail at the time of undertaking the assessment.

4.9.2 Screening

4.9.2.1 Identification and screening of transboundary impacts has been undertaken and is presented in part 4, annex A: Transboundary screening, of the EIA Scoping Report.

4.10 Inter-related effects

4.10.1.1 Regulation 5(2) of the 2017 EIA Regulations and Regulation 22(c) of the 2007 EIA Regulations require a consideration of the interactions or inter-relationships between EIA topics that may lead to additional environmental effects. For example, the separate impacts of subsea noise and habitat loss may together have an effect upon a single receptor, such as marine mammals.

4.10.1.2 Guidance on inter-related effects is provided within the Planning Inspectorate's Advice Note Nine: Rochdale Envelope (the Planning Inspectorate, 2018), which state that 'interactions between aspect assessments includes where a number of separate impacts, e.g. noise and air quality, affect a single receptor such as fauna'. The approach to inter-related effects will take into account this Advice Note, along with any other guidance that may prevail at the time.

4.10.1.3 The approach to the assessment of inter-related effects will consider two levels of potential effect:

- Project lifetime effects: effects that occur throughout more than one phase of the Mona Offshore Wind Project (e.g. construction, operation and maintenance or decommissioning).
- Receptor-led effects: effects that interact spatially and/or temporally resulting in inter-related effects upon a single receptor.

4.10.1.4 The assessment of inter-related effects will be undertaken with specific reference to the potential for such effects to arise in relation to receptor groups (i.e. the proposed approach assessment will, in the main, not assess every individual receptor assessed at the EIA stage, but rather, potentially sensitive groups of receptors).

4.10.1.5 The broad approach to inter-related effects assessment will follow the below key steps:

- Review of effects for individual EIA topic areas.
- Review of the assessment carried out for each EIA topic area, to identify 'receptor groups' requiring assessment.
- Identify potential inter-related effects on these receptor groups via review of the assessment carried out across a range of topics.
- Develop tables that list all potential effects on the selected receptor across the construction, operation and maintenance and decommissioning phases (project lifetime effects).
- Develop lists for all potential receptor-led effects.
- Qualitative assessment on how individual effects may combine to create inter-related effects.

4.10.1.6 It is important to note that the inter-relationships assessment will consider only effects produced by the Mona Offshore Wind Project, and not those from other projects (these will be considered within the CEA).

5. Consultation process

5.1 Pre-application consultation

5.1.1.1 The Planning Inspectorate's Advice Note Three: EIA Notification and Consultation (the Planning Inspectorate, 2017a) states that 'It is the responsibility of the Applicant to ensure that their pre-application consultation fully accords with the requirements of the [Planning Act 2008], including associated regulations, and that they have regard to relevant guidance'.

5.1.1.2 The Planning Act 2008 requires the Applicant to:

- Consult with the relevant local authorities on what should be contained within the promoter's Statement of Community Consultation (SoCC), which will describe how the promoter proposes to consult the local community about the proposal (as prescribed in Section 43 of the Planning Act 2008).
- Have regard to the local authorities' responses to that consultation in preparing the SoCC.
- Publish the SoCC in a locally circulating newspaper, as required by secondary legislation under the Planning Act 2008, and carry out consultation in accordance with the SoCC (this Environmental Impact Assessment (EIA) Scoping Report will help to inform that consultation exercise).
- Consult with the local authorities and such persons as prescribed in Section 42 and Section 44 of the Planning Act 2008 and Schedule 1 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended).
- Have regard to any relevant responses to this consultation, as prescribed in Section 49 of the Planning Act 2008.
- Consult a range of statutory consultees as identified by the Planning Inspectorate (this EIA Scoping Report will help inform that consultation exercise). Consultation from non-statutory consultees will also be taken into account where relevant.
- Set a deadline of at least 28 days by which responses to consultation must be received.

5.2 Statement of Community Consultation (SoCC)

5.2.1.1 Under Section 47 of the Planning Act 2008, the Applicant has a duty to prepare a SoCC, which sets out how it plans to consult local communities on the proposed development. The Applicant must conduct its consultation in line with the SoCC. The Applicant must consult on the contents of the SoCC with each of the local authorities in whose area the proposed development is situated (as prescribed in Section 43(1) of the Planning Act 2008).

5.2.1.2 In Wales, community/town councils are also proscribed consultees and will be notified and consulted by the Planning Inspectorate and the Applicant as part of the scoping and pre-application consultation.

5.2.1.3 In the case of the Mona Offshore Wind Project, land directly affected by the onshore works may come under the local authority jurisdiction of the following. Designations are given as per the Planning Act 2008 under Section 42 (1) a,b,c and d:

- Conway B (Host)
- Denbighshire B (Host)
- Flintshire A (Adjacent)
- Wrexham A (Adjacent)
- Powys A (Adjacent)

5.2.1.4 Gwynedd A (Adjacent)Consultation on the contents of a draft SoCC will be undertaken in summer 2022 in accordance with Section 47 of the Planning Act 2008.

5.3 Evidence plan process

5.3.1.1 Since September 2012, applicants of Nationally Significant Infrastructure Projects (NSIPs) located in England, or both England and Wales, have been able to agree evidence plans with relevant Statutory Nature Conservation Bodies (SNCBs).

5.3.1.2 Evidence plans are formal mechanisms to agree what information the Applicant needs to supply to the Planning Inspectorate as part of a DCO application. This helps to ensure compliance with the Habitats Regulations, and helps applicants provide sufficient information as part of their application.

5.3.1.3 Guidance on the evidence plan approach is provided by the Department for Environment, Food and Rural Affairs (Defra) in 'Habitats Regulations: Evidence Plans for Nationally Significant Infrastructure Projects' (Defra, 2012) and within the Planning Inspectorate's Advice Note Eleven, Annex H – Evidence Plans for Habitats Regulations Assessments of Nationally Significant Infrastructure Projects (the Planning Inspectorate, 2017b). The Planning Inspectorate's Advice Note Eleven, Annex H describes four stages to the evidence plan process:

- The Applicant requests an evidence plan.
- The Applicant and relevant SNCB(s) agree the initial structure and content of the evidence plan.
- The Applicant gathers and analyses the evidence and the relevant SNCB(s) assess the evidence through an iterative process. The Applicant and SNCB(s) agree where specific issues are resolved.
- The evidence plan process is finalised and agreed by the Applicant and SNCB(s) during the pre-application stage.

5.3.1.4 An evidence plan steering group has been established for the Mona Offshore Wind Project. The steering group is comprised of the Planning Inspectorate, the Applicant, Natural Resources Wales (NRW), Natural England, the Joint Nature Conservation Committee (JNCC) and the Marine Management Organisation (MMO) as the key regulatory bodies and SNCBs. The steering group will meet at key milestones throughout the EIA process. In addition, Expert Working Groups (EWG) have been established to discuss topic specific issues with relevant stakeholders. EWG meetings will be held at key stages in the EIA process or when new information becomes available for each topic, to provide the opportunity for stakeholders to provide feedback and advice at an early stage. EWGs have been established for the following topics:

- physical processes, benthic ecology and fish and shellfish ecology
- marine mammals
- offshore ornithology
- terrestrial ecology.

5.4 Timing of consultation

5.4.1.1 Prior to the submission of the DCO and marine licence applications, further consultation will take place with relevant parties. This will include, but not be limited to, consultation on the site selection process for the offshore and onshore transmission infrastructure and consultation on the preliminary environmental information (including submission of a Preliminary Environmental Information Report (PEIR)). This will ensure that relevant stakeholder feedback is received and can be taken into account.

5.4.1.2 Key dates include:

- Q2 2022: EIA Scoping
- Q2 2022: Phase 1 community consultation (non-statutory consultation)
- Q2/early Q3 2022: draft SoCC consultation with local authorities
- Q4 2022: Publication of SoCC
- Q4 2022/Q1 2023: Phase 2 community consultation (statutory consultation on the PEIR).

5.4.1.3 Consultation will continue with key topic-specific technical stakeholders throughout the EIA process.

5.4.2 Scoping

5.4.2.1 The Planning Inspectorate, and Natural Resources Wales (NRW) (for the offshore export cable and related works), having received this EIA Scoping Report, will consult with the relevant authorities and key statutory consultees to seek their comments on the scope of the Mona Offshore Wind Project EIA. In addition to the bodies that the Planning Inspectorate and NRW will formally consult, the Applicant will make the EIA Scoping Report available to other stakeholders via the Mona Offshore Wind Project website (https://www.enbw-bp.com/). Following consultation with statutory consultees on the scope of the EIA, the Secretary of State and NRW will provide a Scoping Opinion.

5.4.3 Phase 1 consultation

5.4.3.1 In parallel to seeking Scoping Opinions from the Secretary of State and NRW, the Applicant will carry out its Phase 1 public consultation. Anyone who could potentially be affected by, or may have an active interest in, the Mona Offshore Wind Project is encouraged to participate.

5.4.3.2 An online consultation platform will form a central hub for the consultation, making all information easily accessible and providing a simple way to provide feedback. Over the consultation period, a number of events are proposed. These are likely to include online events, public exhibitions and pop-up events to allow those interested in, or affected by, the Mona Offshore Wind Project generation or transmission assets to view the information provided.

5.4.3.3 At these events (whether online or in person), members of the public will be able to view the latest information on the Mona Offshore Wind Project, including maps and diagrams illustrating the proposed infrastructure. They will be able to speak directly with members of the Mona Offshore Wind Project team and ask any questions or raise any concerns they may have. Participants will have the opportunity to complete a feedback form. The dates, venues and times will be confirmed nearer to the time and advertised online and in local media.

5.4.3.4 At the end of Phase 1 consultation, a consultation feedback report will be produced. The report will include an overview of the issues raised during the Phase 1 community consultation events and will inform future development of the consultation and EIA process, where appropriate.

5.4.4 Phase 2 consultation

5.4.4.1 Phase 2 consultation comprises statutory consultation (under Section 42 of the Planning Act 2008) on the PEIR. This document will act as a draft ES, will be based on the EIA Scoping Report and Scoping Opinion, and will take into account comments received from the consultation process.

5.4.4.2 In parallel to this consultation with statutory consultees, the Applicant will hold a second round of public consultation events, either online or in local authority areas across the consultation zone (subject to public health advice on COVID-19 at the time). At this stage, the Applicant will specifically consult stakeholders and the local community on the contents of the PEIR and following this additional community consultation events will be held. The dates, venues and times will be confirmed nearer to the time and advertised online and in local media.

5.4.4.3 During these consultation events, the Applicant may be able to present a more refined scheme for development, on which members of the public can comment. Participants will have the opportunity to complete a feedback form and a consultation feedback report will be produced and made available online.

Preliminary Environmental Information Report (PEIR)

5.4.4.4 The EIA Regulations require preliminary environmental information (PEI) to be provided for public consultation by those seeking a DCO for NSIPs. The level of detail required in the PEI is not defined by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017; however it must cover those areas being assessed by the ES, which will accompany the application for development consent. There is no formal requirement for consultation on PEI in relation to the separate marine licence application to NRW, but NRW will be a key consultee for the PEIR as part of the deemed marine licence.

5.4.4.5 The Applicant plans to submit and consult upon the PEIR for the Mona Offshore Wind Project as part of Phase 2 consultation during the winter of 2022/2023. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the Mona Offshore Wind Project, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process.

5.4.4.6 The Applicant expects it will further refine the Mona Offshore Wind Project proposal, in terms of the detailed consent application to be submitted, based upon the consultation responses received from the PEI process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the applications for development consent and marine licence.

5.4.5 Application for development consent and marine licence

5.4.5.1 The application for development consent and marine licence is planned to be submitted to the Planning Inspectorate and NRW, respectively, in Q4 2023. The ES that will be submitted to accompany the applications will be prepared taking into account the responses to the Phase 1 and Phase 2 consultation, which will be captured in the Consultation Report that will accompany the applications.

6. References

6.1 Introduction

European Commission. (2017) Environmental Impact Assessment of Projects Guidance on Scoping. Directive 2011/92/EU as amended by 2014/52/EU. Implemented for the European Commission by COWI A/S and Milieu Ltd.

6.2 Policy and legislation

Department for Business, Energy and Industrial Strategy (BEIS) (2020) Contracts for Difference Policy Paper. Available at: https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference#the-fourth-cfd-allocation-round-ar4. Accessed November 2021.

Department for Business, Energy and Industrial Strategy (BEIS) (2021a) Draft Overarching National Policy Statement for Energy (EN-1). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf]

Department for Business, Energy and Industrial Strategy (BEIS) (2021b) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf]

Department for Business, Energy and Industrial Strategy (BEIS) (2021c) Draft National Policy Statement for Electricity Networks Infrastructure (EN5). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015238/en-5-draft-for-consultation.pdf]

Department of Energy and Climate Change (DECC) (2011) Overarching National Policy Statements for Energy (NPS EN-1). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf Accessed November 2021.

Department of Energy and Climate Change (DECC) (2011a) Overarching National Policy Statements for Energy (NPS EN-1). Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf]

Department of Energy and Climate Change (DECC) (2011b) National Policy Statement for Renewable Energy Infrastructure. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf]

Department of Energy and Climate Change (DECC) (2011c) National Policy Statements for Electricity Networks Infrastructure (NPS EN-5). Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf]

European Commission (2021) Commission presents Renewable Energy Directive revision. Available: [https://ec.europa.eu/info/news/commission-presents-renewable-energy-directive-revision-2021-jul-14_en]

European Commission (2020a) 2030 climate and energy framework. Available at: https://ec.europa.eu/clima/policies/strategies/2030_en. Accessed November 2021.

European Commission (2020b) 2050 long-term strategy. Available at: [https://ec.europa.eu/clima/policies/strategies/2050_en]

European Commission (2011) The roadmap for transforming the EU into a competitive, low-carbon economy by 2050. Available at: [https://ec.europa.eu/clima/sites/clima/files/2050_roadmap_en.pdf]

HM Government (2011a) The Carbon Plan: Delivering our Low Carbon Future. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf. Accessed November 2021.

HM Government (2011b) UK Marine Policy Statement. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf. Accessed November 2021.

HM Government (2019) Industry Strategy. Offshore Wind Sector Deal. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790950/BEIS_Offshore_Wind_Single_Pages_web_optimised.pdf. Accessed November 2021.

HM Government (2020a) 2017 UK greenhouse gas emissions, final figures, statistical release: National Statistics. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776085/2017_Final_emissions_statistics_-_report.pdf Accessed November 2021

HM Government (2020b) Offshore wind Sector Deal – one year on. Available at: https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal-one-year-on. Accessed November 2021.

Institute for Government (2020) UK net zero target. Available at: https://www.instituteforgovernment.org.uk/explainers/net-zero-target#:~:text=The%20UK%20is%20on%20track%20to%20meet%20its,sixth%20carbon%20budget%20%282033%E2%80%9337%29%20in%20September%202020.%20%5B15%5D. Accessed November 2021.

6.3 Project description

Department for Business, Energy and Industrial Strategy (BEIS) (2021a) Draft Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf.

BEIS (2021b) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3), September 2021. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf Accessed November 2021.

Department of Energy and Climate Change (DECC) (2011a) Overarching National Policy Statements for Energy (NPS EN-1). Avalable at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf.

Department of Energy and Climate Change (DECC) (2011b) National Policy Statement for Renewable Energy Infrastructure (NPS EN-3). Avalable at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf.

6.4 EIA methodology

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2004) Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of Food and Environment Protection Act 1985 and Coastal Protection Act 1949 requirements – Version 2. Prepared by CEFAS on behalf of the Marine Consents and Environment Unit (MCEU).

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2012) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Report reference: ME5403 – Module 15.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

Climate Change Committee (2017) UK Climate Change Risk Assessment 2017 Evidence Report, Available at: https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/

Department of Energy and Climate Change (DECC) (2011a) Overarching National Policy Statements forEnergy(NPSEN-1). [Online],available: < 1938-overarching-nps-for-energy-en1.pdf (publishing.service.gov.uk)>.

Department of Energy and Climate Change (DECC) (2011b) National Policy Statement for Renewable Energy Infrastructure (EN3).

Department of Energy and Climate Change (DECC) (2011c) 'National Policy Statement for Electricity Networks Infrastructure (EN-5)'.

Institute of Ecology and Environmental Management (IEEM) (2010) Guidelines for ecological impact assessment in Britain and Ireland - Marine and Coastal. IEEM, Winchester Hampshire.

Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2019) Design Manual for Roads and Bridges (DMRB) LA 104, Environmental assessment and monitoring, Revision 1, Available at: https://www.standardsforhighways.co.uk/dmrb/ [Accessed 10/02/2022].

Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment. IEMA, St Nicholas House, 70 Newport, Lincoln.

Institute of Environmental Management and Assessment (IEMA) (2016) Environmental Impact Assessment Guide to: Delivering Quality Development. IEMA, St Nicholas House, 70 Newport, Lincoln.

Institute of Environmental Management and Assessment (IEMA) (2017) Delivering Proportionate EIA - A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice. IEMA, Lincoln.

Maclean, I.M.D., Wright, L.J., Showler, D.A., and Rehfisch, M.M. (2009) A review of assessment methodologies for offshore wind farms. British Trust for Ornithology Report, commissioned by COWRIE Ltd.

OSPAR (The Convention for the Protection of the Marine Environment of the North-East Atlantic) (2008) Assessment of the environmental impact of offshore wind-farms.

RenewableUK (2013) Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms.

The Crown Estate (2018) Industry Evidence Programme.

The Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope.

The Planning Inspectorate (2020a) Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping.

The Planning Inspectorate (2020b) Advice Note Twelve: Transboundary Impacts and Process.

The Planning Inspectorate (2019) Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects.

UK Government (2017) UK Climate Change Risk Assessment 2017, Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2017

6.5 Consultation process

Department for Environment, Food and Rural Affairs (Defra) (2012) ‘Habitats Regulations: Evidence plans for Nationally Significant Infrastructure Projects. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69601/pb13825-habitats-evidence-plans.pdf]

Planning Inspectorate (2017a) 'Advice Note Three: EIA Notification and Consultation'. Avalable: [https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-three-eia-notification-and-consultation-2/]

Planning Inspectorate (2017b) ‘Advice Note Eleven, Annex H – Evidence Plans for Habitats Regulations Assessments of Nationally Significant Infrastructure Projects’. Available : [https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/an-eleven-annex-h/]

Part 2: Generation assets

Table of Contents

1 Introduction 20
1.1 Background 20
1.2 Mona Offshore Wind Project generation assets overview 20
1.3 Structure 22
2 Site selection and alternatives 25
2.1 Introduction 25
2.2 Offshore Wind Leasing Round 4 25
2.3 Northern Wales and Irish Sea Bidding Area 26
2.4 Identification of the Preferred Bidding Areas 26
2.5 The Mona Potential Array Area 27
3 Offshore physical environment 28
3.1 Physical processes 28
3.1.1 Introduction 28
3.1.2 Study area 28
3.1.3 Data sources 30
3.1.4 Baseline environment 31
3.1.5 Potential project impacts 38
3.1.6 Measures adopted as part of the project 41
3.1.7 Proposed assessment methodology 41
3.1.8 Potential cumulative effects 42
3.1.9 Potential inter-related effects 42
3.1.10 Potential transboundary impacts 42
3.2 Underwater noise 43
3.2.1 Introduction 43
3.2.2 Study area 43
3.2.3 Data sources 43
3.2.4 Baseline environment 44
3.2.5 Potential project impacts 44
3.2.6 Measures adopted as part of the project 48
3.2.7 Proposed assessment methodology 48
3.2.8 Potential cumulative effects 52
3.2.9 Potential inter-related effects 52
3.2.10 Potential transboundary impacts 52
4 Offshore biological environment 53
4.1 Benthic subtidal and intertidal ecology 53
4.1.1 Introduction 53
4.1.2 Study area 53
4.1.3 Data sources 55
4.1.4 Baseline environment 58
4.1.5 Potential project impacts 68

4.1.6 Measures adopted as part of the project 73
4.1.7 Proposed assessment methodology 73
4.1.8 Potential cumulative effects 74
4.1.9 Potential inter-related effects 75
4.1.10 Potential transboundary impacts 75
4.2 Fish and shellfish ecology 75
4.2.1 Introduction 75
4.2.2 Study area 75
4.2.3 Data sources 77
4.2.4 Baseline environment 79
4.2.5 Potential project impacts 98
4.2.6 Measures adopted as part of the project 103
4.2.7 Proposed assessment methodology 103
4.2.8 Potential cumulative effects 104
4.2.9 Potential inter-related effects 104
4.2.10 Potential transboundary impacts 104
4.3 Marine mammals 105
4.3.1 Introduction 105
4.3.2 Study area 105
4.3.3 Data sources 108
4.3.4 Baseline environment 109
4.3.5 Potential project impacts 125
4.3.6 Measures adopted as part of the project 129
4.3.7 Proposed assessment methodology 129
4.3.8 Potential cumulative effects 130
4.3.9 Potential inter-related effects 131
4.3.10 Potential transboundary impacts 131
4.4 Offshore ornithology 131
4.4.1 Introduction 131
4.4.2 Study area 132
4.4.3 Data sources 134
4.4.4 Baseline environment 136
4.4.5 Potential project impacts 143
4.4.6 Measures adopted as part of the project 146
4.4.7 Proposed assessment methodology 146
4.4.8 Potential cumulative effects 148
4.4.9 Potential inter-related effects 148
4.4.10 Potential transboundary impacts 149
5 Offshore human environment 150
5.1 Commercial fisheries 150
5.1.1 Introduction 150
5.1.2 Study area 150

5.1.3 Data sources ... 152
5.1.4 Baseline environment ... 153
5.1.5 Potential project impacts ... 160
5.1.6 Measures adopted as part of the project ... 163
5.1.7 Proposed assessment methodology ... 163
5.1.8 Potential cumulative effects ... 164
5.1.9 Potential inter-related effects ... 164
5.1.10 Potential transboundary impacts ... 165
5.2 Shipping and navigation ... 165
5.2.1 Introduction ... 165
5.2.2 Study area ... 165
5.2.3 Data sources ... 167
5.2.4 Baseline environment ... 168
5.2.5 Potential project impacts ... 179
5.2.6 Measures adopted as part of the project ... 182
5.2.7 Proposed assessment methodology ... 182
5.2.8 Potential cumulative effects ... 184
5.2.9 Potential inter-related effects ... 185
5.2.10 Potential transboundary impacts ... 185
5.3 Marine archaeology ... 185
5.3.1 Introduction ... 185
5.3.2 Study area ... 185
5.3.3 Data sources ... 187
5.3.4 Baseline environment ... 188
5.3.5 Potential project impacts ... 194
5.3.6 Measures adopted as part of the project ... 196
5.3.7 Proposed assessment methodology ... 196
5.3.8 Potential cumulative effects ... 197
5.3.9 Potential inter-related effects ... 197
5.3.10 Potential transboundary impacts ... 197
5.3.11 Appendix 5.3.11: ... 198
5.4 Other sea users ... 200
5.4.1 Introduction ... 200
5.4.2 Study area ... 200
5.4.3 Data sources ... 202
5.4.4 Baseline environment ... 203
5.4.5 Potential project impacts ... 209
5.4.6 Measures adopted as part of the project ... 213
5.4.7 Proposed assessment methodology ... 213
5.4.8 Potential cumulative effects ... 213
5.4.9 Potential inter-related effects ... 214
5.4.10 Potential transboundary impacts ... 214

6 Offshore and onshore combined topics 215
6.1 Seascape, landscape and visual resources 215
6.2 Socio-economics and community 216
6.3 Aviation and radar 217
6.3.1 Introduction 217
6.3.2 Study area 217
6.3.3 Data sources 219
6.3.4 Baseline environment 219
6.3.5 Potential project impacts 225
6.3.6 Measures adopted as part of the project 228
6.3.7 Proposed assessment methodology 228
6.3.8 Potential cumulative effects 229
6.3.9 Potential inter-related effects 229
6.3.10 Potential transboundary impacts 229
6.4 Climate change 230
6.4.1 Introduction 230
6.4.2 Study area 230
6.4.3 Data sources 231
6.4.4 Baseline environment 232
6.4.5 Potential project impacts 233
6.4.6 Measures adopted as part of the project 236
6.4.7 Proposed assessment methodology 236
6.4.8 Potential cumulative effects 237
6.4.9 Potential inter-related effects 237
6.4.10 Potential transboundary impacts 237
7 Other environmental topics 239
7.1 Introduction 239
7.2 Topics with supporting information in the ES 239
7.2.1 Human health 239
7.2.2 Waste 240
7.3 Topics proposed to be scoped out 241
7.3.2 Local planning policy context 241
7.3.3 Daylight, sunlight and microclimate 241
7.3.4 Heat and Radiation 241
7.4 Topics covered elsewhere in the ES 242
7.4.2 Other residues and emissions 242
7.4.3 Material assets 243
7.4.4 Major accidents and disasters 243
8 Generation assets summary 245
8.1 Overview 245
8.2 Cumulative effects 249
8.3 Transboundary impacts 249
8.4 Consultation 250

8.5 Next steps 250
9 References 252
9.1 Introduction 252
9.2 Site selection and alternatives 252
9.3 Offshore physical environment 252
9.3.1 Physical processes 252
9.3.2 Underwater noise 253
9.4 Offshore biological environment 255
9.4.1 Benthic subtidal and intertidal ecology 255
9.4.2 Fish and Shellfish 257
9.4.3 Marine Mammals 259
9.4.4 Offshore ornithology 263
9.5 Offshore human environment 265
9.5.1 Commercial fisheries 265
9.5.2 Shipping and navigation 266
9.5.3 Marine archaeology 267
9.5.4 Other sea users 267
9.6 Offshore and onshore combined topics 269
9.6.1 Seascape, landscape and visual resources 269
9.6.2 Socio-economics and community 269
9.6.3 Aviation and radar 269
9.6.4 Climate change 270
9.7 Other environmental topics 271
9.8 Generation assets summary 271

Table of tables

Table 1.1: Topics considered within part 2, Generation assets, of the EIA Scoping Report. 22
Table 3.1: Summary of key desktop datasets and reports. 30
Table 3.2: Impacts proposed to be scoped into the project assessment for physical processes (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 39
Table 3.3: Impacts proposed to be scoped out of the project assessment for physical processes. 40
Table 3.4: Summary of key desktop datasets and reports. 44
Table 3.5: Impacts proposed to be scoped into the project assessment for underwater noise (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 46
Table 3.6: Impacts proposed to be scoped out of the project assessment for underwater noise. 47
Table 3.7: Assessment swim speeds of marine mammals and fish that are likely to occur within the Irish Sea for the purpose of exposure modelling. 50
Table 4.1: Summary of key desktop datasets and reports. 55
Table 4.2: JNCC marine habitat codes used in Figure 4.4 (JNCC, 2022). 66

Table 4.3: Relevant protected benthic species and habitats which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the generation assets. 67
Table 4.4: Impacts proposed to be scoped into the project assessment for benthic subtidal and intertidal ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 69
Table 4.5: Impacts proposed to be scoped out of the project assessment for benthic subtidal and intertidal ecology. 72
Table 4.6: Summary of key desktop datasets and reports. 77
Table 4.7: Key species with geographic spawning and nursery overlaps with the Mona fish and shellfish ecology study area for the generation assets (Coull *et al*., 1998 and Ellis *et al*., 2012. Mapped in Figure 4.6 to Figure 4.15). 82
Table 4.8: Summary of designated sites with relevant fish and shellfish ecology features within the Mona fish and shellfish ecology study area for the generation assets. 94
Table 4.9: Relevant protected fish and shellfish species which have the potential to occur within the Mona fish and shellfish ecology study area for the generation assets. 97
Table 4.10: Impacts proposed to be scoped into the project assessment for fish and shellfish ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 99
Table 4.11: Impacts proposed to be scoped out of the project assessment for fish and shellfish ecology. 101
Table 4.12: Summary of key desktop datasets and reports. 108
Table 4.13: Summary of designated sites with relevant marine mammal features within the Mona regional marine mammal study area for the generation assets. 121
Table 4.14: Relevant protected marine mammal species which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the generation assets. 124
Table 4.15: Impacts proposed to be scoped into the project assessment for marine mammals (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 126
Table 4.16: Impacts proposed to be scoped out of the Mona Offshore Wind Project assessment for marine mammals. 127
Table 4.17: Summary of key desktop datasets and reports. 134
Table 4.18: The distribution of seabird species in the Mona offshore ornithology study area for the generation assets recorded by the site-specific surveys from March 2020 to February 2021. 139
Table 4.19: Impacts proposed to be scoped into the project assessment for offshore ornithology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 144
Table 4.20: Impacts proposed to be scoped out of the project assessment for offshore ornithology. 145
Table 5.1: Summary of key desktop datasets and reports. 152
Table 5.2: Impacts proposed to be scoped into the project assessment for commercial fisheries (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 161
Table 5.3: Impacts proposed to be scoped out of the project assessment for commercial fisheries. 162
Table 5.4: Summary of key desktop datasets and reports. 167
Table 5.5: Oil and gas platforms in proximity to the Mona Offshore Wind Project. 171

Table 5.6: Offshore wind farms in proximity to the Mona Offshore Wind Project. .. 172
Table 5.7: Aggregate sites in proximity to the Mona Offshore Wind Project........... 172
Table 5.8: Impacts proposed to be scoped into the project assessment for shipping and navigation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 180
Table 5.9: Impacts proposed to be scoped into the project assessment for marine archaeology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 195
Table 5.10: Data sources for other sea users. 202
Table 5.11: Impacts proposed to be scoped into the project assessment for other sea users (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 211
Table 6.1: Summary of key desktop datasets and reports. 219
Table 6.2: Platforms with 9nm consultation zones which overlap with the Mona Potential Array Area. 224
Table 6.3: Impacts proposed to be scoped into the assessment for aviation and radar (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 226
Table 6.4: Impacts proposed to be scoped out of the project assessment for aviation and radar. 226
Table 6.5: Baseline data sources. 232
Table 6.6: Impacts proposed to be scoped into the project assessment for climate change (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 234
Table 6.7: Impacts proposed to be scoped out of the project assessment for climate change. 235
Table 8.1: Summary of potential impacts of the Mona Offshore Wind Project generation assets (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 245

Table of figures

Figure 1.1: The Mona Potential Array Area. 21
Figure 3.1: The Mona physical processes study area for the generation assets. 29
Figure 3.2: The Mona physical processes study area for the generation assets with bathymetry data (EMODnet, 2020). 33
Figure 4.1: Mona benthic subtidal and intertidal ecology study areas for the generation assets. 54
Figure 4.2: Sample locations undertaken across the Mona Array Scoping Boundary during the summer 2021 benthic survey. 57
Figure 4.3: Predicted ENUIS habitats from the EUSeaMap for the benthic subtidal and intertidal ecology study areas for the generation assets (Source, EMODnet, 2019). 60
Figure 4.4: Benthic survey results for the other offshore wind projects in relation to the Mona benthic subtidal and intertidal ecology study area for the generation assets.. 65
Figure 4.5: The Mona Fish and shellfish ecology study area for the generation assets. 76
Figure 4.6: Anglerfish and cod spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 84
Figure 4.7: European hake and haddock spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 85

Figure 4.8: Herring and horse mackerel spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 86
Figure 4.9: Lemon sole and ling and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 87
Figure 4.10: Mackerel and nephrops spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 88
Figure 4.11: Plaice and sandeel and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 89
Figure 4.12: Sole and spotted ray and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 90
Figure 4.13: Sprat and spurdog spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 91
Figure 4.14: Thornback ray and topeshark spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012). . 92
Figure 4.15: European Hake spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Ellis *et al*., 2012). 93
Figure 4.16: Marine nature conservation designations of relevance to fish and shellfish ecology that overlap with the Mona fish and shellfish ecology study area for the generation assets. 96
Figure 4.17: The Mona marine mammal study areas for the generation assets. 107
Figure 4.18: Grey seal at-sea distribution (from Russell *et al*., 2017). 118
Figure 4.19: Harbour seal at-sea distribution (from Russell *et al.,* 2020)............... 120
Figure 4.20: Marine nature conservation designations of relevance to marine mammal ecology that overlap with the Mona regional marine mammal study area for the generation assets. 123
Figure 4.21: The Mona offshore ornithology study area for the generation assets. 133
Figure 4.22: Marine nature conservation designations with relevance to offshore ornithology within the proximity of the Mona Potential Array Area. 142
Figure 5.1: The Mona commercial fisheries study area for the generation assets. 151
Figure 5.2: Total volume (tonnes) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 156
Figure 5.3: Total value (GBP) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 156
Figure 5.4: Top four species by weight (tonnes) from 2010 to 2020 landed from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 157
Figure 5.5: Top four species by value (GBP) from 2010 to 2020 landed from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 157
Figure 5.6: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2017 and 2018) (MMO, 2020). 158
Figure 5.7: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2019 and 2020) (MMO, 2020). 159
Figure 5.8: The Mona shipping and navigation study area for the generation assets. 166

Figure 5.9: Key marine navigation features and activities in the vicinity of the Mona shipping and navigation study area for the generation assets............................... 170
Figure 5.10: Marine traffic (commercial shipping and ferries) in the vicinity of the Mona shipping and navigation study area for the generation assets (all AIS vessel tracks from 2019).. 173
Figure 5.11: Marine traffic (fishing vessels and recreational vessels) in the vicinity of the Mona shipping and navigation study area for the generation assets (all AIS vessel tracks from 2019). 174
Figure 5.12: Marine traffic (tug and service vessels and all vessels combined) in the vicinity of the Mona shipping and navigation study area for the generation assets (all AIS vessel tracks from 2019). 175
Figure 5.13: Maritime incidents in the vicinity of the Mona shipping and navigation study area for the generation assets (MAIB data from 2010-2019)........................ 178
Figure 5.14: The Mona marine archaeology study area for the generation assets. 186
Figure 5.15: Submerged prehistoric archaeology within the Mona marine archaeology study area for the generation assets. 190
Figure 5.16: Maritime archaeology within the Mona marine archaeology study area for the generation assets.. 193
Figure 5.17: The Mona regional other sea users study area for the generation assets and the Mona local other sea users study area for the generation assets. 201
Figure 5.18: Marine aggregate areas, disposal sites, offshore wind farms and cables within the Mona regional other sea users study area for the generation assets and the Mona local other sea users study area for the generation assets. 205
Figure 5.19: Recreational activities in the Mona local other sea users study area for the generation assets.. 206
Figure 5.20: Oil and gas infrastructure within the Mona local other sea users study area for generation assets.. 208
Figure 6.1: The Mona aviation and radar study area for the generation assets. 218
Figure 6.2: Airspace above the Mona Potential Array Area.................................... 221
Figure 6.3: Radar locations and aviation features in the vicinity of the Mona aviation and radar study area for the generation assets. 223

Revision history

Amendment Date	Revision Number	Amender Initials	Amendment

Glossary

Term	Meaning
Acoustic Deterrent Devices	A device of lower acoustic energy used to encourage marine mammals away from an area before high energy industrial activities begin.
Allision	The act of striking or collision of a moving vessel against a stationary object.
Amphipod	Members of the invertebrate order Amphipoda (Crustaceans).
Anthropogenic	An activity resulting from or relating to the influence of humans.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status.
Avoided Emissions	Avoided emissions are emission reductions that occur outside of a product's life cycle or value chain, but as a result of the use of that product.
Baseline GHG Emissions	The production of GHGs that have occurred in the past and which are being produced prior to the construction of the Mona Offshore Wind Project.
Bathymetry	A measurement of the depth of water in the ocean.
BC and BP	BP is used when discussing early prehistory (e.g. the Palaeolithic) and BC becomes the relevant term when discussing later prehistory (e.g. Mesolithic onwards)
Cadw	The Welsh government's historic environment service.
Carboniferous	A geological period of time from 359 million years ago to 299 million years ago.
Carbon Intensity	The quantity of carbon dioxide CO_2 that it takes to make one unit of electricity a kilowatt per hour.
CO_2-Equivalents	A carbon dioxide equivalent is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential, by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Collision	The act or process of colliding (crashing) between two moving objects.
Construction Traffic Management Plan	A document detailing the construction traffic routes for HGV and personnel travel, protocols for delivery of Abnormal Indivisible Loads to site, measures for road cleaning and sustainable site travel measures.
Conversion Factors	Conversion factors allow organizations and individuals to calculate GHG emissions from a range of activities, including energy use, water consumption, waste disposal, recycling and transport activities.
Development Consent Order	A legal order granting development consent for one or more nationally significant infrastructure projects.
Embodied Carbon	Embodied carbon means all the CO_2 emitted in producing materials. It's estimated from the energy used to extract and transport raw materials as well as emissions from manufacturing processes.
Environmental Product Declarations	A transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle.
Epifauna	The animals living on top of the seabed.
Fishery	A group of vessel voyages which target the same species or use the same gear.
Flight Level	A standard nominal altitude of an aircraft, in hundreds of feet, based upon a standardised air pressure at sea-level.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Gazetteer	A geographical index.
Gear Type	The method/equipment used for fishing.
Generation Assets	The generation assets of the Mona Offshore Wind Project including the wind turbine generators, wind turbine foundations, inter-array cables.

Term	Meaning
Greenhouse Gases (GHG)	The main gases responsible for the greenhouse effect include carbon dioxide, methane, nitrous oxide, and water vapor (which all occur naturally), and fluorinated gases (which are synthetic).
Helicopter Main Route (HMR)	Routes which are established to facilitate safe helicopter flights in instrument Flight Rules (IFR) conditions (i.e. when flight cannot be completed in visual conditions).
Hominid	A human or an early form of human.
Hydrozoa	Small predatory marine animals, some are colonial and can form large colonies of individual animals.
ICES Statistical Rectangles	Defined areas, 1 degree longitude x 0.5 degree latitude equalling approximately 30 x 30 NM used for fisheries statistics.
Infauna	The animals living within the seabed.
Instrument Flight Rules (IFR)	The rules governing procedures for flights conducted on instruments.
Instrument Meteorological Conditions (IMC)	Weather conditions which would preclude flight by the Visual Flight Rules (VFR) (i.e. conditions where the aircraft is in or close to cloud or flying in visibility less than a specified minimum).
Landings	Quantitative description of amount of fish returned to port for sale, in terms of value or weight.
Life Cycle Analysis Studies	Life cycle assessment is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a commercial product, process, or service.
Magnetometer	A device that measures magnetic fields.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping and of life at sea, and to prevent or minimise pollution from shipping.
Mean Annual Significant Wave Height	A measure of wave height, it is the average height of the highest third of waves over a typical year.
Mean High Water Springs (MHWS)	The height of mean high water during spring tides in a year.
Mean Low Water Springs (MLWS)	The height of mean low water during spring tides in a year.
Metocean Buoy	Buoy that is deployed in the ocean that measure wave, current and sea surface wind speeds.
Mona Array Scoping Boundary	The Preferred Bidding Area that the Applicant was awarded by The Crown Estate as part of UK Offshore Wind Round 4.
Mona Potential Array Area	The Mona Potential Array Area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) are likely to be located.
Mona Offshore Transmission Infrastructure Scoping Search Area	The Mona Offshore Transmission Infrastructure Scoping Search Area encompassing and location between the Mona Potential Array Area and the landfall up to Mean High Water Springs (MHWS), in which the offshore export cables and any offshore booster substations will be located.
Mona Onshore Transmission Infrastructure Scoping Search Area	The Mona Onshore Transmission Infrastructure Scoping Search Area is the area located between the landfall landwards of Mean Low Water Springs (MLWS)and the onshore National Grid substation, in which the onshore export cables, onshore substation and other associated onshore transmission infrastructure will be located.
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets and offshore and onshore transmission assets and associated activities.
Minimum Safe Altitude (MSA)	Under aviation flight rules, the altitude below which it is unsafe to fly in IMC owing to presence of terrain or obstacles within a specified area.
Net Effects	The overall effect on climate change, considering the positive and negative effects of Mona Offshore Wind Project on GHG emissions.
Peak Pressure	The highest pressure above or below ambient that is associated with a sound wave.
Polychaete	Marine segmented worms
Reefiness	A reefiness determination is the result of an assessment of the characteristics of a reef in order to determine if a habitat is considered a reef in the specific contact of the Habitats Directive. The features that contribute to the 'reefiness' of a rocky reef include (Irving, 2019):

Term	Meaning
	• Composition (percentage cover, including patchiness) • Elevation (height of the reef above the seabed level) • Extent (percentage of species composed of epifaunal species).
Semi-diurnal Tides	A tide cycle with two nearly equal high tides and low tides every lunar day.
Sound Exposure Levels	The representation of a noise event if all the energy were compressed into a 1 second period. This provides a uniform way to make comparisons between noise events of different durations.
Traffic Separation Scheme (TSS)	A traffic-management route-system ruled by the IMO. The traffic-lanes (or clearways) indicate the general direction of the vessels in that zone; vessels navigating within a TSS all sail in the same direction or they cross the lane in an angle as close to 90 degrees as possible.
Triassic	A geological period of time from 252 million years ago to 201 million years ago.
Uncontrolled Airspace	Airspace in which Air Traffic Control (ATC) does not exercise any executive authority, but may provide basic information services to aircraft in radio contact. In the UK, Class G airspace is uncontrolled.
Vessel Monitoring System (VMS)	A system used in commercial fishing to allow environmental and fisheries regulatory organizations to monitor, minimally, the position, time at a position, and course and speed of fishing vessels.
Visual Flight Rules (VFR)	The rules governing flight conducted visually (i.e. with the crew maintaining separation from obstacles and other aircraft visually).
Waste Management Plan	A plan setting out a framework for the management of waste arisings from the construction of the generation assets of Mona Offshore Wind Project and protocols for recording waste arisings, waste minimisation measures and protocols that will further developed and implemented.

Acronyms

Acronym	Meaning
ADD	Acoustic Deterrent Devices
ADS	Archaeological Data Service
AFBI	Agri-Food and Biosciences Institute
AGA	Aerodromes and Ground Aids
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMSL	Above Mean Sea Level
ANIFPO	Anglo Northern Irish Fish Producers Organisation
ANSP	Air Navigation Service Provider
ARU	Acoustic Recorder Unit
ASA	Acoustic Society of America
ATC	Air Traffic Control
ATS	Air Traffic Service
BAP	Biodiversity Action Plan
BAE	British Aerospace
BC	Before Christ
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BP	Before Present

Acronym	Meaning
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CCC	Climate Change Committee
CCS	Carbon Capture and Storage
CCW	Countryside Council for Wales
CEF	Culminative Effect Framework
CFPO	Cornish Fish Producers Organisation
CI	Confidence Intervals
CMACS	Centre for Marine and Coastal Studies Ltd
CMS	Construction Method Statement
CNS	Communication, Navigation and Surveillance
CSIP	Cable Specification and Installation Plan
CTA	Control Area
CV	Coefficient of Variation
DCO	Development Consent Order
DDV	Drop Down Video
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
DIO	Defence Infrastructure Organisation
DSDP	Deep Sea Drilling Project
DUKES	Digest of UK Energy Statistics
ECMWF	European Centre for Medium-range Weather Forecasting
ECON	Ecological Consultancy Ltd
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre
EMF	Electric and Magnetic Fields
EMODnet	European Marine Observation and Data Network
EMP	Environmental Management Plan
EPD	Environmental Product Declarations
ERCoP	Emergency Response and Cooperation Plan
ES	Environmental Statement
ESCA	European Subsea Cables UK Association
ESRI	Environmental Systems Research Institute
EU	European Union
FIF	Federation of Irish Fishermen
FIR	Fishing Industry Representative
FL	Flight Level
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GEBCO	General Bathymetric Chart of the Oceans

Acronym	Meaning
GEMS	Geotechnical Engineering and Marine Surveys
GES	Good Environmental Status
GHG	Greenhouse Gas
GIA	Gross Internal Area
GPS	Global Positioning System
GSD	Ground Sampling Distance
GSI	Geological Survey Ireland
HE	Historic England
HER	Historic Environment Record
HM	Her Majesty’s
HMCG	Her Majesty’s Coastguard
HMR	Helicopter Main Route
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICES	International Council for the Exploration of the Sea
ICPC	International Cable Protection Committee
ICNIRP	International Commission on Non-ionising Radiation Protection
IEF	Important Ecological Features
IEMA	Institute for Environmental Management and Assessment
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IMO	International Maritime Organisation
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland’s Marine Resource
INNS	Invasive Non-native Species
IPCC	Intergovernmental Panel on Climate Change
ISEFPO	Irish South and East Fish Producers Organisation
ISWFPO	Irish South and West Fish Producers Organisation
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
JRCC	Joint Rescue Coordination Centre
LAT	Lowest Astronomical Tide
LCA	Lifecycle Analysis
LF	Low Frequency
LGM	Last Glacial Maximum
LID	Lynn and Inner Dowsing
LSE	Likely Significant Effects
MAIB	Marine Accident Investigation Branch
Manx PO	Manx Fish Producers Organisation
MarESA	Marine Evidence based Sensitivity Assessment
MarLIN	Marine Life Information Network
MBA	Marine Biological Association
MBES	Multibeam Echo Sounder

Acronym	Meaning
MCA	Maritime and Coastguard Agency
MCAA	Marine Coastal Access Act
MGN	Marine Guidance Note
MMO	Marine Management Organisation
MCZ	Marine Conservation Zones
MDS	Maximum Design Scenario
MEDIN	Marine Environmental Data and Information Network
MHWS	Mean High Water Springs
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MNCR	Marine Nature Conservation Review
MNEF	Maritime Navigation Engagement Forum
MNR	Marine Nature Reserves
MOD	Ministry of Defence
MPA	Marine Protected Areas
MPCP	Marine Pollution Contingency Plan
MRCC	Maritime Rescue Coordination Centre
MRSC	Maritime Rescue Sub Centre
MSA	Minimum Safe Altitude
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NERC	Natural Environment and Rural Communities
NDFA	North Devon Fisheries Association
NFFO	National Federation of Fishermen’s Organisations
NIFPO	Northern Irish Fish Producers Organisation
NIGFS	Northern Irish Ground Fish Trawl Survey
NMFS	National Marine Fisheries Service
NMRW	National Monuments Record Wales
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NRHE	National Record of the Historic Environment
NRW	Natural Resources Wales
NTMs	Notice to Mariners
NWIFCA	North Western Inshore Fisheries and Conservation Authority
OMP	Operational Management Plan
OGA	Oil and Gas Authority
OPERA	Operational Programme for the Exchange of Weather Radar information
OREI	Offshore Renewable Energy Installation
OSP	Offshore Substation Platform
PAD	Protocol for Archaeological Discoveries
PCW	Phocid Carnivores in Water

Acronym	Meaning
PDE	Project Design Envelope
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PEL	Probable Effect Levels
PELTIC	Pelagic ecosystem in the western English Channel and eastern Celtic Sea
PEMMP	Project Environmental Monitoring and Management Programme
PEXA	Military Practice and Exercise Area
PS	Piling Strategy
PSA	Particle Size Analysis
PSR	Primary Surveillance Radar
PVA	Population Viability Analysis
RAF	Royal Air Force
RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
REWS	Radar Early Warning System
RIAA	Report to Inform Appropriate Assessment
rms	Root Mean Square
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
RYA	Royal Yachting Association
SAR	Search and Rescue
SAC	Special Areas of Conservation
SBP	Sub-bottom Profiler
SCANS	Small Cetaceans in the European Atlantic and North Seas
SCOS	Special Committee on Seals
sCRM	stochastic Collision Risk Modelling
SEA	Strategic Environmental Assessment
SEL	Sound Exposure Level
SFF	Scottish Fishermen's Federation
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentrations
SSR	Secondary Surveillance Radar
SSS	Side Scan Sonar
STECF	Scientific, Technical and Economic Committee for Fisheries
SWFPA	Scottish White Fish Producers Association
SWFPO	South West Fish Producers Organisation
TCE	The Crown Estate
TSS	Traffic Separation Scheme
UHRS	Ultra-high Resolution Seismic
UK	United Kingdom
UKCP	UK Climate Projections

Acronym	Meaning
UKCS	United Kingdom Continental Shelf
UKFEN	United Kingdom Fisheries Economics Network
UKGA	United Kingdom General Aviation
UKHO	UK Hydrographic Office
UKOOA	United Kingdom Offshore Operators Association
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VHF	Very High Frequency
VMP	Vessel Management Plan
VMS	Vessel Monitoring Systems
WCSP Ltd	West Coast Sea Products Ltd
WFA	Welsh Fishermen's Association
WFPO	Western Fish Producers Organisation
WMP	Waste Management Plan
WSI	Written Scheme of Investigation
ZOI	Zone Of Influence

Units

Unit	Description
%	Percentage
£/GBP	Pound Sterling
°	Degrees
CO_2e	CO_2-Equivalents
CO_2	Carbon Dioxide
dB	Decibels
ft	Feet
GW	Gigawatt
kHz	Kilohertz
kV	Kilovolts
km	Kilometres
km^2	Kilometres Squared
m	Metres
m^2	Metres Squared
m/s	Metres Per Second (Speed)
mg/l	Milligrams Per Litre (Concentration)
MW	Megawatt
nm	Nautical Miles
$kgCO_2e/MWh$	Kilogram CO_2-Equivalents Per Megawatt Hour
tCO_2e	Tonnes of CO_2-Equivalents
SEL_{cum}	Cumulative Sound Exposure Level
SEL_{peak}	Peak Sound Exposure Level

1 Introduction

1.1 Background

1.1.1.1 Part 2, Generation assets, of the EIA Scoping Report, provides an introduction to the generation assets of the Mona Offshore Wind Project, including an overview of the considerations for site selection and alternatives, and identifies the main aspects of the offshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance and decommissioning of the generation assets.

1.1.1.2 While the proposed scope of the EIA for the generation assets and transmission assets is presented in part 2, Generation assets, of the EIA Scoping Report, and part 3, Transmission assets, of the EIA Scoping Report respectively, the Applicant is seeking a Scoping Opinion from the Secretary of State in respect of the Mona Offshore Wind Project as a whole.

1.2 Mona Offshore Wind Project generation assets overview

1.2.1.1 The Mona Potential Array Area (the area within which the offshore wind turbines will be located) is 449.97km^2 in area and is located in the east Irish Sea, 28.8km (15.2nm) from the north coast of Wales, 39.9km (21.5nm) from the northwest coast of England and 42.6km (23nm) from the Isle of Man (when measured from Mean High Water Springs (MHWS)). Figure 1.1 presents the Mona Potential Array Area.

1.2.1.2 A description of the Mona Offshore Wind Project is presented in part 1, section 3: Project description, of the EIA Scoping Report. Key components of the Mona Offshore Wind Project generation assets include:

- offshore wind turbines
- foundations and support structures
- scour protection and cable protection
- inter-array cables.

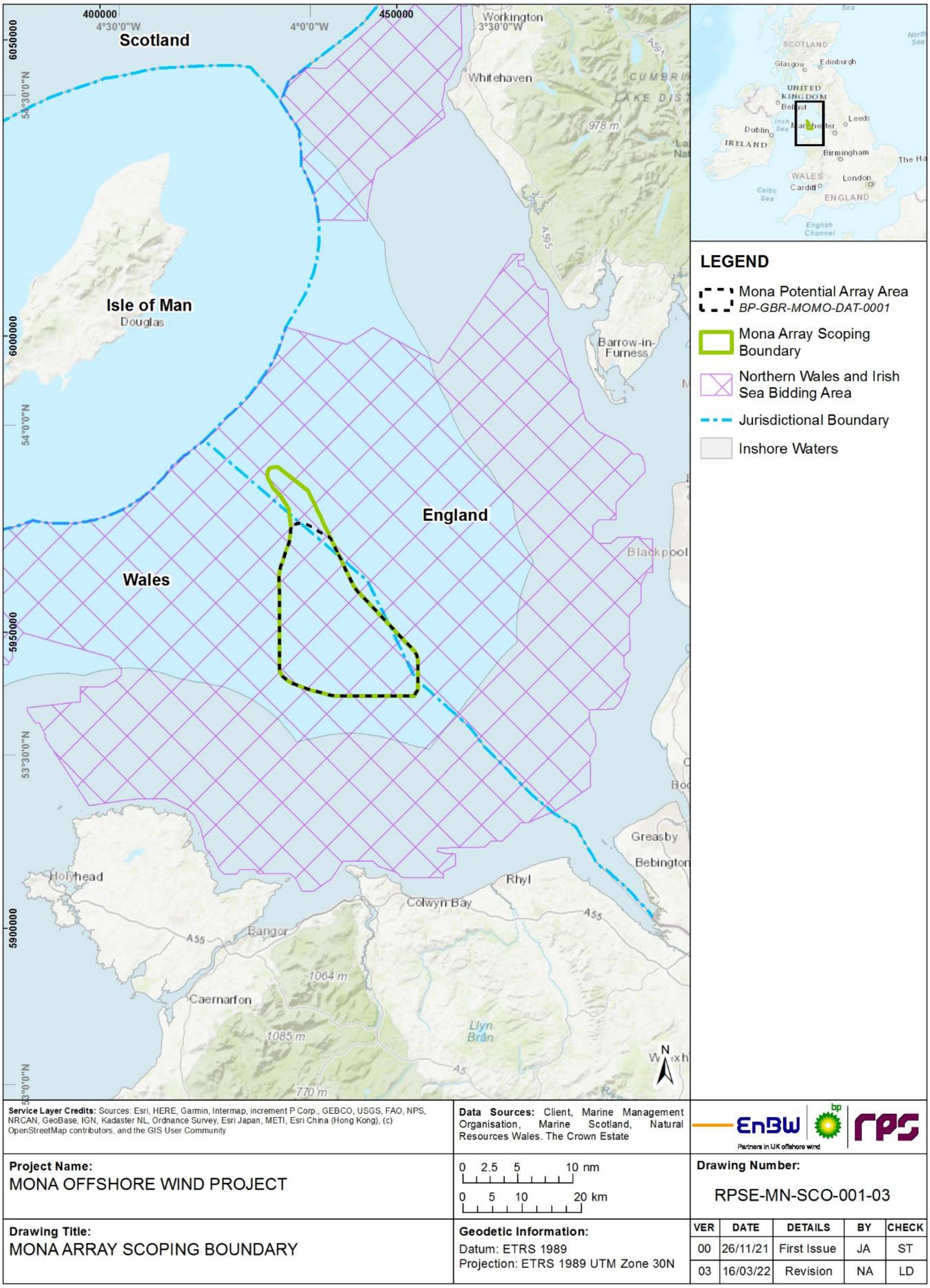


Figure 1.1: The Mona Potential Array Area.

1.3 Structure

1.3.1.1 The structure of part 2, Generation assets, of the EIA Scoping Report, is set out in Table 1.1. This structure has been designed for the EIA Scoping Report only, in order to enable EIA Scoping to progress in parallel with the identification of grid connection options by National Grid. The structure of the Preliminary Environmental Information Report (PEIR) and ES will be presented in offshore and onshore (and where relevant, combined) volumes considering the generation assets and transmission assets as a whole, with each topic assessment forming a separate chapter. Each topic chapter will consider the impact of the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project. The structure of the PEIR and ES is further described in part 1, section 4: EIA methodology, of the EIA Scoping Report.

Table 1.1: Topics considered within part 2, Generation assets, of the EIA Scoping Report.

Topic	Summary of Content	Section	Author
Part 2: Generation assets			
Section 1: Introduction			
Introduction	Background to the generation assets and what is considered within part 2 of the EIA Scoping Report.	Part 2, section 1	RPS
Section 2: Site selection and alternatives			
Site selection and alternatives	Description of the site selection process relevant to the generation assets, including the approach undertaken by the Applicant to identify the siting of the Mona Offshore Wind Project generation assets.	Part 2, section 2	RPS and bp/EnBW
Section 3: Offshore physical environment			
Physical processes	Overview of the offshore physical environment (tidal elevations, currents, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the Mona Potential Array Area. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Part 2, section 3.1	RPS
Underwater noise	Overview of approach to the assessment of underwater noise arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project generation assets. Required for understanding of potential impact to underwater noise sensitive receptors such as marine mammals and fish.	Part 2, section 3.2	RPS and Seiche
Section 4: Offshore biological environment			
Benthic subtidal and intertidal ecology	Overview of the ecology of the seabed within the Mona Potential Array Area. Required for understanding of potential impacts to seabed ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.1	RPS
Fish and shellfish ecology	Overview of the fish and shellfish ecology of the seabed within the Mona Potential Array Area. Required for understanding of potential impact to fish	Part 2, section 4.2	RPS

Topic	Summary of Content	Section	Author
	and shellfish ecology from construction, operation and maintenance and decommissioning.		
Marine mammals	Overview of the marine mammals within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Part 2, section 4.3	RPS
Offshore ornithology	Overview of the ornithology features within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Part 2, section 4.4	RPS
Section 5: Offshore human environment			
Commercial fisheries	Overview of commercial fisheries within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Part 2, section 5.1	RPS and Marine Space
Shipping and navigation	Overview of the baseline shipping and navigation within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Part 2, section 5.2	RPS and NASH Maritime
Marine archaeology	Overview of marine archaeology within the vicinity of the Mona Potential Array Area. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Part 2, section 5.3	RPS
Other sea users	Overview of other sea users within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to other sea users from construction, operation and maintenance and decommissioning.	Part 2, section 5.4	RPS
Section 6: Offshore and onshore combined topics			
Seascape, landscape and visual resources	Overview of seascape, landscape and visual resources within the Mona Potential Array Area. Required for understanding of potential impacts to seascape, landscape and visual resources from construction, operation and maintenance and decommissioning.	Part 3, section 6.1	RPS
Socio-economics and community	Overview of socio-economics and community within the vicinity of the Mona Offshore Wind Project. Required for understanding of potential impacts to socio-economics and community from construction, operation and maintenance and decommissioning.	Part 3, section 6.2	RPS and Hardisty Jones
Aviation and radar	Overview of aviation and radar receptors within the vicinity of the Mona Potential Array Area. Required for understanding of potential impacts to aviation and radar from construction, operation and maintenance and decommissioning.	Part 2, section 6.3	RPS and Osprey
Climate change	Overview of climate change receptors for the Mona Offshore Wind Project.	Part 3, section 6.4	RPS
Section 7: Other Environmental Topics			

Topic	Summary of Content	Section	Author
Topics with supporting information	Overview of topics of relevance to the Mona Offshore Wind Project generation assets where a technical appendix only will be provided to support the relevant technical chapters of the ES.	Part 2, section 7.1	RPS
Topics proposed to be scoped out	Justification for scoping out relevant topics for the Mona Offshore Wind Project generation assets.	Part 2, section 7.2	RPS
Topics covered elsewhere in the ES	Overview of topics of relevance to the Mona Offshore Wind Project generation assets that will be covered in other technical chapters of the ES and are not proposed to be subject to standalone chapters or appendices within the ES.	Part 2, section 7.3	RPS
Section 8: Summary			
Summary	Presents an overview of the EIA Scoping Report and a summary of the topics which are proposed to be scoped into and out of the EIA relevant to the generation assets.	Part 2, section 8	RPS

2 Site selection and alternatives

2.1 Introduction

2.1.1.1 This section provides a summary of the considerations for site selection and alternatives for the generation assets of the Mona Offshore Wind Project. It includes an outline of the stages of site selection that have been carried out in order to establish the Mona Potential Array Area.

2.1.1.2 The Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) will provide further detail on the site selection process that has been undertaken to establish the Mona Potential Array Area. The ES will also set out any refinements to the Mona Offshore Wind Project that may have taken place as a result of the Environmental Impact Assessment (EIA) process and in response to consultation and stakeholder feedback, and will describe the main alternatives considered as part of this process.

2.2 Offshore Wind Leasing Round 4

2.2.1.1 Four Bidding Areas were identified by The Crown Estate (TCE) through the Offshore Wind Leasing Round 4 process. This process involved undertaking a regional characterisation exercise using data, analysis and stakeholder engagement to identify areas of the seabed that were the least constrained for offshore wind development.

2.2.1.2 Through engagement with stakeholders, TCE received over 500 written responses from over 20 organisations (The Crown Estate, 2019). TCE undertook further analysis to refine the areas and to establish a detailed evidence base. The seabed regions were further refined to remove areas where constraints were deemed to be high. These constraints included:

- Ministry of Defence (MOD) ranges and exercise areas.
- Potential visual sensitivity within 13km of shore.
- Overlap with Traffic Separation Schemes and shipping routes with traffic exceeding 1,000 ships per year.
- Potential for cumulative environmental impacts, particularly ornithology.

2.2.1.3 TCE are preparing a Plan-Level Habitats Regulations Assessment (HRA) which assesses the potential impact of the preferred bidding areas that were selected through the Round 4 process on the UK's network of designated sites and protected habitats and species. The Plan-Level HRA is due to be finalised in Spring/Summer 2022.

2.2.1.4 The Department for Business, Energy and Industrial Strategy (BEIS) are undertaking an offshore energy Strategic Environmental Assessment (SEA) (OESEA4), including leasing and licensing for offshore renewables (including wind, wave and tidal energy), offshore oil and gas exploration and production, offshore hydrocarbon and carbon dioxide gas storage, and offshore hydrogen production. The SEA is due to be published in early 2022.

2.3 Northern Wales and Irish Sea Bidding Area

2.3.1.1 The Northern Wales and Irish Sea Bidding Area was one of four Bidding Areas identified by TCE through the Offshore Wind Leasing Round 4 process.

2.3.1.2 The Northern Wales and Irish Sea Bidding Area covers an area of approximately 8,500km^2 and has water depths up to 50m, with an average water depth of 34m.

2.3.1.3 A Bidding Area Report was prepared by TCE that identified the environmental designations within the Northern Wales and Irish Sea Bidding Area and the key species present (e.g. birds and fish). The report also identified a number of other constraints from activities such as fishing, oil and gas, NATS radar, defence and navigation.

2.4 Identification of the Preferred Bidding Areas

2.4.1.1 The Applicant identified two Preferred Bidding Areas (Morgan and Mona) within the Northern Wales and Irish Sea Bidding Area. In February 2021, TCE awarded the Applicant the right to develop up to 1.5GW of wind capacity within each of the two Preferred Bidding Areas.

2.4.1.2 The Morgan and Mona Preferred Bidding Areas were identified by the Applicant using an iterative process which involved consideration of the following constraints:

- MOD activity including radar, ranges, danger and exercise areas
- NATS radar
- Commercial fisheries
- Environmental designations including maintaining 10km offset from the Liverpool Bay Special Protection Area (SPA)
- Fish spawning and nursery areas
- Oil and gas infrastructure and licences including consideration of decommissioning timeframes and safety zones
- Shipping density
- Avoidance of Traffic Separation Schemes
- Other marine infrastructure including offshore wind, marine aggregates and dredging
- Geological conditions
- Landscape and visual designations
- Metocean considerations.

2.4.1.3 The consenting risks as provided by TCE in the Characterisation Area Report for the Northern Wales and Irish Sea Bidding Area were assessed by the Applicant against the Preferred Bidding Areas and compliance with the constraints was an important factor in identifying the suitability of the Preferred Bidding Area.

2.5 The Mona Potential Array Area

2.5.1.1 The full Mona Preferred Bidding Area forms the Mona Array Scoping Boundary. During the initial project development phase the Applicant has focussed on the potential for development of the southern part of the Mona Preferred Bidding Area (i.e. the Mona Potential Array Area) and not the northernmost tip which will be excluded from wind turbine development. This was based on an initial review of environmental and social constraints.

2.5.1.2 Further refinement of the Mona Preferred Bidding Area will be undertaken as additional survey information is collected and project design undertaken. The PEIR and ES will further describe this refinement of the Mona Preferred Bidding Area. In addition, the PEIR and ES will outline the process that has been followed to identify potential indicative turbine layouts within the Mona Potential Array Area, the main alternatives that were considered and the rationale for the selection of the indicative layouts taking into account any modifications identified during consultation. The final layout of the wind turbines will be confirmed at the final design stage (post-consent).

3 Offshore physical environment

3.1 Physical processes

3.1.1 Introduction

3.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the elements of physical processes of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets.

3.1.1.2 For the purposes of this EIA Scoping Report and subsequent Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES), physical processes are defined as encompassing the following elements:

- bathymetry
- waves
- tidal elevations and currents
- geology
- seabed substrate
- suspended sediments
- sediment transport.

3.1.1.3 The parameters listed above are collectively referred to as 'physical processes' throughout the remainder of this EIA Scoping Report.

3.1.2 Study area

3.1.2.1 The Mona physical processes study area for the generation assets is defined as the area encompassing the Mona Potential Array Area plus a buffer of one tidal excursion (Figure 3.1). This is the predicted Zone Of Influence (ZOI) of the Mona generation assets as the maximum distance suspended sediments would travel from the Mona Potential Array Area in one tidal cycle prior to deposition on slack water (ABPmer, 2018).

3.1.2.2 The Mona physical processes study area for the generation assets forms the focus for the assessment however the numerical modelling will provide predictions of effects over a wider area than the Mona physical processes study area for the generation assets for waves, tidal elevation and currents, suspended sediments and sediment transport over multiple tidal cycles. The assessment will therefore also identify any potential impacts that may occur beyond the Mona physical processes study area for the generation assets.

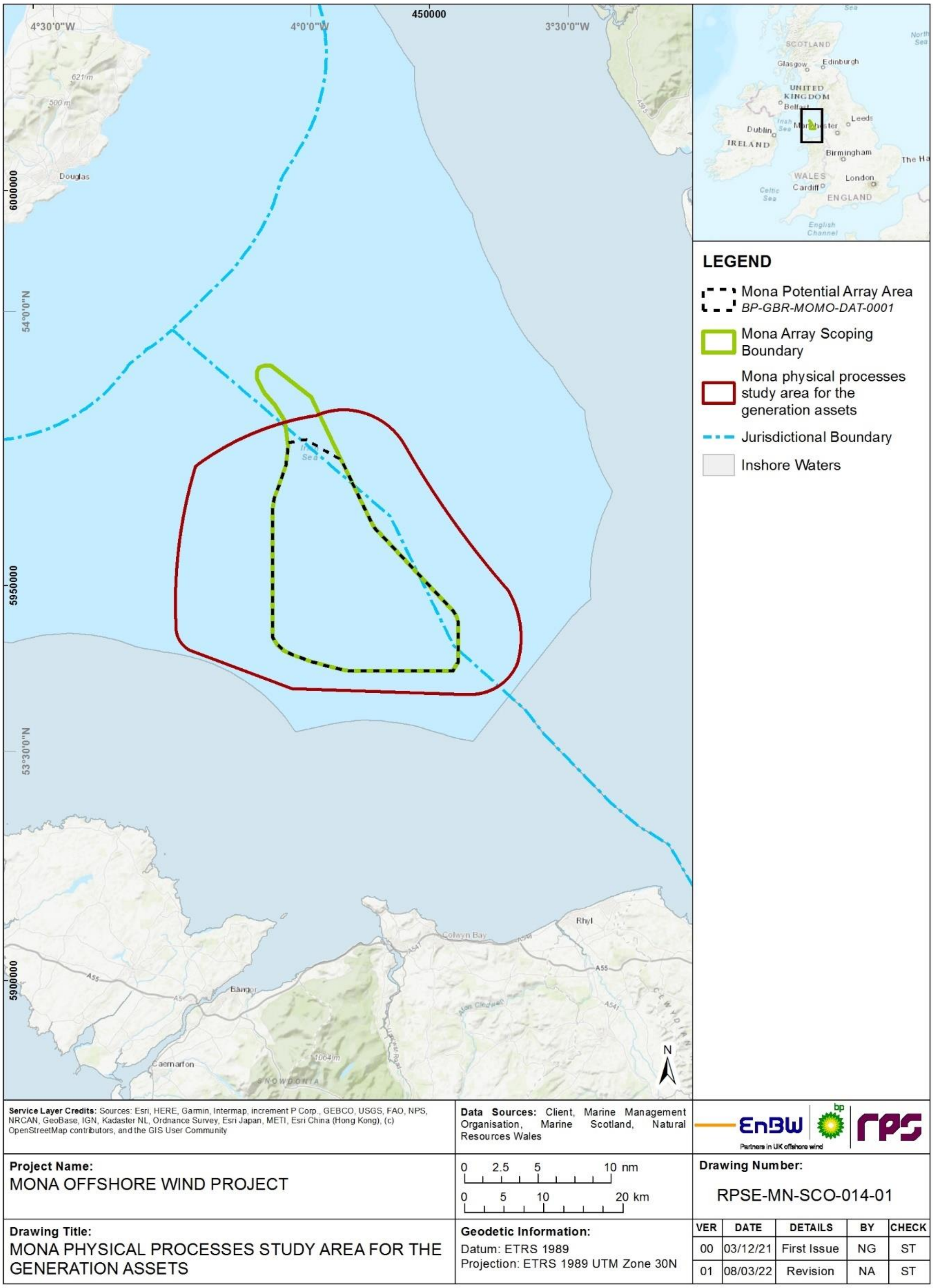


Figure 3.1: The Mona physical processes study area for the generation assets.

3.1.3 Data sources

Desktop data

3.1.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of sources which provide coverage of the Mona physical processes study area for the generation assets and provide information for the numerical model study. These are summarised in Table 3.1.

Table 3.1: Summary of key desktop datasets and reports.

Title	Source	Year	Author
European Marine Observation and Data Network (EMODnet)	EMODnet	2020	EMODnet
ABPmer data explorer	ABPmer	2018	ABPmer
Hydrography of the Irish Sea, SEA6 Technical Report	UK Government	2005	Howarth M.J.
Anthropogenic mixing of seasonally stratified shelf seas by offshore wind farm infrastructure	Environmental Science scientific journal	2021	Dorrell *et al*.
Atlas of UK Marine Renewable Energy Resources	ABPmer	2008	ABPmer
Geology of the seabed and shallow subsurface: The Irish Sea	British Geological Survey (BGS)	2015	Mellett *et al*.
Suspended Sediment Climatologies around the UK	Department for Business, Energy and Industrial Strategy (BEIS)	2016	Cefas
Metocean data collection for the Ormonde offshore wind project	Marine Data Exchange	2011	Geotechnical Engineering and Marine Surveys (GEMS)
Irish Sea Zone Hydrodynamic measurment campaign	Marine Data Exchange	2010-2013	EMU Ltd (now Fugro Ltd)
Admiralty Tide Tables	UK Hydrographics Office (UKHO)	2021	UKHO
Marine Enviornmental Data and Information Network (MEDIN) Seabed Mapping Programme	Admiralty Marine Data Portal	2021	MEDIN
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Seabed Mapping Programme	Geological Survey Ireland (GSI) and Marine Institute	2021	INFOMAR
Long term wind and wave datasets	Eurpoean Centre for Medium-range Weather Forecasting (ECMWF)	2021	ECMWF
UK tide gauge network and database of current observation	British Oceanographic Data Centre (BODC)	2021	BODC
UK Climate Projections (UKCP)	Met Office	2018	Met Office
A user-friendly database of coastal flooding in the United Kingdom from 1915–2014	Scientific Data scientific journal	2015	Haigh *et al*.
Biritish Oceanographic Data Centre	National Oceanography Centre	various	National Oceanography Centre

Title	Source	Year	Author
Review of aggregate dredging off the Welsh coast	HR Wallingford	2016	HR Wallingford

Site specific survey data

3.1.3.2 A recent geophysical survey campaign was completed across the Mona Array Scoping Boundary in summer 2021. This survey provides both geophysical and bathymetric data which will support the development of the Physical processes ES chapter for the Mona Offshore Wind Project. The aims of the data collection, and a summary of the data collected during these surveys includes:

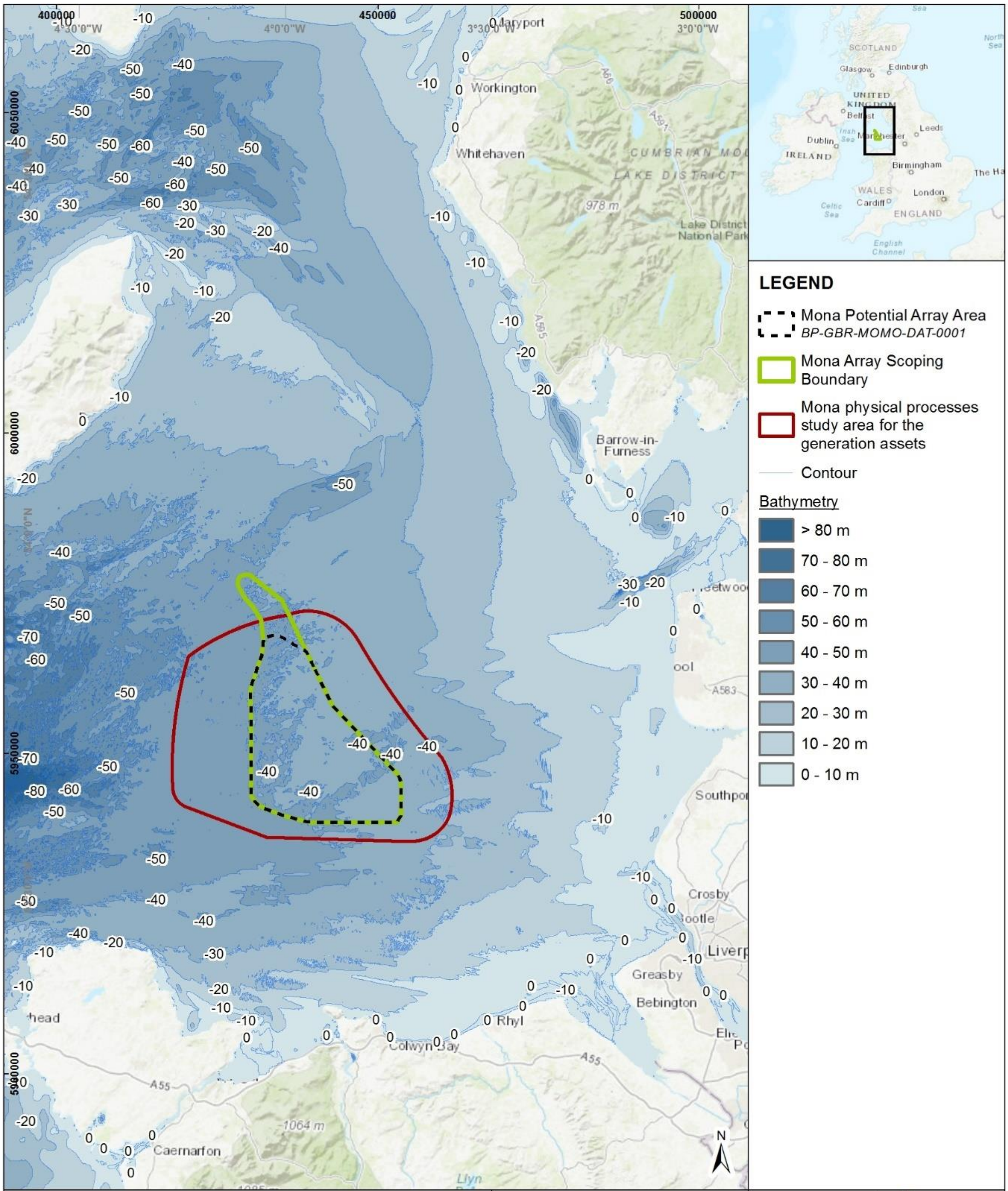
- Bathymetric data to determine site topography, gradients and a baseline to inform foundation design and cable installation using multibeam echo sounder (MBES).
- High-resolution sidescan sonar (SSS) data to determine seabed features and the presence of boulders, seabed sediments and debris.
- High-resolution sub-bottom profiler (SBP) data to determine the shallow sub-surface soil conditions that may influence foundation design and cable installation such as boulders and shallow geology features.
- Multichannel 2D ultra-high resolution seismic (UHRS) data to windfarm infrastructure foundation depth to determine the deeper sub-surface soil conditions.
- Metocean buoy deployment to gather data relating to the metocean parameters within the Mona Potential Array Area.
- A subtidal benthic ecology survey across the Mona Array Scoping Boundary providing an overview of the seabed sediment composition to support the characterisation of the subtidal environment.

3.1.3.3 An infill benthic subtidal ecology survey and geophysical survey are planned for spring/summer 2022 and will collect data on the seabed within one tidal excursion around the Mona Potential Array Area (the predicted ZOI of the Mona generation assets; Figure 3.1). The 2022 survey will also re-sample a number of sample stations within the Mona Potential Array Area that were taken during the 2021 benthic survey. The scope of the 2022 survey campaign will be discussed and agreed with consultees through the Evidence Plan process.

3.1.4 Baseline environment

Bathymetry

3.1.4.1 The bathymetry of the Mona physical processes study area for the generation assets is relatively consistent with no large banks or large changes in water depth. Deeper waters generally occur to the west of the Mona physical processes study area for the generation assets. Depths within the Mona physical processes study area for the generation assets vary between 29m and 45m relative to Lowest Astronomical Tide (LAT) with an average depth of 39.23m relative to LAT. Shallower water depths are generally present to the east of the Mona physical processes study area for the generation assets which is closer to the coast (Figure 3.2) (EMODnet, 2020).



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, EMODnet.

EnBW | bp | Partners in UK offshore wind | rps

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 nm
0 5 10 20 km

Drawing Number:
RPSE-MN-SCO-036-01

Drawing Title:
MONA OFFSHORE WIND PROJECT BATHYMETRY DATA

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	07/12/21	First Issue	JA	ST
01	08/03/22	Revision	NA	ST

Figure 3.2: The Mona physical processes study area for the generation assets with bathymetry data (EMODnet, 2020).

Waves

3.1.4.2 Waves in the Irish Sea are highest to the southwest of the Isle of Man with the highest mean annual significant wave height of 1.39m recorded between the Isle of Man and Anglesey. Significant wave height is reduced closer to the coast with the lowest significant wave height of 0.73m recorded to the west of the Dee Estuary (ABPmer, 2008).

3.1.4.3 Mean annual wave height in the Mona physical processes study area for the generation assets ranges from 1.1m to 1.3m. Over 40% of the waves arise from the southwest with all significant wave heights (>4m) arriving from the southwest or west (ABPmer, 2018).

3.1.4.4 Metocean buoys were deployed within the Ormonde offshore wind project in 2010, to the east of the Mona physical processes study area for the generation assets. Waves were recorded with a dominant direction from the southwest with the majority of the waves originating from the open sea. Significant wave heights ranged from 0.06m to 5.95m, with a maximum wave height of 14.22m recorded in November 2010 (GEMS, 2011).

3.1.4.5 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. The campaign recorded significant wave heights of over 6m in October, November and December with the maximum wave height recorded at 9.8m. The most commonly occurring wave direction was from the southwest (EMU, 2013).

3.1.4.6 Within the Physical processes ES chapter, a detailed baseline will be presented which will provide an overview of the wave regime within the region and specific to the Mona Offshore Wind Project, utilising data collected from the deployed metocean buoys.

Tidal currents and elevation

3.1.4.7 An understanding of the tidal currents provides an insight into the patterns and rates of naturally occurring sediment transport. Currents are primarily driven by tides with a residual component generally dominated by storm driven currents (Ramsay and Brampton, 2000).

3.1.4.8 The semi-diurnal tides are the dominant physical process in the Irish Sea moving into the Irish Sea from the Atlantic Ocean through both the North Channel and St. George’s Channel. The tidal range in the Irish Sea is highly variable with the range in Liverpool Bay exceeding 10m on the largest spring tides, the second largest in the Britain. Mean tidal elevation over the Irish Sea is highest around the English Coast with average tidal elevations of 3m (m^2 tidal elevation amplitude in metres). Tidal elevation decreases out to the Isle of Man with average tidal elevations of between 2m and 2.5m over the Mona physical processes study area for the generation assets (Howarth, 2005).

3.1.4.9 Tidal currents in the Irish Sea are strongest around the north of Anglesey with a mean spring peak flow of 2.8m/s. Tidal currents in the Irish Sea are also strong between the Isle of Man and Scotland with a mean spring peak flow of 2m/s. Tidal currents within the Mona physical processes study area for the generation assets are lower with a mean spring peak flow of between 1.1m/s and 0.72m/s. Tidal currents range from the fastest currents in the west to the slowest currents in the east of the Mona physical processes study area for the generation assets (ABPmer, 2008).

3.1.4.10 The Ormonde offshore wind project metocean buoys deployed near the coast, to the east of the Mona physical processes study area for the generation assets, recorded a maximum current speed of 0.85m/s in March 2011 with an average speed of 0.30m/s. The major current axis flowed in an east/northwest direction (GEMS, 2011).

3.1.4.11 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. The highest tidal range observed was 8.71m. The minimum tidal range observed was 6.40m. The tidal current direction varied across the zone, with the greatest differences occurring from the southwest of the zone with an observed depth averaged flood and ebb bearing of 56°/236°, to the southeast corner of the zone with a depth averaged flood bearing of 102°/282°. The maximum current speed recorded was 1.7m/s (EMU, 2013).

Geology

3.1.4.12 Information on the geology of the Mona physical processes study area for the generation assets allows for an understanding of the origin and stability of the seabed, and the geology which will be encountered during the installation of the Mona Offshore Wind project generation assets.

3.1.4.13 The predominant bedrock lithologies in the region are Triassic and Carboniferous sandstone and mudstone (Mellett *et al.,* 2015). The bedrock is covered by sediments of Quaternary age (<2.6 million years old) over much of the Irish Sea area, with only small areas of exposed bedrock. Quaternary sediment thickness exceeds 50m in the eastern and western Irish Sea. Quaternary sediment thickness is generally <20m in the central Irish Sea although relict glacial valleys can cause it to increase to >100 m over a short distance (Mellett *et al.,* 2015). The uppermost surface of the bedrock underlying the Quaternary sediments has potentially been weathered during the last glacial period and may be weaker than the underlying rock (Mellett *et al.,* 2015).

Seabed substrate

3.1.4.14 Bedforms show a high degree of variability in the Irish Sea and can range from very small ripples (5cm high) to very large sediment waves (>10m high). The largest are found to the west of the Isle of Man and Anglesey, however, there are several bedform banks in the central Irish Sea, forming a boundary between the east Irish mud belt and the central gravel belt (Mellett *et al.,* 2015).

3.1.4.15 Seabed sediments are subdivided into regions of soft mud (clay and silt) rich sediment in the eastern and western Irish Sea and a central gravel belt comprising coarse sand and gravel. Small areas of bedrock outcrop at the seabed have also been recorded. The Mona Potential Array Area sits within the central Irish Sea gravel belt (Mellett *et al.,* 2015).

3.1.4.16 Seabed sediments within the Mona physical processes study area for the generation assets are dominated by circalittoral coarse sediment and circalittoral mixed sediment with areas of circalittoral mud and circalittoral sand (EMODnet, 2019). Further detail on the seabed substrate is presented in section 4.1.

Sediment transport and suspended sediment

3.1.4.17 The Cefas Climatology Report 2016 (Cefas, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UK continental shelf (UKCS). Between 1998 and 2005, the greatest plumes are associated with large rivers such as the Thames Estuary, The Wash and Liverpool Bay, which show mean values of SPM above 30mg/l. Based on the data provided within this study, the SPM within the Mona physical processes study area for the generation assets has been estimated as approximately 2mg/l to 10mg/l over the 1998 to 2005 period. Higher levels of SPM are experienced more commonly in the winter months; however, due to the tidal influence, even during summer months the levels remain elevated.

3.1.4.18 The principal mechanisms governing suspended sediment concentrations (SSC) in the water column are tidal currents, with fluctuations observed across the spring-neap cycle and across the different tidal stages (high water, peak ebb, low water, peak flood) observed throughout both datasets. It is key to note that SSCs can also be temporarily elevated by wave driven currents during storm events. During high-energy storm events, levels of SSC can rise significantly, both near bed and extending into the water column. Following storm events, SSC levels will gradually decrease to baseline conditions, regulated by the ambient regional tidal regimes. The seasonal nature and frequency of storm events supports a broadly seasonal pattern for SSC levels.

3.1.4.19 Sediments in the Irish Sea have been reported, on average, to experience mobilisation 35% of the time during a year (Coughlan *et al*., 2021). Sediments in the east Irish Sea have been reported to experience 5-95% sediment mobility with the highest mobility around Morecambe Bay, Solway Firth and around the north coast of Anglesey (Coughlan *et al*., 2021). The 2012 report commissioned by Celtic Array as part of the Zonal Appraisal and Planning process reported that in the east Irish Sea, sediment suspension and transport are mainly driven by tidal currents. Sediment transport was reported to be of a net northeasterly and easterly transport pathway into Liverpool Bay (Celtic Array Ltd., 2014).

3.1.4.20 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. Mean SSC near the seabed ranged from 4.3mg/l to 23.6mg/l. Maximum SSCs were recorded at 48mg/l (EMU, 2013). Mean SSC in the water column ranged from 1.6mg/l to 55.8mg/l (EMU, 2013).

Stratification

3.1.4.21 The temperature distribution of the east Irish Sea is dominated by vertical exchanges and heat input at the sea surface leading to seasonal cycles. The water is coolest in February or March with temperature decreasing from the deeper channel towards the coasts (Howarth, 2005). The coolest water is towards the coast in the eastern Irish Sea – between the Solway Firth and Liverpool Bay where the temperature is below 5ºC (Howarth, 2005). The temperatures are highest in August with the warmest water close to the coasts, exceeding 16ºC in Liverpool Bay (Howarth, 2005).

3.1.4.22 The annual mean salinity decreases from south to north and from the centre of the channel to the edges. In the eastern Irish Sea there is often a marked change in salinity, running approximately north/south at the eastern Irish front at the west side of the Isle of Man (Foster *et al*, 1985). Seasonal variations are much less pronounced than for temperature, especially away from the coasts (Howarth, 2005).

3.1.4.23 Throughout most of the region tidal mixing is sufficiently intense to ensure that the water column remains well mixed throughout the year (Howarth, 2005). To the east of the Isle of Man conditions for this are only marginal so that stratification is only likely to develop during hot, calm conditions and can easily be mixed away by storms or spring tides (Howarth, 2005). Near to estuaries and especially in Liverpool Bay the water column can also stratify because fresh water is lighter than salty; conditions are most suitable at neap tides, when the weather is calm and when river discharges are large (Howarth, 2005).

Designated sites

3.1.4.24 The identification of sites designated for their conservation value for inclusion in the Physical processes ES chapter was carried out as follows:

- Sites with relevant qualifying features which overlap with the Mona Potential Array Area were screened in for further assessment.
- Sites with relevant qualifying features, which are located within the likely Zone Of Influence (ZOI) of effects associated with the Mona Potential Array Area were screened in for further assessment. The likely ZOI is encapsulated by the Mona physical processes study area for the generation assets and has been determined through a review of the potential impacts associated with the Mona Offshore Wind Project. This ensures that all designated sites and their features potentially affected by changes in water quality (e.g. increased suspended sediment concentrations) and potential changes to the hydrodynamic regime are included in the physical processes assessment.

3.1.4.25 No designated sites overlap with the Mona physical processes study area for the generation assets.

3.1.4.26 Information to support a full screening of European sites with qualifying physical processes interest features will be provided in the Habitats Regulation Assessment (HRA) Screening Report. Relevant features screened in will be fully considered and assessed in the Physical processes ES chapter, with the information to support the assessment on European sites and features provided in the Report to Inform Appropriate Assessment (RIAA). A preliminary screening of relevant Marine Conservation Zones (MCZs) has been included in part 4, Annex C: MCZ Screening of the EIA Scoping Report.

3.1.5 Potential project impacts

3.1.5.1 A range of potential impacts on physical processes have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project generation assets.

3.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 3.2 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

3.1.5.3 Potential impacts scoped out of the assessment are presented in Table 3.3, with justification.

Table 3.2: Impacts proposed to be scoped into the project assessment for physical processes (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	The interaction of the wind turbine foundations and associated infrastructure with the wave regime has the potential to impact upon adjacent physical coastal features and sediment transport.	Data collected during the 2021 site-specific survey and data that will be collected during the 2022 site-specific infill geophysical and benthic ecology survey campaigns, will support the development of the physical processes numerical modelling. Data collected from the metocean buoys will also be utilised. A detailed desktop data review will be undertaken to gather other relevant data which will support the assessment. An overview of this is presented in section 3.1.3.	The potential impact of the Mona Offshore Wind Project generation assets on coastal features and sediment transport will be informed by the physical processes numerical modelling detailed in section 3.1.7. A qualitative assessment of impact on key coastal features will be presented within the Physical processes ES chapter.
Increase in suspended sediments due to construction, operation and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓	There is potential for increased SSCs and deposition associated with seabed preparation activities, foundation installation and cable installation activities, from maintenance activities such as array cable repairs and deposition associated with decommissioning activities.		Numerical modelling (see details in section 3.1.7) will be undertaken to provide an overview of the potential impacts to physical processes relating to the various activities of the Mona Offshore Wind Project generation assets. This assessment will consider the potential impacts arising from changes in SSC and deposition on physical processes and sediment transport. Elevation in SSCs and subsequent deposition of disturbed sediments also have the potential to result in adverse and indirect impacts on receptors for other offshore topics, such as benthic subtidal and intertidal ecology, fish and shellfish ecology, marine mammals, marine archaeology and infrastructure and other users. For these receptor groups, significance of effect for direct and indirect impacts will be assigned in each of the receptor group assessments and not within the physical processes assessment.
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	The interaction of the wind turbine foundations and associated infrastructure with the tidal regime has the potential to impact upon adjacent physical coastal features and sediment transport.		The potential impact of the Mona Offshore Wind Project generation assets on coastal features and sediment transport will be informed by the physical processes numerical modelling detailed in section 3.1.7. A qualitative assessment of impact on key coastal features will be presented within the Physical processes ES chapter.
Impacts to sediment transport and sediment transport	✓	✓	✓	Foundations and associated scour protection within the Mona Potential Array Area may		The potential impact of the Mona Offshore Wind Project generation assets on sediment transport

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.				interrupt sediment transport pathways. In addition, cable protection may pose an obstacle to sediment transport pathways.		and sediment transport pathways will be informed by the physical processes numerical modelling outlined in section 3.1.7. This assessment will be presented within the Physical processes ES chapter.
Impacts to temperature and salinity stratification due to the presence of presence of infrastructure	✓	✓	✓	Foundations and associated scour protection with the Mona Potential Array Area may disrupt the temperature and salinity stratification and their seasonal variation in the Dee Estuary. This impact has been specifically highlighted, in relation to the Dee Estuary, by consultees through the Evidence Plan process.		A qualitative assessment of impact on the temperature and salinity stratification will be presented within the Physical processes ES chapter. The detailed approach will be informed by preliminary findings of the physical processes numerical modelling detailed in section 3.1.7.

Table 3.3: Impacts proposed to be scoped out of the project assessment for physical processes.

Impact	Justification
Changes to bathymetry due to depressions left by jack-up vessels.	The potential for jack-up vessel spud-cans to affect the sediment regime has been scoped out of the assessment. Jack-up footprint depressions would likely only persist temporarily after jack-up operations have been completed and these would infill over time. Monitoring at the Barrow offshore wind farm showed depressions were almost entirely infilled 12 months after construction (BOWind, 2008). It is not anticipated that jack-up vessel footprints will have implications for the sediment regime.
Scour of seabed sediments during the operation and maintenance phase.	Interaction between the waves and current and the Mona Offshore Wind Project generation infrastructure has the potential to cause localised scouring of seabed sediment. Scour protection will be a measure adopted as part of the project to prevent scour from occurring. The scour protection measures will be subject to engineering design to ensure they are fit for purpose and prevent scour from occurring. The seabed habitat disturbed/lost due to scour protection will be considered in the Benthic subtidal and intertidal ecology chapter of the ES. Therefore, it is proposed that scour of seabed sediments is scoped out of the Physical processes ES chapter.

3.1.6 Measures adopted as part of the project

3.1.6.1 The following measures adopted as part of the project are relevant to physical processes. These measures may evolve as the engineering design and the EIA progresses.

- Scour protection will be used around offshore structures as set out in part 1, section 3: Project Description of the EIA Scoping Report. Note that scour protection and potential impact on benthic communities will be assessed in the Benthic subtidal and intertidal ecology ES chapter.
- Development and adherence to a Cable Specification and Installation Plan which will include cable burial where possible and cable protection as necessary.

3.1.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

3.1.7 Proposed assessment methodology

3.1.7.1 The Physical processes ES chapter will follow the methodology set out in part 1 section 4: EIA Methodology of the EIA Scoping Report. Specific to the Physical processes ES chapter, the following guidance documents will also be considered:

- Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments (Pye *et al*., 2017).
- Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects (Brooks *et al*., 2018).
- Collaborative Offshore Wind Energy Research into the Environment (COWRIE) - Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide (Lambkin *et al.,* 2009).
- Guidelines in the use of metocean data through the lifecycle of a marine renewables development (ABPmer *et al*., 2008).

3.1.7.2 To support the development of the Physical processes ES chapter, a numerical modelling study is planned. This study will be undertaken using the MIKE software developed by DHI (www.dhigroup.com), which contains a suite of coastal and environmental modelling modules of global standard. The key to the MIKE suite of computational models is that each module may be applied to a single model and then the modelling of combined (coupled) parameters may be undertaken.

3.1.7.3 The MIKE 21 Flexible Mesh coupled modules would be used to model baseline wave climate, tidal flows and sediment transport, using a model which, whilst providing sufficient detail to simulate the necessary parameters, is also computationally efficient by utilising a flexible mesh comprised of the most up to date bathymetric data. The computational model applied in the baseline study will be amended to include the impact of the wind turbine and offshore substation platform structures with associated scour protection and cable protection to quantify the change in tidal flow, sediment transport and wave climate. Similarly, sediment will be released into the water column to replicate the construction phase works during the seabed clearance, foundation installation and installation of the inter-array cabling, and the sediment dispersion and fate will be gauged. Modelling will be validated using all available data sources.

3.1.7.4 The computational modelling will quantify the potential impacts of the installation (including seabed preparation activities) and ongoing operational effects on the tide, wave and sediment transport processes. It will also provide the transport and fate of any material released into the water column as part of the installation works.

3.1.7.5 The results of this numerical modelling will be used to support the impact assessments within the below topics:

- benthic subtidal and intertidal ecology (section 4.1)
- fish and shellfish ecology (section 4.2)
- marine mammals (section 4.3)
- marine archaeology (section 5.3)
- other sea users (section 5.4).

3.1.7.6 The results of the numerical modelling will also support the HRA Screening Report and RIAA.

3.1.8 Potential cumulative effects

3.1.8.1 The predicted effects of construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project on physical processes predominately occur within the footprint of the Mona Potential Array Area. However, there is potential for cumulative effects to occur on physical processes from other projects or activities within and outside the Mona physical processes study area for the generation assets, where projects or plans could act cumulatively with the Mona Offshore Wind Project to affect physical processes.

3.1.8.2 The cumulative effects assessment will follow the approach outlined in section part 1 section 4: EIA Methodology of the EIA Scoping Report.

3.1.9 Potential inter-related effects

3.1.9.1 The assessment of potential inter-related effects will be considered within the Physical processes ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

3.1.10 Potential transboundary impacts

3.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon physical processes due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

3.2 Underwater noise

3.2.1 Introduction

3.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the elements of underwater noise of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the pre-construction, construction, operation and maintenance, and decommissioning of the generation assets.

3.2.1.2 Underwater noise and vibration sources during construction may include piling, hammering or drilling for the wind turbine foundations and will include the use of barges and vessels, heavy machinery and generators on the vessels. Underwater noise during operation could include noise transmitted into the water from aerodynamic noise, from wind turbine blades passing through the air via the air to water interface, and structure borne mechanical noise from the gearbox and generators of the turbines.

3.2.1.3 An underwater noise study will be undertaken to provide an assessment of the level of underwater noise generated from the Mona Offshore Wind Project and will be provided as a technical appendix to support the relevant offshore chapters of the Environmental Statement (ES) including the following receptor groups:

- fish and shellfish ecology (section 4.2)
- marine mammals (section 4.3)
- commercial fisheries (section 5.1).

3.2.2 Study area

3.2.2.1 No separate study area has been outlined for underwater noise as this is defined by the receptors and discussed within the relevant topics listed in section 3.2.1.

3.2.3 Data sources

Desktop data

3.2.3.1 An initial desk based review of literature and data sources has been undertaken to support this EIA Scoping Report. This is summarised in Table 3.4.

3.2.3.2 Seabed bathymetry data will be sourced from the online General Bathymetric chart of the Oceans (GEBCO) database. GEBCO's current gridded bathymetric dataset, the GEBCO 2021 Grid, is a global terrain model for ocean and land, providing elevation data, in metres, on a 15 arc-second interval grid. Seabed sediment and geological condition data will be sourced from the Deep Sea Drilling Project (DSDP) and the British Geological Survey (BGS).

Table 3.4: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Gebco database	https://www.gebco.net/data_and_products/ gridded_bathymetry_data/	2021	GEBCO
Deep Sea Drilling Project	http://deepseadrilling.org/	1983-2003	Ocean drilling program
Biritish Geological Survey	Seabed sediment data	2020	BGS
Geology of the seabed and shallow subsurface: The Irish Sea	BGS	2015	Mellett *et al*.

3.2.4 Baseline environment

3.2.4.1 Baseline noise levels vary significantly depending on multiple factors, such as seasonal variations and different sea states. Lack of long term sound measurements is a widely recognised gap in knowledge in relation to general soundscape and potential effects of human activities on marine life. Understanding the baseline sound level could therefore be valuable in enabling future studies to assess long term effects related to continuous sound levels over time in addition to activity specific effects such as masking impacts. The baseline sound environment will be discussed and agreed through the Evidence Plan process.

3.2.4.2 Sound can be either impulsive (pulsed) such as impact piling, or non-impulsive (continuous) such as ship engines, and the magnitude of the impact on marine life will depend heavily on these characteristics. Background or “ambient” underwater sound is created by several natural sources, such as rain, breaking waves, wind at the surface, seismic sound, biological sound and thermal sound. Biological sources include marine mammals (using sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources of sound in the marine environment include fishing boats, ships (non-impulsive), marine construction noise (such as piling or dredging), subsurface (seismic) and seabed imaging surveys and leisure activities (all could be either impulsive or non-impulsive), all of which add to ambient background sound. Anthropogenic sound within the vicinity of the Mona Offshore Wind Project will arise primarily from shipping, the offshore oil and gas industry, subsea geophysical and geotechnical surveys, and the offshore renewables industry. Measurements of underwater sound from the operational Ormonde windfarm where undertaken in June 2012 (Nedwell *et al*., 2012). The results reported that there was an increase in noise levels between 0 and 50kHz at a distance of 30m from individual wind turbines. The noise was continuous in nature, and the increase was detectable to a maximum range of approximately 1km. Beyond this range, the underwater sound level was consistent with the ambient underwater sound in the region (Nedwell *et al*., 2012). Shipping routes and shipping traffic are discussed in section 5.2.

3.2.5 Potential project impacts

3.2.5.1 A range of potential impacts resulting from a change in underwater noise have been identified which may occur during the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project generation assets. There is the potential for underwater noise to impact sensitive ecological receptors. The potential effects on these receptors will be assessed within the relevant technical sections of the ES (marine mammals, fish and shellfish and commercial fisheries).

3.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 3.5 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

3.2.5.3 Potential impacts scoped out of the assessment are presented in Table 3.6, with justification.

Table 3.5: Impacts proposed to be scoped into the project assessment for underwater noise (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Effects of underwater noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	✓	✓	✓	Although noise from these sources will be relatively low in level (e.g. compared to impact piling) and continuous in nature (rather than impulsive) there is still some residual potential for disturbance due to long term increased traffic and use of rigs etc.	N/A	The approach used for assessing underwater noise is detailed in section 3.2.7. The results of the noise modelling will be presented in an Underwater Noise Technical Report, which will inform the Fish and shellfish ecology, Marine mammal and Commercial fisheries ES chapters.
Effects of underwater noise on marine life due to impact driven and drilled pile installations for the wind turbines foundations.	✓	×	×	Due to the potentially high source levels involved and impulsive nature of the sound, modelling and assessment of the proposed piling activities will be undertaken.	N/A	
Effects of underwater noise on marine life due to jacket or monopile cutting and removal.	×	×	✓	There is potential for disturbance or possibly injury from decommissioning activities, depending on the techniques utilised. It is therefore proposed to include these activities in the assessment.	N/A	
Effects of underwater noise from wind turbine operation during operation and maintenance.	×	✓	×	There is potential for disturbance from wind turbine operation, the magnitude of which will depend on the size of the turbines constructed. The underwater noise impact of very large turbines during operation is not well understood. A qualitative assessment will be included for this impact. Modelling will be undertaken if sufficient input data exists.	N/A	
Effects of underwater noise on marine life due to clearance of unexploded ordnance (UXO) detonation.	✓	×	×	There is potential for disturbance during the construction phase due to the clearance or detonation of UXO, depending on the occurrence, size, and techniques used. It is therefore proposed to include these activities in the assessment.	N/A	
Effects of the particle motion element of underwater noise on fish and shellfish receptors.	✓	×	✓	There is potential for injury or disturbance due to particle motion. The impact of the construction and demolition phases is not well understood and therefore it is proposed to include both in the assessment to at least a qualitative level.	N/A	

Table 3.6: Impacts proposed to be scoped out of the project assessment for underwater noise.

Impact	Justification
Effects of the particle motion element of underwater noise on marine mammals during all phases.	There is insufficient evidence that particle motion has any effect on marine mammals therefore this impact is scoped out of the Marine mammals ES chapter.

3.2.6 Measures adopted as part of the project

3.2.6.1 Measures adopted as part of the project are discussed within each of the relevant sections of the EIA Scoping Report for which underwater noise is considered relevant (section 4.3: marine mammals, section 4.2: fish and shellfish and section 5.1: commercial fisheries). Each of the measures adopted as part of the project relating to reducing potential impacts on receptors from underwater noise will be modelled to assess their efficacy in a quantitative way. These measures may evolve as the engineering design and the EIA progresses.

3.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process. Any approach to noise mitigation will be informed by best available evidence and latest guidance, including any outputs from work undertaken during assessment and construction of the nearby operational offshore wind farms and lessons learnt within the industry.

3.2.7 Proposed assessment methodology

3.2.7.1 The underwater noise EIA will follow the methodology set out in part 1, section 4: EIA Methodology of the EIA Scoping report. Specific to the underwater noise assessment, the following guidance documents will also be considered:

- Good practice guide to underwater noise measurement (NPL, 2014).
- Review of underwater acoustic propagation models (NPL) (Wang *et al*., 2014).
- National Oceanic and Atmospheric Administration (NOAA) technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (NMFS, 2016).
- Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018).
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al.,* 2019).
- Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioural response to human noise (Southall *et al*., 2021)
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al*., 2014).
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).
- Guidance on noise management in harbour porpoise SACs (JNCC, 2020).

- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental status (GES) in Europe's seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." This Directive was transposed into United Kingdom (UK) law by the Marine Strategy Regulations 2010.
- Department for Business, Energy and Industrial Strategy (BEIS) Policy Statement - Marine environment: unexploded ordnance clearance joint interim position statement (BEIS, 2022).

3.2.7.2 The impact criteria will be based on the most recent and up-to-date scientific research and guidance, while utilising a precautionary approach. Potential impacts arising from underwater noise on marine mammals and fish will be assessed with respect to the potential for injury and behavioural disturbance. Where possible, noise source data will be based on measured data from similar wind turbine devices. Source noise levels will be based on a combination of theoretical and empirical predictions, and detailed source level modelling where appropriate. The associated source levels of other types of underwater noise associated with the Mona Offshore Wind Project will be based on published data and established prediction methodologies.

3.2.7.3 Underwater noise modelling is planned to assess the impact of construction and operational noise using a robust, peer reviewed model. In accordance with National Physical Laboratory guidance (NPL, 2014), the choice of model will depend upon many factors which will be determined during the consultation period and will depend on site-specific circumstances (such as bathymetry etc.). However, the chosen model will be appropriate and peer reviewed, such as the energy flux model (Weston, 1976). Such models have been successfully benchmarked against other sound propagation models (e.g. Etter, 2018; Toso *et al*., 2014; Schulkin and Mercer, 1985) and used in previous underwater noise assessments for offshore wind and tidal energy developments as well as for oil and gas and port developments. The noise model proposed for this assessment has been calibrated against a range of other noise models showing good agreement (typically within +/- 1dB out to a range of 2.5km).

3.2.7.4 The exact scope, specification and methodology of the noise propagation modelling will be discussed and agreed with the Marine Management Organisation (MMO), Natural Resources Wales (NRW) and the Statutory Nature Conservation Bodies (SNCBs). On the basis of previous underwater noise modelling completed for other recent offshore wind projects, the assessment will consider the bathymetry and other characteristics of the area, including the geo-acoustic properties of the seabed, as well as other factors such as the sound source characteristics and frequency range of interest. It is anticipated that the underwater noise assessment will likely include:

- A review of the publicly available literature and studies on the impact of impulsive underwater noise on marine mammal and fish species, including an assessment of the sensitivity of fish and marine mammals to underwater noise, and derivation of criteria for estimating the impact, to be agreed with the MMO, NRW and SNCBs.

- Estimation of the realistic design scenario for source level noise for impact piling operations within the Mona Potential Array Area. This will include consideration of the hammer energy, hammer type, ground conditions, water depth, pile size, pile geometry, strike rate, number of strikes and other relevant parameters.
- Estimation of the maximum design scenario for source level noise for impact piling operations within the Mona Potential Array Area. This will include consideration of the hammer energy, hammer type, ground conditions, water depth, pile size, pile geometry, strike rate, number of strikes and other relevant parameters.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of piling during construction within the Mona Potential Array Area.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of the operation and maintenance phase and decommissioning phases within the Mona Potential Array Area.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of concurrent piling operations within the Mona Offshore Wind Project.

3.2.7.5 The model will be used to estimate the unweighted and hearing group weighted Sound Exposure Level (SEL), Root Mean Square (rms) (T90) sound pressure level and peak (peak-to-peak) pressure level parameters, as recommended by Southall *et al.,* 2019, National Marine Fisheries Service (NMFS) 2018, Southall *et al.,* 2007, Acoustic Society of America (ASA) Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al*., 2014) and other guidance. The model will also incorporate swim speeds of marine mammals and fish to calculate cumulative SELs (for example see Table 3.7).

Table 3.7: Assessment swim speeds of marine mammals and fish that are likely to occur within the Irish Sea for the purpose of exposure modelling.

Species	Hearing group	Swim speed (m/s)	Source reference
Harbour seal *Phoca vitulina*	Phocid Carnivores in Water (PCW)	1.8	Thompson, 2015
Grey seal *Halichoerus grypus*	PCW	1.8	Thompson, 2015
Harbour porpoise *Phocoena phocoena*	Very High Frequency (VHF)	1.5	Otani *et al.,* 2001
Minke whale *Balaenoptera acutorostrata*	Low Frequency (LF)	2.3	Boisseau *et al.,* 2001

Species	Hearing group	Swim speed (m/s)	Source reference
Bottlenose dolphin *Tursiops truncatus*	High Frequency (HF)	1.52	Bailey and Thompson, 2010
White-beaked dolphin *Lagenorhynchus albirostris*	HF	1.52	Bailey and Thompson, 2010
Short beaked common dolphin *Delphinus delphis*	HF	1.52	Bailey and Thompson, 2010
Risso's dolphin *Grampus griseus*	HF	1.52	Bailey and Thompson, 2010
Basking shark *Cetorhinus maximus*	Group 1 fish	1.0	Sims, 2000
All fish hearing groups (excluding basking sharks)	Group 1 to 4 fish	0.5	Popper *et al*., 2014

3.2.7.6 Historically, research relating to both physiological effects and behavioural disturbance of noise on marine receptors has typically been based on determining the absolute noise level for the onset of that effect (whether presented as a single onset threshold or a dose response/probabilistic function). Consequently, the available numerical criteria for assessing the effects of noise on marine mammals, fish and shellfish, tend to be based on the absolute noise criteria, rather than the difference between the baseline noise level and the noise being assessed (Southall *et al.*, 2007). The available research rarely takes into account other factors such as measures of impulsivity, frequency content and other characteristics which could be as (or more) important than the absolute level alone. In 2021 Southall *et al.* released additional guidance for the types of measurements and parameters which should be reported as part of studies into the impact of anthropogenic noise on the behaviour of marine life, however no additional quantitative guidance for the assessment of those levels were included (Southall *et al*., 2021). Instead, the guidance makes recommendations for additional parameters to be reported for future studies in order to ensure that better information becomes available in future in order to derive better relationships between the sound, its characteristics and the response (e.g. by investigation the exposure novelty, signal-to-noise ratio, sensation level, rise time etc.). In the meantime, assessing potential behavioural disturbance due to anthropogenic sound is a challenging topic and requires a combination of quantitative assessment (e.g. use of dose-response relationships such as those set out in Graham *et al*. (2017)) and qualitative considerations. The approach proposed for the assessment is described in part 2, section 4.3: Marine mammals, of the EIA Scoping Report.

3.2.7.7 The cumulative effect of multiple events/operations will also be assessed/modelled and will consider the likely exposure times of species, allowing for safe distances and reaction ranges to be determined. Further, modelling will be undertaken with the consideration of mitigation, for example acoustic deterrent devices (ADDs), comparing otherwise identical scenarios with and without ADDs.

3.2.7.8 The results of the noise modelling will be presented in an Underwater Noise Technical Report which will cover underwater noise for the Mona Offshore Wind Project.

3.2.8 Potential cumulative effects

3.2.8.1 Consideration will be given to cumulative effects from underwater noise, in particular during construction related piling activities. The potential for cumulative effects with other offshore wind farm developments, including the Morgan Offshore Wind Project, and other offshore developments with the potential to create underwater noise will be considered in the relevant topic receptors chapters of the ES. A detailed assessment of offshore developments within the area and their construction windows (where available) will be required for the ES, to identify which other offshore developments will be considered in terms of the cumulative underwater noise assessment.

3.2.8.2 The cumulative effects assessment will be considered within the respective ES chapters for marine mammals, fish and shellfish and commercial fisheries.

3.2.9 Potential inter-related effects

3.2.9.1 The potential inter-related effects for underwater noise will be assessed within the relevant technical sections of the ES and described within the relevant sections of the EIA Scoping Report (section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries).

3.2.10 Potential transboundary impacts

3.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. Any transboundary impacts will be discussed within each of the relevant sections of the EIA Scoping Report for which underwater noise is considered relevant (section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries).

4 Offshore biological environment

4.1 Benthic subtidal and intertidal ecology

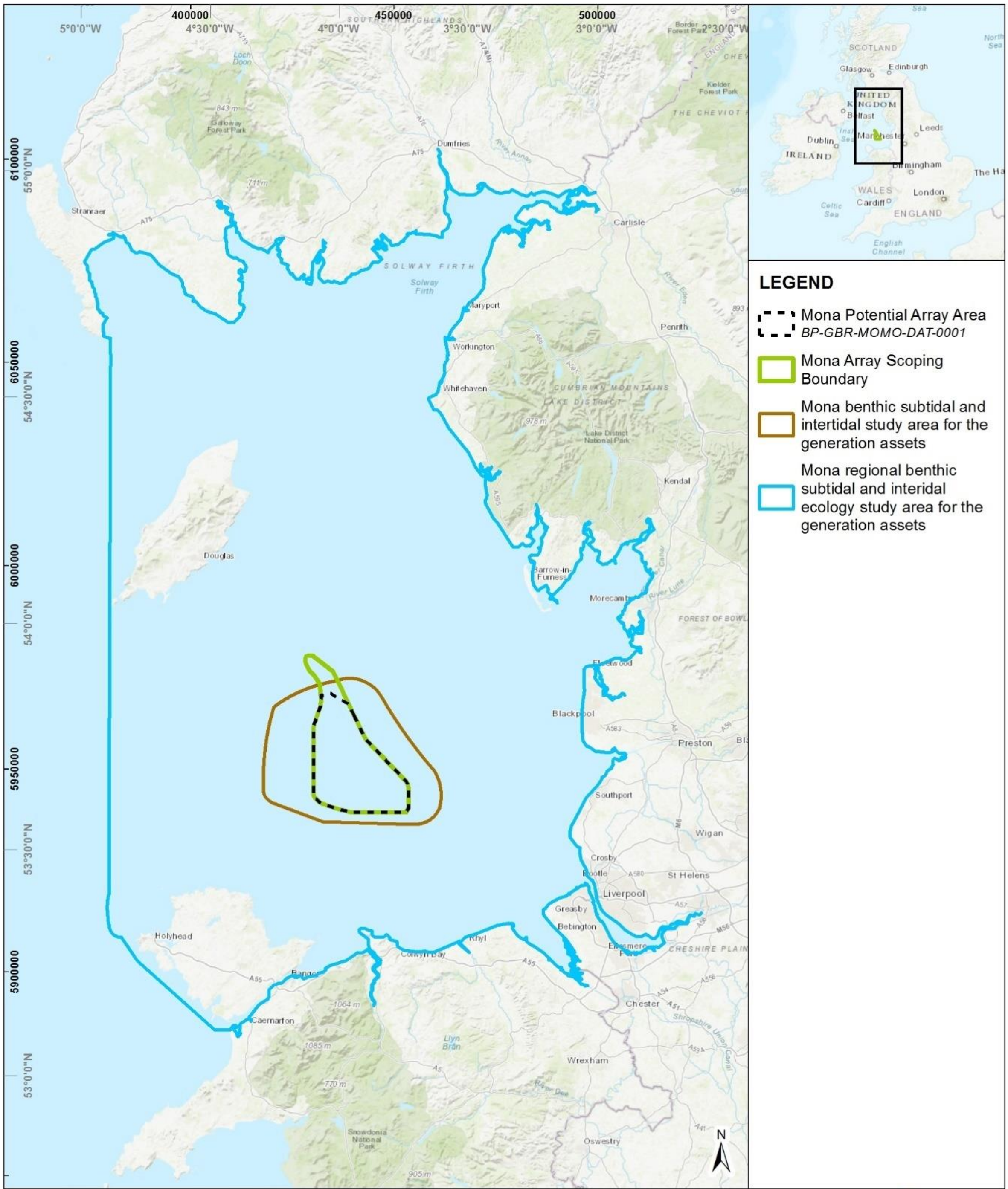
4.1.1 Introduction

4.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the benthic subtidal and intertidal ecology receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets.

4.1.2 Study area

4.1.2.1 To support the development of the Benthic Subtidal and Intertidal Ecology Environmental Statement (ES) chapter, two study areas have been defined:

- The Mona benthic subtidal and intertidal ecology study area for the generation assets: this is defined as the area encompassing the Mona Potential Array Area plus a buffer of one tidal excursion (Figure 4.1). This is the predicted Zone Of Influence (ZOI) of the Mona generation assets and is the area within which site-specific benthic surveys have been undertaken, with further surveys planned for summer 2022. The results of the site-specific benthic surveys will inform the baseline characterisation and identification of benthic receptors against which potential impacts associated with the Mona Offshore Wind Project will be assessed.
- The Mona regional benthic subtidal and intertidal ecology study area for the generation assets covers the east Irish Sea, extending from Mean High Water Springs (MHWS) out to the furthest west extent from the Mull of Galloway in Scotland to the western tip of Anglesey. This study area has been selected to encompassing the wider Irish Sea habitats and includes the neighbouring consented and developing offshore wind farms and designated sites (Figure 4.1). This was considered appropriate as it will provide wider context to the site-specific data collected within the Mona benthic subtidal and intertidal ecology study area for the generation assets and is large enough to consider all direct and indirect impacts of the Mona Offshore Wind Project on the identified receptors.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client.

EnBW bp rps — Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 nm
0 5 10 20 30 40 km

Drawing Number:
RPSE-MN-SCO-017-00

Drawing Title:
MONA BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREAS FOR GENERATION INFRASTRUCTURE

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	01/12/21	First Issue	JA	ST
01	03/03/22	Revision	NA	TGB

Figure 4.1: Mona benthic subtidal and intertidal ecology study areas for the generation assets.

4.1.3 Data sources

Desktop data

4.1.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets, and which will provide context to the site-specific benthic ecology survey data collected. These are summarised in Table 4.1.

Table 4.1: Summary of key desktop datasets and reports.

Title	Source	Year	Author
OneBenthic	Cefas	2021	Cefas
Marine recorder public UK snapshot	Joint Nature Conservation Comittee (JNCC)	2020	JNCC
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
EMODnet broad scale seabed habitat map for Europe (EUSeaMap)	EMODnet – Seabed Habitats	2019	EMODnet – Seabed Habitats
JNCC Marine Protected Area (MPA) mapper	JNCC	2019	JNCC
Burbo Bank extension benthic and annex I habtiat pre-construction survey	Marine Data Exchange	2015	Centre for Marine and Coastal Studies Ltd (CMACS)
Rhiannon offshore wind project Preliminary Environmental Information Report - benthic Ecology	Marine Data Exchange	2014	Celtic Array Ltd
Walney Year 3 post consent benthic monitoring survey report	Marine Data Exchange	2014	CMACS
Burbo Bank extension environmental statement - benthic ecology	Marine Data Exchange	2013	Dong Energy Ltd.
Walney Extension environmental statement. chapter 10 benthic ecology	Marine Data Exchange	2013	Dong Energy
Walney Year 2 post-consent benthic monitoring survey report	Marine Data Exchange	2013	CMACS
Ormonde Year 1 post-construction benthic enviornmental monitoring survey	Marine Data Exchange	2012	CMACS
Burbo Bank Year 3 post construction benthic monitoring survey	Marine Data Exchange	2010	CMACS
Walney pre-construction monitoring report	Marine Data Exchange	2009	CMACS
Gwynt y Môr offshore wind farm baseline characterisation	Marine Data Exchange	2005	CMACS

Title	Source	Year	Author
Burbo Bank pre-construction contaminants investigation	Marine Data Exchange	2005	CMACS
Marine Nature Conservation Review (MNCR) areas summaries- Liverpool Bay and the Solway Firth	JNCC	1998	Covey. R.

Site-specific survey data

4.1.3.2 A site-specific survey was undertaken across the Mona Array Scoping Boundary in summer 2021. The subtidal survey combined drop down video (DDV) and $0.1m^2$ Hamon grab sampling. The sampling strategy was designed to adequately sample the area to provide up to date data for baseline characterisation. The survey design was discussed and updated following advice from Natural Resource Wales (NRW), JNCC and Natural England in June 2021.

4.1.3.3 Sampling was conducted from the MV Ocean Resolution vessel. The survey comprised:

- Combined DDV and $0.1m^2$ Hamon grab sampling at 51 sampling locations and an additional ten camera only stations within the Mona Array Scoping Boundary to ensure adequate data coverage for both infaunal and epifaunal communities at each location, with grab samples analysed for benthic infauna (abundance and biomass), sediment chemistry and particle size analysis (PSA). Sample locations are presented in Figure 4.2.

4.1.3.4 Site-specific geophysical surveys were also undertaken across the Mona Array Scoping Boundary in summer 2021. This included a 2DUHR geophysical survey, side scan sonar (SSS), sub-bottom profiler (SBP) and magnetometer survey. This data will be used to further inform the baseline characterisation alongside the marine ecological datasets.

4.1.3.5 This site-specific data along with the comprehensive desktop information and data sources available will inform the characterisation of the benthic subtidal and intertidal ecology baseline which will be presented within the Preliminary Environmental Information Report (PEIR) and ES.

4.1.3.6 An infill benthic subtidal ecology survey is planned for spring/summer 2022 which will collect data on the benthic habitats within one tidal excursion around the Mona Potential Array Area (the predicted ZOI of the Mona generation assets; Figure 4.1). The 2022 survey will also re-sample a number of sample stations within the Mona Potential Array Area that were taken during the 2021 benthic survey. The scope of the 2022 survey campaign will be discussed and agreed with consultees through the Evidence Plan process.

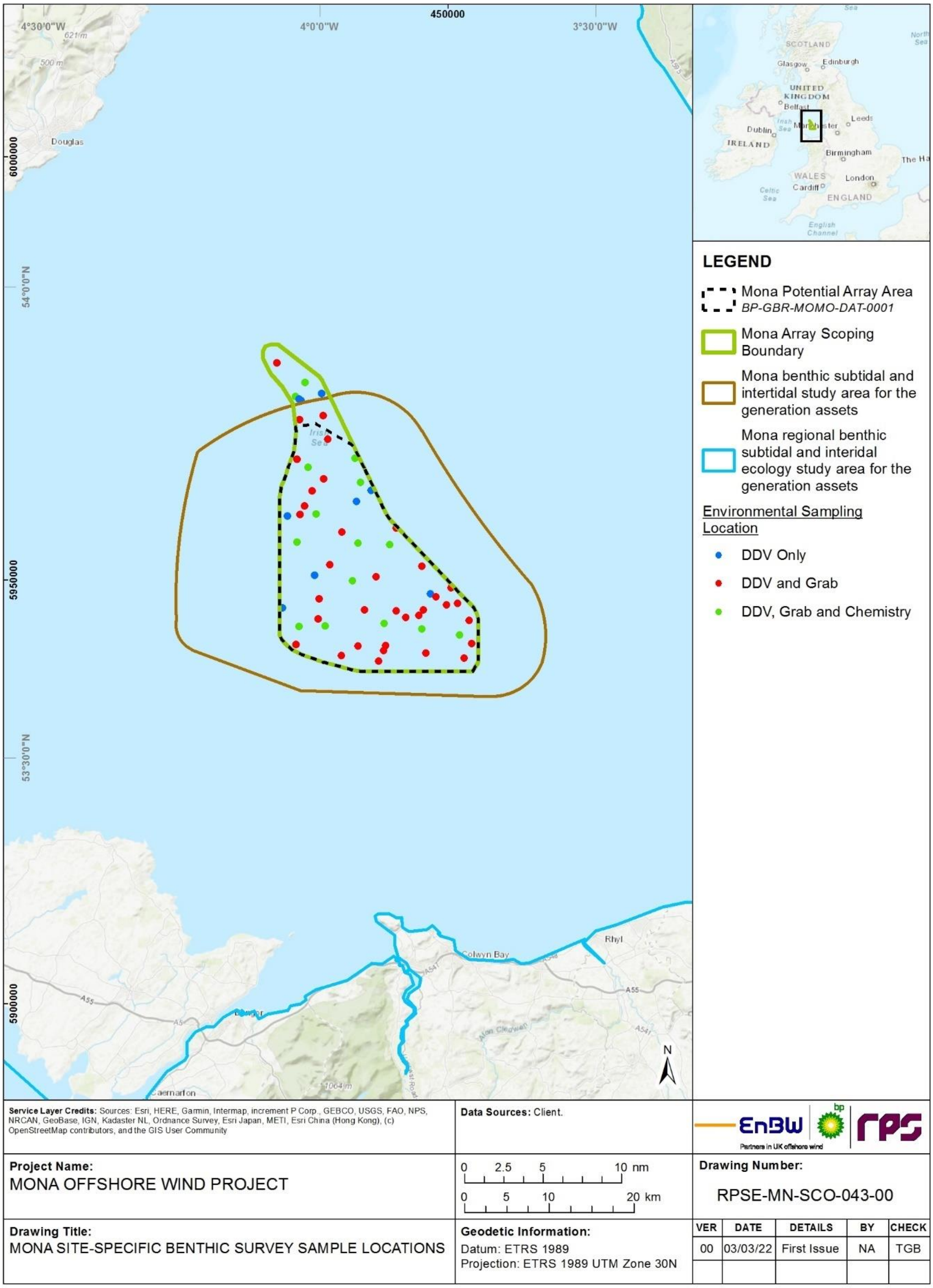


Figure 4.2: Sample locations undertaken across the Mona Array Scoping Boundary during the summer 2021 benthic survey.

4.1.4 Baseline environment

4.1.4.1 This section provides a summary of the benthic ecology baseline environment of the Mona Offshore Wind Project, based on desktop data only.

Subtidal sediments

Mona regional benthic subtidal and intertidal ecology study area for the generation assets

4.1.4.2 Within the Mona regional benthic subtidal and intertidal ecology study area for the generation assets, seabed sediments are dominated by 'circalittoral coarse sediment' (SS.SCS.CCS) and 'circalittoral mixed sediment' (SS.SMx.CMx) in the west with sediments transitioning to 'offshore circalittoral sand' (SS.SSa.OSa) and 'offshore circalittoral mud' (SS.SMu.OMu) to the east of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets. South of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets, sediments transition to SS.SSa.OSa with areas of 'circalittoral rock' (CR) around the coast of Anglesey. Seabed sediments along the north Wales coast are dominated by 'circalittoral fine sand' (SS.SSa.CFiSa) and 'circalittoral muddy sands' (SS.SSa.CMuSa), with areas of SS.SCS.CCS closer to shore around Great Orme headland. A larger area of SS.SCS.CCS occurs north of Colwyn Bay which extends slightly east of Rhyl (illustrated in Figure 4.3; EMODnet, 2019).

4.1.4.3 The Isle of Man is located northwest of the Mona Potential Array Area (Figure 4.3) within the Mona regional benthic subtidal and intertidal ecology study area for the generation assets. SS.SCS.CCS were recorded to the south and east of the isle, while 'infralittoral coarse sediments' (SS.SCS.ICS) were observed north of the isle. SS.SSa.CFiSa and SS.SSa.CMuSa were present to the east of the isle (illustrated in Figure 4.3; EMODnet, 2019).

4.1.4.4 The benthic surveys conducted for planned and operational offshore wind projects within the Mona regional benthic subtidal and intertidal ecology study area for the generation assets also provide an overview of the sedimentary habitats present within the immediate vicinity of the Mona benthic subtidal and intertidal ecology study area for the generation assets (illustrated in Figure 4.4).

4.1.4.5 The Ormonde offshore wind project is within the northeast of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets. The 2013 year 1 post construction benthic monitoring survey for the Ormonde offshore wind project reported mud, sand and gravel sediments across the Ormonde offshore wind project array area and export cable corridor. Sample sites further offshore reported a higher percentage of mud compared to the inshore sample sites (CMACS, 2012).

4.1.4.6 Pre-construction monitoring surveys for Walney Extension in 2011 and 2012 and a subsequent monitoring survey for Walney in 2014 were undertaken in the east of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets. The surveys reported the presence of subtidal mud and subtidal sand within the Mona regional benthic subtidal and intertidal ecology study area for the generation assets (Dong Energy, 2013; CMACS, 2014).

4.1.4.7 Benthic surveys were undertaken in 2010 and 2012 to support the EIA benthic baseline characterisation for the Rhiannon offshore wind project. These surveys reported that sediments were dominated by SS.SCS.CCS, SS.SSa.CFiSa, SS.SMx.CMx with patches of moderately exposed rock reef. Sediments graded into mud sediments towards the Welsh coast. Two large sandbanks were recorded off Lynas Point, as illustrated within Figure 4.4. These were composed of very well sorted mobile sand that remains submerged at all times (Celtic Array Ltd, 2014).

<u>Mona benthic subtidal and intertidal ecology study area for the generation assets</u>

4.1.4.8 Preliminary results from the 2021 site-specific survey report that sediments within the Mona Potential Array Area ranged from sand to muddy sandy gravels with finer sand present within the south of the Mona Potential Array Area which have formed poorly defined sandwaves and megaripples which reach up to 6.5m in height. The survey identified SS.SCS.CCS, SS.SMx.CMx and SS.SSa.CFiSa.

4.1.4.9 Sediments overlapping with the Mona benthic subtidal and intertidal ecology study area for the generation assets were reported in the Rhiannon baseline surveys as SS.SMx.CMx with SS.SCS.CCS to the centre and north of the Mona benthic subtidal and intertidal ecology study area for the generation assets (Celtic Array Ltd, 2014).

4.1.4.10 The EUSeaMap data describes the Mona benthic subtidal and intertidal ecology study area for the generation assets as being dominated by A5.15 deep circalittoral coarse sediments in the western extent of the Mona benthic subtidal and intertidal ecology study area for the generation assets. This sediment type stretches through the western extent of the Mona Potential Array Area, with a large pocket of A5.45 deep circalittoral mixed sediments also present on the western Mona Potential Array Area. The eastern extent of the Mona benthic subtidal and intertidal ecology study area for the generation assets overlaps with an area A5.27 deep circalittoral sand (illustrated in Figure 4.3; EMODnet, 2019). The EUSeaMap describes these habitats as moderate energy habitats (EMODnet, 2019).

4.1.4.11 Further detail on the seabed sediments within the Mona benthic subtidal and intertidal ecology study area for the generation assets from the site-specific surveys will be presented in the PEIR and ES.

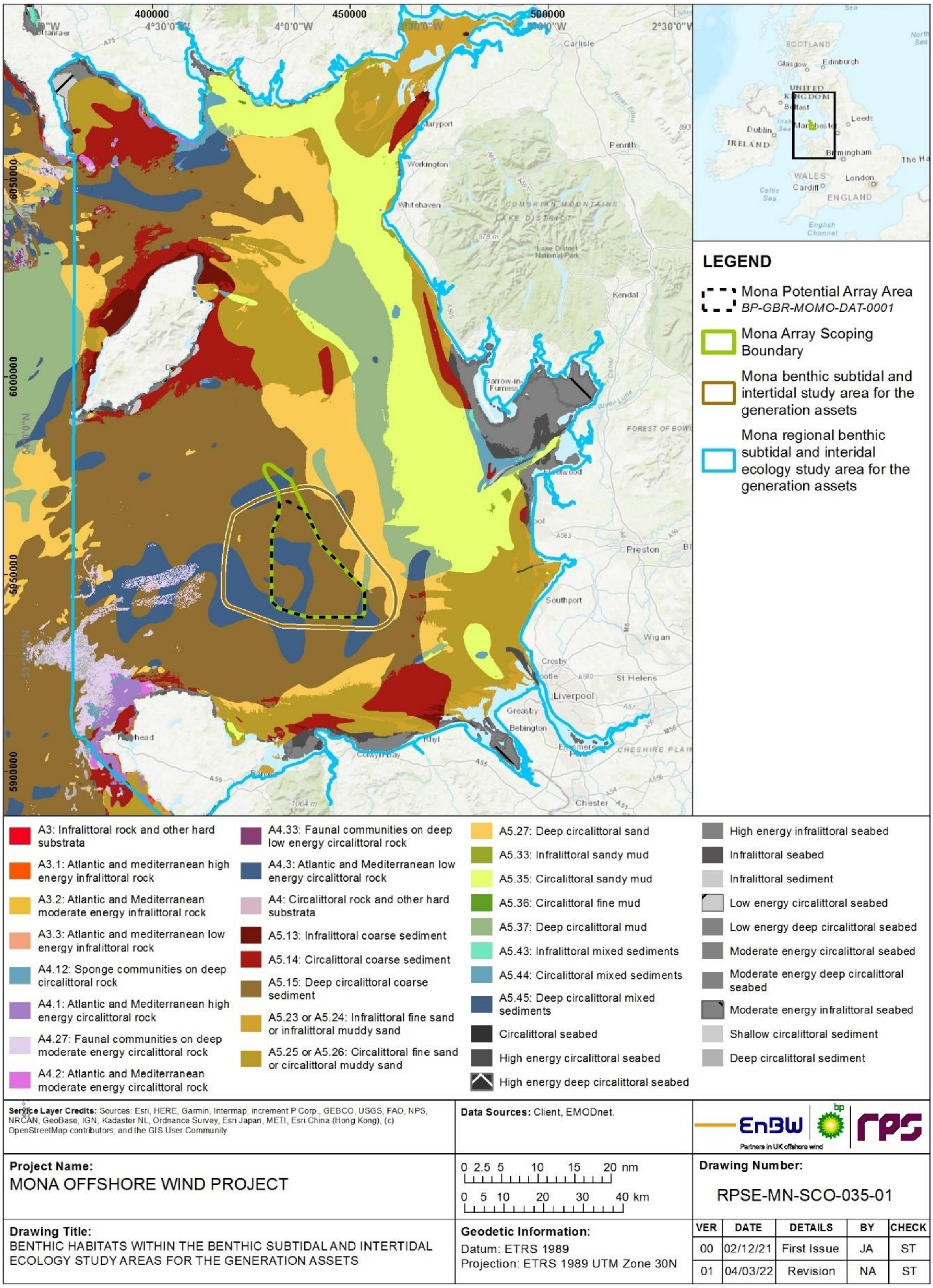


Figure 4.3: Predicted ENUIS habitats from the EUSeaMap for the benthic subtidal and intertidal ecology study areas for the generation assets (Source, EMODnet, 2019).

Sediment contamination

4.1.4.12 Benthic surveys undertaken for the Rhiannon offshore wind project reported sediment chemical contaminants at generally very low levels across the Mona benthic subtidal and intertidal ecology study area for the generation assets and wider surveyed area. Arsenic marginally exceeded Cefas Action Level 1 in a several samples taken across the Rhiannon offshore wind project array area, within the west of the Mona benthic subtidal and intertidal ecology study area for the generation assets (Figure 4.4). Arsenic levels are relatively high in Liverpool Bay and surrounding areas (e.g. Camacho-Ibar *et al*., 1992). This is generally considered to be due to weathering of glaciated regions such as North Wales and the Lake District rather than to anthropogenic sources (e.g. Leah *et al.,* 1992; Thornton *et al*., 1975).

4.1.4.13 Pre-construction monitoring surveys for Walney Extension in 2011 and 2012 reported elevated levels of aluminium, iron and arsenic, however they were at levels not considered to pose a risk to the environment (Dong Energy, 2013).

4.1.4.14 Pre-construction monitoring surveys for Burbo Bank offshore wind project in 2005 reported that most contaminants were below the interim sediment quality guidelines and Probable Effect Levels (PELs) (Cole *et al*., 2001; Nagpal *et al*., 2001). Elevated levels of lead and mercury were reported, with only arsenic and zinc detectable below 1.5m from the seabed surface. The report concluded that the construction, operation and decommissioning of the offshore wind farm prosed no increased risk to water quality (CMACS, 2005).

Subtidal benthic communities

<u>Mona regional benthic subtidal and intertidal ecology study area for the generation assets</u>

4.1.4.15 Benthic surveys undertaken for the Rhiannon offshore wind project reported that this section of the east Irish Sea was dominated by SS.SMx.CMx, 'offshore circalittoral mixed sediments' (SS.SMx.OMx), SS.SMx.CMx-'*Ophiothrix fragilis*[1] and/or *Ophiocomina nigra*[2] on sublittoral mixed sediment' SS.SMx.CMx.OphMx and SS.SCS.CCS (Figure 4.4). Large patches of SS.SSa.CFiSa were recorded further west and to the north of the Rhiannon offshore wind project survey area and Mona Potential Array Area (Figure 4.4; Celtic Array Ltd, 2014).

4.1.4.16 The '*Mediomastus fragilis*[3], *Lumbrineris*[3] *spp*. and venerid bivalves in circalittoral coarse sand or gravel' (SS.SCS.CCS.MedLumVen) biotope was reported to be widespread across the southeast of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets. However, when considering the wider area, the match was not felt to be sufficiently strong enough to be a separate biotope on the final biotope map for the Rhiannon offshore wind farm (Figure 4.4); Celtic Array Ltd, 2014a). The SS.SMx.CMx habitats were often sufficiently covered with *Ophiothrix*

[1] Common brittlestar

[2] Black brittlestar

[3] Polychaete

sufficiently covered with *Ophiothrix fragilis*[1] to be classified as the biotope SS.SMx.CMx.OphMx (Figure 4.4; Celtic Array Ltd, 2014a).

4.1.4.17 Annex I (of the Habitats Directive; see part 1, section 2: Policy and legislation, of the EIA Scoping Report) rocky reefs of mostly low to moderate reefiness, were recorded to the west of the Rhiannon offshore wind project array area, over 10km to the west of the Mona Potential Array Area and over 5km from the Mona benthic subtidal and intertidal ecology study area for generation assets. It was characterised by relatively sparse epifauna dominated by starfish, with some dense patches of *O. fragilis*[1]. Annex I rocky reefs were mapped separately and were not presented on the biotope map available on the Marine Data Exchange (as of December 2021). Annex I stony reefs were also recorded over 10km to the west of the Mona Potential Array Area and over 5km from the Mona benthic subtidal and intertidal ecology study area for generation assets, however these mostly occurred as a patchwork of boulders over areas more generally described as SS.SMx.CMx or SS.SCS.CCS and were not presented as defined areas on the biotope map available on the Marine Data Exchange (Figure 4.4;Celtic Array, 2014a).

4.1.4.18 No Annex I *Sabellaria spinulosa*[4] reefs were recorded, however a mosaic of '*Sabellaria spinulosa*[4] encrusted circalittoral rock' (CR.MCR.CSab.Sspi) and '*Sabellaria spinulosa*[4] on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx) were recorded in a very small patch over 20km outside the Mona Potential Array Area, in the west of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets (Figure 4.4; Celtic Array, 2014a).

4.1.4.19 Areas of potential *Modiolus*[5] reefs were recorded over 10km outside the Mona Potential Array Area, to the west of the Mona benthic subtidal and intertidal ecology study area for the generation assets. These occur within the biotope 'Sublittoral mussel beds' (SS.SBR.Smus) (Celtic Array Ltd, 2014a; Figure 4.4). Potential *Modiolus*[5] reefs have also been recorded by NRW in 2015 north of Anglesey, to the southeast of the Mona benthic subtidal and intertidal ecology study area for the generation assets (Moore *et al*., 2017).

4.1.4.20 Benthic surveys undertaken in 2013 for the Walney Year 2 post construction survey recorded sandy mud sediment communities within the Walney offshore wind project array area. They recorded mixed sediment communities closer to the coast and bivalve dominated communities closest to the Mona benthic subtidal and intertidal ecology study area for the generation assets (CMACS, 2013; Figure 4.4). The main four habitats recorded were:

- '*Amphiura filiformis*[6], *Mysella bidentata*[5] and *Abra nitida*[7] in circalittoral sandy mud' (SS.SMu.CSaMu.AfilMysAnit).

[4] Ross worm

[5] Bivalve

[6] Brittlestar

[7] Glossy furrow shell

- '*Thyasira*[5] spp. and *Nuculoma tenuis*[5] in circalittoral sandy mud'/'*Abra alba*[8] and *Nucula nitidosa*[9] in circalittoral muddy sand or slightly mixed sediment' (SS.SMu.CSaMu.ThyNten/SS.SSA.CMuSa.AalbNuc).
- '*Ampelisca*[10] spp., *Photis longicaudata*[10] and other tube-building amphipods and polychaetes in infralittoral sandy mud' (SS.SMu.ISaMu.AmpPlor).
- '*Fabulina fabula*[11] and *Magelona mirabilis*[3] with venerid bivalves and amphipods in infralittoral compacted fine muddy sand' (SS.SSa.IMuSa.FfabMag).

4.1.4.21 The 2013 year 1 post construction benthic monitoring survey for the Ormonde offshore wind project reported that faunal taxa composition of samples was dominated by annelids, molluscs and crustaceans. Number of individuals was dominated by annelids and echinoderms which was attributable to the high number of *Amphiura filiformis*[6]. No Annex I reefs were recorded (CMACS, 2012).

4.1.4.22 Pre-construction monitoring surveys for Walney Extension recorded *A. filiformis*[6] and phoronid worms in high abundances alongside species of bivalve molluscs and polychaete worms that are adapted to mud sediments. The dominant benthic habitats recorded in the 2011 and 2012 surveys were (Dong Energy, 2013):

- SS.SMx.CMx.
- 'Mysella bidentata[5] and Thyasira[5] spp. in circalittoral, muddy mixed sediments' (SS.SMx.CMx.MysThyMx).
- SS.SMu.CSaMu.AfilMysAnit.

4.1.4.23 The dominant benthic habitats recorded in the 2014 surveys were (CMACS, 2014):

- 'Nephtys cirrosa[3] and Bathyporeia[10] spp. in infralittoral sand' (SS.SSa.IFiSa.NcirBat).
- 'Dense Lanice conchilega[12] and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand' (SS.SCS.ICS.SLan).
- SS.SSa.IMuSa.FfabMag.
- SS.SMu.CSaMu.AfilMysAnit.
- 'Thyasira5 spp. and Nuculoma tenuis[5] in circalittoral sandy mud' (SS.SMu.CSaMu.ThyNten).
- 'Circalittoral Sandy Mud' (SS.SMu.CSaMu).

4.1.4.24 Evidence of the habitat feature of conservation importance 'sea pen and burrowing megafauna communities' has previously been recorded within

---

[8] White furrow shell

[9] Shiny nut shell

[10] Amphipod

[11] Bean-like tellin

[12] Sand mason worm

the Walney Offshore Wind Farm and the Walney Extension Offshore Wind Farm, within the Mona regional benthic subtidal and intertidal ecology study area for the generation assets, over 20km from the Mona Potential Array Area (Figure 4.4, Table 4.2; Dong Energy, 2013; CMACS, 2014).

Mona benthic subtidal and intertidal ecology study area for the generation assets

4.1.4.25 Benthic surveys undertaken for the Rhiannon offshore wind project reported rich faunal communities on SS.SMx.CMx and SS.SCS.CCS in the Mona benthic subtidal and intertidal ecology study area for the generation assets. Mud content was generally low, and all the predominant sediment types were sandy gravels and gravelly sands (Figure 4.4; Celtic Array Ltd, 2014a).

4.1.4.26 Preliminary results from the 2021 site-specific drop down video benthic subtidal survey reported sparse visible fauna in mobile sandy sediments and higher densities of visible fauna in areas of gravel. Initial survey results reported SS.SMx.CMx.OphMx within the east of the Mona Potential Array Area. Initial analysis of ‘sea pen and burrowing megafauna communities’ habitat suggest that the Mona Potential Array Area is unlikely to constitute anything other than low resemblance to the habitat. Two stations within the east of the Mona Potential Array Area may show evidence of a low resemblance to a rocky reef habitat. Initial survey results show no evidence of any Annex I habitats, priority habitats or species, species or habitats on the OSPAR (2008) list of threatened and/or declining species and habitats or species on the IUCN (2021) Global Red List.

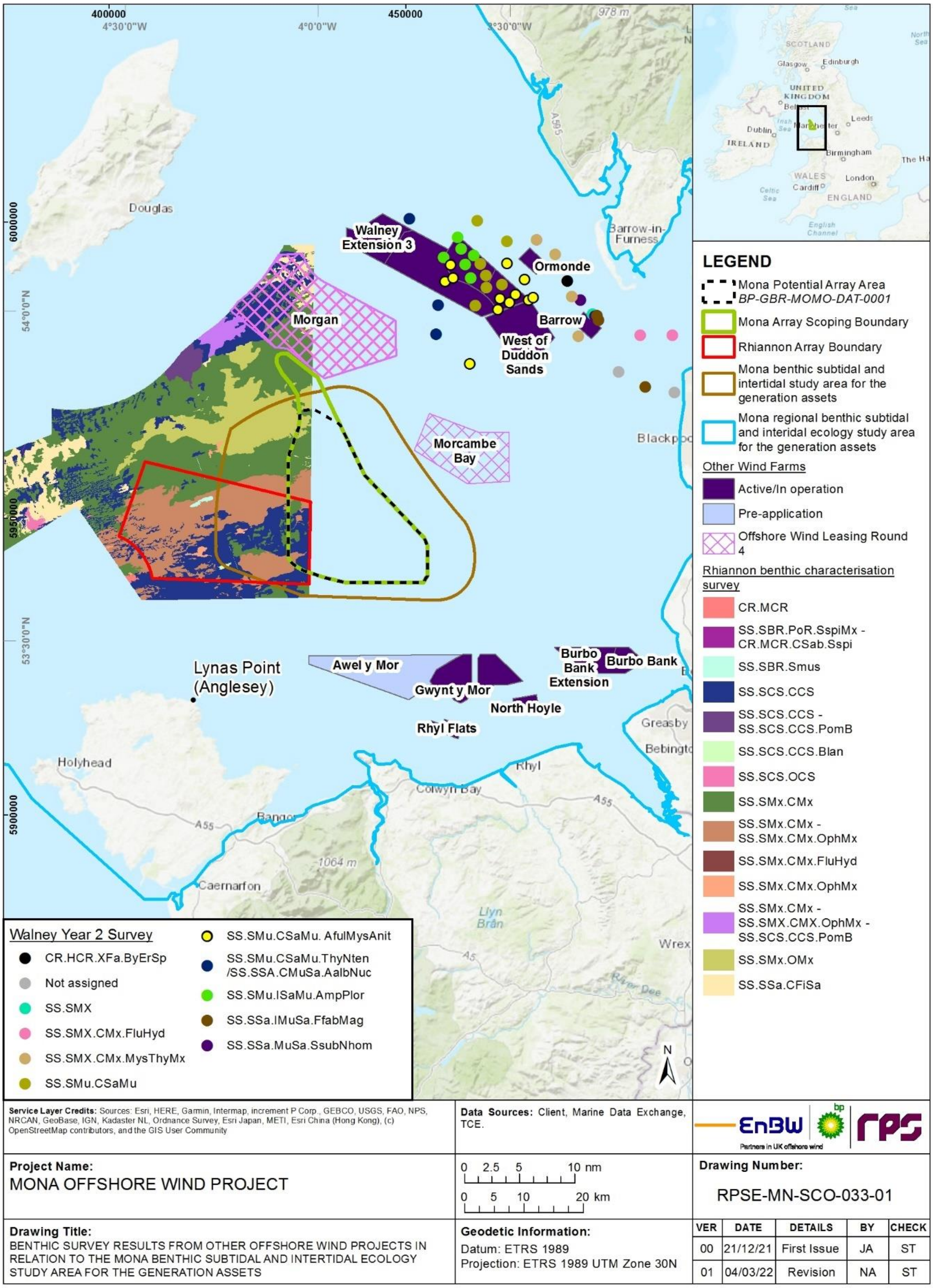


Figure 4.4: Benthic survey results for the other offshore wind projects in relation to the Mona benthic subtidal and intertidal ecology study area for the generation assets.

Table 4.2: JNCC marine habitat codes used in Figure 4.4 (JNCC, 2022).

Habitat code	Biotope description
CR.MCR	Moderate energy circalittoral rock
CR.MCR.CSab.Sspi	*Sabellaria spinulosa*[4] encrusted circalittoral rock
CR.HCR.XFa.ByErSp	Bryozoan turf and erect sponges on tide-swept circalittoral rock
SS.SBR.PoR.SspiMx	*Sabellaria spinulosa*[4] on stable circalittoral mixed sediment
SS.SBR.Smus	Sublittoral mussel beds (on sublittoral sediment)
SS.SCS.CCS	Circalittoral coarse sediment
SS.SCS.CCS.PomB	*Pomatoceros triqueter*[3] with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles
SS.SCS.CCSBlan	*Branchiostoma lanceolatum*[13] in circalittoral coarse sand with shell gravel
SS.SCS.OCS	Offshore circalittoral coarse sediment
SS.SMx	Sublittoral mixed sediment
SS.SMx.CMx	Circalittoral mixed sediment
SS.SMx.OphMx	*Ophiothrix fragilis*[1] and/or *Ophiocomina nigra*[2] brittlestar beds on sublittoral mixed sediment
SS.SMx.CMx.FluHyd	*Flustra foliacea*[14] and *Hydrallmania falcata*[15] on tide-swept circalittoral mixed sediment
SS.SMx.CMx.MysThyMx	*Mysella bidentata*[5] and *Thyasira*[5] spp. in circalittoral muddy mixed sediment
SS.SMx.OMx	Offshore circalittoral mixed sediment
SS.SSa.CFiSa	Circalittoral fine sand
SS.SMu.CSaMu	Circalittoral sandy mud
SS.SMu.CSaMu.AfulMysAnit	*Amphiura filiformis*[6], *Mysella bidentata*[5] and *Abra nitida*[7] in circalittoral sandy mud
SS.SMu.CSaMu.ThyNten	*Thyasira*[5] spp. and *Nuculoma tenuis*[5] in circalittoral sandy mud
SS.SSa.CSaMu.AalbNuc	*Abra alba*[8] and *Nucula nitidosa*[9] in circalittoral muddy sand or slightly mixed sediment
SS.SMu.ISaMu.AmpPlor	*Ampelisca*[10] spp., *Photis longicaudata*[10] and other tube-building amphipods and polychaetes in infralittoral sandy mud
SS.SSa.IMuSa.FfabMag	*Fabulina fabula*[11] and *Magelona mirabilis*[3] with venerid bivalves and amphipods in infralittoral compacted fine muddy sand
SS.SSa.MuSa.SsubNhom	*Spisula subtruncata*[16] and *Nephtys hombergii*[3] in shallow muddy sand

Designated sites

4.1.4.27 The identification of designated sites for inclusion in the Mona benthic subtidal and intertidal ecology EIA was carried out as follows:

- Sites with relevant qualifying features which overlap with the Mona Potential Array Area were screened in for further assessment.

[13] European lancelet

[14] Hornwrack

[15] Hydrozoa

[16] Cut through shell

- Sites with relevant qualifying features, which are located within the likely ZOI of effects associated with the Mona Potential Array Area were screened in for further assessment. The likely ZOI is encapsulated by the Mona benthic subtidal and intertidal ecology study area for the generation assets and has been determined through a review of the potential impacts associated with the Mona Offshore Wind Project. On this basis designated sites within the Mona benthic subtidal and intertidal ecology study area for the generation assets have been included. This ensures that all sites potentially affected by changes in water quality (e.g. increased suspended sediment concentrations) and potential changes to the hydrodynamic regime are included in the assessment.

4.1.4.28 On the basis of this screening methodology, no sites with benthic features of nature conservation importance (European conservation sites (i.e. Special Areas of Conservation (SACs), Ramsar), national designations (i.e. Sites of Special Scientific Interest (SSSI), or Marine Conservation Zones (MCZs)) overlap with the Mona benthic subtidal and intertidal ecology study area for the generation assets, and therefore no sites have been screened into the EIA for the Mona generation assets.

4.1.4.29 Information to support a full screening of European sites with qualifying benthic subtidal and/or intertidal interest features will be provided in the Likely Significant Effects (LSE) screening report for the Mona Offshore Wind Project, as part of the Habitats Regulation Assessment (HRA) process. Relevant features screened into the benthic subtidal and intertidal ecology assessment will be fully considered and assessed in the Benthic subtidal and intertidal ecology ES chapter. The assessment on European sites and effects on the site(s) conservation objectives will be undertaken in the Report to Inform Appropriate Assessment (RIAA). Information on and a preliminary screening of relevant Marine Conservation Zones (MCZs) has been included in part 4, Annex C: MCZ Screening of the EIA Scoping Report.

Protected species and habitats

4.1.4.30 Several species and habitats of conservation importance have been recorded or have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the generation assets. These are presented below in Table 4.3 and include those species and habitats protected under Annex I of the Habitats Regulations. Where species are afforded protection under other legislation, this has also been noted.

Table 4.3: Relevant protected benthic species and habitats which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the generation assets.

Benthic species and habitats	Protection legislation
Rocky Reef	• Annex I of the Habitats Regulations
Cobble Reef	• Annex I of the Habitats Regulations
Sabellaria spinulosa[4] reef	• Annex I of the Habitats Regulations

Benthic species and habitats	Protection legislation
	• Habitat of principal importance in England under the Natural Environment and Rural Communities Act 2006 (NERC 2006 Act) • UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR (Oslo-Paris) convention • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016 • MCZ Feature of Conservation Importance (FOCI)
Modiolus reef	• Annex I of the Habitats Regulations • Habitat of principal importance in England under the NERC Act 2006. • UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR convention • Habitat of principal importance under Section 7 of the Environment (Wales) Act 2016 • MCZ Habitat FOCI
Sea pen and burrowing megafauna communities	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR convention • Habitat of principal importance in England under the NERC Act 2006. • Habitat of principal importance under Section 7 of the Environment (Wales) Act 2016 • MCZ Habitat FOCI
Subtidal sands and gravels	• Annex I of the Habitats Regulations • Habitat of principal importance in England under the NERC Act 2006. • UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR convention • Habitat of principal importance under Section 7 of the Environment (Wales) Act 2016 • MCZ Habitat FOCI

4.1.5 Potential project impacts

4.1.5.1 A range of potential impacts on benthic subtidal and intertidal ecology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

4.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.4 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.1.5.3 Potential impacts scoped out of the assessment are presented in Table 4.5, with justification.

Table 4.4: Impacts proposed to be scoped into the project assessment for benthic subtidal and intertidal ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Increased suspended sediment concentrations (SSC) and associated deposition.	✓	✓	✓	Sediment disturbance arising from construction activities (e.g. foundation and cable installation – including drilling and any deposits arising, unexploded ordnance (UXO) detonation and seabed preparation); maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.); and decommissioning activities (e.g. cable and foundation removal) may result in indirect impacts on benthic communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects). Changes in SSCs can impact benthic receptors through changes in water clarity and reduced feeding due to increases in suspended solids and smothering and siltation rate changes.	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022 infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact assessment. Further details of this modelling are presented within section 3.1. For the operation and maintenance phase, the magnitude is assumed to be no greater than for the construction phase therefore modelling carried out for the construction phase will be used to quantify the magnitude of effect. The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario (MDS). For example, the MDS for increases in SSC/associated deposition will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the Mona regional benthic subtidal and intertidal ecology study area for the generation assets. The sensitivity of benthic receptors will be determined using the Marine Evidence based Sensitivity Assessment (MarESA) tool.
Temporary habitat loss/disturbance.	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of installation activities, cable installation activities (including UXO detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss/disturbance may occur during the operation and maintenance phase as a result of operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022 infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove array cables, and jack-up operations to remove foundations, resulting in potential effects on benthic ecology.		
Long term habitat loss.	✓	✓	×	There is the potential for long term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase although this impact will largely occur throughout the operation and maintenance phase. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the Mona Offshore Wind Project lifetime.	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022 infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Increased risk of introduction and spread of invasive non-native species (INNS).	✓	×	✓	There is potential for an increased risk of introduction and spread of INNS through the vessel movements required during the construction phase and decommissioning phase.	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022 infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES. This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Colonisation of hard structures.	×	✓	×	Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of marine INNS.	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022 infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES. This assessment will be based on information derived from the PDE. Invasive non-native species (INNS) will be considered, particularly in relation to colonisation of hard structures. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Changes in physical processes.	×	✓	×	The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022	Outputs of numerical modelling (as per section 3.1) undertaken for the physical processes assessment will inform this impact assessment. The approach to

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology.	infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Removal of hard substrates.	×	×	✓	The removal of foundations and any scour/cable protection during decommissioning has the potential to lead to loss of species/habitats colonising these structures.	Benthic subtidal surveys were undertaken across the Mona Array Scoping Boundary in 2021. A 2022 infill benthic subtidal ecology survey will also be undertaken. Together these will provide data to support the benthic characterisation within the Mona benthic subtidal and intertidal ecology study area for the generation assets.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.

Table 4.5: Impacts proposed to be scoped out of the project assessment for benthic subtidal and intertidal ecology.

Impact	Justification
Impacts to benthic invertebrates due to electromagnetic fields (EMF).	EMF generated through the subsea electrical cabling may affect benthic subtidal receptors however there is limited evidence on the electro sensitivity of benthic organisms and therefore the impact of EMFs on benthic invertebrates. In addition, for buried cables, the magnetic field at the seabed is reduced due to the distance between the cable and the seabed surface as a result of field decay with distance from the cable (CSA, 2019). A recent study conducted by CSA (2019) found that inter-array and export cables buried between depths of 1m to 2m reduces the magnetic field at the seabed surface four fold. For cables that are unburied and instead protected by thick concrete mattresses or rock berms, the field levels were found to be similar to buried cables. A Cable Specification and Installation Plan (CSIP) for the Mona Offshore Wind Project will include cable burial where possible or cables will be protected as necessary therefore there is limited scope for impacts to benthic invertebrates due to electromagnetic fields. Impacts of EMF on shellfish species will be fully assessed in the Fish and shellfish ecology ES Chapter (see part 2, section 4.2: Fish and Shellfish of the EIA Scoping Report).
Accidental pollution during construction, operation and maintenance and decommissioning.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post consent plans (e.g. Environmental Management Plan, including Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR, International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as a MPCP. As such, it is intended that this impact is scoped out of further consideration within the Benthic subtidal and intertidal ecology ES chapter.
Impacts from the release of sediment-bound contaminants.	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. Historical sampling within the vicinity of the Mona Potential Array Area has shown levels of sediment contaminants are low. The risk of sediment-bound contaminants being present in concentrations likely to be harmful to benthic receptors is considered to be low. Site-specific sediment chemistry sampling will be undertaken across the Mona Potential Array Area during subtidal sampling. This potential impact is proposed to be scoped out of further consideration within the Benthic subtidal and intertidal ecology ES chapter subject to the results of the site-specific surveys and consultation with the Statutory Nature Conservation Bodies (SNCBs) via the Evidence Plan process.

4.1.6 Measures adopted as part of the project

4.1.6.1 The following measures adopted as part of the project are relevant to benthic subtidal and intertidal ecology. These measures may evolve as the engineering design and EIA progresses.

- Development and adherence to a CSIP which will include cables to be buried to where possible and cable protection as necessary (The potential impact of this measure will be consulted upon with statutory consultees throughout the EIA process).
- Development of, and adherence to, a Construction Method Statement (CMS).
- Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.

4.1.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of the effects and will be consulted upon with statuary consultees throughout the EIA process.

4.1.7 Proposed assessment methodology

4.1.7.1 The benthic subtidal and intertidal ecology EIA will follow the methodology set out in part 1 section 4: EIA Methodology of the EIA Scoping Report. Specific to the Benthic Subtidal and Intertidal Ecology EIA, the following guidance documents will also be considered:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2019).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef (Limpenny *et al.,* 2010).
- Defining and Managing *Sabellaria spinulosa* Reefs (Gubbay, 2007).
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009).
- Advances in assessing *Sabellaria spinulosa* reefs for ongoing monitoring (Jenkins *et al.,* 2018).
- Marine Evidence-based Sensitivity Assessment – A Guide (Tyler-Walters *et al*., 2018).
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).

4.1.7.2 A Benthic Subtidal and Intertidal Ecology Technical Report will present a detailed baseline characterisation for the Mona Offshore Wind Project using site-specific survey data and the most recent desktop data. This report will inform the Benthic subtidal and intertidal ecology ES chapter. The approach and focus of these impact assessments will be discussed with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Evidence Plan process.

4.1.7.3 For the purposes of undertaking the EIA, marine habitats and species identified as occurring in the Mona benthic subtidal and intertidal ecology study area for the generation assets will be grouped into broad habitat/community types. These broad habitat/community types will serve as the Important Ecological Features (IEFs) against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Mona Offshore Wind Project will be assessed. Habitats with similar physical and biological characteristics (including species complement and richness/diversity) as well as conservation status/interest will be grouped together for the purposes of the EIA. Consideration will also be given to the sensitivities of different habitats in assigning the groupings, such that habitats and species with similar vulnerability and recoverability, often as a result of similar broad sediment types and species complements, will be grouped together. Impacts on IEFs will be described in terms of the magnitude of that impact and correlated against the sensitivity of each IEF to that each impact, to produce a statement of significance (see part 1 section 4: EIA Methodology of the EIA Scoping Report).

4.1.7.4 Information on the sensitivities of benthic ecology receptors will largely be drawn from the MarESA (Tyler-Walters *et al*., 2018). The MarESA is a database which has been developed through the Marine Life Information Network (MarLIN) of Britain and Ireland and is maintained by a number of organisations, including the Marine Biological Association (MBA) and other statutory organisations in the UK. This database comprises a detailed review of available evidence on the effects of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of effect.

4.1.7.5 The evidence base presented in the MarESA is peer reviewed and represents the largest review undertaken to date on the effects of human activities and natural events on marine species and habitats. It is considered to be one of the best available sources of evidence relating to recovery of benthic species and habitats.

4.1.7.6 Further detail of how sensitivity is defined is outlined in Tyler-Walters *et al*. (2018). Sensitivities to the key activities across the Mona Offshore Wind Project lifetime (i.e. construction, and operation and maintenance and decommissioning phases) will be summarised according to the MarESA for each of the IEFs within the Mona benthic subtidal and intertidal ecology study area for the generation assets. Where sensitivity information on specific biotopes are not available through the MarESA, suitable proxies will be used.

4.1.8 Potential cumulative effects

4.1.8.1 The majority of predicted effects of construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project infrastructure within the Mona Potential Array Area on benthic communities are considered to be localised to within the footprint of the Mona Offshore Wind Project. However, there is potential for cumulative effects to occur on benthic subtidal and intertidal ecology from other projects or activities within the Mona regional benthic subtidal and intertidal ecology study area for the generation assets, where projects or plans could act collectively with the Mona Offshore Wind Project to affect benthic receptors. The cumulative effects assessment will follow the approach outlined in section part 1 section 4: EIA Methodology of the EIA Scoping Report.

4.1.9 Potential inter-related effects

4.1.9.1 The assessment of potential inter-related effects will be considered within the Benthic subtidal and intertidal ecology ES chapter. It will include consideration of project lifetime effects and receptor led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

4.1.10 Potential transboundary impacts

4.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for significant transboundary effects with regard to benthic subtidal and intertidal ecology due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project, as the predicted impacts on the benthic communities will largely occur within the footprint of the Mona Potential Array Area.

4.2 Fish and shellfish ecology

4.2.1 Introduction

4.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the fish and shellfish ecological receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets.

4.2.2 Study area

4.2.2.1 Fish and shellfish are spatially and temporally variable therefore, for the purpose of the fish and shellfish ecology characterisation, a broad study area has been defined. The Mona fish and shellfish ecology study area for the generation assets is presented in Figure 4.5 and described below.

4.2.2.2 The Mona fish and shellfish ecology study area for the generation assets covers the east Irish Sea, extending from Mean High Water Springs (MHWS) out to the furthest west extent from the Mull of Galloway in Scotland to the western tip of Anglesey. This study area has been selected to account for the spatial and temporal variability of fish and shellfish populations, including fish migration. This was considered appropriate as it will ensure characterisation of all fish and shellfish receptors in the east Irish Sea and is large enough to consider all direct (e.g. habitat loss/disturbance within project boundaries) and indirect impacts (e.g. underwater noise over a much wider area) of the Mona Offshore Wind Project on the identified receptors.

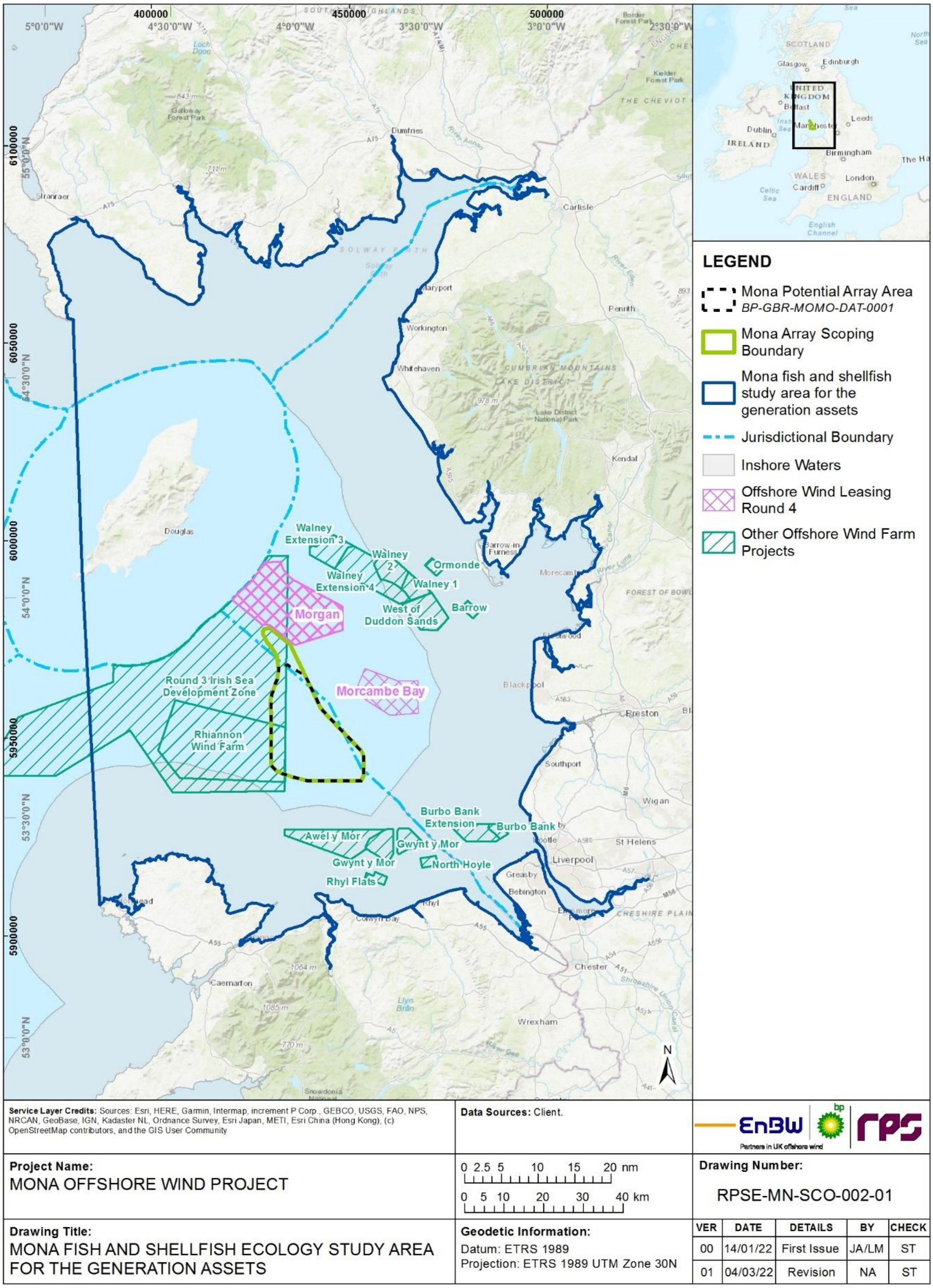


Figure 4.5: The Mona Fish and shellfish ecology study area for the generation assets.

4.2.3 Data sources

Desktop data

4.2.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the Mona fish and shellfish ecology study area for the generation assets. These are summarised in Table 4.6.

Table 4.6: Summary of key desktop datasets and reports.

Title	Source	Year	Author
International council for the exploration of the sea (ICES) working group on surveys on ichthyoplankton in the North Sea and adjacent seas	ICES	2021	ICES
Marine Recorder Public UK Snapshot	Joint Nature Conservation Committee (JNCC)	2020	JNCC
Bass and Ray Ecology in Liverpool Bay	Bangor University Sustainable Fisheries and Aquaculture Group.	2020	Moore *et al*.
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
Welsh Waters Scallop Surveys and Stock Assessment	Bangor University	2019	Delargy *et al*.
JNCC MPA Mapper	JNCC	2019	JNCC
Walney Offshore Wind Farm, Year 2 Post construction Monitoring Fish and Epibenthic Survey	Marine Data Exchange	2013	Brown and May Marine Ltd
Welsh waters scallop survey – Cardigan Bay to Liverpool Bay July-August 2013	Bangor University	2013	Lambert *et al.*
Celtic Array Ltd offshore wind farm preliminary environmental information chapter 10: fish and shellfish ecology	Marine Data Exchange	2014	Celtic Array Ltd
Northern Irish Ground Fish Trawl Survey (NIGFS)	ICES	2013	ICES
West of Duddon Sands Offshore Wind Farm, Adult and Juvenile Fish and Epibenthic Pre-Construction Surveys	Marine Data Exchange	2012	Brown and May Marine Ltd
Mapping the Spawning and Nursery Grounds of Selected Fish for Spatial Planning	Cefas	2012	Ellis *et al.*
Gwynt y Mor Offshore Wind Farm, Pre-construction Baseline Beam Trawl Data	Marine Data Exchange	2011	Centre for Marine and Coastal Studies Ltd (CMACS)
Burbo Bank Offshore Wind Farm, Post construction (Year 3) Commercial Fish Survey	Marine Data Exchange	2010	CMACS
Ormonde Offshore Wind Farm, Construction (Year 1) Environmental Monitoring	Marine Data Exchange	2010	RPS Energy
Celtic Array Ltd (Zone 9) Autumn Fish Trawl Survey	Marine Data Exchange	2010	CMACS

Title	Source	Year	Author
Walney Offshore Wind Farm Pre-Construction Fish Survey	Marine Data Exchange	2009	Brown and May Marine Ltd
Rhyl Flats Offshore Wind Farm, Fish and Fisheries Baseline Study	Marine Data Exchange	2002-2006	Coastal Fisheries Conservation and Management
Burbo Bank Offshore Wind Farm, Electromagnetic Fields and Marine Ecology Study	Marine Data Exchange	2007	CMACS
Burbo Bank Offshore Wind Farm, Pre-construction Commercial Fish Survey (2m Beam Trawl)	Marine Data Exchange	2006	CMACS
Walney and West of Duddon Sands Offshore Wind Farms, Baseline Benthic Survey – Epifaunal Beam Trawl Results	Marine Data Exchange	2005	Titan Environmental Surveys Ltd
Fisheries Sensitivity Maps in British Waters	United Kingdom Offshore Operators Association (UKOOA) Ltd.	1998	Coull *et al*.
Herring larvae surveys of the northern Irish Sea	The Agri-Food and Biosciences Institute (AFBI)	1993-2021	AFBI
Fish and shellfish survey results for the east Irish Sea	Environment Agency	Various	Environment Agency
Marine Life Information Network (MarLIN)	MarLIN	2018	Tyler-Wlaters *et al*
SeaLifeBase	https://www.sealifebase.ca/	2021	Palomares and Pauly
Fish and shellfish survey results for the east Irish Sea	Environment Agency	Various	Environment Agency
Updating Fishereis Sensitivity Maps in British Waters	Scottish Marine and Freshwater Science Report	2014	Aires *et al*
Cefas Pelagic ecosystem in the western English Channel and eastern Celtic Sea (PELTIC) surveys	Cefas	Various	Cefas
Fish and shellfish sensitivity reports	https://www.marlin.ac.uk/activity/pressures_report	n/a	Various

4.2.3.2 There are a number of publicly available fish and shellfish characterisation datasets and reports which overlap with the Mona fish and shellfish ecology study area for the generation assets which will be used to inform the fish and shellfish baseline characterisation. Site-specific data collected as part of the benthic surveys will also be used to inform the fish and shellfish baseline characterisation. The benthic surveys will include benthic grab samples which will be analysed for particle size analysis (PSA) to inform habitat suitability for sandeels *Ammodytidae* and herring *Clupea harengus* spawning (discussed in section 4.2.4). Fish assemblage data collected through incidental observations of fish and shellfish species from the benthic grabs and seabed imagery (e.g. sandeels and crustaceans) will also provide additional validation to the desktop data. Site-specific data collected as part of the aerial marine mammal surveys will record basking shark (if sighted) which will inform the fish and shellfish baseline characterisation.

4.2.3.3 No further site-specific fish and shellfish surveys are therefore proposed across the Mona fish and shellfish ecology study area for the generation assets.

4.2.4 Baseline environment

Fish assemblage

4.2.4.1 Distribution of fish is determined by a range of factors including abiotic parameters such as water temperature, salinity, depth, local scale habitat features and substrate type. In addition to biotic parameters such as predator prey interactions, competition and anthropogenic factors such as infrastructure and commercial fishing intensity.

4.2.4.2 The fish assemblage within the Mona fish and shellfish ecology study area for the generation assets includes demersal species: European plaice *Pleuronectes platessa*, dab *Limanda limanda*, solenette *Buglossidium luteum*, Dover sole *Solea solea*, whiting *Merlangius merlangus*, lesser spotted dogfish *Scyliorhinus canicula* and cod *Gadus morhua*.

4.2.4.3 European seabass *Dicentrarchus labrax* and thornback ray *Raja clavata* have been recorded in Liverpool Bay, the Dee estuary and Morecambe Bay within the Mona fish and shellfish ecology study area for the generation assets. European seabass caught in local fisheries recorded a bias towards females which is consistent with data from north Wales and could possibly indicate localized spawning (Moore *et al*., 2020).

4.2.4.4 Beam trawl surveys were undertaken in 2010 and 2011 across the Irish Sea Round 3 development zone which overlaps with the southwest of the Mona fish and shellfish ecology study area for the generation assets and partially overlaps with the Mona Potential Array Area (Figure 4.5). The surveys reported that the most dominant fish species present were poor cod *Trisopterus minutus* and the lesser spotted dogfish. The next most common species were dragonet *Callionymus lyra*, grey gurnard *Eutrigla gurnardus* and red gurnard *Aspitrigla cuculus*. The most common commercial fish species was plaice. Seven elasmobranch species were recorded, including cuckoo ray *Raja naevus* and spotted ray *Raja montagui* (CMACS, 2010; Celtic Array Ltd, 2014b).

4.2.4.5 A number of fish surveys have been undertaken across the Mona fish and shellfish ecology study area for the generation assets for the surrounding offshore wind farm developments (Figure 4.5). Beam and otter trawl surveys were undertaken during 2011-2013 for Walney offshore wind farm year 2 post construction monitoring, for the West of Duddon Sands offshore wind farm pre-construction survey and for the Gwynt y Mor offshore wind farm pre-construction surveys. All surveys recorded plaice, dab, solenette and the lesser spotted dogfish as the most abundance species (CMACS, 2010; CMACS, 2011; Celtic Array Ltd, 2014b; Brown and May Marine Ltd, 2013; 2012). Cod and whiting were also consistently recorded across the area. Dover sole and cod were identified as species of key commercial importance in the area (Brown and May Marine Ltd, 2013). Sand goby *Pomatoschistus minutus* were recorded in high abundance within the Gwynt y Mor offshore wind farm (CMACS, 2011). Two elasmobranch species were also recorded within the Gwynt y Mor offshore wind farm: thornback ray and blonde ray *Raja brachyura* (CMACS, 2011).

4.2.4.6 Basking shark *Cetorhinus maximus* are known to migrate through the Irish Sea, with high numbers of sighting recorded around the Isle of Man (NBN Atlas, 2019). Basking shark have been sighted in a density of 11-50 individuals sighted per 0.5 by 0.5° (degrees) (50 by 50km) to the north of the Isle of Man, within the Mona fish and shellfish ecology study area for the generation assets (Southall *et al*., 2005). Basking shark have a north south migration and are expected to be in the vicinity of the Mona fish and shellfish ecology study area for the generation assets during August to October and during the return migration in March to June (Doherty *et al*., 2017). No basking shark were recorded in the site-specific surveys from March 2020-August 2021. Basking shark will be recorded (if sighted) in the remaining months of the site-specific aerial surveys undertaken for marine mammals across the Mona Potential Array Area. This data will be presented as part of the fish and shellfish baseline characterisation within the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) chapter.

Diadromous fish species

4.2.4.7 Diadromous fish are species which migrate between freshwater and the sea during key life history stages (i.e. spawning). These may be anadromous (when fish spend most of their lives at sea but return to freshwater to spawn (e.g. Atlantic salmon *Salmo salar*)) or catadromous (when fish spend most of their lives in freshwater but return to the sea to breed (e.g. European eel *Anguilla anguilla*)).

4.2.4.8 There is the potential for diadromous fish species to migrate to and from rivers in the vicinity of the Mona Offshore Wind Project and, therefore, they may migrate through the Mona fish and shellfish ecology study area for the generation assets to rivers during certain periods of the year (NBN Atlas, 2019).

4.2.4.9 Fish and epibenthic surveys carried out in 2013 for the Walney offshore wind farm and in 2012 for the West of Duddon Sands offshore wind farm recorded sea trout Salmo trutta, a migratory species of relevance within the Mona fish and shellfish ecology study area for the generation assets (Brown and May Marine Ltd, 2013; 2012).

4.2.4.10 Sea trout, European eel, river lamprey *Lampetra fluviatilis* and Atlantic salmon have been recorded in the estuaries of rivers across the Mona fish and shellfish ecology study area for the generation assets. Twaite shad *Alosa fallax* and allis shad *Alosa alosa* have only been recorded at the mouth of the river Esk in the north of the Mona fish and shellfish ecology study area for the generation assets (NBN Atlas, 2019).

4.2.4.11 Sea lamprey Petromyzon marinus have been recorded in the estuaries of the river Dee and the river Mersey, however these records are from the 1960s and 1970s (NBN Atlas, 2019).

4.2.4.12 For the purposes of the fish and shellfish assessment, it will be assumed that the aforementioned diadromous species have the potential to occur within the Mona fish and shellfish ecology study area for the generation assets, primarily during key migration periods (e.g. adult migration to spawning rivers and smolt/juvenile migration from natal rivers in the vicinity of the Mona Offshore Wind Project). For migratory fish species, the fish and shellfish assessment will determine whether construction, operation and maintenance or decommissioning activities have the potential to lead to disruption to migration, for example construction noise potentially creating an effective barrier to fish migration. The timing of fish migration will therefore be an important element of the baseline characterisation and this will be collected through a review of desktop data sources e.g. recent papers (e.g. Gardiner *et al*., 2018), local rod catches and fish stock reports (Cefas and Environment Agency, 2017).

Shellfish assemblage

4.2.4.13 North Wales has a long history of scallop fisheries with both king *Pecten maximus* and queen scallops *Aequipecten opercularis* regularly fished. Bangor University has conducted eight scallop research surveys in Welsh waters since 2012. The king scallop populations in Liverpool Bay have been recorded in consistently low densities and are dominated by larger, older individuals with little or highly sporadic recruitment occurring. However, the 2019 surveys did record evidence of pre-recruit (<110mm) scallops in Liverpool Bay (Delargy *et al*., 2019).

4.2.4.14 Shellfish recorded in the trawl surveys undertaken in 2010 and 2011 across the Rhiannon offshore wind farm were king scallop, queen scallop, common whelk *Buccinum undatum*, edible crab *Cancer pagurus*, lobster *Homarus gammarus*, brown shrimp *Crangon crangon* and horse mussel *Modiolus modiolus*. Queen scallop were the most numerous shellfish species recorded (Celtic Array Ltd, 2014b).

4.2.4.15 Beam trawl surveys carried out in 2012 for the West of Duddon Sands offshore wind farm, in 2013 for the Walney offshore wind farm and in 2011 for the Gwynt y Mor offshore wind farm recorded a number of shellfish species within the Mona fish and shellfish ecology study area for the generation assets. Frequently recorded species included: *Nephrops norvegicus*, swimming crab *Liocarcinus* spp., brown shrimp *Crangon allmanni*, transparent razor shell *Phaxas pellucidus*, prickly cockle *Acanthocardia echinata* and the common whelk (Brown and May Marine Ltd, 2013; 2012; CMACS, 2011).

4.2.4.16 Nephrops have been consistently recorded across the Walney offshore wind farm with the highest number of individuals (3,296) in a single otter trawl recorded in 2009 (Brown and May Marine Ltd, 2013). The otter trawl surveys for the Walney offshore wind farm post construction monitoring recorded Nephrops as the most abundant shellfish species. Nephrops were identified as a species of key commercial importance in the area (Brown and May Marine Ltd, 2013). Beam trawl surveys carried out in 2012 for the West of Duddon Sands offshore wind farm also recorded Nephrops within the West of Duddon Sands offshore wind farm array area, which is within the Mona fish and shellfish ecology study area for the generation assets (Figure 4.5).

Spawning and nursery grounds

4.2.4.17 Potential nursery and spawning areas in the Irish Sea for a range of species were identified by Coull *et al*. (1998), based on larvae, egg and benthic habitat data. Ellis *et al*. (2012) reviewed this data for several finfish species in the Irish Sea, including cod, whiting and herring, providing an updated understanding of areas of low and high intensity nursery and spawning grounds.

4.2.4.18 Based on this data, spawning areas and nursery for several species overlap the Mona fish and shellfish ecology study area for the generation assets. Species with known spawning periods and nursery habitats identified within the Mona fish and shellfish ecology study area for the generation assets have been summarised in Table 4.7, and illustrated in Figure 4.6 to Figure 4.15.

Table 4.7: Key species with geographic spawning and nursery overlaps with the Mona fish and shellfish ecology study area for the generation assets (Coull *et al*., 1998 and Ellis *et al*., 2012. Mapped in Figure 4.6 to Figure 4.15).

Common name	Species	Spawning	Nursery
Anglerfish	*Lophius piscatorius*	×	✓
Cod	*Gadus morhua*	✓	✓
European hake	*Merluccius merluccius*	✓	×
Haddock	*Melanogrammus aeglefinus*	×	✓
Herring	*Clupea harengus*	✓	✓
Horse mackerel	*Trachurus trachurus*	✓	×
Lemon sole	*Microstomus kitt*	✓	✓
Ling	*Molva molva*	✓	×
Mackerel	*Scomber scombrus*	✓	✓
Nephrops	*Nephrops norvegicus*	✓	✓
Plaice	*Pleuronectes platessa*	✓	✓
Sandeels	*Ammodytidae*	✓	✓
Sole	*Solea solea*	✓	✓
Spotted ray	*Raja montagui*	×	✓
Sprat	*Clupeidae sp.*	✓	×
Spurdog	*Squalus acanthias*	×	✓
Thornback ray	*Raja clavata*	×	✓
Tope shark	*Galeorhinus galeus*	×	✓
Whiting	*Merlangius merlangus*	✓	✓

4.2.4.19 A review of spawning and nursery grounds suggests there is an overlap of the Mona fish and shellfish ecology study area for the generation assets with herring spawning and nursey grounds. For nursery grounds this overlap occurs across the east of the Mona Potential Array Area and is high intensity (Ellis *et al*. 2012). The AFBI in Northern Ireland has undertaken herring larvae surveys of the northern Irish Sea in November every year since 1993. The 2019 survey results recorded that the majority of herring larvae were captured in the east Irish Sea in the vicinity of the Douglas Bank spawning ground and to the north of the Isle of Man (ICES, 2021). Additional data on the north Irish Sea herring larvae survey will be requested from the AFBI to support the baseline characterisation presented within the Fish and shellfish ecology ES chapter.

4.2.4.20 Herring are a commercially and ecologically important pelagic fish species (as an important prey species for numerous fish, marine mammal and bird species) and are common across much of the Irish Sea (Dickey-Collas *et al.,* 2001). Herring utilise specific benthic habitats during spawning, which increases their vulnerability to activities impacting the seabed. Further, as a hearing specialist, herring are vulnerable to impacts arising from underwater noise.

4.2.4.21 A detailed review of the herring spawning and nursery grounds will be undertaken to support the fish and shellfish ecology assessment following guidelines set out by Boyle and New (2018) considering seabed sediment type and herring larval abundances (using data from the AFBI, as outlined above).

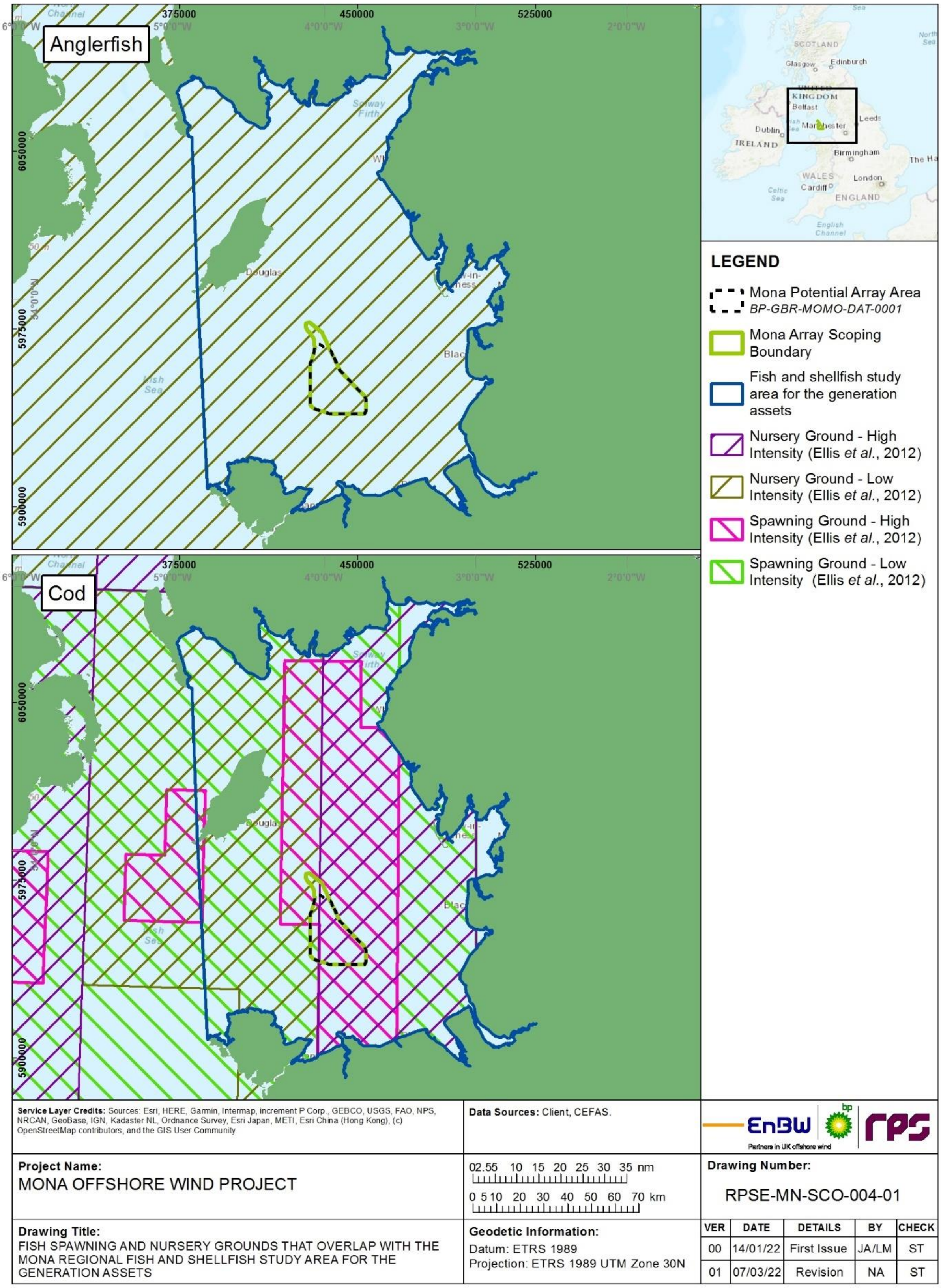


Figure 4.6: Anglerfish and cod spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

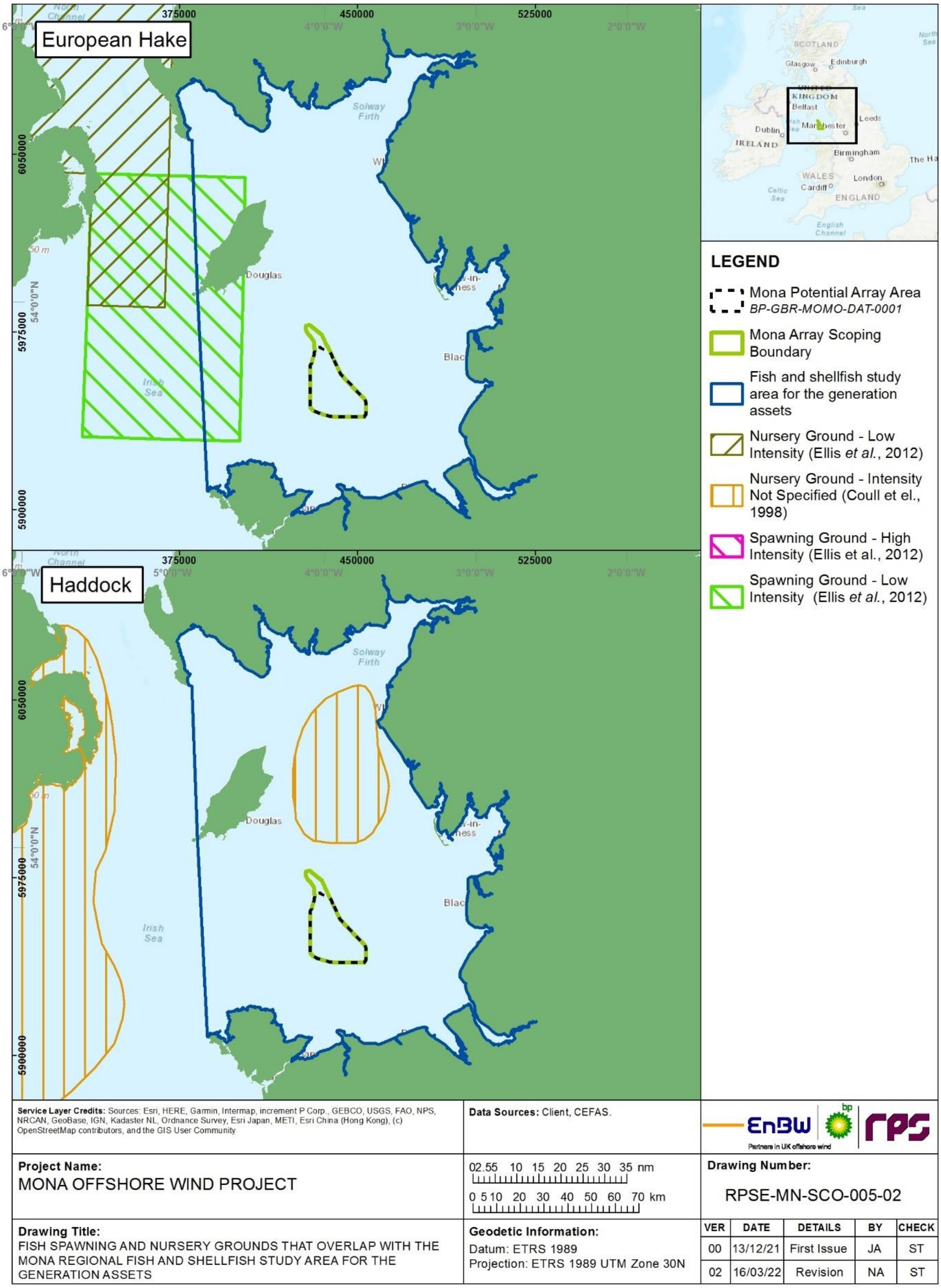


Figure 4.7: European hake and haddock spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

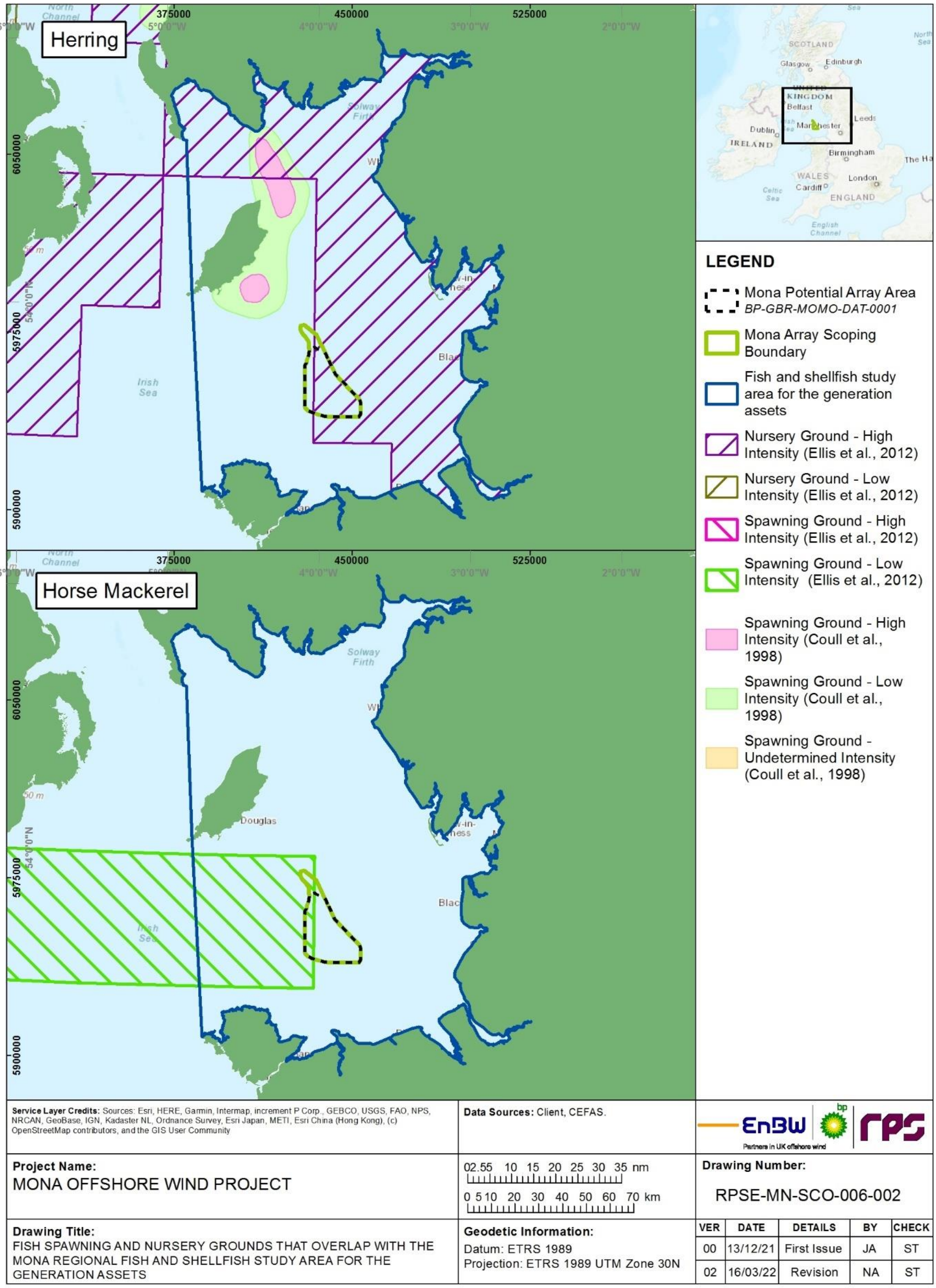


Figure 4.8: Herring and horse mackerel spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

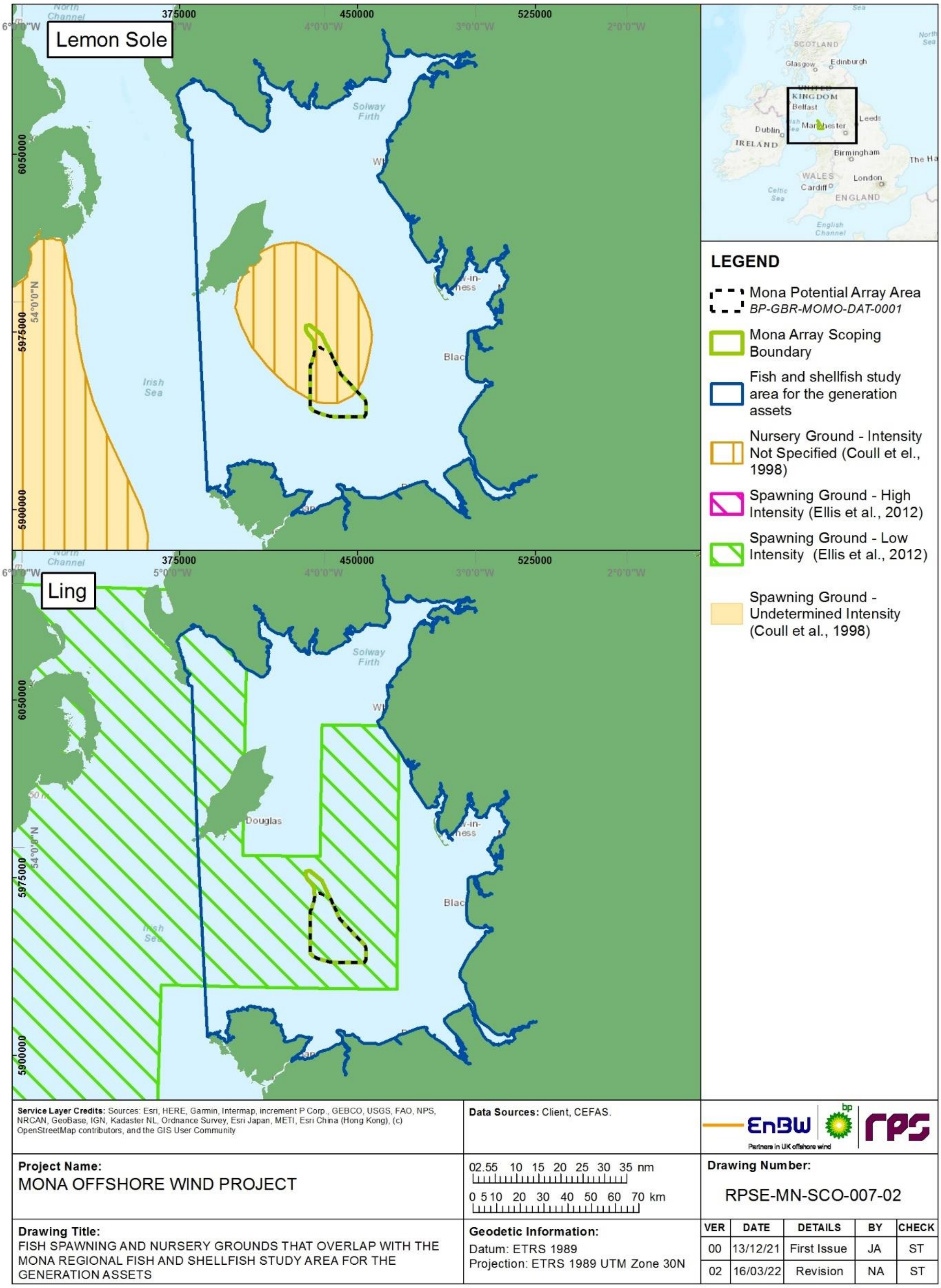


Figure 4.9: Lemon sole and ling and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

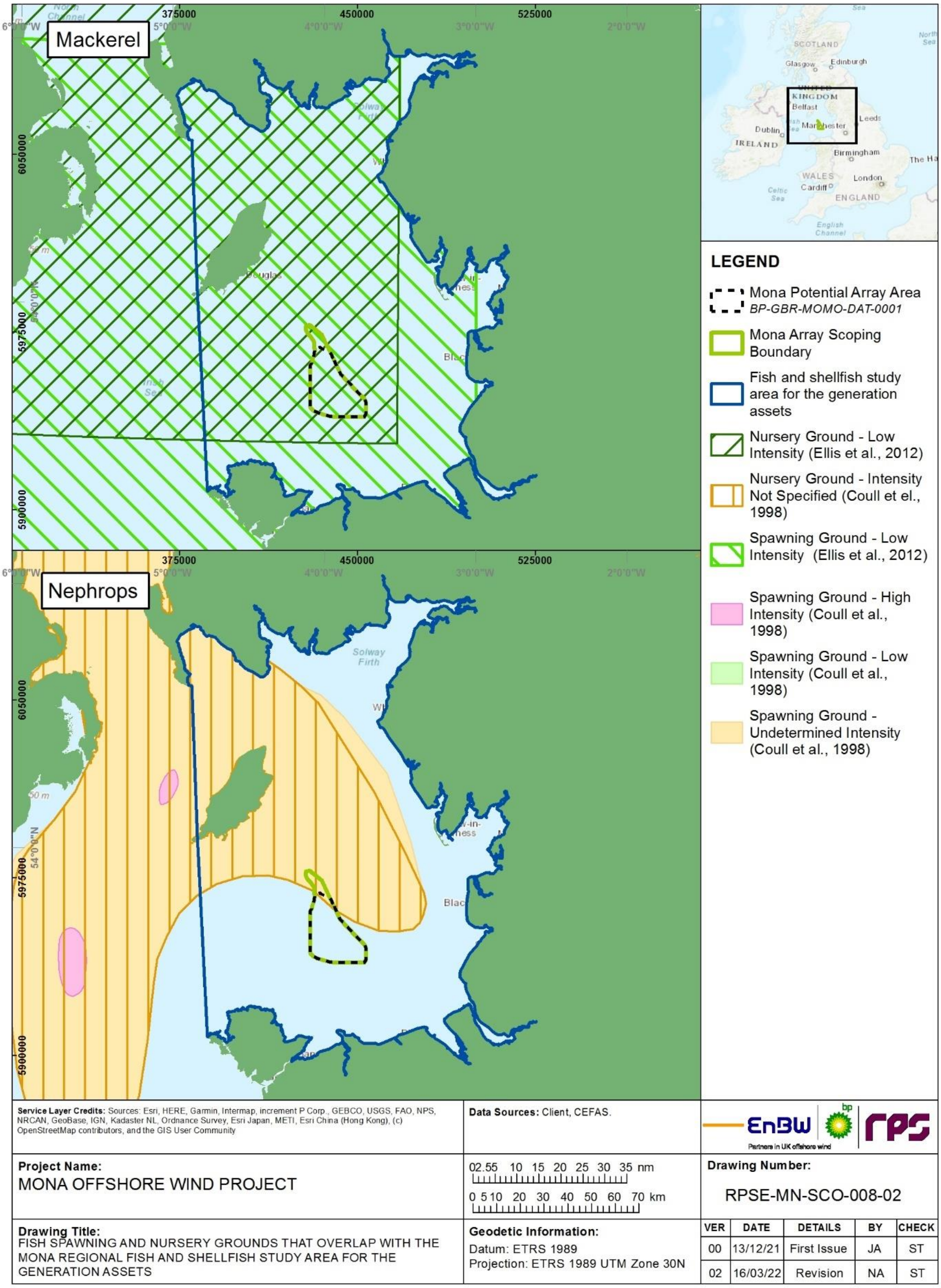


Figure 4.10: Mackerel and nephrops spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

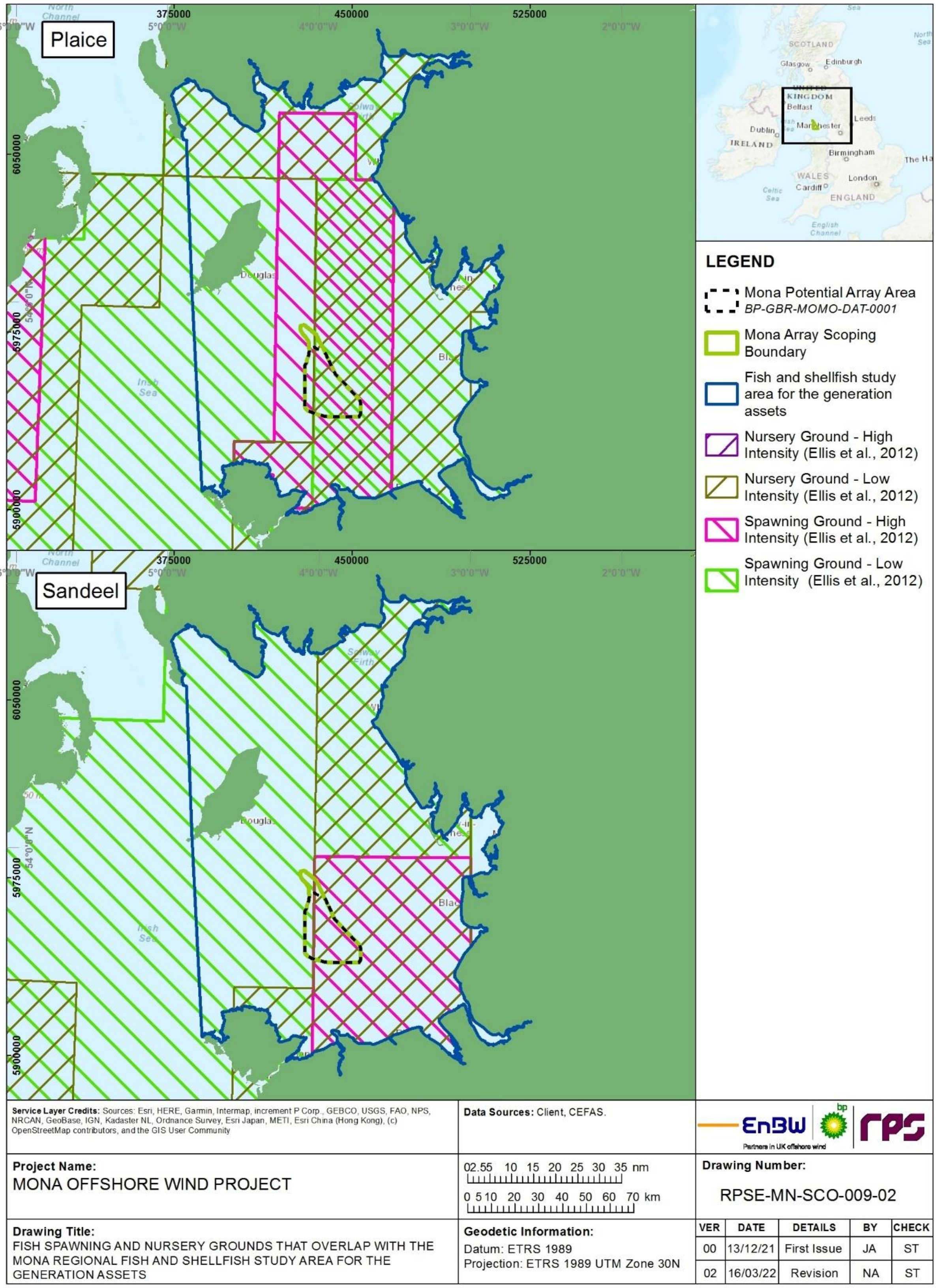


Figure 4.11: Plaice and sandeel and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

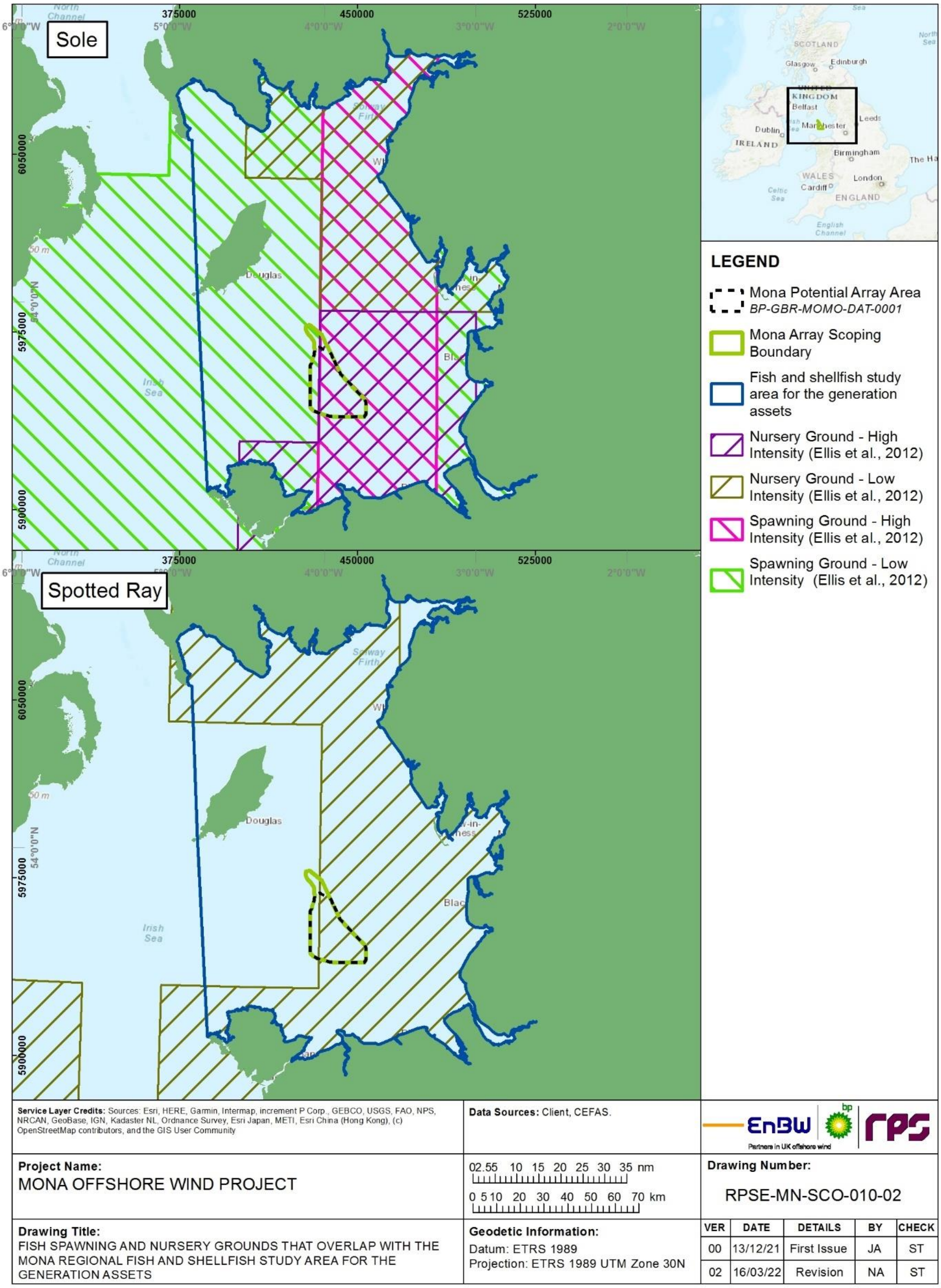


Figure 4.12: Sole and spotted ray and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

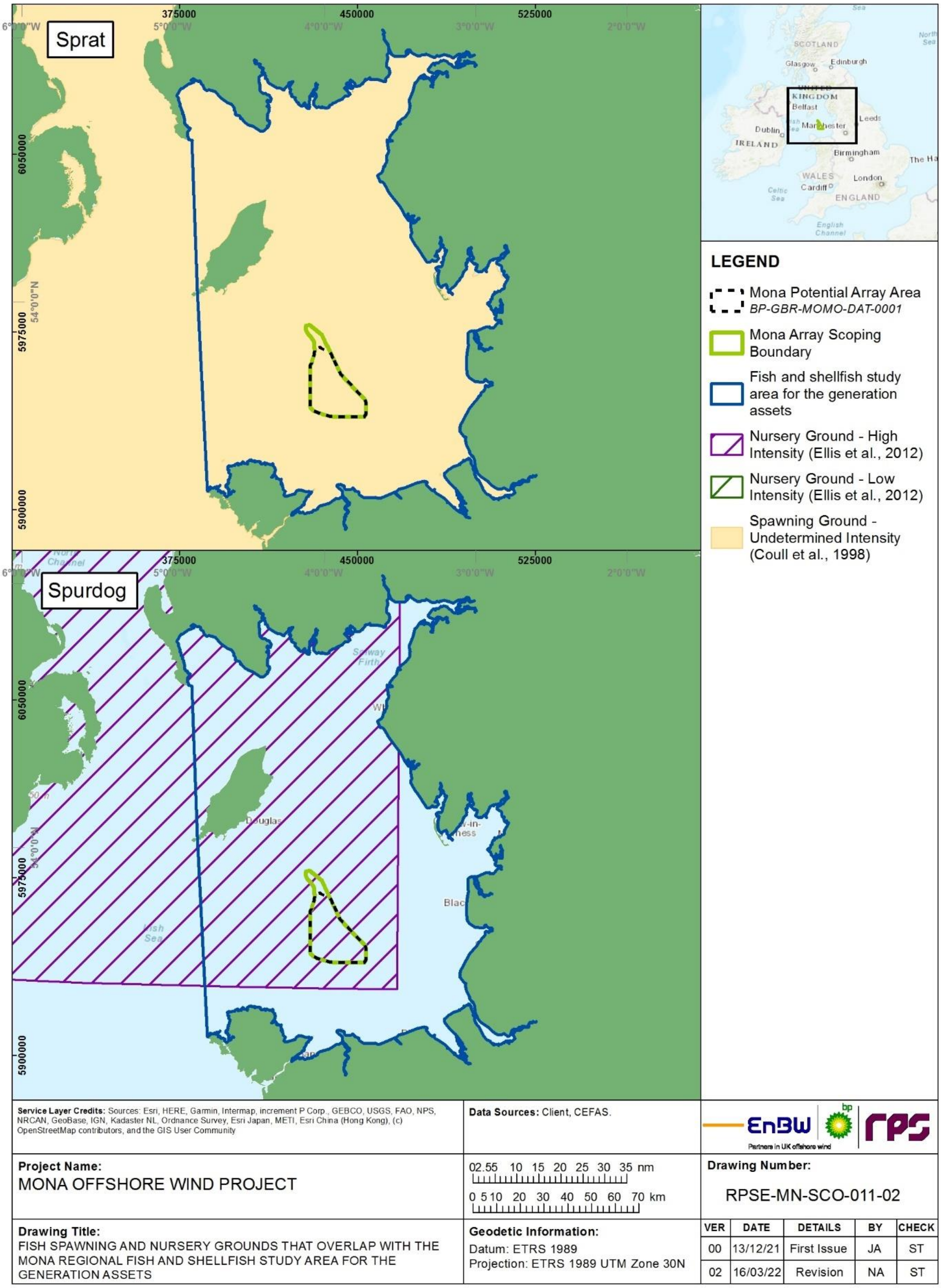


Figure 4.13: Sprat and spurdog spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

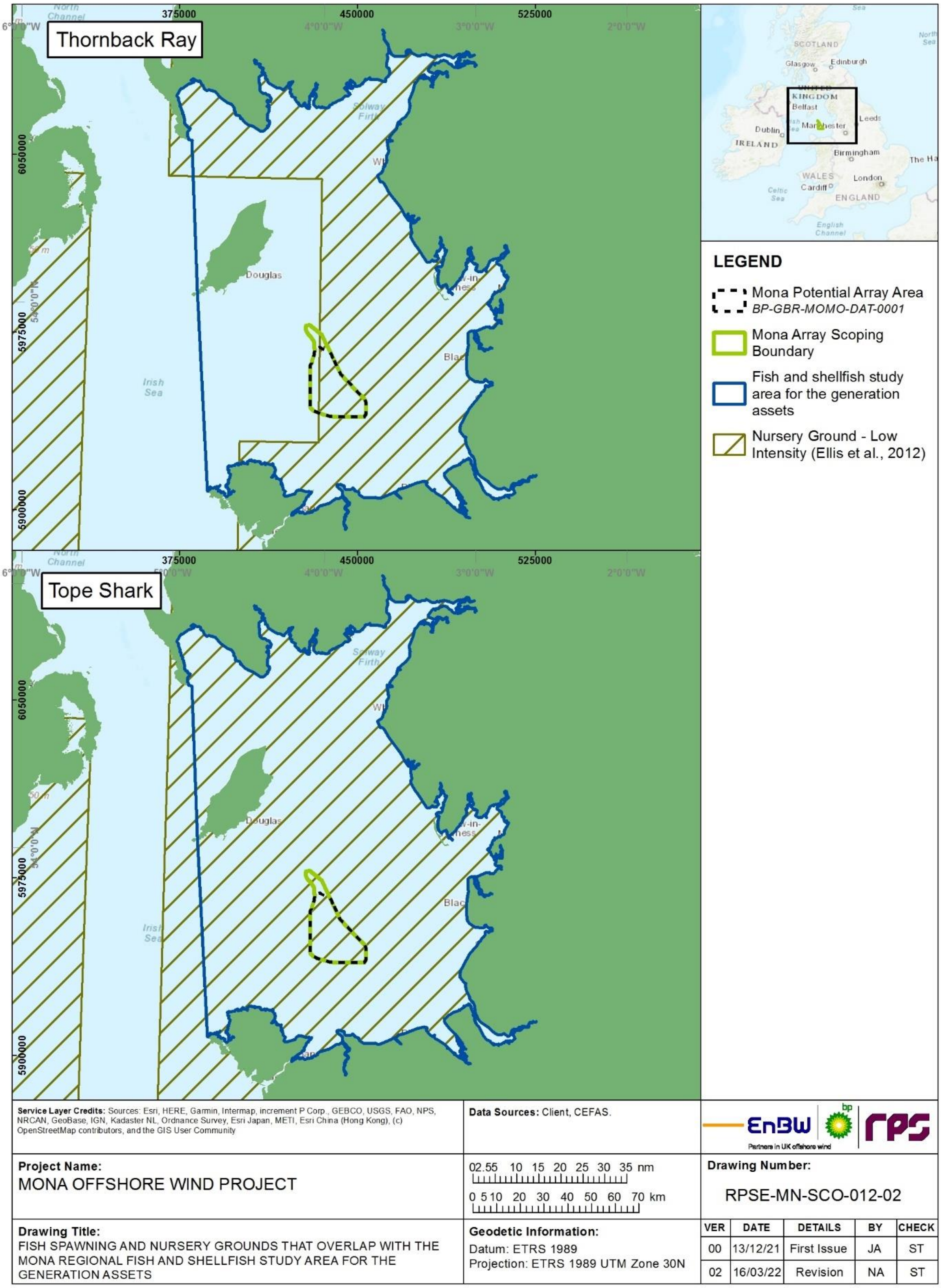
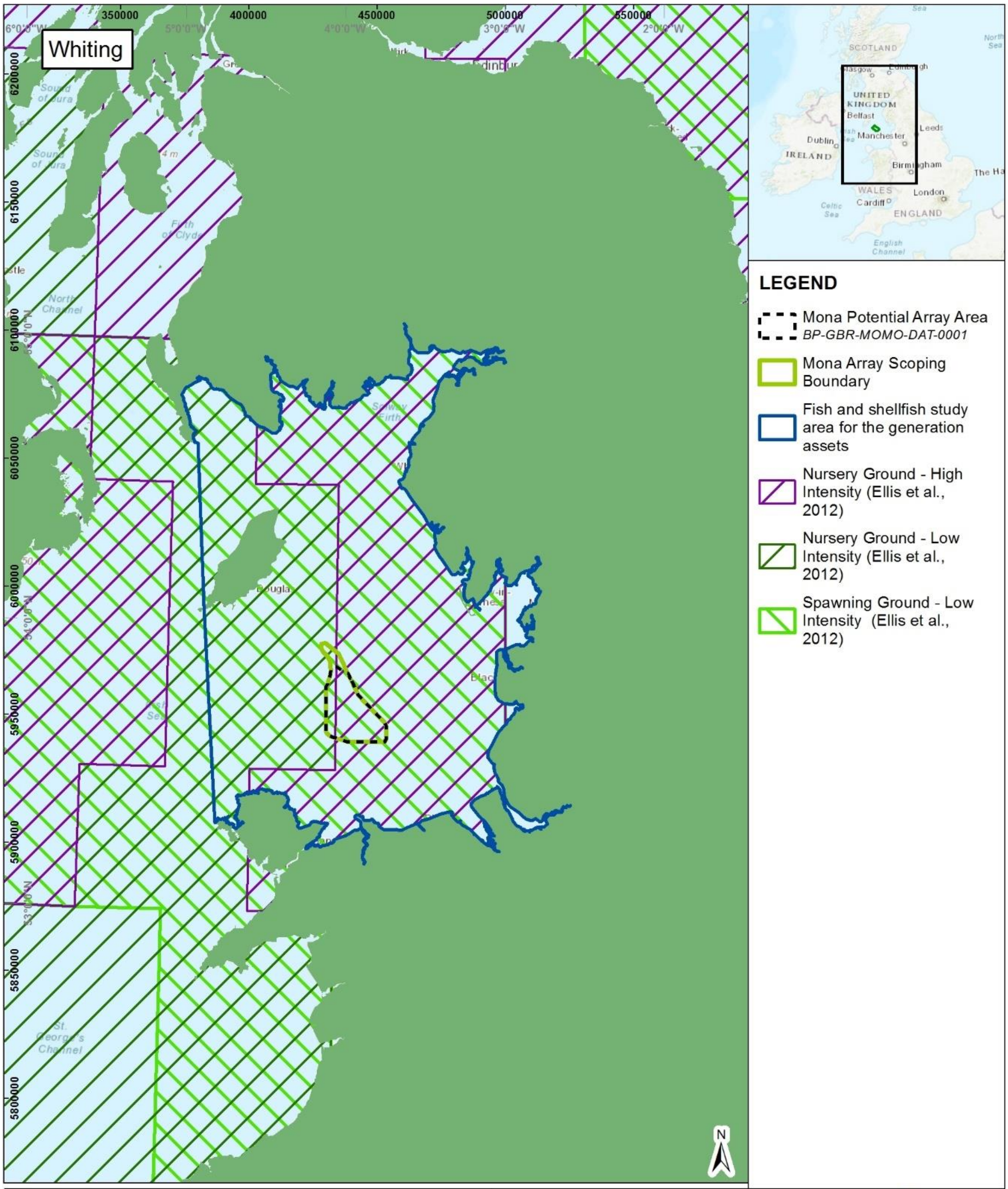


Figure 4.14: Thornback ray and topeshark spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Coull *et al*., 1998 and Ellis *et al*., 2012).



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Data Sources:** Client, CEFAS.	EnBW bp rps Partners in UK offshore wind				
Project Name: MONA OFFSHORE WIND PROJECT	0 2.5 5 10 15 20 25 30 35 nm; 0 5 10 20 30 40 50 60 70 km	**Drawing Number:** RPSE-MG-SCO-039-02				
Drawing Title: FISH SPAWNING AND NURSERY GROUNDS THAT OVERLAP WITH THE MONA REGIONAL FISH AND SHELLFISH STUDY AREA FOR THE GENERATION ASSETS	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N	VER	DATE	DETAILS	BY	CHECK
		00	14/12/21	First Issue	JA	ST
		02	16/03/22	Revision	NA	ST

Figure 4.15: European Hake spawning and nursery grounds in the vicinity of the Mona Potential Array Area (Ellis *et al*., 2012).

Designated sites

4.2.4.22 Designated sites with relevant qualifying features (i.e. fish and shellfish species) which overlap with the Mona fish and shellfish ecology study area for the generation assets are described in this section.

4.2.4.23 Table 4.8 and Figure 4.16 provide an indication of the designated sites (including migratory fish features) that may be considered within the EIA, Likely Significant Effects (LSE) Screening Report and potentially the Report to Inform Appropriate Assessment (RIAA) if an LSE is identified. This list of designated sites will be refined in the EIA to include sites that fall within the potential ZOI of the Mona Offshore Wind Project. This will be determined as part of the EIA process as a more detailed understanding of the project activities and impact pathways develops.

4.2.4.24 A full screening of European sites with qualifying fish features will be undertaken in the LSE Screening Report for the Mona Offshore Wind Project, as part of the HRA process. Relevant Annex II fish species of European designated sites screened into the fish and shellfish ecology assessment will be fully considered and assessed in the Fish and shellfish ecology ES chapter. The assessment on the European sites and effects on the site(s) conservation objectives will be undertaken in the RIAA.

4.2.4.25 The Fish and shellfish ecology ES chapter will also include consideration of nationally designated sites (i.e. Marine Nature Reserves (MNR) and recommended and designated Marine Conservation Zones (MCZs)). Nationally designated sites and their relevant qualifying features will be fully considered and assessed in the Fish and shellfish ecology ES chapter, where there is potential for significant effects on these. MCZs and their features will be considered within a separate MCZ Assessment.

Table 4.8: Summary of designated sites with relevant fish and shellfish ecology features within the Mona fish and shellfish ecology study area for the generation assets.

Designated Site	Distance to the Mona Potential Array Area (km)	Features
Dee Estuary/Aber Dyfrdwy SAC	34.5	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)
Langness MNR	37.0	• Horse mussel beds (*Modiolus modiolus*) • Icelandic clam (*Arctica islandica*) • European eel (*Anguilla anguilla*) • Cod (spawning/nursery)
Little Ness MNR	40.7	• Horse mussel beds (*Modiolus modiolus*) • Icelandic clam (*Arctica islandica*) • European eel (*Anguilla anguilla*)
Douglas Bay MNR	42.6	• European eel (*Anguilla anguilla*)
Laxey Bay MNR	44.4	• Icelandic clam (*Arctica islandica*)
Baie Ny Carrickey MNR	47.3	• European eel (*Anguilla anguilla*) • Spiny lobster (*Palinuridae*)
Ribble Estuary MCZ	48.2	• Smelt (*Osmeridae*)

Designated Site	Distance to the Mona Potential Array Area (km)	Features
Calf and Wart Bank MNR	51.4	• Spiny lobster (*Palinuridae*) • Flame shell (*Limaria hians*) • Sand eel
Ramsey Bay MNR	52.0	• Icelandic clam (*Arctica islandica*) • European eel (*Anguilla anguilla*)
Wyre-Lune MCZ	52.4	• Smelt (*Osmeridae*)
Port Erin Bay MNR	54.0	• Flame shell (*Limaria hians*) • Icelandic clam (*Arctica islandica*)
Niarbyl MNR	54.7	• Icelandic clam (*Arctica islandica*)
West Coast MNR	57.5	• European eel (*Anguilla anguilla*) • Common skate (*Dipturus batis*) • Cod (spawning/nursery) • Sand eel • Seabass nursery
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC	59.1	• Sea Lamprey (*Petromyzon marinus*) • Atlantic salmon (*Salmo salar*) • River lamprey (*Lampetra fluviatilis*) • Brook lamprey (*Lampetra planeri*) • Bullhead (*Cottus gobio*)*
River Ehen SAC	77.6	• Atlantic salmon (*Salmo salar*)
River Derwent and Bassenthwaite Lake SAC	86.2	• Sea lamprey (*Petromyzon marinus*) • Atlantic salmon (*Salmo salar*) • River lamprey (*Lampetra fluviatilis*) • Brook lamprey (*Lampetra planeri*)
Allonby Bay MCZ	102	• Blue mussel (*Mytilus edulis*) beds
Solway Firth SAC	110.0	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)
Solway Firth MCZ	121	• Smelt (*Osmeridae*)

*****Bull head is a wholly freshwater species therefore there is no impact-pathway for this species.

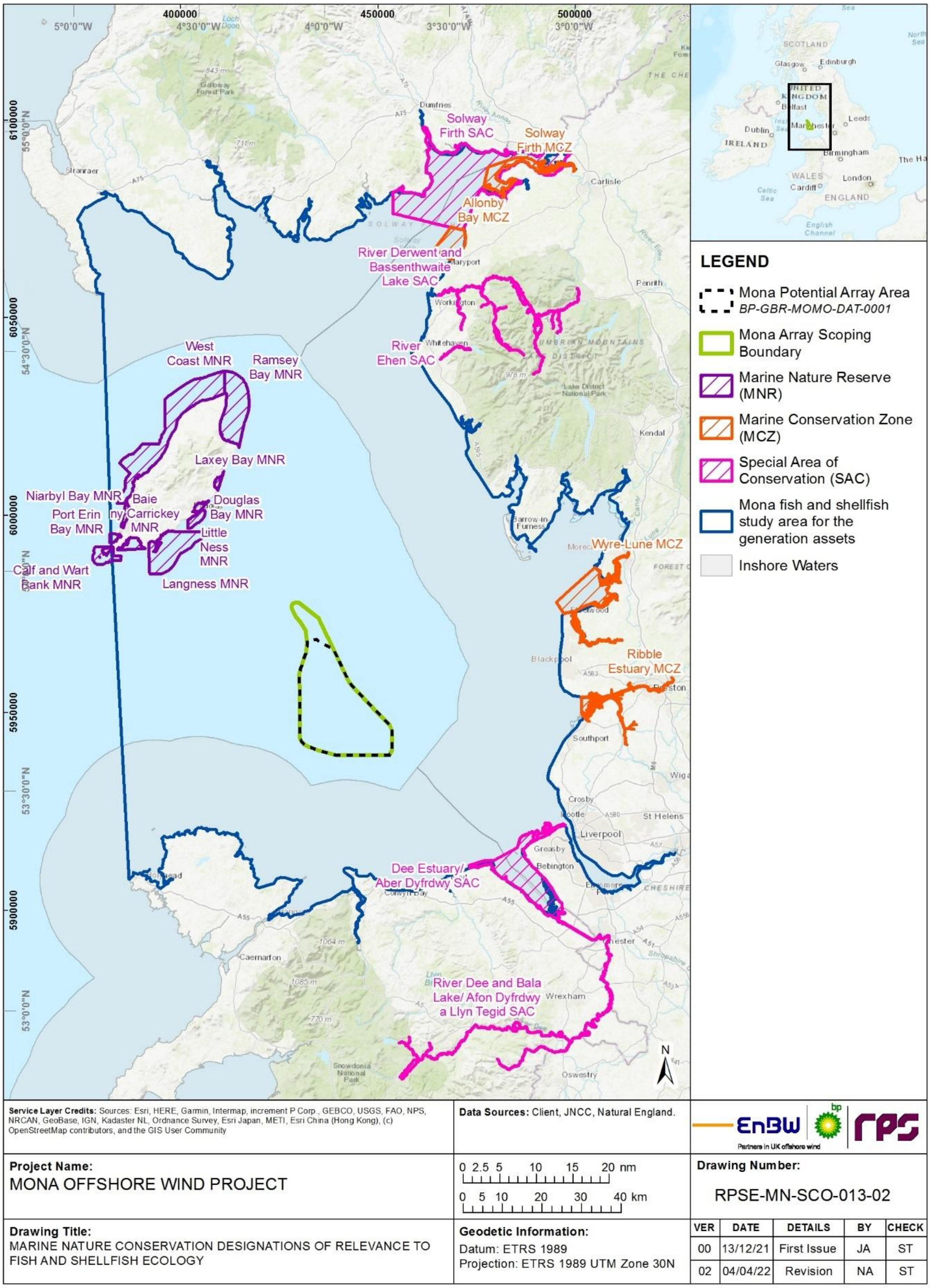


Figure 4.16: Marine nature conservation designations of relevance to fish and shellfish ecology that overlap with the Mona fish and shellfish ecology study area for the generation assets.

Protected species

4.2.4.26 Several species of conservation importance have been recorded or have the potential to occur within the Mona fish and shellfish ecology study area for the generation assets. These are presented below in Table 4.9 and include those species protected under Annex II of the Habitats Regulations or listed as 'species of principal importance' under Section 41 in England and Section 42 in Wales of the NERC Act 2006. Where species are afforded protection under other legislation, this has also been noted.

Table 4.9: Relevant protected fish and shellfish species which have the potential to occur within the Mona fish and shellfish ecology study area for the generation assets.

Fish and Shellfish Species	Protection legislation
Salmon (*Salmo salar*)	• Annex II of the Habitats Regulations • Habitat of principal importance in England under the Natural Environment and Rural Communities Act 2006 (NERC 2006 Act)
European Eel (*Anguilla anguilla)*	• Annex II of the Habitats Regulations • Habitat of principal importance in England under the NERC 2006 Act • UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Critically endangered on the International Union for Conservation of Nature (IUCN) Red List
Allis shad (*Alosa alosa*)	• Annex II of the Habitats Regulations • Habitat of principal importance in England under the NERC 2006 Act • Schedule 5 of the Wildlife and Countryside Act 1981
Twaite shad (*Alosa fallax)*	• Annex II of the Habitats Regulations • Habitat of principal importance in England under the NERC 2006 Act • Schedule 5 of the Wildlife and Countryside Act 1981
River lamprey (*Lampetra fluviatilis*)	• Annex II of the Habitats Regulations • Habitat of principal importance in England under the NERC 2006 Act
Sea lamprey (*Petromyzon marinus*)	• Annex II of the Habitats Regulations • Habitat of principal importance in England under the NERC 2006 Act
Sea trout (*Salmo trutta*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016 • Habitat of principal importance in England under the NERC 2006 Act • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Smelt (*Osmerus eperlanus*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016 • Habitat of principal importance in England under the NERC 2006 Act

Fish and Shellfish Species	Protection legislation
	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Basking shark (*Cetorhinus maximus*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016 • Habitat of principal importance in England under the NERC 2006 Act • Schedule 5 of the Wildlife and Countryside Act 1981 • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Angel shark (*Squatina squatina*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016 • Habitat of principal importance in England under the NERC 2006 Act • Schedule 5 of the Wildlife and Countryside Act 1981 • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Atlantic cod (*Gadus morhua*)	• Habitat of principal importance in England under the NERC 2006 Act • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • OSPAR threatened and/or declining species • Vulnerable on the IUCN Red List.
Whiting (*Merlangius merlangus*)	• Habitat of principal importance in England under the NERC 2006 Act • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
European hake (*Merluccius merluccius*)	• Habitat of principal importance in England under the NERC 2006 Act • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Thornback ray (*Raja clavata*)	• Habitat of principal importance in England under the NERC 2006 Act

4.2.5 Potential project impacts

4.2.5.1 A range of potential impacts on fish and shellfish ecological receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

4.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.10 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.2.5.3 Potential impacts scoped out of the assessment are presented in Table 4.11, with justification.

Table 4.10: Impacts proposed to be scoped into the project assessment for fish and shellfish ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Temporary habitat loss/disturbance.	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of foundation installation activities, cable installation activities (including unexploded ordnance (UXO) detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss/disturbance may occur during the operation and maintenance phase as a result of operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove array cables resulting in potential effects on fish and shellfish ecology.	There is wide ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the generation assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario (MDS). For example, the MDS for habitat loss/disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the Mona fish and shellfish ecology study area for the generation assets.
Underwater noise impacting fish and shellfish receptors.	✓	×	✓	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as UXO detonation, pile-driving, pre-construction geophysical surveys and similar for decommissioning activities.	As above.	Underwater noise modelling will be undertaken as set out in section 3.2. to inform the assessment of underwater noise impacts to fish and shellfish. This will use the most up to date best practice guidelines (i.e. Popper *et al.,* 2014) and other scientific literature to give consideration to the potential for injury and disturbance to fish and shellfish species, including disruption to spawning activity for marine fish species, disruption to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Increased suspended sediment concentrations (SSCs) and associated sediment deposition.	✓	✓	✓	Sediment disturbance arising from construction activities (e.g. foundation and cable installation including drilling and any deposits arising, UXO detonation and seabed preparation), maintenance operations (e.g. cable repair/reburial) and decommissioning activities (e.g. cable and foundation removal) may result in indirect impacts on fish and shellfish communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects).	As above.	The outputs of numerical modelling undertaken for the physical processes assessment (section 3.2) will inform this impact assessment. This will include consideration of the potential for effects on spawning habitats (i.e. changes to sediment composition, smothering of eggs etc) and disturbance to migration of diadromous fish species. This will consider differing sensitivities of the identified receptors and life history stages to this impact. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Long term habitat loss.	✓	✓	✓	There is the potential for long term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase although the impact will largely occur throughout the operation and maintenance phase. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the Mona Offshore Wind Project lifetime.	As above.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS.
Electromagnetic Fields (EMF) from subsea electrical cabling.	×	✓	×	EMF generated through the subsea electrical cabling may affect fish and shellfish prey/predator relationship by inhibiting/interfering with fish and shellfish behaviours due to changes in background EMFs.	As above.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on EMFs in the marine environment and effects on fish and shellfish ecology receptors. This assessment will be based on information derived from the PDE.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.
Colonisation of hard structures.	✓	✓	✓	Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and/or aggregation of fish and shellfish in the vicinity of structures.	As above.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on colonisation of hard structures, including from offshore wind farms. This assessment will be based on information derived from the PDE. Invasive non-native species (INNS) will be considered, particularly in relation to colonisation of hard structures. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario.

Table 4.11: Impacts proposed to be scoped out of the project assessment for fish and shellfish ecology.

Impact	Justification
Accidental pollution during construction, operation and maintenance and decommissioning phases.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. Environmental Management Plan, including Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as MPCP. As such, this impact will be scoped out of further consideration within the Fish and shellfish ecology ES chapter.
Underwater noise from wind turbine operation during operation and maintenance phase.	Noise generated by operational wind turbines is of a very low frequency and low sound pressure level (Andersson *et al*., 2011). Studies have found that sound levels are only high enough to possibly cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson, 2011) and therefore such levels are not considered to have potentially significant effects on fish and shellfish receptors. The Marine Management Organisation (MMO, 2014) review of post-consent monitoring at offshore wind farms found that available data on the operational wind turbine noise, from the UK and abroad, in general showed that noise levels from operational wind turbines are low and the spatial extent of the potential impact of the operational

Impact	Justification
	wind turbine noise on marine receptors is generally estimated to be small, with behavioural response only likely at ranges close to the wind turbines. No significant effects on fish populations were detected from operational wind farms from the fish monitoring reviewed as part of the MMO (2014) review. As such, this impact will be scoped out of further consideration within the Fish and shellfish ecology ES chapter.
Underwater noise from vessels during all phases.	Operational underwater noise generated from vessels is likely to be low and effects would only occur if fish species remained within immediate vicinity of the vessel (i.e. within metres) for a number of hours which is highly unlikely. As such, this impact will be scoped out of further consideration within the Fish and shellfish ecology ES chapter.
Impacts from the release of sediment-bound contaminants.	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on fish and shellfish communities. Historical sampling within the vicinity of the Mona Potential Array Area has shown levels of sediment contaminants are low. The risk of sediment-bound contaminants being present in concentrations likely to be harmful to benthic receptors is considered to be low. Site-specific sediment chemistry sampling will be undertaken across the Mona Potential Array Area during subtidal sampling. This impact is proposed to be scoped out of further consideration within the Fish and shellfish ecology ES chapter subject to the results of the site-specific surveys and consultation with the Statutory Nature Conservation Bodies (SNCBs) via the Evidence Plan process.

4.2.6 Measures adopted as part of the project

4.2.6.1 The following measures adopted as part of the project are relevant to fish and shellfish ecology. These measures may evolve as the engineering design and EIA progresses.

- Development and adherence to a Cable Specification and Installation Plan (CSIP) which will include cables to be buried to where possible and cable protection as necessary (the potential impact of this measure will be consulted upon with statutory consultees throughout the EIA process).
- Implementation of piling soft-start and ramp-up measures to reduce the risk of injury to fish species.
- Development and adherence to a Construction Method Statement (CMS).
- Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.

4.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

4.2.7 Proposed assessment methodology

4.2.7.1 The fish and shellfish ecology EIA will follow the methodology set out in part 1 section 4: EIA Methodology of the EIA Scoping Report. Specific to the fish and shellfish ecology EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019).
- Offshore Wind Farms. Guidance Note for EIA in Respect of FEPA (Food and Environment Protection Act 1985) and CPA (Coast Protection Act 1949) Requirements (Cefas *et al*., 2004).
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al*., 2014).

4.2.7.2 For the purposes of undertaking the EIA, fish and shellfish receptors identified as having the potential to occur in the Mona fish and shellfish ecology study area for the generation assets will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction phase, operation and maintenance phase and decommissioning phases of the

Mona Offshore Wind Project will be assessed. Criteria defining the value of each IEF will be defined to reflect topic specific interests.

4.2.7.3 The Fish and shellfish ecology ES chapter will include diadromous fish in the fish and shellfish ecology impact assessment, and a separate section presented discussing sensitivity of and implications of the impact on diadromous fish in each impact assessment. The approach and focus of these impact assessments will be discussed with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Evidence Plan process.

4.2.7.4 The importance of fish species (such as herring, sandeels and sprat) as key prey species will be assessed in the relevant sections of other receptor groups (i.e. section 4.4: ornithology and section 4.3: marine mammals). These will be informed by the Fish and shellfish ecology ES chapter which will provide clear outputs to inform these assessments.

4.2.7.5 Habitat suitability for sandeels and herring will be assessed using data collected as part of the site-specific benthic ecology survey in line with industry good practice guidelines and in consultation with stakeholders via the Evidence Plan process.

4.2.7.6 A fish and shellfish ecology technical report will present a detailed baseline characterisation for the Mona Offshore Wind Project using site-specific survey data and the most recent desktop data for the Mona fish and shellfish ecology study area for the generation assets. This report will inform the Fish and shellfish ecology ES chapter.

4.2.8 Potential cumulative effects

4.2.8.1 The majority of predicted effects of construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project infrastructure within the Mona Potential Array Area on fish and shellfish communities are considered to be localised to within the footprint of the Mona Offshore Wind Project. However, there is potential for cumulative effects to occur on fish and shellfish ecology from other projects or activities within the fish and shellfish ecology study area for the generation assets, where projects or plans could act collectively with the Mona Offshore Wind Project to affect fish and shellfish receptors.

4.2.8.2 The cumulative effects assessment will follow the approach outlined in part 1 section 4: EIA Methodology of the EIA Scoping Report.

4.2.9 Potential inter-related effects

4.2.9.1 The assessment of potential inter-related effects will be considered within the Fish and shellfish ecology ES chapter. It will include consideration of project lifetime effects and receptor led effects, in line with the approach outlined in part 1, section 4: EIA Methodology of the EIA Scoping Report.

4.2.10 Potential transboundary impacts

4.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon fish and shellfish ecology due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- underwater noise impacting fish and shellfish receptors
- loss of habitat (in particular, spawning and nursery habitat)
- increased suspended sediment concentrations and associated sediment deposition

4.2.10.2 These activities have the potential to directly affect Annex II species and species that are of commercial importance for fishing fleets of other states. Therefore, the potential for transboundary impacts will be considered within the ES.

4.3 Marine mammals

4.3.1 Introduction

4.3.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the marine mammal ecological receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets.

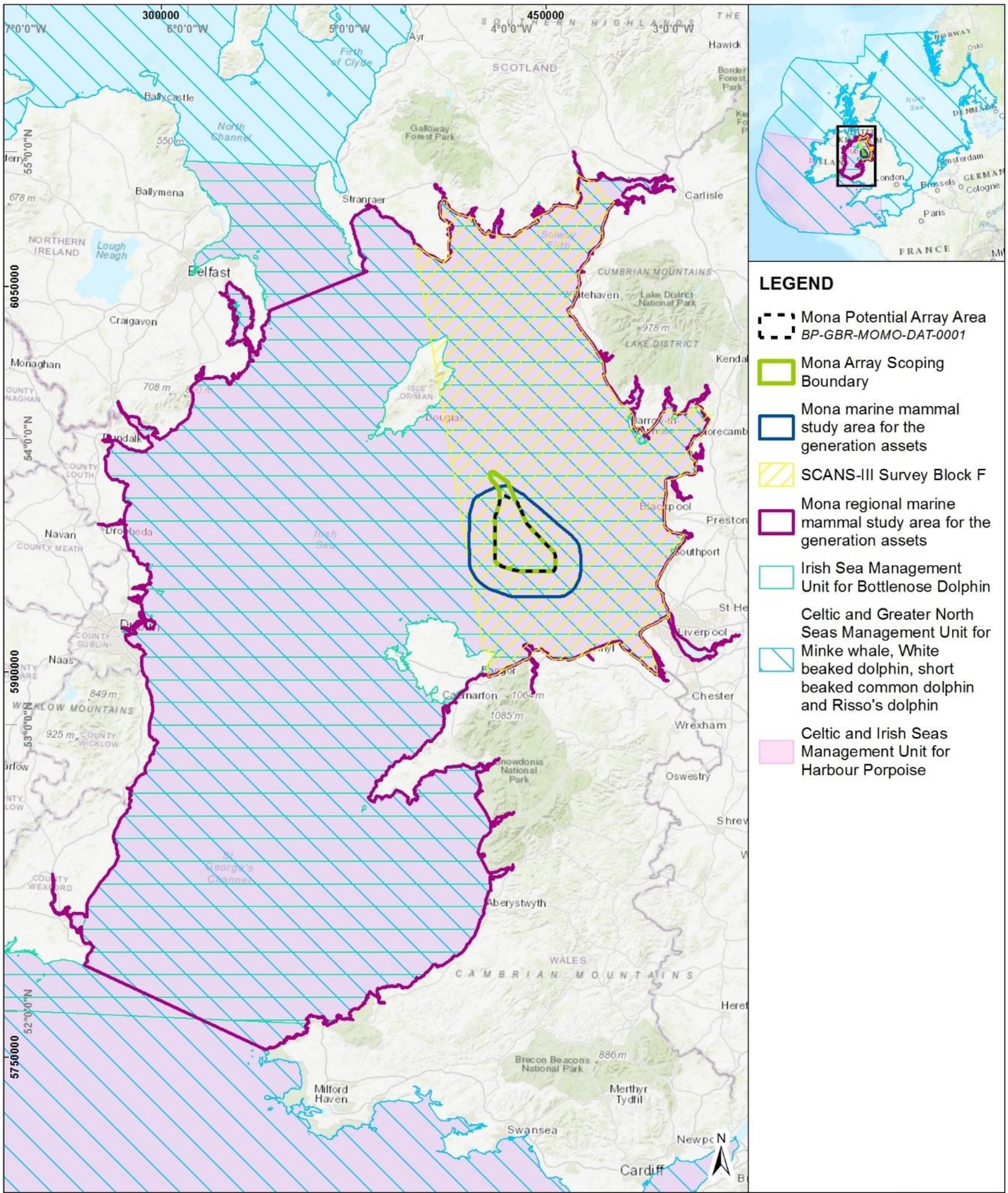
4.3.2 Study area

4.3.2.1 For the purpose of the Environmental Statement (ES), two marine mammal study areas have been defined:

4.3.2.2 The Mona marine mammal study area for the generation assets comprises the Mona Array Scoping Boundary with a 4km to 10km buffer and represents the Mona marine mammal survey area. The Mona marine mammal study area for the generation assets does not extend fully to 10km in all directions around the Mona Array Scoping Boundary, as this area was refined following commencement of the marine mammal surveys. However, it will mostly reach 10km and will consistently exceed 4km. The uneven buffer around the Mona Array Scoping Boundary is a result of the surveys being designed on the basis of a scoping boundary that differed to the final boundary awarded through the Offshore Wind Leasing Round 4.

4.3.2.3 This is the area within which the site-specific aerial surveys have been undertaken and will provide fine scale data showing the spatial distribution and densities of marine mammals on a project specific basis. The data derived from these surveys will be used to underpin the quantitative assessment of impacts on marine mammal ecological receptors.

4.3.2.4 The Mona regional marine mammal study area for the generation assets extends over the Irish Sea geographic region. Marine mammals are highly mobile and may range over large distances and therefore the Mona regional marine mammal study area for the generation assets provides wider context. The desktop review will consider the ecology, distribution and abundance of marine mammals within the wider Irish Sea region. The Mona regional marine mammal study area for generation infrastructure also informs the assessment where the Zone Of Influence (ZOI) for a given impact (e.g. underwater noise) may extend beyond the Mona marine mammal study area for the generation assets.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, University of St Andrews, JNCC.

EnBW bp rps
Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 5 10 20 30 nm
0 10 20 40 60 km

Drawing Number:
RPSE-MN-SCO-016-02

Drawing Title:
MONA MARINE MAMMAL STUDY AREA FOR THE GENERATION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	17/01/22	First Issue	JA/LM	ST
02	04/04/22	Revision	NA	ST

Figure 4.17: The Mona marine mammal study areas for the generation assets.

4.3.3 Data sources

Desktop data

4.3.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the Mona regional marine mammal study area for the generation assets. These are summarised in Table 4.12.

Table 4.12: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Scientific advice on matters related to the management of seal populations: 2020	Sea Mammal Research Unit (SMRU), University of St Andrews	2021	Special Committee on Seals (SCOC)
Marine recorder public UK snapshot	Joint Nature Conservation Comittee (JNCC)	2020	JNCC
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
SCANS-III	SMRU, University of St Andrews	2016	Hammond *et al*.
Seal habitat preference maps	SMRU, University of St Andrews	2020	Carter *et al*.
JNCC Report 544: Harbour Porpoise Density	JNCC	2010-2011	Heinänen and Skov
Updated abundance estimates for cetacean management units in UK waters	JNCC	2021	Inter-Agency Marine Mammal Working Group (IAMMWG)
Joint cetacean protocol phase III	JNCC	2009-2010	Paxton *et al*.
Background information on marine mammals for Strategic Environmental Assessment 6	SMRU, Gatty Marine Laboratory, University of St Andrews	2005	Hammond *et al*.
Atlas of the Marine Mammals of Wales	Countryside Council for Wales (CCW)	2012	Baines and Evans
Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters	Irish Whale and Dolphin Group	2005-2011	Wall *et al*.
Barrow offshore wind farm (BOW) construction monitoring report	Marine Data Exchange	2006	BOW Wind
Ormonde offshore wind farm construction (Year 1) environmental monitoring	Marine Data Exchange	2010	RPS Energy
Walney and West of Duddon Sands Environmental Impact Assessment - marine mammals in the NW3 Area, Irish Sea	Marine Data Exchange	2006	DHI Water and Environment
Ormonde offshore wind farm marine mammal observers and PAM survey	Marine Data Exchange	2010	RPS Energy
Walney offshore wind farm construction monitoring	Marine Data Exchange	2010-2011	Centre for Marine and Coastal Studies Ltd (CMACS)

Title	Source	Year	Author
Burbo Bank Exensions offshore wind farm environmental statement	Marine Data Exchange	2013	Dong Energy
Skerries tidal stream array marine mammal monitoring	Marine Data Exchange	2014	SMRU Marine
JNCC MPA mapper	JNCC	2019	JNCC
Zone 9 Celtic Array Ltd, Bird Mammal Survey	Marine Data Exchange	2010-2012	Ecological Consultancy Ltd. (ECON)
Zone 9 Celtic Array Ltd, Hidef Aerial Bird Survey	Marine Data Exchange	2012-2013	HiDef
Morlais Tidal Array Scoping Report	Morlais Energy	2018	Morlais Energy
Manx whale and dolphin watch	Manx whale and dolphin watch	Various	Various
Cefas Pelagic ecosystem in the western English Channel and eastern Celtic Sea (PELTIC) surveys	Cefas	Various	Cefas

Site-specific surveys

4.3.3.2 Aerial digital surveys for marine mammals have been undertaken within the Mona marine mammal study area for the generation assets including a buffer (see Section 4.3.2). Aerial surveys commenced in March 2020 and continued until February 2022, completing a total of 24 surveys spanning two years.

4.3.3.3 The survey method was designed to optimise the data collection for marine mammals by using a grid-based collection method with 30% of the sea surface collected and 12% analysed. APEM's bespoke camera system was fitted into a twin-engine aircraft. The camera system captured still imagery along 18 survey lines spaced approximately 2km between tracks. The images were analysed to enumerate marine mammals to species level, where possible.

4.3.3.4 Results of the site-specific surveys will be discussed through the Evidence Plan process to the Expert Working Group as described in part 1, section 5: Consultation of the EIA Scoping Report. Initial observations are taken from site-specific surveys undertaken from March 2020 to August 2021. The following section provides an overview of the initial observations from the site-specific surveys and other sources of data available for the Mona Offshore Wind Project. Further details of site-specific data will be presented in the PEIR and ES.

4.3.4 Baseline environment

Initial site-specific survey results

4.3.4.1 Initial results from 17 months of survey (March 2020 to August 2021) provided sightings of harbour porpoise, Risso's dolphin, bottlenose dolphin, harbour seal and grey seal within the Mona marine mammal study area for generation assets. Details on the number and seasonality of individuals recorded is presented for each species below. A number of individuals could not be identified to species level. For example, the surveys recorded unidentified dolphin species in all survey months available (March 2020 to August 2021). Peak numbers of unidentified dolphins were recorded in March 2020 when 28 individuals were recorded. Similarly, unidentified phocid species were recorded in March, April, July, August, September, November, December 2020, January, February, March and April 2021. Peak numbers of unidentified phocids were recorded in December 2020 when six individuals were recorded. In addition, unidentified marine mammal species were recorded in March, May, July, September 2020, January, March and April 2021. Peak numbers were recorded in March 2020 when five unidentified marine mammals were recorded.

Harbour porpoise Phocoena phocoena

4.3.4.2 Harbour porpoise are widespread and common in the Irish Sea throughout the year with potential for breeding (Baines and Evans, 2012). Long term sightings between 1990 to 2009 show an average of 1.1 to 15 harbour porpoise counts per hour around Anglesey (Baines and Evans, 2012). Suitable habitat is available within the east of the Mona regional marine mammal study area for the generation assets and harbour porpoise have been recorded there regularly (RPS Energy, 2012; CMACS, 2011; DHI Water and Environment, 2006). The most recent assessment of harbour porpoise in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential future prospects for the population (JNCC, 2019b).

4.3.4.3 The Mona Offshore Wind Project is within the Celtic and Irish Sea management unit (MU) for harbour porpoise (Figure 4.17; IAMMWG, 2021), which is estimated to have an abundance of 62,517 individuals (CV (coefficient of variation): 0.13, 955 CI (confidence interval) 48,324 – 80,877) based on estimates from the Small Cetaceans in the European Atlantic and North Seas (SCANS) III survey (Hammond *et al*., 2017; Hammond *et al*., 2021). The SCANS III density estimate for the relevant survey block (Block F) was estimated to be 0.086 porpoise per km^2 (CV: 0.383).

4.3.4.4 The Joint Cetacean Protocol (JCP) has undertaken analysis of 18 years of data to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the United Kingdom (UK) marine area (Heinänen and Skov, 2015). Areas of persistent high density include coastal areas off west Wales (Pembrokeshire and Cardigan Bay), and northwest Wales (Anglesey, Llŷn Peninsula), within the Mona regional marine mammal study area for the generation assets (Heinänen and Skov, 2015). The densities of harbour porpoise are seasonal with large reductions during winter in the areas of high densities predicted for the northern Irish Sea and Cardigan Bay (Heinänen and Skov, 2015). Densities within the Mona regional marine mammal study area for the generation assets are up to three individuals per km2 (Heinänen and Skov, 2015).

4.3.4.5 Monitoring surveys were undertaken in 2010 for the Ormonde offshore wind farm year 1 post-construction surveys. They recorded harbour porpoise at an encounter rate of 0.014 per hour within the Ormonde offshore wind farm which is within the northeast of the Mona regional marine mammal study area for the generation assets (RPS Energy, 2012). Monitoring surveys were undertaken during the construction of the Walney offshore wind between 2009 and 2010. These recorded harbour porpoise within and to the northeast of the Walney offshore wind farm which is within the Mona regional marine mammal study area for the generation assets (CMACS, 2011).

4.3.4.6 Initial results from the aerial surveys undertaken across the Mona Potential Array Area show that harbour porpoise were recorded within the Mona marine mammal study area for the generation assets throughout the first survey year (March 2020 to February 2021). Peak numbers of harbour porpoise were recorded in June 2020 and February 2021 when seven individuals were recorded, resulting in relative abundance estimates of 49 individuals within the Mona marine mammal study area for the generation assets. Harbour porpoise were also recorded in every month from March 2021 to August 2021 with peak number recorded in July 2021 with 15 individuals. Ten harbour porpoise were also recorded by marine mammal observers during the 2021 site-specific geophysical site investigation survey.

4.3.4.7 Baseline characterisation surveys undertaken in 2012 to 2013 for the Rhiannon offshore wind farm recorded a total of 227 harbour porpoise across the wider Irish Sea Zone (as defined by The Crown Estate (TCE) Round 3 leasing process). Recording an overall density of 0.09 per km2 for the Irish Sea Zone over the entire year. Distribution varied across the season however the greatest numbers of sightings occurred in the west of the Rhiannon offshore wind farm, outside the Mona marine mammal study area for generation assets (Celtic Array Ltd., 2014c). Harbour porpoise are regularly recorded around the Isle of Man by the Manx whale and dolphin watch (Manx whale and dolphin watch, 2022).

4.3.4.8 Based on the review of literature including previous surveys in this region, it is considered likely that harbour porpoise occur year round within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that harbour porpoise are scoped into the EIA.

Minke whale Balaenoptera acutorostrata

4.3.4.9 Minke whale are an occasional visitor to the Irish Sea where it occurs annually in small numbers, mainly in July and August (Baines *et al*., 2012). Records of long-term sightings between 1990 to 2007 show that most minke whale encounters are in the east Irish Sea (Baines and Evans, 2012). This species is rarely recorded east of the Isle of Man and are rare in Liverpool Bay (Dong Energy, 2013). The most recent assessment of minke whale in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential future prospects for the population (JNCC, 2019c).

4.3.4.10 All minke whale in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021) which is estimated to have an abundance of 20,118 minke whale (CV: 0.18, 95% CI: 14,061 – 28,786) based on estimates from the SCANS III survey (Hammond *et al*., 2017; Hammond *et al*., 2021) and the ObSERVE survey (Rogan *et al*., 2018). The SCANS III survey did not record minke whale within the relevant survey block (Block F).

4.3.4.11 Minke whale were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). Minke whale are not regularly recorded around the Isle of Man by the Manx whale and dolphin watch however individuals were recorded in November, October and September 2021 (Manx whale and dolphin watch, 2022).

4.3.4.12 Initial results from the aerial surveys undertaken across the Mona Potential Array Area show that minke whale were not recorded within the Mona marine mammal study area for the generation assets throughout March 2020 to August 2021. One minke whale was recorded by marine mammal observers during the 2021 site-specific geophysical site investigation survey.

4.3.4.13 Boat-based surveys for the Rhiannon offshore wind farm recorded 19 minke whale over the two-year survey, within and to the west of the Rhiannon offshore wind farm. Three were recorded within the Mona marine mammals study area for generation assets (Celtic Array Ltd, 2014c).

4.3.4.14 Based on the review of literature including previous surveys in this region, it is considered likely that minke whale occur within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that minke whale are scoped into the EIA.

White beaked dolphin Lagenorhynchus albirostris

4.3.4.15 White beaked dolphin are common in British and Irish waters, especially to the north around Scotland. This species is also common around the west coast of Ireland, Iceland and west Norway although it is only an occasional visitor to the Irish Sea (Seawatch, 2012). The most recent assessment of white beaked dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential future prospects for the population (JNCC, 2019d).

4.3.4.16 All white beaked dolphin in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021), which has an estimated population size of 43,951 dolphin (CV: 0.22, 95% CI: 28,439 – 67,924) based on estimates from the SCANS III survey (Hammond *et al*., 2017; Hammond *et al*., 2021) and the ObSERVE survey (Rogan *et al*., 2018). The SCANS III did not record any white beaked dolphin within the relevant survey block (Block F).

4.3.4.17 White beaked dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). A small number of unidentified dolphins were recorded during the recent site-specific aerial surveys, although these were considered unlikely to be white beaked dolphin based on the known distribution and occurrence of this species within the Mona regional marine mammal study area for the generation assets.

4.3.4.18 Based on the review of literature including previous surveys in this region, it is considered unlikely that white beaked dolphin are a key species within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that white beaked dolphin are scoped out of the EIA.

Bottlenose dolphin Tursiops truncatus

4.3.4.19 Bottlenose dolphin use both coastal and offshore waters in the UK. One of the main coastal areas is around Cardigan Bay in the southeast of the Irish Sea. The population size in Cardigan Bay has been estimated at between 130-350 individuals (UKBAP, 1999), although the JNCC has estimated that the total UK population is less than 300 (Reid *et al*., 2003). Bottlenose dolphin have also been recorded occurring off the north coast of Wales, particularly north and east of Anglesey (Baines and Evans, 2012). Casual records also show that bottlenose dolphin are present sporadically off the Isle of Man and elsewhere in the northeast Irish Sea (Manx Whale and Dolphin Group unpublished data; Sea Watch Foundation unpublished data). Long term sightings between 1990 to 2009 show an average of 2.5-5 bottlenose dolphin counts per hour around Anglesey (Baines and Evans, 2012).

4.3.4.20 The most recent assessment of bottlenose dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the population size appears to be stable, there were too few datapoints to confidently draw conclusions on current and future population trends (JNCC, 2019e).

4.3.4.21 The Mona Offshore Wind Project is within the Irish Sea MU for bottlenose dolphin (Figure 4.17; IAMMWG, 2021), which is estimated to have an abundance of 293 individuals (CV: 0.54, 95% CI: 108 - 793) based on surveys undertaken for the Cardigan Bay Special Area of Conservation (SAC) (Lohrengel *et al*., 2018). The SCANS III did not record any bottlenose dolphin within the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.22 Bottlenose dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). A small number of unidentified dolphins were recorded during the recent site-specific aerial surveys, and these may potentially have been bottlenose dolphin based on the known distribution and occurrence of this species within the Mona regional marine mammal study area for the generation assets. In addition, four bottlenose dolphin were recorded in the Mona marine mammal study area for the generation assets in June 2021. Two bottlenose dolphin sightings (one of a pod of six) were recorded by marine mammal observers during the 2021 site-specific geophysical site investigation survey.

4.3.4.23 Aerial surveys for the Rhiannon offshore wind farm recorded bottlenose dolphin, to the east of the Rhiannon offshore wind farm, within the Mona marine mammal study area for generation assets. Insufficient sightings were recorded to produce a local abundance (Celtic Array Ltd, 2014c). Bottlenose dolphin are regularly recorded around the Isle of Man by the Manx whale and dolphin watch (Manx whale and dolphin watch, 2022).

4.3.4.24 Given the presence of bottlenose dolphin within coastal waters in the Irish Sea, it is considered likely that bottlenose dolphin occur within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that bottlenose dolphin are scoped into the EIA.

Short beaked common dolphin Delphinus delphis

4.3.4.25 The short beaked common dolphin are the most numerous offshore cetacean species in the temperate northeast Atlantic. Off the western coasts of Britain and Ireland, the species is found in continental shelf waters, notably in the Celtic Sea and Western Approaches to the Channel, and off southern and western Ireland (Reid, 2003).

4.3.4.26 The most recent assessment of short beaked common dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019g).

4.3.4.27 There is a relatively low population of short beaked common dolphin in the Irish Sea, however they are regularly seen off the south of the Isle of Man. Long term sightings between 1990 to 2009 show an average of 0.5-1 short beaked common dolphin counts per hour around the south of the Isle of Man and the Pembroke Peninsula (Baines and Evans, 2012).

4.3.4.28 All short beaked common dolphin in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021), which has an estimated population size of 102,656 dolphin (CV: 0.29, 95% CI: 58,932 –178,822). The SCANS III did not record any short beaked common dolphin within the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.29 Short beaked common dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). A small number of unidentified dolphins were recorded during the recent site-specific aerial survey, and these may potentially have been short beaked common dolphin based on the known distribution and occurrence of this species within the Mona regional marine mammal study area for the generation assets.

4.3.4.30 Aerial surveys for the Rhiannon offshore wind farm recorded a single sighting of a pod of six short beaked common dolphin, to the west of the Rhiannon offshore wind farm, outside the Mona marine mammal study area for generation assets (Celtic Array Ltd, 2014c).

4.3.4.31 Given the presence of short beaked common dolphin within coastal waters in the Irish Sea, it is considered likely that short beaked common dolphin occur within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that short beaked common dolphin are scoped into the EIA.

Risso's dolphin Grampus griseus

4.3.4.32 Risso's dolphin are most common around northern Scotland however they have been sighted around Ireland and in the Irish Sea. Most sightings from the Irish Sea occurred between July and September. Nearshore records off southwest Ireland were obtained primarily between May and August (Reid, 2003). Coastal areas of the Isle of Man and north Anglesey have a low sighting rate for Risso's dolphin (Baines and Evans, 2012). Long term sightings between 1990 to 2009 show an average of 0.26-0.5 Risso's dolphin counts per hour around the south of the Isle of Man and an average of 0.04-0.1 Risso's dolphin counts per hour around the north of Anglesey (Baines and Evans, 2012).

4.3.4.33 The most recent assessment of Risso's dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019h).

4.3.4.34 All Risso's dolphin in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021), which has an estimated population size of 12,262 Risso's dolphin (CV: 0.46, 95% CI: 5,227 – 28,764). The SCANS III did not record any Risso's dolphin within the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.35 Risso's dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). A small number of unidentified dolphins were recorded during the recent site-specific aerial survey and may potentially have been Risso's dolphin based on the known distribution and occurrence of this species within the Mona regional marine mammal study area for the generation assets. In addition, two Risso's dolphin were recorded in November 2020 within the Mona marine mammal study area for generation assets. Boat-based surveys for the Rhiannon offshore wind farm recorded three sightings of Risso's dolphin, outside the Rhiannon offshore wind farm, outside the Mona marine mammal study area for generation assets (Celtic Array Ltd, 2014c). Risso's dolphin are not regularly recorded around the Isle of Man by the Manx whale and dolphin watch however individuals were recorded in September 2021 (Manx whale and dolphin watch, 2022).

4.3.4.36 Given the presence of Risso's dolphin within coastal waters in the Irish Sea, it is considered likely that Risso's dolphin occur within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that Risso's dolphin are scoped into the EIA.

Grey seal Halichoerus grypus

4.3.4.37 Grey seal have a wide distribution in the seas around Wales and are present in coastal areas throughout the year. Grey seal have been recorded at the River Dee Estuary, Walney Island at the southern tip of the Isle of Man and around Cardigan Bay (SCOS, 2021). Long term sightings between 1990 to 2007 show an average of 0.5-1 grey seal counts per hour around the north coast of Wales. The most recent assessment of grey seal in UK waters concluded that the overall trend in Conservation Status was Favourable, with an overall trend in Conservation Status assessed as Improving (JNCC, 2019f).

4.3.4.38 Grey seal typically forages within 100 km of a haul-out site and foraging trips can last for 30 days; however, individual tracks have shown that some grey seal can make trips several hundred kilometres offshore (SCOS, 2021). The estimated adult class population size in the regularly monitored national colonies at the start of the 2019 breeding season was 133,900 (95% CI 115,300-156,500) (SCOS, 2021). Over 400 grey seal individuals were recorded on the east Irish coast in 2017/2018 (Morris & Duck, 2019). Pup production of grey seals in Ireland (the east coast of which is within the regional marine mammal study area for the generation assets) was estimated at 2,100 pups with an increasing population trend. Pup production of grey seal in the UK was estimated at 68,050 pups with an increasing population trend (SCOS, 2021). However, the Mona regional marine mammal study area for the generation assets does not contain any of the main UK grey seal breeding colonies, the majority of which are in Scotland.

4.3.4.39 There are two main grey seal haul-outs in the Mona regional marine mammal study area for the generation assets: the Dee Estuary and Walney Island. In 2019 and 2020, the August count at Walney Island was 248 and 300 adults, respectively. It has been a pupping site since 2015 but numbers are currently still low (2-10 per year). Less extensive monitoring has occurred at the Dee Estuary haul-out site (SCOS, 2021).

4.3.4.40 Grey seal at-sea distribution maps have been produced by Carter *et al*. (2020) based on a Global Positioning System (GPS) telemetry tagging programme by The Department for Business, Energy and Industrial Strategy (BEIS), through their Offshore Energy Strategic Environmental Assessment (OESEA) programme. This data shows that grey seal do not occur in high densities within the Mona regional marine mammal study area for the generation assets. Densities are higher around the coasts and around the River Dee Estuary, the River Mersey Estuary, and the southern tip of the Isle of Man (Figure 4.18; Russell *et al*., 2017; Carter *et al*., 2020).

4.3.4.41 Monitoring surveys were undertaken in 2010 for the Ormonde offshore wind farm year 1 post-construction surveys. Grey seal were recorded at an encounter rate of 0.007 per hour within the Ormonde offshore wind farm which is within the Mona regional marine mammal study area for the generation assets (RPS Energy, 2012).

4.3.4.42 Monitoring surveys were undertaken during the construction of the Walney offshore wind from in 2010-2009. They recorded regular grey seal sightings at the southern end of Walney Island and around the Walney and Ormonde offshore wind farms which are within the Mona regional marine mammal study area for the generation assets (CMACS, 2011).

4.3.4.43 Initial results from the aerial surveys undertaken across the Mona Potential Array Area show that grey seal were recorded in March, May, September, November 2020 and February, March, June and July 2021. Peak numbers were recorded in February 2021 when five individuals were recorded, resulting in a relative abundance estimate of 35 individuals within the Mona marine mammal study area for the generation assets. One dead grey seal was recorded by marine mammal observers during the 2021 site-specific geophysical site investigation survey.

4.3.4.44 Aerial and boat-based surveys for the Rhiannon offshore wind farm consistently recorded grey seal, particularly between February and August, across the Rhiannon offshore wind farm, partially within the Mona marine mammal study area for generation assets (Celtic Array Ltd, 2014c).

4.3.4.45 Based on the review of literature including previous surveys in this region, it is considered likely that grey seal occur within the Mona regional marine mammal study area for the generation assets. It is therefore proposed that grey seal are scoped into the EIA.

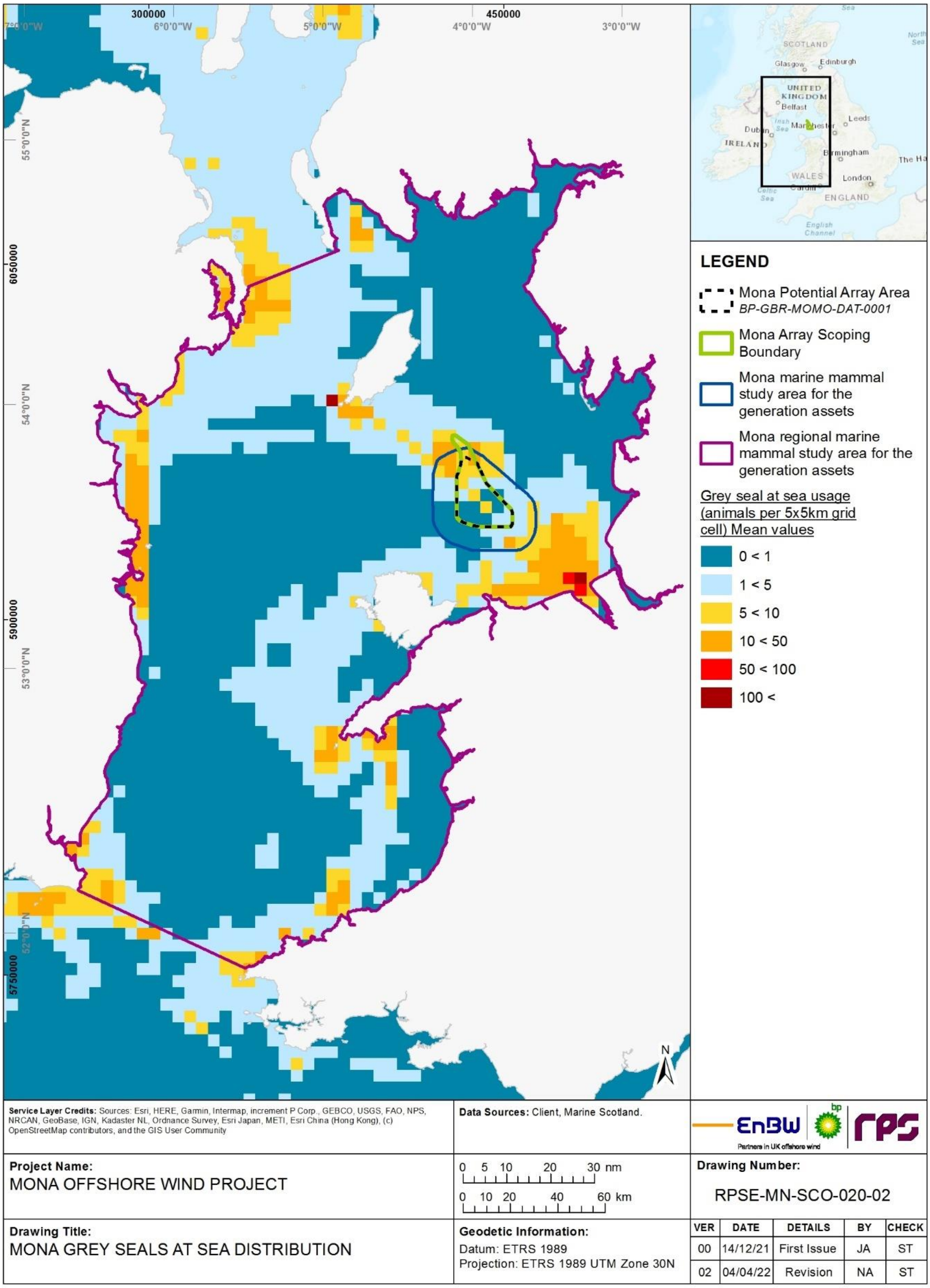


Figure 4.18: Grey seal at-sea distribution (from Russell *et al*., 2017).

Harbour seal Phoca vitulina

4.3.4.46 Harbour seal are present around the UK with a higher abundance around Scotland; approximately 80% of the UK population resides around the Scottish coast. Low numbers are also encountered along the south and west coast of England and along the coasts of Wales (JNCC, 2019i). The most recent assessment of harbour seal in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable and the population trend is good, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019i).

4.3.4.47 Harbour seal populations around northern Ireland and Wales have been estimated at 1,000 and <10 individuals respectively (SCOS, 2021). Over 130 harbour seal individuals were recorded on the east Irish coast in 2017/2018 (Morris & Duck, 2019). Harbour seal at-sea distribution maps have been produced by Carter *et al*. (2020) and Russell *et al*. (2017). This data shows that harbour seal do not occur in high densities within the Mona regional marine mammal study area for the generation assets. Areas of high density are present around the east coast of Northern Ireland (Figure 4.19; Russell *et al*., 2017; Carter *et al*., 2020; SCOS, 2021).

4.3.4.48 The population from Carlingford Lough to Copeland Islands has been monitored more frequently from 2002 to 2018. This subset of the Irish Sea population declined slowly over the period 2002 to 2011 at an average rate of 2.7% p.a. (95% CIs: 1.8, 3.5). However, the 2018 survey suggests that since that time period there has been no significant change (SCOS, 2021).

4.3.4.49 Monitoring surveys were undertaken during the construction of the Walney offshore wind from in 2010-2009. They recorded a single harbour seal within the Walney offshore wind farm during the monitoring survey which is within the Mona regional marine mammal study area for the generation assets (CMACS, 2011).

4.3.4.50 Initial results from the aerial surveys undertaken across the Mona Potential Array Area show that one harbour seal was recorded in March 2020, resulting in a relative abundance estimate of seven individuals within the Mona marine mammal study area for the generation assets.

4.3.4.51 Harbour seal were not recorded during the aerial or boat-based surveys for the Rhiannon offshore wind farm (Celtic Array Ltd, 2014c). Four harbour seal were recorded by marine mammal observers during the 2021 site-specific geophysical site investigation survey.

4.3.4.52 Based on the review of literature including previous surveys in this region, it is considered unlikely that harbour seal are a key species within the Mona regional marine mammal study area for the generation assets. It therefore proposed that harbour seal are scoped out of the EIA.

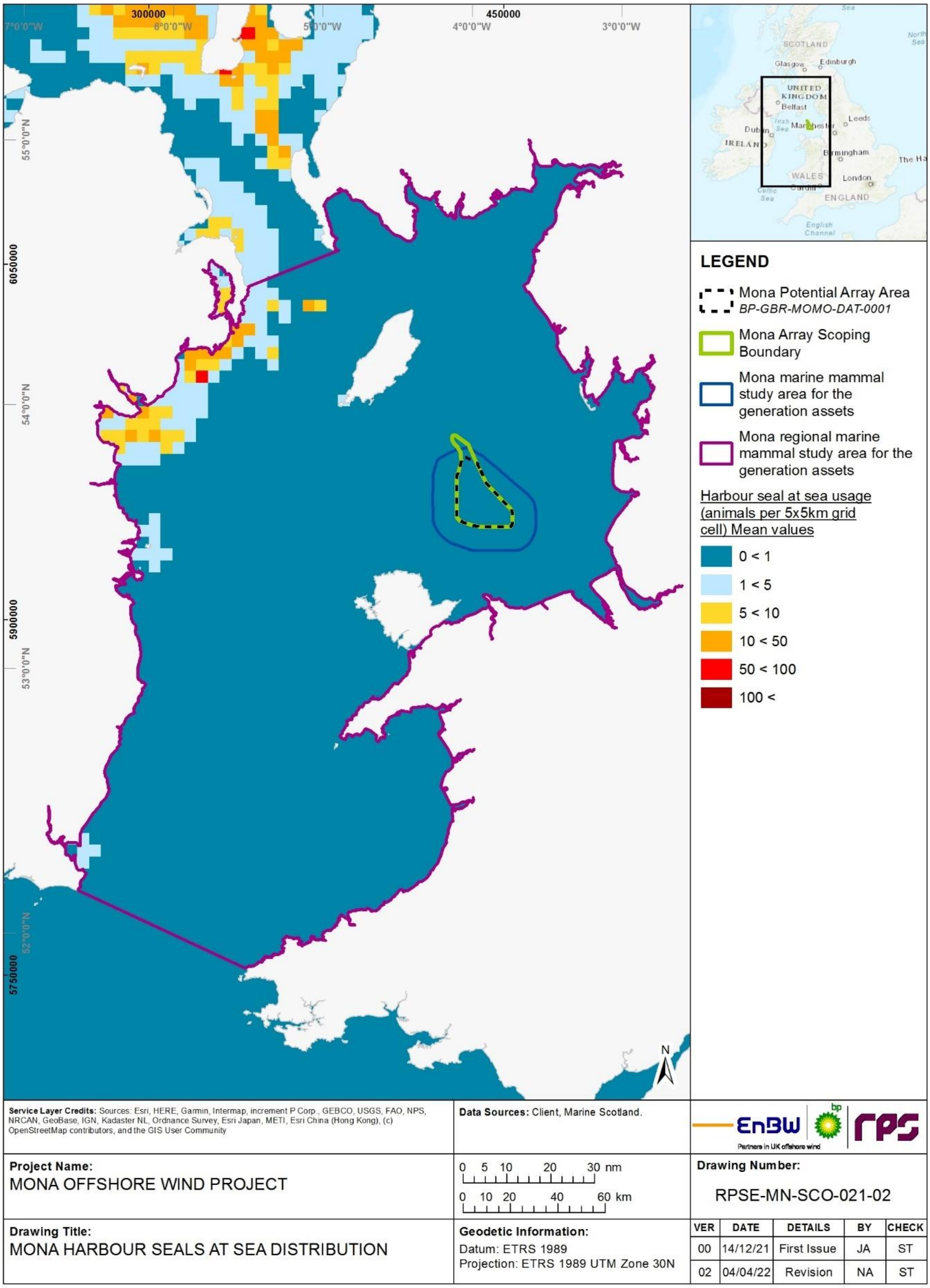


Figure 4.19: Harbour seal at-sea distribution (from Russell *et al.,* 2020).

Designated sites

4.3.4.53 Designated sites with relevant qualifying features which overlap with the Mona regional marine mammal study area for the generation assets are described in this section.

4.3.4.54 Table 4.13 provides an early indication of the designated sites that may be considered within the EIA, Likely Significant Effects (LSE) Screening Report and potentially the Report to Inform Appropriate Assessment (RIAA) if an LSE is identified. The list of designated sites, which includes all marine mammal SACs within the Mona regional marine mammal study area for the generation assets, will be presented in the Marine mammal ES Chapter. As a more detailed understanding of the project activities and impact pathways develops the EIA will consider potential impacts on relevant Annex II marine mammal species of European designated sites.

4.3.4.55 A full screening of European sites with qualifying marine mammal features will be undertaken in the LSE Screening Report for the Mona Offshore Wind Project, as part of the HRA process. The assessment on the European sites and effects on the site(s) conservation objectives will be undertaken in the RIAA.

Table 4.13: Summary of designated sites with relevant marine mammal features within the Mona regional marine mammal study area for the generation assets.

Designated Site	Distance to the Mona Potential Array Area (km)	Features
North Anglesey Marine/Gogledd Môn Forol SAC	22.6	• Harbour porpoise *Phocena phocoena*
Langness MNR	37.0	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus* • Basking Shark *Cetorhinus maximus* • Harbour porpoise *Phocena phocoena* • Risso's dolphin *Grampus griseus*
Douglas Bay MNR	42.6	• Risso's dolphin *Grampus griseus* • Bottlenose dolphin *Tursiops truncatus*
Laxey Bay MNR	44.4	• Harbour porpoise *Phocena phocoena* • Minke whale *Balaenoptera acutorostrata*
Baie Ny Carrickey MNR	47.3	• Risso's dolphin *Grampus griseus* • Harbour porpoise *Phocena phocoena* • Bottlenose dolphin *Tursiops truncatus* • Basking Shark *Cetorhinus maximus*
Calf and Wart Bank MNR	51.4	• Risso's dolphin *Grampus griseus* • Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus*
Ramsey Bay MNR	52.0	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
Port Erin Bay MNR	54.0	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus*

Designated Site	Distance to the Mona Potential Array Area (km)	Features
Niarbyl MNR	54.7	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus* • Grey seal *Halichoerus grypus*
West Coast MNR	57.5	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus* • Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
Pen Llyn a`r Sarnau/Llŷn Peninsula and the Sarnau SAC	72.7	• Bottlenose dolphin *Tursiops truncatus* • Grey seal *Halichoerus grypus*
North Channel SAC	78.4	• Harbour porpoise *Phocena phocoena*
West Wales Marine/Gorllewin Cymru Forol SAC	81.8	• Harbour porpoise *Phocena phocoena*
Strangford Lough SAC	109.3	• Harbour seal *Phoca vitulina*
Murlough SAC	114.2	• Harbour seal *Phoca vitulina*
Rockabill to Dalkey Island SAC	126.1	• Harbour porpoise *Phocena phocoena*
Lambay Island SAC	129.2	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
Cardigan Bay/Bae Ceredigion SAC	135.3	• Bottlenose dolphin *Tursiops truncatus* • Grey seal *Halichoerus grypus*
Slaney River Valley SAC	178.4	• Harbour seal *Phoca vitulina*
Pembrokeshire Marine/Sir Benfro Forol SAC	203.4	• Grey seal *Halichoerus grypus*

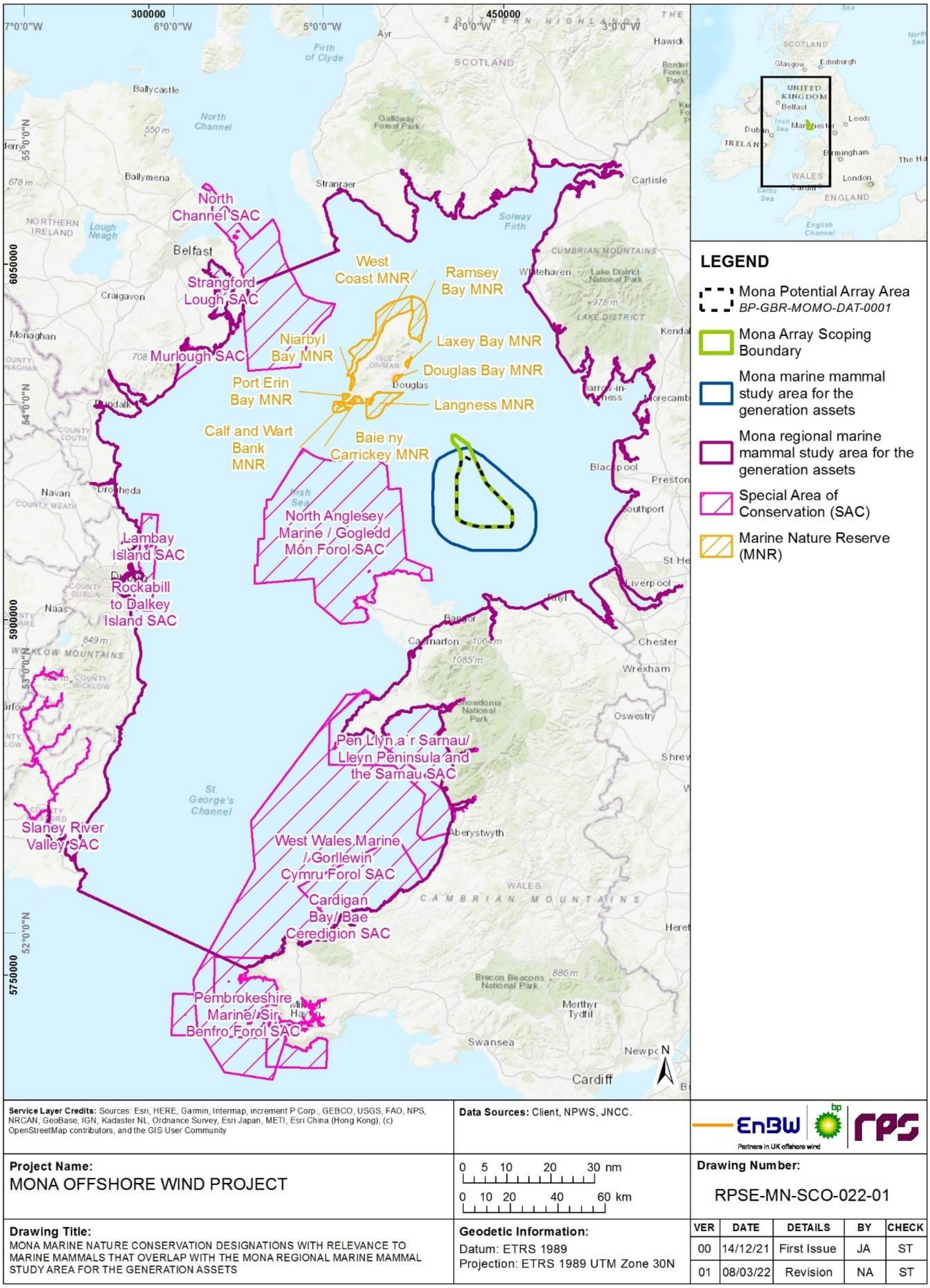


Figure 4.20: Marine nature conservation designations of relevance to marine mammal ecology that overlap with the Mona regional marine mammal study area for the generation assets.

Protected species

4.3.4.56 Several species and habitats of conservation importance have been recorded or have the potential to occur within the Mona marine mammal study area for the generation assets. These are presented below in Table 4.14 and include those species and habitats protected under Annex II of the Habitats Regulations. Where species are afforded protection under other legislation, this has also been noted.

Table 4.14: Relevant protected marine mammal species which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the generation assets.

Marine Mammal species	Protection legislation
Bottlenose dolphin (*Tursiops truncatus*)	• Annex II of the Habitats Regulations • UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Habitat of principal importance in England under the Natural Environment and Rural Communities (NERC) Act 2006 • European Protected Species under Annex IV of the European Comission habitats directive • Part II Section 28 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Harbour porpoise (*Phocoena phocoena*)	• Annex II of the Habitats Regulations • Annex V of the OSPAR (Oslo-Paris) convention • UK BAP prioity habitat that continues to be regarded as conservation priorities in the • European Protected Species under Annex IV of the European Comission habitats directive subsequent UK Post-2010 Biodiversity Framework • Schedule 6 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Grey seal (*Halichoerus grypus*)	• Annex II of the Habitats Regulations • European Protected Species under Annex IV of the European Comission habitats directive • Annex V of the European Comission habitats directive • Part II Section 28 of the Wildlife and Countryside Act 1981 • Conservation of Seals Act 1970
Harbour seal (*Phoca vitulina*)	• Annex II of the Habitats Regulations • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Habitat of principal importance in England under the NERC 2006 Act • European Protected Species under Annex IV of the European Comission habitats directive • Annex V of the European Comission habitats directive • Conservation of Seals Act 1970
Minke whale (*Balaenoptera acutorostrata*)	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework

Marine Mammal species	Protection legislation
	• Habitat of principal importance in England under the NERC 2006 Act • European Protected Species under Annex IV of the European Comission habitats directive • Schedule 5 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Short beaked common dolphin (*Delphinus delphis*)	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • European Protected Species under Annex IV of the European Comission habitats directive • Schedule 6 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Risso's dolphin (*Grampus griseus*)	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Habitat of principal importance in England under the NERC 2006 Act • European Protected Species under Annex IV of the European Comission habitats directive • Schedule 5 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016

4.3.5 Potential project impacts

4.3.5.1 A range of potential impacts on marine mammals have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

4.3.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.15 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.3.5.3 Potential impacts scoped out of the assessment are presented in Table 4.16, with justification.

Table 4.15: Impacts proposed to be scoped into the project assessment for marine mammals (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Injury and disturbance from underwater noise generated from piling.	✓	×	×	Impact piling during construction may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals.	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Underwater noise modelling will be undertaken (as set out in section 3.1.7) to quantitatively assess the risk of auditory injury. Unless any new guidance is published prior to the impact assessment, the Southall *et al*. (2019) thresholds will be used to assess the risk of a permanent auditory injury. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (SPL^{peak}). The assessment of disturbance will be based on the good practice methodology available at the time of assessment and making use of the best available scientific evidence. Noise contours at appropriate intervals will likely be generated by noise modelling and overlaid on species density surfaces to predict the number of animals potentially affected.
Injury and disturbance from underwater noise generation from unexploded ordnance (UXO) detonation.	✓	×	×	UXO detonation may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals.	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Underwater noise modelling will be undertaken for UXO detonation activities (as set out in section 3.1.7) will be used to inform this assessment and determine the extent of noise contours and whether these could lead to injury/disturbance effects.
Disturbance to marine mammals from vessel use and other (non-piling) noise producing activities.	✓	✓	✓	The impact of vessel use during all phases of the project may result in behavioural disturbance/ displacement (including barrier effects) of marine mammals. Other (non-piling) related noise-producing activities could also result in disturbance including construction activities (e.g. seabed preparation, trenching, and rock placement), operation and maintenance activities and decommissioning activities.	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g. rock placement, vessel movement.
Injury to marine mammals due to collision with vessels.	✓	✓	✓	Increased vessel traffic during construction activities, operation and maintenance activities and decommissioning activities may	N/A	A qualitative assessment will be undertaken based on best available literature at the time of writing.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				result in collisions with marine mammals.		
Effects on marine mammals due to changes in prey availability.	✓	✓	✓	Changes in prey abundance and distribution resulting from construction activities, operation and maintenance activities and decommissioning activities may impact on the ability of marine mammals to forage in the area.	N/A	No specific modelling required for this impact although the assessment will be based on the results of the underwater noise modelling assessment (section 3.2) and physical processes assessment (section 3.1), and the resulting impact assessment carried out fish and shellfish receptors (section 4.2).
Disturbance to marine mammals from pre-construction surveys.	✓	×	×	Geophysical surveys in the construction phase may result in behavioural disturbance/ displacement of marine mammals.	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities.

Table 4.16: Impacts proposed to be scoped out of the Mona Offshore Wind Project assessment for marine mammals.

Impact	Justification
Accidental pollution during all phases.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. This may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. Environmental Management Plan (EMP), including Marine Pollution Contingency Plans (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at-sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning (MPCP). As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.
Increased suspended sediment concentrations (SSC) and associated sediment deposition during all phases.	Disturbance to water quality as a result of construction operations can have both direct and indirect impacts on marine mammals. Indirect impacts would include effects on prey species (which is scoped in). Direct impacts include the impairment of visibility and therefore foraging ability which might be expected to reduce foraging success. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seal in the UK have been documented foraging in areas with high tidal flows (e.g. Pierpoint, 2008; Marubini *et al*., 2009; Hastie *et al*., 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways, for example, seals can detect water movements and hydrodynamic trails with their mystacial vibrissae; while odontocetes primarily use echolocation to navigate and find food in darkness. Whilst elevated levels of SSC arising during construction of the Mona Offshore Wind Project may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is a large

Impact	Justification
	natural variability in the SSC within the Mona Marine Mammal study area for the generation assets, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.
Impact of EMF (from surface lain or buried cables) during the operation and maintenance phase.	Based on the data available to date, there is no evidence of EMF related to marine renewable devices having any impact (either positive or negative) on marine mammals (Copping, 2018). There is no evidence that seals can detect or respond to EMF, however, some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al*., 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin (*Sotalia guianensis*) which has been shown to possess an electroreceptive system, which uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal *et al.,* 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the Mona marine mammal study area for the generation assets. As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.
Disturbance to marine mammals from operational noise from wind turbine operation during the operation and maintenance phase.	The Marine Management Organisation (MMO, 2014) review of post-consent monitoring at offshore wind farms found that available data on the operational wind turbine noise, from the UK and abroad, in general showed that noise levels from operational wind turbines are low and the spatial extent of the potential impact of the operational wind turbine noise on marine receptors is generally estimated to be small, with behavioural response only likely at ranges close to the wind turbines. This is supported by several published studies which provide evidence that marine mammals are not displaced from operational wind farms. At the Horns Rev and Nysted offshore wind farms in Denmark, long term monitoring showed that both harbour porpoise and harbour seal were sighted regularly within the operational offshore wind farms, and within two years of operation, the populations had returned to levels that were comparable with the wider area (Diederichs *et al.*, 2008). Similarly, a monitoring programme at the Egmond aan Zee offshore wind farm in the Netherlands reported that significantly more porpoise activity was recorded within the offshore wind farm compared to the reference area during the operational phase (Scheidat *et al*., 2011). Other studies at Dutch and Danish offshore wind farms (Lindeboom *et al*., 2011) also suggest that harbour porpoise may be attracted to increased foraging opportunities within operating offshore wind farms. In addition, recent tagging work by Russell *et al*. (2014) found that some tagged harbour and grey seals demonstrated grid like movement patterns as these animals moved between individual wind turbines, strongly suggestive of these structures being used for foraging. Other reviews have also concluded that operational wind farm noise will have negligible effects (Madsen *et al*.,2006; Teilmann *et al*., 2006a; Teilmann *et al*., 2006b; CEFAS, 2010; Brasseur *et al*., 2012). As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.

4.3.6 Measures adopted as part of the project

4.3.6.1 The following measures adopted as part of the project are relevant to marine mammals. These measures may evolve as the engineering design and the EIA progresses.

- Development of, and adherence to, an appropriate Construction Method Statement (CMS).
- Development of, and adherence to, an Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan (MPCP) which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.
- Development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP) which would include implementation of piling soft start and ramp up measures.

4.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effect and will be consulted upon with statutory consultees throughout the EIA process.

4.3.7 Proposed assessment methodology

4.3.7.1 The marine mammal offshore EIA will follow the methodology set out in part 1 section 4: EIA Methodology, of the EIA Scoping Report. Specific to the marine mammal EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019).
- European Union Guidance on Wind Energy Developments and Natura 2000 legislation (European Commission, 2010).
- Oslo Paris Convention (OSPAR) Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al.*, 2019).
- National Oceanic and Atmospheric Administration (NOAA) technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (NMFS, 2016).
- Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018).
- Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioural response to human noise (Southall *et al*., 2021).
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).

- Guidance on noise management in harbour porpoise SACs (JNCC, 2020b).
- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental status (GES) in Europe's seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." This Directive was transposed into United Kingdom (UK) law by the Marine Strategy Regulations 2010.

4.3.7.2 The impact assessment will consist of a detailed quantitative assessment for underwater noise (impulsive and non-impulsive noise sources). The assessment will include permanent auditory injury and behavioural disturbance. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SELcum) and peak sound pressure level (peak SPL). To assess the SELcum criterion, the predictions of received sound level over 24 hours are frequency weighted, to reflect the hearing sensitivity of each functional hearing group. The peak SPL criterion is for unweighted received sound level. The assessment of disturbance will be based on the good practice methodology available at the time of assessment, and, where possible, will include consideration of species-specific dose response curves. Noise contours at appropriate intervals will be generated by noise modelling and overlaid on species density surfaces to predict the number of animals potentially disturbed. This will allow the quantification of the number of animals that will potentially respond.

4.3.7.3 The densities to be used in the assessment process for assessing potential impacts on marine mammals, and agreement of correction factors for availability bias will be discussed with stakeholders as part of the Marine Mammal Evidence Plan process.

4.3.7.4 For the purposes of undertaking the EIA, marine mammal receptors identified as having the potential to occur in the Mona marine mammal study area for the generation assets will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Mona Offshore Wind Project will be assessed. Criteria defining the value of each IEF will be defined to reflect topic specific interests.

4.3.8 Potential cumulative effects

4.3.8.1 For marine mammal receptors, the approach to cumulative impact assessment will be holistic and combine all potential sources of underwater noise from other plans and projects including:

- pile driving
- disturbance from vessels
- UXO clearance
- seismic surveys
- other construction developments.

4.3.8.2 The key cumulative effect is likely to come from underwater noise from pile driving. A range of realistic scenarios for cumulative underwater noise effects will be developed for the cumulative effects assessment, based on publicly available information, liaison with other developers where possible, as well as consultation with the regulators and stakeholders.

4.3.8.3 The impacts of fishing and existing shipping activity will not be considered in the cumulative effects assessment since these activities occur throughout the baseline and are therefore already accounted for in the existing marine mammal baseline characterisation abundance and density estimates.

4.3.8.4 The cumulative effects assessment will follow the approach outlined in part 1, section 4: EIA Methodology of the EIA Scoping Report. The cumulative study area (within which the screening for other plans/projects is undertaken) will be defined as the Mona regional marine mammal study area for the generation assets (see section 4.3.2).

4.3.9 Potential inter-related effects

4.3.9.1 The assessment of potential inter-related effects will be considered within the Marine mammals ES chapter. It will include consideration of project lifetime effects and receptor led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

4.3.10 Potential transboundary impacts

4.3.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon marine mammals due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- Injury and disturbance from underwater noise generated from piling.
- Injury and disturbance from underwater noise generation from UXO detonation.
- Disturbance to marine mammals from vessel use and other (non-piling) noise-producing activities.
- Effects on marine mammals due to changes in prey availability.

4.3.10.2 These activities have the potential to directly affect Annex II marine mammal species that are associated with European sites of other states. Therefore, the potential for transboundary impacts will be considered within the ES.

4.4 Offshore ornithology

4.4.1 Introduction

4.4.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the offshore ornithology receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets on offshore (marine) ornithology receptors. Intertidal and terrestrial ornithology receptors are addressed in part 3, section 7.1: Terrestrial and intertidal ecology, of the EIA Scoping Report.

4.4.2 Study area

4.4.2.1 The Mona offshore ornithology study area for the generation assets is presented in Figure 4.21 and described below.

4.4.2.2 The Mona offshore ornithology study area for the generation assets comprises the Mona Potential Array Area with a 4km to 10 km buffer and represents the Mona aerial bird survey area. The Mona offshore ornithology study area for the generation assets does not extend fully to 10km in all directions around the Mona Potential Array Area, as this area was refined following commencement of the aerial bird surveys. However, it will mostly reach 10km and will consistently exceed 4km.

4.4.2.3 Current Statutory Nature Conservation Body (SNCB) guidance regarding displacement (SNCBs, 2017) advises a displacement buffer of 2km for auk species (e.g. guillemot *Uria aalge*, razorbill *Alca torda*). Diver species are perceived to be more sensitive, and displacement has typically been assessed for the area within 4km of an offshore wind farm array boundary; however, there is recent evidence of displacement effects at substantially larger distances (Mendel *et al.*, 2019; Heinänen *et al.*, 2020) and emerging guidance (Natural England, in prep.) suggests that buffer areas around offshore wind farm arrays should cover 10km when wintering divers are present and may be connected to a nearby designated site. Initial results from the Mona aerial bird surveys, however, indicate extremely low densities of wintering red-throated diver. Therefore, the Mona offshore ornithology study area for the generation assets is considered to be suitable for characterising the offshore ornithology features and for considering potential impacts from the Mona Offshore Wind Project generation assets.

4.4.2.4 Seabirds and migratory birds are highly mobile species and there is potential for birds occurring within the Mona Potential Array Area to have originated from more distant locations (e.g. breeding colony). Published foraging ranges (Woodward *et al.*, 2019) and regional population scales (Furness, 2015) will be reviewed to determine the potential connectivity of breeding and non-breeding populations with the Mona Offshore Wind Project.

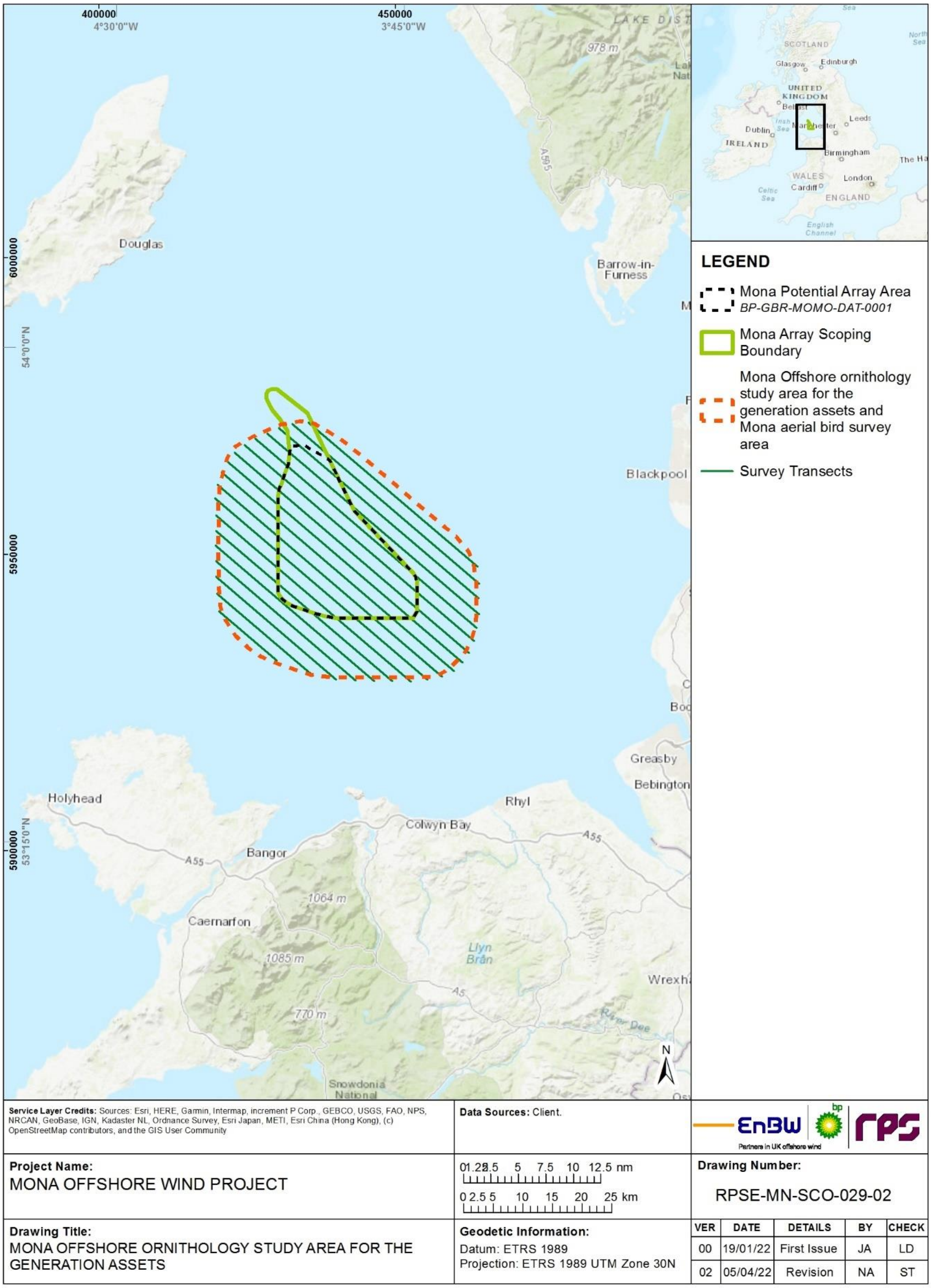


Figure 4.21: The Mona offshore ornithology study area for the generation assets.

4.4.3 Data sources

Desktop data

4.4.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of sources which provide coverage of the Mona offshore ornithology study area for the generation assets. These are summarised in Table 4.17.

Table 4.17: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Seabird Population Trends and Causes of Change	Joint Nature Conservation Commitee (JNCC)	2021	JNCC
Seabirds Count and the Seabird Monitoring Programme	JNCC	2021	JNCC
Protected site networks	JNCC, NatureScot SiteLink (Scotland), Natural England GOV.UK (England), Natural Resources Wales (NRW) GOV.WALES (Wales), Department of Agriculture, Environment and Rural Affairs (DAERA) (Northern Ireland), National Parks and Wildlife Service (NPWS) (Ireland), Isle of Man GOV.IM (DEFA)	2021	Statutory Nature Conservation Bodies (SNCBs)
National Biodiversity Network (NBN) Atlas	NBN Atlas	2021	NBN Atlas
Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping	Biological Conservation	2020	Cleasby *et al*.
Desk-based revision of seabird foraging ranges used for Habitats Regulation Asssessment (HRA) screening	BTO Research Report	2019	Woodward *et al*.
Seabird Mapping and Sensitivity Tool (SeaMAST)	Natural England GOV.UK	2019	Natural England
Distribution maps of cetacean and seabird populations in the North-East Atlantic	Journal of Applied Ecology	2019	Waggitt *et al*.
Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species	Ecological Applications	2017	Wakefield *et al*.
Report to Inform Appropriate Assessment: Offshore Wind Leasing Round 4. Plan Level HRA	The Crown Estate	2021/ 2022	Niras
Awel y Mor aerial digital surveys (2019 to 2021)	Awel y Mor Preliminary Environmental Information Report (PEIR), Volume 2, Chapter 4: Offshore Ornithology https://awelymor.cymru/	2019-2021	RWE
Morlais Project baseline boat-based seabird survey results	Morlais Project Environmental Statement	2019	Natural Power/Royal Haskoning
Walney offshore wind farm year 3 post-construction monitoring	Marine Data Exchange	2014	CMACS

Title	Source	Year	Author
Rhiannon offshore wind farm Preliminary Environmental Information Report (PEIR)	Marine Data Exchange	2012	Celtic Array Ltd
West of Duddon Sands pre-construction offshore wind farm boat-based ornithology samples	Marine Data Exchange	2012	Centre for Marine and Coastal Studies Ltd (CMACS)
Ormonde and Walney offshore wind farm ornithology surveys	Marine Data Exchange	2011-2012	Aarhus University
Round 3 Irish Sea Offshore Wind Farm Development ornithology surveys	Marine Data Exchange	2010-2012	Ecological Consultancy Ltd. (ECON)
SEA678 Data Report for offshore seabird populations	University College Cork	2006	Mackey and Giménez

Site-specific surveys

4.4.3.2 Aerial digital surveys for seabirds and marine mammals have been undertaken within the Mona offshore ornithology study area for the generation assets. The Mona offshore ornithology study area for the generation assets does not extend fully to 10km in all directions around the Mona Potential Array Area, however, it will mostly reach 10km and will consistently exceed 4km, as explained in section 4.4.2. Surveys commenced in March 2020 and continued until February 2022, completing a suite of 24 surveys spanning two years.

4.4.3.3 The surveys follow APEM's grid-based method for collecting seabird and marine mammal data, with approximately 30% of the sea surface collected and 12% analysed, conforming with guidance in Thaxter *et al*. (2016). APEM's bespoke camera system was fitted into a twin-engine aircraft and custom flight planning software allowed each flight line to be accurately mapped for use before and during the flight. The camera system captures abutting still imagery along 18 survey lines spaced approximately two kilometres (km) between-track and aligned northwest to southeast.

4.4.3.4 The aircraft collects the data at an altitude of approximately 396 metres (m), and a speed of approximately 120 knots. The data collected are 1.5 centimetre (cm) Ground Sampling Distance (GSD) digital still images, and target coverage has been met for each survey. All surveys are undertaken in weather conditions that do not compromise the ability to provide data on the identification, distribution and abundance of bird species and marine megafauna within the Mona aerial bird survey area. Favourable conditions for surveying are defined as a cloud base of >396m, visibility of > 5km, wind speed of <30 knots and a sea state of no more than 4 (moderate). For health and safety reasons, no surveys are undertaken in icing conditions. Measures are taken to minimise glint and glare (strong reflected light off the sea), that makes finding and identifying bird species and marine megafauna more difficult. On days with minimal cloud, surveys avoid the period for two hours around midday. This reduces the risk of collecting images that are difficult to analyse.

4.4.3.5 The images are analysed to enumerate bird and marine mammals to species level, where possible. Each animal and anthropogenic object located in the imagery is geo-referenced, allowing the locations to be related to the boundary of the survey area. Internal quality assurance is undertaken to check for missed targets and to ensure the correct species are identified. Birds and marine mammals identified from the images are 'snagged' (i.e. located within the images) and categorised to the lowest taxonomic level possible.

4.4.3.6 The site-specific survey data will be used to generate density and spatial abundance estimates for the most frequently recorded bird species within the Mona offshore ornithology study area for the generation assets, using either a modelling application (e.g. MRSea) or design-based abundance estimation methods. The method used will be discussed and agreed in consultation with the Evidence Plan Expert Working Group for offshore and coastal ornithology.

4.4.3.7 The direction of birds in flight are recorded from all digital still images. This is undertaken by measuring the axis of bill to tail, within APEM's bespoke image analysis software, taking the bearing relative to the bird's head. This bearing is linked to the geo-referenced image and thus provides an accurate representation of bird orientation at time of image capture. This data can be used to explore the predominant flight direction of each species during a survey or during a season by the creation of circular statistic outputs termed 'rose diagrams'.

4.4.3.8 Further details on the site-specific surveys will be presented in the Environmental Statement (ES) and are being consulted on with the SNCBs through the Evidence Plan Expert Working Group for offshore and coastal ornithology.

4.4.4 Baseline environment

4.4.4.1 This section provides a high-level overview of the offshore ornithology baseline environment within the Mona offshore ornithology study area for the generation assets in the context of the Irish Sea bird populations.

4.4.4.2 The primary data source used to inform the offshore ornithology EIA for the Mona Offshore Wind Project will be the 24 months of digital aerial transect surveys conducted between March 2020 and February 2022.

Irish Sea

4.4.4.3 A review of ornithology surveys in the Irish Sea from 1980 to 2003 was undertaken for the Strategic Environmental Assessment (SEA) area 6 which covers the Irish Sea. Manx shearwater *Puffinus puffinus* have been recorded at densities of up to eight birds per km^2 in the Irish Sea during the breeding season and post-breeding season. Northern gannet *Morus bassanus* have also been recorded at densities of up to 2.5 birds per km^2 in the Irish Sea during the post-breeding season. Herring gull *Larus argentatus* have been recorded at densities of 5 birds per km^2 during the winter, breeding season and autumn. Kittiwake *Rissa tridactyla* were recorded in densities of up to 2 birds per km^2 across all seasons. The great cormorant *Phalacrocorax carbo*, northern fulmar *Fulmarus glacialis*, European shag *Phalacrocorax aristotelis*, arctic skua *Stercorarius parasiticus*, great skua *Stercorarius skua*, black headed gull *Chroicocephalus ridibundus*, common gull *Larus canus*, long-tailed skua *Stercorarius longicaudus*, Pomarine Skua

Stercorarius pomarinus, lesser black-backed gull *Larus fuscus*, great black-backed gull *Larus marinus*, common tern *Sterna hirundo*, arctic tern *Sterna paradisaea*, black guillemot *Cepphus grylle*, common guillemot *U. aalge*, razorbill *A. torda* and Atlantic puffin *Fratercula arctica* are also identified as being present within the Irish Sea (Mackey and Giménez, 2006).

4.4.4.4 Boat-based ornithology surveys were carried out within the east Irish Sea (to the southwest of the Mona offshore ornithology study area for the generation assets) from March 2010 to April 2012 to support the Environmental Impact Assessment (EIA) for the Rhiannon offshore wind farm. The species assemblage recorded was primarily composed of petrel *Procellariiformes*, shearwater *Procellariidae*, northern gannet, skuas *Stercorarius*, gulls *Laridae*, terns *Sternidae* and auks *Alcidae*. Manx shearwater dominated the recorded individuals, making up 44% of all birds recorded. Guillemot and razorbill were the second and third most common species recorded. Seasonal variation was also recorded with many of the more numerous species recorded in higher numbers throughout the spring and summer months (Celtic Array Ltd, 2012).

4.4.4.5 Boat-based ornithology surveys were carried out within the east Irish Sea (to the east of the Mona offshore ornithology study area for the generation assets) in 2014 as part of pre-construction and post-construction monitoring for the West of Duddon Sands and Walney offshore wind farms. Manx shearwater and guillemot were the most frequently recorded species and were recorded in all surveys. Kittiwake, lesser black-backed gull and gannet were also recorded frequently. The abundance of birds recorded within the offshore wind farms peaked in June and July. There were low numbers of birds in May and August across both survey campaigns (CMACS, 2012; 2014).

Mona offshore ornithology study area for the generation assets

4.4.4.6 Interim analysis of the aerial digital survey data collected between March 2020 and February 2021 indicates that the four most frequently recorded species occurring within the Mona offshore ornithology study area for the generation assets over this period were guillemot, razorbill, kittiwake and Manx shearwater. Gannet, herring gull and lesser black-backed gull were recorded regularly but in lower numbers.

4.4.4.7 A summary of the most frequently recorded species in the site-specific surveys from March 2020 to February 2021 across the Mona offshore ornithology study area for the generation assets is presented below, with a summary of the distribution of all other species recorded presented in Table 4.18.

- Guillemot were recorded in all months. Lowest numbers were recorded during the autumn and winter period (September to January). Numbers were highest in late winter to summer with peak densities recorded during early spring (March 2020), when 1,788 individuals were recorded, resulting in an abundance estimate of 12,563 within the Mona offshore ornithology study area for the generation assets. Guillemot were recorded throughout the Mona offshore ornithology study area for the generation assets. However, they showed a higher density within the centre of the Mona offshore ornithology study area for the generation assets in the non-breeding season and across the east of the Mona offshore ornithology study area for the generation assets in the breeding season.

- Razorbill were recorded in all months. Numbers were highest in winter with peak densities recorded during early spring (March 2020), when 534 individuals were recorded, resulting in an abundance estimate of 3,752 within the Mona offshore ornithology study area for the generation assets. Razorbill were recorded throughout the Mona offshore ornithology study area for the generation assets. However, they showed a higher density within the centre of the Mona offshore ornithology study area for the generation assets in the non-breeding season.
- Guillemot and razorbill cannot be reliably identified to species level in some images and such incidences are therefore snagged as 'unidentified guillemot/razorbill'. Unidentified guillemot/razorbill were recorded in all months, although numbers fluctuated between months. Lowest numbers were recorded during the late summer to autumn period (July to October). Numbers increased from November onwards with peak densities recorded during early spring (February 2020), when 1,400 individuals were recorded, resulting in an abundance estimate of 9,798 within the Mona offshore ornithology study area for the generation assets. Guillemot/razorbill were recorded throughout the Mona offshore ornithology study area for the generation assets however they showed a higher density within the centre of the Mona offshore ornithology study area for the generation assets in the breeding and non-breeding season. Numbers will be apportioned to each species on the basis of the monthly proportions of each species in the dataset.
- Kittiwake were recorded in all months, although numbers fluctuated between months. Lowest numbers were recorded during the autumn post-breeding period (August to October). Numbers increased from November onwards with peak densities recorded during early spring (March 2020), when 353 individuals were recorded, resulting in an abundance estimate of 2,480 birds within the Mona offshore ornithology study area for the generation assets. Kittiwake were mainly recorded in the east of the Mona offshore ornithology study area for the generation assets apart from in October and December 2020 when they were recorded in the southwest and north of the Mona offshore ornithology study area for the generation assets respectively.
- Manx shearwater were recorded in March, June, July, August and September 2020. Within this period, lowest numbers were recorded during the spring and autumn (March and September). Numbers were highest in summer with peak densities recorded during July 2020, when 465 individuals were recorded, resulting in an abundance estimate of 4,060 within the Mona offshore ornithology study area for the generation assets. During March and September 2020 Manx shearwater were recorded in the west of the Mona offshore ornithology study area for the generation assets, whereas in June, July and August 2020 they were recorded in the east of the Mona offshore ornithology study area for the generation assets

- Gannet were recorded in all months except February 2021. Numbers were highest during the summer months and lowest in mid-winter. A peak raw count of 101 individuals was recorded in July 2020, resulting in an abundance estimate of 882 birds within the Mona offshore ornithology study area for the generation assets. Gannet were recorded throughout the Mona offshore ornithology study area for the generation assets but were less prevalent in the west of the area.

4.4.4.8 Further analysis of density and abundance results using 18 months of aerial digital survey data will be undertaken and presented in the PEIR. Analysis of the full 24 months of aerial survey data will be presented in the ES chapter.

Table 4.18: The distribution of seabird species in the Mona offshore ornithology study area for the generation assets recorded by the site-specific surveys from March 2020 to February 2021.

Species	Distribution across the Mona offshore ornithology study area for the generation assets
Black-tailed godwit	A single record of 13 birds in July 2020 flying in the southeast of the Mona offshore ornithology study area for the generation assets.
Unidentified wader species	Records in May and August 2020 totalling 12 birds mostly flying in the east of the Mona offshore ornithology study area for the generation assets.
Black-headed gull	Seven birds recorded in August and October 2020 and February 2021 across the Mona offshore ornithology study area for the generation assets.
Little gull	A total of 16 birds recorded in flight during the winter months in the northeast of the Mona offshore ornithology study area for the generation assets.
Common gull	Recorded mainly in flight during the winter months with peak of 18 birds in February 2021 in the east of the Mona offshore ornithology study area for the generation assets.
Unidentified small gull species	Small numbers of up to five birds recorded on surveys between April and December 2020 across the Mona offshore ornithology study area for the generation assets.
Great black-backed gull	Moderate numbers of up to 23 birds recorded in most months across the Mona offshore ornithology study area for the generation assets.
Herring gull	Small numbers recorded in most months across the Mona offshore ornithology study area for the generation assets, with a peak of 21 birds in February 2021.
Lesser black-backed gull	Small numbers of up to 11 birds recorded across the Mona offshore ornithology study area for the generation assets between March and November 2020.
Unidentified gull species	Small numbers of unidentified gull species that could not be assigned to species level that were recorded across the Mona offshore ornithology study area for the generation assets throughout the year.
Sandwich tern	Single birds recorded in June and August 2020 in the east of the Mona offshore ornithology study area for the generation assets.
Common tern	Recorded in low numbers (12 birds in the June 2020 survey) in the southwest of the Mona offshore ornithology study area for the generation assets.
Unidentified ‘commic’ tern	Small numbers of up to three unidentifiable ‘commic’ terns recorded during summer months in the Mona offshore ornithology study area for the generation assets.
Unidentified tern species	One individual recorded in the centre of the Mona offshore ornithology study area for the generation assets in June 2020.

Species	Distribution across the Mona offshore ornithology study area for the generation assets
Great skua	One individual recorded in the southeast of the Mona offshore ornithology study area for the generation assets in November 2020.
Arctic skua	Two records of single birds in May and September 2020 in the south and east of the Mona offshore ornithology study area for the generation assets.
Unidentified skua species	One individual recorded in the north of the Mona offshore ornithology study area for the generation assets in May 2020.
Puffin	Small numbers recorded sitting on the water between March and August 2020 throughout the Mona offshore ornithology study area for the generation assets with a peak of 14 birds in March 2020.
Unidentified auk species	Small numbers recorded throughout the year (mostly sitting on the water) mainly in the centre and east of the Mona offshore ornithology study area for the generation assets with a peak of 20 birds in January 2021.
Red-throated diver	Single birds recorded in August, October and November 2020 in the north of the Mona offshore ornithology study area for the generation assets.
Unidentified storm petrel species	One individual recorded sitting on the water in the east of the Mona offshore ornithology study area for the generation assets in May 2020.
Fulmar	Moderate numbers recorded mainly in the west of the Mona offshore ornithology study area for the generation assets with a peak of 27 birds in December 2020.

Designated sites

4.4.4.9 There are no Special Protection Areas (SPAs) within 10km of the Mona Potential Array Area. As part of the site selection process (see part 2, section 2: Site selection and alternatives, of the EIA Scoping Report), a 10km buffer was applied to the Liverpool Bay SPA, to minimise impacts on offshore ornithology receptors.

4.4.4.10 Nature conservation designations with relevance to seabirds comprise SPAs within the National Site Network in the UK and Natura 2000 network of European sites in the Republic of Ireland, Ramsar sites, national (e.g. Sites of Special Scientific Interest (SSSI)) and regional designations. There are no current or proposed designated sites within the Mona Potential Array Area. There are, however, a number of SPAs along the western British coastline and eastern and northern coastlines of Ireland and Northern Ireland that support qualifying species that have been recorded during the site-specific surveys for the Mona Offshore Wind Project. Figure 4.22 provides an initial indication of the designated sites (international and national) with relevant ornithology features that are within 100km of the Mona Potential Array Area and likely to be given consideration within the EIA and HRA. This is not an exhaustive representation of all designated sites with potential connectivity to the Mona Offshore Wind Project.

4.4.4.11 It is considered that there is the potential for an impact on a breeding seabird colony if the wind farm is located within the regular foraging range of the species. In the absence of specific information on the foraging patterns of breeding birds, Natural England (2015) has previously advised that the 'mean maximum' range (i.e. the maximum range reported in each study averaged across studies per species) as reported by Thaxter *et al*. (2012)

is used as a guide to establish likely connectivity between breeding seabird colonies and an offshore wind farm development. However, emerging English guidance (Natural England in prep.) and advice for more recent UK offshore wind applications recommend that connectivity is established by the mean maximum (plus one standard deviation (+1 S.D.)) foraging range reported in Woodward *et al*. (2019). This approach will be adopted for the Mona Offshore Wind Project EIA. Use of this metric takes into account different maxima having been quantified by tracking studies for the same species, and the mean maximum (+1 S.D.) range incorporates this variability without relying on single values that might be unrepresentative of all colonies.

4.4.4.12 SPAs and proposed SPAs (pSPAs) designated for breeding seabird interests will be identified by a search for sites within the species-specific foraging range distances, defined by the mean maximum +1 S.D. distance. The assessment will identify a likely significant effect of the Mona Offshore Wind Project on those breeding seabird SPAs within range that have recorded presence of the qualifying interests within the Mona offshore ornithology study area for the generation assets. Consideration will also be given to the potential for impacts on wetland SPAs that host important wintering waterbird features that may interact with the Mona Offshore Wind Project when in flight outside the respective SPA boundary. This process will generate a ‘long-list’ of designated sites with potential connectivity to the Mona Offshore Wind Project generation assets.

4.4.4.13 This long list will be refined in the EIA to include sites that fall within the potential Zone Of Influence (ZOI) of the Mona Offshore Wind Project, which will be determined as part of the EIA process to include consideration of migratory bird species.

4.4.4.14 A full screening of the National Site Network and European sites with qualifying ornithology features will be undertaken in the HRA Screening Report for the Mona Offshore Wind Project. Relevant qualifying interests of these designated sites screened into the offshore ornithology assessment will be fully considered and assessed in the offshore ornithology chapter of the EIA, with the assessment on the designated sites deferred to the Report to Inform Appropriate Assessment (RIAA).

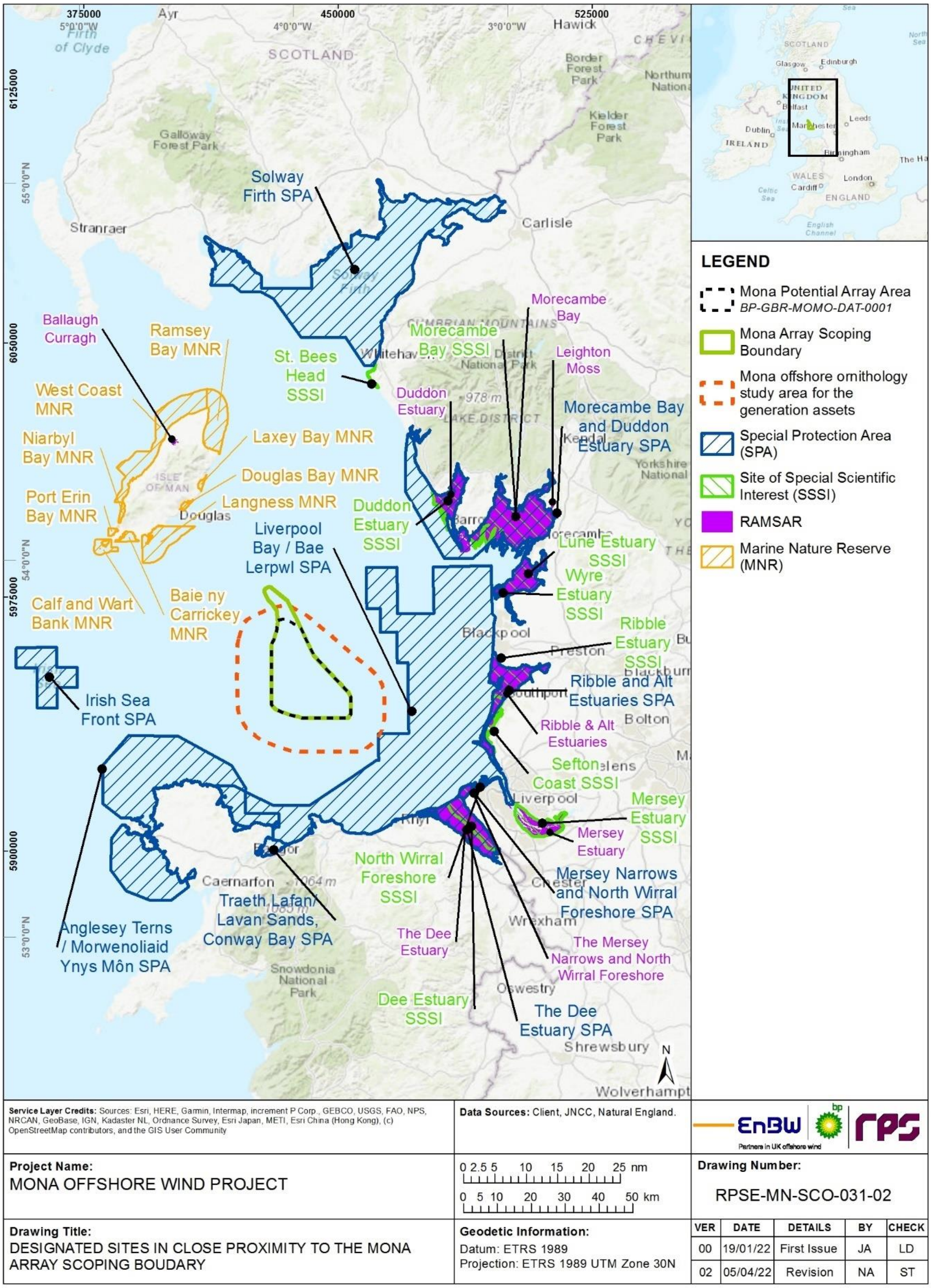


Figure 4.22: Marine nature conservation designations with relevance to offshore ornithology within the proximity of the Mona Potential Array Area.

4.4.5 Potential project impacts

4.4.5.1 A range of potential impacts on offshore ornithology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 4.19, together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, potential impacts proposed to be scoped out of the assessment are presented in Table 4.20, with justification.

Table 4.19: Impacts proposed to be scoped into the project assessment for offshore ornithology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.	✓	✓	✓	Airborne noise and underwater noise generated during construction activities (such as pile-driving), and the presence of vessels, may temporarily disturb/displace birds from foraging areas. Presence of operational wind turbines and associated maintenance activities may disturb birds and displace them from their foraging or resting areas. The presence of vessels during the decommissioning phase may temporarily disturb birds from foraging areas.	Desk study, ornithological baseline surveys and data analysis.	Quantified assessment based on area disturbed during the construction and decommissioning phases with reference to noise modelling and the impacts from vessels on birds. The extent of disturbance from vessels and the species' sensitivities will be based on published literature, e.g. Furness *et al*. (2013) and Wade *et al*. (2016). Displacement modelling and population viability analysis will be undertaken to quantify the estimated level of impact arising from displacement impacts during the operation and maintenance phase. Section 4.4.7 presents details of the proposed approach to be undertaken for displacement modelling, apportioning and population viability analysis.
Indirect impacts from underwater noise affecting prey species.	✓	×	✓	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as pre-construction geophysical surveys, Unexploded Ordnance (UXO) detonation, and pile-driving. Similar impacts may arise during the decommissioning phase (although piling will not be required during the decommissioning phase). This may cause reduced energy intake affecting the productivity or survival of birds. This does not apply to the operation and maintenance phase when underwater noise emissions would not cause significant disruption to prey species.	Ornithological baseline surveys and data analysis, supported by information presented in the Fish and shellfish ecology ES chapter.	The assessment of potential effects on birds will draw upon the results from the Fish and shellfish ecology ES chapter and a qualitative assessment will be undertaken based on predicted extent of impact and known behaviour of fish to noise using the latest published literature.
Temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs).	✓	✓	✓	There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of activities during all phases (e.g. seabed preparation, UXO detonation, drilling, cable installation and repair/reburial, removal of infrastructure) (see part 2, section 4.1: Benthic subtidal and	Ornithological baseline surveys and data analysis, supported by information presented in the Benthic subtidal and intertidal ecology and Fish and shellfish ecology ES chapters.	The assessment of potential effects on birds will draw upon the results from the Benthic subtidal and intertidal ecology and Fish and shellfish ecology ES chapters and a qualitative assessment will be undertaken based on predicted extent of impact on habitats.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				intertidal ecology, of the EIA Scoping Report). This has potential to affect the foraging efficiency of diving birds as well as indirect effects from impacts on fish and shellfish prey.		
Collision risk.	×	✓	×	Presence of operational wind turbines may lead to collision risk. Additional mortality may cause a decrease in seabird populations.	Ornithological baseline survey and desktop data.	Collision risk modelling and population viability analysis will be undertaken to quantify the estimated level of impact arising from collisions. Section 4.4.7 presents details of the proposed approach to the collision risk modelling, apportioning and population viability analysis.
Barrier to movement.	×	✓	×	Presence of operational wind turbines may result in additional energy expenditure as migrating or commuting birds fly longer distances around the wind farm.	Ornithological baseline surveys and data analysis.	Barrier effects will be assessed alongside displacement impacts using the recommended and emerging SNCB approaches and Population Viability Analysis (PVA).

Table 4.20: Impacts proposed to be scoped out of the project assessment for offshore ornithology.

Impact	Justification
Direct disturbance and displacement impacts from underwater noise during operation and maintenance and decommissioning phases.	Underwater noise as a result of operation of the wind turbines is extremely unlikely to result in noise levels that would harm birds. In the unlikely event that such low levels of noise emission result in displacement of birds away from wind turbines, this impact would already be accounted for by the above-water operational displacement assessment. Underwater noise generated during the decommissioning phase will be lower than that generated during the construction phase, as piling will not be required during the decommissioning phase. As such, it is proposed that this impact is scoped out of the EIA.
Accidental pollution during all phases of the Mona Offshore Wind Project.	Pollution impacts (accidental oil/fuel spills) during all phases of the Mona Offshore Wind Project relating to the generation assets are scoped out on the basis that the implementation of a Marine Pollution Contingency Plan will avoid the risk of significant pollution events. Consequently, seabirds and shorebirds are extremely unlikely to be significantly affected by any such pollution impacts.

4.4.6 Measures adopted as part of the project

4.4.6.1 The following measures adopted as part of the project are relevant to offshore ornithology, and may evolve as the engineering design and EIA progresses.

- The Applicant has committed to a minimum lower blade tip height (air draught) of 34m above Lowest Astronomical Tide (LAT) (see part 1, section 3: Project description, of the EIA Scoping Report). Air draught is known to be an important factor for collision risk, with typically fewer collisions predicted with increasing air draught.
- The development of and adherence to a Vessel Management Plan (VMP) which will include measures to minimise disturbance to rafting seabirds.
- Implementation of an Environmental Management Plan (EMP) including a Marine Pollution Contingency Plan (MPCP) which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.

4.4.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

4.4.7 Proposed assessment methodology

Overview

4.4.7.1 The offshore ornithology EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. The offshore ornithology EIA will be supported by a number of technical appendices, including:

- aerial survey report
- baseline characterisation report
- seabird Collision Risk Modelling
- migratory bird Collision Risk Modelling
- displacement analysis
- apportioning
- population Viability Analysis
- cumulative impact analysis.

4.4.7.2 The EIA will use the source-pathway-receptor method, where likely impacts will be identified on offshore ornithology receptors resulting from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project. This method is defined as follows:

- Source: The origin of a potential impact, for example foundation installation and a resultant impact such as underwater noise

- Pathway: The method by which the effects of the activity could impact ornithology receptors. For example, underwater noise disturbing prey species
- Receptor: The baseline environment/species present that are impacted by the activity (e.g. prey species are unavailable for feeding birds).

4.4.7.3 The site-specific aerial surveys will provide data on the species present within the Mona offshore ornithology study area for the generation assets, as well as abundance, distribution, behaviour, location, sex and age, flight height and direction (all where possible). The EIA will identify the usage of the Mona Potential Array Area and relevant buffer areas by bird species recorded in order to determine its importance relative to the wider area. The sensitivity of each species will be determined based on the size of its population, its conservation status and any known sensitivity to offshore wind farms.

4.4.7.4 Sources of guidance and information to inform the ornithological assessment will be identified within the Offshore ornithology ES chapter. Emerging guidance will be monitored and applied as appropriate to the assessment and in discussion with consultees, including as part of the ornithology Evidence Plan process.

Baseline characterisation and analytical framework

4.4.7.5 The results of the aerial surveys will be presented in the accompanying technical appendices. Aerial survey data will be analysed using design-based or model-based methods (e.g. MRSea package) to produce abundance and density estimates for each species, with associated confidence intervals. The estimates will take account of availability bias for diving birds, and species apportioning of individuals not identified to species level. Abundance and density estimates will be produced for assessment within various areas in accordance with guidance, including the Mona Potential Array Area, the Mona Potential Array Area plus 2km buffer, the Mona Potential Array Area plus 4km buffer and (where applicable) the Mona Potential Array Area plus 10km buffer. Seasonality will be incorporated so that abundance and density estimates are available for the different breeding, non-breeding and migratory seasons, based on Furness (2015).

4.4.7.6 Disturbance and displacement impacts will be assessed following the recommended matrix approach (SNCB, 2017) based on the abundance estimates within the appropriate species-specific site plus buffer areas. This will be completed using the site mean peak population estimates including lower and upper confidence intervals. Consideration will be given to model-based approaches, such as SeabORD, Searle *et al*. (2018), through discussion with the Evidence Plan Expert Working Group for offshore and coastal ornithology. The additional estimated mortality will be apportioned to breeding colonies within species-specific foraging ranges.

4.4.7.7 Collision risk will be quantified using the deterministic Band model approach (Band, 2012), although model runs will be carried out accounting for variation in parameters and upper and lower confidence limits in the population estimates. The collision risk models will incorporate currently recommended avoidance rates and nocturnal activity factors (Cook *et al.,* 2014; SNCB, 2014), although these will be presented alongside estimates based on other rates if emerging evidence from monitoring studies indicates any likely updates to the previously published rates. Other physical modelling parameters, including bird size, flight speed, flight type etc, will follow best practice and will be set out and agreed through the Evidence Plan process. SNCBs are currently working on new guidance regarding the use of the stochastic Collision Risk Modelling (sCRM) approach (McGregor *et al*., 2018), which incorporates variability in several parameters. However, there are currently technical issues with the sCRM that undermine the confidence that can be placed in the outputs; hence the deterministic approach is currently recommended.

4.4.7.8 The potential impacts arising from collision risk and displacement will be summed to estimate overall additional mortality in seabird populations. Where there is an increase of more than 1% in the baseline mortality rate in the population, this will trigger more detailed investigation of population effects. Below this 1% threshold, there is not likely to be a significant effect; however the impact will still be quantified and considered in the cumulative impact assessment. The population under consideration will be defined by Biologically Defined Minimum Population Scales (BDMPS). Non-breeding season populations will be derived from Furness (2015), while breeding season populations will be derived from estimates of abundance at colonies within foraging range of the Mona Potential Array Area.

4.4.7.9 Where given further consideration, the impact will be apportioned appropriately to breeding colonies following the latest available guidance (in preparation by Natural England). Impacts given further consideration will be analysed using PVA (Searle *et al.*, 2019), with model parameterisation agreed through close consultation with the Evidence Plan Expert Working Group for offshore and coastal ornithology. The results will be considered in the context of the counterfactuals of population size and growth.

4.4.8 Potential cumulative effects

4.4.8.1 Seabirds range over large distances and as a result, individuals and populations may interact with a number of other developments within the wider area. There is therefore potential for cumulative effects to arise where other projects or plans could act collectively with the Mona Offshore Wind Project to affect offshore ornithology receptors.

4.4.8.2 The cumulative effects assessment will follow the approach outlined in part 1 section 4: EIA methodology, of the EIA Scoping Report. Where necessary, other project impacts may be standardised to allow like-for-like accumulation of impacts for assessment. The developing Cumulative Effect Framework (CEF) approach may be used if it becomes available within the Mona Offshore Wind Project timescales (UK Centre for Ecology and Hydrology, no date).

4.4.9 Potential inter-related effects

4.4.9.1 The assessment of potential inter-related effects will be considered within the Offshore ornithology ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

4.4.10 Potential transboundary impacts

4.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon offshore ornithology due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure
- indirect impacts from underwater noise
- collision risk
- barrier to movement.

4.4.10.2 The potential for transboundary effects will be considered within the ES.

5 Offshore human environment

5.1 Commercial fisheries

5.1.1 Introduction

5.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the commercial fisheries receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets on commercial fisheries receptors.

5.1.2 Study area

5.1.2.1 For the purpose of identifying commercial fisheries receptors for the Mona Offshore Wind Project generation assets, a broad study area has been defined. The Mona commercial fisheries study area for the generation assets is presented in Figure 5.1 and described below.

5.1.2.2 The Mona Offshore Wind Project is located within the International Council for the Exploration of the Sea (ICES) Division VIIa (Irish Sea) statistical area. For the purpose of recording fisheries landings, ICES Division VIIa is divided into statistical rectangles which are consistent across all states operating in the Irish Sea. The Mona commercial fisheries study area for the generation assets is defined by the ICES statistical rectangles that contain the Mona Potential Array Area. These are ICES statistical rectangles 36E5 and 36E6.

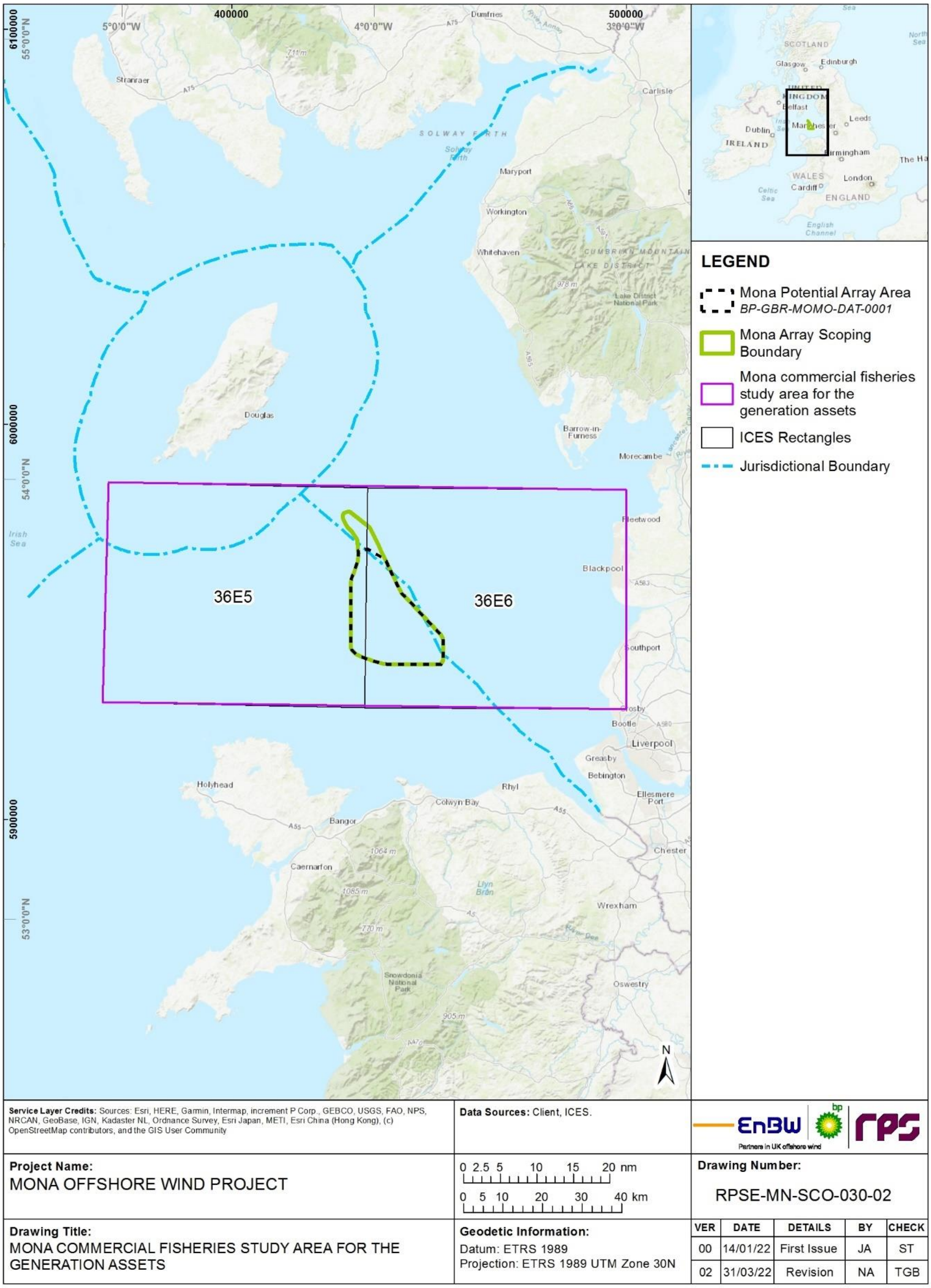


Figure 5.1: The Mona commercial fisheries study area for the generation assets.

5.1.3 Data sources

5.1.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of sources to inform the identification of commercial fisheries receptors within the Mona commercial fisheries study area for the generation assets. These are summarised in Table 5.1.

5.1.3.2 It should be noted that these datasets do not cover all fishing activity in the Mona commercial fisheries study area for the generation assets. For instance, the Marine Management Organisation (MMO) landing and effort statistics datasets generally only record data for UK and Isle of Man vessels landing in the UK and at European ports and non-UK vessels landing in the UK. As a result, landings taken by non-UK vessels landing into ports in Europe are not captured, therefore data from the European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF) will also be collated to inform the EIA.

5.1.3.3 It is acknowledged that a range of data limitations exist for the various datasets. For example, smaller vessels are excluded from Vessel Monitoring Systems (VMS) data, as only vessels with a length of ≥15m (MMO) or >12m (ICES) are captured. To ensure that smaller vessels are included within the assessment, consultation will be held with fisheries stakeholders, and further datasets will be obtained, such as the generalised fishing activity maps from the Welsh National Marine Plan and FishMap Môn.

Table 5.1: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Landing Statistics from 2010 to 2020	MMO	2021	MMO
Effort Statistics from 2010 to 2020	MMO	2021	MMO
Landings data by port	MMO	2020	MMO
Landing Statistics for EU vessels	EU STECF	2021	EU STECF
VMS Data for UK and Isle of Man vessels (≥15m)	MMO	2020	MMO/
VMS Data for EU mobile bottom contacting gear vessels (>12m)	ICES	2018	ICES
Estimated relative fishing activity (Welsh waters)	Welsh National Marine Plan	2019	Welsh National Marine Plan
Generalised fishing intensity (Welsh waters)	FishMap Môn	2021	FishMap Môn
Data from site-specific 2 x 14-day Marine Vessel Traffic Surveys	NASH Maritime (commissioned by the Applicant)	2021/ 2022	NASH Maritime

5.1.3.4 The key regional and national fishing organisations that will be consulted during this assessment are listed below:

- West Coast Sea Products Ltd (WCSP Ltd)
- Scottish White Fish Producers Association (SWFPA)

- Scottish Fishermen's Federation (SFF)
- Scottish Creel Fishermen's Federation (SCFF)
- National Federation of Fishermen's Organisations (NFFO)
- Whitehaven Fishermen's Cooperative Ltd
- Irish South and East Fish Producers Organisation (ISEFPO)
- Federation of Irish Fishermen (FIF)
- Irish South and West Fish Producers Organisation (ISWFPO)
- Manx Fish Producers Organisation (Manx FPO)
- Northern Irish Fish Producers Organisation (NIFPO)
- Anglo Northern Irish Fish Producers Organisation (ANIFPO)
- Welsh Fishermen's Association (WFA)
- Western Fish Producers Organisation (WFPO)
- North Devon Fisheries Association (NDFA)
- Cornish Fish Producers Organisation (CFPO)
- South West Fish Producers Organisation (SWFPO)
- Rederscentrale (Belgium fisheries)[17]
- North Western Inshore Fisheries and Conservation Authority (NW IFCA).

5.1.3.5 Initial engagement has taken place with a number of fisheries stakeholders. Two rounds of meetings (in June/July 2021 and February 2022) have been held to date with regional fisheries organisations and offshore commercial fisheries operators, to provide comment at this stage of the Mona Offshore Wind Project and during the surveys off the array areas. Outputs from these initial consultations have been used to develop further understanding of existing fishing activity in the region.

5.1.4 Baseline environment

5.1.4.1 The baseline environment for commercial fisheries is constantly evolving, as the fishing industry is dynamic with frequent and sometimes unpredictable changes in fish abundance and distribution, climatic conditions, management regulations and fuel costs, all of which affect activity (DECC, 2016). Anticipated trends to the baseline environment will be considered within the EIA, including changes as a result of the new EU-UK Trade and Cooperation Agreement.

5.1.4.2 The Mona commercial fisheries study area for the generation assets is located within the ICES Division VIIa (Irish Sea) statistical area. As stated in section 5.1.2, it is defined by the ICES statistical rectangles that contain the Mona Potential Array Area. These are ICES statistical rectangles 36E5

[17] Following review of official landings/activity data, commercial fishing vessels from Belgium were identified as being active within the east Irish Sea. This was confirmed by the Fishing Industry Representative. Rederscentrale (a fish producer organisation in Belgium) is recognised as representing these vessels.

and 36E6. The annual average value of landings for these ICES rectangles is £3.45 million per rectangle for all UK and Isle of Man vessels for the years 2010 to 2020 (MMO, 2021).

5.1.4.3 The average total tonnage of historical landings across the Mona commercial fisheries study area for the generation assets is presented in Figure 5.2 and the average annual value across the Mona commercial fisheries study area for the generation assets is presented in Figure 5.3. It is important to note that this data only covers landings by UK-registered vessels into the UK and abroad, and foreign vessels into the UK. There may also be landings from the Mona commercial fisheries study area for the generation assets by foreign vessels into foreign ports which would not be represented by this data.

5.1.4.4 Figure 5.4 shows the top four species landed from the Mona commercial fisheries study area for the generation assets, by weight and value, from 2010 to 2020. Figure 5.5 shows the top four species by value from the same area over the same period. The key species in terms of both value and weight are queen scallop *Aequipecten opercularis* and king scallop *Pecten maximus*, with a particularly large weight of queen scallop being landed from 2010 to 2016.

5.1.4.5 Whelk *Buccinum undatum* had a comparable level of weight landed and total value with king scallop and queen scallop in the years 2018 to 2020. Herring *Clupea harengus* were the fourth key species, with comparable weights landed in 2016 in particular with the other three key species.

5.1.4.6 While catches of king scallop are lower by weight than catches of queen scallop in every year other than 2018 and 2020, their value is similar or higher in most years owing to a higher market price. The data suggests that the king scallop and queen scallop are important in the Mona commercial fisheries study area for the generation assets and are the most valuable landings in every year other than 2019 and 2020, when whelk had a higher value landed than queen scallop.

5.1.4.7 In addition to landings and effort data, data on the type of fishing activity in the Mona commercial fisheries study area for the generation assets has also been obtained. This is presented in Figure 5.6 for the years 2017 and 2018, and Figure 5.7 for the years 2019 and 2020. The data suggests that ≥15m mobile gear vessels are active across a larger spatial extent with higher levels of activity than ≥15m static gear vessels within the Mona commercial fisheries study area for the generation assets. This data is only for vessels 15m in length and over from the UK and the Isle of Man, so does not capture vessels that are smaller or from other nationalities.

5.1.4.8 Higher levels of activity by ≥15m vessels occur in the west and centre of the Mona commercial fisheries study area for the generation assets, closer to the Isle of Man and overlapping with the Mona Potential Array Area. Within the Mona Array Scoping Boundary, the highest levels of static gear activity by ≥15m vessels were in the east, whereas the highest levels of mobile gear activity by ≥15m vessels were in the west and central area. It should be noted that the spatial extent of mobile and static gear activity fluctuates across years.

5.1.4.9 The data in Figure 5.6 and Figure 5.7 is for UK and Isle of Man vessels only. There are vessels from other nations, including the Republic of Ireland and Belgium, conducting fishing activity within the Mona commercial fisheries study area for the generation assets. Data will be analysed further through collation of landings and VMS data from non-UK organisations, consultation, AIS data and site-specific marine vessel traffic survey data to provide a full baseline characterisation for commercial fisheries.

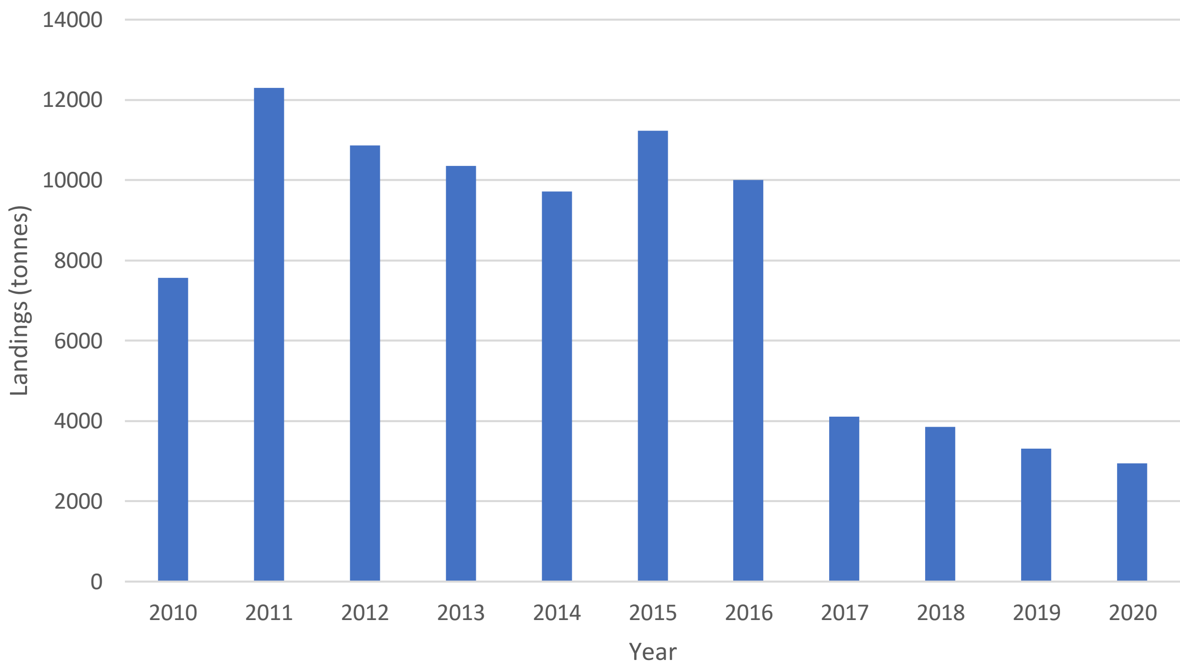


Figure 5.2: Total volume (tonnes) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

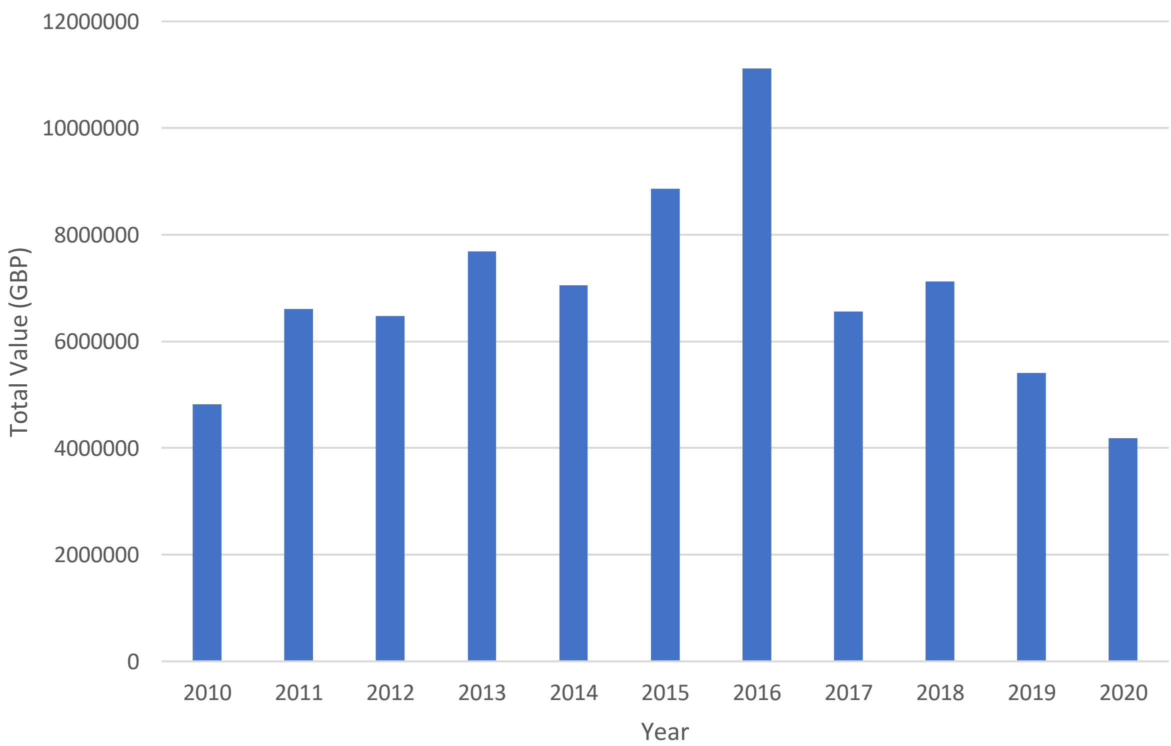


Figure 5.3: Total value (GBP) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

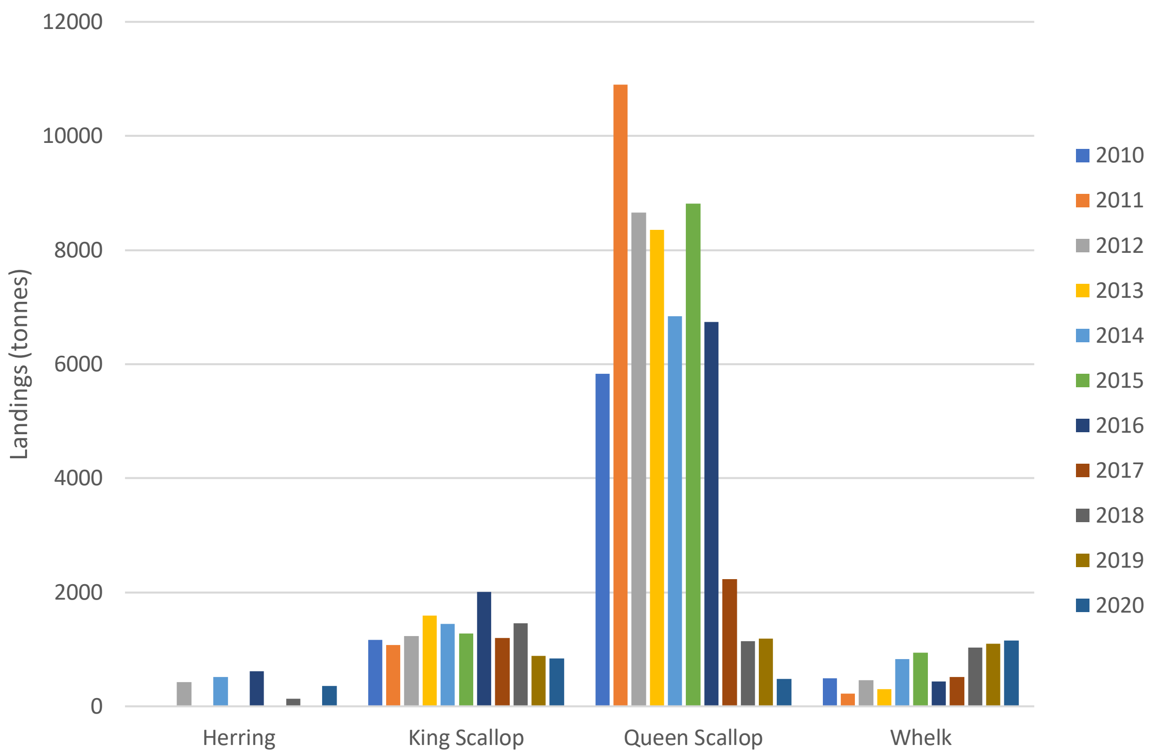


Figure 5.4: Top four species by weight (tonnes) from 2010 to 2020 landed from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

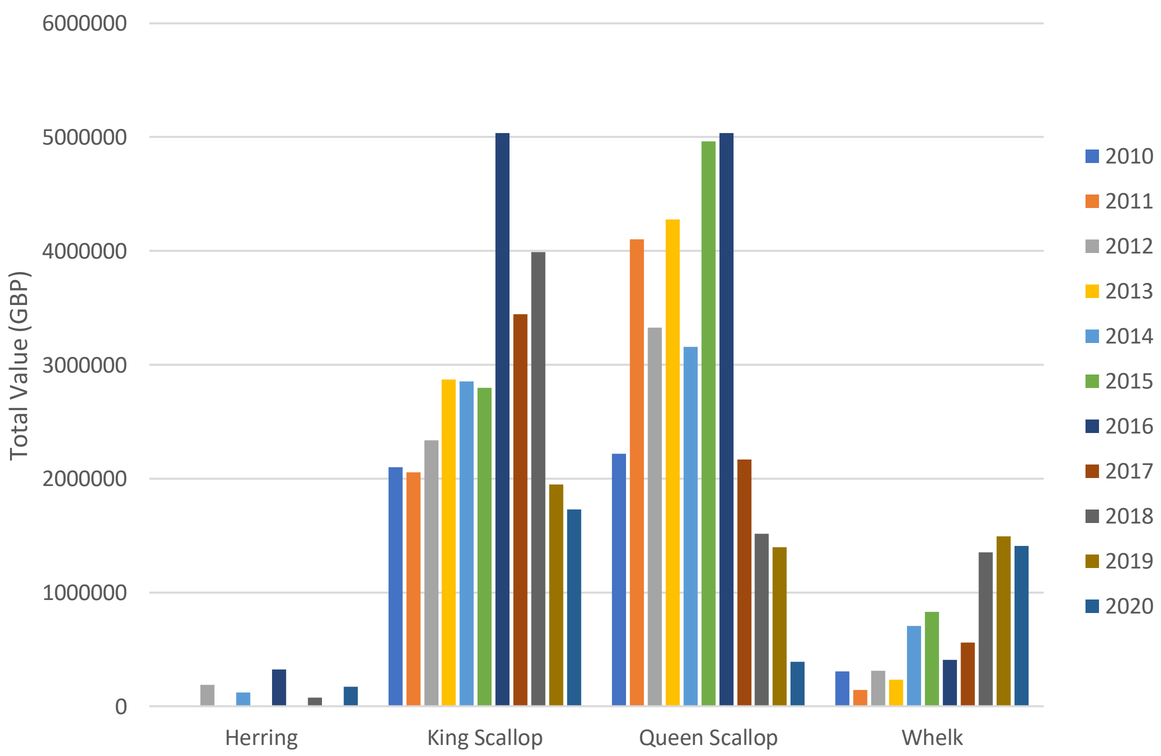


Figure 5.5: Top four species by value (GBP) from 2010 to 2020 landed from the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

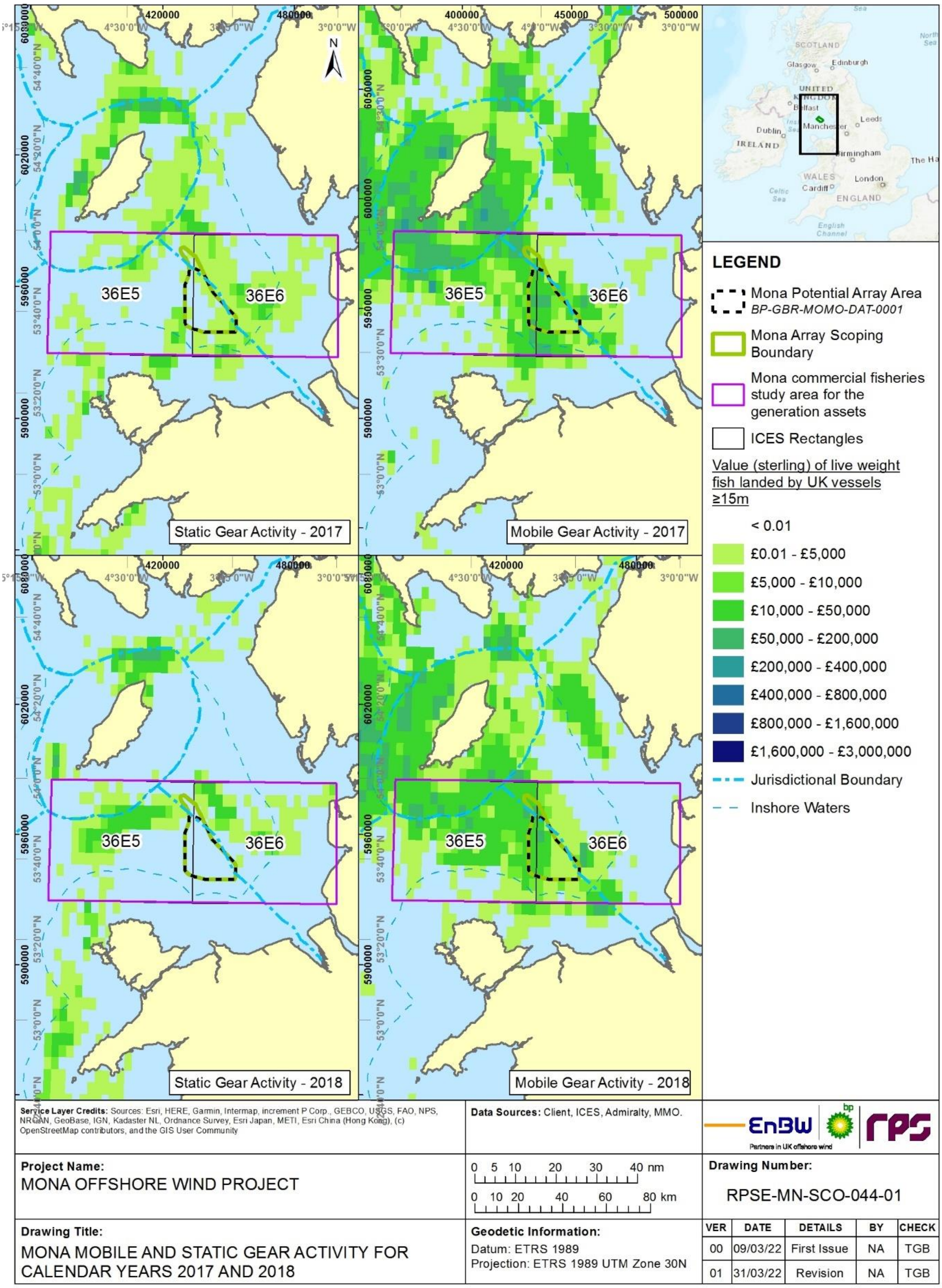


Figure 5.6: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2017 and 2018) (MMO, 2020).

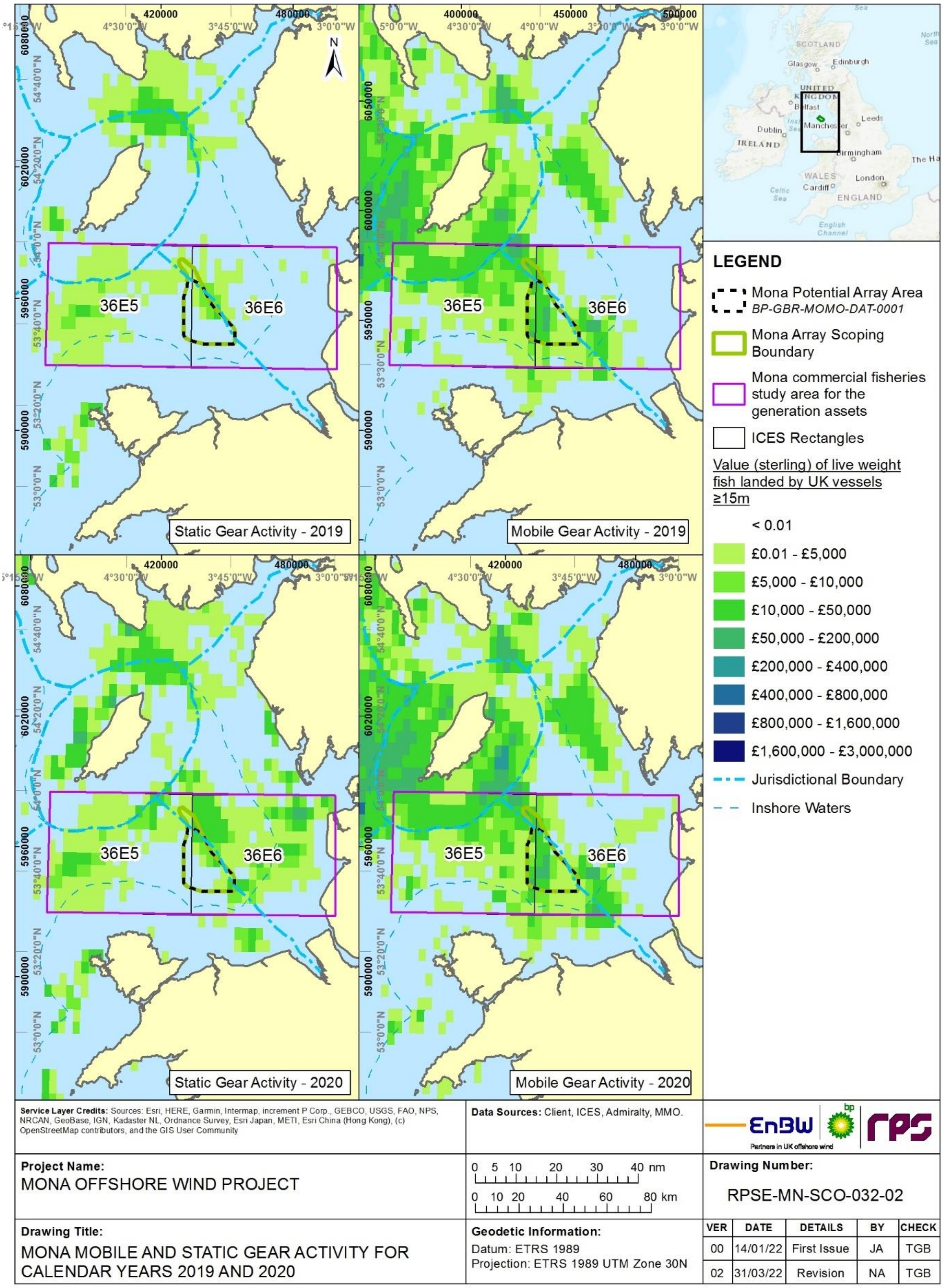


Figure 5.7: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the generation assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2019 and 2020) (MMO, 2020).

5.1.5 Potential project impacts

5.1.5.1 A range of potential impacts on commercial fisheries receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.2, together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.1.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, potential impacts proposed to be scoped out of the assessment are presented in Table 5.3, with justification.

Table 5.2: Impacts proposed to be scoped into the project assessment for commercial fisheries (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Loss or restricted access to fishing grounds.	✓	✓	✓	The implementation of safety zones around construction, maintenance and decommissioning works may result in temporary loss or restricted access to fishing grounds within the Mona Potential Array Area. The presence of wind farm infrastructure may result in long-term loss or restricted access to parts of the existing fishing grounds within the Mona Potential Array Area.	Datasets are listed in section 5.1.3 and include VMS data (indicating hours fished and value of catch by area) and landing statistics by ICES rectangle. Additional datasets including maps of key fishing grounds may also be collated where available. These datasets will be requested from the relevant fishing industry representatives and stakeholders in order to inform the commercial fisheries EIA. This information will also be supplemented by results of site-specific marine vessel traffic survey data.	Detailed analysis of existing datasets will be carried out to characterise the status of historic commercial fisheries patterns within the Mona commercial fisheries study area for the generation assets and predict the potential impacts upon future commercial fishing activities (for UK and non-UK vessels). Datasets will be analysed over 5 to 10 year time periods to account for fluctuations in the commercial fisheries activities. Qualitative assessment informed by data analysis and consultation.
Displacement of fishing activity into other areas	✓	✓	✓	Fishing activity may be temporarily displaced to other areas due to loss or restricted access to fishing grounds.	As above.	As above.
Interference with fishing activity.	✓	×	✓	Increased vessel traffic within fishing grounds as a result of changes to shipping routes and project vessel traffic in the vicinity of the Mona Potential Array Area may result in increased interaction with fishing vessels.	As above.	Detailed analysis of existing datasets will be carried out to characterise the status of historic commercial fisheries patterns within the Mona commercial fisheries study area for the generation assets and predict the potential impacts upon future commercial fishing activities (for UK and non-UK vessels). Datasets will be analysed over 5 to 10 year time periods to account for fluctuations in the commercial fisheries activities. Qualitative assessment informed by data analysis and consultation.
Temporary increase in steaming distances.	✓	×	✓	The implementation of safety zones around construction, maintenance and decommissioning works may result in temporary increases in steaming distances to and from fishing grounds.	As above.	As above.
Loss or damage to fishing gear due to snagging.	×	✓	×	Potential for snagging fishing gear on inter-array cables. Safety risks for fishing vessels associated with potential gear snagging will be assessed in the shipping and navigation	As above.	As above.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				chapter of the EIA (see part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report).		
Potential impacts on commercially important fish and shellfish resources.	✓	✓	✓	As described in part 2, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report.	As above.	Qualitative assessment informed by data analysis in addition to consideration of results of the fish and shellfish ecology assessment of the EIA.
Supply chain opportunities for local fishing vessels	✓	✓	✓	Requirement for vessels (such as guard vessels) during all phases of the Mona Offshore Wind Project may provide supply chain opportunities for local fishing vessels leading to a beneficial impact.	Engagement with local fisheries stakeholders.	Qualitative assessment informed by consultation.

Table 5.3: Impacts proposed to be scoped out of the project assessment for commercial fisheries.

Impact	Justification
Increased steaming distances during the operation and maintenance phase.	Once the Mona Offshore Wind Project has been constructed, fishing vessels will be able to transit through the Mona Potential Array Area to/from adjacent fishing grounds, ensuring that the presence of wind farm infrastructure does not affect steaming distances. Consequently, any potential impacts are considered to be not significant in EIA terms. Therefore, subject to consultation with commercial fisheries stakeholders and feedback received on this EIA Scoping Report, the Mona Offshore Wind Project intends to scope this impact out of further consideration within the EIA.

5.1.6 Measures adopted as part of the project

5.1.6.1 The following measures adopted as part of the project are relevant to commercial fisheries. These measures may evolve as the engineering design and the EIA progresses.

- Ongoing liaison with the fishing industry via the Mona Offshore Wind Project Fisheries Liaison Officer (FLO) and Fishing Industry Representative (FIR).
- Development of a Fisheries Liaison and Coexistence Plan.
- Adherence to good practice guidance with regards to fisheries liaison (e.g. Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW), 2014; 2015).
- Advance warning to fishing fleets of construction, maintenance and decommissioning activities.
- Timely and efficient distribution of Notices to Mariners (NTM) of the location and nature of construction, maintenance and decommissioning works.
- Notification to the United Kingdom Hydrographic Office (UKHO) of the works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications.
- Use of advisory clearance distances and safety zones during construction and periods of major maintenance.
- Use of guard vessels where required by risk assessment.
- Marking and lighting of the Mona Offshore Wind Project in accordance with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and in consultation with the Maritime and Coastguard Agency (MCA) and Trinity House.
- Cables to be buried to a suitable depth, where possible, to avoid interaction with fishing gear.
- Undertaking of post-lay and cable burial inspection surveys and monitoring.
- Cables will be buried where possible to a target depth of 1m, and in areas where this is not achievable the cable will be protected (e.g. with rock or mattressing). Any external cable protection will be designed, where possible, to enable trawling to occur over it (ESCA, 2016).

5.1.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.1.7 Proposed assessment methodology

5.1.7.1 The commercial fisheries EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the commercial fisheries EIA, the following guidance documents will also be considered:

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2014)
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2015)
- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (United Kingdom Fisheries Economics Network (UKFEN), 2012)
- Options and opportunities for marine fisheries mitigation associated with windfarms (Blyth-Skyrme, 2010)
- Fishing and Submarine Cables – Working Together (International Cable Protection Committee (ICPC), 2009).

5.1.7.2 In order to characterize the importance of fisheries in this region, consideration will be given to the value of fisheries within the Mona commercial fisheries study area for the generation assets. Any valuation will not be used as the basis of the impact assessment process.

5.1.8 Potential cumulative effects

5.1.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea where projects or activities could act collectively with the Mona Offshore Wind Project to affect commercial fisheries receptors.

5.1.8.2 The cumulative effect assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the Mona commercial fisheries study area for the generation assets:

- other offshore wind farms, including the Morgan Offshore Wind Project and other existing and proposed projects
- other energy infrastructure projects, including oil and gas activities (including decommissioning) and carbon capture and storage (CCS) projects
- other infrastructure projects (e.g. cables and pipelines).

5.1.8.3 The cumulative effect assessment will follow the approach outlined in part 1 section 4: EIA methodology, of the EIA Scoping Report.

5.1.9 Potential inter-related effects

5.1.9.1 The assessment of potential inter-related effects will be considered within the commercial fisheries Environmental Statement (ES) chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.1.10 Potential transboundary impacts

5.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon commercial fisheries due to construction, operation and maintenance, and decommissioning impacts of the project. These include:

- loss or restricted access to fishing grounds affecting fleets from the Republic of Ireland and Belgium
- displacement of fishing activity into other areas affecting fleets from the Republic of Ireland and Belgium.

5.1.10.2 The potential for transboundary impacts will be considered within the ES.

5.2 Shipping and navigation

5.2.1 Introduction

5.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the shipping and navigation receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets on shipping and navigation receptors.

5.2.2 Study area

5.2.2.1 For the purpose of identifying shipping and navigation receptors for the Mona Offshore Wind Project generation assets, a broad study area has been defined. The Mona shipping and navigation study area for the generation assets is presented in Figure 5.8 and described below.

5.2.2.2 The Mona shipping and navigation study area for the generation assets has been defined as an area extending 10 nautical miles (nm) around the Mona Potential Array Area. This is in line with industry standard and will provide a local context of activity within and in proximity to the Mona Potential Array Area.

5.2.2.3 Additionally, the waters of the east Irish Sea to the south and east of the Isle of Man (south of 54.5 degrees north and east of 5.0 degrees west) have been considered in terms of shipping routes in these waters and their interaction with the Mona Offshore Wind Project and existing and planned offshore wind projects within this area.

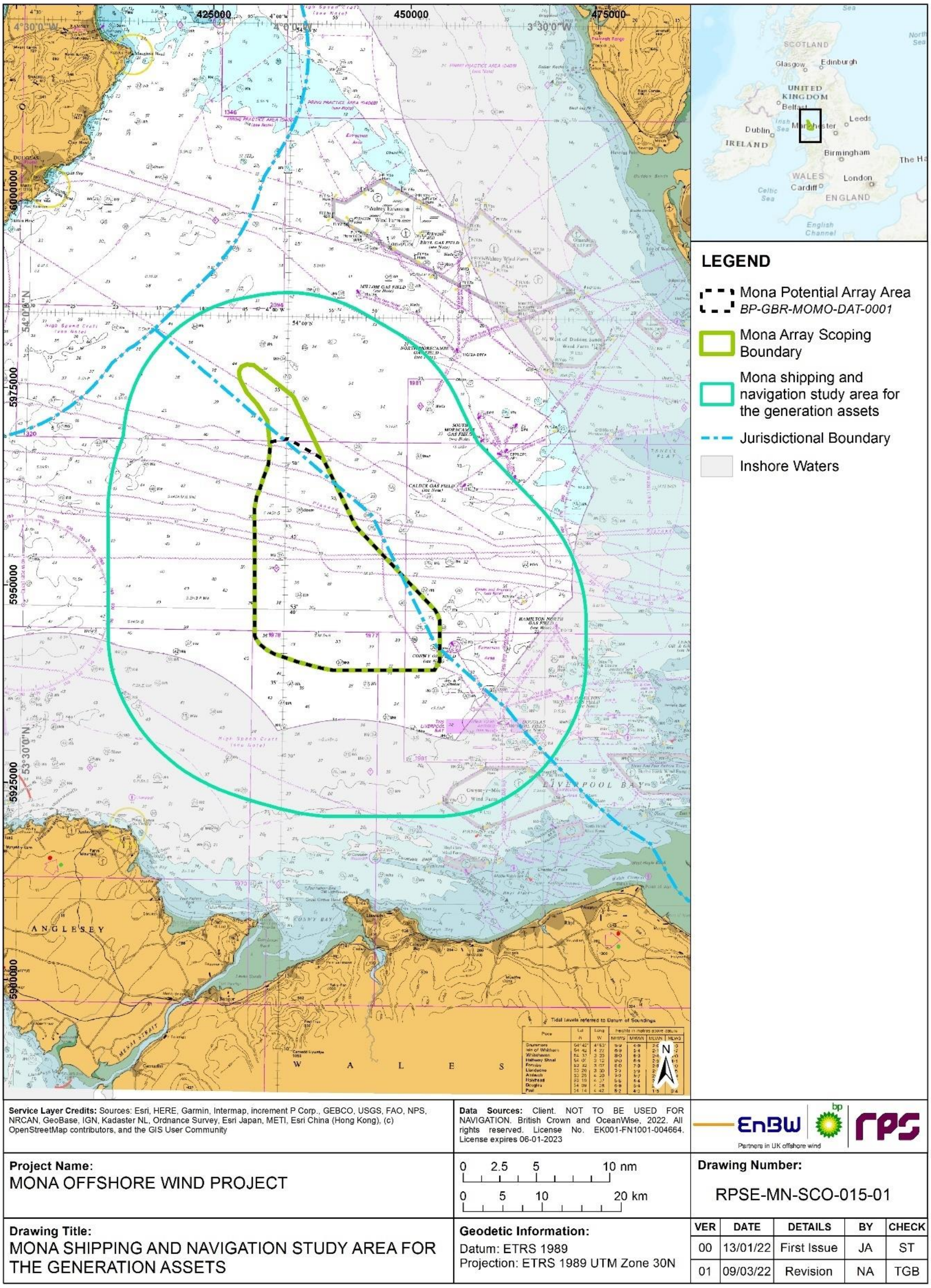


Figure 5.8: The Mona shipping and navigation study area for the generation assets.

5.2.3 Data sources

Desktop data

5.2.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources to inform the identification of shipping and navigation receptors within the Mona shipping and navigation study area for the generation assets. These are summarised in Table 5.4.

Table 5.4: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Admiralty charts	British Crown and OceanWise, License No. EK001-FN1001-004664	2021	British Crown
Automatic Identification System (AIS) vessel traffic data	NASH Maritime Ltd.	2019	MarineTraffic
Vessel Monitoring Systems (VMS) data	MMO	2019	MMO
International Maritime Organization (IMO) Traffic Separation Schemes (TSS)	Oceanwise	2021	Oceanwise
UK Coastal Atlas of Recreational Boating	Royal Yachting Association (RYA)	2018	RYA
Marine Incident Data	Marine Accident Investigation Branch (MAIB)	2000-2019	MAIB
Royal National Lifeboat Institution (RNLI) incident data	RNLI	2010-2019	RNLI
Helicopter Search and Rescue (SAR) locations	The Bristow Group	2021	The Bristow Group
Offshore wind farms	The Crown Estate	2021	The Crown Estate
Oil and gas platforms	Oil and Gas Authority	2021	Oil and Gas Authority
Maritime statistics	Department for Transport (DfT)	2021	DfT
Practice and exercise (PEXA) charts	Admiralty	2013	Admiralty
Cables and pipelines	Kis-Orca via Client onemap site	2021	Kis-Orca
Marine aggregate sites and disposal sites	The Crown Estate	2021	The Crown Estate

Site-specific survey data

5.2.3.2 In addition to existing data, site-specific marine vessel traffic surveys will be carried out to inform the EIA. Surveys will comprise two seasonal 14-day surveys collecting Automatic Identification Systems (AIS), radar and visual vessel traffic survey data within the Mona Potential Array Area, in line with MCA Marine Guidance Note (MGN) 654. The winter vessel traffic survey was carried out in December 2021 with the second survey planned for summer 2022. AIS data from 2019 will be used to benchmark the outputs of these vessel traffic surveys and account for temporary changes in shipping/ferry activity. Consultation with operators (including fishing/recreational users) and analysis of shipping statistics from the DfT will support this comparison.

5.2.3.3 The data from these surveys will be used to inform the Navigation Risk Assessment (NRA) and EIA for the Mona Offshore Wind Project. The scope of the vessel traffic surveys was reviewed and agreed with the MCA in October 2021.

Consultation

5.2.3.4 Supporting information and data will also be obtained from stakeholder consultation. The Applicant has established a Maritime Navigation Engagement Forum (MNEF) to provide a platform for the exchange of information, knowledge and experience that will enable marine developers and relevant shipping and navigation stakeholders to coexist in the marine environment. Specifically, the MNEF will focus on matters relating to:

- risk to safety of marine operations and navigation
- impact on marine operations and navigation.

5.2.3.5 Members of the MNEF include the MCA and Trinity House as statutory bodies, in addition to key user groups and organisations identified as having a potential shipping and navigation interface with the Mona Offshore Wind Project including: the UK and Irish Chamber of Shipping, ferry operators, port operators, representatives from other industries (oil and gas, aggregates, other offshore wind developers), with fishing interests represented by the Mona Offshore Wind Project Fisheries Liaison Officer (FLO). Other invited members include the RYA and Ministry of Defence (MOD). The MNEF is scheduled to meet quarterly during the pre-application phase and the first meeting of the MNEF took place in November 2021.

5.2.3.6 A marine hazard workshop will also be held as part of the NRA. The MCA, Trinity House and a number of local stakeholders representing all maritime interests (including ports, fishing, commercial shipping, oil and gas, recreation) will be invited to the hazard workshop.

5.2.4 Baseline environment

Navigational features

5.2.4.1 The Mona Potential Array Area is located in the east Irish Sea, where several ferry and shipping routes presently operate and safely co-exist alongside a number of notable marine assets and activities. Key marine navigation features within the east Irish Sea include:

- IMO TSS
- oil and gas activities (see Table 5.5)
- commercial fishing activities
- recreational cruising routes
- commercial ship anchorages
- pilot boarding stations
- ports and marine terminals

- offshore wind farms (see Table 5.6)
- marine aggregate sites and disposal sites (see Table 5.7).

5.2.4.2 The key marine navigation features and activities within the east Irish Sea are presented in Figure 5.9.

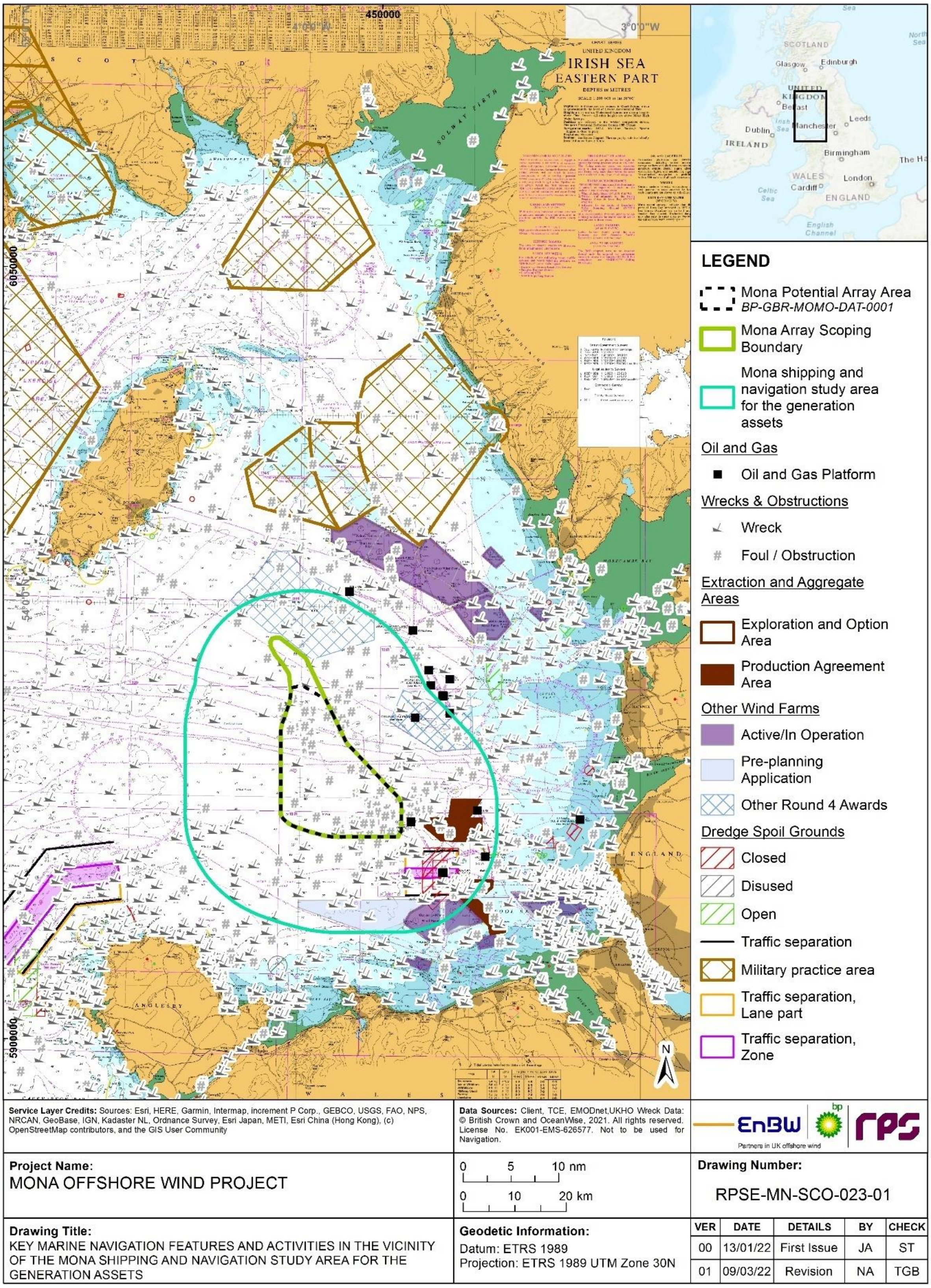


Figure 5.9: Key marine navigation features and activities in the vicinity of the Mona shipping and navigation study area for the generation assets.

Table 5.5: Oil and gas platforms in proximity to the Mona Offshore Wind Project.[18]

Platform	Operator	Distance to Mona Potential Array Area	
		Kilometres (km)	Nautical miles (nm)
Conwy	Eni	1.9	1
Douglas DA	Eni	11.1	6
Douglas DP	Eni	11.2	6
Douglas DW	Eni	11.3	6.1
Calder	Spirit Energy	13.1	7.1
Hamilton North	Eni	14.8	8
Hamilton	Eni	17.1	9.2
South Morecambe DP3	Spirit Energy	18.5	10
South Morecambe DP6 (E)[19]	Spirit Energy	19.6	10.6
South Morecambe DP6 (W)	Spirit Energy	19.6	10.6
South Morecambe DP1 (N)	Spirit Energy	19.8	10.7
South Morecambe DP1 (S)	Spirit Energy	19.8	10.7
South Morecambe AP1 (N)	Spirit Energy	19.8	10.7
South Morecambe AP1 (S)	Spirit Energy	19.8	10.7
South Morecambe CPP1 (N)	Spirit Energy	19.8	10.7
South Morecambe CPP1 (S)	Spirit Energy	19.8	10.7
South Morecambe FL1 (N)	Spirit Energy	19.8	10.7
South Morecambe FL1 (S)	Spirit Energy	19.8	10.7

[18] Initial consultation has been carried out by the Applicant with oil and gas operators in the area and some operators have confirmed plans for decommissioning platforms such as Conwy, Douglas, Calder, Hamilton and South Morecambe DP3. The decommissioning plan for South Morecambe DP3 (https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines) contains a proposed schedule for that particular platform indicating a target for decommissioning by 2023.

[19] The Mona Potential Array Area does not overlap with the 10nm consultation zones of either South Morecambe DP6 (N+S) or the platforms Morecambe South central complex (DP1 (N+S), AP1 (N+S), CPP1 (N+S) and FL1 (N+S), but they have been included here to provide context and because the Mona Offshore Wind Project still may impact upon them.

Table 5.6: Offshore wind farms in proximity to the Mona Offshore Wind Project.

Offshore Wind Farm	Distance to Mona Potential Array Area	
	Kilometres (km)	Nautical miles (nm)
Morgan Offshore Wind Project	5.5	2.9
Round 4 Morecambe	8.9	4.8
Awel y Môr	12.2	6.6
Gwynt y Môr	13.8	7.5

Table 5.7: Aggregate sites in proximity to the Mona Offshore Wind Project.

Aggregate Site	Distance to Mona Potential Array Area	
	Kilometres (km)	Nautical miles (nm)
Liverpool Bay 457	4.4	2.4
Liverpool Bay 1808	14.5	7.8
Hilbre Swash 457	17.1	9.2

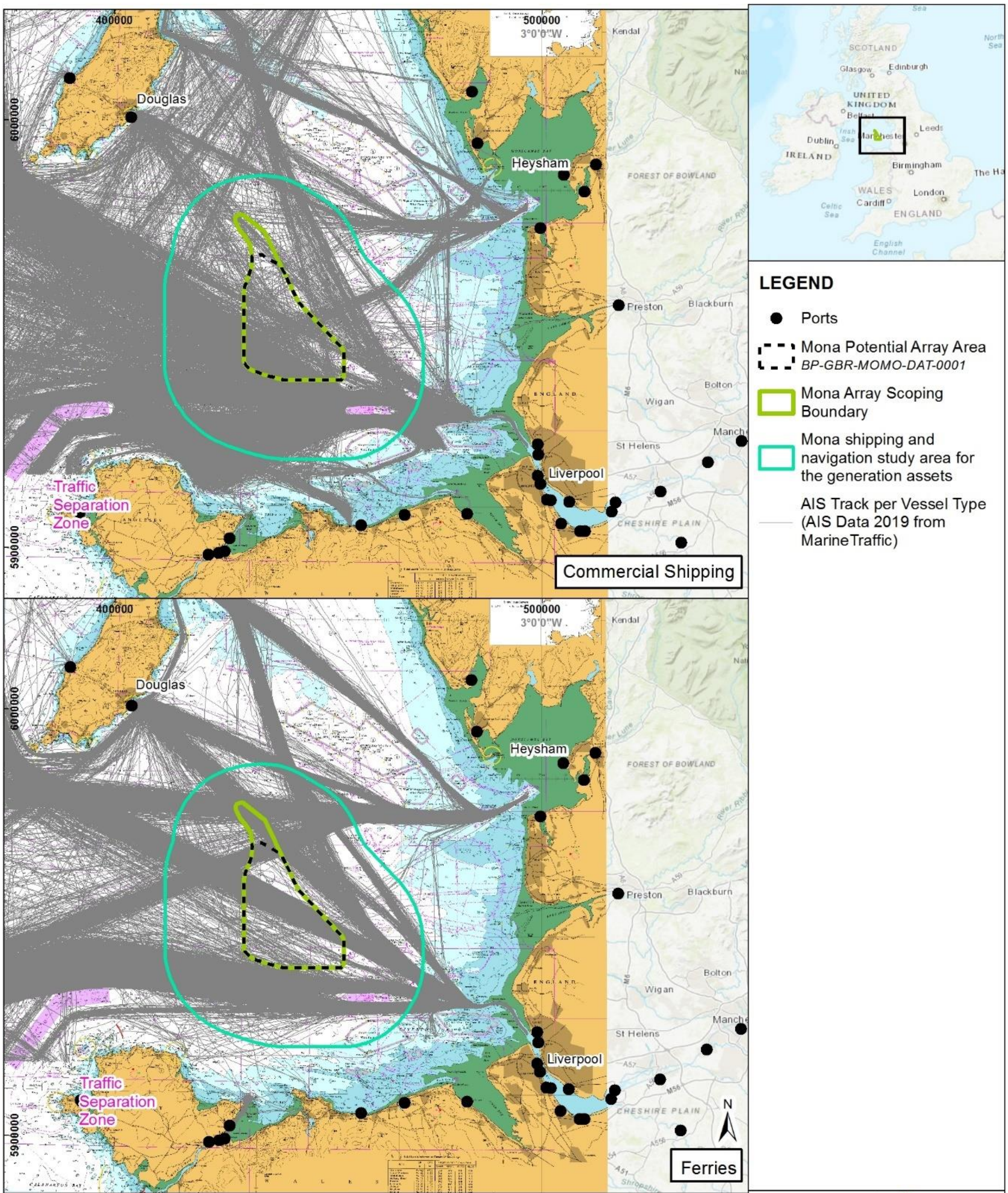
Commercial vessel and commercial passenger vessel analysis

5.2.4.3 The main commercial vessel routes identified in the Mona shipping and navigation study area for the generation assets are shown in Figure 5.10. It should be noted that this data is preliminary and will be further informed by site-specific data collected during the marine traffic surveys.

5.2.4.4 Large commercial vessels are concentrated in routes to the Port of Liverpool, including a route passing Anglesey and to the south of the Mona Potential Array Area, and a route from Liverpool to the northern Irish Sea, passing to the west of the Isle of Man and intersecting with the Mona Potential Array Area. Usage of the IMO TSS ensures the separation of opposing streams of traffic to aid navigational safety.

5.2.4.5 As shown in Figure 5.10, a number of commercial ferry routes pass through the Mona shipping and navigation study area for the generation assets. Commercial ferry routes intersect the Mona Potential Array Area (namely Liverpool to Belfast and Heysham to Dublin) whilst other routes are immediately adjacent (namely Liverpool to Dublin and Liverpool to Douglas). Other passenger vessels, including cruise ship activity, is recorded in the data passing within the Mona shipping and navigation study area for the generation assets.

5.2.4.6 Key commercial ferry operators identified to date include Isle of Man Steam Packet Company, Seatruck Ferries, P&O ferries, and Stena Line. Each of these operators are members of the MNEF and consultation is underway to further understand their activities and operational procedures.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client. NOT TO BE USED FOR NAVIGATION. British Crown and OceanWise. 2022. All rights reserved. License No. EK001-FN1001-004664. License expires 06-01-2023. AIS Data 2019 from MarineTraffic (licensed for project 18th November 2021) and processed by NASH Maritime Ltd.

EnBW | bp | rps — Partners in UK offshore wind

Project Name: MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 nm
0 5 10 20 30 40 km

Drawing Number: RPSE-MN-SCO-024-02

Drawing Title: MARINE TRAFFIC IN THE VICINITY OF THE MONA SHIPPING AND NAVIGATION STUDY AREA FOR THE GENERATION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	14/01/22	First Issue	JA	TGB
02	01/04/22	Revision	NA	TGB

Figure 5.10: Marine traffic (commercial shipping and ferries) in the vicinity of the Mona shipping and navigation study area for the generation assets (all AIS vessel tracks from 2019).

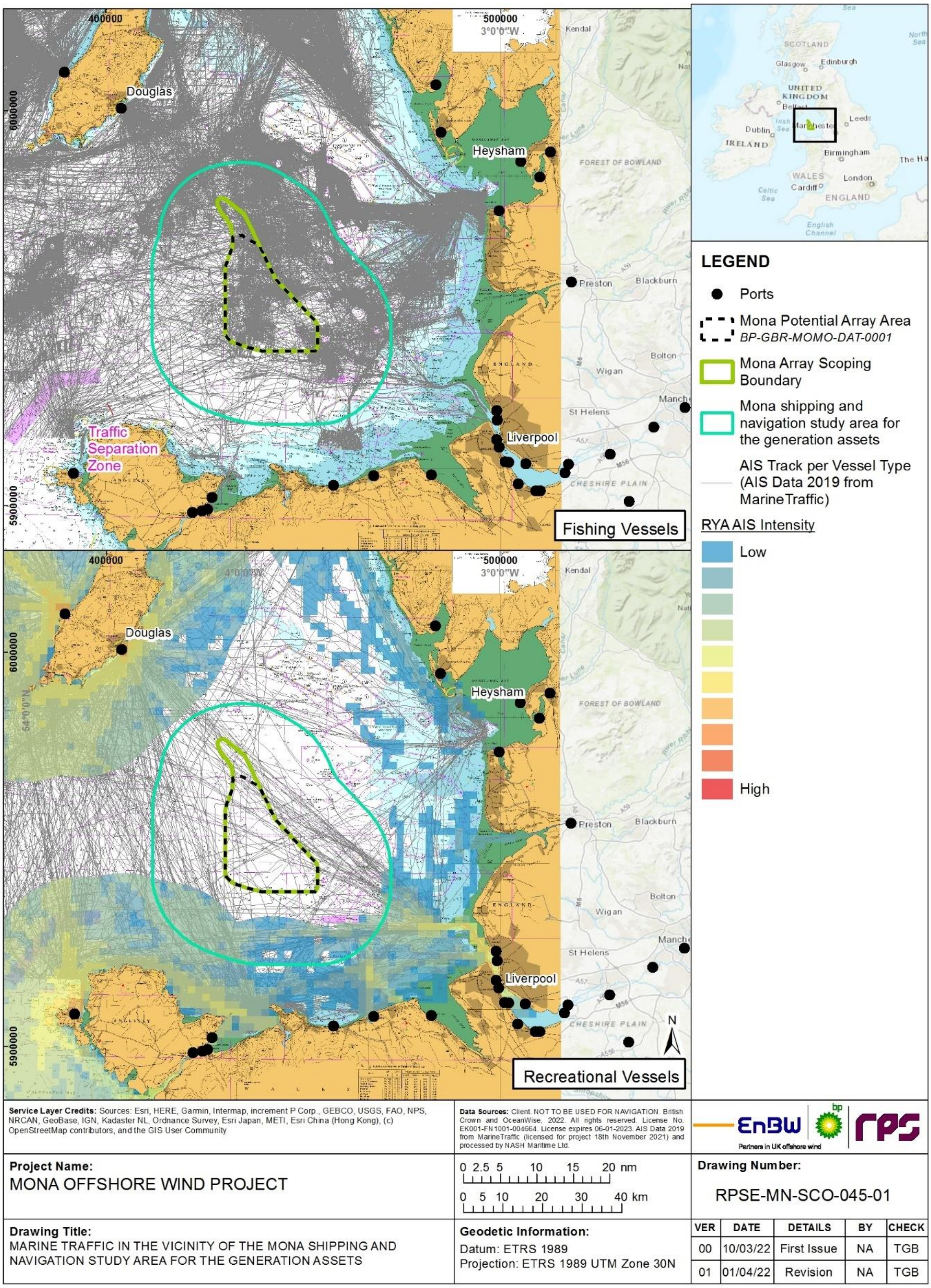


Figure 5.11: Marine traffic (fishing vessels and recreational vessels) in the vicinity of the Mona shipping and navigation study area for the generation assets (all AIS vessel tracks from 2019).

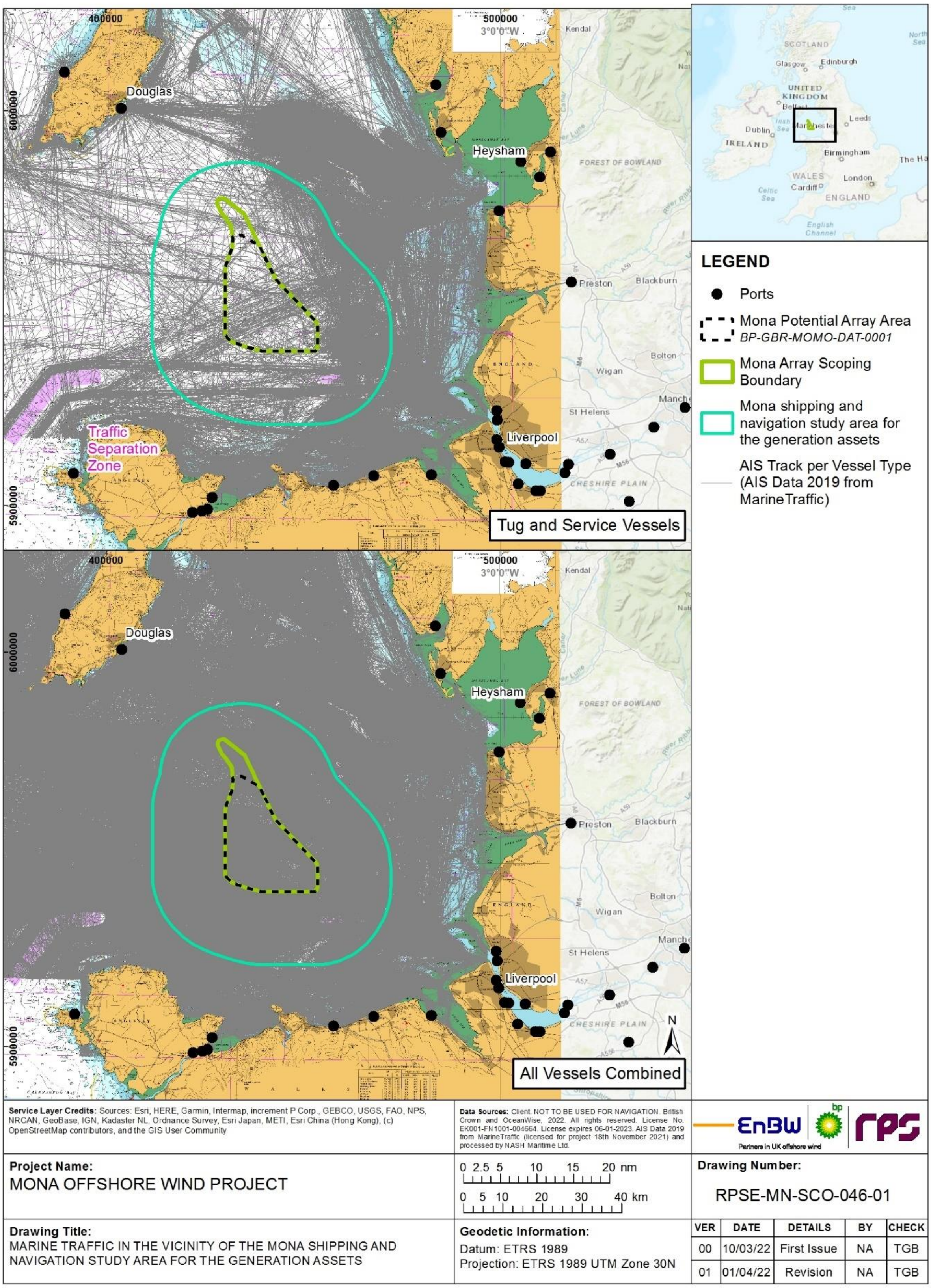


Figure 5.12: Marine traffic (tug and service vessels and all vessels combined) in the vicinity of the Mona shipping and navigation study area for the generation assets (all AIS vessel tracks from 2019).

Fishing vessel density

5.2.4.7 Commercial fishing occurs within the Mona shipping and navigation study area for the generation assets, with the waters in the east showing a higher density of fishing vessels than surrounding waters based on AIS data (Figure 5.11). Not all fishing vessels carry AIS and therefore additional data will be collected as part of the vessel traffic surveys and through consultation with commercial fisheries stakeholders through the Mona Offshore Wind Project FLO.

5.2.4.8 Further detail on commercial fishing activity is provided in part 2, section 5.1: Commercial fisheries, of the EIA Scoping Report.

Recreational vessel activity

5.2.4.9 Recreational activity is defined for the purpose of the shipping and navigation assessment as sailing and motor craft (including those undertaking dive/fish excursions).

5.2.4.10 There is low recreational vessel activity within the Mona shipping and navigation study area for the generation assets based on AIS data, as shown in Figure 5.11. Much of the recreational activity is concentrated inshore with only sporadic use of offshore cruising routes between the UK mainland and the Isle of Man. Not all recreational vessels carry AIS and therefore additional data will be collected as part of the vessel traffic surveys and through the MNEF engagement activities and hazard workshop.

Service vessels

5.2.4.11 Tugs and service vessels support ongoing operations associated with other infrastructure projects within the east Irish Sea (Figure 5.9). The activity of these vessels is shown in Figure 5.12 and is concentrated in harbours and within and between other offshore wind farms and oil and gas platforms, generally beyond the Mona Potential Array Area.

Search and rescue

5.2.4.12 SAR within the UK is coordinated by the MCA, with other organisations providing declared assets to undertake SAR operations. These different organisations are outlined below.

5.2.4.13 The MCA provides a coordination service for SAR, counter pollution and salvage. SAR is coordinated through a network of Maritime Rescue Coordination Centres (MRCC) situated throughout the UK, a Maritime Rescue Sub Centre (MRSC) based in London, and the Joint Rescue Coordination Centre (JRCC) in Fareham. The Mona Offshore Wind Project falls within the area of responsibility of the Holyhead MRCC.

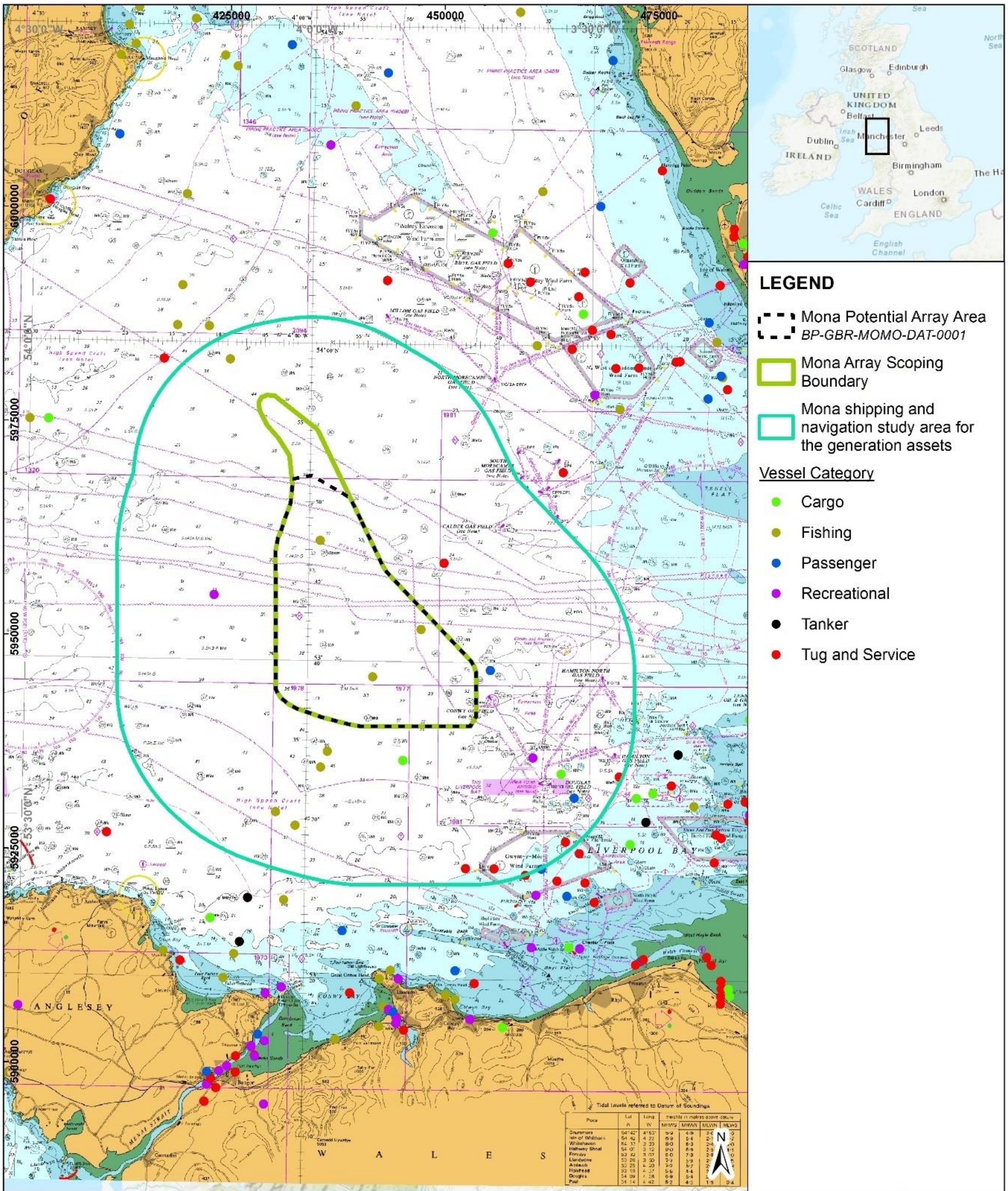
5.2.4.14 SAR helicopters, available to the MCA for use during a SAR incident, are provided by the Bristow Group. The Caernarfon SAR helicopter base is the closest to the Mona Offshore Wind Project, located 60.1km from the Mona Potential Array Area.

5.2.4.15 The RNLI provides a 24-hour SAR service maintaining a fleet of lifeboats from stations positioned around the coast of the UK and Ireland. There are a number of lifeboat stations positioned along the coast of north Wales and northwest coast of England that operate a variety of both smaller (open-deck) inshore lifeboats and larger all-weather lifeboats that are capable of high speed and able to safely undertake operations in all weather. Due to the distance offshore it is most likely that only all-weather lifeboats would respond to an incident in the vicinity of the Mona Offshore Wind Project. The closest all-weather lifeboat stations to the Mona Offshore Wind Project are the Llandudno and Moelfre Lifeboat Stations, however, given the significant number of stations surrounding the Irish Sea, other assets may respond to an incident.

5.2.4.16 Other offshore operators (e.g. oil and gas and other renewable energy developments) also have resources which could be used to assist with an incident in the vicinity of the Mona Offshore Wind Project. As part of the EIA process, the Applicant will undertake further consultation with the MCA in order to inform the assessment of SAR capability in the region.

Maritime accidents and incidents

5.2.4.17 Maritime incidents in the east Irish Sea from 2010 to 2019 have been recorded by MAIB and are shown in Figure 5.13 according into vessel type. The majority of records occur in inshore waters, with three records of incidents involving fishing vessels within the Mona Potential Array Area. Data on maritime accidents and incidents will be analysed as part of the NRA for the Mona Offshore Wind Project.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Data Sources:** Client. NOT TO BE USED FOR NAVIGATION. British Crown and OceanWise, 2022. All rights reserved. License No. EK001-FN1001-004664. License expires 06-01-2023	EnBW bp rps Partners in UK offshore wind
Project Name: MONA OFFSHORE WIND PROJECT	0 2.5 5 10 nm 0 5 10 20 km	**Drawing Number:** RPSE-MN-SCO-040-01
Drawing Title: MARITIME INCIDENTS IN THE VICINITY OF THE MONA SHIPPING AND NAVIGATION STUDY AREA FOR THE GENERATION ASSETS	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N	

VER	DATE	DETAILS	BY	CHECK
00	14/01/22	First Issue	JA	ST
01	10/03/22	Revision	NA	TGB

Figure 5.13: Maritime incidents in the vicinity of the Mona shipping and navigation study area for the generation assets (MAIB data from 2010-2019).

5.2.5 Potential project impacts

5.2.5.1 A range of potential impacts on shipping and navigation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.8, together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

5.2.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for shipping and navigation.

Table 5.8: Impacts proposed to be scoped into the project assessment for shipping and navigation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Deviations to commercial routes.	✓	✓	✓	The presence of wind farm infrastructure within the Mona Potential Array Area may require deviations to shipping routes and result in increased transit times.	AIS and radar marine traffic surveys will be undertaken to inform the NRA. The NRA will be used to inform the assessment. Consultation with commercial operators through the MNEF.	Modelling of deviations for commercial vessel routes will be undertaken in the NRA with input from regular operators and consideration of the baseline environment, including adverse weather routeing.
Increased vessel to vessel collision risk.	✓	✓	✓	Activities within the Mona Potential Array Area will increase the number of vessels operating and may increase the risk of collision between project vessels and other vessels. The deviation of existing commercial and ferry routes around the Mona Potential Array Area may increase the number of vessel interactions which may increase collision risk. Displacement of existing activities (such as fishing and recreational users) into adjacent shipping routes may increase the risk of collision.	AIS and radar marine traffic surveys will be undertaken to inform the NRA. The NRA will be used to inform the assessment. Consultation with commercial operators and other user groups through the MNEF.	Collision modelling to assess change in risk due to the Mona Offshore Wind Project.
Increased allision (contact) risk to vessels.	✓	✓	✓	The presence of wind farm infrastructure in previously open sea areas within the Mona Potential Array Area may increase the risk of allision (contact) from passing vessels following engine failure or human error.	AIS and radar marine traffic surveys will be undertaken to inform the NRA. The NRA will be used to inform the assessment. Consultation with commercial operators and other user groups through the MNEF.	Allision risk will be calculated to assess change in risk due to the Mona Offshore Wind Project.
Increased risk of anchor and gear snagging for commercial vessels and commercial fishing vessels (in transit).	✓	✓	✓	The presence of cables associated with the Mona Offshore Wind Project may increase the likelihood of anchor and gear interaction for third party vessels including a snagging risk.	An assessment of the vessel traffic in proximity to the Mona Offshore Wind Project will be carried out including identification of areas where anchoring activity occurs frequently.	Qualitative assessment to assess potential impact, informed by the NRA.
Reduction of under keel clearance	×	✓	×	The presence of cable protection associated with the Mona Offshore Wind Project may reduce water depths and therefore reduce under keel clearance for third party vessel traffic.	An assessment of the vessel traffic in proximity to the Mona Offshore Wind Project will be carried out and assessed against water depths to identify any areas where under keel clearance may be of concern.	Qualitative assessment to assess potential impact, informed by the NRA.
Reduction of emergency response capability due to increased incident rates and	✓	✓	✓	The Mona Offshore Wind Project will increase the number of vessels in the area which may result in an increased number of incidents requiring emergency response	MAIB and RNLI incident data and DfT SAR helicopter taskings data will be assessed to characterise baseline incident rates.	Qualitative assessment to assess potential impact, informed by the NRA. The NRA will include a section that considers the impacts of the Mona Offshore Wind Project on SAR

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
reduced access for SAR responders.				and may reduce access for SAR responders.		response in line with MGN 654 and its annexes based on desk-based research.
Interference with marine navigation, communications and position fixing equipment.	×	✓	×	Communication and position fixing equipment may be affected by the presence of infrastructure within the Mona Potential Array Area.	AIS and radar marine traffic surveys will be undertaken to characterise vessel movements in the area and inform the NRA. The NRA will be used to inform the assessment.	Qualitative assessment to assess potential impact, informed by the NRA.

5.2.6 Measures adopted as part of the project

5.2.6.1 The following measures adopted as part of the project are relevant to shipping and navigation. These measures may evolve as the engineering design and the EIA progresses.

- the use of advisory clearance distances and safety zones during construction and periods of major maintenance
- compliance with MGN 654 Safety of Navigation Offshore Renewable Energy Installations (OREIs) – UK Navigational Practice, Safety and Emergency Response (MGN 654) (MCA, 2021a), including:
  - at least one line of orientation, providing a helicopter corridor through the Mona Offshore Wind Project (see also part 2, section 6.3: Aviation and radar, of the EIA Scoping Report)
  - lowest blade tip height (air draught clearance) of at least 22m above mean high water springs (MHWS). A commitment has been made by the Applicant to a minimum height that exceeds this (see part 1, section 3: Project description, of the EIA Scoping Report).
- the use of guard vessels where required by risk assessment
- notifying the United Kingdom Hydrographic Office (UKHO) of wind turbine locations, for marking on Admiralty Charts
- marking and lighting of the Mona Offshore Wind Project in accordance with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and in consultation with the MCA and Trinity House
- marine coordination and promulgation of information using Notices to Mariners and fishermen's awareness charts
- development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP) and provision of self-help capabilities.

5.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.2.6.3 The Applicant is also committed to implementing construction vessel traffic monitoring.

5.2.7 Proposed assessment methodology

Approach

5.2.7.1 Shipping and navigation is assessed primarily in accordance with guidance provided by the statutory consultees. The MCA require that their methodology is used as a template for undertaking the EIA (see MCA, 2021b). This template is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place in order for the assessed risk (base case and future case) to be judged as broadly acceptable or tolerable.

5.2.7.2 The following paragraphs provide an overview of the proposed approach to assessing risk to navigation receptors and how the outputs of the NRA will be carried through into the EIA in order to assess the significance of effect.

Navigation Risk Assessment and Formal Safety Assessment

5.2.7.3 The shipping and navigation EIA will be informed by a NRA undertaken in accordance with MGN 654. The NRA will be supported by stakeholder consultation and a hazard workshop in accordance with MGN 654.

5.2.7.4 The NRA will use a structured and systematic methodology to score the likelihood and consequence of different hazards occurring and is based on the IMO Formal Safety Assessment (FSA) approach (IMO, 2018).

5.2.7.5 The IMO FSA process is a structured and systematic methodology based on risk. As part of the FSA, the impact of the Mona Offshore Wind Project is considered against the baseline datasets identified.

5.2.7.6 There are five basic steps within this process:

- Step 1 – Identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes).
- Step 2 – Risk analysis (evaluation of risk factors).
- Step 3 – Risk control options (devising measures to control and reduce the identified risks).
- Step 4 – Cost benefit analysis (determining cost effectiveness of risk control measures).
- Step 5 – Recommendations for decision-making (information about the hazards, their associated risks and the cost effectiveness of alternative risk control measures).

5.2.7.7 The FSA would combine both quantitative and qualitative inputs in order to determine the level of risk. Quantitative inputs include vessel traffic analysis, historical incident analysis and risk modelling of shipping accidents. Qualitative inputs include the expertise and judgements of master mariners, regulators and wider stakeholders, elicited through extensive consultation and hazard workshops. By combining these inputs together, a holistic, collaborative approach to maritime risk assessment will be achieved.

Hazard workshop

5.2.7.8 In order to gather expert opinion and local knowledge, a hazard workshop will be undertaken, during which a project and site-specific hazard log will be prepared. The hazard log will be used to identify direct or indirect hazards relating to the development of the Mona Offshore Wind Project, the level of risk associated with the hazards, the controls to be put in place and the tolerability of the residual risks.

5.2.7.9 The hazard log will also be used to identify standard and additional mitigation measures required to demonstrate that the hazards associated with the Mona Offshore Wind Project are broadly acceptable or tolerable on the basis of As Low As Reasonably Practicable (ALARP) declarations, in line with regulatory requirements. This information is then fed into the FSA process to identify impacts associated with the development.

EIA methodology

5.2.7.10 The shipping and navigation EIA will broadly follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report, but with the assessment criteria tailored to align with MCA requirements described above. Specifically, the assessment criteria will include a combination of consequence and frequency, rather than magnitude and sensitivity, to establish significance. Significance will be determined as either broadly acceptable, tolerable, or unacceptable. This will be further described in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

5.2.7.11 Specific to the shipping and navigation EIA, the following guidance documents will be considered:

- MGN 654 (M+F) Safety of Navigation: OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021a)
- Methodology for Assessing the Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI) (MCA, 2021b).

5.2.7.12 Other guidance that will be referred to during the completion of the shipping and navigation EIA include:

- Marine Guidance Notice 372, OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008)
- G1162 ED1.0 The Marking of Offshore Man-Made Structures (IALA, 2021)
- Guidelines for FSA for use in the IMO rule-making process (IMO, 2018)
- The RYA’s Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019).

5.2.8 Potential cumulative effects

5.2.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Mona Offshore Wind Project to affect shipping and navigation receptors.

5.2.8.2 The cumulative assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the Mona shipping and navigation study area for the generation assets:

- other offshore wind farms, including the Morgan Offshore Wind Project and other existing and proposed projects
- other energy infrastructure projects, including oil and gas activities (including decommissioning) and carbon capture and storage (CCS) projects
- other infrastructure projects (e.g. cables and pipelines).

5.2.8.3 The cumulative effect assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.2.9 Potential inter-related effects

5.2.9.1 The assessment of potential inter-related effects will be considered within the shipping and navigation ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.2.10 Potential transboundary impacts

5.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon shipping and navigation due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- Deviations to commercial routes: there is potential for transboundary impacts on ferry and commercial routes operating to/from the Republic of Ireland.

5.2.10.2 The potential for transboundary impacts will be considered within the ES.

5.3 Marine archaeology

5.3.1 Introduction

5.3.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the marine archaeology receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets on marine archaeology receptors.

5.3.2 Study area

5.3.2.1 The Mona marine archaeology study area for the generation assets is shown in Figure 5.14. The Mona marine archaeology study area for the generation assets is defined as the Mona Potential Array Area with an additional 2km buffer. This encompasses the generation assets of the Mona Offshore Wind Project and allows the site-specific data to be put into a wider context.

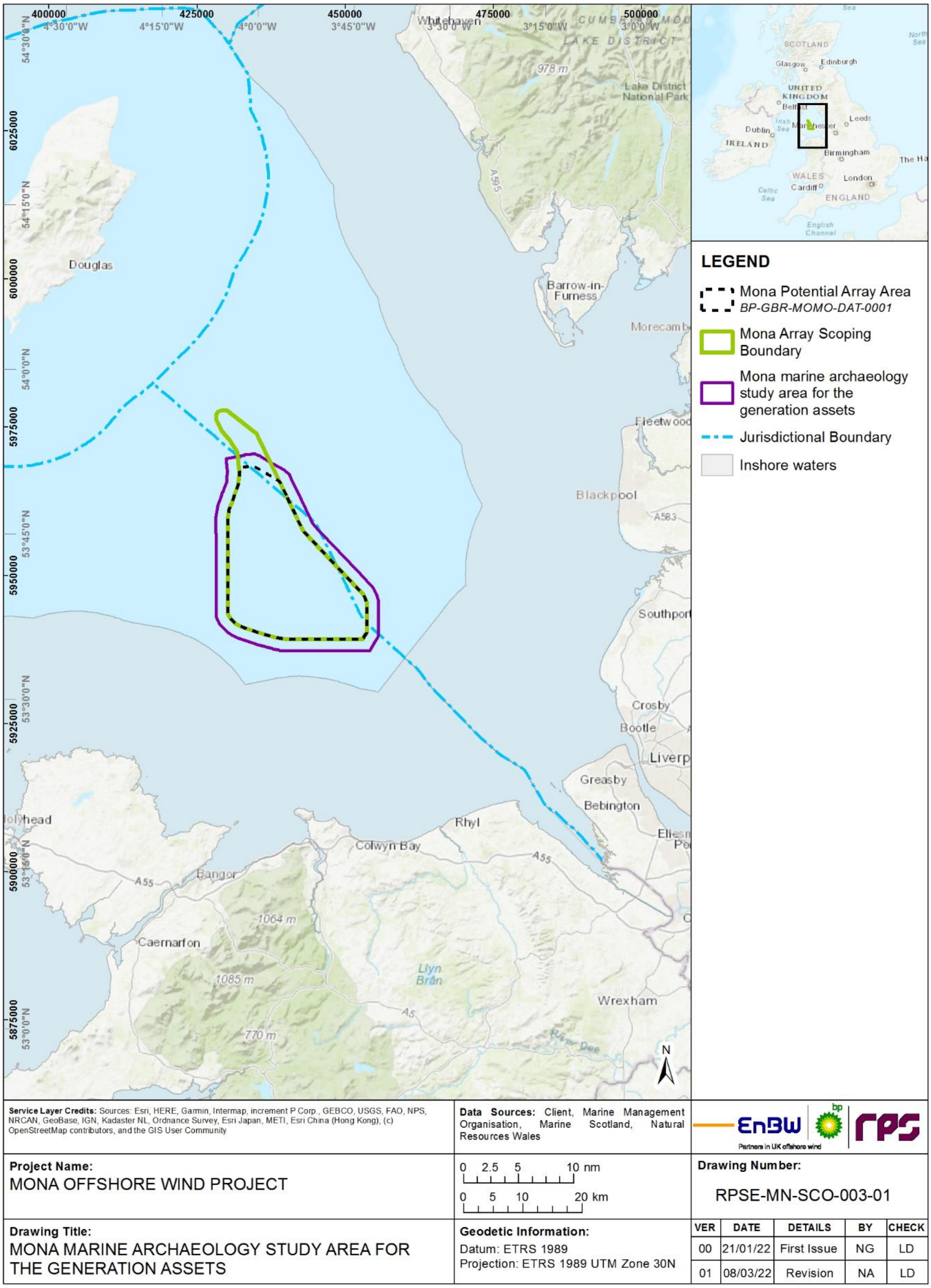


Figure 5.14: The Mona marine archaeology study area for the generation assets.

5.3.3 Data sources

Desktop data

5.3.3.1 A number of sources were consulted in order to inform the marine archaeology section of the EIA Scoping Report and will be used to inform the EIA. These comprise:

- The United Kingdom Hydrographic Office (UKHO) wrecks database, containing recorded wreck and obstruction data
- Records held by the National Record of the Historic Environment (NRHE), which include:
  - monuments records
  - archaeological event records
  - maritime records
  - aircraft crash sites
  - find locations.
- National Monuments Records Wales (NMRW) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)
- Relevant mapping including Admiralty Charts, British Geological Survey (BGS), Ordnance Survey and historic maps
- Relevant primary and secondary sources and grey literature, available through the Archaeological Data Service (ADS) and other websites, including published and unpublished archaeological reports relevant to the vicinity of the Mona marine archaeology study area for the generation assets.

5.3.3.2 In order to compile a marine archaeological baseline for the purposes of this EIA Scoping Report, these sources were compiled into gazetteers (see appendix 5.3.11).

5.3.3.3 The historic environment records have been classified between records where material is known to be on the seabed and 'recorded losses'. Recorded losses are events of vessels that are known to have been lost in the area, but with which no accurately located remains are associated.

5.3.3.4 Where multiple entries across the datasets occur that relate to the same archaeological receptor, the coordinates from the UKHO dataset have been used, as they are most frequently updated with the latest survey positions.

Site-specific surveys

5.3.3.5 A geophysical survey took place in summer 2021 within the Mona Potential Array Area. This included a Multibeam Echo Sounder (MBES), Side Scan Sonar (SSS), Sub-bottom Profiler (SBP), multichannel 2D Ultra-high Resolution Seismic (UHRS), and magnetometer survey. Data from this survey will be reviewed by a marine archaeologist specialising in geophysical data interpretation and will be used to inform the marine archaeology baseline for the EIA.

5.3.4 Baseline environment

5.3.4.1 This section provides a high-level overview of the marine archaeological baseline environment within the Mona marine archaeology study area for the generation assets. The baseline environment is structured into the following categories:

- Submerged prehistoric archaeology: This includes palaeochannels and other inundated terrestrial landforms that may preserve sequences of sediment of palaeoenvironmental interest, Palaeolithic and Mesolithic sites and artefacts.
- Maritime archaeology: relates generally to craft or vessels and any of their associated structures and/or cargo.
- Aviation archaeology: this comprises all military and civilian aircraft crash sites and related wreckage.

5.3.4.2 There are no designated archaeological sites within the Mona marine archaeology study area for the generation assets.

5.3.4.3 A gazetteer of the known marine archaeology within the Mona marine archaeology study area for the generation assets can be found in appendix 5.3.11.

Submerged prehistoric archaeology

5.3.4.4 There are five entries within the NMRW data relating to palaeolandscapes within the Mona marine archaeology study area for the generation assets. These include a flood plain, highlands, a glacial tunnel valley and glacial outwash channels, suggesting that there is potential for glacial features to be present. The locations of these features are shown in Figure 5.15.

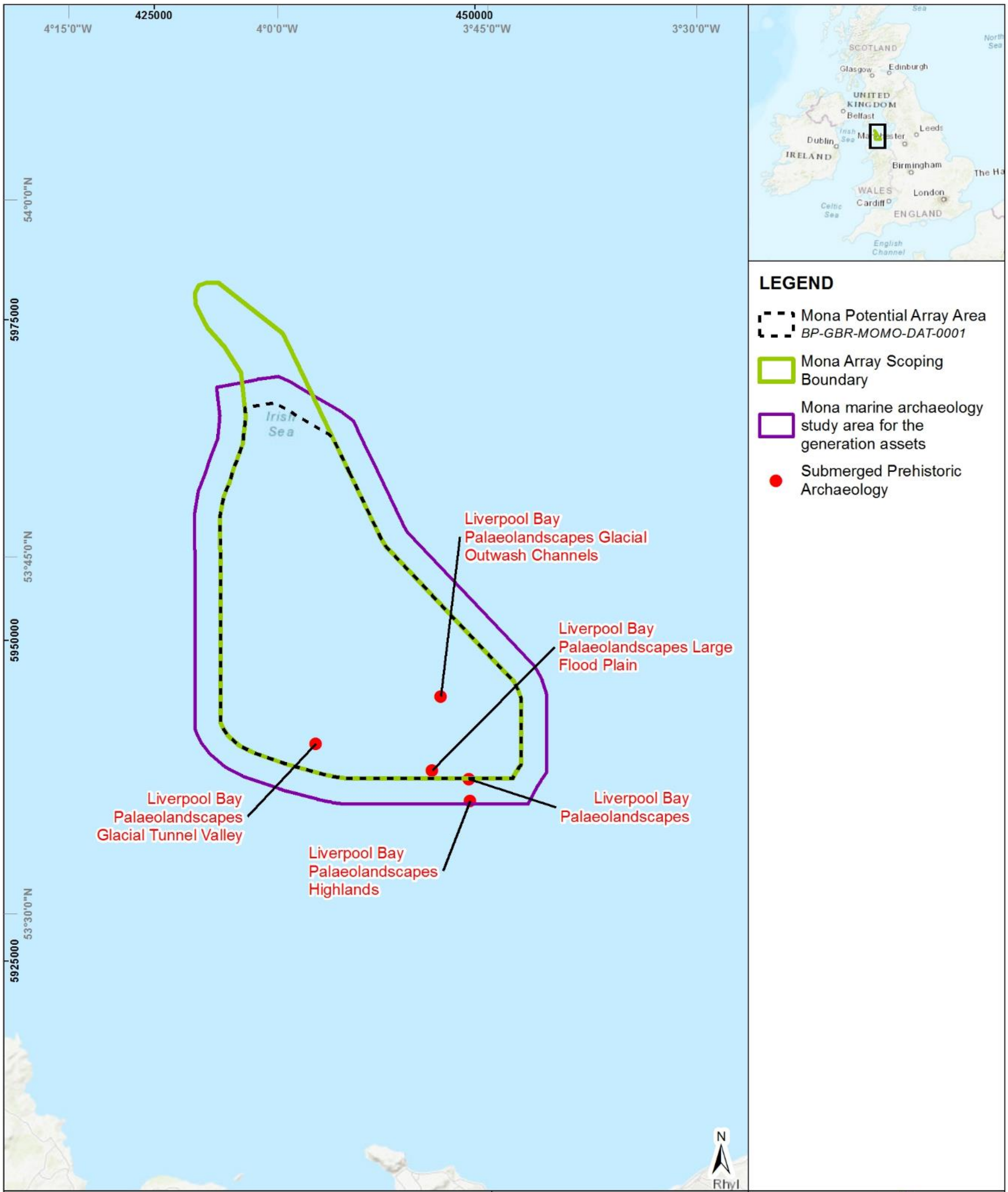
<u>Submerged prehistoric archaeological potential</u>

5.3.4.5 The potential for submerged prehistoric archaeology within the Mona marine archaeology study area for the generation assets is moderate with any surviving evidence likely to be found in association with palaeolandscape features. Archaeological assessment of the geophysical survey data (see section 5.3.3) will provide further information on the potential for submerged prehistoric archaeology within the Mona marine archaeology study area for the generation assets and will be presented in the PEIR and ES chapter.

5.3.4.6 Prior to 5,500BC, fluctuations in sea level presented opportunities for early hominids to occupy and traverse the now submerged Liverpool Bay area (Fitch *et al*., 2011). When sea levels were low, the Liverpool Bay area was a landscape that connected the Isle of Man to mainland Britain (Coles, 1988). These falls in sea level were associated with the last three glacial maximums and the retreat of the ice sheets.

5.3.4.7 The earliest known occupation of the area near the Mona marine archaeology study area for the generation assets is located on the north coast of Wales, at the Pontnewydd Cave site, Llandudno. This site dates to circa 225,000BP (Before Present) and confirms that this area was being exploited during the low to mid palaeolithic period.

5.3.4.8 The Last Glacial Maximum (LGM) began circa 18,000BP and ice sheets began to retreat around 13,000BP. It is thought that human and animal reoccupation of mainland Britain was swift, and that this reoccupation came from crossing the now submerged palaeolandscape of Doggerland from mainland Europe (Fitch *et al.,* 2011). There is therefore a potential that this exploitation of the landscape continued across mainland Britain and over to the Isle of Man via the now submerged palaeolandscape identified within the Mona marine archaeology study area for the generation assets.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client.

EnBW bp rps — Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 nm
0 5 10 km

Drawing Number:
RPSE-MN-SCO-037-01

Drawing Title:
SUBMERGED PREHISTORIC ARCHAEOLOGY WITHIN THE MONA MARINE ARCHAEOLOGY STUDY AREA FOR GENERATION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	09/12/21	First Issue	JA	LD
01	08/03/22	Revision	NA	LD

Figure 5.15: Submerged prehistoric archaeology within the Mona marine archaeology study area for the generation assets.

Maritime archaeology

5.3.4.9 The known maritime archaeology within the Mona marine archaeology study area for the generation assets is shown in Figure 5.16 and described below.

Non-designated maritime archaeology

5.3.4.10 Within the datasets listed in section 5.3.3 there are a total of 26 entries that may indicate the presence of material of anthropogenic origin within the Mona marine archaeology study area for the generation assets. These are described below.

5.3.4.11 There are two known wreck sites, both of which are the remains of modern ships and currently considered 'live' by the UKHO. The *Ardlough* was a cargo ship built in Germany in 1968 which sank in 1988 after taking on water in the Irish Sea. The *Tijl Uilenspiegle* was a Belgian fishing trawler built in 1972 and sank in 1987 under mysterious circumstances.

5.3.4.12 Within the UKHO data there are three wreck sites which are listed as 'dead', indicating that no remains have been located and therefore the wreck is considered not to exist at the location given. However, it is worth noting that 'dead' wrecks may still be present at the locations indicated but are buried or flattened and therefore no longer represent a navigational hazard. Archaeological interpretation of the geophysical survey data will clarify whether archaeological material survives at these locations.

5.3.4.13 There are nine unnamed or unknown wreck sites recorded in the NMRW, NRHE and UKHO data about which no further information is known. These entries within the datasets are attributed unverifiable positions and therefore may not exist within the Mona marine archaeology study area for the generation assets. Archaeological interpretation of the geophysical survey data will determine whether they relate to the presence of archaeological material.

5.3.4.14 There are 12 seabed anomalies recorded as being of man-made origin, clustered predominantly in the northern half of the Mona marine archaeology study area for the generation assets. These may also relate to the presence of archaeological material on the seabed within the Mona marine archaeology study area for the generation assets.

Maritime archaeological potential

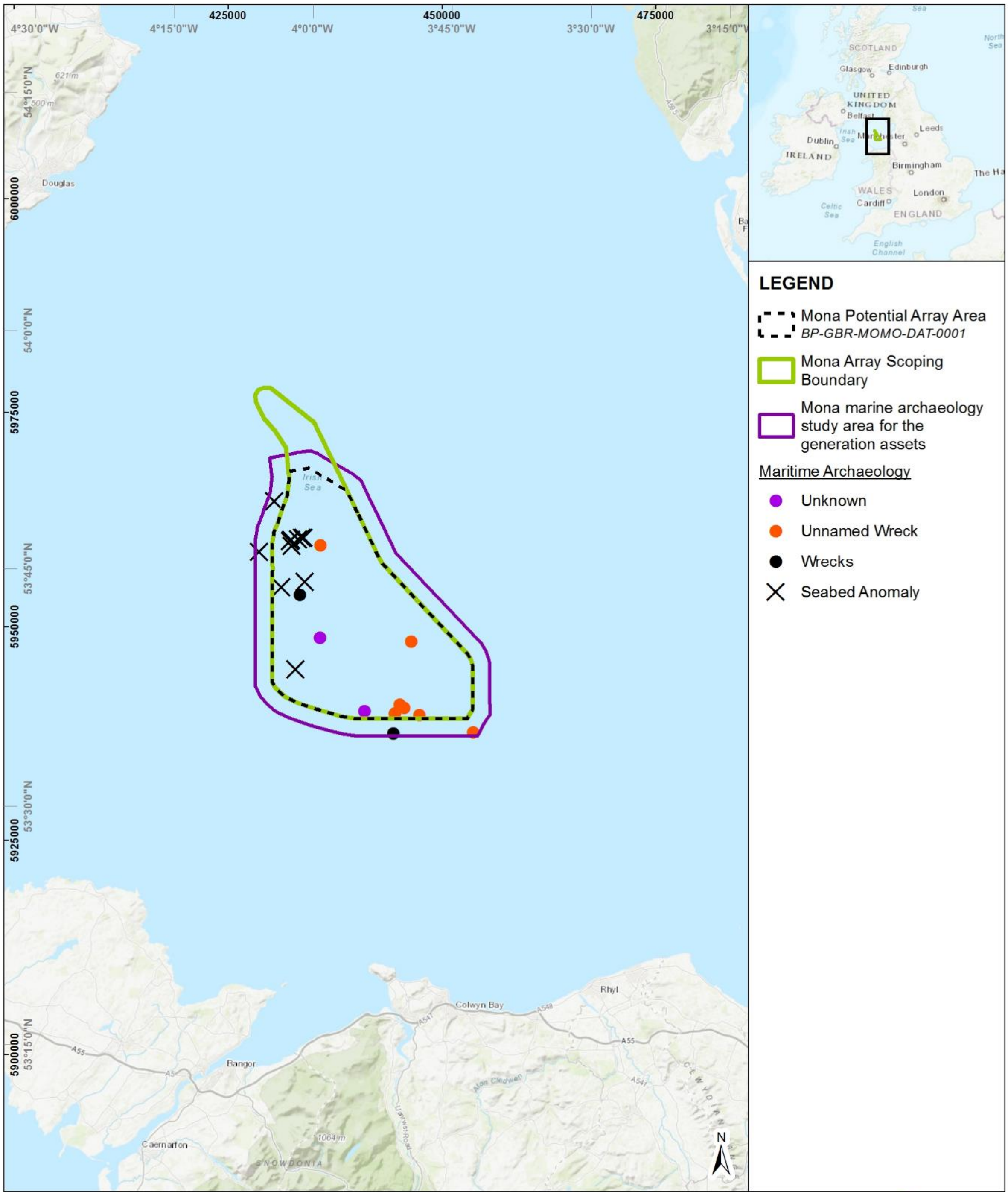
5.3.4.15 Maritime archaeological sites and materials can be defined as the physical remains of boats and ships that have been wrecked, sunk or have foundered and artefacts which rest upon the seabed as the result of being jettisoned or lost overboard (for example, anchors, cannon or fishing gear).

5.3.4.16 There are no recorded losses attributed to coordinates within the Mona marine archaeology study area for the generation assets. Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but to which no specific location can be attributed. Recorded losses are often grouped with reference to a geographic, hydrographic or other point of reference, making the positional data of these records unreliable. However, they do provide information on the historical marine traffic of the general region. The closest grouping of recorded losses lies approximately 7km to the south of the Mona marine archaeology study area for the generation assets and largely represents post-medieval and modern vessels.

5.3.4.17 Records of known wreck sites and losses in UK waters are biased towards the recent, predominantly post-medieval and modern periods. Although the existence and survival of Palaeolithic watercraft are highly speculative in the UK, Bronze and Iron Age sea-going vessels are likely to have been lost in the east Irish Sea.

5.3.4.18 The potential for the survival of medieval maritime archaeology is higher than from prehistoric periods but still rare, as ship construction during the medieval period relied heavily on organic building materials that are less likely to survive on and in the seabed.

5.3.4.19 The post-medieval and modern periods present the greatest potential for unrecorded archaeology to be discovered. The increasing incorporation of metal structural elements into vessel designs during this period means that wrecks for the 19th and early 20th centuries are also often more visible on the seabed than their wooden predecessors. They are visible to bathymetric and geophysical survey, and also generate strong magnetic anomalies, and this greater visibility is reflected in the increased number of known wrecks (i.e. those that have been located on the seabed) in contrast to earlier periods.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client.

EnBW bp rps — Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 nm
0 5 10 20 km

Drawing Number:
RPSE-MN-SCO-038-01

Drawing Title:
MARITIME ARCHAEOLOGY WITHIN THE MONA MARINE ARCHAEOLOGY STUDY AREA FOR THE GENERATION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	24/01/22	First Issue	NG	LD
01	08/03/22	Revision	NA	LD

Figure 5.16: Maritime archaeology within the Mona marine archaeology study area for the generation assets.

Aviation archaeology

5.3.4.20 There are no known aviation remains within the Mona marine archaeology study area for the generation assets.

Aviation archaeological potential

5.3.4.21 Thousands of military and civilian aircraft casualties have occurred in UK waters since the advent of powered flight in the early 20th century. The bulk of these casualties date to World War II and most are concentrated off the south and southeast coasts of England. However, there is evidence for substantial numbers of aircraft casualties in the east Irish Sea (Wessex Archaeology, 2008).

5.3.4.22 Whilst this aviation archaeology record is potentially very large, the ephemeral nature of aircraft wrecks ensures that many sites remain unknown and unrecorded. In addition, although records of aircraft losses at sea are extensive, they are seldom tied to an accurate position, which further complicates any assessment of the likely presence of aircraft wreckage on any area of the seabed.

5.3.4.23 Since World War II, despite the volume of both military and civilian air traffic, there have been few aviation losses off the west coast of England and north Wales, in the vicinity of the Mona Offshore Wind Project. The potential for post-war aircraft remains to be discovered within the Mona marine archaeology study area for the generation assets is therefore considered to be low. Civilian aircraft wrecks are not subject to protection under the terms of the Protection of Military Remains Act 1986.

5.3.5 Potential project impacts

5.3.5.1 A range of potential impacts on marine archaeology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.9 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.3.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for marine archaeology.

Table 5.9: Impacts proposed to be scoped into the project assessment for marine archaeology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Sediment disturbance and deposition leading to indirect impacts on archaeological receptors.	✓	✓	✓	Construction works, including seabed preparation, installation of foundations, and cable installation, may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors. Effects from decommissioning are likely to be similar to effects from construction. Maintenance operations, including cable repair activities, may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors.	Review of desktop data and archaeological assessment of geophysical survey data with reference to the results of the Physical processes chapter of the ES which will consider the extent of sediment disturbance and associated deposition. The geophysical survey data will be scanned to provide an understanding of the geological nature of the area and interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft Written Scheme of Investigation (WSI).
Direct damage to archaeological receptors.	✓	✓	✓	Construction works could directly affect any archaeological receptors present within the Mona Potential Array Area. These effects will likely be localised, but should they occur, they could lead to adverse and irreversible damage to archaeological receptors. Where receptor locations are already known, measures for their avoidance and protection include implementing Archaeological Exclusion Zones (AEZs). Effects from decommissioning are likely to be similar to effects from construction.	As above.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft Written Scheme of Investigation (WSI).
Alteration of sediment transport regimes.	×	✓	×	The presence of wind turbine foundations and associated scour protection, and cable protection, may interrupt sediment transport pathways, which could be directed towards or away from archaeological receptors causing damage.	As above, with reference to the Physical processes chapter of the ES which will consider the potential impact on sediment transport pathways.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft WSI.

5.3.6 Measures adopted as part of the project

5.3.6.1 The following measures adopted as part of the project are relevant to marine archaeology. These measures may evolve as the engineering design and the EIA progresses.

- The identification and implementation of AEZs around receptors identified as having a known archaeological potential. The size of the AEZ will be evidence based and established using the precautionary principle to ensure that it is of sufficient size to protect the site from the nature of the impact (Wessex Archaeology, 2007; Wessex Archaeology for The Crown Estate, 2020).
- The development of, and adherence to, a WSI for the construction phase.
- Provision of a Protocol for Archaeological Discoveries (PAD) similar to that set out by The Crown Estate (TCE, 2014) for unexpected archaeological discoveries made during the course of the development.
- Archaeological input into specifications for and analysis of pre-construction geophysical surveys.
- Suitably qualified marine archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle (ROV) or diver surveys and, if appropriate, in the monitoring and checking of data.
- Geoarchaeological input into specifications for and analysis of pre-construction geotechnical surveys. This may include the presence of a geoarchaeologist on board the survey vessel and provision for sampling, analysis and reporting of recovered cores. The results of all geoarchaeological investigations will be complied in a final report which will include a sediment deposit model.

5.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.3.7 Proposed assessment methodology

5.3.7.1 The marine archaeology EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the marine archaeology EIA, the following guidance will also be considered:

- Standard and Guidance for Historic Environment Desk-Based Assessment, Chartered Institute for Archaeologists (CIfA) (2014).
- Historic Environment Guidance for Offshore Renewable Energy Sector, Collaborative Offshore Wind Research into the Environment (COWRIE) (2007).
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy, COWRIE (2008).
- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development, JNAPC (2006).

- Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects, The Crown Estate (2010).
- Protocol for Archaeological Discoveries: Offshore Renewables Projects, The Crown Estate (2014).

5.3.8 Potential cumulative effects

5.3.8.1 The majority of the potential impacts on marine archaeological receptors arising from the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project are considered to be localised to within the footprint of the Mona Potential Array Area. However, there is potential for cumulative effects to arise from other projects or activities within the east Irish Sea where projects or activities could act collectively on sediment transport regimes with the Mona Offshore Wind Project to affect marine archaeological receptors. The cumulative assessment will consider the maximum design scenarios for each of the projects or activities.

5.3.8.2 The cumulative effect assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.3.9 Potential inter-related effects

5.3.9.1 The assessment of potential inter-related effects will be considered within the marine archaeology Environmental Statement (ES) chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.3.10 Potential transboundary impacts

5.3.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon marine archaeology due to construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project.

5.3.11 Appendix 5.3.11:

Gazetteer of known marine archaeology within the Mona marine archaeology study area for the generation assets (data has been compiled from the NMRW, NRHE and UKHO datasets as listed in section 5.3.3 and the data is presented in WGS84 UTM30N.).

Some of the data cannot be attributed an ID number at this stage. If these become confirmed locations of archaeological material, they will be assigned ID numbers during the geophysical data analysis.

ID	Easting	Northing	Name	Description	Period
7004	444342.1	5937501	Ardlough	The *Ardlough* was a cargo ship built in Germany in 1968 which sank in 1988 after taking on water in the Irish Sea.	Modern
7563	433422.7	5953756	Tijl Uilenspiegle	The *Tijl Uilenspiegle* was a Belgian fishing trawler. Built in 1972 the *Tijl Uilenspiegle* sank in 1987 under mysterious circumstances.	Modern
7332 / 909482	440992	5940149	Unknown	Steam ship/remains of a vessel	Unknown
7630 / 909485	435799.7	5948722	Unknown	Probable remains of a lightship	Unknown
-	433716.8	5960372	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	432950.6	5945040	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	431274.5	5954586	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	433998.1	5955236	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	428656.9	5958769	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	432511.7	5959463	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	432318.3	5959991	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	432399.1	5960145	Seabed anomaly of man-made origin	Find scatter	Post Medieval
-	432399.1	5960145	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	433248.9	5960227	Seabed anomaly of man-made origin	Findspot	Post Medieval

ID	Easting	Northing	Name	Description	Period
-	430454.9	5964644	Seabed anomaly of man-made origin	Findspot	Post Medieval
-	433856.1	5960418	Seabed anomaly of man-made origin	Find scatter	Post Medieval
-	453724.3	5937636	Unnamed wreck	Wreck	Modern
-	447431.4	5939710	Unnamed wreck	Wreck	Post Medieval
-	444575	5939897	Unnamed wreck	Wreck	Post Medieval
-	445611.4	5940503	Unnamed wreck	Wreck	Post Medieval
-	445119.7	5940911	Unnamed wreck	Wreck	Post Medieval
-	446462.9	5948288	Unnamed wreck	Wreck	Post Medieval
-	435876.1	5959489	Unnamed wreck	Wreck	Post Medieval
-	446694.5	5939851	Liverpool Bay palaeolandscapes large flood plain	Landscape	Palaeolithic
-	449674.4	5937498	Liverpool Bay palaeolandscapes highlands	Landscape	Palaeolithic
-	449572.8	5939179	Liverpool Bay palaeolandscapes	Landscape	Palaeolithic
-	437622.7	5941948	Liverpool Bay palaeolandscapes glacial tunnel valley	Landscape	Palaeolithic
-	447354.6	5945602	Liverpool Bay palaeolandscapes glacial outwash channels	Landscape	Palaeolithic

5.4 Other sea users

5.4.1 Introduction

5.4.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the other sea users receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets on other sea users receptors.

5.4.1.2 Potential impacts upon other sea users related to navigational safety are addressed in part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report. Potential impacts on helicopter access to oil and gas platforms are addressed in part 2, section 6.3: Aviation and radar, of the EIA Scoping Report. The other sea users Environmental Statement (ES) chapter will only consider impacts that have likely significant effects on the undertaking of a certain marine activity or the operational effectiveness of marine infrastructure.

5.4.2 Study area

5.4.2.1 The other sea users study area varies in scale depending on the receptor. Two study areas have been defined for the assessment of different groupings of other sea users receptors. These are the Mona regional other sea users study area for the generation assets, and the Mona local other sea users study area for the generation assets, as shown in Figure 5.17.

5.4.2.2 The Mona regional other sea users study area for the generation assets is based on one tidal excursion of the Mona Potential Array Area and represents the area with potential increases in suspended sediments arising from Mona Offshore Wind Project activities. This study area is relevant to those receptors which are susceptible to increases in suspended sediment concentrations:

- aggregate extraction and disposal sites
- recreational receptors (dive sites).

5.4.2.3 The Mona local other sea users study area for the generation assets is defined as the Mona Potential Array Area with an additional 1km buffer. The 1km buffer has been included as oil and gas infrastructure, cables and pipelines and offshore wind farm structures undergoing maintenance will require a 500m safety zone or advisory clearance distance. This area includes the extent of potential direct physical overlap between the Mona Offshore Wind Project activities and the following receptors:

- recreational receptors (including sailing and motor cruising and recreational fishing)
- offshore energy projects (including offshore wind farms, oil and gas activities, carbon capture and storage)
- cable and pipeline operators
- offshore microwave fixed communication links.

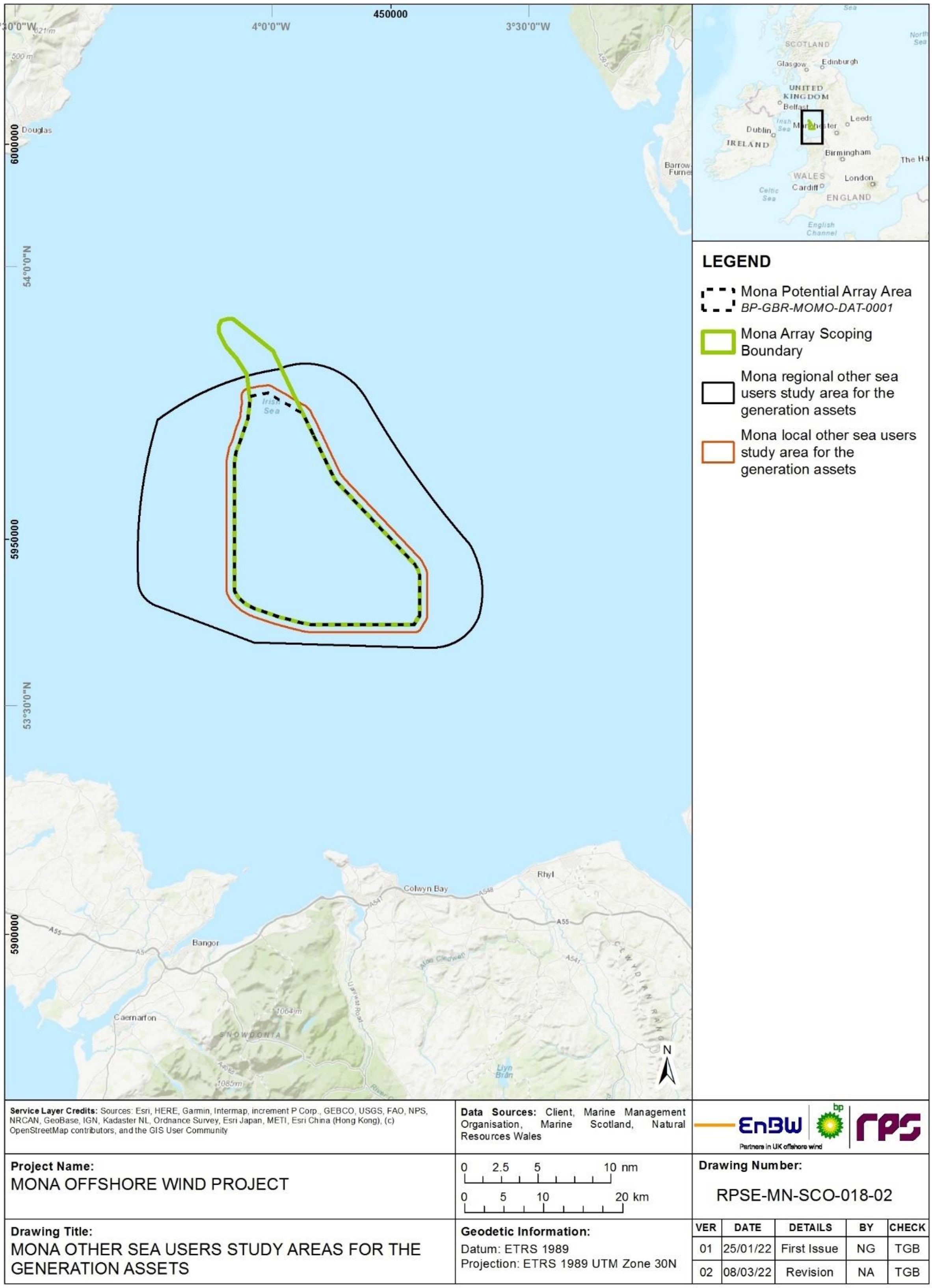


Figure 5.17: The Mona regional other sea users study area for the generation assets and the Mona local other sea users study area for the generation assets.

5.4.3 Data sources

Desktop data

5.4.3.1 A number of sources were consulted in order to inform the other sea users section of the EIA Scoping Report and will be used to inform the EIA. These are shown in Table 5.10.

Table 5.10: Data sources for other sea users.

Title	Source	Year	Author
Cable routes	Kis-Orca	2021	Kis-Orca
Disposal sites	EMODnet	2015	EMODnet
Offshore wind farms	The Crown Estate (TCE)	2021	TCE
Aggregate extraction areas	TCE	2021	TCE
Pipelines	Oil and Gas Authority (OGA)	2021	OGA
Wells	OGA	2021	OGA
Oil and gas platforms	OGA	2021	OGA
Subsurface structures	OGA	2021	OGA
Hydrocarbon fields	OGA	2021	OGA
Oil and gas licence block	OGA	2021	OGA
United Kingdom Continental Shelf (UKCS) block	OGA	2021	OGA
Marinas	UK Coastal Atlas of Recreational Boating	2018	Royal Yachting Association (RYA)
Recreational activities	UK Coastal Atlas of Recreational Boating	2018	RYA
RYA clubs	UK Coastal Atlas of Recreational Boating	2018	RYA
RYA training centres	UK Coastal Atlas of Recreational Boating	2018	RYA
General boating areas	UK Coastal Atlas of Recreational Boating	2018	RYA
Data from site-specific 2 x 14-day Marine Vessel Traffic Surveys (see part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report)	NASH Maritime (commissioned by the Applicant)	2021/ 2022	NASH Maritime
Wrecks (diving sites)	UKDiving.co.uk	2010	UK Diving
Communication links	Ofcom, communication	2019	Ofcom
Recreational fishing	Cefas British sea fishing	2021 2020	Cefas British sea fishing

Consultation

5.4.3.2 Supporting data and information will also be obtained through consultation with relevant other sea users receptors with activities and interests in proximity to the Mona Potential Array Area.

5.4.4 Baseline environment

5.4.4.1 This section provides a high level overview of the other sea users baseline environment within the Mona regional other sea users study area for the generation assets and the Mona local other sea users study area for the generation assets.

Mona regional other sea users study area for the generation assets

5.4.4.2 Other sea users receptors within the Mona regional other sea users study area for the generation assets include aggregate extraction and disposal sites and recreational receptors (dive sites). The baseline environment for these receptors is described below.

Marine aggregate extraction

5.4.4.3 There is one marine aggregate production agreement area within the Mona regional other sea users study area for the generation assets. It is located in the southeast of the Mona regional other sea users study area for the generation assets (Figure 5.18).

Disposal sites

5.4.4.4 There is one dredge disposal site located within the Mona regional other sea users study area for the generation assets, located 5.2km to the southeast of the Mona Potential Array Area.

5.4.4.5 There are no disposal sites for explosive material, chemical munitions disposal sites (post 1945) or radioactive waste sites (1946 to 1993) located within the Mona regional other sea users study area for the generation assets, according to DECC, 2011 (see Figure A3h.21 in DECC, 2011).

Scuba diving

5.4.4.6 There is one recreational dive site within the Mona regional other sea users study area for the generation assets (www.ukdiving.co.uk) (see Figure 5.19), located to the south of the Mona Potential Array Area.

Mona local other sea users study area for the generation assets

5.4.4.7 Other sea users receptors within the Mona local other sea users study area for the generation assets include recreational receptors (sailing and motor cruising and recreational fishing), offshore energy projects (offshore wind farms, oil and gas activities, carbon capture and storage), cable and pipeline operators and communication links. The baseline environment for these receptors is described below.

Recreational sailing and motor cruising

5.4.4.8 Recreational sailing is generally divided into two categories: offshore and inshore. Offshore sailing is usually undertaken by yachts in the form of either cruising or organised offshore racing. Inshore sailing is typically undertaken by smaller vessels including dinghies and recreational vessels that are used for either cruising at leisure or racing. Cruising may include day trips between local ports and often includes a return journey to the home port on the same day. Inshore racing takes place around racing marks and navigational buoyage.

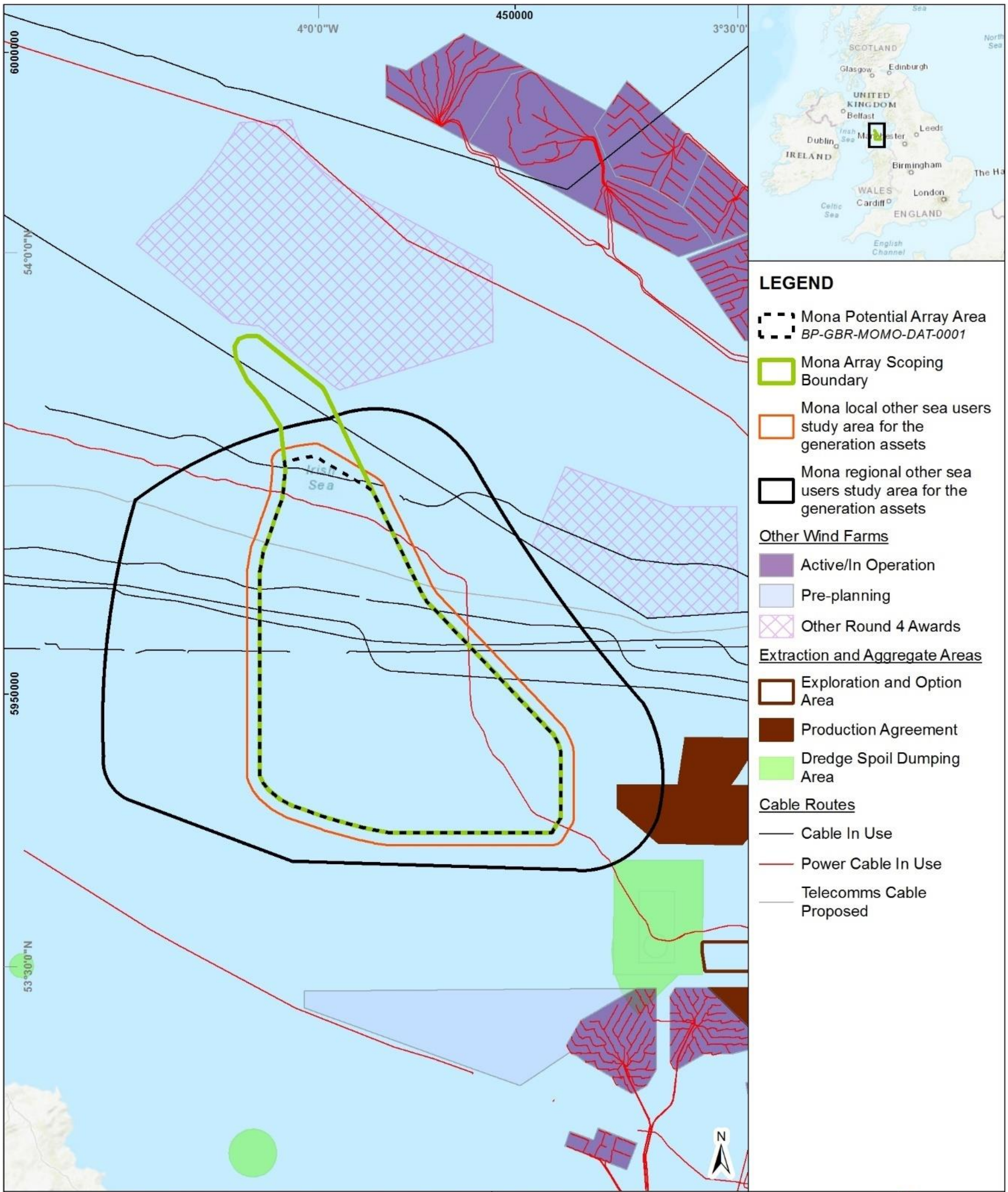
5.4.4.9 As noted in paragraph 5.4.1.2, navigational safety and risk to recreational vessels is considered in part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report. The other sea users ES chapter will only consider receptors undertaking recreational sailing and motor cruising as an activity.

5.4.4.10 Figure 5.19 illustrates that recreational sailing and motor cruising in inshore and coastal areas is of a low to medium intensity. The RYA data is limited to inshore waters, but Automatic Identification System (AIS) data tracks show that recreational vessels also transit through the Mona local other sea users study area for the generation assets, mainly between Douglas and Liverpool. Due to the distance of the Mona Potential Array Area from the coast (28.2km/15.2nm), any sailing would likely consist of offshore cruising and racing.

5.4.4.11 Data from the marine vessel traffic surveys and consultation activities carried out to inform the Navigation Risk Assessment (NRA) (see part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report) will be used as an additional data source to inform the assessment on recreational sailing and motor cruising receptors.

Recreational fishing

5.4.4.12 Sea fishing trips run from Conwy, North Wales and specialise in wreck fishing, deep sea fishing and reef fishing from Anglesey to Liverpool Bay (www.sea-fishing-trips.co.uk). Sea fishing trips also operate from the Isle of Man (https://www.manxseafishing.com/) and Fleetwood, Lancashire (http://www.bluemink boatcharters.co.uk/) amongst other ports along the coasts of the east Irish Sea. Consultation will take place with local operators to further understand activities and operational range.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, The Crown Estate, Marine Management Organisation, Marine Scotland, Natural Resources Wales

EnBW bp Partners in UK offshore wind | rps

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 nm
0 5 10 km

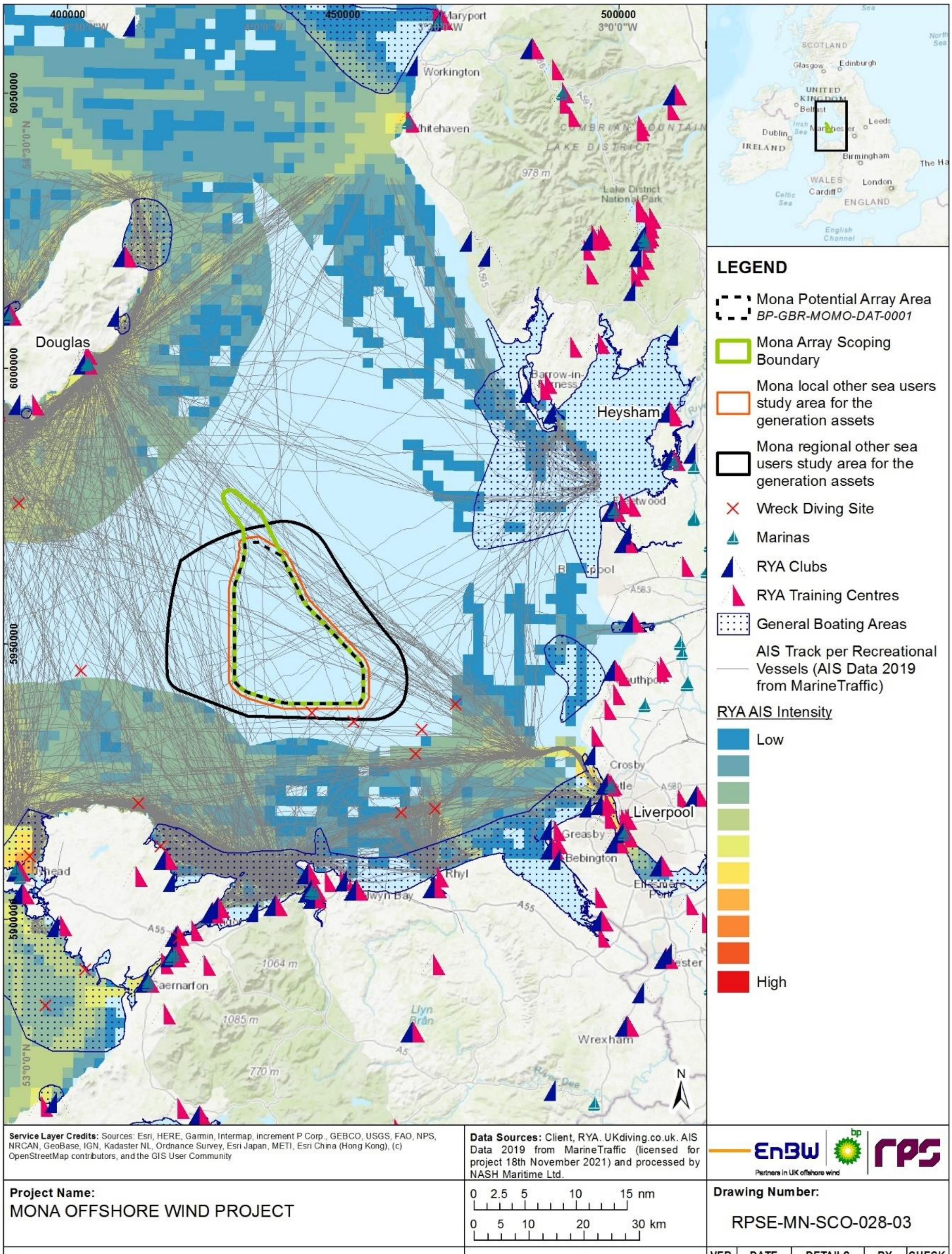
Drawing Number:
RPSE-MN-SCO-026-02

Drawing Title:
MARINE AGGREGATE AREAS, DISPOSAL SITES, OFFSHORE WIND FARMS AND CABLES IN THE VICINITY OF THE MONA OTHER SEA USERS STUDY AREAS FOR THE GENERATION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
01	25/01/22	First Issue	NG	TGB
02	08/03/22	Revision	NA	TGB

Figure 5.18: Marine aggregate areas, disposal sites, offshore wind farms and cables within the Mona regional other sea users study area for the generation assets and the Mona local other sea users study area for the generation assets.



VER	DATE	DETAILS	BY	CHECK
01	25/01/22	First Issue	NG	TGB
03	04/04/22	Revision	NA	TGB

Figure 5.19: Recreational activities in the Mona local other sea users study area for the generation assets.

Offshore wind farms

5.4.4.13 Offshore wind farms in the east Irish Sea are shown in Figure 5.18. There are no offshore wind farms within the Mona local other sea users study area for the generation assets. The nearest operational offshore wind farm is Gwynt y Môr, located 14km to the southeast of the Mona Potential Array Area. Further to the south and southeast are the operational wind farms of Rhyl Flats, North Hoyle, Burbo Bank and Burbo Bank Extension. Other operational wind farms within the east Irish Sea include Walney, Walney Extension, West of Duddon Sands, Ormonde and Barrow, to the northeast of the Mona Potential Array Area.

5.4.4.14 The nearest offshore wind farms in planning are the Morgan, Morecambe and Awel y Môr offshore wind projects, located 5.5km to the north, 8.9km to the east, and 12.2km to the south of the Mona Potential Array Area respectively.

Oil and gas operations

5.4.4.15 The Mona local other sea users study area for the generation assets overlaps with nine licence blocks currently licenced for the exploration and extraction of oil and gas (Figure 5.20). Eight of these blocks are licenced by Chrysaor North Sea Ltd (109/5, 109/10, 109/15, 110/1, 110/6, 110/7b, 110/11 and 110/12c), with one licenced by Eni UK Ltd. (block 110/12a). There are no hydrocarbon fields or oil and gas platforms located within the Mona local other sea users study area for the generation assets (Figure 5.20). There is one hydrocarbon producing platform located just beyond the southeastern boundary of the Mona local other sea users study area for the generation assets (1.9km from the Mona Potential Array Area), operated by Eni. Initial consultation with Eni has confirmed that this platform (the Conwy platform) is planned to be decommissioned. Radar Early Warning Systems (REWS) may be used on oil and gas platforms to detect approaching vessels and prevent vessel collision with a platform.

5.4.4.16 Subsurface structures (including protective structures, pipe junctions, manifolds, wellheads, trees and valves) are usually protected by a 500m safety zone. There are no subsurface structures located within the Mona local other sea users study area for the generation assets, with the closest located 5km to the southeast of the Mona Potential Array Area.

5.4.4.17 Wells are classified into the following four categories: completed wells (ready for production), drilling wells (wells in the process of being drilled), plugged and abandoned wells (where work has ceased because it has become non-productive or non-viable) and suspended wells (a well may be temporarily suspended if an operator intends to carry out further operations at a later date). Completed and drilling wells typically have a 500m safety zone. Plugged and abandoned and suspended wells do not have safety zones attached to their location. There are nine plugged and abandoned wells located within the Mona local other sea users study area for the generation assets.

5.4.4.18 Consultation will take place with Chrysaor North Sea Ltd and Eni to further understand the nature of their operations.

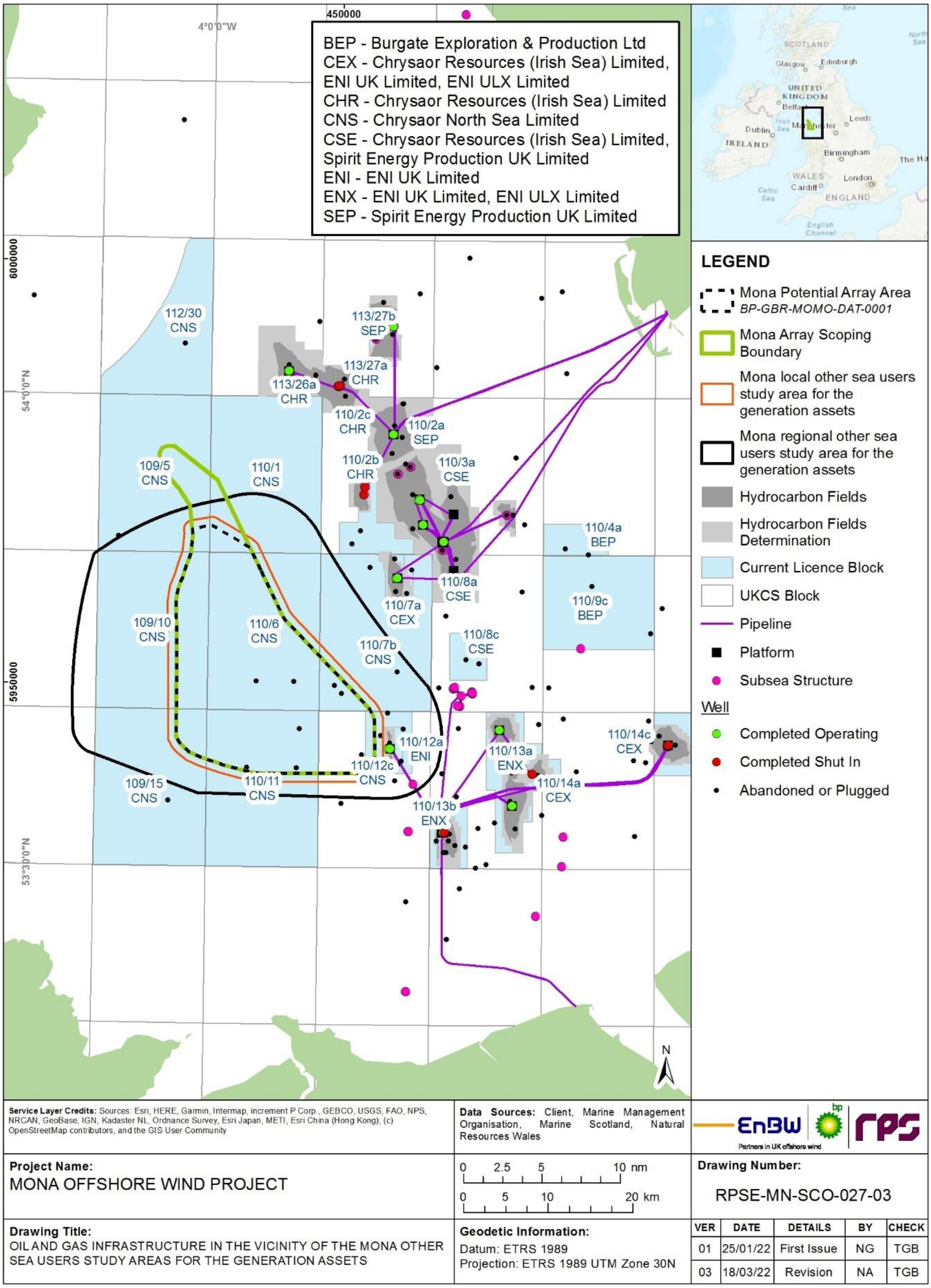


Figure 5.20: Oil and gas infrastructure within the Mona local other sea users study area for generation assets.

Cables

5.4.4.19 There are six operational cables that cross the Mona local other sea users study area for the generation assets (Figure 5.18). Additionally, there is one proposed telecoms cable within the Mona local other sea users study area for the generation assets.

5.4.4.20 Where the Mona Offshore Wind Project cables will be required to cross an active cable, it is intended that a commercial 'crossing agreement' will be entered into with the cable operator. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely. A crossing agreement based upon the International Cable Protection Committee (ICPC) Recommendation 3-10C 'Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria' will be used for any cable crossings. Where a cable is inactive, the Applicant will consult with the cable operator to ascertain if such a crossing agreement is required.

Pipelines

5.4.4.21 There are no pipelines that intersect with the Mona local other sea users study area for the generation assets. The nearest pipeline is located within the Mona regional other sea users study area for the generation assets, 1.95km from the Mona Potential Array Area (Figure 5.20).

Carbon capture and storage

5.4.4.22 In October 2020, the OGA awarded Eni a six-year appraisal licence which targets Eni's offshore fields in Liverpool Bay to be utilised as a permanent store for CO_2 (www.eni.com). The development is part of 'HyNet North West', a low carbon cluster project to help UK decarbonisation which also operates a carbon capture and storage (CCS) facility off the north coast of Wales (www.hynet.co.uk).

5.4.4.23 Consultation will take place with Eni to further understand the location and nature of their plans.

Offshore microwave fixed communication links

5.4.4.24 Communication systems considered within this section include offshore microwave fixed links, which may be used to facilitate communications between offshore oil and gas platforms. Marine navigation, communications and position fixing equipment is addressed in part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report.

5.4.4.25 It is considered unlikely that wireless fixed telecommunication links cross the Mona Potential Array Area, due to the location of the offshore assets as presented in Figure 5.20. This will be further explored through desk study and consultation for the EIA.

5.4.5 Potential project impacts

5.4.5.1 A range of potential impacts on other sea users receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.11, together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.4.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for other sea users.

Table 5.11: Impacts proposed to be scoped into the project assessment for other sea users (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Displacement of recreational activities.	✓	✓	✓	Safety zones and advisory clearance distances established during construction, maintenance and decommissioning activities may displace recreational activities.	Review of desktop data, including results of the marine vessel traffic surveys, supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition affecting recreational diving sites.	✓	✓	✓	Increased suspended sediment concentrations and associated deposition arising from construction, maintenance and decommissioning activities wihtin the Mona Potential Array Area may affect recreational diving sites.	Review of desktop data supported by the outcome of consultation, with reference to the results of the physical processes chapter of the EIA which will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed from the results of baseline data review, consultation, and the physical processes chapter of the EIA.
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines.	✓	✓	✓	There are several active cables within the Mona Potential Array Area and therefore there is potential for impact to existing cables or restrictions on access to cables from installation, maintenance and decommissioning activities.	Review of desktop data supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	✓	✓	✓	Installation, maintenance and decommissioning of the generation assets has the potential to lead to increased suspended sediment concentrations and deposition, which could cause a change in aggregate resource in aggregate extraction areas.	Review of desktop data, with reference to the results of the physical processes chapter of the EIA which will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed from the results of baseline data review and the physical processes chapter of the EIA.
Alterations to sediment transport pathways affecting aggregate extraction areas.	×	✓	×	The presence of offshore wind farm infrastructure has the potential to affect sediment transport pathways, which could affect aggregate resource in aggregate extraction areas.	Review of desktop data, with reference to the results of the physical processes chapter of the EIA which will consider the extent of changes to sediment transport pathways.	Qualitative assessment informed from the results of baseline data review and the physical processes chapter of the EIA.
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Mona Potential Array Area.	✓	✓	✓	The installation, presence and decommissioning of infrastructure associated with the Mona Offshore Wind Project may reduce or restrict oil and gas exploration activities within the Mona Potential Array Area.	Review of desktop data. Consultation with each potentially affected licence block operator will be undertaken to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Interference with the performance of REWS located on oil and gas platforms.	×	✓	×	The presence of wind turbines in previously open sea areas may cause interference with the performance of the REWS located on oil and gas platforms.	Consultation will be carried out with oil and gas operators to identify any platforms with REWS and to understand the range and capabilities of the REWS.	Approach to assessment depends on the outcome of consultation. Should a potential impact be established, a REWS modelling study will be commissioned to support the assessment.
Interference with offshore microwave fixed communication links.	×	✓	×	Presence of wind turbines within the Mona Potential Array Area may affect offshore microwave fixed links between offshore oil and gas platforms.	Review of desktop data. Consultation with Ofcom and oil and gas operators to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.

5.4.6 Measures adopted as part of the project

5.4.6.1 The following measures adopted as part of the project are relevant to other sea users. These measures may evolve as the engineering design and the EIA progresses.

- Promulgation of information advising on the nature, timing and location of activities, including through Notices to Mariners.
- Navigational aids and marine charting.
- Consultation with oil and gas operators and other energy infrastructure operators to promote and maximise cooperation between parties and minimise both spatial and temporal interactions between conflicting activities.
- Installation of infrastructure over or adjacent to existing or future cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the start of the construction phase.

5.4.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.4.7 Proposed assessment methodology

5.4.7.1 The other sea users EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the other sea users EIA, the following guidance will also be considered:

- The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019)
- European Subsea Cables UK Association (ESCA) guideline no 6, the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters (ESCA, 2016)
- ICPC recommendations:
  - recommendation No.2-11B: Cable routing and reporting criteria (ICPC, 2015)
  - recommendation No.3-10C: Telecommunications cable and oil pipeline/power cables crossing criteria (ICPC, 2014)
  - recommendation No.13-2C: The proximity of offshore renewable wind energy installations and submarine cable infrastructure in national waters (ICPC, 2013)
- Pipeline crossing agreement and proximity agreement pack (Oil and Gas UK, 2021).
- Submarine cables and offshore renewable energy installations proximity study (TCE, 2012).

5.4.8 Potential cumulative effects

5.4.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Mona Offshore Wind Project to affect other sea users receptors. The cumulative assessment will consider the maximum design scenarios for each of the projects or activities.

5.4.8.2 The cumulative effect assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.4.9 Potential inter-related effects

5.4.9.1 The assessment of potential inter-related effects will be considered within the other sea users ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.4.10 Potential transboundary impacts

5.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon other sea users due to construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project.

6 Offshore and onshore combined topics

6.1 Seascape, landscape and visual resources

6.1.1.1 The assessment of seascape, landscape and visual resources has considered the potential impacts arising from construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project as a whole, including both the generation and transmission assets.

6.1.1.2 The approach to the assessment of the impacts of construction, operation and maintenance and decommissioning of the generation and transmission assets on seascape, landscape and visual resources has been described in part 3, section 9.1: Seascape, landscape and visual resources, of this Environmental Impact Assessment Scoping Report.

6.2 Socio-economics and community

6.2.1.1 The assessment of socio-economics and community has considered the potential impacts arising from construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project as a whole, including both the generation and transmission assets.

6.2.1.2 The approach to the assessment of the impacts of construction, operation and maintenance and decommissioning of the generation and transmission assets on socio-economics and community has been described in part 3, section 9.4: Socio-economics and community, of this Environmental Impact Assessment Scoping Report.

6.3 Aviation and radar

6.3.1 Introduction

6.3.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the aviation and radar receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation assets on aviation and radar receptors.

6.3.2 Study area

6.3.2.1 For the purposes of identifying aviation and radar receptors for the Mona Offshore Wind Project generation assets, a broad study area has been defined. The Mona aviation and radar study area for the generation assets is presented in Figure 6.1 and described below.

6.3.2.2 The Mona aviation and radar study area for the generation assets has been defined as the airspace created when joining the following points:

- the National Air Traffic Services (NATS) Lowther Hill Primary Surveillance Radar (PSR) to the north northeast of the Mona Potential Array Area
- the NATS Great Dun Fell PSR to the northeast of the Mona Potential Array Area
- the Manchester Airport PSR to the southeast of the Mona Potential Array Area
- the NATS Clee Hill PSR to the south southeast of the Mona Potential Array Area
- the Ministry of Defence (MOD) Royal Air Force (RAF) Valley PSR to the southwest of the Mona Potential Array Area
- a point 30km west of the location of the Ronaldsway Airport PSR, Isle of Man
- the MOD (QinetiQ) West Freugh PSR to the north of the Mona Potential Array Area.

6.3.2.3 This area has been defined to include the aviation radar systems that could potentially detect the maximum wind turbine blade tip height (see part 1, section 3: Project description, of the EIA Scoping Report) within the Mona Potential Array Area and to encompass other relevant aviation receptors in proximity to the Mona Potential Array Area.

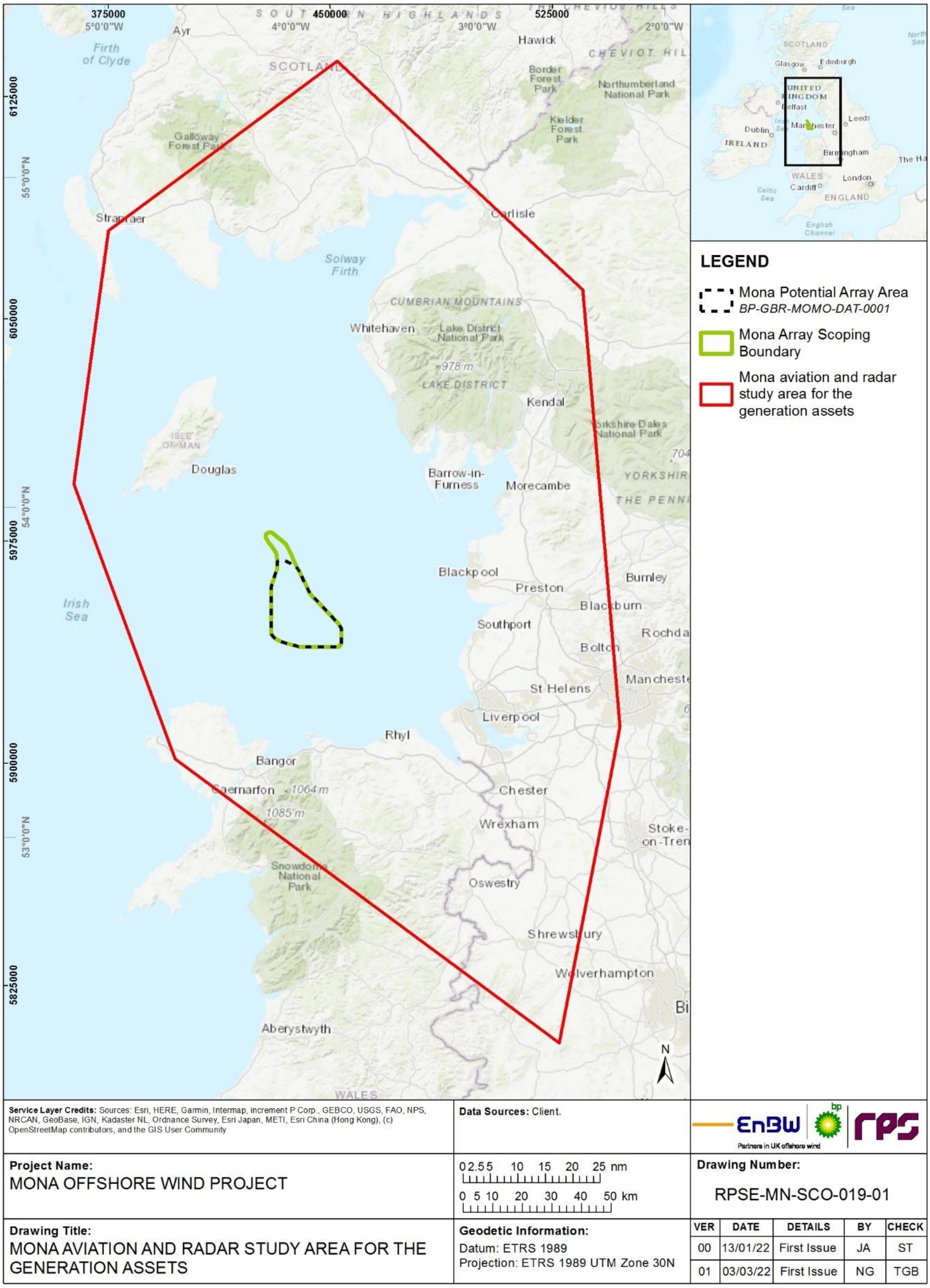


Figure 6.1: The Mona aviation and radar study area for the generation assets.

6.3.3 Data sources

6.3.3.1 A number of sources were consulted in order to inform the aviation and radar section of the EIA Scoping Report and will be used to inform the EIA. These are summarised in Table 6.1.

6.3.3.2 In addition to existing data, the assessment will be informed through desk studies and computer modelling carried out by Osprey Consulting Services, including radar line of sight analysis. Other supporting data will be obtained from stakeholder consultation.

Table 6.1: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Visual Flight Rules (VFR) Data	NATS VFR Chart	2020	NATS
Search and Rescue (SAR) Locations	The Bristow Group	2021	The Bristow Group
Meteorological radar sites	The Met Office	2020	The Met Office
Helicopter Main Routes (HMRs)	NATS En-Route charting	2019	NATS
Aerodromes and Ground Aids (AGA), Surveillance Radars, Navigational Aid areas	NATS Safeguarding	2012	NATS
Air navigation characterisations	UK Aeronautical Information Publication	2021	NATS
Airfields	UK General Aviation (UKGA) Environmental Systems Research Institute (ESRI) Ordnance Survey Open Data	2022 2015 2021	UKGA ESRI Ordnance Survey
Military Practice and Exercise Areas (PEXAs)	Oceanwise	2021	Emapsite
Offshore platforms and consultation zones	Oil and Gas Authority	2021	Oil and Gas Authority

6.3.4 Baseline environment

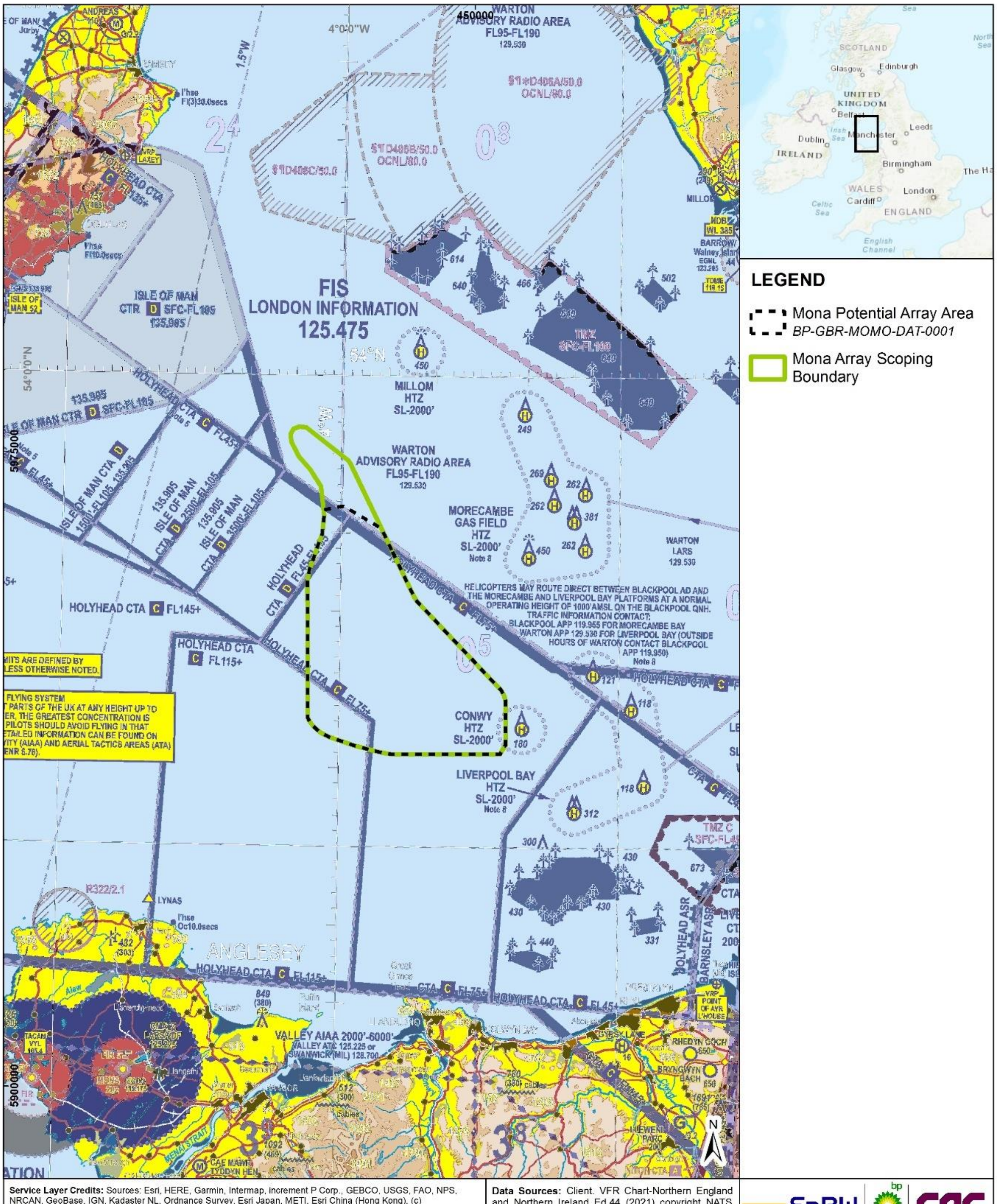
Airspace

6.3.4.1 The airspace within, above and surrounding the Mona Potential Array Area (Figure 6.2) is used by both military and civil registered aircraft which observe the airspace rules dependent on the classification of airspace they are operating in as follows:

- Class G uncontrolled airspace: any aircraft can operate in an area of uncontrolled airspace without any mandatory requirement to be in communication with Air Traffic Control (ATC). Pilots of aircraft operating under VFR in Class G airspace are ultimately responsible for seeing and avoiding other aircraft, terrain and obstructions
- Class C and D Controlled airspace: all aircraft operating in this airspace must be in receipt of an Air Traffic Service (ATS).

6.3.4.2 The majority of the Mona Potential Array Area is within Class G uncontrolled airspace, established from the surface to Flight Level (FL) 75 (approximately 7,500 feet (ft)). Above FL 75, Class C controlled airspace is established, which forms the Holyhead Control Area (CTA); this airspace lowers to a base level of FL 45 (approximately 4,500ft) with uncontrolled airspace below at the northwestern corner of the Mona Potential Array Area.

6.3.4.3 At the southwestern edge of the Mona Potential Array Area, Class G uncontrolled airspace is established from the surface to FL 115 (11,500 ft), with Class C controlled airspace established above.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	Data Sources: Client. VFR Chart-Northern England and Northern Ireland Ed.44 (2021) copyright NATS (Services)Ltd/ALL RIGHTS RESERVED	EnBW bp rps Partners in UK offshore wind
Project Name: MORGAN AND MONA OFFSHORE WIND PROJECTS	0 2.5 5 10 nm 0 5 10 20 km	**Drawing Number:** RPSE-MN-SCO-047-00
Drawing Title: AIRSPACE ABOVE THE MONA POTENTIAL ARRAY AREA	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N	VER: 00 / DATE: 14/03/22 / DETAILS: First Issue / BY: NG / CHECK: TGB

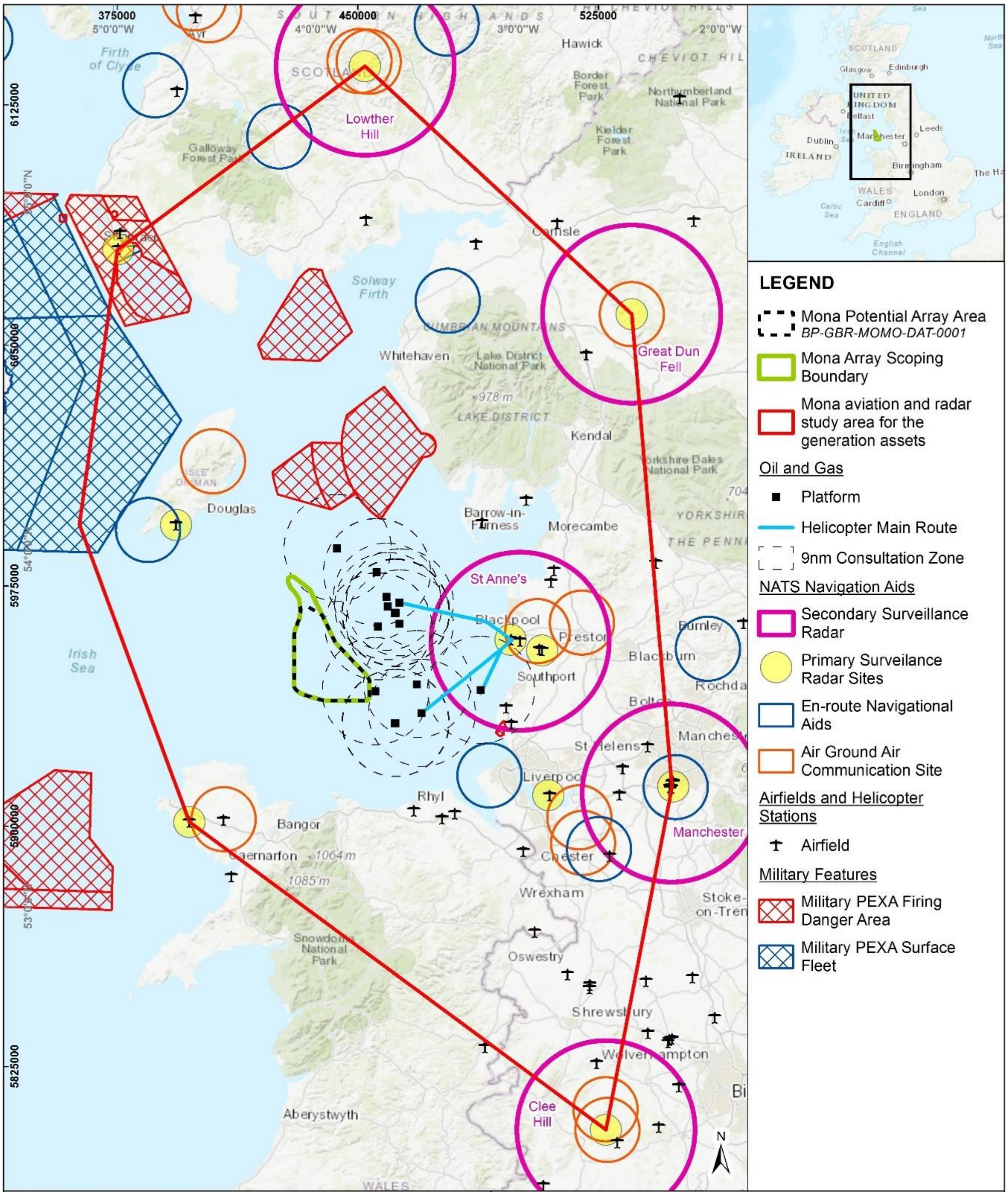
Figure 6.2: Airspace above the Mona Potential Array Area.

Civil aviation

6.3.4.4 HMRs support the transport of personnel and equipment to offshore oil and gas installations. HMRs are routes typically and routinely flown by helicopters operating to and from offshore destinations and are promulgated for the purpose of signposting concentrations of helicopter traffic to other airspace users. HMR promulgation does not predicate the flow of helicopter traffic. Whilst HMRs have no airspace status and assume the background airspace classification within which they lie (in the case of the Irish Sea, Class G), they are used by the Air Navigation Service Provider (ANSP) and helicopter operators for flight planning and management purposes. Civil Aviation Publication (CAP) 764 CAA Policy and Guidance on Wind Turbines (Civil Aviation Authority (CAA), 2016) states that HMRs have no defined lateral dimensions (only route centre-lines are charted on navigation charts) and that 2nm either side of the route centre-line should be kept obstacle free (CAA, 2016). No HMRs cross the Mona Potential Array Area. The HMR system in the east Irish Sea is shown in Figure 6.3.

6.3.4.5 In order to maintain a safe operating environment, the CAA recommend a consultation zone of 9nm radius around offshore installations serviced by helicopters (CAA, 2016). This consultation zone is not considered a prohibition on development, but a trigger for consultation between offshore helicopter operators, the operators of existing installations and developers of proposed offshore wind farms, in order to determine a solution that maintains safe offshore helicopter operations. The Mona Potential Array Area extends into the 9nm consultation zones established around six platforms. These platforms and their consultation zones are presented in Figure 6.3 and listed in Table 6.2, along with information on the platform operator and distance from the Mona Potential Array Area. A 9nm consultation zone should also be a trigger for consultation with the operators of any subsea infrastructure and wells where mobile drilling rigs or vessels may require helicopter access.

6.3.4.6 Initial consultation carried out by the Applicant with Spirit Energy has indicated that the Calder platform has plans for decommissioning.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client.

Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 25 nm
0 5 10 20 30 40 50 km

Drawing Number:
RPSE-MN-SCO-025-01

Drawing Title:
RADAR LOCATIONS AND AVIATION FEATURES IN THE VICINITY OF THE MONA AVIATION AND RADAR STUDY AREA FOR THE GENERATION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	13/01/22	First Issue	JA	ST
01	14/03/22	Revision	NG	TGB

Figure 6.3: Radar locations and aviation features in the vicinity of the Mona aviation and radar study area for the generation assets.

Table 6.2: Platforms with 9nm consultation zones which overlap with the Mona Potential Array Area.

Platform	Owner/operator	Distance to Mona Potential Array Area	
		Kilometres (km)	Nautical miles (nm)
Conwy	Eni	1.9	1
Douglas DA	Eni	11.1	6
Douglas DP	Eni	11.2	6
Douglas DW	Eni	11.3	6.1
Calder	Harbour Energy own, Spirit Energy operate	13.1	7.1
Hamilton North	Eni	14.8	8

Civil and military radar

6.3.4.7 UK airspace and air traffic surveillance and management infrastructure is comprised of the following systems which may be affected by the detection and proximity of wind turbines:

- PSR
- Secondary Surveillance Radar (SSR).

6.3.4.8 Radar detection of a rotating wind turbine by a PSR may create reflections from both stationary and moving elements: these provide different challenges for the radar. While the reflected radar signal from stationary elements, such as the tower, can be removed using stationary clutter filters in the radar processor, rotating wind turbine blades can impart a Doppler shift to any radar energy reflecting off the blades. Doppler shifts are used by a number of radars to differentiate between moving objects, namely aircraft, and stationary terrain with the latter being processed out and not displayed to the operator. The radar may therefore detect Doppler returns from moving wind turbine blades and display them as radar clutter on the radar screen.

6.3.4.9 Furthermore, at sites with more than one turbine, the radar may illuminate a blade or blades from one turbine on one antenna sweep, then illuminate the blades of a different turbine on the next sweep. This can create the appearance on the radar screen of returns moving about within the area of the wind farm, sometimes described as a ‘twinkling’ appearance or ‘blade flash effect’. These moving returns can appear very similar to those that would be produced by a light aircraft. The appearance of multiple false targets in close proximity can trick the radar processor into initiating false aircraft tracks. False PSR returns can also ‘seduce’ real aircraft tracks away from their true returns as the radar attempts to update an aircraft track using the false return. This can lead to degradation of radar tracking capability (CAA, 2016).

6.3.4.10 NATS operate PSRs located at Lowther Hill, Great Dun Fell, St Anne’s and Clee Hill to support its provision of ATC services to aircraft operating in the east Irish Sea region. Additional PSRs are also located at the airfields at RAF Valley, British Aerospace (BAE) Warton, West Freugh, Ronaldsway, Manchester and Liverpool. These locations are shown in Figure 6.3. The Mona Potential Array Area is within the declared operational range of all of these sites; however, initial radar line of sight modelling results indicate that theoretically the Clee Hill, RAF Valley and West Freugh PSRs will not detect wind turbines with a tip height of up to 320m above mean sea level (AMSL).

6.3.4.11 CAP 764 states that wind turbine effects on SSR are traditionally less than those on PSRs but can be caused due to the physical blanking and diffracting effects of the turbine towers, depending on the size of the wind turbines and the wind farm. These effects are typically only a consideration when the wind turbines are located very close to the SSR (i.e. less than 10km). There are no SSR radar systems within 10km of the Mona Potential Array Area.

6.3.4.12 Military air traffic management is supported by military ATC radars with an instrumented range of 60nm. The RAF Valley PSR is located within 60nm of the Mona Potential Array Area.

6.3.4.13 The Statement of the European Union Meteorological Network Operational Programme for the Exchange of weather Radar information (OPERA) Group, on the cohabitation between meteorological weather radars and wind turbines, states that the deployment of wind turbines within 5km of weather radar is prohibited (OPERA, 2009). The Meteorological (Met) Office radar infrastructure is safeguarded by the Met Office. The Met office works to wind turbine safeguarding guidelines that stipulate a 20km separation between any development and a weather radar system. The closest Met Office radar system is located at Hameldon Hill (Met Office, 2020), approximately 4.6km southwest of Burnley, Lancashire, 94km from the Mona Potential Array Area.

Airborne search and rescue operations

6.3.4.14 The SAR helicopter force provides constant SAR cover in the UK from ten bases located across the UK. The bases are positioned close to SAR hotspots so aircraft can provide support as quickly and efficiently as possible. Bristow Helicopters was awarded the contract to provide helicopter SAR services for the UK in 2013, with the closest SAR base to the Mona Potential Array Area being at Caernarfon Airport, Gwynedd, 60.1km away. The Mona Offshore Wind Project has the potential to affect airborne SAR operations due to the creation of multiple obstructions.

6.3.5 Potential project impacts

6.3.5.1 A range of potential impacts on aviation and radar receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 6.3, together with a description of any additional data collection and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

6.3.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3, Project description, of the EIA Scoping Report, potential impacts to be scoped out of the assessment are presented in Table 6.4, with justification.

Table 6.3: Impacts proposed to be scoped into the assessment for aviation and radar (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Potential interference to the NATS Lowther Hill, Great Dun Fell and St Anne's PSRs, and the BAE Warton PSR, Manchester Airport PSR, Liverpool Airport PSR and Ronaldsway Airport PSR.	×	✓	×	The Mona Potential Array Area is within the range of the NATS Lowther Hill, Great Dun Fell and St Anne's PSRs, BAE Warton PSR, Liverpool Airport PSR, Manchester Airport PSR and Ronaldsway Airport PSR and therefore the presence of operational wind turbines within the Mona Potential Array Area could affect the radar performance.	Review of the data sources as set out in Table 6.1. has been carried out to identify radar receptors. Consultation with each radar operator will be carried out to understand the potential impact of the Mona Offshore Wind Project on radar systems and operations.	A radar line of sight analysis will be undertaken using the maximum wind turbine blade tip height to understand theoretical visibility. This will be supplemented with the outcomes of consultation with radar operators to understand the potential impact on radar systems and operations.
Creation of physical obstacles to aircraft operations.	✓	✓	✓	Construction and decommissioning infrastructure and the presence of wind turbines within the Mona Potential Array Area may impinge on the routing of aircraft operating at low level in the vicinity of the Mona Potential Array Area.	Consultation with airspace users to understand current airspace usage and potential for impact.	Qualitative assessment informed by consideration of the outcomes of consultation and taking into account the extant rules of the air.
Physical obstruction and potential for disruption to helicopter access/egress to/from offshore oil and gas platforms.	✓	✓	✓	The Mona Potential Array Area overlaps with the 9nm consultation zones of six oil and gas platforms. The presence of physical obstructions in proximity to the airspace utilised by helicopters operating to and from oil and gas platforms may disrupt helicopter operations to and from the potentially affected platforms.	Consultation with the operators of these platforms and their helicopter service providers to understand current and future helicopter access requirements (including any temporary access requirements to drilling rigs and vessels), and to understand any plans for decommissioning of assets.	A helicopter access report considering routine and emergency access procedures will be prepared for those platforms where ongoing helicopter operations will be required during all phases of the Mona Offshore Wind Project.
Obstruction to SAR helicopter operations.	✓	✓	✓	The presence of infrastructure (and associated construction equipment) within a previously open sea area may cause an obstruction to SAR operations.	Consultation will be carried out with SAR operators and the Maritime and Coastguard Agency (MCA) to understand requirements and to inform the assessment.	Qualitative assessment based on industry guidance informed through review of the project description against the outcomes of consultation with SAR operators and the MCA.

Table 6.4: Impacts proposed to be scoped out of the project assessment for aviation and radar.

Impact	Justification
Potential disruption to HMRs due to presence of wind turbines.	The Mona Potential Array Area does not overlap with any HMRs and therefore it is proposed that this impact is scoped out of the EIA.
Increased helicopter traffic to and from the Mona Offshore Wind Project may affect available airspace for other users.	The Mona Offshore Wind Project may require helicopter operations during the construction, operation and maintenance and decommissioning phases, which may affect the available airspace for other users. The Mona Offshore Wind Project will be located within Class G (uncontrolled airspace) where pilots are responsible for the avoidance of terrain, obstacles and other

Impact	Justification
	aircraft. The present operation of low flying aircraft in the Irish Sea is safe. This, together with the availability of an air traffic service, will remove aviation traffic risk therefore it is proposed that this impact is scoped out of the EIA.
Disruption to meteorological radar.	The Met Office publish defined consultation zones for each meteorological radar system; the Mona Offshore Wind Project is outside of these consultation zones and therefore it is proposed that this impact is scoped out of the EIA .
Impacts to SSR systems.	The CAA (2016) state that impact to SSR systems may be prevalent if wind turbines are located within 10km of the radar source; there are no SSR systems within 10km of the Mona Potential Array Area and therefore it is proposed that this impact is scoped out of the EIA.

6.3.6 Measures adopted as part of the project

6.3.6.1 The following measures adopted as part of the project are relevant to aviation and radar. These measures may evolve as the engineering design and the EIA progresses.

- Appropriate lighting and marking of wind turbines will be established in accordance with CAA regulations and guidance (CAA, 2016; 2021) and in consultation with the CAA and the Defence Infrastructure Organisation (DIO).
- Prior to the start of construction and decommissioning, the UK Hydrographic Office (UKHO) will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of activities, and the maximum height of any equipment to be used, to allow inclusion on Aviation Charts.
- The DIO will be informed of the construction start and end dates; the maximum height of construction equipment; and the latitude and longitude of each wind turbine.
- A minimum spacing of 500 m shall be maintained between blade tip to blade tip of all surface infrastructure. This is to facilitate access by SAR helicopters operating under Instrument Meteorological Conditions (IMC) flight rules, in line with MCA guidance (MCA, 2021b).
- Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP), including consideration of helicopters undertaking SAR operations.
- The Mona Offshore Wind Project operator will issue, as necessary, requests to the UK Aeronautical Information Service to submit Notice to Airmen (NOTAM) in the event of any failure of aviation lighting.

6.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

6.3.7 Proposed assessment methodology

6.3.7.1 The aviation and radar EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the aviation and radar EIA, the following guidance documents will also be considered:

- CAP 393: Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016 (CAA, 2021)
- CAP 764: CAA Policy and Guidelines on Wind Turbines, Sixth Edition (CAA, 2016)
- CAP 670: Air Traffic Services Safety Requirements, Third Issue Amendment 1/2019 (CAA, 2019)
- OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response, MGN 654 (M+F) (MCA, 2021a)

- Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response (MCA, 2021b).

6.3.8 Potential cumulative effects

6.3.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea where projects or activities could act collectively with the Mona Offshore Wind Project to affect aviation and radar receptors.

6.3.8.2 The cumulative assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the Mona aviation and radar study area for generation assets:

- other offshore wind farms, including the Morgan Offshore Wind Project
- other infrastructure projects (e.g. cables and pipelines).

6.3.8.3 The cumulative effects assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

6.3.9 Potential inter-related effects

6.3.9.1 The assessment of potential inter-related effects will be considered within the aviation and radar ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

6.3.10 Potential transboundary impacts

6.3.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon aviation and radar due to construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project.

6.4 Climate change

6.4.1 Introduction

6.4.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the climate change receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation and transmission assets.

6.4.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of climate change impacts for the generation and transmission assets.

6.4.1.3 In accordance with the EIA Regulations, Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017) and Environmental Impact Assessment Guide to Climate Change Resilience & Adaptation (IEMA, 2020), the following aspects of climate change are relevant to the assessment:

- The emission of greenhouse gases (GHGs) contributing to climate change, including cumulative impacts with other development.
- The potential risks to the generation and transmission assets arising from a changing climate and its vulnerability to climate change.
- The potential inter-related impact of climate change with other environmental topics to be considered in the Environmental Statement.

6.4.1.4 However, as discussed below, it is proposed to scope out a climate change risk assessment and inter-related effects will be assessed in the relevant topic chapters of the Environmental Statement.

6.4.1.5 Therefore, this section of EIA Scoping Report focuses on the proposed approach to the assessment of GHG emissions arising from the construction, operation and maintenance and decommissioning of the generation and transmission assets.

6.4.2 Study area

6.4.2.1 GHG emissions have a global effect rather than directly affecting any specific local receptor. The impact of GHG emissions occurring due to the Mona Offshore Wind Project on the global atmospheric concentration of the relevant GHGs, expressed in CO_2-equivalents (CO_2e), will therefore be considered in the climate change assessment.

6.4.2.2 The GHG emissions will be assessed on a life-cycle basis for activities required for the construction, operation and maintenance and decommissioning of the generation and transmission assets. GHG emissions will be caused directly and indirectly from sources at a variety of locations, including the onsite activities and the associated supply chain.

6.4.2.3 In addition, as the Mona Offshore Wind Project is proposed to generate renewable electricity, it will avoid the baseline GHG emissions from other grid-connected electricity generators; this will be considered in the assessment of net effects of the Mona Offshore Wind Project.

6.4.2.4 The climate change study area for the generation and transmission assets is therefore defined in terms of an assessment boundary rather than geographical area. The assessment boundary and relevant sources of GHG emissions are set out in sections 6.4.5 and 6.4.7 of the EIA Scoping Report respectively.

6.4.3 Data sources

6.4.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available online. No baseline surveys would be required to support the climate change assessment for the generation and transmission assets. Where a date or edition has been specified, this is the current edition but the latest at the time of assessment would be used. These data sources are summarised in Table 6.5 of the EIA Scoping Report below.

Table 6.5: Baseline data sources.

Source	Summary
Climate Change Committee (CCC) – Progress Report to Parliament (2021)	Provides information regarding state of renewable energy generation in the UK
Digest of UK Energy Statistics (DUKES)	Provide statistics on UK renewable energy and electricity generation
Published Environmental Product Declarations (EPDs, the outputs of lifecycle analysis studies – LCAs)	Use of published Environmental Product Declarations and LCA studies to establish the embodied carbon emissions for a typical wind turbine and associated switchgear, transformers and transmission cabling.
Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book, and supporting data tables	Used to establish baseline grid scenarios from which to compare to the development.
UK Government GHG Conversion Factors for Company Reporting	Current UK grid carbon intensity and other GHG emissions factors.
RICS, GBUK or OneClick Building Carbon Database for 'industrial/utilities' building;	Benchmark values per m2 of gross internal area (GIA) for an 'industrial building'
National Grid Future Energy Scenarios (2021)	Provides projected future energy scenarios to compare the development's renewable energy generation potential with

6.4.4 Baseline environment

6.4.4.1 The baseline environment for this climate change section is concerned with two areas:

- GHG emissions from the generation and transmissions assets associated land use change.
- GHG emissions savings that the operational use of the generation and transmissions assets will provide to the National Grid.

6.4.4.2 The current baseline with regard to land-use within the Mona Onshore Transmission Scoping Search Area is its existing use as mainly lower quality Subgrade 3b agricultural land. This baseline environment does not have high soil or vegetation carbon stocks that would be subject to disturbance by construction of the development.

6.4.4.3 The current baseline within the Morgan Generation and Offshore Transmission Scoping Search Areas will also be taken into account in the assessment and would be based on the information provided in the marine environment chapters of the Preliminary Environmental Information Report (PEIR).

6.4.4.4 The future baseline GHG emissions for existing land-use in the absence of the Mona Offshore Wind Project are expected to remain similar, with a decrease in agriculture-related GHG emissions over time, in line with the UK's national climate change policies.

6.4.4.5 The current baseline with regard to the carbon intensity of grid-average electricity generation, without the Mona Offshore Wind Project and accounting for generation, excluding transmission and distribution loses is 212.3 $kgCO_2e/MWh$.

6.4.4.6 The future baseline for electricity generation that would be displaced by the Mona Offshore Wind Project depends broadly on future energy and climate policy in the UK, and more specifically (with regard to day-to-day emissions) on the demand for operation of the Mona Offshore Wind Project compared to other generation sources available, influenced by commercial factors and National Grid's needs.

6.4.4.7 The carbon intensity of baseline electricity generation is projected to reduce over time and so too would the intensity of the marginal generation source displaced at a given time.

6.4.4.8 The Mona Offshore Wind Project operational GHG emissions savings from renewable energy generation for the grid will be compared with appropriate sources such as the Department for Business, Energy and Industrial Strategy (BEIS) projected marginal and grid average baseline scenarios and the National Grid's Future Energy Scenario publication.

6.4.5 Potential project impacts

6.4.5.1 A range of potential impacts on climate change have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the generation and transmission assets.

6.4.5.2 The impacts that have been scoped into the assessment are outlined in Table 6.6 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

6.4.5.3 Potential impacts scoped out of the assessment are presented in Table 6.7, with justification.

Table 6.6: Impacts proposed to be scoped into the project assessment for climate change (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of GHG emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance phase.	×	✓	×	GHG emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance phase would contribute to the lifecycle total and net GHG balance of the Mona Offshore Wind Project.	Use of published carbon intensity benchmark values for buildings and/or project specific materials estimates together with published EPD's concerning Life Cycle Assessment research into embodied carbon associated with construction of the substation building and associated infrastructure including switchgear, transformers and additional cabling. Use of published EPD's concerning Life Cycle Assessment research into embodied carbon associated with construction of wind turbines and wind farm developments. Use of published EPD's concerning Life Cycle Assessment research into embodied carbon associated with operation and maintenance of wind turbines and wind farm developments. Use of published data on agricultural land use classes, soil carbon stocks and GHG fluxes. Use of published EPD's concerning Life Cycle Assessment research into embodied carbon associated with recycling and recovery activities at end of life for wind turbines and wind farm developments.	No modelling is proposed to be undertaken as part of the climate change assessment.
The impact of GHG emissions arising from land-use change during the construction, operation and maintenance and decommissioning phase	✓	✓	✓	GHG emissions arising from land-use change during the construction, operation and maintenance and decommissioning phase are likely to be minor as agricultural land is not typically a significant carbon stock or have significant baseline emissions, but this will be assessed further in the ES.		
The impact of GHG emissions arising from the manufacturing and installation of the generation assets.	✓	×	×	GHG emissions arising from the manufacturing and installation of the generation assets would contribute to the lifecycle total and net GHG balance of the Mona Offshore Wind Project; they have the potential to be significant within the context of construction-stage effects.		
The impact of GHG emissions arising from the manufacturing and installation of the transmission assets.	✓	×	×	GHG emissions arising from the manufacturing and installation of the generation assets would contribute to the lifecycle total and net GHG balance of the Mona Offshore Wind Project; they have the potential to be significant within the context of construction-stage effects.		
The impact of GHG emissions arising from decommissioning works (e.g. plant, fuel and vessel use) and the recovery (or disposal) of materials.	×	×	✓	GHG emissions arising from decommissioning works (e.g. Plant, fuel and vessel use) and the recovery (or disposal) of materials would contribute to the lifecycle total and net GHG balance of the Mona Offshore Wind Project. With the development planned to operate for 35 years, options for either recycling or re-		

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				powering turbines will be assessed at end of life.		
The impact of estimated abatement of UK Grid emissions during the operation and maintenance phase.	×	✓	×	Exporting renewable energy to the grid throughout the 35-year operational lifetime of the Mona Offshore Wind Project is likely to have a significant net benefit compared to the future baseline for power generation.	Future baseline environment will be based on BEIS and/or National Grid projections for grid average marginal carbon intensity of electricity generation.	The reduction in GHG emissions as a result of operation of the Project will be assessed based on the carbon intensity of the alternative grid average and marginal generation source that is displaced (i.e. the generator that would be supplying the grid in the absence of the Mona Offshore Wind Project).

Table 6.7: Impacts proposed to be scoped out of the project assessment for climate change.

Impact	Justification
The vulnerability of the generation and transmission assets to climate change during the construction, operation and maintenance and decommissioning phase.	The main climate risk to the onshore transmission assets is flooding, which will be assessed, including appropriate allowances for climate change, in the Flood Risk Assessment (FRA), which will be submitted alongside the Environmental Statement. With respect to other climate risks: - Onshore assets are all industrial type buildings, containing electrical equipment (largely self-operating) and buried cabling which are in a low-risk category with no vulnerable site users. The key risk for onshore would be flooding, this would be addressed within a Flood Risk Assessment (FRA) submitted in support of the application. The main non-flooding risk would be increased cooling demand for the equipment as a result of climate change including global temperature increases and increased risk of heatwave (Met Office, 2018). To mitigate, cooling systems will be designed with sufficient capacity headroom and supplied by renewable electricity. - Offshore assets (turbines, subsea cables and offshore platforms) are designed to be resilient to storm events with an engineering safety headroom. There is no clear evidence that peak wind speeds or wave heights are likely to be increased by climate change during the development's lifetime (Met Office, 2018). - The construction phase will not be lengthy enough for significant climate change risks compared to the present-day baseline to occur. The developer will employ good health & safety practices with respect to risks such as heatstroke or storm events offshore.

6.4.6 Measures adopted as part of the project

6.4.6.1 The following measures adopted as part of the project are relevant to climate change. These measures may evolve as the engineering design and the EIA progresses.

- The Mona Offshore Wind Project will incorporate circular economy considerations, with the intention for wind turbine generators to be recycled where possible at the end of the operational phase.

6.4.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with relevant statutory consultees throughout the EIA process.

6.4.7 Proposed assessment methodology

6.4.7.1 The climate change assessment will take into account the IEMA Environmental Impact Assessment Guide 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance' (IEMA, 2017) and any updates to this guidance that may be published by IEMA at the time of assessment. It will be undertaken on a lifecycle basis, calculating the GHG emissions associated with the construction, operation and decommissioning of the Mona Offshore Wind Project.

6.4.7.2 GHG emissions would contribute to the effect of global climate change. The guidance suggests that, in principle, any additional GHG emissions may be considered significant and recommends that GHG emissions should be reported using an appropriate and proportionate level of detail.

6.4.7.3 The reduction in GHG emissions as a result of operation of the Mona Offshore Wind Project will be assessed based on the carbon intensity of the alternative marginal generator that is displaced (i.e. the generator that would be supplying the grid in the absence of the Mona Offshore Wind Project).

6.4.7.4 The magnitude of impact will be expressed as tonnes of carbon dioxide equivalent (tCO_2e), using 100-year global warming potential values for non-CO_2 GHGs from the Intergovernmental Panel on Climate Change's Sixth Assessment Working Group 1 Report (IPCC, 2021) or as otherwise defined in literature sources to be used.

6.4.7.5 The sensitive receptor will be defined as the global atmospheric concentration of GHGs, and it will be characterised as having a 'high' sensitivity, given the severe consequences of climate change.

6.4.7.6 There are no clear, generally agreed, thresholds or methods for evaluating the significance of GHG impacts in EIA. The IEMA guidance recommends contextualising a development's GHG impacts, for example on a sectoral basis or compared to the UK's national carbon budget.

6.4.7.7 It is considered that broadly speaking, the significance of the Mona Offshore Wind Project GHG emissions can be contextualised in the following ways:

- With reference to the absolute magnitude of net GHG emissions as a percentage of the UK's national carbon budget.

- Through considering any increase/reduction in absolute GHG emissions and GHG intensity compared with baseline scenarios, including projections for future changes in those baselines.
- With reference to whether the Mona Offshore Wind Project contributes to and is in line with the UK's national carbon budget sectoral goals for GHG emissions reduction, which are consistent with science-based commitments to limit global climate change to an internationally agreed level.

6.4.7.8 Taking these factors into account, where applicable, the evaluation of significance will ultimately be a matter of professional judgement, as it is not considered that a fixed numerical threshold can be defined.

6.4.7.9 The main sources of GHG emissions arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project would be:

- Embodied carbon of materials used for construction and maintenance of the generation and transmission assets.
- GHG emission savings from the Mona Offshore Wind Project operational life contributing to national grid decarbonisation.
- Fuel/energy use in vessels for the Mona Offshore Wind Project construction, operation and maintenance and eventual decommissioning.
- GHG emissions arising from land use change as a result of the Mona Offshore Wind Project.

6.4.8 Potential cumulative effects

6.4.8.1 All developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Consequently, cumulative effects due to other specific local development projects are not individually identified but would be taken into account when evaluating the impact of the Mona Offshore Wind Project by defining the atmospheric mass of GHGs as a high sensitivity receptor.

6.4.9 Potential inter-related effects

6.4.9.1 The assessment of potential inter-related effects will be considered within the climate change chapter of the ES . It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

6.4.10 Potential transboundary impacts

6.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon climate change due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

6.4.10.2 All developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a transboundary impact on climate change. Consequently, transboundary effects due to other specific international development projects are not individually identified but would be taken into account when evaluating the impact of the Mona Offshore Wind Project by defining the atmospheric mass of GHGs as a high sensitivity receptor. Each country has its own policy and targets concerning carbon and climate change which are intended to limit GHG emissions to acceptable levels within that county's defined budget and international commitments.

7 Other environmental topics

7.1 Introduction

7.1.1.1 This section sets out the approach for the other environmental topics that are required to be considered within the Environmental Impact Assessment (EIA) process under Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and Schedule 3 of The Marine Works (Environmental Impact Assessment Regulations) 2007 (as amended) for which no Environmental Statement (ES) chapter is proposed. The section identifies the following:

- Environmental topics where information will be submitted in support of the Development Consent Order (DCO) and marine licence applications for the Mona Offshore Wind Project
- Environmental topics which are proposed to be scoped out of the EIA
- Environmental topics which are considered elsewhere in the ES.

7.2 Topics with supporting information in the ES

7.2.1 Human health

7.2.1.1 The potential impacts on human health arising from the construction, operation and maintenance, and decommissioning of the generation assets will be considered in the following topic chapters of the ES where relevant:

- physical processes
- commercial fisheries
- shipping and navigation
- socio-economics and community
- other sea users.

7.2.1.2 Therefore, the details in relation to impacts on health will be provided in the main topic chapters within the ES. In addition, the potential inter-related effects between each of the environmental topics listed above on human health, will also be considered within the topic chapters of the ES.

7.2.1.3 It is proposed that a technical appendix be provided to draw the information relevant to human health together and to sign post where further details can be found. This appendix will include an overall conclusion regarding the significance of effects on human health.

7.2.1.4 The scope of the population and human health statement will be modified in response to refinements made to the transmission asset boundary and informed through consultation with the relevant statutory and non-statutory consultees, such as the Health and Safety Executive (HSE) and Environmental Health Officers (EHOs) from the Local Authorities.

7.2.2 Waste

7.2.2.1 The Applicant intends to submit a Waste Management Plan (WMP) in support of the application for development consent for the Mona Offshore Wind Project, which would be included as a technical appendix to the ES.

7.2.2.2 Contractors will be required to follow the measures set out in the WMP for managing waste and recording the movement of waste from the area of construction to the waste management facilities. Contractors will also be required to follow the best practice measures within the Project Environmental Management Plan. On that basis, the potential impacts arising from the disposal and recovery of waste during construction of the generation assets are unlikely to give rise to significant effects. Therefore, no standalone chapter within the ES is considered to be necessary.

7.2.2.3 The WMP will identify the likely waste arisings from the construction of the generation assets and set out appropriate measures for managing the waste in accordance with the waste hierarchy principle. These measures will include measures to reduce waste; to use less harmful alternative materials; opportunities to use materials with recycled content; to provide appropriate waste storage; and the utilisation licensed/ registered waste carriers.

7.2.2.4 The WMP will be prepared in accordance with the relevant legislation, policy, and guidance including:

- Environmental Protection Act 1990
- Environment Act 1995
- Hazardous Waste (England and Wales) Regulations 2005 (as amended)
- Waste Management (England and Wales) Regulations 2006
- Waste (England and Wales) Regulations 2011 (as amended)
- The Environmental Permitting (England and Wales Regulations) 2016.

7.2.2.5 The roles and responsibilities of person(s) overseeing the implementation of waste management procedures during the construction phase will be identified in the WMP, including relevant mandatory training requirements (e.g.toolbox talks, method statements).

7.2.2.6 The WMP will also set out requirements for ongoing monitoring (e.g.regular site inspections) to ensure that construction waste is being managed appropriately according to the waste management procedures prescribed in the WMP.

Waste impacts proposed to be scoped out

<u>Operational waste</u>

7.2.2.7 Operation and maintenance of the generation assets will generate limited amounts of operational waste (e.g.materials from maintenance activities). However, operational waste would be segregated, recycled (where possible) and disposed of in accordance with collection procedures as agreed by the relevant regulator, including the Marine Management Organisation (MMO) and Natural Resources Wales. These waste collection procedures will be included in an Operational Management Plan (OMP) for the generation assets.

7.2.2.8 On this basis the potential impact arising from operational waste is unlikely to be significant and is proposed to be scoped out of the EIA.

7.3 Topics proposed to be scoped out

7.3.1.1 The following topics are proposed to be scoped out of the EIA process. Details are provided below.

7.3.2 Local planning policy context

7.3.2.1 A description of the consenting process and the Planning Act will be provided within the introductory chapters of the ES.

7.3.2.2 For each environmental topic, the relevant legislative and planning policy context will be described within each topic chapter of the ES. The assessment of each topic included in the ES will consider the requirements and objectives set out in national, regional and local planning policy where relevant and appropriate.

7.3.2.3 In addition, a Planning Statement will be submitted in support of the application for development consent, which will outline how the generation assets comply with relevant local plans and planning policy.

7.3.2.4 Taking the information above into account, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing local planning policy context is not required and should be scoped out of the ESIA process.

7.3.3 Daylight, sunlight and microclimate

7.3.3.1 The generation assets will comprise wind turbine generators, wind turbine foundations, inter-array cables and associated infrastructure.

7.3.3.2 The location of the generation assets is not likely to result in significant effects relating to daylight and sunlight. In addition, the nature of the generation assets is not likely to result in microclimate changes and therefore this topic is proposed to be scoped out of the EIA.

7.3.3.3 The effects of the Mona Offshore Wind Project on climate change will be considered separately in a Climate change chapter of the ES, as described in part 2: section 6.4: Climate change, of the EIA Scoping Report.

7.3.4 Heat and Radiation

Heat

7.3.4.1 Construction, operation and maintenance, and decommissioning of the generation assets are unlikely to generate significant levels of heat.

7.3.4.2 The technical specification of the offshore booster station will consider any heat generated within the design and this would, as is usual practice, prevent any overheating or heat effects.

7.3.4.3 With these measures in place, it is not considered likely that significant effects in relation to heat will occur.

Radiation

7.3.4.4 Electric and magnetic fields (EMFs) are part of the natural world, and are also produced wherever electricity is generated, transmitted or used. Public exposure to power-frequency EMFs comes from a range of sources including household wiring and appliances, low-voltage distribution power lines or underground cables, and high-voltage transmission power lines or underground cables. Exposure to static EMFs comes from the earth's natural magnetic field, atmospheric electrical field, and human sources such as appliances and electric rail lines.

7.3.4.5 It is considered that activities required to facilitate construction and decommissioning of the generation assets would generate negligible levels of EMFs.

7.3.4.6 Operation and maintenance of the offshore booster station and inter-array cables would produce EMFs due to the voltage and flow of current through electrical infrastructure.

7.3.4.7 Potential EMF impacts from the offshore booster station and inter-array cables will be considered in the Benthic ecology and Fish and shellfish chapters of the ES.

7.3.4.8 Based on the information above it is proposed that a standalone chapter addressing heat and radiation is not required and should be scoped out of the EIA process.

7.4 Topics covered elsewhere in the ES

7.4.1.1 In order to avoid duplication and to ensure a proportionate EIA process, the following topics are not proposed to be subject to stand alone chapters or appendices within the ES.

7.4.1.2 These environmental topics are already covered within the scope of work proposed in part 2, sections 2 to 6, of this EIA report. Therefore, no further assessment is required.

7.4.2 Other residues and emissions

7.4.2.1 The potential impacts of residues and emissions (e.g.dust, pollutants, light, noise, vibration) arising from the construction, operation and maintenance, and decommissioning of the generation assets will be considered in the following topic chapters of the ES where relevant:

- benthic subtidal and intertidal ecology; fish and shellfish ecology; marine mammals and offshore ornithology (impacts of emissions to water and noise emissions on ecological receptors)
- underwater noise (impacts of noise emissions and vibration)
- physical processes (impacts of sediment releases).

7.4.2.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely effects of emissions and residues is not required.

7.4.3 Material assets

7.4.3.1 The potential impacts on material assets arising from the construction, operation and maintenance, and decommissioning of the generation assets will be considered in the following topic chapters of the ES:

- marine archaeology
- commercial fisheries
- shipping and navigation
- aviation and radar
- socio-economics and community.

7.4.3.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely significant effects of the generation assets on material assets is not required and should be scoped out of the EIA process.

7.4.4 Major accidents and disasters

7.4.4.1 The 2017 EIA Regulations require that the significant effects to be assessed on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape, including, where relevant, those significant effects arising from the vulnerability of the proposed development to major accidents and disasters.

7.4.4.2 A description of how major accidents and disasters have been considered in the design of the Mona Offshore Wind Project will be outlined in the project description chapter of the PEIR and ES.

Physical environment

7.4.4.3 The physical environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- The vulnerability of the Mona Offshore Wind Project to climate change:
  - part 2, section 6.4: Climate change, of the EIA Scoping Report.

Biological environment

7.4.4.4 The biological environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Accidental pollution:
  - part 2, section 4.1: Benthic subtidal and intertidal ecology, of the EIA Scoping Report
  - part 2, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report
  - part 2, section 4.3: Marine mammals, of the EIA Scoping Report.

Human environment

7.4.4.5 The human environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Vessel to vessel collision risk:
  - part 2, section 5.2: Shipping and Navigation, of the EIA Scoping Report
- Vessel allision (contact) risk:
  - part 2, section 5.2: Shipping and Navigation, of the EIA Scoping Report
- Risk of vessel anchor and gear snagging:
  - part 2, section 5.2: Shipping and Navigation, of the EIA Scoping Report
- Reduction of under keel clearance:
  - part 2, section 5.2: Shipping and Navigation, of the EIA Scoping Report
- Reduction of emergency response capability and reduced access for Search and Rescue (SAR) responders:
  - part 2, section 5.2: Shipping and Navigation, of the EIA Scoping Report
- Creation of physical obstacles to aircraft operations:
  - part 2, section 6.3: Aviation and radar, of the EIA Scoping Report.

7.4.4.6 A description of how major accidents and disasters during the construction, operation and maintenance and decommissioning of the transmission assets will be considered is provided in part 3, section 10: Other environmental topics, of the EIA Scoping Report.

8 Generation assets summary

8.1 Overview

8.1.1.1 The information set out in this Environmental Impact Assessment (EIA) Scoping Report is provided to support the Applicant's request for a Scoping Opinion from the Secretary of State in relation to the development of the Mona Offshore Wind Project generation assets.

8.1.1.2 As the Mona Offshore Wind Project is an offshore generating station with a capacity of greater than 350MW located in both Welsh and English waters, it is a Nationally Significant Infrastructure Project (NSIP) requiring a Development Consent Order (DCO) under the Planning Act 2008. The application for development consent will comprise full details of the Mona Offshore Wind Project and will be accompanied by an Environmental Statement (ES), which will present the findings of the EIA process.

8.1.1.3 In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1,500MW. The Mona Potential Array Area (i.e. the area within which the offshore wind turbines will be located) is located in the east Irish sea, 28.2km (15.2nm) from the north coast of Wales, 39.9km (21.5nm) from the northwest coast of England and 42.6km (23nm) from the Isle of Man (when measured from Mean High Water Springs (MHWS)).

8.1.1.4 This EIA Scoping Report has identified the main aspects of the offshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project generation assets.

8.1.1.5 Table 8.1 provides an overview of the potential impacts that are proposed to be scoped into (considered further) or scoped out of (not considered further) the EIA process for the Mona Offshore Wind Project generation assets.

Table 8.1: Summary of potential impacts of the Mona Offshore Wind Project generation assets (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase		
	C	O	D
Section 3: Offshore physical environment			
Physical processes			
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓
Increase in suspended sediments due to construction, operation and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.	✓	✓	✓
Changes to bathymetry due to depressions left by jack-up vessels.	×	×	×

Impact	Project phase		
	C	O	D
Scour of seabed sediments during the operation and maintenance phase.	×	×	×
Underwater noise			
Effects of underwater noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	✓	✓	✓
Effects of underwater noise on marine life due to impact driven and drilled pile installations for the wind turbines foundations.	✓	×	×
Effects of underwater noise on marine life due to jacket or monopile cutting and removal.	×	×	✓
Effects of underwater noise from wind turbine operation during operation and maintenance.	×	✓	×
Effects of underwater noise on marine life due to clearance of unexploded ordnance (UXO) detonation.	✓	×	×
Effects of the particle motion element of underwater noise on fish and shellfish receptors.	✓	×	✓
Effects of the particle motion element of underwater noise on marine mammals during all phases.	×	×	×
Section 4: Offshore biological environment			
Benthic subtidal and intertidal ecology			
Increased suspended sediment concentrations (SSC) and associated deposition.	✓	✓	✓
Temporary habitat loss/disturbance.	✓	✓	✓
Long term habitat loss.	✓	✓	×
Increased risk of introduction and spread of invasive non-native species (INNS).	✓	×	✓
Colonisation of hard structures.	×	✓	×
Changes in physical processes.	×	✓	×
Removal of hard substrates.	×	×	✓
Impacts to benthic invertebrates due to electromagnetic fields (EMF).	×	×	×
Accidental pollution during construction, operation and maintenance and decommissioning.	×	×	×
Impacts from the release of sediment-bound contaminants.	×	×	×
Fish and shellfish ecology			
Temporary habitat loss/disturbance.	✓	✓	✓
Underwater noise impacting fish and shellfish receptors.	✓	×	✓
Increased suspended sediment concentrations (SSCs) and associated sediment deposition.	✓	✓	✓
Long term habitat loss.	✓	✓	✓
Electromagnetic Fields (EMF) from subsea electrical cabling.	×	✓	×
Colonisation of hard structures.	✓	✓	✓
Accidental pollution during construction, operation and maintenance and decommissioning phases.	×	×	×
Underwater noise from wind turbine operation during operation and maintenance phase.	×	×	×
Underwater noise from vessels during all phases.	×	×	×
Impacts from the release of sediment-bound contaminants.	×	×	×

Impact	Project phase		
	C	O	D
Marine mammals			
Injury and disturbance from underwater noise generated from piling.	✓	×	×
Injury and disturbance from underwater noise generation from unexploded ordnance (UXO) detonation.	✓	×	×
Disturbance to marine mammals from vessel use and other (non-piling) noise producing activities.	✓	✓	✓
Injury to marine mammals due to collision with vessels.	✓	✓	✓
Effects on marine mammals due to changes in prey availability.	✓	✓	✓
Disturbance to marine mammals from pre-construction surveys.	✓	×	×
Accidental pollution during all phases.	×	×	×
Increased suspended sediment concentrations (SSC) and associated sediment deposition during all phases.	×	×	×
Impact of EMF (from surface lain or buried cables) during the operation and maintenance phase.	×	×	×
Disturbance to marine mammals from operational noise from wind turbine operation during the operation and maintenance phase.	×	×	×
Offshore ornithology			
Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.	✓	✓	✓
Indirect impacts from underwater noise affecting prey species.	✓	×	✓
Temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs).	✓	✓	✓
Collision risk.	×	✓	×
Barrier to movement.	×	✓	×
Direct disturbance and displacement impacts from underwater noise during operation and maintenance and decommissioning phases.	×	×	×
Accidental pollution during all phases of the Mona Offshore Wind Project.	×	×	×
Section 5: Offshore human environment			
Commercial fisheries			
Loss or restricted access to fishing grounds.	✓	✓	✓
Displacement of fishing activity into other areas	✓	✓	✓
Interference with fishing activity.	✓	✓	✓
Temporary increase in steaming distances.	✓	×	✓
Loss or damage to fishing gear due to snagging.	×	✓	×
Potential impacts on commercially important fish and shellfish resources.	✓	✓	✓
Supply chain opportunities for local fishing vessels	✓	✓	✓
Increased steaming distances during the operation and maintenance phase.	×	×	×
Shipping and navigation			
Deviations to commercial routes.	✓	✓	✓
Increased vessel to vessel collision risk.	✓	✓	✓

Impact	Project phase		
	C	O	D
Increased allision (contact) risk to vessels.	✓	✓	✓
Increased risk of anchor and gear snagging for commercial vessels and commercial fishing vessels (in transit).	✓	✓	✓
Reduction of under keel clearance	×	✓	×
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓
Interference with marine navigation, communications and position fixing equipment.	×	✓	×
Marine archaeology			
Sediment disturbance and deposition leading to indirect impacts on archaeological receptors.	✓	✓	✓
Direct damage to archaeological receptors.	✓	✓	✓
Alteration of sediment transport regimes.	×	✓	×
Other sea users			
Displacement of recreational activities.	✓	✓	✓
Increased suspended sediment concentrations and associated deposition affecting recreational diving sites.	✓	✓	✓
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines.	✓	✓	✓
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	✓	✓	✓
Alterations to sediment transport pathways affecting aggregate extraction areas.	×	✓	×
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Mona Potential Array Area.	✓	✓	✓
Interference with the performance of REWS located on oil and gas platforms.	×	✓	×
Interference with offshore microwave fixed communication links.	×	✓	×
Section 6: Offshore and onshore combined topics			
Aviation and radar			
Potential interference to the NATS Lowther Hill, Great Dun Fell and St Anne's PSRs, and the BAE Warton PSR, Manchester Airport PSR, Liverpool Airport PSR and Ronaldsway Airport PSR.	×	✓	×
Creation of physical obstacles to aircraft operations.	✓	✓	✓
Physical obstruction and potential for disruption to helicopter access/egress to/from offshore oil and gas platforms.	✓	✓	✓
Obstruction to SAR helicopter operations.	✓	✓	✓
Potential disruption to HMRs due to presence of wind turbines.	×	×	×
Increased helicopter traffic to and from the Mona Offshore Wind Project may affect available airspace for other users.	×	×	×
Disruption to meteorological radar.	×	×	×
Impacts to SSR systems.	×	×	×
Climate change			
The impact of GHG emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance phase.	×	✓	×

Impact	Project phase		
	C	O	D
The impact of GHG emissions arising from land-use change during the construction, operation and maintenance and decommissioning phase	✓	✓	✓
The impact of GHG emissions arising from the manufacturing and installation of the generation assets.	✓	×	×
The impact of GHG emissions arising from the manufacturing and installation of the transmission assets.	✓	×	×
The impact of GHG emissions arising from decommissioning works (e.g. plant, fuel and vessel use) and the recovery (or disposal) of materials.	×	×	✓
The impact of estimated abatement of UK Grid emissions during the operation and maintenance phase.	×	✓	×
The vulnerability of the generation and transmission assets to climate change during the construction, operation and maintenance and decommissioning phase.	×	×	×
Topics to be scoped out			
Daylight, sunlight and microclimate	×	×	×
Local planning policy context	×	×	×
Heat	×	×	×
Radiation	×	×	×

8.2 Cumulative effects

8.2.1.1 This EIA Scoping Report has proposed an approach to Cumulative Effects Assessment (CEA) that is consistent with the Planning Inspectorate's Advice Note Seventeen: Cumulative Effects Assessment (The Planning Inspectorate, 2019) and the RenewableUK Cumulative Impact Assessment Guidelines, specifically Guiding Principle 4 and Guiding Principle 7 (RenewableUK, 2013).

8.2.1.2 A detailed CEA will be undertaken to support the ES, in line the methodology outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

8.3 Transboundary impacts

8.3.1.1 A transboundary screening assessment for the Mona Offshore Wind Project has been undertaken and is presented in part 4, Annex A: Transboundary Impacts Screening. This screening has been carried out in accordance with the Planning Inspectorate's Advice Note Twelve: Transboundary Impacts and Process (The Planning Inspectorate, 2020).

8.3.1.2 Based on what is currently known of the likely spatial scale of effects arising from the Mona Offshore Wind Project and the economic interests of other states in the vicinity, transboundary impacts have been screened into the EIA process for the following topics:

- fish and shellfish ecology
- marine mammals
- ornithology

- commercial fisheries
- shipping and navigation
- climate change.

8.4 Consultation

8.4.1.1 Before an application for a DCO is submitted to the Secretary of State, extensive consultation with key stakeholders (local authorities, statutory bodies, local communities and interest groups) is required. The proposed approach to stakeholder consultation during the pre-application phase is outlined in part 1, section 5: Consultation process, of the EIA Scoping Report.

8.4.1.2 Feedback provided within the Scoping Opinion, co-ordinated by the Secretary of State, will be taken into account as part of the EIA process for the Mona Offshore Wind Project. In parallel to seeking a Scoping Opinion, the Applicant will carry out its Phase 1 public consultation. Over the consultation period, a number of events are proposed, which are likely to include online events, public exhibitions and pop-up events. Anyone who could potentially be affected by, or may have an active interest in, the Mona Offshore Wind Project is encouraged to participate.

8.5 Next steps

8.5.1.1 Consultees are invited to consider the information presented in this EIA Scoping Report and advise on whether or not they agree with the conclusions. Several broad questions are presented below to encourage reflection of the key elements discussed in this EIA scoping report:

- Are there any additional baseline data sources available that could be used to inform the EIA?
- Does the reader agree that the proposed study areas are appropriate for each of the EIA topics?
- Have all potential impacts resulting from the Mona Offshore Wind Project generation assets been identified for each of the EIA topics within this EIA Scoping Report?
- Does the reader agree with the impacts to be scoped in, and out, of the assessment?
- For those impacts scoped in, does the reader agree that the methods described are sufficient to inform a robust impact assessment?
- Are there any specific developments or infrastructure schemes which should be taken into account when considering potential cumulative impacts?

8.5.1.2 Following receipt of the Scoping Opinion from the Secretary of State, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted on during Q4 2022/Q1 2023. The PEIR will provide an initial statement of the environmental information available for the Mona Offshore Wind Project, including descriptions of the likely environmental effects and measures adopted as part of the project. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the Mona Offshore Wind Project, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process.

8.5.1.3 The Applicant expects it will further refine the Mona Offshore Wind Project based upon the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the application for development consent which is planned to be submitted to the Secretary of State in Q4 2023.

9 References

9.1 Introduction

None.

9.2 Site selection and alternatives

The Crown Estate (2019) Offshore Wind Leasing Round 4: Summary Stakeholder Feedback Report, Available at: 3994-TCE-R4 Document covers-V7.indd (thecrownestate.co.uk).

9.3 Offshore physical environment

9.3.1 Physical processes

ABPmer (2008) WebVision Atlas of UK Marine Renewable Energy Resources. Available: https://www.renewables-atlas.info/explore-the-atlas/. Accessed: December 2021

ABPmer (2018) Data Explorer. Available: https://www.seastates.net/explore-data/ Accessed: December 2021.

BOWind (2008) Barrow Offshore Wind Farm Post-Construction Monitoring Report. First annual report. 15 January 2008, 60pp.

Brooks, AJ., Whitehead, PA., and Lambkin, DO. (2018) Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects, NRW Report No: 243, 119 pp

CEFAS Report, (2016) Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme.

Celtic Array Ltd., (2014) Environmental Impact Assessment Offshore Scoping Report, Section 6: Physical Processes.

Coughlan, M., Guerrinid, M., Creanece, S., O'Sheade, M., Ward, S., Van Landeghem, K., Murphy, J., Doherty, P. (2021) A new seabed mobility index for the Irish Sea: Modelling seabed shear stress and classifying sediment mobilisation to help predict erosion, deposition, and sediment distribution. Continental Shelf Research, Vol 229, 104574. November 2021.

Dorrell, R., Lloyd, C., Lincoln, B., Rippeth, T., Taylor, J., Caulfield, C., Sharples, J., Polton, J., (2021) Scannell, B., Greaves, D., Hall, R., Simpson, J., Anthopogenic Mixing of Seasonally Stratified Shelf Seas by Offshore Wind Farm Infrastructure. Available: https://arxiv.org/pdf/2112.12571.pdf. Accessed March 2022.

EMODnet (2020) Bathymetry. Available: https://www.emodnet-bathymetry.eu/. Accessed December 2021.

EMU (2013) Irish Sea Zone, Hydrodynamic measurement campaign October 2010-October 2012. Report issued to Centrica Energy Renewable Investments.

Foster, P., Beardall, J., Voltolina, D., Savidge, G., 1985. The effects of wind, phytoplankton and density discontinuities upon ammonia distribution in Liverpool Bay. Estuarine, Coastal and Shelf Science, 20, 463-475.

GEMS (2011) Metocean data collection, Ormonde wind farm project. Report prepared for: Offshore Design Engineering Ltd. Document number: GSL10108-FIN-001-01

Haigh, I., Wadey, M., Gallop, S., Loehr, H., Nicholls, R., Horsburgh, K., Brown, J., Bradshaw, E. (2015) A user-friendly database of coastal flooding in the United Kingdom from 1915–2014, Scientific data 2 150021.

Howarth, M.J. (2005) Hydrography of the Irish Sea, SEA6 Technical Report, POL Internal document 174.

Lambkin, D.O., Harris, J.M., Cooper, W.S., and Coates, T. (2009) Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide. COWRIE.

Mellett, C., Long, D., Carter, G., Chiverell, R., and Van Landeghem, K. (2015) Geology of the seabed and shallow subsurface: The Irish Sea. British Geological Survey Commissioned Report, CR/15/057. 52pp

Met Office (2018) UK Climate Projections (UKCP).

Pye, K., Blott, S.J., and Brown, J. (2017) Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments. NRW Report No 208, 139pp.

Ramsay, D.L., and Brampton, A.H. (2000) Coastal Cells in Scotland: Cell 1 - St Abb's Head to Fife Ness. Available at: http://www.dynamiccoast.com/links.html. Accessed June 2020.

9.3.2 Underwater noise

Andersson, M., Sigray, P. and Persson, L. (2011) Operational Wind Farm Noise and Shipping Noise Compared with Estimated Zones of Audibility for Four Species of Fish. Journal of The Acoustical Society of America. Vol.129. 10

Bailey, H., Senior, B., Simmons, D., Rusin, J., Picken, G., and Thompson, P. (2010) Assessing Underwater Noise Levels during Pile-Driving at an Offshore Windfarm and Its Potential Effects on Marine Mammals. Marine Pollution Bulletin 60 (6): 888–97.

Boisseau, O., McGarry, T., Stephenson, S., Compton, R., Cucknell, A. C., Ryan, C., McLanaghan, R. and Moscrop, A. (2021) Minke whales *Balaenoptera acutorostrata* avoid a 15 kHz acoustic deterrent device (ADD). Marine Ecology Progress Series, 667, 191-206.

Etter, P.C. (2018) Underwater acoustic modelling and simulation. CRC press.

Nedwell J.R., Collett A.G., Barham R.J., Mason T.I., and Bird H.V. (2012) Measurement and Assessment of Underwater Noise during Ormonde Offshore Wind Farm's Operational Phase. Subacoustech Report No. E354R0104

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf.

JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available online at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.

JNCC (2020) Guidance on noise management in harbour porpoise SACs. Available online at: https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784.

National Physical Laboratory (2014) Good Practice Guide No. 133 – Underwater Noise Measurement. Available online at: https://www.npl.co.uk/special-pages/guides/gpg133underwater. Accessed October 2021.

Nedwell, J.R., Collett, A.G., Barham, R.J., Mason, T.I., Bird, H.V. (2012) Measurement and Assessment of Underwater Noise during Ormonde Offshore Wind Farm's Operational Phase, Subacoustech Report No. E354R0104.

National Marine Fisheries Service (2018) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. National Marine Fisheries Service (NOAA).

National Marine Fisheries Service (2016) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p

Otani, Seiji and Naito, Yasuhiko and Kato, Akiko and Kawamura, Akito. (2001) Oxygen consumption and swim speed of the harbor porpoise *Phocoena phocoena*. Fisheries Science. 67. 894-898. 10.1046/j.1444-2906.2001.00338.x.

Popper, Arthur, N., Anthony, D., Hawkins, Richard, R., Fay, David, A., Mann, Soraya Bartol, Thomas, J., Carlson, and Sheryl Coombs (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. Springer.

Schulkin, M., and J. A. Mercer. (1985) Colossus Revisited: A Review and Extension of the Marsh-Schulkin Shallow Water Transmission Loss Model (1962). DTIC Document.

Sigray, P. and Andersson, M. (2011) Particle Motion Measured at an Operational Wind Turbine in Relation to Hearing Sensitivity in Fish. The Journal of the Acoustical Society of America. 130. 200-7.

Sims, D.W., Speedie, C.D. and Fox, A.M. (2000) Movements and growth of a female basking shark resighted after a three year period. Journal of the Marine Biological Association of the U.K. 80: 1141-1142.

Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, A., Bejder, L., Tyack, P.L. (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise, Aquatic Mammals 27:421-464.

Southall, B., Finneran, J. J., Reichmuth, C., Nachtigall, P. E., Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D., and Tyack, P.. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Southall, B, L., Bowles, A.E., Ellison, T.W., Finneran, J.J., Gentry, R.L., Greene Jr, C.R., Kastak, D., (2007) Marine Mammal Noise-Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals 33 (4): 411–521.

Thompson, D., Brownlow, A., Onoufriou, J. & Moss, S. (2015) Collision Risk and Impact Study: Field tests of turbine blade-seal carcass collisions. Sea Mammal Research Unit, University of St Andrews, Report to Scottish Government, no. MR 5, St Andrews, 16pp.

Toso, Giovanni, Paolo Casari, and Michele Zorzi. (2014) The Effect of Different Attenuation Models on the Performance of Routing in Shallow-Water Networks. In Underwater Communications and Networking (UComms), 2014, 1–5. IEEE.

Weston D.E. (1976) Propagation in water with uniform sound velocity but variable-depth lossy bottom, J. Sound Vib., 47, pp.473-483, 1976.

Wang, Heaney, Pangerc, Theobald, Robinson and Ainslie. (2014) Review of underwater acoustic propagation models. National Physical Laboratory AC 12.

9.4 Offshore biological environment

9.4.1 Benthic subtidal and intertidal ecology

BEIS (2021) Draft national policy statement for renewable energy infrastructure (EN-3), September 2021.

Camacho-Ibar, V. (1991) Trace elements and polychlorinated biphenyls (PCB) congeners in Liverpool Bay Sediments. PhD. Thesis. University of Wales, Bangor.

Cefas (2021) OneBenthic web app. Available: https://rconnect.cefas.co.uk/onebenthic_dashboard/. Accessed: December 2021

Celtic Array Ltd (2014a) Rhiannon Offshore Wind Farm, Environmental Statement PEI- Benthic Ecology. Rev03

Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland. {online] Available at: https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/

CMACS (2005) Burbo Bank offshore wind farm pre-construction contaminants investigation. Document: J3034 Contaminants v1.0

CMACS (2012) Ormonde Offshore Wind Farm Year 1 post-construction benthic monitoring technical survey report (2012 survey). Report to RPS Energy. November 2012.

CMACS (2013) Walney Offshore Wind Farm Year 2 post-construction benthic monitoring technical survey report. (2013 survey). Report to Walney Offshore Wind Farms (UK) Ltd/DONG Energy. November 2013.

CMACS (2014). Walney Offshore Wind Farm Year 3 post-construction benthic monitoring technical survey report (2014 survey). Report to Walney Offshore Wind Farms (UK) Ltd/DONG Energy. December 2014.

Cole, S., Codling, I.D., Parr, W. and Zabel, T. (1991) Guidelines for managing water quality impacts within UK European marine sites. Prepared for the UK Marine SAC Project.

Covey, R. (1998) Marine Nature Conservation Review Sector 11. Liverpool Bay and the Solway Firth: area summaries. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series).

CSA Ocean Sciences Inc. and Exponent (2019) Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA. OCS Study BOEM 2019-049. 59 pp.

Dong Energy (2013) Walney Extension offshore wind farm, vol 1 environmental statement, chapter 10 benthic ecology.

European Marine Observation and Data Network (EMODnet) (2016) [online] Available at: https://www.emodnet-seabedhabitats.eu/ [Accessed November 2021].

Irving, R. (2009) Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive. Summary of an Inter Agency Workshop 26-27 March 2008. Joint Nature Conservation Committee, JNCC Report No. 432, 28pp.

Leah, R.T., Evans, S.J., and Johnson, M.S. (1992). Arsenic in plaice (*Pleuronectes platessa*) and whiting (*Merlangius merlangus*) from the North east Irish Sea. Marine Pollution Bulletin. 24.pp 544-9.

Jenkins, C., Eggleton, J., Barry, J. and O'Connor, J. (2018) Advances in assessing Sabellaria spinulosa reefs for ongoing monitoring. Ecology and Evolution 8 7673 – 7687.

JNCC, 2022, Marine Habitat Classification for Britain and Ireland, available: https://mhc.jncc.gov.uk/. Accessed March 2022.

Limpenny, D.S., Foster-Smith, R.L., Edwards, T.M., Hendrick, V.J., Diesing, M., Eggleton, J.D., Meadows, W.J., Crutchfield, Z., Pfeifer, S. and Reach, I.S. (2010) Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef. Natural England Supported Through Defra's Aggregates Levy Sustainability Fund, ALSF Ref No. MAL0008, 149pp.

Moore J., Jones J. and Robinson, K. (2017) NRW Rhiannon *Modiolus* survey 2015: video and still image analysis. NRW Evidence Report Series, Report No: 215, 31pp.

Nagpal, N.K., Pommen, L.W. and Swain, L.G. (2001) A compendium of working water quality guidelines for British Columbia. Water Management Branch, Environmental and Resource Management Department, Ministry of Environment, Lands and Parks.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (Reference number: 2008-3).

Thornton, I., Watling, H. and Darracott, A. (1975) Geochemical studies in several rivers and estuaries used for oyster rearing. Science of the total environment. Vol 4, pp 325-345.

Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T. (2018) Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, pp. 91. Available from https://www.marlin.ac.uk/publications.

9.4.2 Fish and Shellfish

Brown and May Marine Ltd (2009) Walney Offshore Wind Farm Pre-Construction Fish Survey.

Brown and May Marine Ltd (2012) West of Duddon Sands Offshore Wind Farm, Adult and Juvenile Fish and Epibenthic Pre-Construction Surveys.

Brown and May Marine Ltd (2013) Walney Offshore Wind Farm, Year 2 Post-construction Monitoring Fish and Epibenthic Survey, FINAL Ref WOWPCOB03.

Cefas (2004) Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements, June 2004.

Cefas and Environment Agency (2017) Assessment of Salmon Stocks and Fisheries in England and Wales.

CIEEM (2019) Guidelines for ecological impact assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.1 - updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

Celtic Array Ltd (2014b) Celtic Array offshore wind farm preliminary environmental information chapter 10: fish and shellfish ecology. Document number SE-D-EV-075-0002-000000-010.

CMACS (2006) Burbo Bank offshore wind farm, pre-construction commercial fish survey (2m beam trawl).

CMACS (2007) Burbo Bank Offshore Wind Farm, Electromagnetic Fields and Marine Ecology Study. Prepared for Seascape Energy. Report reference J3034 EMF v2 (09-07).

CMACS (2010a) Burbo Bank Offshore Wind Farm, Post-construction (Year 3) Commercial Fish Survey.

CMACS (2010b) Celtic Array (Zone 9) Autumn fish trawl survey. CMACS ref: J3152(Irish Sea Zone R3 Autumn Benthic Trawl Survey v1).

CMACS (2011) Gwynt y Môr Offshore Wind Farm baseline pre- construction benthic survey report (2010 survey). Report to Gwynt y Môr OWF Ltd. July 2011.

Coastal Fisheries Conservation and Management (2006) Rhyl Flats Offshore Wind Farm, Fish and Fisheries baseline study. Prepared for Npower Renewables.

Coull, K.A., Johnstone, R., and S.I. Rogers (1998) Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

Delargy, A., Hold, N., Lambert, G.I., Murray L.G., Hinz H., Kaiser M.J., McCarthy, I., and Hiddink J.G. (2019) – Welsh waters scallop surveys and stock assessment. Bangor University, Fisheries and Conservation Report No. 75. pp 48.

Dickey-Collas, M., Nash, R.D.M. and Brown, J. (2001) The location of spawning Irish Sea herring (*Clupea harengus*). Journal of the Marine Biological Association of the United Kingdom, 81: 713–714.

Doherty P.D., J. M. Baxter, F. R. Gell, B. J. Godley, R. T. Graham, G. Hall, J. Hall, L. A. Hawkes, S. M. Henderson, L. Johnson, C. Speedie and M. J. (2017) Witt Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic, Scientific Reports, article number 42837

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012) Mapping the spawning and nursery grounds of selected fish for spatial planning. Report for Cefas, Science Series Technical Report no. 147.

Gardiner, R., Main, R., Davies, I., Kynoch, R., Gilbey, J., Adams, C., and Newton M. (2018) Recent Investigations into the Marine Migration of Salmon Smolts in the Context of Marine Renewable Development. Conference Presentation. Environmental Interactions of Marine Renewables (EIMR) Conference, Kirkwall, 24-26 April 2018.

ICES. (2021) ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2020 meeting) ICES Scientific Reports. 3:14. 31pp. https://doi.org/10.17895/ices.pub.7910.

JNCC (2019) MPA Mapper, Available: https://jncc.gov.uk/mpa-mapper/ Accessed: October 2021.

JNCC (2020) Marine Recorder Public UK Snapshot. Available: https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307 Accessed: October 2021.

Judd (2012) Guidelines for data acquisition to support marine environmental assessment of offshore renewable energy projects, Final, issued 2 May 2012.

Lambert, G.I., Murray L.G., Kaiser M.J., Salomonsen H., and Cambie, G. (2013) Welsh waters scallop survey – Cardigan Bay to Liverpool Bay July-August 2013. Bangor University, Fisheries and Conservation Report No. 30. pp 44.

MMO (2014). Review of post-consent offshore wind farm monitoring data associated with licence conditions. A report produced for the Marine Management Organisation, pp 194. MMO Project No: 1031. ISBN: 978-1-909452-24-4.

Moore, A.B.M., Bater R., Lincoln H., Simpson S.J., Brewin, J., Chapman, T., Heney, C., Southworth, L., Spencer, J., Hold, N., and McCarthy I.D. (2020). Bass and ray ecology in Liverpool Bay. Bangor University Sustainable Fisheries and Aquaculture Group, Fisheries Report 3. 56 pages.

NBN Atlas (2019) Species records, Available: https://nbnatlas.org/ Accessed: October 2021.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. (Reference number: 2008-3). Available at: http://www.vliz.be/imisdocs/publications/ocrd/224682.pdf. Accessed October 2021.

Popper, Arthur, N., Anthony, D., Hawkins, Richard, R., Fay, David, A., Mann, Soraya Bartol, Thomas, J., Carlson, and Sheryl Coombs (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. Springer.

RPS Energy (2010) Ormonde Offshore Wind Farm, Construction (Year 1) Environmental Monitoring. Volume 1 Main Report.

Southall E.J., D.W., Sims J.D., Metcalfe O .J.I., Doyle P , S. Fanshawe P.C., Lacey J., Shrimpton, J.L., Solandt P., and C.D., Speedie (2005) Spatial distribution patters of basking sharks on the European shelf, preliminary comparison of satellite-tag geolocation, survey and public sightings data. Journal of Marine Biology Associate UK., Vol 85, p1083-1088.

Titan Environmental Surveys Ltd (2005) Walney and West of Duddon Sands Offshore Wind Farms, Baseline Benthic Survey – Epifaunal Beam Trawl Results.

9.4.3 Marine Mammals

Baines, M.E. and Evans, P.G.H. (2012) Atlas of Marine Mammals of Wales. CCW Monitoring Report No. 68. 2nd edition. 139pp.

BOWind (2006) Barrow offshore wind farm construction monitoring report, 02 November 2006 Rev01.

Brasseur, S., Aarts, G., Meesters, E., van Polanen Petel, T., Dijkman, E., Cremer, J. and Reijnders, P. (2012) Habitat preference of harbour seals in the Dutch coastal area: analysis and estimate of effects of offshore wind farms.

Carter, M. I. D. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78.

Celtic Array Ltd (2014c) Rhiannon Offshore Wind Farm, Environmental Statement PEI- Chapter 11 marine mammals, basking shark and turtles. Document number: SE-D-EV-001-0002-000000-001

CEFAS (2010) Strategic review of offshore wind farm monitoring data associated with FEPA licence conditions – annex 4: underwater noise., Cefas report ME1117.

CIEEM (2019) Guidelines for ecological impact assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.1 - updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

CMACS (2011) Walney offshore wind farm marine mammal mitigation during construction, final report v3.

Copping, A. (2018) The State of Knowledge for Environmental Effects Driving Consenting/Permitting for the Marine Renewable Energy Industry. Prepared for Ocean Energy Systems On behalf of the Annex IV Member Nations, January 2018.

Czech-Damal, N. U., Dehnhardt, G., Manger, P. and Hanke, W. (2013) Passive electroreception in aquatic mammals. Journal of Comparative Physiology A-Neuroethology Sensory Neural and Behavioural Physiology 199:555-563.

DHI Water and Environment (2006) Walney and West of Duddon Sands Environmental Impact Assessment - Marine Mammals in the NW3 Area, Irish Sea.

Diederichs, A., Nehls, G., Dähne, M., Adler, S., Koschinski, S. and Verfuß, U. (2008) Methodologies for measuring and assessing potential changes in marine mammal behaviour, abundance or distribution arising from the construction, operation and decommissioning of offshore windfarms.

Dong Energy (2013) Burbo Bank offshore wind farm Environmental Statement Volume 2- Chapter 14: Marine Mammals.

European Commission (2010) Guidance Document: Wind Energy Developments and Natura 2000.

Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J., Vingada, J. and Øie. N. (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys - revised June 2021.

Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J.,. Vingada, J., and Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.

Hastie, G. D., Russell, D. J., Benjamin, S., Moss, S., Wilson, B., and Thompson, D., (2016) Dynamic habitat corridors for marine predators; intensive use of a coastal channel by harbour seals is modulated by tidal currents. Behavioural Ecology and Sociobiology:1-14.

Heinänen, S. and Skov, H. (2015) The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No.544 JNCC, Peterborough.

IEEM (2010) Guidelines For Ecological Impact Assessment In Britain And Ireland Marine And Coastal Guidelines For Ecological Impact Assessment In The United Kingdom. Winchester: Chartered Institute of Ecology and Environmental Management.

IAMMWG. 2021. Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680, JNCC Peterborough, ISSN 0963-8091.JNCC (2020a) Marine Recorder Public UK Snapshot. Available https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307. Accessed November 2021

JNCC (2020b) Guidance on noise management in harbour porpoise SACs. Available online at: https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784.

JNCC (2019a) JNCC MPA mapper. Available: https://jncc.gov.uk/our-work/marine-protected-area-mapper/ Accessed November 2021

JNCC (2019b) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1351 - Harbour porpoise (*Phocoena phocoena*) United Kingdom.

JNCC (2019c) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2618 - Minke whale (*Balaenoptera acutorostrata*) United Kingdom.

JNCC (2019d) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2032 - White beaked dolphin (*Lagenorhynchus albirostris*) United Kingdom.

JNCC (2019e) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1349 - Bottlenose dolphin (*Tursiops truncatus*) United Kingdom.

JNCC (2019f) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United

Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1364 - Grey seal (*Halichoerus grypus*) United Kingdom.

JNCC (2019g) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1350 - Common dolphin (*Delphinus delphis*) United Kingdom.

JNCC (2019h) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2030 - Risso's dolphin (*Grampus griseus*) United Kingdom.

JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available online at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf.

Lindeboom, H. J., Kouwenhoven, H. J., Bergman, M. J. N., Bouma, S. Brasseur, S., Daan, R., Fijn, R.C., de Haan, D., Dirksen, S., van Hal, R., Hille Ris Lambers, R., ter Hofstede, R., Krijgsveld, K.L., Leopold, M. and Scheidat, M. (2011) Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. Environmental Research Letters 6:1-13.

Lohrengel, K., Evans, P.G.H., Lindenbaum, C.P., Morris, C.W. and Stringell, T.B. (2018) Bottlenose dolphin monitoring in Cardigan Bay 2014-2016. NRW Evidence Report No: 191, Natural Resources Wales, Bangor. Available at: https://naturalresources.wales/evidence- and-data/research-and-reports/marine-reports/marine-and-coastal-evidencereports/?lang=en

Madsen, P. T., Wahlberg, M., Tougaard, J., Lucke, K. and Tyack, P.(2006) Wind turbine underwater noise and marine mammals: implications of current knowledge and data needs. Marine Ecology Progress Series 309:279-295.

Manx whale and dolphin watch (2022) Recent sightings in Max waters. Available: https://www.mwdw.net/recent-sightings/?frm-page-3048=15 Accessed: February 2022

Marubini, F., Gimona, A., Evans, P. G.,, P. J. and Pierce G. J. (2009) Habitat preferences and interannual variability in occurrence of the harbour porpoise *Phocoena phocoena* off northwest Scotland. Marine Ecology Progress Series 381:297-310.

MMO (2014). Review of post-consent offshore wind farm monitoring data associated with licence conditions. A report produced for the Marine Management Organisation, pp 194. MMO Project No: 1031. ISBN: 978-1-909452-24-4.

C.D. Morris & C.D. Duck (2019) Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018. Irish Wildlife Manuals, No. 111 National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

National Biodiversity Network (2019) Available: https://nbn.org.uk/ Accessed: November 2021.

National Marine Fisheries Service (2018) 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

National Marine Fisheries Service (2016) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p

Normandeau Inc, Exponent Inc, Tricas, T. and Gill, A. (2011) Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. (Reference number: 2008-3). Available at: http://www.vliz.be/imisdocs/publications/ocrd/224682.pdf. Accessed November 2021.

Paxton, C. G. M., Scott-Hayward, L., Mackenzie, M., Rexstad, E., and Thomas L. (2016) Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources. JNCC Report No. 517, JNCC, Peterborough.

Pierpoint, C. (2008) Harbour porpoise (*Phocoena phocoena*) foraging strategy at a high energy, nearshore site in southwest Wales, UK. Journal of the Marine Biological Association of the UK 88:1167-1173.

Plunkett, R, Sparling, C. and Kidney, D. (2014) Anglesey skerries marine mammal monitoring: land based vantage point survey trial. report number smrum-mct-2014-012 provided to MCT, November 2014 (unpublished).

Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003) Atlas of Cetaceans Distributions in North-west European Waters, Joint Nature Conservation Committee, Peterborough.

Riley, T., Waggitt, J., and Davies, A. (2020). Distribution modelling of the Eurasian Otter (*Lutra lutra*) on the Isle of Anglesey, Wales. OTTER, the Journal of the International Otter Survival Fund, 6, 30-39. https://www.otter.org/public/MediaAndResources_Resources_Journal.aspx

RPS Energy (2012) Ormonde offshore wind farm 2010 construction (year 1) environmental monitoring report, Volume 1: main report.

Russell, D. J., Brasseur, S. M., Thompson, D., Hastie, G. D., Janik, V. M., Aarts, G., McClintock, B. T., Matthiopoulos, J., Moss, S. E.and McConnell B. (2014) Marine mammals trace anthropogenic structures at sea. Current Biology 24:R638-R639.

Russell D.J.F., Jones E.L. and Morris C.D., (2017) Updates Sea Usage Maps: The estimates at -sea distribution of grey and harbour seals, Scottish Marine and Freshwater Science Report Vol 8 No 25.

Seawatch Foundation (2012) The White-beked dolphin in UK waters fact sheet. Available: https://seawatchfoundation.org.uk/wp-content/uploads/2012/07/White-beaked_Dolphin.pdf Accessed: December 2021

Scheidat, M., Tougaard, J., Brasseur, S., Carstensen, J., van Polanen Petel, T., Teilmann, J. and Reijnders P. (2011) Harbour porpoises (*Phocoena phocoena*) and wind farms: a case study in the Dutch North Sea. Environmental Research Letters 6:1-10.

SCOS (2021) Scientific Advice on Matters Related to the Management of Seal Populations: 2020.

Southall, B., Finneran, J. J., Reichmuth, C., Nachtigall, P. E.,Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D. and Tyack, P. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, A., Bejder, L., Tyack, P.L. (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise, Aquatic Mammals 27:421-464.

Teilmann, J., Tougaard, J. and Carstensen J. (2006a) Summary on harbour porpoise monitoring 1999-2006 around Nysted and Horns Rev Offshore Wind Farms.

Teilmann, J., Tougaard, J., Cartensen, J., Dietz, R. and Tougaard S. (2006b) Summary on seal monitoring 1999-2005 around Nysted and Horns Rev Offshore Wind Farms.

UKBAP (1999) UK Biodiversity Group, Tranche 2 Action Plans. Maritime Species and habitats.

Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D.,Whooley P., and Berrow, S. (2013) Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011. Irish Whale and Dolphin Group, Merchants Quay, Kilrush, Co Clare.

9.4.4 Offshore ornithology

Band, B. (2012) Using a collision risk model to assess bird collision risks for offshore windfarms. Guidance document. SOSS Crown Estate.

Celtic Array Ltd (2012) Round 3 Irish Sea Zone Rhiannon Wind Farm Ltd Preliminary Environmental information.

Cleasby, I. R., Owen, E., Wilson, L., Wakefield, E. D., O'Connell, P. and Bolton, M. (2020) Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping. Biological Conservation, 241, 108375.

CMACS (2012) West of Duddon Sands offshore wind farm ornithology survey report 2012. Prepared for DONG Energy.

CMACS (2014) Walney I and III & II Ornithology Final Report. Prepared for: Walney (UK) Offshore Wind Farms Ltd.

Cook, A. S. C. P., Humphreys, E.M., Masden, E.A. & Burton, N.H.K. (2014) The avoidance rates of collision between birds and offshore turbines. BTO Report No. 656. Scottish Marine and Freshwater Science, 5(16).

Ecological Consultancy Ltd. (2012) Zone 9 Celtic Array bird and marine mammal surveys.

Furness, R.W., Wade, H.M. and Masden, E.A., (2013). Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management, 119, pp. 56-66.

Furness, R.W. (2015) Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, No. 164. Available at: http://publications.naturalengland.org.uk/publication/6427568802627584.

Heinänen, S., Žydelis, R., Kleinschmidt, B., Dorsch, M., Burger, C., Morkūnas, J., Quillfeldt, P. & Nehls, G. (2020) Satellite telemetry and digital aerial surveys show strong displacement of red-throated divers (*Gavia stellata*) from offshore wind farms. Marine Environmental Research, 160, 104989.

JNCC (2021a) Marine Recorder Public UK Snapshot. Available https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307. Accessed November 2021.

JNCC (2021b) Seabird Population Trends and Causes of Change: 1986–2019 Report (https://jncc.gov.uk/our-work/smp-report-1986-2019). Joint Nature Conservation Committee, Peterborough. Updated 20 May 2021.

Mackey and Giménez (2006) SEA678 Data Report for Offshore Seabird Populations. Coastal & marine resources centre environmental research institute university college cork.

Mendel, B., Kotzerka, J., Sommerfeld, J., Schwemmer, H., Sonntag, N. and Garthe, S. (2014) Effects of the alpha ventus offshore test site on distribution patterns, behaviour and flight heights of seabirds. In Ecological Research at the Offshore Windfarm alpha ventus (pp. 95-110). Springer Fachmedien Wiesbaden.

National Biodiversity Network (NBN) Atlas, 2019, Available https://nbnatlas.org/. Accessed November 2021.

Natural England (2015). Written Submission for Deadline 4. Hornsea Offshore Wind Farm - Project Two Application. Planning Inspectorate Reference: EN010053. Natural England, Peterborough.

Peterson K., Groom G., Stjernholm M., Nielsen D. (2012) Ornithological surveys in the Walney and Ormond offshore wind farm areas, January 2012. Department of Bioscience, University of Aarhus, Report commissioned by DONG Energy.

Searle, K., Mobbs, D., Daunt, F. & Butler, A. (2019) A Population Viability Analysis Modelling Tool for Seabird Species. Report by Centre for Ecology & Hydrology. Natural England Commissioned Report NECR274. Available at: http://publications.naturalengland.org.uk/file/6217749003239424.

Searle, K., Mobbs, D., Butler,A., Furness, R., Trinder, M and F Daunt. (2018) Finding out the Fate of Displaced Birds. Scottish Marine and Freshwater Science Vol 9 No 8, 149pp.

Statutory Nature Conservation Bodies (SNCBs) (2014) Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review.

Statutory Nature Conservation Bodies (SNCBs) (2017) Joint SNCB Interim Displacement Advice Note. Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm (OWF) developments. January 2017.

Thaxter, C.B., Ross-Smith, V.H. and Cook, A.S.C.P. (2016) How high do birds fly? A review of current datasets and an appraisal of current methodologies for collecting flight height data: Literature Review. BTO Research Report No. 666. Thetford.

Thaxter, C.B. & Burton, N.H.K. (2009) High Definition Imagery for Surveying Seabirds and Marine Mammals: A Review of Recent Trials and Development of Protocols. British Trust for Ornithology Report Commissioned by Cowrie Ltd.

Thaxter, Lascelles and Cook (2012) Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation 156. December 2012.

UK Centre for Ecology and Hydrology (no date) Cumulative effects framework for ecological receptors. Available online at https://www.ceh.ac.uk/our-science/projects/cumulative-effects-framework-key-ecological-receptors. Accessed January 2022.

Wade H.M., Masden. E.A., Jackson, A.C. and Furness, R.W. (2016) Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. Marine Policy 70, 108–113. Available online at doi:10.1016/j.marpol.2016.04.045.

Waggitt, J. J., Evans , P. G. H., Andrade, J., Banks, A. N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C. J., Durinck, J., Felce, T., Fijn, R. C., Garcia-Baron, I., Garthe, S., Geelhoed, S. C. V., Gilles, A., Goodhall, M., Haelters, J., Hamilton, S. and Hiddink, J. G. (2020) Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology, 57(2), 253-269. Available at: https://doi.org/10.1111/1365-2664.13525.

Wakefield, E.D., Owen, E., Baer, J., Carroll, M.J., Daunt, F., Dodd, S.G., Green, J.A., Guilford, T., Mavor, R.A., Miller, P.I., Newell, M.A., Newton, S.F., Robertson, G.S., Shoji, A., Soanes, L.M., Votier, S.C., Wanless, S. and Bolton, M. (2017) Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species. Ecological Applications, 27(7), 2074-2091.

Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. Report by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate. BTO Research Report No. 724.

9.5 Offshore human environment

9.5.1 Commercial fisheries

Blyth-Skyrme, R.E. (2010) Options and opportunities for marine fisheries mitigation associated with windfarms. Final report for Collaborative Offshore Wind Research Into the Environment contract FISHMITIG09. COWRIE Ltd, London. 125 pp. Available: https://tethys.pnnl.gov/sites/default/files/publications/Blyth-Skyrme-2010.pdf. [Accessed 28/02/2022]

Department of Energy and Climate Change (DECC) (2016) UK Offshore Energy Strategic Environmental Assessment. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536672/OESEA3_Post_Consultation_Report.pdf. [Accessed 28/02/2022]

European Subsea Cables Association (ESCA) (2016) ESCA Guideline No.7 Guidelines for the Use of Rock Placement. Available: https://www.escaeu.org/guidelines/. [Accessed 28/02/2022]

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2014) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison. Available: https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for-Offshore-Renewables-Developments-Jan-2014.pdf. [Accessed 28/02/2022]

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2015) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Available: https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2009) Fishing and Submarine Cables – Working Together. Available: https://www.iscpc.org/documents/?id=142. [Accessed 28/02/2022]

The Marine Management Organisation (MMO) (2021) UK sea fisheries annual statistics report 2020. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020. [Accessed 28/02/2022]

United Kingdom Fisheries Economics Network (UKFEN) (2012) Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments. Available: https://www.seafish.org/document/?id=AA0CB236-1E2A-4D2A-9F86-49CEB2B6DD5E. [Accessed 28/02/2022]

9.5.2 Shipping and navigation

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) (2021) G1162 ED1.0 The Marking of Man-Made Offshore Structures. Available: https://www.iala-aism.org/product/g1162-ed1-0-the-making-of-offshore-man-made-structures/. [Accessed 18/03/2022]

International Maritime Organization (IMO) (2018) Formal Safety Assessment. Available: https://wwwcdn.imo.org/localresources/en/OurWork/Safety/Documents/MSC-MEPC%202-Circ%2012-Rev%202.pdf/. [Accessed 28/02/2022]

Marine and Coastguard Agency (MCA) (2008) Marine Guidance Notice 372, OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940185/MGN_372.pdf. [Accessed 28/02/2022]

Marine and Coastguard Agency (MCA) (2021a) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf. [Accessed 28/02/2022]

Marine and Coastguard Agency (MCA) (2021b) Methodology for Assessing Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI). Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980900/MGN_654_Annex_1_NRA_Methodology_2021.pdf. [Accessed 28/02/2022]

Royal Yachting Association (RYA) (2019) The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – wind energy. Available: https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001778-MMC237%20MOR-POL-DOC-040%20RYA%20Position%20OREI%20Wind%20Energy.pdf. [Accessed 28/02/2022]

UK Government, 2019. South Morecambe DP3-DP4 Decommissioning Programmes. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/834846/South_Morecambe_DP3-DP4_Decommissioning_Programmes.pdf. [Accessed 28/02/2022]

9.5.3 Marine archaeology

Coles, B.J. (1998) 'Doggerland: a speculative survey', Proceedings of the Prehistoric Society, 64: 45-81.

Fitch, S., Gaffney, V., Ramsey, E., and Kitchen, E. (2011) West Coast Palaeoloandscapes Survey. Online, available at: https://www.dyfedarchaeology.org.uk/lostlandscapes/WCPStechnical.pdf. [Accessed 28/02/2022]

The Crown Estate (TCE) (2014) Protocol for Archaeological Discoveries: Offshore Renewables Projects. Available at: 03-PAD Offshore Renewables_Crown Estate (thecrownestate.co.uk). [Accessed 28/02/2022]

Wessex Archaeology (2007) COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector.

Wessex Archaeology (2008) Aircraft Crash Sites at Sea: A Scoping Study. Archaeological Desk-based Assessment, Unpublished Report 66641.02.

Wessex Archaeology for The Crown Estate (2021) Archaeological Mitigation for Offshore Wind Farms: Model Clauses for Written Schemes of Investigation.

9.5.4 Other sea users

Blue Mink Boat Charters. Available at: blueminkboatcharters.co.uk. [Accessed 28/02/2022]

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2021) Participation, effort, and catches of sea anglers resident in the UK in 2018 & 2019. Available at: https://www.substance.net/wp-content/uploads/Sea_angling-_2018-19_report_final.pdf. [Accessed 28/02/2022]

Department of Energy and Climate Change (DECC) (2011) UK Offshore Energy Strategic Environmental Assessment 2: Environmental Report. Available at: https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-2-environmental-report. [Accessed 28/02/2022]

Eni (2020) Eni Liverpool Bay Project: a clean growth opportunity for the UK, Available at: https://www.eni.com/en-IT/operations/united-kingdom-liverpool-bay.html. [Accessed 28/02/2022]

European Subsea Cables UK Association (ESCA) (2016) Guideline No. 6, the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters. Available at: https://www.escaeu.org/download/?Id=123&source=guidelines. [Accessed 28/02/2022]

HyNet (2021) What is HyNet? Available at: https://hynet.co.uk/about/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2015) Recommendation No.2-11B: Cable routing and reporting criteria. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2014) Recommendation No. 3-10C: Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2013) Recommendation No.13-2C: The proximity of offshore renewable wind energy installations and submarine cable infrastructure in national waters. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

Manx Sea Fishing, Available at: www.manxseafishing.com. [Accessed 28/02/2022]

Oil and Gas Authority (OGA) (2020) Energy integration in action: Eni project awarded carbon storage licence. Press release. Available at: Oil and Gas Authority: Energy integration in action: Eni project awarded carbon storage licence - 2020 - News - News &
publications (ogauthority.co.uk). [Accessed 28/02/2022]

Oil and Gas UK (2015) Guidelines for the Abandonment of Wells, Issue 5. Available at: http://oilandgasuk.co.uk/product/op071/. [Accessed 28/02/2022]

Oil and Gas UK (2021) Pipeline crossing agreement and proximity agreement pack. Available at: https://oguk.org.uk/product/pipeline-crossing-agreement-proximity-agreement-pack/. [Accessed 28/02/2022]

Royal Yachting Association (RYA) (2019) The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy. Available at: https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001778-MMC237%20MOR-POL-DOC-040%20RYA%20Position%20OREI%20Wind%20Energy.pdf. [Accessed 28/02/2022]

Royal Yachting Association (RYA) (2019) UK Coastal Atlas of Recreational Boating. Available at: https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating. [Accessed 28/02/2022]

Sea Fishing Trips in North Wales. Available at: https://sea-fishing-trips.co.uk/. [Accessed 28/02/2022]

The Crown Estate (TCE) (2012) Submarine cables and offshore renewable energy installations proximity study. Available at: https://www.thecrownestate.co.uk/media/1784/submarine-cables-and-offshore-renewable-energy-installations-proximity-study.pdf. [Accessed 28/02/2022]

UK Diving, Map of North Wales. Available at: www.ukdiving.co.uk. [Accessed 28/02/2022]

9.6 Offshore and onshore combined topics

9.6.1 Seascape, landscape and visual resources

None.

9.6.2 Socio-economics and community

None.

9.6.3 Aviation and radar

Civil Aviation Authority (CAA) (2021) CAP 393: The Air Navigation Order 2016. Available at: https://publicapps.caa.co.uk/docs/33/Air%20Navigation%20Order%202016%20Sept%202021.pdf. [Accessed 04/03/2022]

Civil Aviation Authority (CAA) (2016) CAP 764: CAA Policy and Guidelines on Wind Turbines. Available at: https://publicapps.caa.co.uk/docs/33/CAP764%20Issue6%20FINAL%20Feb.pdf. [Accessed 04/03/2022]

Civil Aviation Authority (CAA) (2019) CAP 670: Air Traffic Services Safety Requirements Third Issue Amendment 1/2019. Available at: http://publicapps.caa.co.uk/docs/33/CAP670%20Issue3%20Am%201%202019(p).pdf. [Accessed 04/03/2022]

Marine and Coastguard Agency (MCA) (2021a) MGN 654 (M+F): Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf. [Accessed 04/03/2022]

Marine and Coastguard Agency (MCA) (2021b) Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034158/OREI_SAR_Requirements_v3.pdf. [Accessed 04/03/2022]

Met Office (2020) Factsheet 15 – Weather Radar. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/library-and-archive/library/publications/factsheets/factsheet_15-weather-radar-2020_temp.pdf. [Accessed 04/03/2022]

Marine and Coastguard Agency (MCA) and QinetiQ (2004) Results of the electromagnetic investigations and assessments of marine radar, communications and positioning systems undertaken at the North Hoyle wind farm by QinetiQ and the Maritime and Coastguard Agency. Available at: https://users.ece.utexas.edu/~ling/EU1%20QuinetiQ%20effects_of_offshore_wind_farms_on_marine_systems-2.pdf. [Accessed 04/03/2022]The Office of Communications (Ofcom) (2009) Tall structures and their impact on broadcast and other wireless services. Available at:

https://www.ofcom.org.uk/__data/assets/pdf_file/0026/63494/tall_structures.pdf. [Accessed 04/03/2022]

Operational Programme for the Exchange of weather Radar information (OPERA) Group (2009) Statement of the OPERA group on the cohabitation between weather radars and wind turbines. Available at: https://www.eumetnet.eu/wp-content/uploads/2017/01/OPERA_2010_14_Statement_on_weather_radars_and_wind_turbines.pdf. [Accessed 04/03/2022]

The Bristow Group (2021) United Kingdom Locations for SAR bases. Available at: https://www.bristowgroup.com/locations/bristow-locations/country/united-kingdom. [Accessed 04/03/2022]

9.6.4 Climate change

Climate Change Committee (2021) 2021 Progress Report to Parliament - The CCC's annual assessment of UK progress in reducing emissions and biennial assessment of progress in adapting to climate change. Available: https://www.theccc.org.uk/publication/2021-progress-report-to-parliament Accessed: December 2021.

Department for Business, Energy & Industrial Strategy (BEIS) (2021) Government conversion factors for company reporting of greenhouse gas emissions. Available: https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting Accessed: December 2021.

HM Government (2021) Digest of UK Energy Statistics (DUKES). Available: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes Accessed: December 2021.

Institute of Environmental Management and Assessment (IEMA) (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available: assessing-greenhouse-gas-emissions-and-evaluating-their-significance (iema.net). Accessed: December 2021.

Institute of Environmental Management and Assessment (IEMA) (2020) Environmental Impact Assessment Guide to Climate Change Resilience & Adaptation (iema.net). Accessed: December 2021.

IPCC (2021) Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

Met Office, Lowe, J.A., Bernie, D., Bett, P., Bricheno, L., Brown, S., Calvert, D., Clark, R., Eagle, K., Edwards, T., Fosser, G. and Fung, F., 2018. UKCP18 science overview report. Met Office Hadley Centre: Exeter, UK.

National Grid ESO (2021) Future Energy Scenarios 2021. Available: https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2021. Accessed: December 2021.

UK Government (2021) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal Accessed: December 2021.

9.7 Other environmental topics

CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice. Available: https://www.claire.co.uk/ Accessed: December 2021.

European Union (1993) Waste Framework Directive (1993/31/EC). Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0031 Accessed: December 2021.

ICNIRP (1988) Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection. Available: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf Accessed: December 2021.

International Commission on Non-ionising Radiation Protection (ICNIRP) (2020) 2020 Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz). Available: https://www.icnirp.org/en/publications/index.html Accessed: December 2021.

UK Government (1990) Environmental Protection Act 1990. Available: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed: December 2021.

UK Government (1995) Environment Act 1995. Available: https://www.legislation.gov.uk/ukpga/1995/25/contents Accessed: December 2021.

UK Government (2005) The Hazardous Waste (England and Wales) Regulations 2005. Available: https://www.legislation.gov.uk/uksi/2005/894/contents/made Accessed: December 2021.

UK Government (2006) The Waste Management (England and Wales Regulations 2006. Available: https://www.legislation.gov.uk/uksi/2006/937/made Accessed: December 2021.

UK Government (2011) The Waste (England and Wales) Regulations 2011. Available: https://www.legislation.gov.uk/uksi/2011/988/contents/made Accessed: December 2021.

UK Government (2016) The Environmental Permitting (England and Wales) Regulations 2016. Available: https://www.legislation.gov.uk/uksi/2016/1154/contents/made Accessed: December 2021.

Welsh Government (2014) Technical advice note (TAN) 21: waste. Available: https://gov.wales/sites/default/files/publications/2018-09/tan21-waste.pdf Accessed: December 2021.

Welsh Government (2014) Waste Planning Practice Guide. Available: https://gov.wales/sites/default/files/publications/2018-09/tan21-practice-guidance.pdf Accessed: December 2021.

9.8 Generation assets summary

RenewableUK (2013) Cumulative Impact Assessment Guidelines - Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms.

The Planning Inspectorate (2019) Advice Note Seventeen: Cumulative Effects Assessment.

The Planning Inspectorate (2020) Advice Note Twelve: Transboundary Impacts and Process.

Part 3: Transmission assets

Table of Contents

1 Introduction ... 26

1.1 Background ... 26
1.2 Mona Offshore Wind Project transmission assets overview ... 26
1.3 Structure ... 29

2 Site selection and alternatives ... 33

2.1 Introduction ... 33
2.2 Work undertaken by National Grid ESO ... 33
2.3 Siting and route option identification process to date ... 34
2.3.2 Constraints influencing the identification of potential locations for the Mona Onshore Transmission Infrastructure ... 37
2.3.3 Constraints influencing the identification of the Mona Offshore Transmission Infrastructure ... 38
2.4 Ongoing siting and routing process ... 38
2.4.2 Offshore export cable route corridor ... 39
2.4.3 Landfall ... 39
2.4.4 Onshore electrical transmission cable corridors ... 40
2.4.5 Onshore substation site ... 41
2.5 Next steps ... 41

3 Offshore physical environment ... 42

3.1 Physical processes ... 42
3.1.1 Introduction ... 42
3.1.2 Study area ... 42
3.1.3 Data sources ... 44
3.1.4 Baseline environment ... 45
3.1.5 Potential project impacts ... 54
3.1.6 Measures adopted as part of the project ... 57
3.1.7 Proposed assessment methodology ... 57
3.1.8 Potential cumulative effects ... 58
3.1.9 Potential inter-related effects ... 58
3.1.10 Potential transboundary impacts ... 58
3.2 Underwater noise ... 59
3.2.1 Introduction ... 59
3.2.2 Study area ... 59
3.2.3 Data sources ... 59
3.2.4 Baseline environment ... 60
3.2.5 Potential project impacts ... 61
3.2.6 Measures adopted as part of the project ... 63
3.2.7 Proposed assessment methodology ... 63
3.2.8 Potential cumulative effects ... 67
3.2.9 Potential inter-related effects ... 67

3.2.10 Potential transboundary impacts 67
4 Offshore biological environment 68
4.1 Benthic subtidal and intertidal ecology 68
4.1.1 Introduction 68
4.1.2 Study area 68
4.1.3 Data sources 70
4.1.4 Baseline environment 72
4.1.5 Potential project impacts 86
4.1.6 Measures adopted as part of the project 91
4.1.7 Proposed assessment methodology 91
4.1.8 Potential cumulative effects 92
4.1.9 Potential inter-related effects 93
4.1.10 Potential transboundary impacts 93
4.2 Fish and shellfish ecology 93
4.2.1 Introduction 93
4.2.2 Study area 93
4.2.3 Data Sources 95
4.2.4 Baseline environment 97
4.2.5 Potential project impacts 116
4.2.6 Measures adopted as part of the project 122
4.2.7 Proposed assessment methodology 122
4.2.8 Potential cumulative effects 123
4.2.9 Potential inter-related effects 123
4.2.10 Potential transboundary impacts 123
4.3 Marine mammals 124
4.3.1 Introduction 124
4.3.2 Study area 124
4.3.3 Data sources 126
4.3.4 Baseline environment 128
4.3.5 Potential project impacts 142
4.3.6 Measures adopted as part of the project 146
4.3.7 Proposed assessment methodology 146
4.3.8 Potential cumulative effects 147
4.3.9 Potential inter-related effects 148
4.3.10 Potential transboundary impacts 148
4.4 Offshore ornithology 148
4.4.1 Introduction 148
4.4.2 Study area 149
4.4.3 Data sources 151
4.4.4 Baseline environment 153
4.4.5 Potential project impacts 157
4.4.6 Measures adopted as part of the project 160

4.4.7 Proposed assessment methodology 160
4.4.8 Potential cumulative effects 160
4.4.9 Potential inter-related effects 161
4.4.10 Potential transboundary impacts 161
5 Offshore human environment 162
5.1 Commercial fisheries 162
5.1.1 Introduction 162
5.1.2 Study area 162
5.1.3 Data sources 164
5.1.4 Baseline environment 165
5.1.5 Potential project impacts 172
5.1.6 Measures adopted as part of the project 175
5.1.7 Proposed assessment methodology 175
5.1.8 Potential cumulative effects 176
5.1.9 Potential inter-related effects 176
5.1.10 Potential transboundary impacts 176
5.2 Shipping and navigation 177
5.2.1 Introduction 177
5.2.2 Study area 177
5.2.3 Data sources 179
5.2.4 Baseline environment 180
5.2.5 Potential project impacts 190
5.2.6 Measures adopted as part of the project 193
5.2.7 Proposed assessment methodology 193
5.2.8 Potential cumulative effects 195
5.2.9 Potential inter-related effects 195
5.2.10 Potential transboundary impacts 196
5.3 Marine archaeology 196
5.3.1 Introduction 196
5.3.2 Study area 196
5.3.3 Data sources 198
5.3.4 Baseline environment 198
5.3.5 Potential project impacts 205
5.3.6 Measures adopted as part of the project 207
5.3.7 Proposed assessment methodology 207
5.3.8 Potential cumulative effects 208
5.3.9 Potential inter-related effects 208
5.3.10 Potential transboundary impacts 208
5.3.11 Appendix 5.3.11 209
5.4 Other sea users 219
5.4.1 Introduction 219
5.4.2 Study area 219

5.4.3 Data sources ... 221
5.4.4 Baseline environment ... 222
5.4.5 Potential project impacts ... 230
5.4.6 Measures adopted as part of the project ... 233
5.4.7 Proposed assessment methodology ... 233
5.4.8 Potential cumulative effects ... 233
5.4.9 Potential inter-related effects ... 234
5.4.10 Potential transboundary impacts ... 234

6 Onshore physical environment ... 235

6.1 Geology, hydrogeology and ground conditions ... 235
6.1.1 Introduction ... 235
6.1.2 Study area ... 235
6.1.3 Data sources ... 235
6.1.4 Baseline environment ... 237
6.1.5 Potential project impacts ... 238
6.1.6 Measures adopted as part of the project ... 242
6.1.7 Proposed assessment methodology ... 242
6.1.8 Potential cumulative effects ... 243
6.1.9 Potential inter-related effects ... 243
6.1.10 Potential transboundary impacts ... 243
6.2 Hydrology and flood risk ... 244
6.2.1 Introduction ... 244
6.2.2 Study area ... 244
6.2.3 Data sources ... 245
6.2.4 Baseline environment ... 246
6.2.5 Potential project impacts ... 258
6.2.6 Measures adopted as part of the project ... 262
6.2.7 Proposed assessment methodology ... 262
6.2.8 Potential cumulative effects ... 263
6.2.9 Potential inter-related effects ... 263
6.2.10 Potential transboundary impacts ... 264

7 Onshore biological environment ... 265

7.1 Terrestrial ecology and intertidal birds ... 265
7.1.1 Introduction ... 265
7.1.2 Study area ... 265
7.1.3 Data sources ... 266
7.1.4 Baseline environment ... 270
7.1.5 Potential project impacts ... 275
7.1.6 Measures adopted as part of the project ... 278
7.1.7 Proposed assessment methodology ... 279
7.1.8 Potential cumulative effects ... 279
7.1.9 Potential inter-related effects ... 280

7.1.10 Potential transboundary impacts 281

8 Onshore human environment 282

8.1 Historic environment 282
8.1.1 Introduction 282
8.1.2 Study area 282
8.1.3 Data sources 283
8.1.4 Baseline environment 283
8.1.5 Potential project impacts 287
8.1.6 Measures adopted as part of the project 290
8.1.7 Proposed assessment methodology 290
8.1.8 Potential cumulative effects 292
8.1.9 Potential inter-related effects 292
8.1.10 Potential transboundary impacts 292
8.2 Land use and recreation 292
8.2.1 Introduction 292
8.2.2 Study area 293
8.2.3 Data sources 293
8.2.4 Baseline environment 294
8.2.5 Potential project impacts 300
8.2.6 Measures adopted as part of the project 303
8.2.7 Proposed assessment methodology 303
8.2.8 Potential cumulative effects 304
8.2.9 Potential inter-related effects 304
8.2.10 Potential transboundary impacts 304
8.3 Traffic and transport 305
8.3.1 Introduction 305
8.3.2 Study area 305
8.3.3 Data sources 306
8.3.4 Baseline environment 307
8.3.5 Potential project impacts 308
8.3.6 Measures adopted as part of the project 312
8.3.7 Proposed assessment methodology 312
8.3.8 Potential cumulative effects 314
8.3.9 Potential inter-related effects 314
8.3.10 Potential transboundary impacts 315
8.4 Noise and vibration 315
8.4.1 Introduction 315
8.4.2 Study area 315
8.4.3 Data sources 316
8.4.4 Baseline environment 317
8.4.5 Potential project impacts 317
8.4.6 Measures adopted as part of the project 320

8.4.7 Proposed assessment methodology 320
8.4.8 Potential cumulative effects 321
8.4.9 Potential inter-related effects 321
8.4.10 Potential transboundary impacts 321
8.5 Air quality 322
8.5.1 Introduction 322
8.5.2 Study area 322
8.5.3 Data sources 323
8.5.4 Baseline environment 323
8.5.5 Potential project impacts 325
8.5.6 Measures adopted as part of the project 329
8.5.7 Proposed assessment methodology 329
8.5.8 Potential cumulative effects 329
8.5.9 Potential inter-related effects 330
8.5.10 Potential transboundary impacts 330
9 Offshore and onshore combined topics 331
9.1 Seascape, landscape and visual resources 331
9.1.1 Introduction 331
9.1.2 Study area 331
9.1.3 Data sources 332
9.1.4 Baseline environment 333
9.1.5 Potential project impacts 340
9.1.6 Measures adopted as part of the project 343
9.1.7 Proposed assessment methodology 343
9.1.8 Potential cumulative effects 344
9.1.9 Potential inter-related effects 345
9.1.10 Potential transboundary impacts 346
9.2 Aviation and radar 346
9.2.1 Introduction 346
9.2.2 Study area 346
9.2.3 Data sources 348
9.2.4 Baseline environment 348
9.2.5 Potential project impacts 352
9.2.6 Measures adopted as part of the project 355
9.2.7 Proposed assessment methodology 355
9.2.8 Potential cumulative effects 356
9.2.9 Potential inter-related effects 356
9.2.10 Potential transboundary impacts 356
9.3 Climate change 356
9.4 Socio-economics and community 356
9.4.1 Introduction 356
9.4.2 Study area 357

9.4.3 Data sources ... 359
9.4.4 Baseline environment ... 359
9.4.5 Potential project impacts ... 361
9.4.6 Measures adopted as part of the project ... 364
9.4.7 Proposed assessment methodology ... 364
9.4.8 Potential cumulative effects ... 364
9.4.9 Potential inter-related effects ... 365
9.4.10 Potential transboundary impacts ... 365
10 Other Environmental Topics ... 366
10.1 Introduction ... 366
10.2 Topics with supporting information in the ES ... 366
10.2.1 Human health ... 366
10.2.2 Waste ... 369
10.3 Topics proposed to be scoped out of the ES ... 370
10.3.1 Local planning policy context ... 370
10.3.2 Daylight, sunlight and microclimate ... 371
10.4 Topics covered elsewhere in the ES ... 371
10.4.1 Other residues and emissions ... 371
10.4.2 Material assets ... 372
11 Transmission assets summary ... 375
11.1 Overview ... 375
11.2 Cumulative effects ... 382
11.3 Transboundary impacts ... 383
11.4 Water Framework Directive screening ... 383
11.5 Marine Conservation Zone screening ... 383
11.6 Consultation ... 383
11.7 Next steps ... 384
12 References ... 385
12.1 Introduction ... 385
12.2 Site selection and alternatives ... 385
12.3 Offshore physical environment ... 385
12.3.1 Physical processes ... 385
12.3.2 Underwater Noise ... 386
12.4 Offshore biological environment ... 388
12.4.1 Benthic subtidal and intertidal ecology ... 388
12.4.2 Fish and Shellfish ... 389
12.4.3 Marine mammals ... 391
12.4.4 Offshore ornithology ... 396
12.5 Offshore human environment ... 398
12.5.1 Commercial Fisheries ... 398
12.5.2 Shipping and navigation ... 398
12.5.3 Marine Archaeology ... 399
12.5.4 Other sea users ... 400

12.6 Onshore physical environment ... 401
12.6.1 Geology, hydrogeology and ground conditions ... 401
12.6.2 Hydrology and flood risk ... 403
12.7 Onshore biological environment ... 405
12.7.1 Terrestrial ecology and intertidal birds ... 405
12.8 Onshore human environment ... 406
12.8.1 Historic Environment ... 406
12.8.2 Land use and recreation ... 406
12.8.3 Traffic and transport ... 407
12.8.4 Noise and vibration ... 408
12.8.5 Air quality ... 409
12.9 Offshore and onshore combined topics ... 409
12.9.1 Seascape, landscape and visual resources ... 409
12.9.2 Aviation and radar ... 409
12.9.3 Climate change ... 410
12.9.4 Socio-economics and community ... 410
12.10 Other environmental topics ... 412
12.11 Transmission assets summary ... 412

Table of tables

Table 1.1: Topics considered within part 3, Transmission assets, of the EIA Scoping Report. ... 29
Table 3.1: Summary of key desktop datasets and reports. ... 44
Table 3.2: Summary of designated sites with relevant physical processes features within the Mona physical processes study area for the transmission assets. ... 51
Table 3.3: Impacts proposed to be scoped into the project assessment for physical processes (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 55
Table 3.4: Impacts proposed to be scoped out of the project assessment for physical processes. ... 56
Table 3.5: Summary of key desktop datasets and reports. ... 60
Table 3.6: Impacts proposed to be scoped into the project assessment for underwater noise (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 62
Table 3.7: Impacts proposed to be scoped out of the project assessment for underwater noise. ... 62
Table 3.8: Assessment swim speeds of marine mammals and fish that are likely to occur within the Irish Sea for the purpose of exposure modelling. ... 65
Table 4.1: Summary of key desk top datasets and reports. ... 70
Table 4.2: JNCC marine habitat codes used in Figure 4.3 (JNCC, 2022). ... 81
Table 4.3: Summary of designated sites with relevant benthic ecology features within the Mona benthic subtidal and intertidal ecology study area for the transmission assets. ... 82
Table 4.4: Relevant protected benthic species and habitats which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the transmission assets. ... 85

Table 4.5: Impacts proposed to be scoped in to the project assessment for benthic subtidal and intertidal ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 87
Table 4.6: Impacts proposed to be scoped out of the project assessment for benthic subtidal and intertidal ecology. ... 90
Table 4.7: Summary of key desktop datasets and reports. ... 95
Table 4.8: Key species with geographic spawning and nursery overlap with the Mona fish and shellfish ecology study area for the transmission assets (Coull *et al*., 1998 and Ellis *et al*., 2012. Mapped in Figure 4.6 to Figure 4.15). ... 100
Table 4.9: Summary of designated sites with relevant fish and shellfish ecology features within the Mona fish and shellfish ecology study area for the transmission assets. ... 112
Table 4.10: Relevant protected fish and shellfish species within the Mona fish and shellfish ecology study area for the transmission assets. ... 115
Table 4.11: Impacts proposed to be scoped into the project assessment for fish and shellfish ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 118
Table 4.12: Impacts proposed to be scoped out of the project assessment for fish and shellfish ecology. ... 121
Table 4.13: Summary of the key desktop datasets and reports. ... 126
Table 4.14: Summary of designated sites with relevant marine mammal features within the Mona regional marine mammal study area for the transmission assets. ... 138
Table 4.15: Relevant protected marine mammal species which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the transmission assets. ... 141
Table 4.16: Impacts proposed to be scoped into the project assessment for marine mammals (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 143
Table 4.17: Impacts proposed to be scoped out of the Mona Offshore Wind Project assessment for marine mammals. ... 144
Table 4.18: Summary of key desktop datasets and reports. ... 151
Table 4.19: Impacts proposed to be scoped into the project assessment for offshore ornithology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 158
Table 4.20: Impacts proposed to be scoped out of the project assessment for offshore ornithology. ... 159
Table 5.1: Summary of key desktop datasets and reports. ... 164
Table 5.2: Impacts proposed to be scoped into the project assessment for commercial fisheries (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 173
Table 5.3: Impacts proposed to be scoped out of the project assessment for commercial fisheries. ... 174
Table 5.4: Summary of key desktop datasets and reports. ... 179
Table 5.5: Impacts proposed to be scoped into the project assessment for shipping and navigation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 191
Table 5.6: Impacts proposed to be scoped into the project assessment for marine archaeology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). ... 206
Table 5.7: Data sources for other sea users. ... 221

Table 5.8: Impacts proposed to be scoped into the project assessment for other sea users (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 231
Table 6.1: Baseline data sources. 236
Table 6.2: Impacts proposed to be scoped into the project assessment for geology, hydrogeology and ground conditions (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 239
Table 6.3: Impacts proposed to be scoped out of the project assessment for geology, hydrogeology and ground conditions 241
Table 6.4: Baseline data sources. 245
Table 6.5: Named watercourses. 246
Table 6.6: Statutory designated sites. 257
Table 6.7: Non-statutory designated sites. 257
Table 6.8: Impacts proposed to be scoped into the project assessment for hydrology and flood risk (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 259
Table 6.9: Impacts proposed to be scoped out of the project assessment for hydrology and flood risk. 261
Table 7.1: Baseline data sources. 266
Table 7.2: Designated sites. 270
Table 7.3: Impacts proposed to be scoped into the project assessment for terrestrial ecology and intertidal birds (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 276
Table 7.4: Impacts proposed to be scoped out of the project assessment for terrestrial ecology and intertidal birds. 277
Table 8.1: Baseline Data Sources. 283
Table 8.2: Historic assets. 284
Table 8.3: Impacts proposed to be scoped into the project assessment for historic environment (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 288
Table 8.4: Impacts proposed to be scoped out of the project assessment for historic environment. 289
Table 8.5: Baseline data sources. 293
Table 8.6: Impacts proposed to be scoped into the project assessment for land use and recreation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 301
Table 8.7: Impacts proposed to be scoped out of the project assessment for land use and recreation. 302
Table 8.8: Baseline data sources. 306
Table 8.9: Impacts proposed to be scoped into the project assessment for traffic and transport (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 309
Table 8.10: Impacts proposed to be scoped out of the project assessment for traffic and transport. 311
Table 8.11: Impacts proposed to be scoped into the project assessment for noise and vibration (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 318
Table 8.12: Impacts proposed to be scoped out of the project assessment for noise and vibration. 319
Table 8.13: Baseline data sources. 323
Table 8.14: Statutory designated sites. 324

Table 8.15: Non-statutory designated sites. 324
Table 8.16: Impacts proposed to be scoped into the project assessment for air quality (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 326
Table 8.17: Impacts proposed to be scoped out of the project assessment for air quality. 327
Table 9.1: Baseline data sources. 332
Table 9.2: Impacts proposed to be scoped into the project assessment of effects on seascape, landscape and visual resources (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 341
Table 9.3: Impacts proposed to be scoped out of the project assessment for seascape, landscape and visual resources. 342
Table 9.4: Summary of key desktop datasets and reports. 348
Table 9.5: Impacts proposed to be scoped into the project assessment for aviation and radar (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 353
Table 9.6: Impacts proposed to be scoped out of the project assessment for aviation and radar. 353
Table 9.7: LIA impact centres. 358
Table 9.8: Baseline data sources. 359
Table 9.9: Impacts proposed to be scoped into the project assessment for socio-economics and community (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 362
Table 9.10: Impacts proposed to be scoped out of the project assessment for socio-economics and community. 363
Table 11.1: Summary of potential impacts of the Mona Offshore Wind Project transmission assets (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)). 376

Table of figures

Figure 1.1: The Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. 28
Figure 2.1: The Mona Onshore and Offshore Transmission Infrastructure Scoping Search Areas. 36
Figure 3.1: The Mona physical processes study area for the transmission assets. 43
Figure 3.2: The Mona physical processes study area for the transmission assets with bathymetry data (EMODnet, 2020). 47
Figure 3.3: Sites designated for their nature conservation value (with features of relevance to physical processes) which overlap with the Mona physical processes study area for the transmission assets. 53
Figure 4.1: The Mona Benthic subtidal and intertidal ecology study areas for the transmission assets. 69
Figure 4.2: Predicted ENUIS habitats from the EUSeaMap for the benthic subtidal and intertidal ecology study areas for the transmission assets (Source, EMODnet, 2019). 75
Figure 4.3: Benthic survey results for the other offshore wind projects in relation to the Mona benthic subtidal and intertidal ecology study area for the transmission assets. 80

Figure 4.4: Marine nature conservation designations of relevance to benthic subtidal and intertidal ecology and the Mona Offshore Wind Project. 84
Figure 4.5: The Mona Fish and shellfish ecology study area for the transmission assets. 94
Figure 4.6: Angerfish and cod spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 102
Figure 4.7: European hake and haddock spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 103
Figure 4.8: Herring and horse mackerel spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 104
Figure 4.9: Lemon sole and ling spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 105
Figure 4.10: Mackerel and nephrops spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 106
Figure 4.11: Plaice and sandeel spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 107
Figure 4.12: Sole and Spotted ray spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 108
Figure 4.13: Sprat and spurdog spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 109
Figure 4.14: Thornback ray and tope shark spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012). 110
Figure 4.15: Whiting spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Ellis *et al*., 2012). 111
Figure 4.16: Marine nature conservation designations of relevance to fish and shellfish ecology that overlap with the Mona fish and shellfish ecology study area for the transmission assets. 114
Figure 4.17: The Mona Marine Mammal study areas for the transmission assets. 125
Figure 4.18: Grey seal at-sea distribution (from Russell *et al*. 2017). 135
Figure 4.19: Harbour seal at-sea distribution (from Russell *et al.* 2017). 137
Figure 4.20: Marine nature conservation designations of relevance to marine mammals ecology that overlap with the Mona regional marine mammal study area for the transmission assets. 140
Figure 4.21: Mona offshore ornithology study area for the transmission assets. 150
Figure 4.22: Marine nature conservation designations with relevance to offshore ornithology within proximity of the Mona Offshore Transmission Infrastructure Scoping Search Area. 156
Figure 5.1: The Mona commercial fisheries study area for the transmission assets. 163
Figure 5.2: Total volume (tonnes) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 168

Figure 5.3: Total value (GBP) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the transmission (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 168
Figure 5.4: Top four species by weight (tonnes) from 2010 to 2020 landed from the Mona commercial fisheries study area for the offshore transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). .. 169
Figure 5.5: Top four species by value (GBP) from 2010 to 2020 landed from the Mona commercial fisheries study area for the offshore transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021). 169
Figure 5.6: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2017 and 2018) (MMO, 2020). 170
Figure 5.7: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2019 and 2020) (MMO, 2020). 171
Figure 5.8: The Mona shipping and navigation study area for the transmission assets. 178
Figure 5.9: Key marine navigation features and activities in the vicinity of the Mona shipping and navigation study area for the transmission assets. 182
Figure 5.10: Marine traffic (commercial shipping and ferries) in the vicinity of the Mona shipping and navigation study area for the transmission assets (all AIS vessel tracks from 2019). 184
Figure 5.11: Marine traffic (fishing vessels and recreational vessels) in the vicinity of the Mona shipping and navigation study area for the transmission assets (all AIS vessel tracks from 2019). 185
Figure 5.12: Marine traffic (tugs and service vessels and all vessels combined) in the vicinity of the Mona shipping and navigation study area for the transmission assets (all AIS vessel tracks from 2019). 186
Figure 5.13: Maritime incidents in the vicinity of the Mona shipping and navigation study area for the transmission assets (MAIB data from 2010 to 2019). 189
Figure 5.14: The Mona marine archaeology study area for the transmission assets. 197
Figure 5.15: Submerged prehistoric archaeology within the Mona marine archaeology study area for the transmission assets. 201
Figure 5.16: Maritime archaeology within the Mona marine archaeology study area for the transmission assets. 204
Figure 5.17: The Mona regional other sea users study area for the transmission assets and Mona local other sea users study area for the transmission assets. 220
Figure 5.18: Marine aggregates, disposal sites, offshore wind farms and cables within the Mona regional other sea users study area for the transmission assets and the Mona local other sea users study areas for the transmission assets. 224
Figure 5.19: Recreational activities in the Morgan regional other sea users study area for the transmission assets and the Morgan local other sea users study area for the transmission assets. 225
Figure 5.20: Oil and gas infrastructure within the Mona local other sea users study area for the transmission assets. 228
Figure 6.1: Surface water plan for the Mona Onshore Transmission Infrastructure Scoping Search Area. 248

Figure 6.2: Fluvial flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area. 250
Figure 6.3: Tidal flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area. 252
Figure 6.4: Surface water flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area. 254
Figure 6.5: Reservoir flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area. 256
Figure 7.1: Ecologically designated sites within the Mona Onshore Transmission Infrastructure Scoping Search Area. 272
Figure 7.2: Priority habitats within the Mona Onshore Transmission Infrastructure Scoping Search Area. 274
Figure 8.1: Designated historic assets and Conservation Areas within the Mona Onshore Transmission Infrastructure Scoping Search Area. 286
Figure 8.2: Quality of agricultural land within the Mona Onshore Transmission Infrastructure Scoping Search Area, according to the Welsh Government predictive ALC viewer. 296
Figure 8.3: Quality of agricultural land within the Mona Onshore Transmission Infrastructure Scoping Search Area, according to the detailed ALC survey work. . 297
Figure 8.4: Land use and recreation receptors within the Mona Onshore Transmission Infrastructure Scoping Search Area. 299
Figure 9.1: Landscape designations within and surrounding the Mona Onshore Transmission Infrastructure Scoping Search Area. 339
Figure 9.2: The Mona aviation and radar study area for the transmission assets. . 347
Figure 9.3: Aviation features in the vicinity of the Mona aviation and radar study area for the transmission assets. 350
Figure 9.4: Airfields in proximity to the Mona Onshore Transmission Infrastructure Scoping Search Area. 351
e

Revision history

Amendment Date	Revision Number	Amender Initials	Amendment

Glossary

Term	Meaning
Access Land	The Countryside and Rights of Way Act 2000 gives a public right of access to land mapped as 'open country' (mountain, moor, heath and down) or registered common land. These areas are known as 'access land'.
Acoustic Deterrent Devices	A device of lower acoustic energy used to encourage marine mammals away from an area before high energy industrial activities begin.
Amphipod	Members of the invertebrate order Amphipoda (Crustaceans).
Anthropogenic	An activity resulting from or relating to the influence of humans.
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Bathymetry	A measurement of the depth of water in the ocean.
Carboniferous	A geological period of time from 359 million years ago to 299 million years ago.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Construction Traffic Management Plan	A document detailing the construction traffic routes for HGV and personnel travel, protocols for delivery of Abnormal Indivisible Loads to site, measures for road cleaning and sustainable site travel measures.
Cumulative Effects	The combined effect of the assessed project in combination with the effects from a number of different projects, on the same single/receptor/resource.
Current	Current is the rate at which electrons flow past a point in a complete electrical circuit.
Development Consent Order	A legal order granting development consent for one or more nationally significant infrastructure projects.
Effect	Term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Electromagnetic Fields (EMF)	EMFs are part of the natural world, and are produced wherever electricity is generated, transmitted, or used.
Epifauna	The animals living on top of the seabed
Flood Consequence Assessment	An assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the National Planning Policy Framework and Planning Practice Guidance.
Generation assets	The generation assets of the Mona Offshore Wind Project include the wind turbines, wind turbine foundations, inter-array cables and associated infrastructure, located within the Mona Potential Array Area.
Helicopter Main Route (HMR)	Routes which are established to facilitate safe helicopter flights in Instrument Flight Rules (IFR) conditions (i.e. when flight cannot be completed in visual conditions).
Hydrozoa	Small predatory marine animals, some are colonial and can form large colonies of individual animals.
Impact	Change that is caused by an action, e.g. land clearing (action) during construction which results in habitat loss (impact).
Infauna	The animals living within the seabed.
Instrument Flight Rules (IFR)	The rules governing procedures for flights conducted on instruments.
Inter-related Effects	Multiple effects on the same receptor as a result of the Mona Offshore Wind Project. These occur when a series of the same effect acts on a receptor over time to produce a potential additive effect or where a number of separate effects, such as noise and habitat loss, affect a single receptor.
Magnetometer	A device that measures magnetic fields.
Main Rivers	The term used to describe a watercourse in respect of which the Environment Agency has permissive powers in relation to its management.

Term	Meaning
Mean High Water Springs (MHWS)	The height of mean high water during spring tides in a year.
Mean Low Water Springs (MLWS)	The height of mean low water during spring tides in a year.
Method Statements	A document that describes how a particular task or action should be undertaken correctly.
Metocean Buoy	Buoy that is deployed in the ocean that measure wave, current and sea surface wind speeds.
Mean Annual Significant Wave Height	A measure of wave height, it is the average height of the highest third of waves over a typical year.
Mona Array Scoping Boundary	The Preferred Bidding Area that the Applicant was awarded by The Crown Estate as part of UK Offshore Wind Round 4.
Mona Offshore Transmission Infrastructure Scoping Search Area	The Mona Offshore Transmission Infrastructure Scoping Search Area encompassing and location between the Mona Potential Array Area and the landfall up to Mean High Water Springs (MHWS), in which the offshore export cables and any offshore booster substations will be located.
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets and offshore and onshore transmission assets and associated activities.
Mona Onshore Transmission Infrastructure Scoping Search Area	The Mona Onshore Transmission Infrastructure Scoping Search Area is the area located between the landfall landwards of Mean Low Water Springs (MLWS)and the onshore National Grid substation, in which the onshore export cables, onshore substation and other associated onshore transmission infrastructure will be located.
Mona Potential Array Area	The Mona Potential Array Area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) will be located.
Ordinary Watercourses	A river, stream, ditch, cut, sluice, dyke or non-public sewer that is not designated a main river and for which the local authority has flood risk management responsibilities and powers.
Peak pressure	The highest pressure above or below ambient that is associated with a sound wave.
Photomontages	A sequence of photographs taken from representative viewpoints which illustrate the location, size, degree of visibility or appearance of a development.
Polychaete	Marine segmented worms
Reefiness	A reefiness determination is the result of an assessment of the characteristics of a reef in order to determine if a habitat is considered a reef in the specific contact of the Habitats Directive. The features that contribute to the 'reefiness' of a rocky reef include (Irving, 2019): • Composition (percentage cover, including patchiness) • Elevation (hight of the reef above the seabed level) • Extent (percentage of species composed of epifaunal species)
Runoff	Runoff occurs when there is more water than land can absorb. The excess liquid flows across the surface of the land.
Semi-diurnal Tides	A tide cycle with two nearly equal high tides and low tides every lunar day.
Severance	Severance occurs when the presence of large or busy road restricts people's ability or desire to move through that area.
Sound Exposure Levels	The representation of a noise event if all the energy were compressed into a 1 second period. This provides a uniform way to make comparisons between noise events of different durations.
Toolbox Talks	A short presentation to the workforce on a single topic (e.g. health and safety, best practice).
Traffic Flows	Traffic flow describes the number of vehicles passing a reference point per unit of time (e.g. vehicles per hour).
Transmission Assets	The offshore and onshore transmission assets of the Mona Offshore Wind Project including the offshore substation platforms, offshore export cables, offshore booster substations, onshore export cables and onshore substation and associated infrastructure, located within the Mona Potential Array Area, the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area.
Triassic	A geological period of time from 252 million years ago to 201 million years ago.

Term	Meaning
Voltage	Voltage is the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop.
Wirelines	A simple outline of the development included in photographs from representative viewpoints.

Acronyms

Acronym	Meaning
AADT	Annual Average Daily Traffic
ADD	Acoustic Deterrent Devices
AFBI	Agri-Food and Biosciences Institute
AfL	Agreement for Lease
AGA	Aerodromes and Ground Aids
AILs	Abnormal Indivisible Loads
ALC	Agricultural Land Classification
ANSP	Air Navigation Service Provider
AONB	Area of Outstanding Natural Beauty
APIS	Air Pollution Information System
APS	Annual Population Survey
AQMA	Air Quality Management Areas
ARU	Acoustic Recorder Unit
ASA	Acoustic Society of America
ASR	Annual Status Reports
ATC	Air Traffic Control
ATCs	Automatic Traffic Counts
BAP	Biodiversity Action Plan
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Department for Business, Energy & Industrial Strategy
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BRES	Business Register and Employment Survey
BS	British Standard
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CCW	Countryside Council for Wales
CEGB	Central Electricity Generating Board
CHMP	Cultural Heritage Management Plan
CI	Confidence Intervals
CIEEM	Chartered Institute of Ecology and Environmental Management
CiFA	Chartered Institute for Archaeology
CION	Connection and Infrastructure Options Note
CIRIA	Construction Industry Research and Information Association
CMACS	Centre for Marine and Coastal Studies

Acronym	Meaning
CMS	Construction Method Statement
CoCP	Code of Construction Practice
CRoW Act	Countryside and Rights of Way Act
CRP	Cable Route Protocol
CRTN	Calculation of Road Traffic Noise
CSIP	Cable Specification and Installation Plan
CTMP	Construction Traffic Management Plan
CV	Coefficient of Variation
DCMS	Department of Digital, Culture, Media and Sport
DCO	Development Consent Order
DDV	Drop Down Video
Defra	Department for Environment, Food & Rural Affairs
DIO	Defence Infrastructure Organisation
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DSDP	Deep Sea Drilling Project
ECMWF	European Centre for Medium-range Weather Forecasting
ECON	Ecological Consultancy Ltd
ECoW	Ecology Clerk of Works
EEA	European Economic Area
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre
EMF	Electric and Magnetic Fields
EMP	Environmental Management Plan
EMODnet	European Marine Observation and Data Network
EMS	Ecology Mitigation Strategy
EnBW	Energie Baden-Wuerttemberg
EPUK	Environmental Protection UK
ES	Environmental Statement
ESO	Electricity System Operator
EU	European Union
FCA	Flood Consequence Assessment
GEBCO	General Bathymetric Chart of the Oceans
GEMS	Geotechnical Engineering and Marine Surveys
GES	Good Environmental Status
GCN	Great Crested Newt
GLVIA3	Guidelines for Landscape and Visual Impact Assessment: Third Edition (Landscape Institute and IEMA, 2013)
GP	General Practitioner
GPS	Global Positioning System
GSI	Geological Survey Ireland
GVA	Gross Value Added

Acronym	Meaning
GWD	Groundwater Directives
HDD	Horizonal Directional Drilling
HDV	Heavy Duty Vehicle
HERs	Historic Environment Records
HGVs	Heavy Goods Vehicles
HLC	Historic Landscape Classification
HMR	Helicopter Main Route
HRA	Habitats Regulation Assessment
HSE	Health and Safety Executive
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-ionising Radiation Protection
IEEM	Institute of Ecology and Environmental Management
IEF	Important Ecological Features
IEMA	Institute of Environmental Management and Assessment
IFR	Instrument Flight Rules
IHBC	Institute of Historic Building Conservation
IMO	International Maritime Organisation
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
INNS	Invasive Non-native Species
ISO	International Standard Organisation
ITT	Invitation to Tender
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
JV	Joint Venture
LAT	Lowest Astronomical Tide
LAQM	Local Air Quality Management Technical Guidance
LF	Low Frequency
LDV	Light Duty Vehicle
LIA	Local Impact Areas
LID	Lynn and Inner Dowsing
LMP	Landscape Management Plan
LNR	Local Nature Reserve
LRN	Local Road Network
LSE	Likely Significant Effects
LWS	Local Wildlife Sites
MAFF	Ministry of Agriculture, Fisheries and Food
MarESA	Marine Evidence based Sensitivity Assessment
MarLIN	Marine Life Information Network
MBA	Marine Biological Association
MBES	Multibeam Echo Sounder

Acronym	Meaning
MCAA	Marine and Coastal Access Act
MCCs	Manual Classified Counts
MCDA	Multi Criteria Decision Analysis
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
MEDIN	Marine Environmental Data and Information Network
MHCLG	Ministry of Housing, Community and Local Government
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMG	Mercia Mudstone Group
MMO	Marine Management Organisation
MMMP	Marine Mammal Mitigation Protocol
MNCR	Marine Nature Conservation Review
MNR	Marine Nature Reserves
MoD	Ministry of Defence
MPA	Marine Protected Areas
MPCP	Marine Pollution Contingency Plan
MSFD	Marine Strategy Framework Directive
MU	Management Unit
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NCN	National Cycle Network
NE	Natural England
NERC	Natural Environment and Rural Communities
NG	National Grid
NGC	National Grid Company plc
NHS	National Health Service
NIA	National Impact Area
NIGFS	Northern Irish Ground Fish Trawl Survey
NMFS	National Marine Fisheries Service
NNR	National Nature Reserve
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
NVC	National Vegetation Classification
OESEA	Offshore Energy Strategic Environmental Assessment
OMP	Operational Management Plan
ONS	Office for National Statistics
OS	Ordnance Survey
OSP	Offshore Substation Platform

Acronym	Meaning
PCDD	Polychlorinated Dibenzo-Para-dioxins
PCDF	Polychlorinated Dibenzofurans
PCW	Phocid Carnivores in Water
PDE	Project Design Envelope
PEA	Preliminary Ecological Appraisal
PEL	Probable Effect Levels
PELTIC	Pelagic Ecosystem in the Western English Channel and Eastern Celtic Sea
PEIR	Preliminary Environmental Information Report
PEMMP	Project Environmental Monitoring and Management Programme
PEXA	Military Practice and Exercise Area
PLCM	Pennine Lower Coal Measures
POI	Point of Interconnection
PRoW	Public Rights of Way
PS	Piling Strategy
PSA	Particle Size Analysis
pSAC	Possible Special Protection Areas
PVA	Population Viability Analysis
RAF	Royal Air Force
RAG	Red, Amber, Green
RAuxAF	Royal Auxiliary Air Force
RIAA	Report to Inform Appropriate Assessment
RIGS	Regionally Important Geological Sites
RPaG	Registered Park and Garden
RSPB	Royal Society for the Protection of Birds
RUA	Robust-Utility Analysis
SAC	Special Area for Conservation
SAR	Search and Rescue
SBP	Sub-bottom Profiler
SCANS	Small Cetaceans in the European Atlantic and North Seas
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SEL	Sound Exposure Level
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMP	Soil Management Plan
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SPZ	Source Protection Zones
SRN	Strategic Road Network
SSC	Suspended Sediment Concentrations
SSG	Sherwood Sandstone Group
SSS	Sidescan Sonar

Acronym	Meaning
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
SWMP	Surface Water Management Plan
SWMP	Site Waste Management Plan
TCE	The Crown Estate
TJB	Transition Joint Bay
TSS	Traffic Separation Scheme
UHRS	Ultra-high Resolution Seismic
UK	United Kingdom
UKOOA	United Kingdom Offshore Operators Association
UKCP	UK Climate Projections
UKCS	UK Continental Shelf
UKHO	UK Hydrographic Office
UKSO	UK Soil Observatory
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMP	Vessel Management Plan
WFD	Water Framework Directive
WHS	World Heritage Site
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Units

Unit	Description
cm	Centimetre
SEL_{cum}	Cumulative Sound Exposure Level
dB	Decibels
°	Degrees
ft	Feet
GHz	Gigahertz
GW	Gigawatts
kHz	Kilohertz
km	Kilometres
km	Kilometres
km^2	Kilometres Squared
kV	Kilovolts
MW	Megawatt
m	Metres
m/s	Metres Per Second (Speed)
mg/l	Milligrams Per Litre (Concentration)
mm	Millimetre

Unit	Description
nm	Nautical Miles
SEL_{peak}	Peak Sound Exposure Level
%	Percentage
rms	Root Mean Square
m^2	Square Metre

1 Introduction

1.1 Background

1.1.1.1 Part 3, Transmission assets, of the Environmental Impact Assessment (EIA) Scoping Report, provides an introduction to the transmission assets of the Mona Offshore Wind Project, including an overview of the considerations for site selection and alternatives, and identifies the main aspects of the offshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance and decommissioning of the transmission assets.

1.1.1.2 While the proposed scope of the EIA for the generation assets and transmission assets is presented in part 2, Generation assets, of the EIA Scoping Report, and part 3, Transmission assets, of the EIA Scoping Report respectively, the Applicant is seeking a Scoping Opinion from the Secretary of State in respect of the Mona Offshore Wind Project as a whole.

1.2 Mona Offshore Wind Project transmission assets overview

1.2.1.1 The Mona Offshore Transmission Infrastructure Scoping Search Area is 1561km^2 in area and extends between the Mona Potential Array Area and the proposed landfall along the coast of north Wales. The Mona Onshore Transmission Infrastructure Scoping Search Area is 113km^2 in area and extends from the landfall to the onshore National Grid substation at Bodelwyddan. Figure 1.1 presents the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. It should be noted however that the Mona Offshore Wind Project transmission assets will be located within both the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area; the EIA Scoping for the Mona Potential Array Area is presented in part 2, Generation assets, of the EIA Scoping Report and the EIA Scoping for the Mona Offshore Transmission Infrastructure Scoping Search Area is presented in part 3, Transmission assets, of the EIA Scoping Report.

1.2.1.2 A description of the Mona Offshore Wind Project is presented in part 1, section 3: Project description, of the EIA Scoping Report. Key components of the Mona Offshore Wind Project transmission assets include:

- interconnector cables
- offshore substation platforms and associated foundations
- offshore export cables
- offshore booster substation and associated foundation
- scour protection and cable protection
- transition joint bays
- onshore export cables
- onshore substation

- Grid connection export cables.

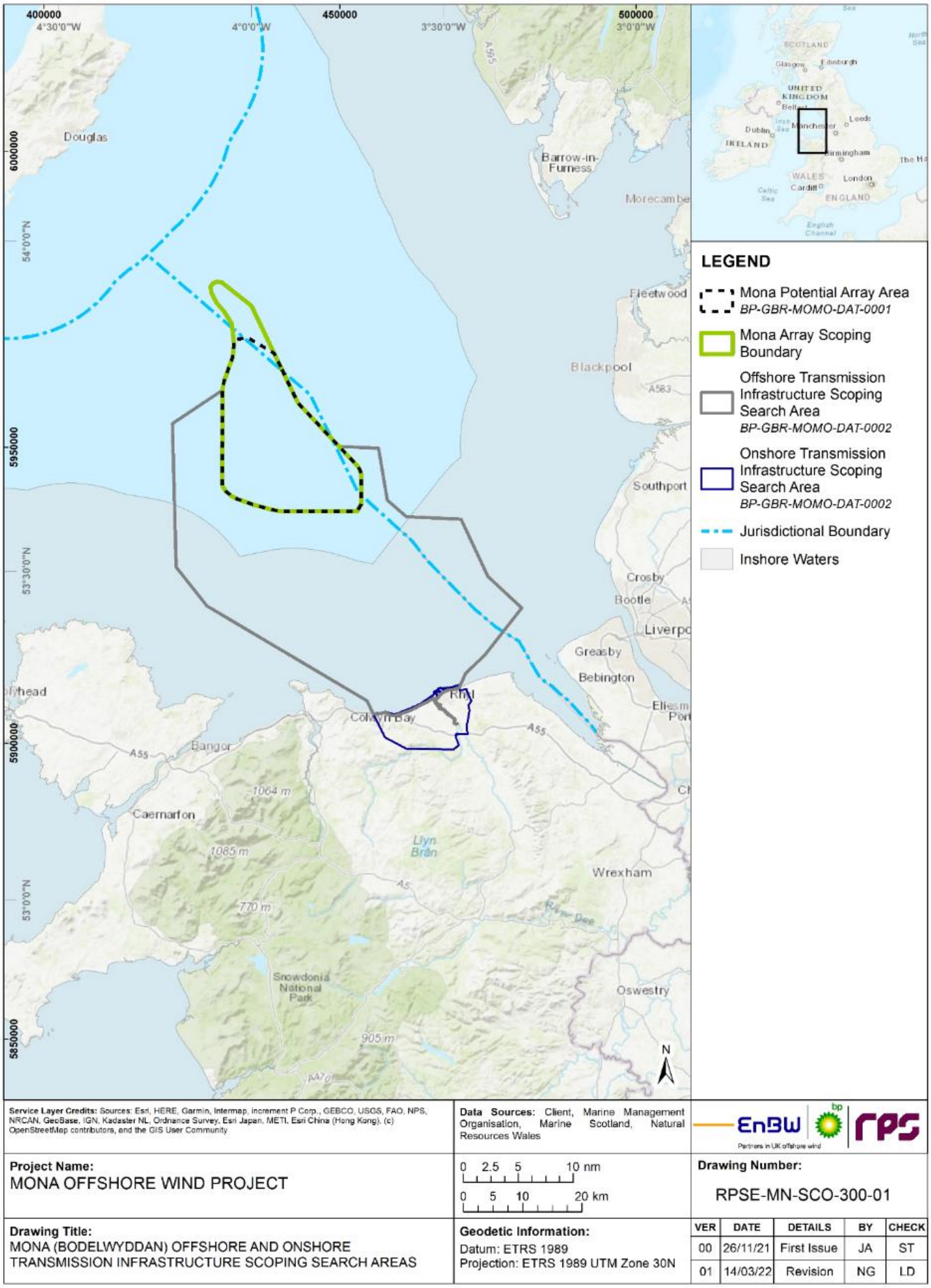


Figure 1.1: The Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area.

1.3 Structure

1.3.1.1 The structure of part 3, Transmission assets, of the EIA Scoping Report, is set out in Table 1.1. This structure has been designed for the EIA Scoping Report only, in order to enable EIA Scoping to progress in parallel with the identification of grid connection options by National Grid. The structure of the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) will be presented in offshore and onshore (and where relevant, combined) volumes considering the generation assets and transmission assets as a whole, with each topic assessment forming a separate chapter. Each topic chapter will consider the impact of the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project. The structure of the PEIR and ES is further described in part 1, section 4: EIA methodology of the EIA Scoping Report.

Table 1.1: Topics considered within part 3, Transmission assets, of the EIA Scoping Report.

Topic	Summary of Content	Section	Author
Part 3: Transmission assets			
Section 1: Introduction			
Introduction	Background to the transmission assets and what is considered within part 3 of the EIA Scoping Report.	Part 3, section 1	RPS
Section 2: Site selection and alternatives			
Site selection and alternatives	Description of the site selection process relevant to the transmission assets, including the approach proposed by the Applicant to identify the siting of the Mona Offshore Wind Project transmission assets and to the approach to consideration of reasonable alternatives.	Part 3, section 2	Wood
Section 3: Offshore physical environment			
Physical processes	Overview of the offshore physical environment (tidal elevations, currents, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Part 3, section 3.1	RPS
Underwater noise	Overview of approach to the assessment of underwater noise arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project transmission assets. Required for understanding of potential impact to underwater noise sensitive receptors such as marine mammals and fish.	Part 3, section 3.2	RPS and Seiche
Section 4: Offshore biological environment			
Benthic subtidal and intertidal ecology	Overview of the ecology of the seabed within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to seabed ecology from construction, operation and maintenance and decommissioning.	Part 3, section 4.1	RPS

Topic	Summary of Content	Section	Author
Fish and shellfish ecology	Overview of the fish and shellfish ecology of the seabed within the boundaries of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impact to fish and shellfish ecology from construction, operation and maintenance and decommissioning.	Part 3, section 4.2	RPS
Marine mammals	Overview of the marine mammals within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Part 3, section 4.3	RPS
Offshore ornithology	Overview of the ornithology features within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Part 3, section 4.4	RPS
Section 5: Offshore human environment			
Commercial fisheries	Overview of commercial fisheries within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Part 3, section 5.1	RPS and Marine Space
Shipping and navigation	Overview of the baseline shipping and navigation within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Part 3, section 5.2	RPS and NASH Maritime
Marine archaeology	Overview of marine archaeology within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Part 3, section 5.3	RPS
Other sea users	Overview of other sea users within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to other sea users from construction, operation and maintenance and decommissioning.	Part 3, section 5.4	RPS
Section 6: Onshore physical environment			
Geology and ground conditions	Overview of geology and ground conditions within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to geology and ground conditions from construction, operation and maintenance and decommissioning.	Part 3, section 6.1	RPS
Hydrology and flood risk	Overview of hydrology and flood risk within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to hydrology and flood risk from construction, operation and maintenance and decommissioning.	Part 3, section 6.2	RPS
Section 7: Onshore biological environment			

Topic	Summary of Content	Section	Author
Terrestrial ecology and intertidal birds	Overview of terrestrial ecology and intertidal birds within the vicinity of the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to terrestrial ecology and intertidal birds from construction, operation and maintenance and decommissioning.	Part 3 section 7.1	RPS
Section 8: Onshore human environment			
Historic environment	Overview of historic environment within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to historic environment from construction, operation and maintenance and decommissioning.	Part 3, section 8.1	RPS
Land use and recreation	Overview of land use and recreation receptors within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to land use and recreation from construction, operation and maintenance and decommissioning.	Part 3, section 8.2	RPS
Traffic and transport	Overview of traffic and transport within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to traffic and transport from construction, operation and maintenance and decommissioning.	Part 3, section 8.3	RPS
Noise and vibration	Overview of potential impacts of noise and vibration arising from the Mona Offshore Wind Project from construction, operation and maintenance and decommissioning.	Part 3, section 8.4	RPS
Air quality	Overview of air quality within the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to air quality from construction, operation and maintenance and decommissioning.	Part 3, section 8.5	RPS
Section 9: Offshore and onshore combined topics			
Seascape, landscape and visual resources	Overview of seascape, landscape and visual resources within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to seascape, landscape and visual resources from construction, operation and maintenance and decommissioning.	Part 3, section 9.1	RPS
Socio-economics and community	Overview of socio-economics and community within the vicinity of the Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to socio-economics and community from construction, operation and maintenance and decommissioning.	Part 3, section 9.2	RPS and Hardisty Jones
Aviation and radar	Overview of aviation and radar receptors within the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area and Mona Onshore Transmission Infrastructure Scoping Search Area. Required for understanding of potential impacts to aviation and radar from construction, operation and maintenance and decommissioning.	Part 3, section 9.3	RPS and Osprey

Topic	Summary of Content	Section	Author
Climate change	Overview of climate change receptors for the Mona Offshore Wind Project.	Part 3, section 9.4	RPS
Section 10: Other environmental topics			
Topics with supporting information	Overview of topics of relevance to the Mona Offshore Wind Project transmission assets where a technical appendix only will be provided to support the relevant technical chapters of the ES.	Part 3, section 10.1	RPS
Topics proposed to be scoped out	Justification for scoping out relevant topics for the Mona Offshore Wind Project transmission assets.	Part 3, section 10.2	RPS
Topics covered elsewhere in the ES	Overview of topics of relevance to the Mona Offshore Wind Project transmission assets that will be covered in other technical chapters of the ES and are not proposed to be subject to standalone chapters or appendices within the ES.	Part 3, section 10.3	RPS
Section 11: Summary			
Summary	Presents a summary of the potential impacts which are proposed to be scoped into and out of the EIA relevant to the transmission assets.	Part 3, section 11	RPS

2 Site selection and alternatives

2.1 Introduction

2.1.1.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) require a description of the reasonable alternatives considered by the applicant and an indication of the main reasons for selection of the chosen option, taking into account effects on the environment. The Environmental Statement (ES) will include this information.

2.1.1.2 The consideration of siting options and alternatives is iterative during an EIA process and, therefore, this process is not yet complete. This section of the Scoping Report therefore provides an overview of the process to date for the transmission assets required for the Mona Offshore Wind Project. The transmission assets include the offshore substation platforms, offshore booster substation, interconnector cables, offshore export cables, a landfall Transition Joint Bay (TJB), onshore export cables, grid connection export cables and onshore (land) substation and associated infrastructure.

2.1.1.3 The site selection process and consideration of alternatives for the Mona Array Scoping Boundary (i.e. the generation assets) is discussed in part 2, section 2: Site selection and alternatives, of the EIA Scoping Report.

2.1.1.4 The site selection process for the transmission assets to date is linked to, and has been informed by, work undertaken by National Grid ESO, who are responsible for determining the most appropriate point of connection to the national electricity transmission network via the Holistic Network Design (HND) review.

2.2 Work undertaken by National Grid ESO

2.2.1.1 Offshore wind farms in the UK are connected to the onshore national electricity transmission system via individual radial connections (i.e. with each offshore wind farm having its own connection to a point of interconnection (POI) with the national electricity transmission system on land).

2.2.1.2 The UK Government has initiated the Offshore Transmission Network Review (OTNR), which is being undertaken by the Department for Business, Energy and Industrial Strategy (BEIS) in partnership with a number of other agencies, including National Grid ESO. The OTNR, and its associated projects, is examining a whole range of technical and engineering solutions to improve the coordination of offshore wind generation connections and transmission.

2.2.1.3 The OTNR aims to ensure value for money for consumers, facilitating offshore wind's contribution to the UK's net zero targets and reducing the environmental and social impact of new onshore connections and transmission assets.

2.2.1.4 National Grid ESO is engaging with offshore wind developers to establish how this affects their anticipated connection to the national electricity transmission system. During late 2021 and early 2022, National Grid ESO considered two options for connection of the Mona Offshore Wind Project to the national electricity transmission network:

- an onshore connection i.e. a direct point to point (radial) connection (both with and without coordination with local UKR4 developers), or
- an offshore connection, coordinated with other offshore wind farm projects.

2.2.1.5 The grid connection work was the subject of National Grid ESO's HND process, which superseded the historic Connection and Infrastructure Options Note (CION) process during May 2021, to identify the most economic, minimal impact and efficient transmission infrastructure to deliver the connection.

2.2.1.6 Following an evaluation of the options, National Grid identified Bodelwyddan as the preferred POI for the Mona Offshore Wind Project, based on the system capability and required reinforcement deliverability to accept the Transmission Export Capacity (TEC) from the Mona Offshore Wind Project.

2.3 Siting and route option identification process to date

2.3.1.1 The consideration of alternatives for electrical transmission infrastructure is focused on identifying the siting and routing of infrastructure between the Mona Array Scoping Boundary and the POI, as well as any alternative design options (such as changes to the number of cables or width of cable corridor required).

2.3.1.2 The objective of any such siting process is to identify technically, economically and environmentally feasible locations for the Mona Offshore Wind Project's electrical transmission infrastructure, whilst minimising potential impacts on the existing environment and communities. This process includes identifying and evaluating alternative technology and routing options, where these would affect constructability and the environment. The design and siting process will be iterative, based on the findings of the EIA work undertaken (such as survey results) and on feedback from stakeholders.

2.3.1.3 Broadly, the process to date has included the following stages.

- Identification of the POI by National Grid ESO (Bodelwyddan).
- Identification of the likely technical/engineering requirements for the transmission infrastructure for the Mona Offshore Wind Project. This includes the likely type and dimensions of the infrastructure required, which in turn informs the land availability requirements for site selection.
- The identification of a path of least resistance through environmental, technical and social constraints. The constraints identified and evaluation process will be reported in the PEIR. The main constraints relevant to the Mona Offshore Wind Project are detailed in sections 2.3.2 and 2.3.3.
- Alternative routes were then developed to connect the generation infrastructure associated with the Mona Offshore Wind Project, to the Bodelwyddan National Grid POI. These alternative routes identified

different pathways through the constraints map, each route seeking an alternative path of least environmental, technical and social resistance. The identification of a preferred route and the process underpinning this will be presented in the PEIR.

- The offshore and onshore search areas were identified by enveloping the potentially feasible routes and associated infrastructure locations, inclusive of easements for construction and mitigation, which relate to the Bodelwyddan POI.

2.3.1.4 The onshore and offshore search areas for the transmission assets are shown on Figure 2.1 and described below and are the areas considered within this EIA Scoping Report.

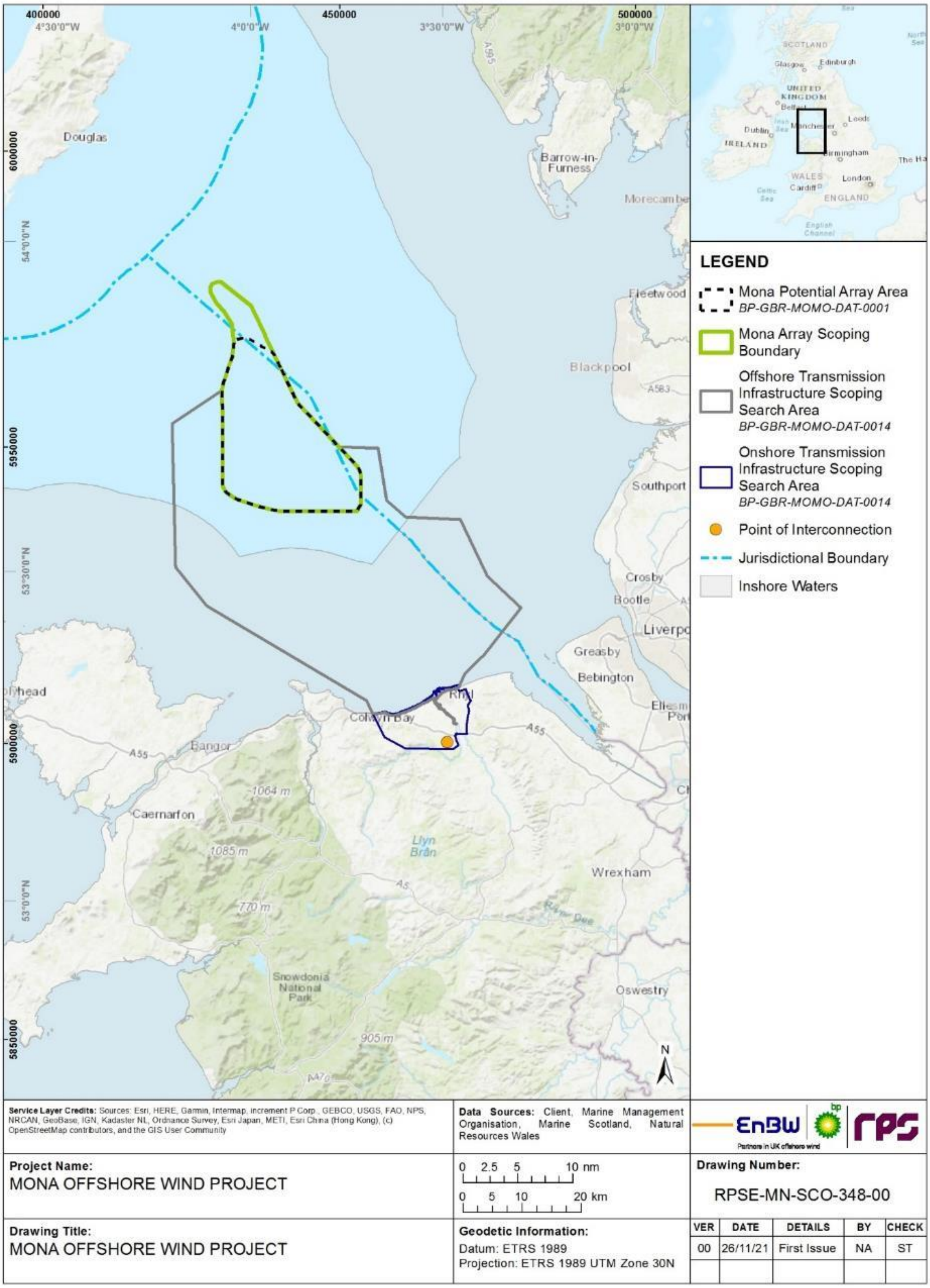


Figure 2.1: The Mona Onshore and Offshore Transmission Infrastructure Scoping Search Areas.

2.3.2 Constraints influencing the identification of potential locations for the Mona Onshore Transmission Infrastructure

2.3.2.1 As outlined in Section 1.2, the search area for the onshore transmission assets (the Mona Onshore Transmission Infrastructure Scoping Search Area) identifies the area within which potentially feasible routes for cables and associated infrastructure could be located, between the point of landfall and the onshore National Grid substation at Bodelwyddan.

2.3.2.2 The key drivers in influencing the initial set of potentially feasible routes for cables and associated infrastructure within the Mona Onshore Transmission Infrastructure Scoping Search Area were the presence of ‘hard constraints’ that would exclude the siting and routing of electrical transmission infrastructure, including but not limited to, the following:

- Urban areas, including residential and industrial developments, particularly (though not exclusively) around Llandulas, Abergele, Kinmele Bay, Rhyl, and Prestatyn.
- Wider infrastructure, including areas of existing resource use and utilities.
- Historic and active landfill sites, historic monuments and listed buildings.

2.3.2.3 Some hard constraints (e.g. settlements) have been included within the Mona Onshore Transmission Infrastructure Scoping Search Area but will be avoided during the final cable route selection process.

2.3.2.4 Further drivers in influencing the initial set of potentially feasible routes for cables and associated infrastructure within the Mona Onshore Transmission Infrastructure Scoping Search Area were the distribution of ‘soft constraints’ that would pose environmental, user and/ or engineering risk or challenges. These were identified as constraints to be avoided where possible, or mitigated by minimising interaction where avoidance is not possible, and include the following.

- Linear infrastructure, such as the A55, A525, A547, and A548, as well as B-roads and local access roads.
- Natural features, including the estuarine River Dee that limits the Mona Onshore Transmission Infrastructure Scoping Search Area to the north-east, the centrally located River Clywdd and its tributaries, and the River Dulas to the west.
- International nature conservation designations (with a terrestrial component), including the Dee Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site.
- National nature conservation designations (with a terrestrial component), including the Llandulas Limestone and Gwyrych Castle Wood Site of Special Scientific Interest (SSSI), Coed y Gopa SSSI, and Traeth Pensarn SSSI, Prestatyn Hillside SSSI, Graig Fawr SSSI, Moel Hiraddug A Bryn Gop SSSI, Maes Hiraddug SSSI, Gronant Dunes and Talacre Warren SSSI.

- National and Local Nature Reserves (Gronant Dunes Local Nature Reserve (LNR), Kinmel Dunes LNR, Brickfield Pond LNR and Rhuddlan Pond LNR).
- Flood risk zones surrounding the River Clwyd.
- A Source Protection Zones (SPZ) to the south-east of Dyserth
- Several ancient woodland sites.
- Some historic landfill sites (Llanddulas, outside of Abergele and Kinmel Bay).

2.3.3 Constraints influencing the identification of the Mona Offshore Transmission Infrastructure

2.3.3.1 The search area for the offshore transmission assets (the Mona Offshore Transmission Infrastructure Scoping Search Area) identifies the area between the Mona Array Scoping Boundary and the landfall site, within which potentially feasible offshore export cables and offshore booster substation options could be located.

2.3.3.2 The key drivers in influencing potentially feasible offshore export cable routes were the distribution of 'hard constraints'. These include the existing Burbo Bank offshore wind site and areas of existing resource use like the 'Liverpool Bay' marine aggregate extraction Area 457.

2.3.3.3 Further drivers in influencing the potentially feasible offshore export cable routes were the distribution of 'soft constraints' that would pose environmental, user and/or engineering risk and challenges. These are considered to be constraints to be avoided where possible, or mitigated by minimising interaction where avoidance is not possible, and include the following.

- International nature conservation designations (with a marine component), including the Menai Strait and Conwy Bay SAC, North Anglesey Marine SAC, Dee estuary SAC, SPA and Ramsar, and Liverpool Bay SPA.
- National nature conservation designations (with a marine component), including the Liverpool Bay Marine Protected Area (MPA).
- Designated shellfish waters in the Dee Estuary and at Llanddulas.
- Two major shipping routes and traffic separation scheme serving the Port of Liverpool.
- Several areas of elevated potential for the presence of Unexploded Ordnance (UXO).

2.4 Ongoing siting and routing process

2.4.1.1 The Applicant is undertaking a process to review and refine the initial potentially feasible cable route and associated electrical infrastructure alignments and locations for the Mona Offshore Wind Project. This refinement and review process is taking place on options which are wholly contained within the Mona Offshore Wind Project onshore and offshore transmission infrastructure Scoping Search Areas. The planned refinement and review process will involve the introduction of weighted environmental and socio-economic constraints and more detailed consideration of construction risks which will lead to the development of preferred cable corridors and associated electrical transmission infrastructure locations. The process will seek to minimise conflict with engineering, environmental and community constraints. The process followed will be reported in the PEIR for the Mona Offshore Wind Project. The following sections outline the guiding principles.

2.4.2 Offshore export cable route corridor

2.4.2.1 In order to connect the power generated by the offshore turbine arrays to the onshore electrical transmission cables, offshore export cables must be installed in the seabed.

2.4.2.2 As the Mona Offshore Wind Project and the design of the offshore turbine array layout evolves, the offshore routing corridors will be developed to account for the identified offshore substation locations within the array and the identified landfall location(s) and the outcome of further technical feasibility studies and surveys.

2.4.2.3 The site selection process will adhere to the principles in key guidance documents, such as Natural Resources Wales advice for offshore cabling and the Crown Estate's cable route protocol and considerations highlighted within the relevant National Policy Statements. In addition, the site selection for the offshore electrical transmission cable corridors will be guided by a further set of commitments intended to mitigate environmental impacts through design. The key criteria being applied in the site selection process are as follows.

- Avoiding, where possible:
  - existing offshore wind and marine aggregate extraction lease areas
  - close proximity to existing oil and gas infrastructure
  - shallow rock substrate that would pose engineering challenges.
- Ensuring:
  - the minimal crossing of linear subsea features such as existing subsea cables and pipelines. This is to reduce risk associated with the need for the installation and maintenance of cable protection at cable crossings
  - consideration of the geophysical context including coastal mobility, shallow rock substrate, seabed topography and bathymetric features
  - minimal interaction of the route with nature conservation designations where possible
  - minimal interaction with busy shipping lanes and traffic separation schemes both during installation and operational maintenance.

2.4.3 Landfall

2.4.3.1 In order to connect the Mona Offshore Wind Project to the national electricity transmission network, the onshore and offshore export cables must meet, via a landfall site. The exact location of the landfall is not yet determined, but it will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area. The indicative criteria to be applied in the site selection process are as follows:

- Avoiding, where possible:
  - proximity to existing properties including urban areas and industrial sites
  - proximity to any known planned developments
  - proximity to existing infrastructure and public rights of way
  - proximity to nature conservation designations
  - proximity to, and viewpoints from heritage and landscape designations
  - unnecessary crossings of linear features such as roads, railways, public rights of way, natural features such as rivers and nearshore cables.
- Ensuring:
  - availability of adequate space and site suitability for landfall construction including adequate working areas for cable installation, jointing bays and cable pull-in and construction compounds
  - availability of appropriate site access routes for construction vehicles and later operation and maintenance access
  - consideration that the nearshore cable installation is technically feasible within the confines of the identified constraints.

2.4.4 Onshore electrical transmission cable corridors

2.4.4.1 The Mona Offshore Wind Project will require onshore electrical transmission cables to bring the power from the landfall site to the onshore substation. The exact location of the onshore electrical transmission cable corridor is not yet defined but it will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area.

2.4.4.2 The site selection and routing process will adhere to the principles in key guidance documents, such as the Horlock and Holford Rules as adhered to by National Grid, and considerations highlighted within the relevant National Policy Statements. The key criteria that are being applied in the identification of the possible onshore cable corridor options are as follows.

- Avoiding, where possible:
  - immediate proximity to existing properties including urban areas and industrial sites
  - significant topographical slopes and shallow rock substrate that would pose engineering challenges
  - unnecessary crossings of linear features such as roads, railways, public rights of way and rivers to reduce the potential for disturbance to users and habitats.
- Ensuring:
  - the use of non-trenched technologies such as horizontal directional drilling (HDD) is considered throughout the routing of the electrical cable corridor to reduce the potential for environmental impacts

  - the use of buried cables is prioritised, to reduce the potential for permanent landscape effects that can be associated with pylons and overhead lines
  - minimal crossing of natural features, such as water bodies including estuaries, rivers, and streams
  - minimal interaction of the route with nature conservation designations
  - adequate access for construction, inspection and maintenance.

2.4.5 Onshore substation site

2.4.5.1 In order to connect the Mona Offshore Wind Project to the National Grid network, a new onshore substation will be built in proximity to the existing Bodelwyddan substation. The exact location of the new substation is not yet determined, but it will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area. The siting process will also consider the requirement for a 400kV link from the new Mona Offshore Wind Project substation to the National Grid Bodelwyddan substation.

2.4.5.2 Indicative criteria to be applied in the site selection process for the onshore substation site are as follows.

- Avoiding where possible:
  - immediate proximity to existing properties, including urban areas and industrial sites
  - proximity to any known planned developments, as identified through review of national and local planning portals
  - intersection with existing infrastructure and public rights of way
  - avoidance of designated sites and environmentally sensitive areas.
- Ensuring:
  - availability of adequate space and site suitability for substation construction
  - availability of appropriate site access routes for construction vehicles and later operation and maintenance access
  - minimal proximity to nature conservation designations
  - Minimal proximity to, and viewpoints from heritage and landscape designations.

2.4.5.3 The final location will be identified through further site visits, surveys, technical feasibility studies and stakeholder consultation feedback.

2.5 Next steps

2.5.1.1 The outcome of the refinement of the cable routing and site selection process for the electrical transmission infrastructure will be used to inform the Preliminary Environmental Impact Report (PEIR), which will be the subject of statutory consultation. Feedback received will be incorporated into final decision making on route corridors and infrastructure location options (where options remained at the PEIR stage). Any further refinements will inform the selection of a final cable route and substation design. This will form the subject of the assessment presented in the ES and the subject of the application for development consent.

3 Offshore physical environment

3.1 Physical processes

3.1.1 Introduction

3.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the elements of physical processes of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets.

3.1.1.2 For the purposes of this EIA Scoping Report and subsequent Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES), physical processes are defined as encompassing the following elements:

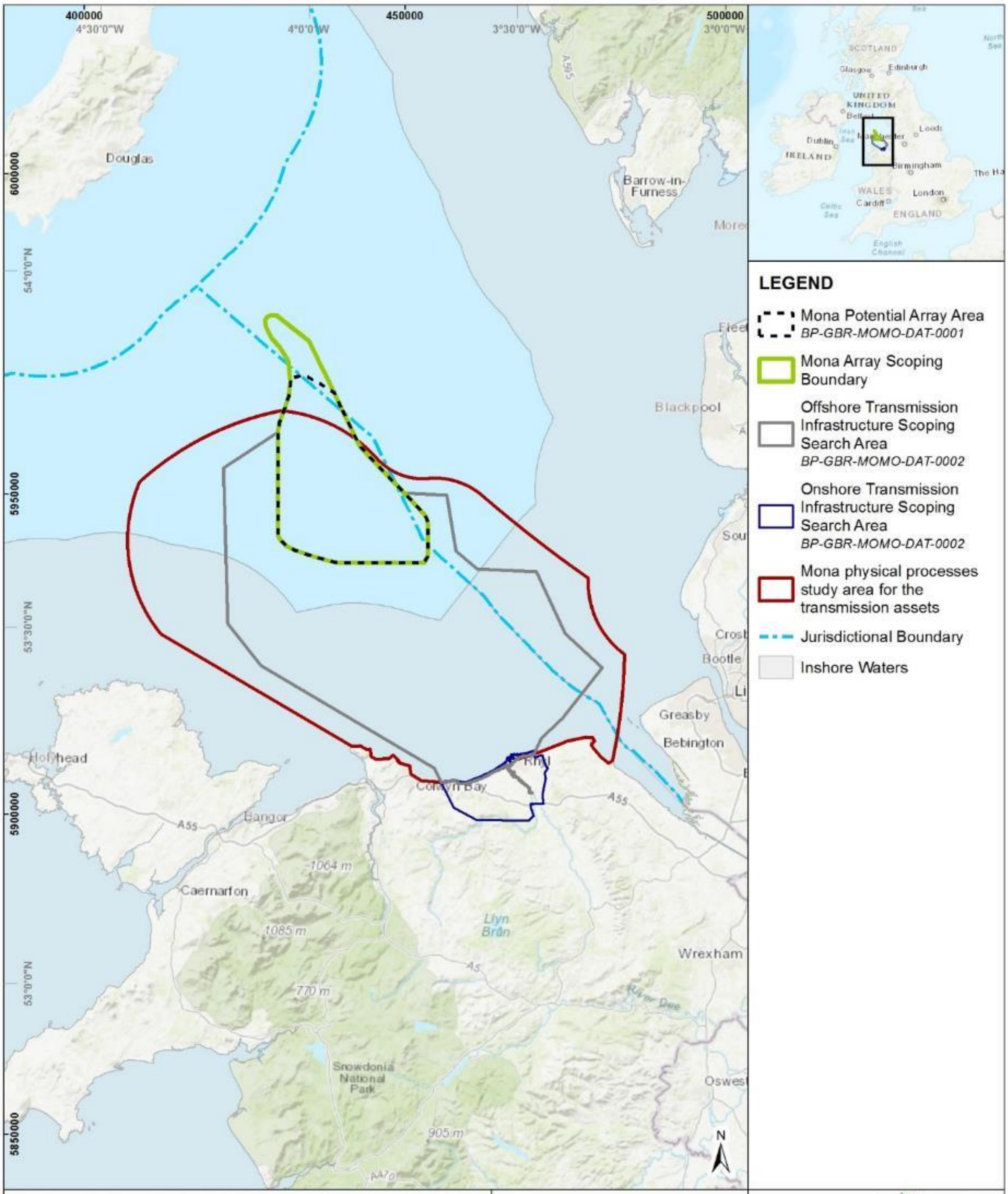
- bathymetry
- waves
- tidal elevations and currents
- geology
- seabed substrate
- suspended sediments
- sediment transport.

3.1.1.3 The parameters listed above are collectively referred to as 'physical processes' though the remainder of this EIA Scoping Report.

3.1.2 Study area

3.1.2.1 The Mona physical processes study area for the transmission assets is defined as the area encompassing the Mona Offshore Transmission Infrastructure Scoping Search Area plus a buffer of one tidal excursion (Figure 3.1). This is the predicted Zone Of Influence (ZOI) of the Mona transmission assets as the maximum distance suspended sediments would travel from the Mona Offshore Transmission Infrastructure Scoping Search Area in one tidal cycle prior to deposition on slack water (ABPmer, 2018).

3.1.2.2 The Mona physical processes study area for the transmission assets forms the focus for the assessment however the numerical modelling will provide predictions of effects over a wider area then the Mona physical processes study area for the transmission assets for waves, tidal elevation and currents, suspended sediments and sediment transport over multiple tidal cycles. The assessment will therefore also identify any potential impacts that may occur beyond the Mona physical processes study area for the transmission assets.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, Marine Management Organisation, Marine Scotland, Natural Resources Wales

Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 nm
0 5 10 20 km

Drawing Number:
RPSE-MN-SCO-313-01

Drawing Title:
MONA PHYSICAL PROCESSES STUDY AREA FOR THE TRANSMISSION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	03/12/21	First Issue	NG	ST
01	08/03/22	Revision	NA	ST

Figure 3.1: The Mona physical processes study area for the transmission assets.

3.1.3 Data sources

Desktop data

3.1.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of sources which provide coverage of the Mona physical processes study area for the transmission assets and provide information for the numerical model study. These are summarised in Table 3.1.

Table 3.1: Summary of key desktop datasets and reports.

Title	Source	Year	Author
European Marine Observation and Data Network (EMODnet)	EMODnet	2020	EMODnet
ABPmer Data exporer	ABPmer	2018	ABPmer
Hydrography of the Irish Sea, SEA6 Technical Report,	UK Government	2005	Howarth M.J.
Atlas of UK Marine Renewable Energy Resources	ABPmer	2008	ABPmer
Geology of the seabed and shallow subsurface: The Irish Sea.	British Geological Survey (BGS)	2015	Mellett *et al.*
Suspended Sediment Climatologies around the UK.	Department for Business, Energy and Industrial Strategy (BEIS)	2016	Cefas
Metocean data collection for the Ormonde offshore wind project	Marine Data Exchange	2011	Geotechnical Engineering and Marine Surveys (GEMS)
Irish Sea Zone Hydrodynamic measurment campaign	Marine Data Exchange	2010-2013	EMU Ltd (now Fugro Ltd)
Admiralty Tide Tables	UK Hydrographics Office (UKHO)	2021	UKHO
Marine Enviornmental Data and Information Network (MEDIN) Seabed Mapping Programme	Admiralty Marine Data Portal	2021	MEDIN
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Seabed Mapping Programme	Geological Survey Ireland (GSI) and Marine Institute	2021	INFOMAR
Long term wind and wave datasets	Eurpoean Centre for Medium-range Weather Forecasting (ECMWF)	2021	ECMWF
UK tide gauge network and database of current observation	British Oceanographic Data Centre (BODC)	2021	BODC
UK Climate Projections (UKCP)	Met Office	2018	Met Office
A user-friendly database of coastal flooding in the United Kingdom from 1915–2014	Scientific Data scientific journal	2015	Haigh *et al.*
Biritish Oceanographic Data Centre	National Oceanography Centre	various	National Oceanography Centre
Review of aggregate dredging off the Welsh coast	HR Wallingford	2016	HR Wallingford

Site specific survey data

3.1.3.2 To support the acquisition of physical processes data, there are surveys planned for spring/summer 2022, which include:

- Geophysical surveys across a refined area within the Mona Offshore Transmission Infrastructure Scoping Search Area. The aims of this survey will include:
  - Bathymetric data to determine site topography, gradients and a baseline to inform foundation design and cable installation using multibeam echo sounder (MBES).
  - High-resolution sidescan sonar (SSS) data to determine seabed features and the presence of boulders, seabed sediments and debris.
  - High-resolution sub-bottom profiler (SBP) data to determine the shallow sub-surface soil conditions that may influence foundation design and cable installation such as boulders and shallow geology features.
  - Multichannel 2D ultra-high resolution seismic (UHRS) data to windfarm infrastructure foundation depth to determine the deeper sub-surface soil conditions.
- A subtidal benthic ecology surveys across a refined area within the Mona Offshore Transmission Infrastructure Scoping Search Area to provide an overview of the seabed sediment composition to support the characterisation of the subtidal environment.
- A metocean buoy has been deployed within the Mona Potential Array Area, the data collected from which will also inform the assessment of the Mona Offshore Wind Project transmission assets.
- A phase 1 intertidal walkover survey will be undertaken at the selected landfall location (a refined area within the intertidal section of the Mona Offshore Transmission Infrastructure Scoping Search Area). The survey will provide an overview of the nature of the foreshore area, including a review of sediments, evidence of erosion/deposition or littoral sediment transport and any defence assets present. Photographs will be gathered to support the characterisation of the landfall area.

3.1.4 Baseline environment

3.1.4.1 The Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 3.1: Physical Processes of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and any offshore booster substations will be located.

Bathymetry

3.1.4.2 The bathymetry of the Mona physical processes study area for the transmission assets is relatively consistent. Depths within the Mona physical processes study area for the transmission assets vary from 29 to 45m relative to Lowest Astronomical Tide (LAT) up to 15km from the coast. Depths then decrease gradually to the landfall (Figure 3.2). In the southwest of the Mona physical processes study area for the transmission assets, 7.5km from the coast, there is a 2km wide, 8m high ridge with depths reduced to 6m below LAT at the top of the ridge (EMODnet, 2020).

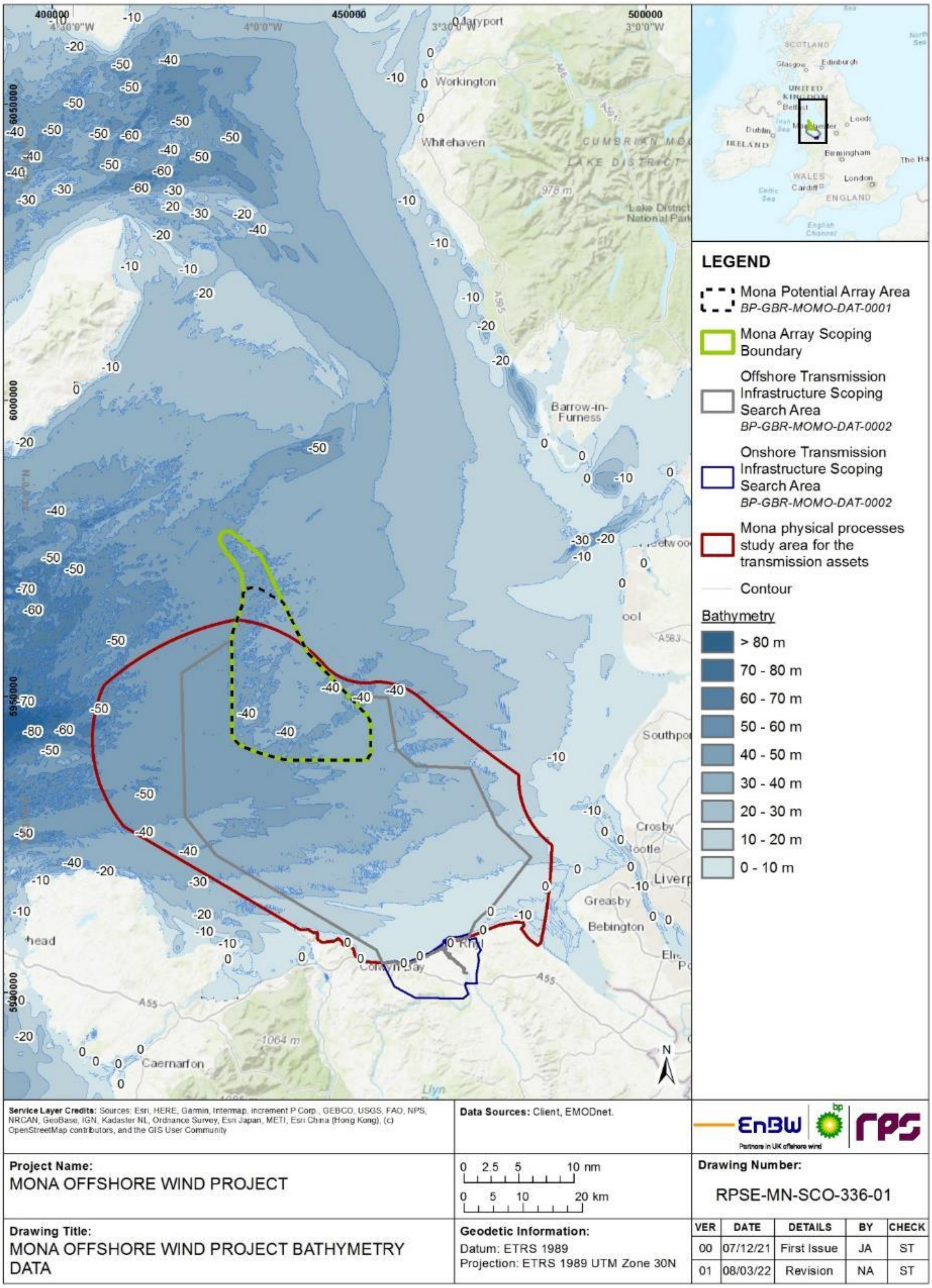


Figure 3.2: The Mona physical processes study area for the transmission assets with bathymetry data (EMODnet, 2020).

Waves

3.1.4.3 Waves in the Irish Sea are highest to the southwest of the Isle of Man with the highest mean annual significant wave height of 1.39m recorded between the Isle of Man and Anglesey. Significant wave height is reduced closer to the coast with the lowest significant wave height of 0.73m recorded to the west of the Dee Estuary (ABPmer, 2008).

3.1.4.4 Mean annual wave height in the Mona physical processes study area for the transmission assets ranges from 0.4m near the coast to 1.3m near the Mona Potential Array Area. Over 40% of the waves near the Mona Potential Array Area arise from the southwest with all significant wave heights (>4m) arriving from the southwest or west. Near the coast, over 30% of the waves arise from the northwest with significant wave heights not typically reaching over 2m (ABPmer, 2018).

3.1.4.5 Metocean buoys were deployed within the Ormonde offshore wind project in 2010, to the east of the Mona physical processes study area for the transmission assets. Waves were recorded with a dominant direction from the southwest, with the majority of the waves originating from the open sea. Significant wave heights ranged from 0.06m to 5.95m, with a maximum wave height of 14.22m recorded in November 2010 (GEMS, 2011).

3.1.4.6 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. The campaign recorded significant wave heights of over 6m in October, November and December with the maximum wave height recorded at 9.8m. The most commonly occurring wave direction was from the southwest (EMU, 2013).

3.1.4.7 Within the Physical processes ES chapter, a detailed baseline will be presented which will provide an overview of the wave regime within the region and specific to the Mona Offshore Wind Project, utilising data collected from the deployed metocean buoys.

Tidal currents and elevation

3.1.4.8 An understanding of the tidal currents provides an insight into the patterns and rates of naturally occurring sediment transport. Currents are primarily driven by tides with a residual component generally dominated by storm driven currents (Ramsay and Brampton, 2000).

3.1.4.9 The semi-diurnal tides are the dominant physical process in the Irish Sea moving into the Irish Sea from the Atlantic Ocean through both the North Channel and St. George's Channel. The tidal range in the Irish Sea is highly variable with the range in Liverpool Bay exceeding 10m on the largest spring tides, the second largest in the Britain. Mean tidal elevation over the Irish Sea is highest around the English Coast with average tidal elevations of 3m (m^2 tidal elevation amplitude in metres). Tidal elevation decreases out to the Isle of Man with average tidal elevations of between 2m and 2.5m over the Mona physical processes study area for the transmission assets (Howarth, 2005).

3.1.4.10 Tidal currents in the Irish Sea are strongest around the north of Anglesey with a mean spring peak flow of 2.8m/s. Tidal currents in the Irish Sea are also strong between the Isle of Man and Scotland with a mean spring peak flow of 2m/s. Tidal currents within the Mona physical processes study area for the transmission assets are lower with a mean spring peak flow of between 1.1m/s and 0.15m/s. Tidal currents range from the fastest currents in the north near the Mona Potential Array Area to the slowest current in the south of the Mona physical processes study area for the transmission assets near the coast (ABPmer, 2008).

3.1.4.11 The Ormonde offshore wind project metocean buoys deployed near the coast to the east of the Mona physical processes study area for the transmission assets, recorded a maximum current speed of 0.85m/s in March 2011 with an average speed of 0.30m/s. The major current axis flowed in an east/northwest direction (GEMS, 2011).

3.1.4.12 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. The highest tidal range observed was 8.71m. The minimum tidal range observed was 6.40m. The tidal current direction varied across the zone, with the greatest differences occurring from the southwest of the zone with an observed depth averaged flood and ebb bearing of 56°/236°, to the southeast corner of the zone with a depth averaged flood bearing of 102°/282°. The maximum current speed recorded was 1.7m/s (EMU, 2013).

Geology

3.1.4.13 Information on the geology of the Mona physical processes study area for the transmission assets allows for an understanding of the origin and stability of the seabed, and the geology which will be encountered during the installation of the Mona Offshore Wind Project transmission assets.

3.1.4.14 The predominant bedrock lithologies in the region are Triassic and Carboniferous sandstone and mudstone (Mellett *et al.,* 2015). The bedrock is covered by sediments of Quaternary age (<2.6 million years old) over much of the Irish Sea area, with only small areas of exposed bedrock. Quaternary sediment thickness exceeds 50m in the eastern and western Irish Sea. Quaternary sediment thickness is generally <20m in the central Irish Sea although relict glacial valleys can cause it to increase to >100 m over a short distance (Mellett *et al.,* 2015). The uppermost surface of the bedrock underlying the Quaternary sediment has potentially been weathered during the last glacial period and may be weaker than the underlying rock (Mellett *et al.,* 2015).

Seabed substrate

3.1.4.15 Bedforms show a high degree of variability in the Irish Sea and can range from very small ripples (5cm high) to very large sediment waves (>10m high). The largest are found to the west of the Isle of Man and Anglesey however, there are several bedform banks in the central Irish Sea, forming a boundary between the east Irish mud belt and the central gravel belt (Mellett *et al*., 2015).

3.1.4.16 Seabed sediments are subdivided into regions of soft mud- (clay and silt) rich sediment in the eastern and western Irish Sea and a central gravel belt comprising coarse sand and gravel. Small areas of bedrock outcrop at the seabed have also been recorded. The Mona Offshore Transmission

Infrastructure Scoping Search Area sits within the central Irish Sea gravel belt (Mellett *et al*., 2015).

3.1.4.17 Seabed sediments within the Mona physical processes study area for the transmission assets are dominated by circalittoral coarse sediment and circalittoral mixed sediment with areas of circalittoral rock and circalittoral sand. Nearer the coast, the sediments grade into fine sand or muddy sand. (EMODnet, 2019). Further detail on the seabed substrate is presented in section 4.1.

Sediment transport and suspended sediment

3.1.4.18 The Cefas Climatology Report 2016 (Cefas, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UK continental shelf (UKCS). Between 1998 and 2005, the greatest plumes are associated with large rivers such as the Thames Estuary, The Wash and Liverpool Bay, which show mean values of SPM above 30mg/l. Based on the data provided within this study, the SPM within the Mona physical processes study area for the transmission assets has been estimated as approximately 2mg/l to 10mg/l over the 1998 to 2005 period. Higher levels of SPM are experienced more commonly in the winter months; however, due to the tidal influence, even during summer months the levels remain elevated.

3.1.4.19 The principal mechanisms governing suspended sediment concentrations (SSC) in the water column are tidal currents, with fluctuations observed across the spring-neap cycle and across the different tidal stages (high water, peak ebb, low water, peak flood) observed throughout both datasets. It is key to note that SSCs can also be temporarily elevated by wave driven currents during storm events. During high-energy storm events, levels of SSC can rise significantly, both near bed and extending into the water column. Following storm events, SSC levels will gradually decrease to baseline conditions, regulated by the ambient regional tidal regimes. The seasonal nature and frequency of storm events supports a broadly seasonal pattern for SSC levels.

3.1.4.20 Sediments in the Irish Sea have been reported, on average, to experience mobilisation 35% of the time during a year (Coughlan *et al*., 2021). Sediments in the east Irish Sea have been reported to experience 5-95% sediment mobility with the highest mobility around Morecambe Bay, Solway Firth and around the north coast of Anglesey (Coughlan *et al*., 2021). The 2012 report commissioned by Celtic Array as part of the Zonal Appraisal and Planning process reported that in the east Irish Sea, sediment suspension and transport are mainly driven by tidal currents. Sediment transport was reported to be of a net northeasterly and easterly transport pathway into Liverpool Bay (Celtic Array Ltd., 2014).

3.1.4.21 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. Mean SSC near the seabed ranged from 4.3mg/l to 23.6mg/l. Maximum SSC were recorded at 48mg/l (EMU, 2013). Mean SSC in the water column ranged from 1.6mg/l to 55.8mg/l (EMU, 2013).

Designated sites

3.1.4.22 The identification of sites designated for their conservation value for inclusion in the Physical processes ES chapter was carried out as follows:

- Sites with relevant qualifying features which overlap with the Mona Offshore Transmission Infrastructure Scoping Search Area were screened in for further assessment.
- Sites with relevant qualifying features, which are located within the likely Zone Of Influence (ZOI) of effects associated with the Mona Offshore Transmission Infrastructure Scoping Search Area were screened in for further assessment. The likely ZOI is encapsulated by the Mona physical processes study area for the transmission assets and has been determined through a review of the potential impacts associated with the Mona Offshore Wind Project. This ensures that all designated sites and their features potentially affected by changes in water quality (e.g. increased suspended sediment concentrations) and potential changes to the hydrodynamic regime are included in the physical processes assessment.

3.1.4.23 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay Special Area of Conservation (SAC) and the Dee Estuary Ramsar and Site of Special Scientific Interest (SSSI) and the Traeth Pensarn SSSI overlap with the Mona physical processes study area for the transmission assets. The designated sites which have therefore been screened in for consideration in the Physical processes ES chapter comprise of European sites (i.e. SACs, Ramsar), and nationally designated sites (i.e. SSSIs; Table 3.2, Figure 3.3).

3.1.4.24 Information to support a full screening of European sites with qualifying physical processes interest features will be provided in the Habitats Regulation Assessment (HRA) Screening Report. Relevant features screened in will be fully considered and assessed in the Physical processes ES chapter, with the information to support the assessment on European sites and features provided in the Report to Inform Appropriate Assessment (RIAA). A preliminary screening of relevant Marine Conservation Zones (MCZs) has been included in part 4, Annex C: MCZ Screening of the EIA Scoping Report.

Table 3.2: Summary of designated sites with relevant physical processes features within the Mona physical processes study area for the transmission assets.

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC	0	• Sandbanks which are slightly covered by sea water all the time • Mudflats and sandflats not covered by seawater at low tide • Reef • Large shallow inlets and bays • Submerged or partially submerged sea caves

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features
Traeth Pensarn SSSI	0	• Vegetated shingle bank
Dee Estuary Ramsar	6.6	• Estuaries • Mudflats and sandflats not covered by seawater at low tide • Vegetated sea cliffs of the Atlantic and Baltic coasts • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-*Puccinellietalia maritimae*)
Dee Estuary SSSI	6.6	• Intertidal mud and sandflats • Saltmarsh

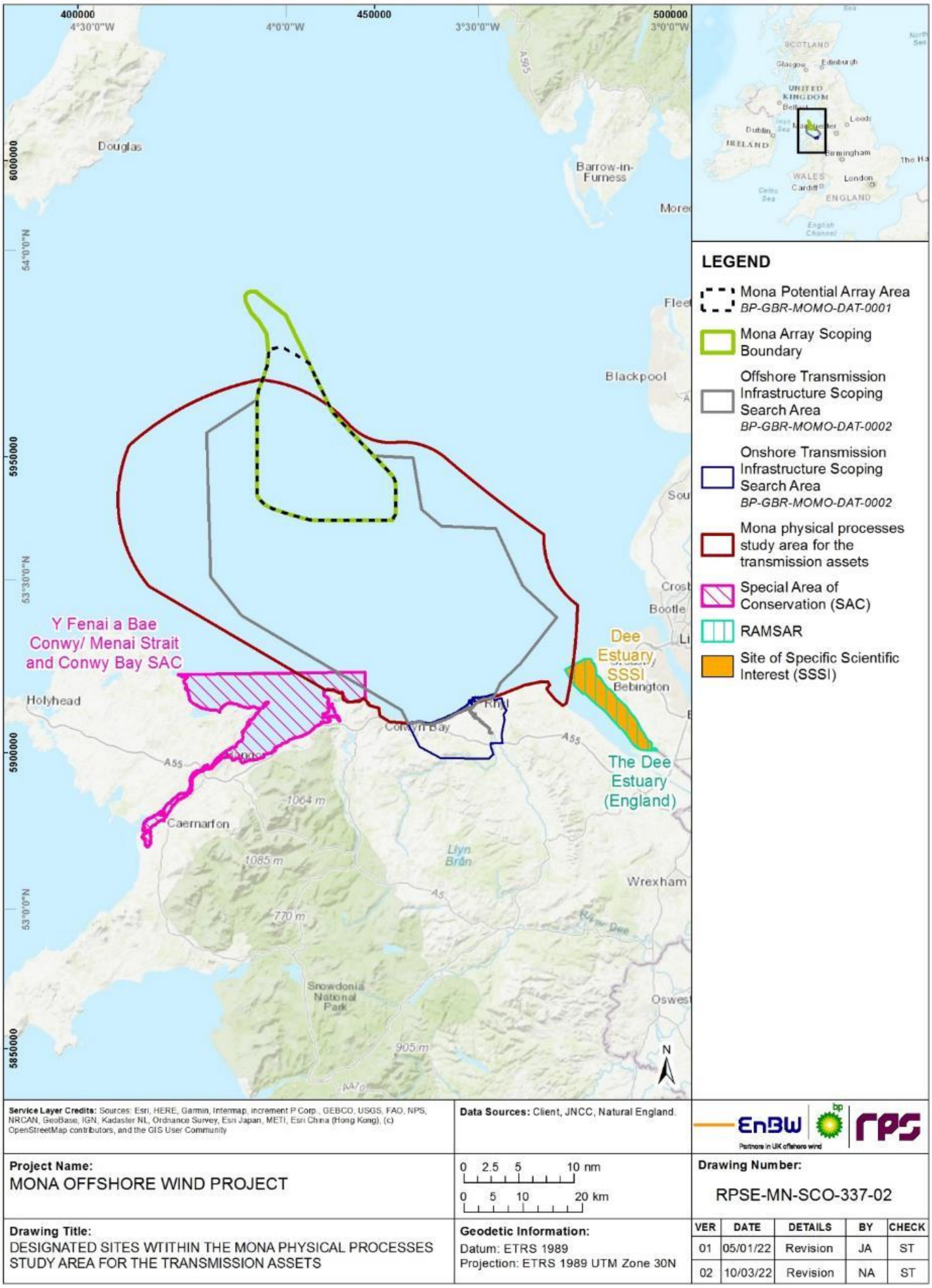


Figure 3.3: Sites designated for their nature conservation value (with features of relevance to physical processes) which overlap with the Mona physical processes study area for the transmission assets.

3.1.5 Potential project impacts

3.1.5.1 A range of potential impacts on physical processes have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project transmission assets.

3.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 3.3 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

3.1.5.3 Potential impacts scoped out of the assessment are presented in Table 3.4, with justification.

Table 3.3: Impacts proposed to be scoped into the project assessment for physical processes (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	The interaction of the OSP and offshore booster substation foundations and associated infrastructure with the wave regime has the potential to impact upon adjacent physical coastal features and sediment transport.	Data to be collected during the 2022 geophysical and benthic ecology site-specific survey campaigns will support the development of the physical processes numerical modelling. Data collected from the metocean buoys will also be utilised. A detailed desktop data review will be undertaken to gather other relevant data which will support the assessment. An overview of this is presented in section 3.1.3.	The potential impact of the Mona Offshore Wind Project transmission assets on coastal features and sediment transport will be informed by the physical processes numerical modelling detailed in section □. A qualitative assessment of impact on key coastal features will be presented within the Physical processes ES chapter.
Increase in suspended sediments due to construction, operation and maintenance, and decommissioning related activities, and the potential impact to physical features.	✓	✓	✓	There is potential for increased SSCs and deposition associated with seabed preparation activities, foundation installation and cable installation activities, from maintenance activities such as export cable repairs and deposition associated with decommissioning activities.		Numerical modelling (see details in section □) will be undertaken to provide an overview of the potential impacts to physical processes relating to the various activities of the Mona Offshore Wind Project transmission assets. This assessment will consider the potential impacts arising due to changes in SSC and deposition on physical processes and sediment transport. Elevations in SSC and subsequent deposition of disturbed sediments also have the potential to result in adverse and indirect impacts on receptors for other offshore topics, such as benthic subtidal and intertidal ecology, fish and shellfish ecology, marine mammals, marine archaeology and infrastructure and other users. For these receptor groups significance of effect for direct and indirect impacts will not be assigned within the physical processes assessment.
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	The interaction of the OSP and offshore booster substation foundations and scour and cable protection with the tidal regime has the potential to impact upon adjacent physical coastal features and sediment transport.		The potential impact of the Mona Offshore Wind Project transmission assets on coastal features and sediment transport will be informed by the physical processes numerical modelling detailed in section □. A qualitative assessment of impact on key coastal features will be presented within the Physical processes ES chapter.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.	✓	✓	✓	Foundations and associated scour protection within the Mona Offshore Transmission Infrastructure Scoping Search Area may interrupt sediment transport pathways. In addition, cable protection may pose an obstacle to sediment transport pathways.		The potential impact of the Mona Offshore Wind Project transmission assets on sediment transport and sediment transport pathways will be informed by the physical processes numerical modelling outlined in section □. This assessment will be presented within the Physical processes ES chapter.
Impacts to sediment transport and sediment pathways at the export cable landfall.	✓	✓	✓	The export cable makes landfall through the intertidal zone. The construction, operation and maintenance and decommissioning the cable and/or cable protection measures may disturb or disrupt the intertidal sediment transport.		The potential impact of the Mona Offshore Wind Project on intertidal sediment transport pathways will be informed by the physical processes numerical modelling outlined in section □. This assessment will be presented within the Physical processes ES chapter.

Table 3.4: Impacts proposed to be scoped out of the project assessment for physical processes.

Impact	Justification
Changes to bathymetry due to depressions left by jack-up vessels.	The potential for jack-up vessel spud-cans to affect the sediment regime has been scoped out of the assessment. Jack-up footprint depressions would likely only persist temporarily after jack-up operations have been completed and these would infill over time. Monitoring at the Barrow offshore wind farm showed depressions were almost entirely infilled 12 months after construction (BOWind, 2008). It is not anticipated that jack-up vessel footprints will have implications for the sediment regime.
Scour of seabed sediments during the operation and maintenance phase.	Interaction between the waves and current and the Mona Offshore Wind Project transmission infrastructure has the potential to cause localised scouring of seabed sediment. Scour protection will be a measure adopted as part of the project to prevent scour from occurring. The scour protection measures will be subject to engineering design to ensure they are fit for purpose and prevent scour from occurring. The seabed habitat disturbed/lost due to scour protection will be considered in the Benthic subtidal and intertidal ecology chapter of the ES. Therefore, it is proposed that scour of seabed sediments is scoped out of the Physical processes ES chapter.

3.1.6 Measures adopted as part of the project

- The following measures adopted as part of the project are relevant to physical processes. These measures may evolve over as the engineering design and the EIA progresses. Scour protection will be used around offshore structures as set out in part 1, section 3: Project Description of the EIA Scoping Report. Note that scour protection and potential impact on benthic communities will be assessed in the Benthic subtidal and intertidal ecology ES chapter.
- Development and adherence to a Cable Specification and Installation Plan which will include cable burial where possible and cable protection as necessary.

3.1.6.1 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

3.1.7 Proposed assessment methodology

3.1.7.1 The Physical processes ES chapter will follow the methodology set out in part 1 section 4: EIA Methodology of the EIA Scoping Report. Specific to the Physical processes ES chapter, the following guidance documents will also be considered:

- Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments (Pye *et al*., 2017).
- Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects (Brooks *et al*., 2018).
- Collaborative Offshore Wind Energy Research into the Environment (COWRIE) - Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide (Lambkin *et al.,* 2009).
- Guidelines in the use of metocean data through the lifecycle of a marine renewables development (ABPmer *et al*., 2008).

3.1.7.2 To support the development of the Physical processes ES chapter, a numerical modelling study is planned. This study will be undertaken using the MIKE software developed by DHI (www.dhigroup.com), which contains a suite of coastal and environmental modelling modules of global standard. The key to the MIKE suite of computational models is that each module may be applied to a single model and then the modelling of combined (coupled) parameters may be undertaken.

3.1.7.3 The MIKE 21 Flexible Mesh coupled modules would be used to model baseline wave climate, tidal flows and sediment transport, using a model which, whilst providing sufficient detail to simulate the necessary parameters, is also computationally efficient by utilising a flexible mesh comprised of the most up to date bathymetric data. The computational model applied in the baseline study will be amended to include the impact of the wind turbine and offshore substation platform structures with associated scour and cable protection to quantify the change in tidal flows, sediment transport and wave climate. Similarly, sediment will be released into the water column to replicate the construction phase works during the seabed clearance and installation of the export cabling and the sediment dispersion and fate will be gauged. Modelling will be validated using all available data sources.

3.1.7.4 The computational modelling will quantify the potential impacts of the installation (including seabed preparation activities) and ongoing operational effects on the tide, wave and sediment transport processes. It will also provide the transport and fate of any material released into the water column as part of the installation works.

3.1.7.5 The results of this numerical modelling will be used to support the impact assessments within the below topics:

- benthic subtidal and intertidal ecology (section 4.1)
- fish and shellfish ecology (section 4.2)
- marine mammals (section 4.3)
- marine archaeology (section 5.3)
- other sea users (section 5.4).

3.1.7.6 The results of this numerical modelling will also support the HRA Screening Report and RIAA.

3.1.8 Potential cumulative effects

3.1.8.1 The predicted effects of construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project transmission assets on physical processes predominately occur within the footprint of the Mona Offshore Transmission Infrastructure Scoping Search Area. However, there is potential for cumulative effects to occur on physical processes from other projects or activities within and outside the Mona physical processes study area for the transmission assets, where projects or plans could act cumulatively with the Mona Offshore Wind Project to affect physical processes. The cumulative effects assessment will follow the approach outlined in section part 1 section 4: EIA Methodology of the EIA Scoping Report.

3.1.9 Potential inter-related effects

3.1.9.1 The assessment of potential inter-related effects will be considered within the Physical processes ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

3.1.10 Potential transboundary impacts

3.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon physical processes due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

3.2 Underwater noise

3.2.1 Introduction

3.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the elements of underwater noise of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the pre-construction, construction, operation and maintenance, and decommissioning of the transmission assets.

3.2.1.2 Underwater noise and vibration sources during construction may include piling, hammering or drilling for the offshore substation platform (OSP) foundations and offshore booster substations foundations and will include the use of barges and vessels, heavy machinery and generators on the vessels. There will be no underwater noise generated by the transmission infrastructure during the operation and maintenance phase.

3.2.1.3 An underwater noise study will be undertaken to provide an assessment of the level of underwater noise generated from the Mona Offshore Wind Project and will be provided as a technical appendix to support the relevant offshore chapters of the Environmental Statement (ES)including the following receptor groups:

- fish and shellfish ecology (section 4.2)
- marine mammals (section 4.3)
- commercial fisheries (section 5.1).

3.2.2 Study area

3.2.2.1 No separate study area has been outlined for underwater noise as this is defined by the receptors and discussed within the relevant topics listed in section 3.2.1.

3.2.3 Data sources

Desktop data

3.2.3.1 An initial desk-based review of literature and data sources has been undertaken to support this EIA Scoping Report. This is summarised in Table 3.5.

3.2.3.2 Seabed bathymetry data will be sourced from the online General Bathymetric chart of the Oceans (GEBCO) database. GEBCO's current gridded bathymetric dataset, the GEBCO 2021 Grid, is a global terrain model for ocean and land, providing elevation data, in metres, on a 15 arc-second interval grid. Seabed sediment and geological condition data will be sourced from the Deep Sea Drilling Project (DSDP) and the British Geological Survey (BGS).

Table 3.5: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Gebco database	https://www.gebco.net/data_and_products/ gridded_bathymetry_data/	2021	GEBCO
Deep Sea Drilling Project	http://deepseadrilling.org/	1983-2003	Ocean drilling program
British Geological Survey	Seabed sediment data	2020	BGS
Geology of the seabed and shallow subsurface: The Irish Sea	BGS	2015	Mellett *et al*.

3.2.4 Baseline environment

3.2.4.1 Baseline noise levels vary significantly depending on multiple factors, such as seasonal variations and different sea states. Lack of long term sound measurements is a widely recognised gap in knowledge in relation to general soundscape and potential effects of human activities on marine life. Understanding the baseline sound level could therefore be valuable in enabling future studies to assess long term effects related to continuous sound levels over time in addition to activity specific effects such as masking impacts. Nevertheless, the value of establishing the precise baseline noise level is also somewhat diminished in relation to the current study due to the lack of available evidence-based studies on the effects of noise relative to background on marine receptors. The baseline sound environment will be discussed and agreed through the Evidence Plan process.

3.2.4.2 Sound can be either impulsive (pulsed) such as impact piling, or non-impulsive (continuous) such as ship engines, and the magnitude of the impact on marine life will depend heavily on these characteristics. Background or “ambient” underwater sound is created by several natural sources, such as rain, breaking waves, wind at the surface, seismic sound, biological sound and thermal sound. Biological sources include marine mammals (using sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources of sound in the marine environment include fishing boats, ships (non-impulsive), marine construction noise (such as piling or dredging), subsurface (seismic) and seabed imaging surveys and leisure activities (all could be either impulsive or non-impulsive), all of which add to ambient background sound. Anthropogenic sound within the vicinity of the Mona Offshore Wind Project will arise primarily from shipping, the offshore oil and gas industry, subsea geophysical and geotechnical surveys, and the offshore renewables industry. Measurements of underwater sound from the operational Ormonde windfarm were undertaken June 2012 (Nedwell *et al*., 2012). The results reported that there was an increase in noise levels between 0 and 50kHz at a distance of 30m from individual wind turbines. The noise was continuous in nature, and the increase was detectable to a maximum range of approximately 1km. Beyond this range, the underwater sound level was consistent with the ambient underwater sound in the region (Nedwell *et al*., 2012). Shipping routes and shipping traffic are discussed in section 5.2.

3.2.5 Potential project impacts

3.2.5.1 A range of potential impacts resulting from a change in underwater noise have been identified which may occur during the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project transmission assets. There is the potential for underwater noise to impact sensitive ecological receptors. The potential effects on these receptors will be assessed within the relevant technical sections of the ES (marine mammals, fish and shellfish and commercial fisheries).

3.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 3.6 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

3.2.5.3 Potential impacts scoped out of the assessment are presented in Table 3.7, with justification.

Table 3.6: Impacts proposed to be scoped into the project assessment for underwater noise (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Effects of underwater noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	✓	✓	✓	Although noise from these sources will be relatively low in level (e.g. compared to impact piling) and continuous in nature (rather than impulsive) there is still some residual potential for disturbance due to long term increased traffic and use of rigs etc.	N/A	The approach used for assessing underwater noise is detailed in section 3.2.7. The results of the noise modelling will be presented in a Underwater Noise Technical Report, which will inform the Fish and shellfish ecology, Marine mammal and Commercial fisheries ES chapters.
Effects of underwater noise on marine life due to impact driven and drilled pile installations for the OSPs and offshore booster substation foundations.	✓	✗	✗	Due to the potentially high source levels involved and impulsive nature of the sound, modelling and assessment of the proposed piling activities will be undertaken.	N/A	
Effects of underwater noise on marine life due to jacket or monopile cutting and removal.	✗	✗	✓	There is potential for disturbance or possibly injury from decommissioning activities, depending on the techniques utilised. It is therefore proposed to include these activities in the assessment.	N/A	
Effects of underwater noise on marine life due to clearance of unexploded ordnance (UXO) detonation.	✓	✗	✗	There is potential for disturbance during the construction phase due to the clearance or detonation of UXO, depending on the occurrence, size, and techniques used. It is therefore proposed to include these activities in the assessment.	N/A	
Effects of the particle motion element of underwater noise on fish and shellfish receptors.	✓	✗	✓	There is potential for injury or disturbance due to particle motion. The impact of the construction and demolition phases is not well understood and therefore it is proposed to include both in the assessment to at least a qualitative level.	N/A	

Table 3.7: Impacts proposed to be scoped out of the project assessment for underwater noise.

Impact	Justification
Effects of the particle motion element of underwater noise on marine mammals during all phases.	There is insufficient evidence that particle motion has any effect on marine mammals therefore this impact is scoped out of the marine mammals ES chapter.

3.2.6 Measures adopted as part of the project

3.2.6.1 Measures adopted as part of the project are discussed within each of the relevant sections of the EIA Scoping Report for which underwater noise is considered relevant (section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries). Each of the proposed measures adopted as part of the project relating to reducing potential impacts on receptors from underwater noise will be modelled to assess their efficacy in a quantitative way. These measures may evolve as the engineering design and the EIA progresses.

3.2.6.2 The requirement and feasibility of any further mitigation will be dependent on the significance of effects of underwater noise on the receptors associated with each topic and will be consulted upon with statutory consultees throughout the EIA process. Any approach to noise mitigation will be informed by best available evidence and latest guidance, including any outputs from work undertaken during assessment and construction of the nearby operational offshore wind farms and lessons learnt within the industry.

3.2.7 Proposed assessment methodology

3.2.7.1 The underwater noise EIA will follow the methodology set out in part 1, section 4: EIA Methodology of the EIA Scoping report. Specific to the underwater noise assessment, the following guidance documents will also be considered:

- Good practice guide to underwater noise measurement (NPL, 2014).
- Review of underwater acoustic propagation models (NPL) (Wang *et al*., 2014). National Oceanic and Atmospheric Administration (NOAA) technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing.
- Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018).
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al*., 2019).
- Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioural response to human noise (Southall *et al.*, 2021).
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al*., 2014).
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).
- Guidance on noise management in harbour porpoise SACs (JNCC, 2020).
- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental

status (GES) in Europe's seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." This Directive was transposed into United Kingdom (UK) law by the Marine Strategy Regulations 2010.

- Department for Business, Energy and Industrial Strategy (BEIS) Policy Statement - Marine environment: unexploded ordnance clearance joint interim position statement (BEIS, 2022).

3.2.7.2 The impact criteria will be based on the most recent and up-to-date scientific research and guidance, while utilising a precautionary approach. Potential impacts arising from underwater noise on marine mammals and fish will be assessed with respect to the potential for injury and behavioural disturbance. Where possible, noise source data will be based on measured data from similar wind turbine devices. Source noise levels will be based on a combination of theoretical and empirical predictions, and detailed source level modelling where appropriate. The associated source levels of other types of underwater noise associated with the Mona Offshore Wind Project will be based on published data and established prediction methodologies.

3.2.7.3 Underwater noise modelling is planned to assess the impact of construction and operational noise using a robust, peer reviewed model. In accordance with National Physical Laboratory guidance (NPL, 2014), the choice of model will depend upon many factors which will be determined during the consultation period and will depend on site-specific circumstances (such as bathymetry etc.). However, the chosen model will be appropriate and peer reviewed, such as the energy flux model (Weston, 1976). Such models have been successfully benchmarked against other sound propagation models (e.g. Etter, 2018; Toso *et al*., 2014; Schulkin and Mercer, 1985) and used in previous underwater noise assessments for offshore wind and tidal energy developments as well as for oil and gas and port developments. The noise model proposed for this assessment has been calibrated against a range of other noise models showing good agreement (typically within +/- 1dB out to a range of 2.5km).

3.2.7.4 The exact scope, specification and methodology of the noise propagation modelling will be discussed and agreed with the Marine Management Organisation (MMO), Natural Resources Wales (NRW) and the Statutory Nature Conservation Bodies (SNCBs). On the basis of previous underwater noise modelling completed for other recent offshore wind projects, the assessment will consider the bathymetry and other characteristics of the area, including the geo-acoustic properties of the seabed, as well as other factors such as the sound source characteristics and frequency range of interest. It is anticipated that the underwater noise assessment will likely include:

- A review of the publicly available literature and studies on the impact of impulsive underwater noise on marine mammal and fish species, including an assessment of the sensitivity of fish and marine mammals to underwater noise, and derivation of criteria for estimating the impact to be agreed with the MMO, NRW and SNCBs.

- Estimation of the realistic design scenario for source level noise for impact piling operations within the Mona Offshore Transmission Infrastructure Scoping Search Area. This will include consideration of the hammer energy, hammer type, ground conditions, water depth, pile size, pile geometry, strike rate, number of strikes and other relevant parameters.
- Estimation of the maximum design scenario for source level noise for impact piling operations within the Mona Offshore Transmission Infrastructure Scoping Search Area. This will include consideration of the hammer energy, hammer type, ground conditions, water depth, pile size, pile geometry, strike rate, number of strikes and other relevant parameters.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of piling during construction within the Mona Offshore Transmission Infrastructure Scoping Search Area.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of the operation and maintenance phase and decommissioning phases within the Mona Offshore Transmission Infrastructure Scoping Search Area.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of concurrent piling operations within the Mona Offshore Wind Project.

3.2.7.5 The model will be used to estimate the unweighted and hearing group weighted Sound Exposure Level (SEL), Root Mean Square (rms) (T90) sound pressure level and peak (peak-to-peak) pressure level parameters as recommended by Southall *et al.,* 2019, National Marine Fisheries Service (NMFS) 2018, Southall *et al.,* 2007, Acoustic Society of America (ASA) Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al*., 2014) and other guidance. The model will also incorporate swim speeds of marine mammals and fish to calculate cumulative SELs (for example see Table 3.8).

Table 3.8: Assessment swim speeds of marine mammals and fish that are likely to occur within the Irish Sea for the purpose of exposure modelling.

Species	Hearing group	Swim speed (m/s)	Source reference
Harbour seal *Phoca vitulina*	Phocid Carnivores in Water (PCW)	1.8	Thompson, 2015
Grey seal *Halichoerus grypus*	PCW	1.8	Thompson, 2015
Harbour porpoise *Phocoena phocoena*	Very High Frequency (VHF)	1.5	Otani *et al.,* 2001

Species	Hearing group	Swim speed (m/s)	Source reference
Minke whale *Balaenoptera acutorostrata*	Low Frequency (LF)	2.3	Boisseau *et al.,* 2001
Bottlenose dolphin *Tursiops truncatus*	High Frequency (HF)	1.52	Bailey and Thompson, 2010
White-beaked dolphin *Lagenorhynchus albirostris*	HF	1.52	Bailey and Thompson, 2010
Short beaked common dolphin *Delphinus delphis*	HF	1.52	Bailey and Thompson, 2010
Risso's dolphin *Grampus griseus*	HF	1.52	Bailey and Thompson, 2010
Basking shark *Cetorhinus maximus*	Group 1 fish	1.0	Sims, 2000
All fish hearing groups (excluding basking sharks)	Group 1 to 4 fish	0.5	Popper *et al*., 2014

3.2.7.6 Historically, research relating to both physiological effects and behavioural disturbance of noise on marine receptors has typically been based on determining the absolute noise level for the onset of that effect (whether presented as a single onset threshold or a dose response/probabilistic function). Consequently, the available numerical criteria for assessing the effects of noise on marine mammals, fish and shellfish, tend to be based on the absolute noise criteria, rather than the difference between the baseline noise level and the noise being assessed (Southall *et al*., 2007). The available research rarely takes into account other factors such as measures of impulsivity, frequency content and other characteristics which could be as (or more) important than the absolute level alone. In 2021 Southall *et al.* released additional guidance for the types of measurements and parameters which should be reported as part of studies into the impact of anthropogenic noise on the behaviour of marine life, however no additional quantitative guidance for the assessment of those levels were included (Southall *et al*., 2021). Instead, the guidance makes recommendations for additional parameters to be reported for future studies in order to ensure that better information becomes available in future in order to derive better relationships between the sound, its characteristics and the response (e.g. by investigation the exposure novelty, signal-to-noise ratio, sensation level, rise time etc.). In the meantime, assessing potential behavioural disturbance due to anthropogenic sound is a challenging topic and requires a combination of quantitative assessment (e.g. use of dose-response relationships such as those set out in Graham *et al*. (2017)) and qualitative considerations. The approach proposed for the assessment is described in part 3, section 4.3: Marine mammals, of the EIA Scoping Report.

3.2.7.7 The cumulative effect of multiple events/operations will also be assessed/modelled and will consider the likely exposure times of species, allowing for safe distances and reaction ranges to be determined. Modelling scenarios will be undertaken for concurrent piling scenarios, including both typical (most likely) and maximum piling parameters within the project design envelope (PDE). Further, modelling will be undertaken with the consideration of mitigation, for example acoustic deterrent devices (ADDs), comparing otherwise identical scenarios with and without ADDs.

3.2.7.8 The results of the noise modelling will be presented in an Underwater Noise Technical Report which will cover underwater noise for the Mona Offshore Wind Project.

3.2.8 Potential cumulative effects

3.2.8.1 Consideration will be given to cumulative effects from underwater noise in particular during construction related piling activities. The potential for cumulative effects with other offshore wind farm developments, including the Mona Offshore Wind Project, and other offshore developments with the potential to create underwater noise will be considered in the relevant topic receptors chapter of the ES. A detailed assessment of offshore developments within the area and their construction windows (where available) will be required for the ES, to identify which other offshore developments will be considered in terms of the cumulative underwater noise assessment.

3.2.8.2 The cumulative effects assessment will be considered within the respective ES chapters for marine mammals, fish and shellfish and commercial fisheries.

3.2.9 Potential inter-related effects

3.2.9.1 The potential inter-related effects for underwater noise will be assessed within the relevant technical sections of the ES and described within the relevant sections of the EIA Scoping Report (section 4.3: marine mammals, section 4.2: fish and shellfish and section 5.1: commercial fisheries).

3.2.10 Potential transboundary impacts

3.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. Any transboundary impacts will be discussed within each of the relevant sections of the EIA Scoping Report for which underwater noise is considered relevant (section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries).

4 Offshore biological environment

4.1 Benthic subtidal and intertidal ecology

4.1.1 Introduction

4.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the benthic subtidal and intertidal ecology receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets.

4.1.2 Study area

4.1.2.1 To support the development of the Benthic Subtidal and Intertidal Ecology Environmental Statement (ES) chapter, two study areas are defined:

- The Mona benthic subtidal and intertidal ecology study area for the transmission assets: this is defined as the area encompassing the Mona Offshore Transmission Infrastructure Scoping Search Area plus a buffer of one tidal excursion (Figure 4.1). This is the predicted Zone Of Influence (ZOI) of the Mona Offshore Wind Project transmission assets. The site-specific benthic surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area. The results of the site-specific surveys will inform the baseline characterisation and identification of benthic receptors against which potential impacts associated with the Mona Offshore Wind Project will be assessed.
- The Mona regional benthic subtidal and intertidal ecology study area for the transmission assets covers the east Irish Sea, extending from Mean High Water Springs (MHWS) out to the furthest west extent from the Mull of Galloway in Scotland to the western tip of Anglesey. This study area has been selected to encompassing the wider Irish Sea habitats and includes the neighbouring consented and developing offshore wind farms and designated sites (Figure 4.1). This was considered appropriate as it will provide wider context to the site-specific data collected within the Mona benthic subtidal and intertidal ecology study area for the transmission assets and is large enough to consider all direct and indirect impacts of the Mona Offshore Wind Project on the identified receptors.

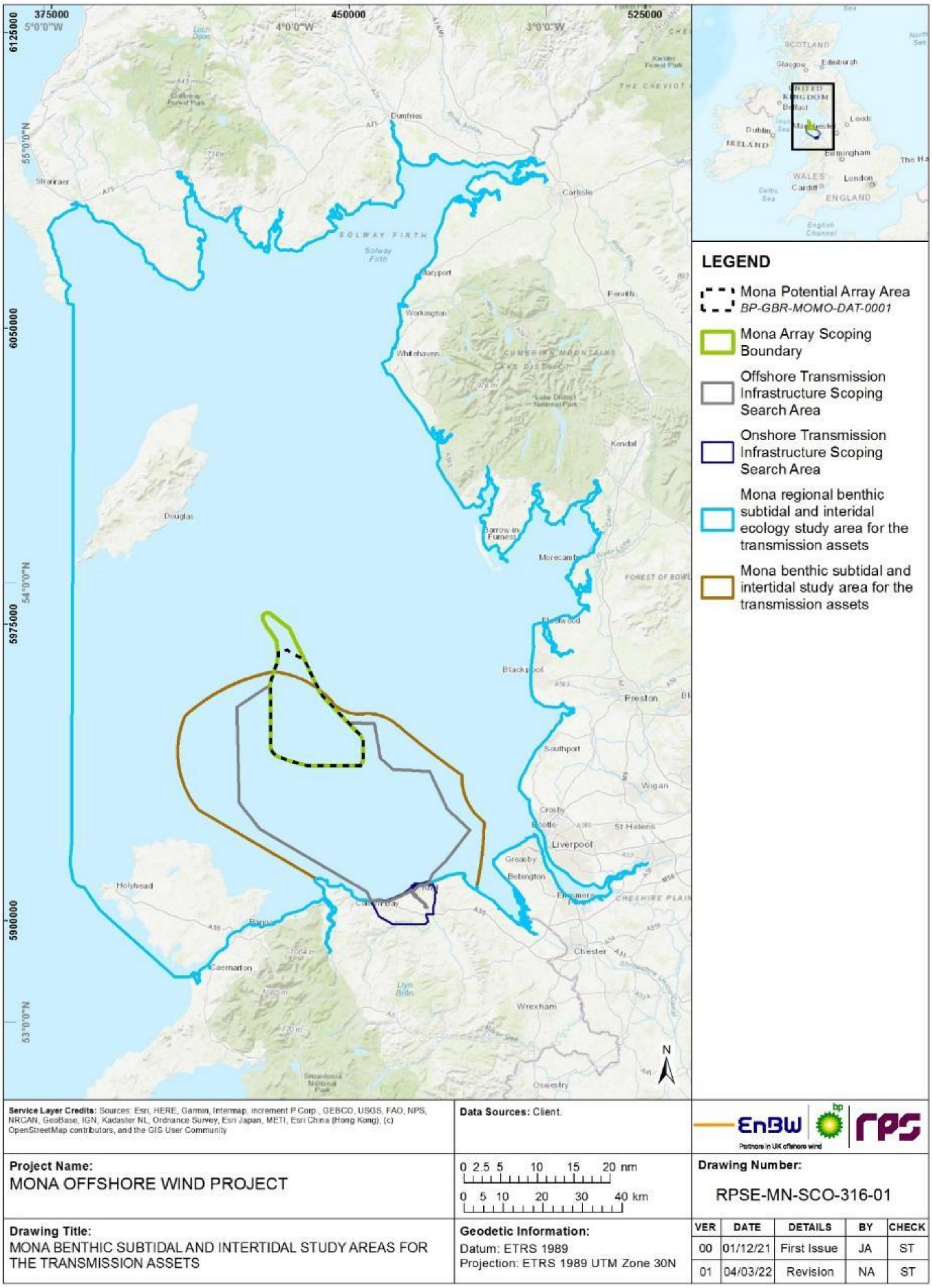


Figure 4.1: The Mona Benthic subtidal and intertidal ecology study areas for the transmission assets.

4.1.3 Data sources

Desktop data

4.1.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets, and which will provide context to the site-specific benthic ecology survey data collected. These are summarised in Table 4.1.

Table 4.1: Summary of key desk top datasets and reports.

Title	Source	Year	Author
OneBenthic	Cefas	2021	Cefas
Marine recorder public UK snapshot	Joint Nature Conservation Comittee (JNCC)	2020	JNCC
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
Marine Recorder Public UK Snapshot	JNCC	2020	JNCC
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)	EMODnet – Seabed Habitats	2019	EMODnet – Seabed Habitats
JNCC Marine Protected Area (MPA) mapper	JNCC	2019	JNCC
Burbo Bank extension benthic and annex I habtiat pre construction survey	Marine Data Exchange	2015	Centre for Marine and Coastal Studies Ltd (CMACS)
Rhiannon offshore wind project Preliminary Environmental Information Report- benthic Ecology	Marine Data Exchange	2014	Celtic Array Ltd
Walney Year 3 post-consent benthic monitoring survey report	Marine Data Exchange	2014	CMACS
Burbo Bank extension environmental statement - benthic ecology	Marine Data Exchange	2013	Dong Energy Ltd.
Walney Extension environmental statement. chapter 10 benthic ecology	Marine Data Exchange	2013	Dong Energy
Walney Year 2 post-consent benthic monitoring survey report	Marine Data Exchange	2013	CMACS
Ormonde Year 1 post-construction benthic enviornmental monitoring survey	Marine Data Exchange	2012	CMACS
Burbo Bank Year 3 post-construction benthic monitring survey	Marine Data Exchange	2010	CMACS
Walney pre construction monitoring report	Marine Data Exchange	2009	CMACS

Title	Source	Year	Author
Gwynt y Môr offshore wind farm baseline characterisation	Marine Data Exchange	2005	CMACS
Burbo Bank pre construction contaminants investigation	Marine Data Exchange	2005	CMACS
Marine Nature Conservation Review (MNCR) areas summaries- Liverpool Bay and the Solway Firth	JNCC	1998	Covey. R.

Site-specific survey data

Benthic subtidal survey

4.1.3.2 A benthic subtidal ecology survey is planned for spring/summer 2022 which will collect data on the benthic habitats within a refined area of the Mona Offshore Transmission Infrastructure Scoping Search Area. The subtidal survey will combine drop down video (DDV) and 0.1m^2 Hamon grab sampling. The sampling strategy will be designed to adequately sample the area to provide up to date data for baseline characterisation. The 2022 survey will also re-sample a number of sample stations within the Mona Potential Array Area that were taken during the 2021 benthic survey. Site-specific geophysical surveys will also be undertaken across a refined area of the Mona Offshore Transmission Infrastructure Scoping Search Area spring/summer 2022. This will include a 2DUHR geophysical survey, side scan sonar (SSS), sub-bottom profiler (SBP) and magnetometer survey. This data will be used to further inform the baseline characterisation alongside the marine ecological datasets.

4.1.3.3 The scope of the 2022 survey campaign, including the requirement for site-specific sediment chemistry data, will be discussed and agreed with consultees through the Evidence Plan process.

Intertidal survey

4.1.3.4 A phase 1 intertidal survey will be undertaken at the selected landfall location (a refined area within the intertidal section of the Mona Offshore Transmission Infrastructure Scoping Search Area). The survey will be undertaken on a spring tide cycle in spring/summer 2022 and will focus on intertidal biotopes from Mean High Water Springs (MHWS) to approximately Mean Low Water Springs (MLWS). The survey will be undertaken with reference to standard intertidal survey methodologies as outlined in the JNCC Marine Monitoring Handbook (Davies *et al*., 2001) within Procedural Guidance No 3-1 In situ intertidal biotope recording (Wyn and Brazier, 2001 and Wyn *et al*., 2000) and The Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey (Wyn *et al*., 2006). The survey will be carried out by two suitably qualified ecologists experienced in habitat mapping in intertidal and coastal environments.

4.1.3.5 The intertidal survey will comprise both a general walkover, noting changes in ecological and physical characteristics, and onsite dig over macrofauna sampling and analysis in soft sediments, to help characterise the habitats. During the walkover survey, notes will be made on the shore type, wave exposure, sediments/substrates present and descriptions of species/biotopes present. The spatial relationships between these features will be observed and waypoints will be recorded by a handheld global positioning system (GPS) device, in conjunction with handwritten descriptions and photographs. All biotopes present will be identified, and their extents mapped, with the aid of aerial photography and a GPS recorder. Other features within the intertidal zone will also be noted including rock pools, man-made structures and any habitats / species of conservation importance. Where present, these features will be target noted in the intertidal biotope maps.

4.1.3.6 Onsite dig over sampling stations will be undertaken in different biotopes, where possible, the locations of which will be determined in the field. This will involve the collection of four spade loads (approximately $0.02m^2$) of sediment dug to a depth of 20-25cm, which will then be sieved through a series of stacked sieves, the finest of which will be 0.5mm mesh. All macrofauna species present will be identified and enumerated on site, where possible. Field notes will also be taken on the physical characteristics, including sediment type and presence of anoxic layers in the sediment. The scope of the intertidal survey will be discussed and agreed with consultees through the Evidence Plan process.

4.1.3.7 A detailed analysis of these results will be appended to the ES within a Benthic subtidal and intertidal ecology Technical Report.

4.1.4 Baseline environment

4.1.4.1 The Mona Offshore Wind Project transmission assets will be located within Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 4.1: Benthic Ecology of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and any offshore booster substations will be located.

Subtidal sediments

<u>Mona Regional benthic subtidal and intertidal ecology study area for the transmission assets</u>

4.1.4.2 Within the Mona regional benthic subtidal and intertidal ecology study area for the transmission asset, seabed sediments are dominated by ‘circalittoral coarse sediment’ (SS.SCS.CCS) and ‘circalittoral mixed sediment’ (SS.SMx.CMx) in the west with sediments transitioning to ‘offshore circalittoral sand’ (SS.SSa.OSa) and ‘offshore circalittoral mud’ (SS.SMu.OMu) to the northeast of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets. Within the southwest of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets, sediment transitions to SS.SSa.OSa with areas of ‘circalittoral rock’ (CR) around the coast of Anglesey (illustrated in Figure 4.2; EMODnet, 2019). Seabed sediments along the north Wales coast are dominated by ‘circalittoral fine sand’ (SS.SSa.CFiSa) and ‘circalittoral muddy sands’ (SS.SSa.CMuSa), with areas of SS.SCS.CCS closer to shore around Great Orme headland. A larger area of SS.SCS.CCS occurs north of Colwyn Bay which extends slightly east of Rhyl (illustrated in Figure 4.2; EMODnet, 2019).

4.1.4.3 The Isle of Man is located northwest of the Mona Offshore Transmission Infrastructure Scoping Search Area (Figure 4.2) within the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets. SS.SCS.CCS were recorded to the south and east of the isle, while ‘infralittoral coarse sediments’ (SS.SCS.ICS) were observed north of the isle. SS.SSa.CFiSa and SS.SSa.CMuSa are present to the east of the isle (illustrated in Figure 4.2; EMODnet, 2019).

4.1.4.4 The benthic surveys conducted for planned or operational offshore wind projects within the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets also provide an overview of the sedimentary habitats present within the immediate vicinity of the Mona benthic subtidal and intertidal ecology study area for the transmission assets (illustrated in Figure 4.3).

4.1.4.5 The Ormonde offshore wind project is within the northeast of the regional benthic subtidal and intertidal ecology study area for transmission infrastructure. The 2013 year 1 post-construction benthic monitoring survey for the Ormonde offshore wind project reported mud, sand and gravel sediments across the Ormonde offshore wind project array area and export cable corridor. Sample sites further offshore reported a higher percentage of mud compared to the inshore sample sites (CMACS, 2012).

4.1.4.6 Pre construction monitoring surveys for Walney Extension in 2011 and 2012 and a subsequent monitoring survey for Walney in 2014 were undertaken in the east of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets. The surveys reported the presence of subtidal mud and subtidal sand within the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets (Dong Energy, 2013; CMACS, 2014).

4.1.4.7 Benthic surveys were undertaken in 2010 and 2012 to support the EIA benthic baseline characterisation for the Rhiannon offshore wind project. These surveys reported that sediments were dominated by SS.SCS.CCS, SS.SSa.CFiSa, SS.SMx.CMx with patches of moderately exposed rock reef. Sediments graded into mud sediments towards the Welsh coast. Two large sandbanks were recorded off Lynas Point, as illustrated in Figure 4.3. These were composed of very well sorted mobile sand that remains submerged at all times (Celtic Array Ltd, 2014a).

<u>Mona benthic subtidal and intertidal ecology study area for the transmission assets</u>

4.1.4.8 Sediments overlapping with the Mona benthic subtidal and intertidal ecology study area for transmission infrastructure were reported in the Rhiannon baseline surveys as SS.SMx.CMx and SS.SCS.CCS with patches of rock within Mona benthic subtidal and intertidal ecology study area for the transmission assets (Celtic Array Ltd, 2014a).

4.1.4.9 The EUSeaMap data describes the Mona benthic subtidal and intertidal ecology study area for the transmission assets as being dominated by A5.15 deep circalittoral coarse sediment and A5.45 deep circalittoral mixed sediments. Theses sediment type) stretch through the northern and central extent of the Mona benthic subtidal and intertidal ecology study area for the transmission assets. Nearer the coast, sediments grade into A5.27 deep circalittoral sand or A5.26 circalittoral muddy sand (illustrated in Figure 4.2; EMODnet, 2019). The EUSeaMap describes these habitats as moderate energy habitats (EMODnet, 2019).

4.1.4.10 Further detail on the seabed sediments within the Mona benthic subtidal and intertidal ecology study area for the transmission assets from the site-specific surveys will be presented in the ES.

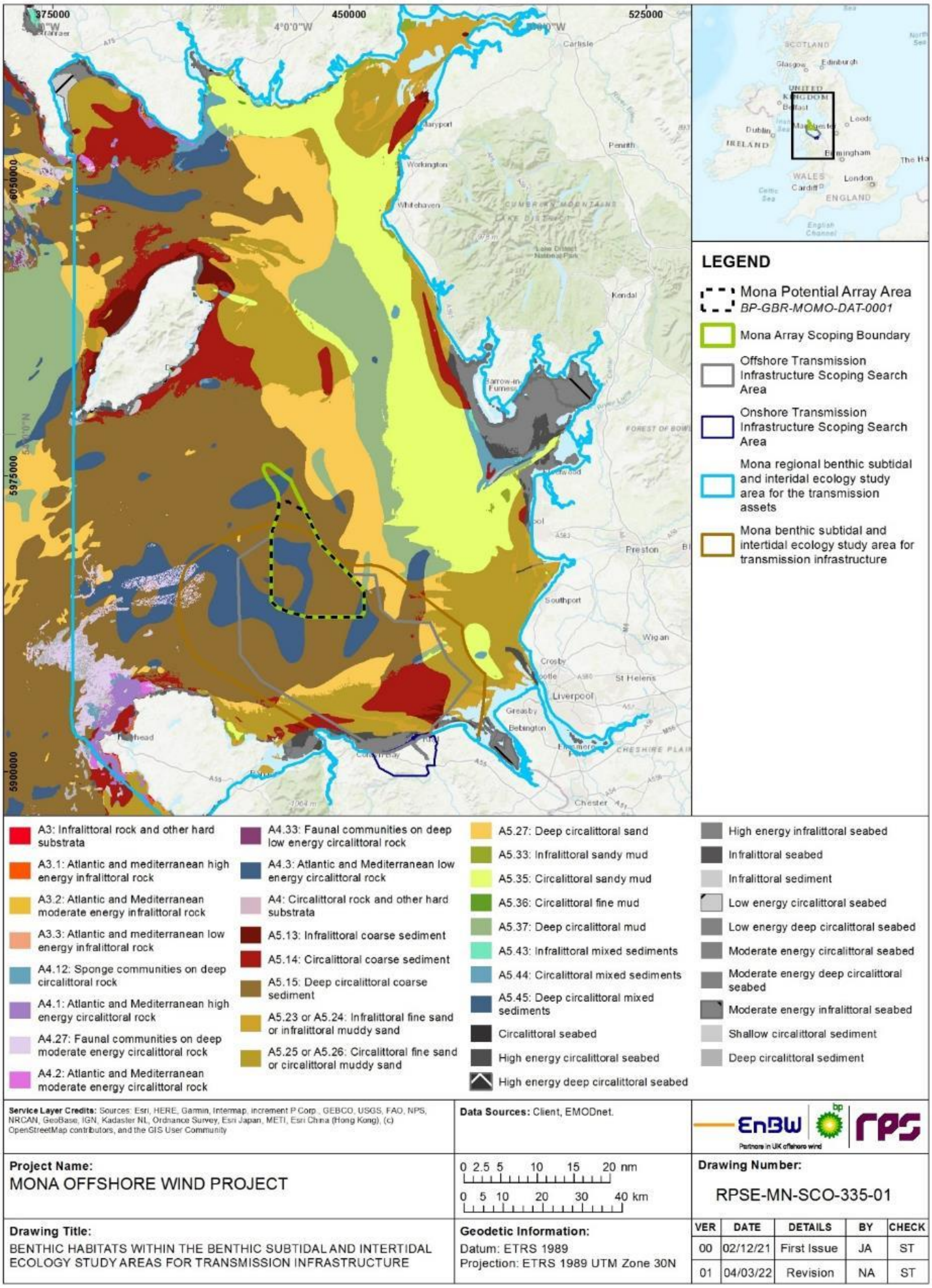


Figure 4.2: Predicted ENUIS habitats from the EUSeaMap for the benthic subtidal and intertidal ecology study areas for the transmission assets (Source, EMODnet, 2019).

Sediment contamination

4.1.4.11 Benthic surveys undertaken for the Rhiannon offshore wind project reported sediment chemical contaminants at generally very low levels across the Mona benthic subtidal and intertidal ecology study area for the transmission assets and wider surveyed area (Celtic Array Ltd, 2014a). Arsenic marginally exceeded Cefas Action Level 1 in several samples taken across the Rhiannon offshore wind project array area, within the west of the Mona benthic subtidal and intertidal ecology study area for the transmission assets (Figure 4.3). Arsenic levels are relatively high in Liverpool Bay and surrounding areas (e.g. Camacho-Ibar *et al*., 1992). This is generally considered to be due to weathering of glaciated regions such as North Wales and the Lake District rather than to anthropogenic sources (e.g. Leah *et al*., 1992; Thornton *et al*., 1975).

4.1.4.12 Pre construction monitoring surveys for Walney Extension in 2011 and 2012 reported elevated levels of aluminium, iron and arsenic however they were at levels not considered to pose a risk to the environment (Dong Energy, 2013).

4.1.4.13 Pre construction monitoring surveys for Burbo Bank offshore wind project in 2005 reported that most contaminants were below the interim sediment quality guidelines and Probable Effect Levels (PELs) (Cole *et al*., 2001; Nagpal *et al*., 2001). Elevated levels of lead and mercury were reported with only arsenic and zinc detectable below 1.5m from the seabed surface. The report concluded that the construction, operation and decommissioning of the offshore wind farm prosed no increased risk to water quality (CMACS, 2005).

4.1.4.14 The Dee Estuary is subject to numerous, legal, industrial discharges and a study on the levels of polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), reported high concentrations within the Dee Estuary (Tyler *et al*., 1994). However, there has been a reduction in the level of pollutants discharged into the estuary in the last two decades (Howarth *et al*., 2001).

Subtidal benthic communities

4.1.4.15 Benthic surveys undertaken for the Rhiannon offshore wind project reported rich faunal communities on SS.SCS.CCS and SS.SMx.CMx habitats in the Mona benthic subtidal and intertidal ecology study area for the transmission assets. Mud content was generally low, and all the predominant sediment types were sandy gravels and gravelly sands. SS.SSa.CFiSa was recorded further west and to the north of the Mona benthic subtidal and intertidal ecology study area for the transmission assets (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.16 The '*Mediomastus fragilis*[1], *Lumbrineris*[1] spp. and venerid bivalves in circalittoral coarse sand or gravel' (SS.SCS.CCS.MedLumVen) biotope was also reported to be widespread across the southeast of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets. However, when considering the wider area, the match was not

[1] Polychaete

considered to be sufficiently strong enough to be a separate biotope on the final biotope map for the Rhiannon offshore wind farm (Figure 4.3; Celtic Array Ltd , 2014a). The SS.SMx.OMx habitats were, sufficiently covered with the brittlestar *Ophiothrix fragilis*[2] to be classified as the biotope '*Ophiothrix fragilis*[2] and/or *Ophiocomina nigra*[3] on sublittoral mixed sediment' (SS.CMx.OphMx) (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.17 Annex I (of the Habitats Directive; see part 1, section 2: Policy and legislation, of the EIA Scoping Report) rocky reefs of mostly low to moderate reefiness, were recorded to the west of the Rhiannon offshore wind project array area, over 5km to the west of the Mona Offshore Transmission Infrastructure Scoping Search Area and just within the west of the Mona benthic subtidal and intertidal ecology study area for the transmission assets.. It was characterised by relatively sparse epifauna dominated by starfish, with some dense patches of brittlestar *O. fragilis*[2]. Annex I reefs were mapped separately and were not presented on the biotope map available on the Marine Data Exchange (as of December 2021). Annex I stony reefs were also recorded over 5km to the west of the Mona Offshore Transmission Infrastructure Scoping Search Area and just within the west of the Mona benthic subtidal and intertidal ecology study area for the transmission assets. However these mostly occurred as a patchwork of boulders over areas more generally described as SS.SCS.CCS or SS.SMx.CMx and were not presented on the biotope map available on the Marine Data Exchange (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.18 No Annex I *Sabellaria spinulosa*[4] reefs were recorded however a mosaic of '*Sabellaria spinulosa*[4] encrusted circalittoral rock' (CR.MCR.CSab.Sspi) and '*Sabellaria spinulosa*[4] on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx) were recorded in a very small patch 30kmto the west of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.19 Areas of potential *Modiolus*[5] reefs were recorded within the Mona benthic subtidal and intertidal ecology study area for the transmission assets. This occurs within the biotope 'Sublittoral mussel beds' (SS.SBR.Smus) (Celtic Array Ltd, 2014a; Figure 4.3). Potential *Modiolus*[5] reefs have also been recorded by NRW in 2015 north of Anglesey, to the southeast of the Mona benthic subtidal and intertidal ecology study area for the transmission assets (Moore *et al*., 2017).

4.1.4.20 Benthic surveys undertaken in 2013 for the Walney Year 2 post-construction survey recorded sandy mud sediment communities within the Walney offshore wind project array area. They recorded mixed sediment communities closer to the coast and bivalve dominated communities closest to the Mona benthic subtidal and intertidal ecology study area for the transmission assets (CMACS, 2013; Figure 4.3). The main four habitats recorded were:

---

[2] Common brittlestar

[3] Black brittlestar

[4] Ross worm

[5] Bivalve

- ‘*Amphiura filiformis*[6], *Mysella bidentata*[5] and *Abra nitida*[7] in circalittoral sandy mud’ (SS.SMu.CSaMu.AfilMysAnit)
- ‘*Thyasira*[5] spp. and *Nuculoma tenuis*[5] in circalittoral sandy mud/*Abra alba*[8] and *Nucula nitidosa*[9] in circalittoral muddy sand or slightly mixed sediment’ (SS.SMu.CSaMu.ThyNten/SS.SSA.CMuSa.AalbNuc).
- ‘*Ampelisca*[10] spp., *Photis longicaudata*[10] and other tube-building amphipods and polychaetes in infralittoral sandy mud’ (SS.SMu.ISaMu.AmpPlor).
- ‘*Fabulina fabula*[11] and *Magelona mirabilis*[1] with venerid bivalves and amphipods in infralittoral compacted fine muddy sand’ (SS.SSa.IMuSa.FfabMag).

4.1.4.21 The 2013 year 1 post-construction benthic monitoring survey for the Ormonde offshore wind project reported that faunal taxa composition of samples was dominated by annelids, molluscs and crustaceans. Number of individuals was dominated by annelids and echinoderms which was attributable to the high number of *Amphiura filiformis*[6]. No Annex I reefs were recorded (CMACS, 2012).

4.1.4.22 Pre construction monitoring surveys for Walney Extension recorded *A. filiformis*[6] and phoronid worms in high abundances alongside species of bivalve molluscs or polychaete worms that are adapted to mud sediments. The dominant benthic habitats recorded in the 2011 and 2012 surveys where (Dong Energy, 2013):

- SS.SMx.CMx.
- *‘Mysella bidentata*[5] and *Thyasira*[5] spp. in circalittoral, muddy mixed sediments’ (SS.SMx.CMx.MysThyMx).
- SS.SMu.CSaMu.AfilMysAnit.

4.1.4.23 The dominant benthic habitats recorded in the 2014 surveys were (CMACS, 2014):

- *‘Nephtys cirrosa*[1] and *Bathyporeia*[10] spp. in infralittoral sand’ (SS.SSa.IFiSa.NcirBat).
- ‘Dense *Lanice conchilega*[12] and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand’)SS.SCS.ICS.SLan).
- SS.SSa.IMuSa.FfabMag.
- SS.SMu.CSaMu.AfilMysAnit.

[6] Brittlestar

[7] Glossy furrow shell

[8] White furrow shell

[9] Shiny nut shell

[10] Amphipod

[11] Bean-like tellin

[12] Sand mason worm

- *‘Thyasira*[5] spp. and *Nuculoma tenuis*[5] in circalittoral sandy mud’ (SS.SMu.CSaMu.ThyNten).
- ‘Circalittoral sandy mud’ (SS.SMu.CSaMu).

4.1.4.24 Evidence of the habitat feature of conservation importance ‘sea pen and burrowing megafauna communities’ has previously been recorded within the Walney Offshore Wind Farm and the Walney Extension Offshore Wind Farm. Within the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets, over 20 km from the Mona Offshore Transmission Infrastructure Scoping Search Area (Dong Energy, 2013 ; CMACS, 2014).

Intertidal communities

4.1.4.25 Characterisation of the intertidal communities will be based on the phase 1 intertidal walkover survey and will be included in the PEIR and ES. At this time the intertidal communities are expected to be typical of sandy sediments.

4.1.4.26 The Dee Estuary/Aber Dyfrdwy Special Area of Conservation (SAC) overlaps with the intertidal area of the Mona benthic subtidal and intertidal ecology study area for the transmission asset. Habitats below MHWS listed as qualifying features for this SAC are outlined below and are likely to be present in the intertidal area of the Mona benthic subtidal and intertidal ecology study area for the transmission asset:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).
- Estuaries.
- Mudflats and sandflats not covered by seawater at low tide.
- *Salicornia* and other annuals colonising mud and sand.

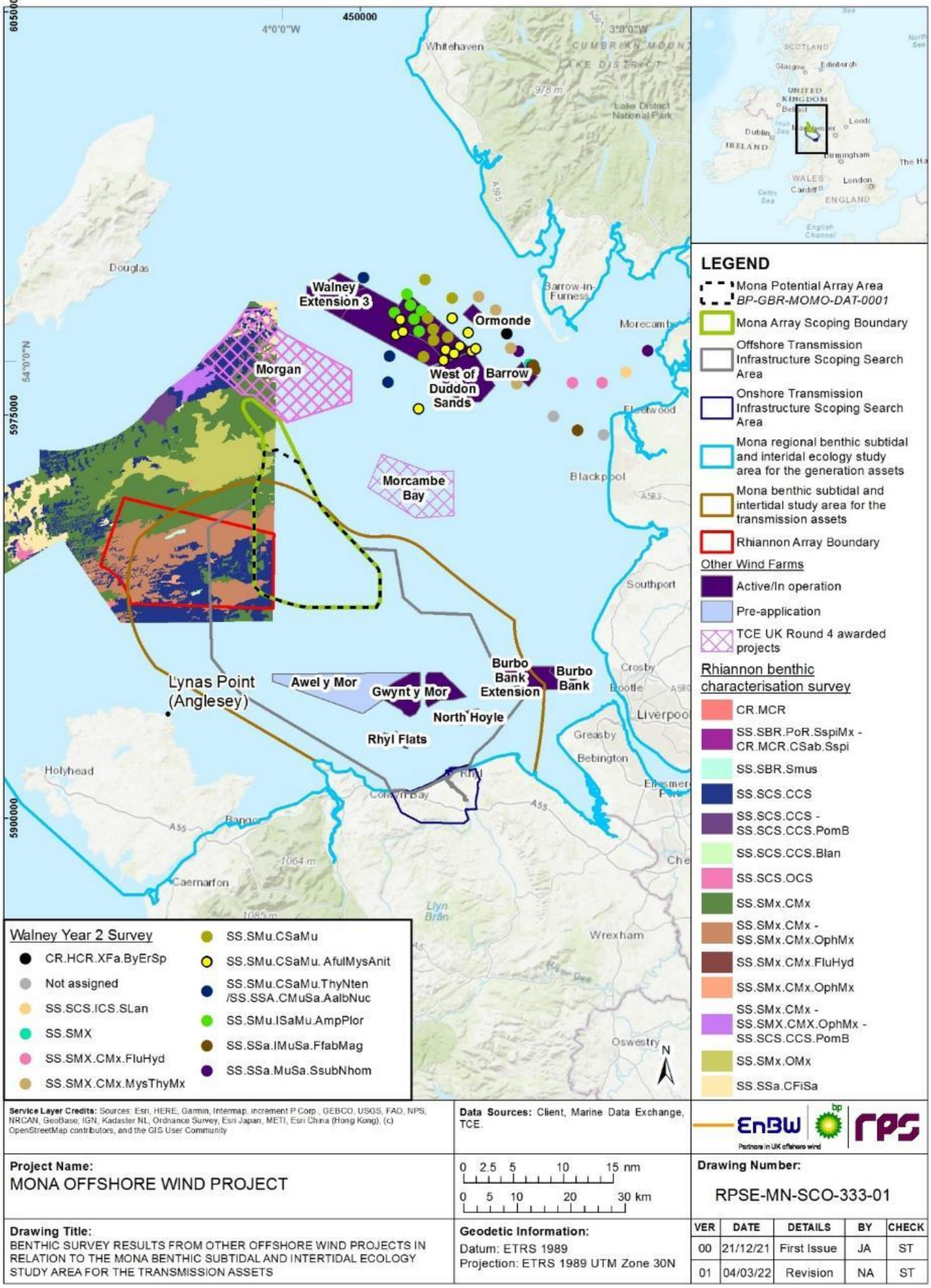


Figure 4.3: Benthic survey results for the other offshore wind projects in relation to the Mona benthic subtidal and intertidal ecology study area for the transmission assets.

Table 4.2: JNCC marine habitat codes used in Figure 4.3 (JNCC, 2022).

Habitat code	Biotope description
CR.MCR	Moderate energy circalittoral rock
CR.MCR.CSab.Sspi	*Sabellaria spinulosa*[4] encrusted circalittoral rock
CR.HCR.XFa.ByErSp	Bryozoan turf and erect sponges on tide-swept circalittoral rock
SS.SBR.PoR.SspiMx	*Sabellaria spinulosa*[4] on stable circalittoral mixed sediment
SS.SBR.Smus	Sublittoral mussel beds (on sublittoral sediment)
SS.SCS.CCS	Circalittoral coarse sediment
SS.SCS.CCS.PomB	*Pomatoceros triqueter*[3] with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles
SS.SCS.CCSBlan	*Branchiostoma lanceolatum*[13] in circalittoral coarse sand with shell gravel
SS.SCS.OCS	Offshore circalittoral coarse sediment
SS.SMx	Sublittoral mixed sediment
SS.SMx.CMx	Circalittoral mixed sediment
SS.SMx.OphMx	*Ophiothrix fragilis*[1] and/or *Ophiocomina nigra*[2] brittlestar beds on sublittoral mixed sediment
SS.SMx.CMx.FluHyd	*Flustra foliacea*[14] and *Hydrallmania falcata*[15] on tide-swept circalittoral mixed sediment
SS.SMx.CMx.MysThyMx	*Mysella bidentata*[5] and *Thyasira*[5] spp. in circalittoral muddy mixed sediment
SS.SMx.OMx	Offshore circalittoral mixed sediment
SS.SSa.CFiSa	Circalittoral fine sand
SS.SMu.CSaMu	Circalittoral sandy mud
SS.SMu.CSaMu.AfulMysAnit	*Amphiura filiformis*[6], *Mysella bidentata*[5] and *Abra nitida*[7] in circalittoral sandy mud
SS.SMu.CSaMu.ThyNten	*Thyasira*[5] spp. and *Nuculoma tenuis*[5] in circalittoral sandy mud
SS.SSa.CSaMu.AalbNuc	*Abra alba*[8] and *Nucula nitidosa*[9] in circalittoral muddy sand or slightly mixed sediment
SS.SMu.ISaMu.AmpPlor	*Ampelisca*[10] spp., *Photis longicaudata*[10] and other tube-building amphipods and polychaetes in infralittoral sandy mud
SS.SSa.IMuSa.FfabMag	*Fabulina fabula*[11] and *Magelona mirabilis*[3] with venerid bivalves and amphipods in infralittoral compacted fine muddy sand
SS.SSa.MuSa.SsubNhom	*Spisula subtruncata*[16] and *Nephtys hombergii*[3] in shallow muddy sand

[13] European lancelet

[14] Hornwrack

[15] Hydrozoa

Designated sites

4.1.4.27 The identification of designated sites for inclusion in the benthic subtidal and intertidal ecology EIA was carried out as follows:

- Sites with relevant qualifying features which overlap with the Mona Offshore Transmission Infrastructure Scoping Search Area were screened in for further assessment.
- Sites with relevant qualifying features, which are located within the likely ZOI of effects associated with the Mona Offshore Transmission Infrastructure Scoping Search Area were screened in for further assessment. The likely ZOI is encapsulated by the Mona benthic subtidal and intertidal ecology study area for the transmission assets and has been determined through a review of the potential impacts associated with the Mona Offshore Wind Project. On this basis sites within the Mona benthic subtidal and intertidal ecology study area for the transmission assets have been included. This ensures that all sites potentially affected by changes in water quality (e.g. increased suspended sediment concentrations) and potential changes to the hydrodynamic regime are included in the assessment.

4.1.4.28 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay Special Area of Conservation (SAC), the Dee Estuary/Aber Dyfrdwy SAC, Ramsar and Site of Special Scientific Interest (SSSI) overlap with the Mona benthic subtidal and intertidal ecology study area for transmission infrastructure. The nature conservation designations which have been screened in for consideration in the benthic subtidal and intertidal ecology EIA comprise of European sites (i.e. SACs, Ramsar), and national designations (i.e. SSSIs; Table 4.3).

4.1.4.29 Information to support a full screening of European sites with qualifying benthic subtidal and/or intertidal interest features will be provided in the Likely Significant Effects (LSE) screening report for the Mona Offshore Wind Project, as part of the Habitats Regulation Assessment (HRA) process. Relevant features screened into the benthic subtidal and intertidal ecology assessment will be fully considered and assessed in the Benthic subtidal and intertidal ecology ES chapter, with the information to support the assessment on European sites and effects on the site(s) conservation objectives will be undertaken in the Report to Inform Appropriate Assessment (RIAA). Information on and a preliminary screening of relevant Marine Conservation Zones (MCZs) has been included in part 4, Annex C: MCZ Screening of the EIA Scoping Report..

Table 4.3: Summary of designated sites with relevant benthic ecology features within the Mona benthic subtidal and intertidal ecology study area for the transmission assets.

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features (below MHWS)
Y Fenai a Bae Conwy/ Menai	0	• Sandbanks which are slightly covered by sea water all the time

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features (below MHWS)
Strait and Conwy Bay SAC		• Mudflats and sandflats not covered by seawater at low tide • Reefs • Large shallow inlets and bays • Submerged or partially submerged sea caves
Dee Estuary/Aber Dyfrdwy SAC	6.6	• Estuaries • Mudflats and sandflats not covered by seawater at low tide • *Salicornia* and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-*Puccinellietalia maritimae*)
Dee Estuary Ramsar	6.6	• Estuaries • Mudflats and sandflats not covered by seawater at low tide • Vegetated sea cliffs of the Atlantic and Baltic coasts • *Salicornia* and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-*Puccinellietalia maritimae*)
Dee Estuary SSSI	6.6	• Intertidal mud and sandflats • Saltmarsh

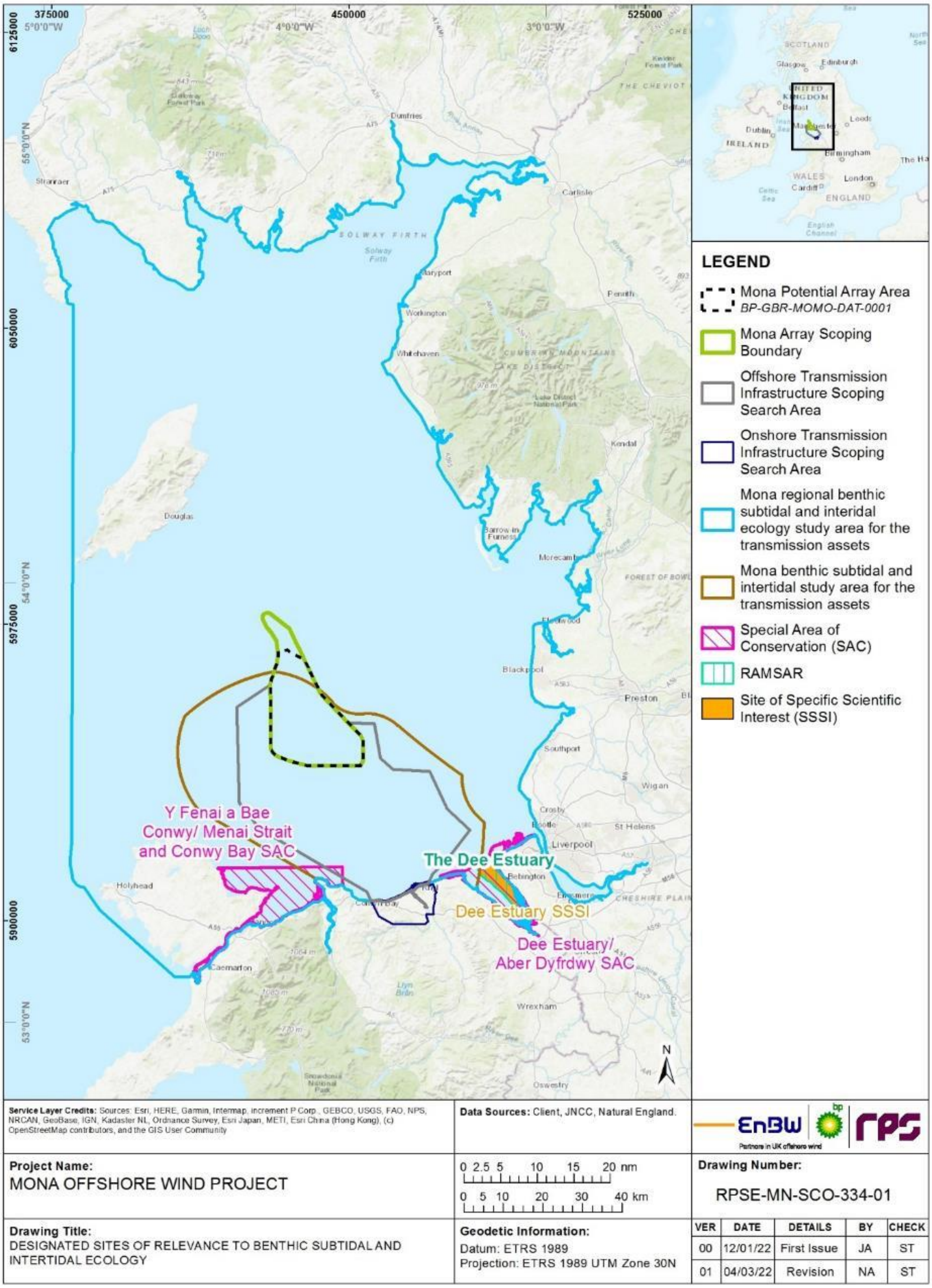


Figure 4.4: Marine nature conservation designations of relevance to benthic subtidal and intertidal ecology and the Mona Offshore Wind Project.

Protected species and habitats

4.1.4.30 Several species and habitats of conservation importance have been recorded or have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the transmission assets. These are presented below in Table 4.4 and include those species and habitats protected under Annex I of the Habitats Regulations. Where species are afforded protection under other legislation, this has also been noted.

Table 4.4: Relevant protected benthic species and habitats which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the transmission assets.

Benthic species and habitats	Protection legislation
Rocky Reef	• Annex I of the Habitats Regulations
Cobble Reef	• Annex I of the Habitats Regulations
Sabellaria spinulosa reef	• Annex I of the Habitats Regulations • Habitat of principal importance in England under the Natural Environment and Rural Communities Act 2006 (NERC 2006 Act) • UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR (Oslo-Paris) convention • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016 • MCZ Feature of Conservation Importance (FOCI)
Modiolus reef	• Annex I of the Habitats Regulations • Habitat of principal importance in England under the NERC Act 2006. • UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR convention • Habitat of principal importance under Section 7 of the Environment (Wales) Act 2016 • MCZ Habitat FOCI
Sea pen and burrowing megafauna communities	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR convention • Habitat of principal importance in England under the NERC Act 2006. • Habitat of principal importance under Section 7 of the Environment (Wales) Act 2016 • MCZ Habitat FOCI
Subtidal sands and gravels	• Annex I of the Habitats Regulations • Habitat of principal importance in England under the NERC Act 2006. • UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Annex V of the OSPAR convention • Habitat of principal importance under Section 7 of the Environment (Wales) Act 2016

Benthic species and habitats	Protection legislation
	• MCZ Habitat FOCI

4.1.5 Potential project impacts

4.1.5.1 A range of potential impacts on benthic subtidal and intertidal ecology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

4.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.5 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.1.5.3 Potential impacts scoped out of the assessment are presented in Table 4.6, with justification.

Table 4.5: Impacts proposed to be scoped in to the project assessment for benthic subtidal and intertidal ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Increased suspended sediment concentrations (SSCs) and associated deposition.	✓	✓	✓	Sediment disturbance arising from construction activities (e.g. OSP and offshore booster substation foundation installation, unexploded ordnance (UXO) detonation, cable installation – including any seabed preparation); maintenance operations (e.g. cable repair/reburial etc.); and decommissioning activities (e.g. cable repair/reburial, use of jack-up vessels to facilitate OSP component repairs etc) may result in indirect impacts on benthic communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects). Changes in SSCs can impact benthic receptors through changes in water clarity and reduced feeding due to increases in suspended solids and smothering and siltation rate changes.	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact assessment. Further details of this modelling are presented within section 3.1. For the operation and maintenance phase, the magnitude is assumed to be no greater than for the construction phase therefore modelling carried out for the construction phase will be used to quantify the magnitude of effect. The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario (MDS). For example, the MDS increases in SSC/associated deposition will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the Mona regional benthic subtidal and intertidal ecology study area for the transmission assets. The sensitivity of benthic receptors will be determined using the Marine Evidence based Sensitivity Assessment (MarESA) tool.
Temporary habitat loss/disturbance.	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of cable installation activities (including UXO detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss/disturbance may occur during the operation and maintenance phase as a result of operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate OSP and offshore booster substation component repairs etc.). The	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The approach to assigning the significance of effect is outlined above for ‘Increased suspended sediment concentrations and associated deposition’ and discussed in Section 4.1.7 below.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				impacts associate with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove export cables, and jack-up operations to remove OSP and offshore booster substation foundations, resulting in potential effects on benthic ecology.		
Long term habitat loss.	✓	✓	×	There is the potential for long term habitat loss to occur directly under all OSP and offshore booster substation foundation structures and associated scour protection, and under any cable protection required along the export cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase although this impact will largely occur throughout the operation and maintenance phase.	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Increased risk of introduction and spread of invasive non-native species (INNS).	✓	×	✓	There is potential for an increased risk of introduction and spread of INNS through the vessel movements required during the construction phase and decommissioning phase.	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Colonisation of hard structures.	×	✓	×	Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of inns	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES. Invasive non-native species (INNS) will be considered, particularly in relation to colonisation of hard structures. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						associated deposition' and discussed in Section 4.1.7 below.
Changes in physical processes.	×	✓	×	The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology.	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	Outputs of numerical modelling (as per section 3.1) undertaken for the physical processes assessment will inform this impact assessment. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Removal of hard substrates.	×	×	✓	The removal of foundations and any scour/cable protection during decommissioning has the potential to lead to loss of species/habitats colonising these structures.	Benthic subtidal surveys will be undertaken within the Mona Offshore Transmission Infrastructure Scoping Search Area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the Mona Offshore Transmission Infrastructure Scoping Search Area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in Section 4.1.7 below.
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities.	There is wide ranging and comprehensive desktop information and data sources available to characterise the Mona regional benthic ecology study area for the transmission assets. However, the majority of the available sediment chemistry data collated to date is from the Rhiannon offshore wind farm surveys and is therefore not focused over the Mona Offshore Transmission Infrastructure Scoping Search Area. This is not currently sufficient information to scope out this impact. Benthic subtidal surveys are being undertaken in spring/summer 2022 over the Mona Offshore Transmission Infrastructure Scoping Search Area. Any requirement for samples to be collected and analysed for sediment contaminants would be agreed with consultees as part of the Evidence Plan process.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the site-specific information on contaminants in the Mona Offshore Transmission Infrastructure Scoping Search Area and available scientific evidence on the effects on benthic ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon benthic ecology receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.

Table 4.6: Impacts proposed to be scoped out of the project assessment for benthic subtidal and intertidal ecology.

Impact	Justification
Impacts to benthic invertebrates due to electromagnetic fields (EMF).	EMF generated through the subsea electrical cabling may affect benthic subtidal receptors however there is limited evidence on the electro sensitivity of benthic organisms and therefore the impact of EMFs on benthic invertebrates. In addition, for buried cables, the magnetic field at the seabed is reduced due to the distance between the cable and the seabed surface as a result of field decay with distance from the cable (CSA, 2019). A recent study conducted by CSA (2019) found that inter-array and export cables buried between depths of 1m to 2m reduces the magnetic field at the seabed surface four fold. For cables that are unburied and instead protected by thick concrete mattresses or rock berms, the field levels were found to be similar to buried cables. A Cable Specification and Installation Plan (CSIP) for the Mona Offshore Wind Project will include cable burial where possible or cables will be protected by rock as necessary therefore there is limited scope for impacts to benthic invertebrates due to electromagnetic fields. Impacts of EMF on shellfish species will be fully assessed in the Fish and shellfish Chapter (see part 3, section 4.2: Fish and shellfish of the EIA Scoping Report).
Accidental pollution during construction, operation and maintenance and decommissioning.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels / vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. Environmental Management Plan, including MPCP). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as MPCP. As such, it is intended that this impact is scoped out of further consideration within the Benthic subtidal and intertidal ecology ES chapter.

4.1.6 Measures adopted as part of the project

4.1.6.1 The following measures adopted as part of the project are relevant to benthic subtidal and intertidal ecology. These measures may evolve as the engineering design and EIA progresses.

- Development and adherence to a CSIP which will include cables to be buried to where possible and cable protection as necessary (The potential impact of this measure will be consulted upon with statutory consultees throughout the EIA process).
- Development of, and adherence to, a Construction Method Statement (CMS).

4.1.6.2 Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details. Any further mitigation will be dependent on the significance of the effects and will be consulted upon with statutory consultees throughout the EIA process.

4.1.7 Proposed assessment methodology

4.1.7.1 The benthic subtidal and intertidal ecology EIA will follow the methodology set out in part 1 section 4: EIA Methodology of the EIA Scoping Report. Specific to the Benthic Subtidal and Intertidal Ecology EIA, the following guidance documents will also be considered:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2019).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef (Limpenny *et al*., 2010).
- Defining and Managing *Sabellaria spinulosa* Reefs (Gubbay, 2007).
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009).
- Advances in assessing *Sabellaria spinulosa* reefs for ongoing monitoring (Jenkins *et al.,* 2018).
- Marine Evidence-based Sensitivity Assessment – A Guide (Tyler-Walters *et al*., 2018).
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).

4.1.7.2 A Benthic Subtidal and Intertidal Ecology Technical Report will present a detailed baseline characterisation for the Mona Offshore Wind Project using specific survey data and the most recent desk top data. This report will inform the Benthic subtidal and intertidal ecology ES chapter. The approach and focus of these impact assessments will be discussed with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Evidence Plan process.

4.1.7.3 For the purposes of undertaking the EIA, marine habitats and species identified as occurring in the Mona benthic subtidal and intertidal ecology study area for the transmission assets will be grouped into broad habitat/community types. These broad habitat/community types will serve as the Important Ecological Features (IEFs) against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Mona Offshore Wind Project will be assessed. Habitats with similar physical and biological characteristics (including species complement and richness/diversity) as well as conservation status/interest will be grouped together for the purposes of the EIA. Consideration will also be given to the sensitivities of different habitats in assigning the groupings, such that habitats and species with similar vulnerability and recoverability, often as a result of similar broad sediment types and species complements, will be grouped together. Impacts on IEFs will be described in terms of the magnitude of that impact and correlated against the sensitivity of each IEF to that each impact, to produce a statement of significance (see part 1 section 4: EIA Methodology of the EIA Scoping Report).

4.1.7.4 Information on the sensitivities of benthic ecology receptors will largely be drawn from the Marine Evidence based Sensitivity Assessment (MarESA) (Tyler-Walters *et al*., 2018). The MarESA is a database which has been developed through the Marine Life Information Network (MarLIN) of Britain and Ireland and is maintained by a number of organisations, including the Marine Biological Association (MBA) and other statutory organisations in the UK. This database comprises a detailed review of available evidence on the effects of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of effect.

4.1.7.5 The evidence base presented in the MarESA is peer reviewed and represents the largest review undertaken to date on the effects of human activities and natural events on marine species and habitats. It is considered to be one of the best available sources of evidence relating to recovery of benthic species and habitats.

4.1.7.6 Further detail of how sensitivity is defined is outlined in Tyler-Walters *et al*. (2018). Sensitivities to the key activities across the Mona Offshore Wind Project lifetime (i.e. construction and operation and maintenance and decommissioning phases) will be summarised according to the MarESA for each of the IEFs within the Mona benthic subtidal and intertidal ecology study area for the transmission assets. Where sensitivity information on specific biotopes are not available through the MarESA, suitable proxies will be used.

4.1.8 Potential cumulative effects

4.1.8.1 The majority of predicted effects of construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project infrastructure within the Mona Offshore Transmission Infrastructure Scoping Search Area on benthic communities are considered to be localised to within the footprint of the Mona Offshore Wind Project. However, there is potential for cumulative effects to occur on benthic subtidal and intertidal ecology from other projects or activities within the regional benthic subtidal and intertidal ecology study area for the transmission assets, where projects or plans could act collectively with the Mona Offshore Wind Project to affect benthic receptors. The cumulative effects assessment will follow the approach outlined in section part 1 section 4: EIA Methodology of the EIA Scoping Report.

4.1.9 Potential inter-related effects

4.1.9.1 The assessment of potential inter-related effects will be considered within the Benthic subtidal and intertidal ecology ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

4.1.10 Potential transboundary impacts

4.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for significant transboundary effects with regard to benthic subtidal and intertidal ecology from the Mona Offshore Wind Project as the predicted impacts on the benthic communities will largely occur within the footprint of the Mona Offshore Transmission Infrastructure Scoping Search Area.

4.2 Fish and shellfish ecology

4.2.1 Introduction

4.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the fish and shellfish ecological receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets.

4.2.2 Study area

4.2.2.1 Fish and shellfish are spatially and temporally variable therefore, for the purpose of the fish and shellfish ecology characterisation, a broad study area has been defined. The Mona fish and shellfish ecology study area for the transmission assets is presented in Figure 4.5 and described below.

4.2.2.2 The Mona fish and shellfish ecology study area for the transmission assets covers the east Irish Sea, extending from Mean High Water Springs (MHWS) out to the furthest west extent from the Mull of Galloway in Scotland to the western tip of Anglesey. This study area has been selected to account for the spatial and temporal variability of fish and shellfish populations, including fish migration. This was considered appropriate as it will ensure characterisation of all fish and shellfish receptors in the east Irish Sea and is large enough to consider all direct (e.g. habitat loss/disturbance within project boundaries) and indirect impacts (e.g. underwater noise over a much wider area) of the Mona Offshore Wind Project on the identified receptors.

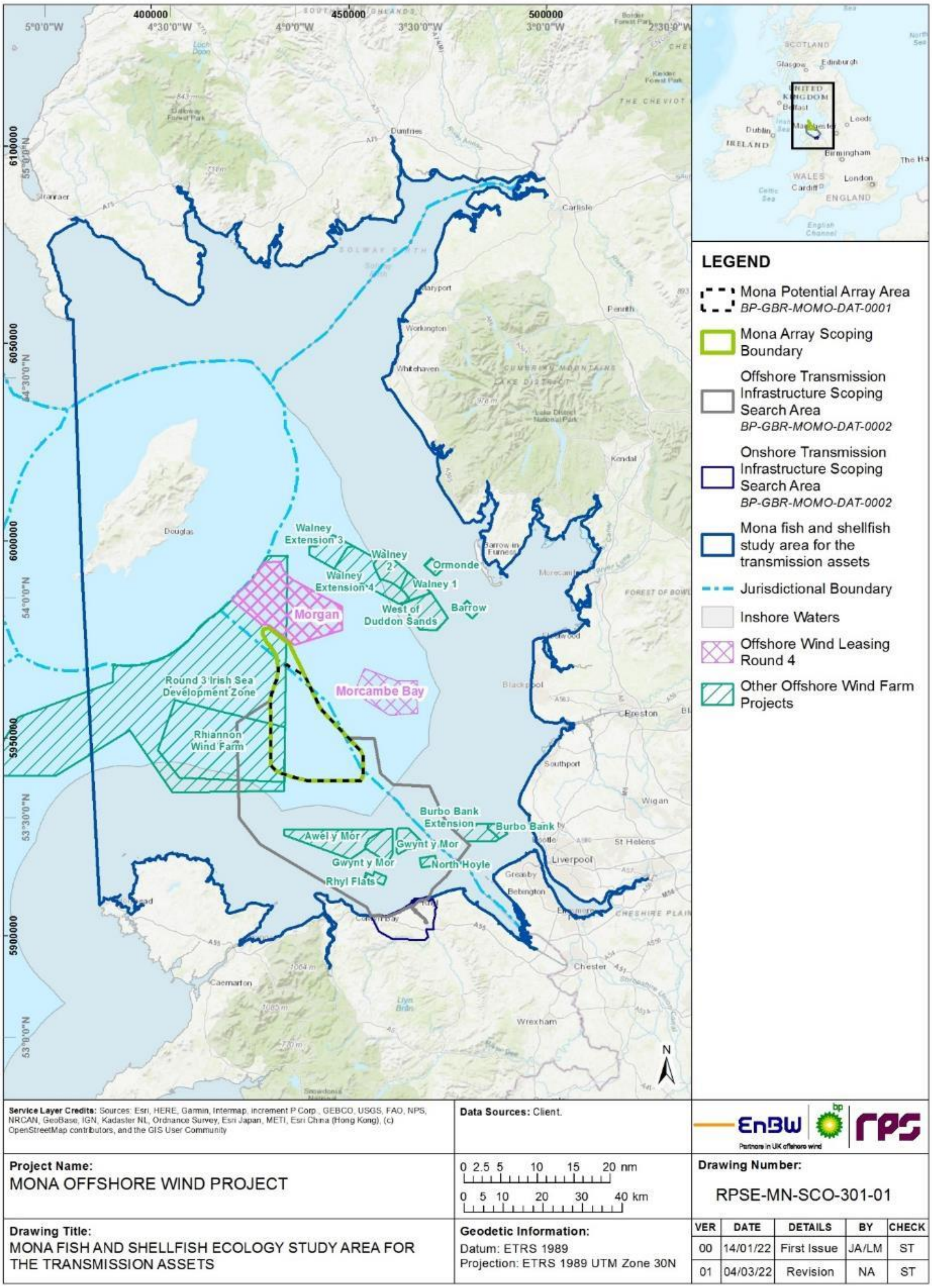


Figure 4.5: The Mona Fish and shellfish ecology study area for the transmission assets.

4.2.3 Data Sources

Desktop data

4.2.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the Mona fish and shellfish ecology study area for the transmission assets. These are summarised in Table 4.7.

Table 4.7: Summary of key desktop datasets and reports.

Title	Source	Year	Author
International council for the exploration of the sea (ICES) working group on surveys on ichthyoplankton in the North Sea and adjacent seas	ICES	2021	ICES
Marine Recorder Public UK Snapshot	Joing Nature Conservation Committee (JNCC)	2020	JNCC
Bass and Ray Ecology in Liverpool Bay	Bangor University Sustainable Fisheries and Aquaculture Group.	2020	Moore *et al*.
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
Welsh Waters Scallop Surveys and Stock Assessment	Bangor University	2019	Delargy *et al*.
JNCC MPA Mapper	JNCC	2019	JNCC
Walney Offshore Wind Farm, Year 2 Post construction Monitoring Fish and Epibenthic Survey	Marine Data Exchange	2013	Brown and May Marine Ltd
Welsh waters scallop survey – Cardigan Bay to Liverpool Bay July-August 2013	Bangor University	2013	Lambert *et al*.
Celtic Array Ltd offshore wind farm preliminary environmental information chapter 10: fish and shellfish ecology	Marine Data Exchange	2014	Celtic Array Ltd
Northern Irish Ground Fish Trawl Survey (NIGFS)	ICES	2013	ICES
West of Duddon Sands Offshore Wind Farm, Adult and Juvenile Fish and Epibenthic Pre Construction Surveys	Marine Data Exchange	2012	Brown and May Marine Ltd
Mapping the Spawning and Nursery Grounds of Selected Fish for Spatial Planning	Cefas	2012	Ellis *et al*.
Gwynt y Mor Offshore Wind Farm, Pre construction Baseline Beam Trawl Data	Marine Data Exchange	2011	Centre for Marine and Coastal Studies Ltd (CMACS)
Burbo Bank Offshore Wind Farm, Post construction (Year 3) Commercial Fish Survey	Marine Data Exchange	2010	CMACS
Ormonde Offshore Wind Farm, Construction (Year 1) Environmental Monitoring	Marine Data Exchange	2010	RPS Energy
Celtic Array Ltd (Zone 9) Autumn Fish Trawl Survey	Marine Data Exchange	2010	CMACS

Title	Source	Year	Author
Walney Offshore Wind Farm Pre Construction Fish Survey	Marine Data Exchange	2009	Brown and May Marine Ltd
Rhyl Flats Offshore Wind Farm, Fish and Fisheries Baseline Study	Marine Data Exchange	2002-2006	Coastal Fisheries Conservation and Management
Burbo Bank Offshore Wind Farm, Electromagnetic Fields and Marine Ecology Study	Marine Data Exchange	2007	CMACS
Burbo Bank Offshore Wind Farm, Pre construction Commercial Fish Survey (2m Beam Trawl)	Marine Data Exchange	2006	CMACS
Walney and West of Duddon Sands Offshore Wind Farms, Baseline Benthic Survey – Epifaunal Beam Trawl Results	Marine Data Exchange	2005	Titan Environmental Surveys Ltd
Fisheries Sensitivity Maps in British Waters	United Kingdom Offshore Operators Association (UKOOA) Ltd.	1998	Coull *et al*.
Herring larvae surveys of the northern Irish Sea	The Agri-Food and Biosciences Institute (AFBI)	1993-2021	AFBI
Fish and shellfish survey results for the east Irish Sea	Environment Agency	Various	Environment Agency
Marine Life Information Network (MarLIN)	MarLIN	2018	Tyler-Wlaters *et al*
SeaLifeBase	https://www.sealifebase.ca/	2021	Palomares and Pauly
Fish and shellfish survey results for the east Irish Sea	Environment Agency	Various	Environment Agency
Updating Fishereis Sensitivity Maps in British Waters	Scottish Marine and Freshwater Science Report	2014	Aires *et al*
Cefas Pelagic ecosystem in the western English Channel and eastern Celtic Sea (PELTIC) surveys	Cefas	Various	Cefas
Fish and shellfish sensitivity reports.	https://www.marlin.ac.uk/activity/pressures_report	n/a	Various

4.2.3.2 There are a high number of publicly available fish and shellfish characterisation datasets and reports which overlap with the Mona fish and shellfish ecology study area for the transmission assets which will be used to inform the fish and shellfish baseline characterisation. Site specific data collected as part of the benthic surveys will also be used to inform the fish and shellfish baseline characterisation. The benthic surveys will include benthic grab samples which will be analysed for particle size analysis (PSA) to inform habitat suitability for sandeels *Ammodytidae* and herring *Clupea harengus* spawning (discussed in section 4.2.4). Fish assemblage data collected through incidental observations of fish and shellfish species from the benthic grabs and seabed imagery (e.g. sandeels and crustaceans) will also provide additional validation to the desktop data. Site-specific data collected as part of the aerial marine mammal surveys will record basking shark (if sighted) which will inform the fish and shellfish baseline characterisation.

4.2.3.3 No further site-specific fish and shellfish surveys are therefore proposed across the Mona fish and shellfish ecology study area for the transmission assets.

4.2.4 Baseline environment

4.2.4.1 The Mona Offshore Wind Project transmission assets will be located within Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 4.2: Fish and Shellfish of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and any offshore booster substations will be located.

Fish assemblage

4.2.4.2 Distribution of fish is determined by a range of factors including abiotic parameters such as water temperature, salinity, depth, local-scale habitat features and substrate type. In addition to biotic parameters such as predator-prey interactions, competition and anthropogenic factors such as infrastructure and commercial fishing intensity.

4.2.4.3 The fish assemblage within the Mona fish and shellfish ecology study area for the transmission assets includes demersal species: European plaice *Pleuronectes platessa*, dab *Limanda limanda*, solenette *Buglossidium luteum*, Dover sole *Solea solea*, whiting *Merlangius merlangus*, lesser spotted dogfish *Scyliorhinus canicula* and cod *Gadus morhua*.

4.2.4.4 European seabass *Dicentrarchus labrax* and thornback ray *Raja clavata* have been recorded in Liverpool Bay, the Dee estuary and Morecambe Bay within the Mona fish and shellfish ecology study area for the transmission assets. European seabass caught in local fisheries recorded a bias towards females which is consistent with data from north Wales and could possibly indicate localized spawning (Moore *et al*., 2020).

4.2.4.5 Beam trawl surveys were undertaken in 2010 and 2011 across the Irish Sea Round 3 development zone which overlaps with the southwest of the Mona fish and shellfish ecology study area for the transmission assets and partially overlaps with the Mona Offshore Transmission Infrastructure Scoping Search Area. The surveys reported that the most dominant fish species present were poor cod *Trisopterus minutus* and the lesser spotted dogfish. The next most common species were dragonet *Callionymus lyra*, grey gurnard *Eutrigla gurnardus* and red gurnard *Aspitrigla cuculus*. The most common commercial fish species was plaice. Seven elasmobranch species were recorded, including cuckoo ray Raja naevus and spotted ray *Raja montagui* (CMACS, 2010; Celtic Array Ltd, 2014b).

4.2.4.6 A number of fish surveys have been undertaken across the Mona fish and shellfish ecology study area for the transmission assets for the surrounding offshore wind farm developments (Figure 4.5). Beam and otter trawl surveys were undertaken during 2011-2013 for Walney offshore wind farm year 2 post construction monitoring, for the West of Duddon Sands offshore wind farm pre construction survey and for the Gwynt y Mor offshore wind farm pre construction surveys. All surveys recorded plaice, dab, solenette and the lesser spotted dogfish as the most abundance species (CMACS, 2010; CMACS, 2011; Celtic Array Ltd, 2014b; Brown and May Marine Ltd, 2013; 2012). Cod and whiting were also consistently recorded across the area. Dover sole and cod were identified as species of key commercial importance in the area (Brown and May Marine Ltd, 2013). Sand goby *Pomatoschistus minutus* were recorded in high abundance within the Gwynt y Mor offshore wind farm (CMACS, 2011). Two elasmobranch species were also recorded within the Gwynt y Mor offshore wind farm: thornback rays and blonde ray *Raja brachyura* (CMACS, 2011).

4.2.4.7 Basking shark *Cetorhinus maximus* are known to migrate through the Irish Sea, with high numbers of sighting recorded around the Isle of Man (NBN Atlas, 2019). Basking shark have been sighted in a density of 11-50 individuals sighted per 0.5 by 0.5° (degrees) (50 by 50km) to the north of the Isle of Man, within the Mona fish and shellfish ecology study area for the transmission assets (Southall *et al.,* 2005). Basking sharks have a north-south migration and are expected to be in the vicinity of the Mona fish and shellfish study area for the transmission assets during August to October and during the return migration in March to June (Doherty *et al*., 2017). No basking shark were recorded in the site-specific surveys from March 2020-August 2021. Basking shark will be recorded (if sighted) in the remaining months of the site-specific aerial surveys undertaken for marine mammals across the Mona Potential Array Area. These data will be presented as part of the fish and shellfish baseline characterisation within the Environmental Statement (ES) chapter.

Diadromous fish species

4.2.4.8 Diadromous fish are species which migrate between freshwater and the sea during key life history stages (i.e. spawning). These may be anadromous (when fish spend most of their lives at sea but return to freshwater to spawn (e.g. Atlantic salmon *Salmo salar)*) or catadromous (when fish spend most of their lives in freshwater but return to the sea to breed (e.g. European eel)).

4.2.4.9 There is the potential for diadromous fish species to migrate to and from rivers in the vicinity of the Mona Offshore Wind Project and, therefore, they may migrate through the Mona fish and shellfish ecology study area for the transmission assets to rivers during certain periods of the year (NBN Atlas, 2019).

4.2.4.10 Fish and epibenthic surveys carried out in 2013 for the Walney offshore wind farm and in 2012 for the West of Duddon Sands offshore wind farm recorded sea trout *Salmo trutta*, a migratory species of relevance within the Mona fish and shellfish ecology study area for the transmission assets (Brown and May Marine Ltd, 2013; 2012).

4.2.4.11 Sea trout, European eel, river lamprey *Lampetra fluviatilis* and Atlantic salmon have been recorded in the estuaries of rivers across the Mona fish and shellfish ecology study area for the transmission assets. Twaite shad *Alosa fallax* and allis shad *Alosa alosa* have only been recorded at the mouth of the river Esk in the north of the Mona fish and shellfish ecology study area for the transmission assets (NBN Atlas, 2019).

4.2.4.12 Sea lamprey *Petromyzon marinus* have been recorded in the estuaries of the river Dee and the river Mersey however these records are from the 1960s and 1970s (NBN Atlas, 2019).

4.2.4.13 For the purposes of the fish and shellfish assessment, it will be assumed that the aforementioned diadromous species have the potential to occur within the Mona fish and shellfish ecology study area for the transmission assets, primarily during key migration periods (e.g. adult migration to spawning rivers and smolt/juveniles migration from natal rivers in the vicinity of the Mona Offshore Wind Project). For migratory fish species, the fish and shellfish assessment will be to determine whether construction, operation and maintenance or decommissioning activities have the potential to lead to disruption to migration, for example construction noise potentially creating an effective barrier to fish migration. The timing of fish migration will therefore be an important element of the baseline characterisation and this will be collected through a review of desktop data sources e.g. recent papers (e.g. Gardiner *et al.,* 2018), local rod catches and fish stock reports (Cefas and Environment Agency 2017).

Shellfish assemblage

4.2.4.14 North Wales has a long history of scallop fisheries with both king *Pecten maximus* and queen scallops *Aequipecten opercularis* regularly fished. Bangor University has conducted eight scallop research surveys in Welsh waters since 2012. The king scallop populations in Liverpool Bay have been recorded in consistently low densities and are dominated by larger, older individuals with little or highly sporadic recruitment occurring. However, the 2019 surveys did record evidence of pre-recruit (<110 mm) scallops in Liverpool Bay (Delargy *et al*., 2019).

4.2.4.15 Shellfish recorded in the trawl surveys undertaken in 2010 and 2011 across the Rhiannon offshore wind farm were king scallop, queen scallop, common whelk *Buccinum undatum*, edible crab *Cancer pagurus*, lobster *Homarus Gammarus*, brown shrimp *Crangon crangon* and horse mussel *Modiolus modiolus*. Queen scallop were the most numerous shellfish species recorded (Celtic Array Ltd, 2014b).

4.2.4.16 Beam trawl surveys carried out in 2012 for the West of Duddon Sands offshore wind farm, in 2013 for the Walney offshore wind farm and in 2011 for the Gwynt y Mor offshore wind farm recorded a number of shellfish species within the Mona fish and shellfish ecology study area for the transmission assets. Frequently recorded species included: *Nephrops norvegicus*, swimming crab *Liocarcinus* sp., brown shrimp *Crangon allmanni*, transparent razor shell *Phaxas pellucidus*, prickly cockle *Acanthocardia* echinata and the common whelk (Brown and May Marine Ltd, 2013; 2012; CMACS, 2011).

4.2.4.17 *Nephrops* have been consistently recorded across the Walney offshore wind farm with the highest number of individuals (3,296) in a single otter trawl recorded in 2009 (Brown and May Marine Ltd, 2013). The otter trawl surveys for the Walney offshore wind farm post construction monitoring recorded *Nephrops* as the most abundant shellfish species. *Nephrops* were identified as a species of key commercial importance in the area (Brown and May Marine Ltd, 2013). Beam trawl surveys carried out in 2012 for the West of

Duddon Sands offshore wind farm also recorded *Nephrops* within the West of Duddon Sands offshore wind farm array area, which is within the Mona regional fish and shellfish ecology study area for the transmission assets.

Spawning and nursery grounds

4.2.4.18 Potential nursery and spawning areas in the Irish Sea for a range of species were identified by Coull *et al*. (1998), based on larvae, egg and benthic habitat data. Ellis *et al*. (2012) reviewed this data for several fin fish species in the Irish Sea, including cod, whiting and herring, providing an updated understanding of areas of low and high intensity nursery and spawning grounds.

4.2.4.19 Based on this data, spawning areas and nursery for several species overlap the Mona fish and shellfish ecology study area for the transmission assets. Species with known spawning periods and nursery habitats identified within the Mona fish and shellfish ecology study area for the transmission assets have been summarised in Table 4.8, and illustrated in Figure 4.6 to Figure 4.15.

Table 4.8: Key species with geographic spawning and nursery overlap with the Mona fish and shellfish ecology study area for the transmission assets (Coull *et al*., 1998 and Ellis *et al*., 2012. Mapped in Figure 4.6 to Figure 4.15).

Common name	Species	Spawning	Nursery
Anglerfish	*Lophius piscatorius*	×	✓
Cod	*Gadus morhua*	✓	✓
European Hake	*Merluccius merluccius*	✓	×
Haddock	*Melanogrammus aeglefinus*	×	✓
Herring	*Clupea harengus*	✓	✓
Horse mackerel	*Trachurus trachurus*	✓	×
Lemon sole	*Microstomus kitt*	✓	✓
Ling	*Molva molva*	✓	×
Mackerel	*Scomber scombrus*	✓	✓
Nephrops	*Nephrops norvegicus*	✓	✓
Plaice	*Pleuronectes platessa*	✓	✓
Sandeels	*Ammodytidae*	✓	✓
Sole	*Solea solea*	✓	✓
Spotted ray	*Raja montagui*	×	✓
Sprat	*Clupeidae sp.*	✓	×
Spurdog	*Squalus acanthias*	×	✓
Thornback ray	*Raja clavata*	×	✓
Tope shark	*Galeorhinus galeus*	×	✓
Whiting	*Merlangius merlangus*	✓	✓

4.2.4.20 A review of spawning and nursery grounds suggests there is an overlap of the Mona fish and shellfish ecology study area for the transmission assets with herring spawning and nursery grounds. For nursery grounds this overlap occurs across the east of the Mona Offshore Transmission Infrastructure Scoping Search Area and is high intensity (Ellis *et al*., 2012; Figure 4.9). The AFBI in Northern Ireland has undertaken herring larvae surveys of the northern Irish Sea in November every year since 1993. The 2019 survey results recorded that the majority of herring larvae were captured in the east Irish Sea in the vicinity of the Douglas Bank spawning ground and to the north of the Isle of Man (ICES, 2021). Additional data on the north Irish Sea herring larvae survey will be requested from AFBI to support the baseline characterisation presented within the Fish and shellfish ecology ES chapter.

4.2.4.21 Herring are a commercially and ecologically important pelagic fish species (being an important prey species for numerous fish, marine mammal and bird species) and are common across much of the Irish Sea (Dickey-Collas *et al*., 2001). Herring utilise specific benthic habitats during spawning, which increases their vulnerability to activities impacting the seabed. Further, as a hearing specialist, herring are vulnerable to impacts arising from underwater noise.

4.2.4.22 A further review of the herring spawning and nursery grounds will be undertaken to support the fish and shellfish ecology assessment following guidelines set out by Boyle and New (2018) considering seabed sediment type and herring larval abundances (using data from the AFBI, as outlined above.

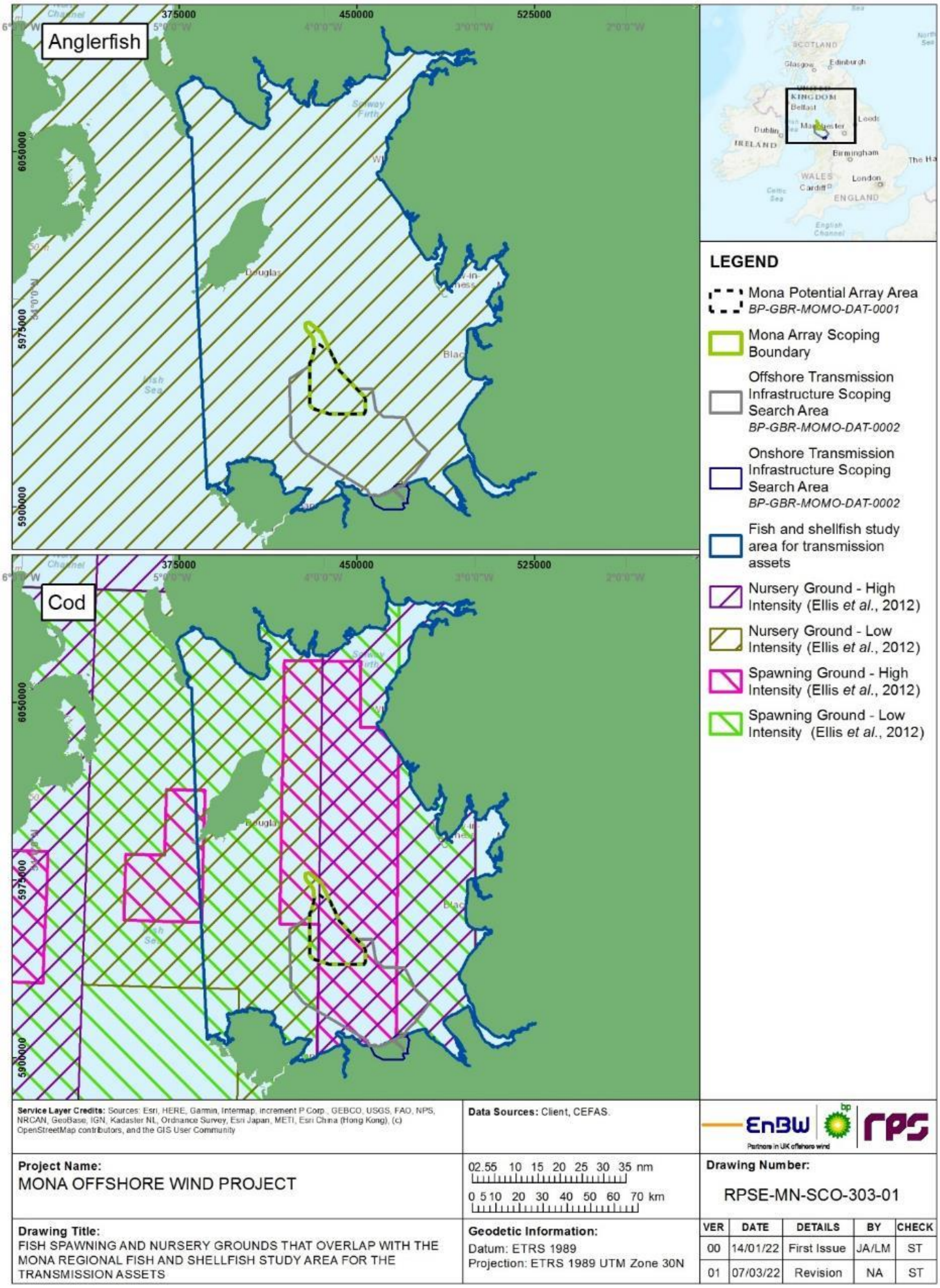


Figure 4.6: Angerfish and cod spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

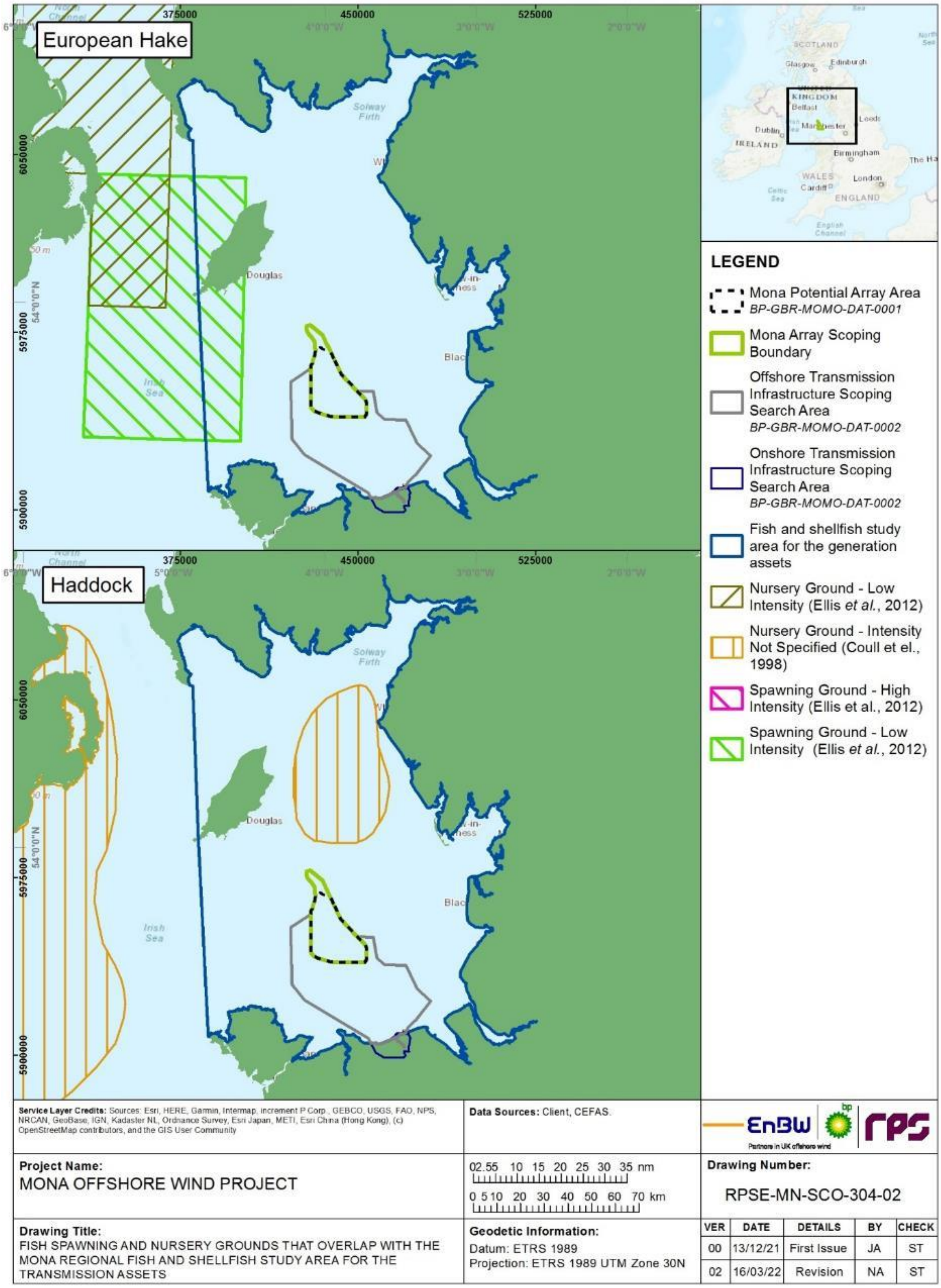
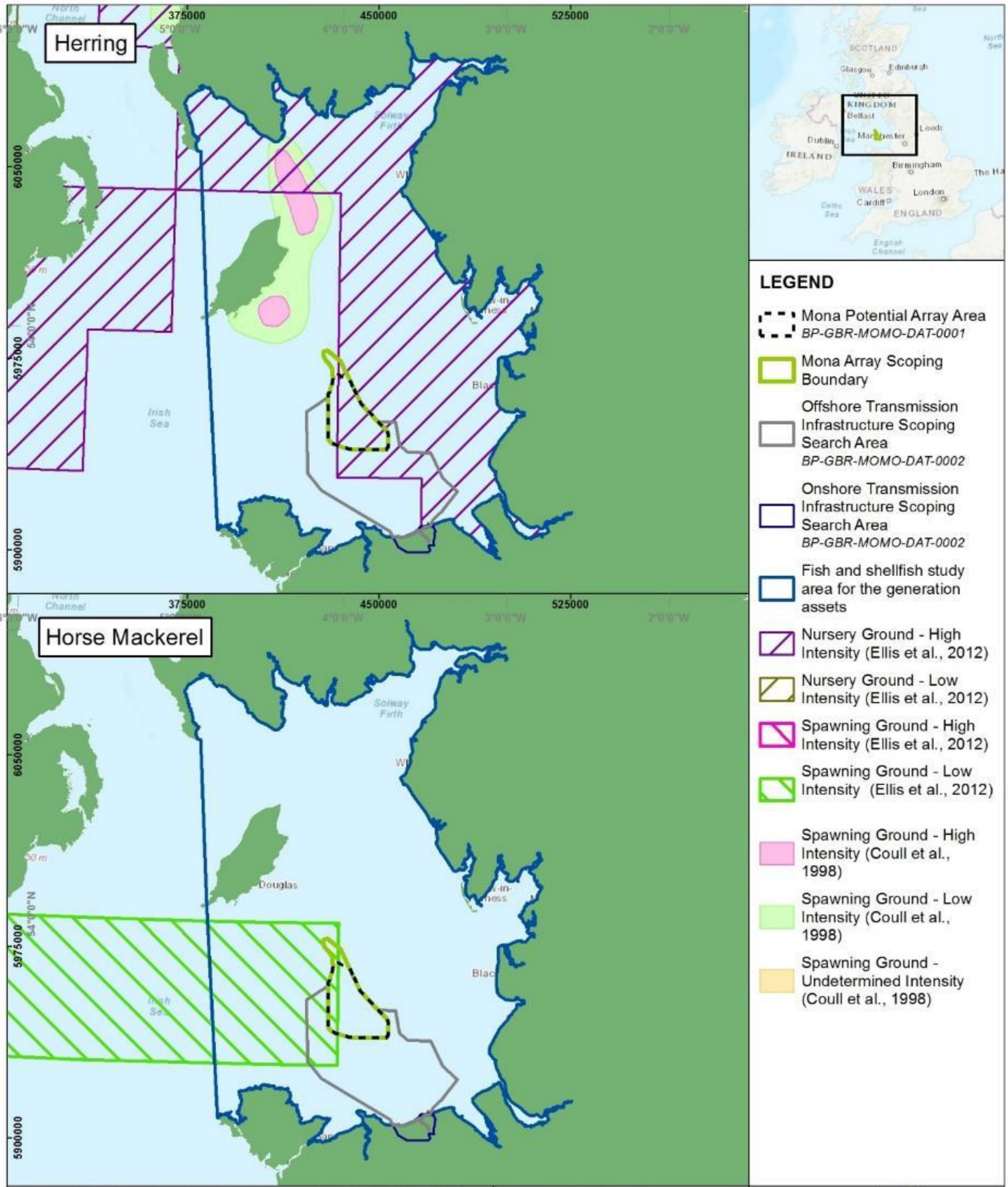


Figure 4.7: European hake and haddock spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, CEFAS.

EnBW bp Partners in UK offshore wind rps

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 25 30 35 nm
0 5 10 20 30 40 50 60 70 km

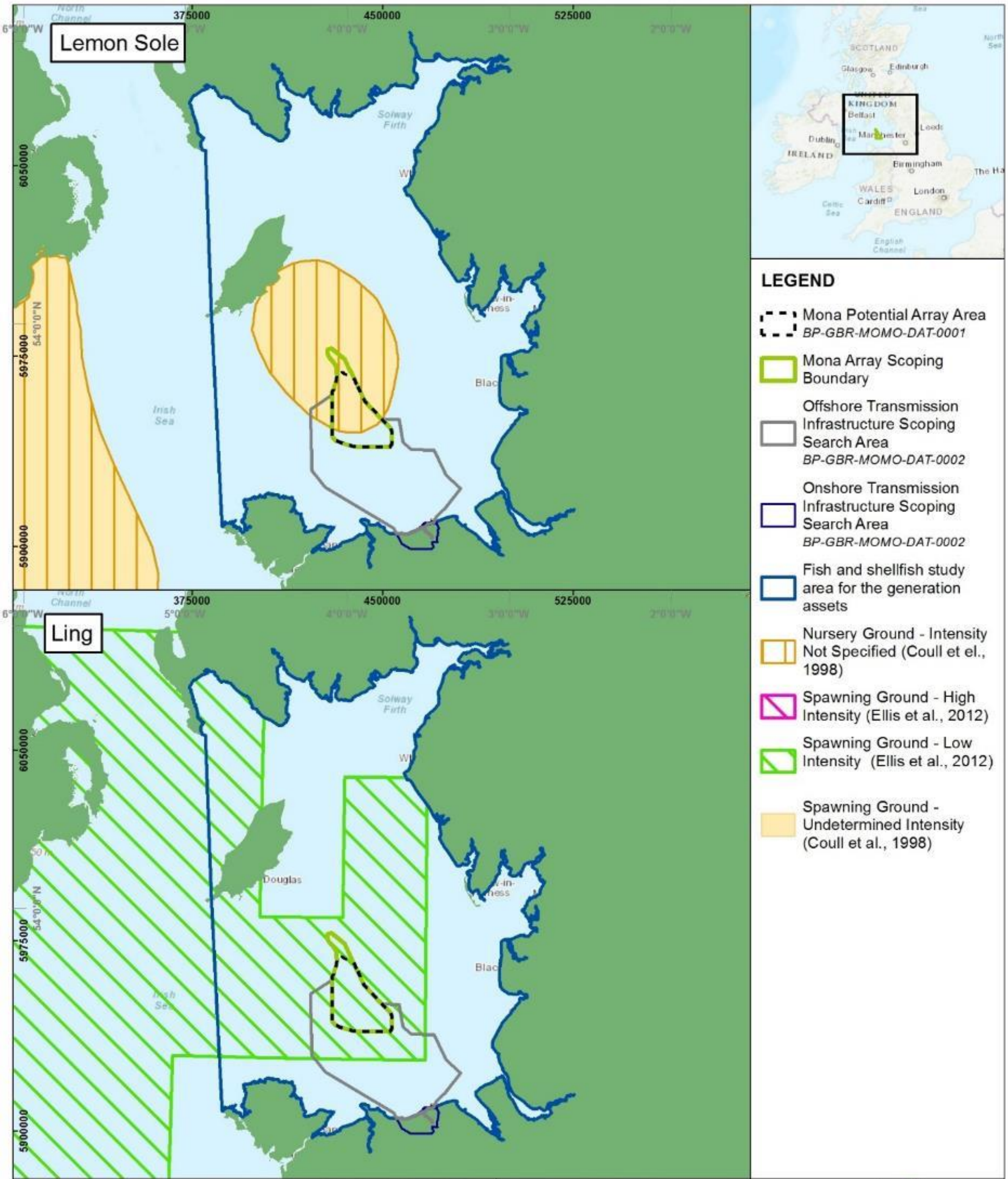
Drawing Number:
RPSE-MN-SCO-305-002

Drawing Title:
FISH SPAWNING AND NURSERY GROUNDS THAT OVERLAP WITH THE MONA REGIONAL FISH AND SHELLFISH STUDY AREA FOR THE TRANSMISSION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	13/12/21	First Issue	JA	ST
02	16/03/22	Revision	NA	ST

Figure 4.8: Herring and horse mackerel spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	Data Sources: Client, CEFAS.	EnBW bp rps Partners in UK offshore wind
Project Name: MONA OFFSHORE WIND PROJECT	0 2.5 5 10 15 20 25 30 35 nm 0 5 10 20 30 40 50 60 70 km	**Drawing Number:** RPSE-MN-SCO-306-02
Drawing Title: FISH SPAWNING AND NURSERY GROUNDS THAT OVERLAP WITH THE MONA REGIONAL FISH AND SHELLFISH STUDY AREA FOR THE TRANSMISSION ASSETS	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N	

VER	DATE	DETAILS	BY	CHECK
00	13/12/21	First Issue	JA	ST
02	16/03/22	Revision	NA	ST

Figure 4.9: Lemon sole and ling spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

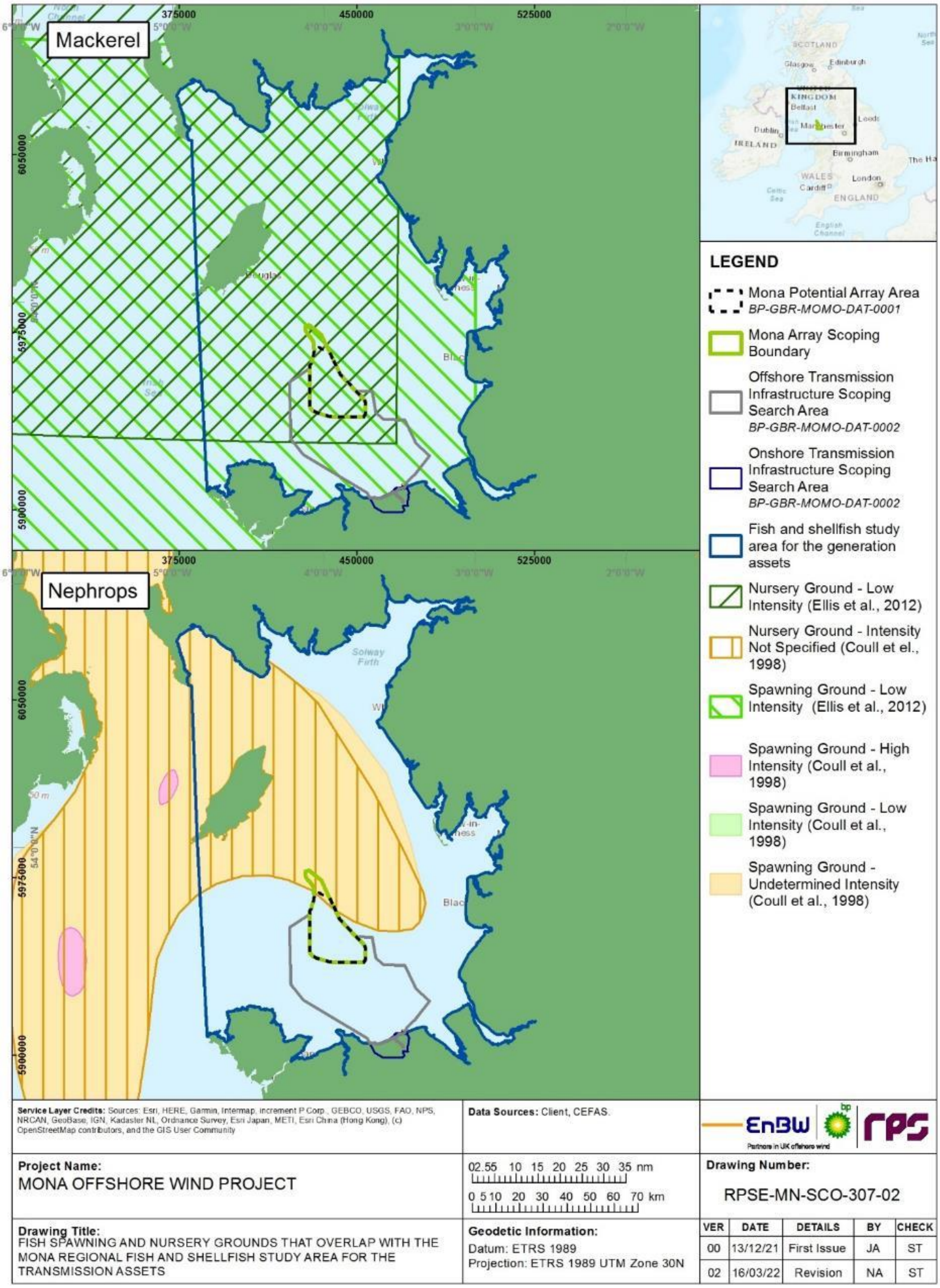
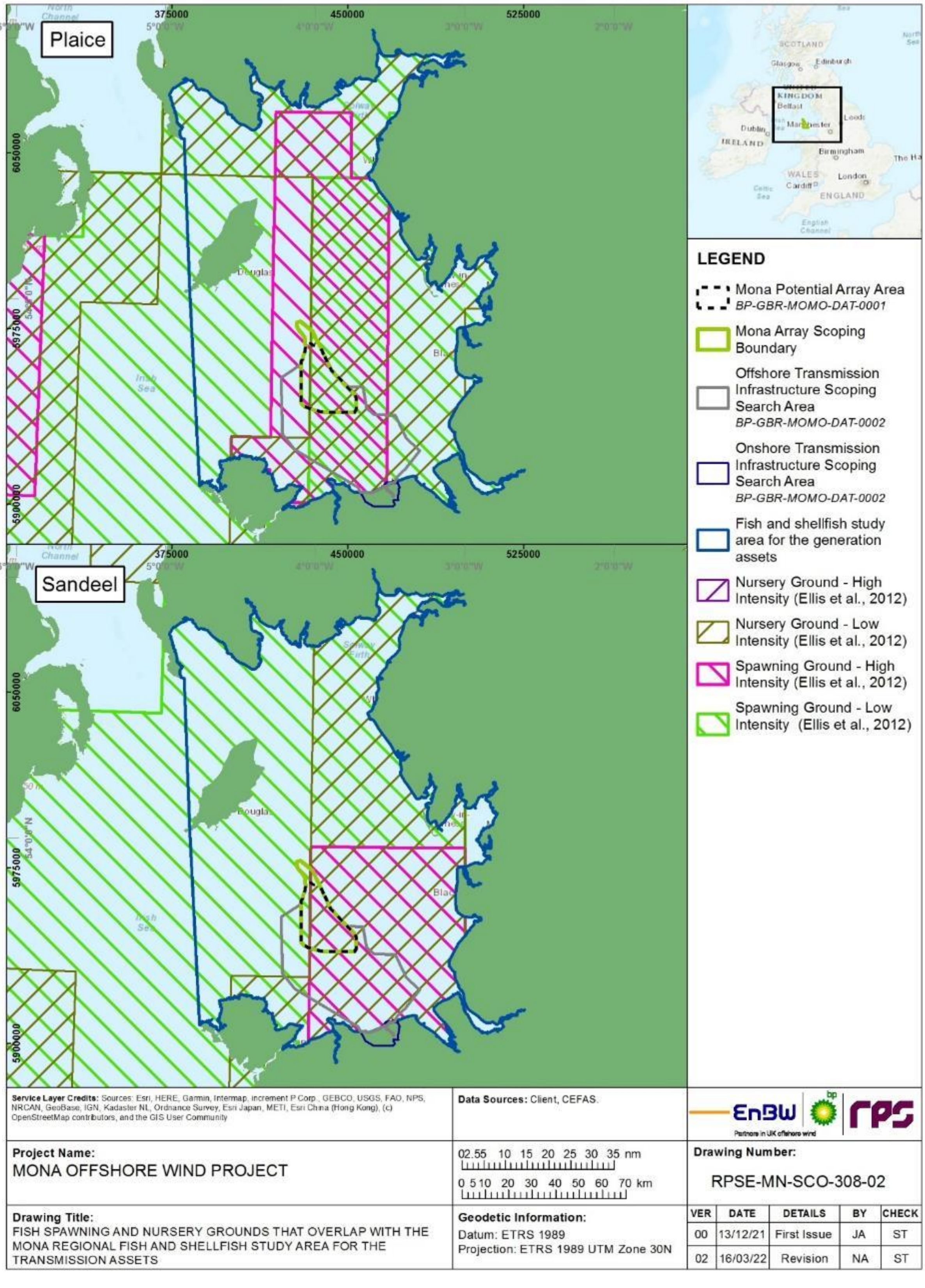
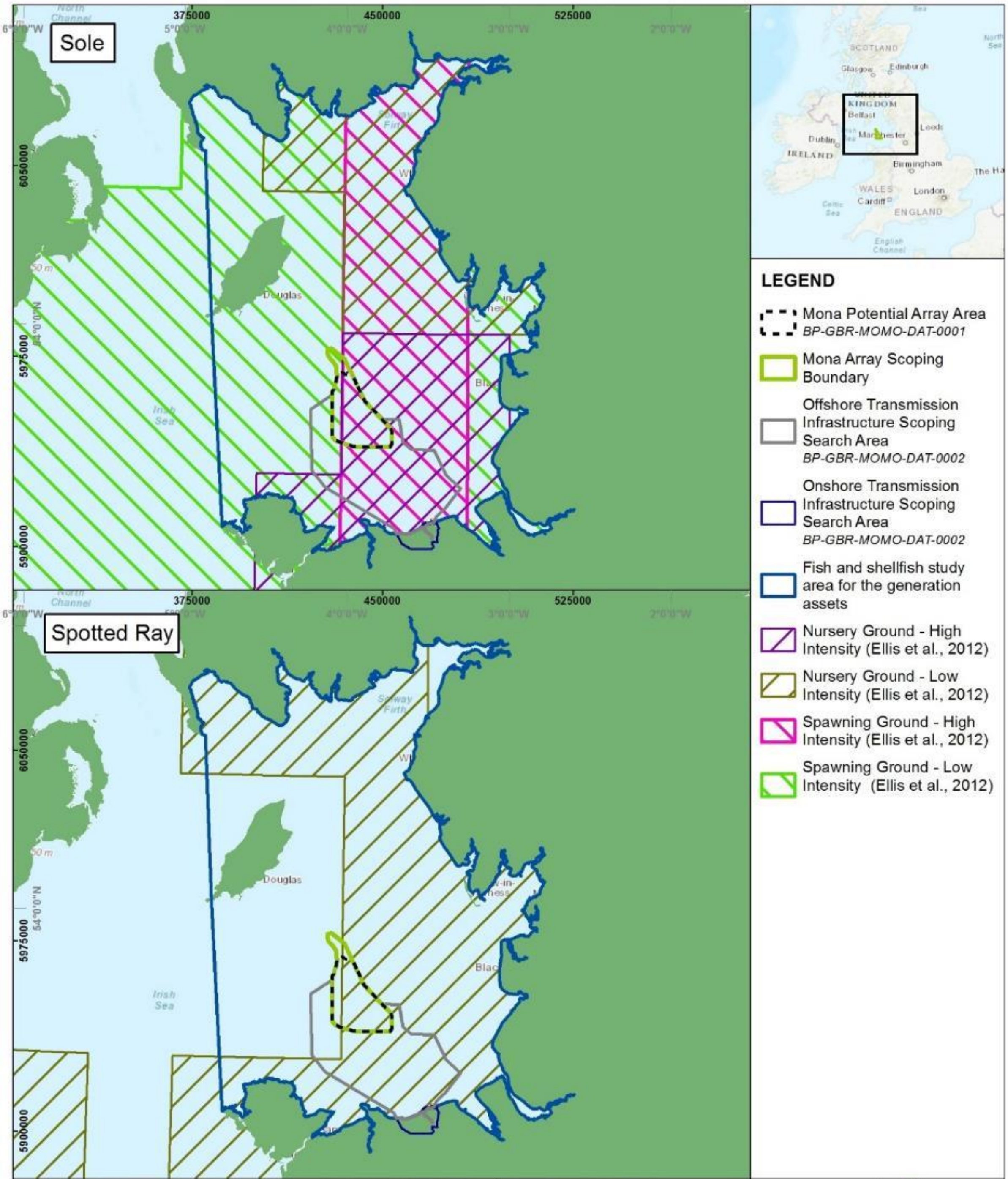


Figure 4.10: Mackerel and nephrops spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).



VER	DATE	DETAILS	BY	CHECK
00	13/12/21	First Issue	JA	ST
02	16/03/22	Revision	NA	ST

Figure 4.11: Plaice and sandeel spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, CEFAS.

EnBW bp rps
Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 25 30 35 nm
0 5 10 20 30 40 50 60 70 km

Drawing Number:
RPSE-MN-SCO-309-02

Drawing Title:
FISH SPAWNING AND NURSERY GROUNDS THAT OVERLAP WITH THE MONA REGIONAL FISH AND SHELLFISH STUDY AREA FOR THE TRANSMISSION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	13/12/21	First Issue	JA	ST
02	16/03/22	Revision	NA	ST

Figure 4.12: Sole and Spotted ray spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

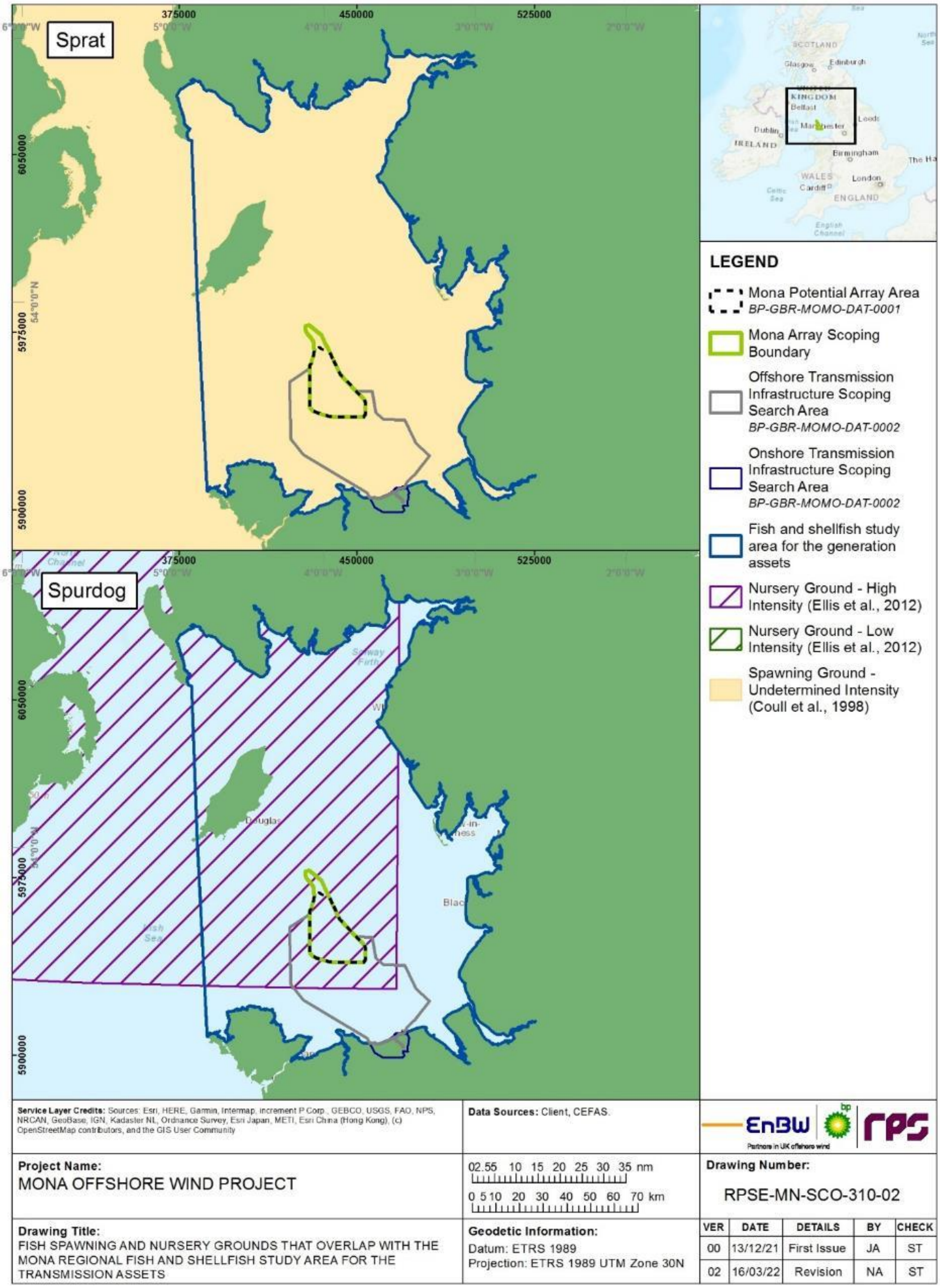


Figure 4.13: Sprat and spurdog spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

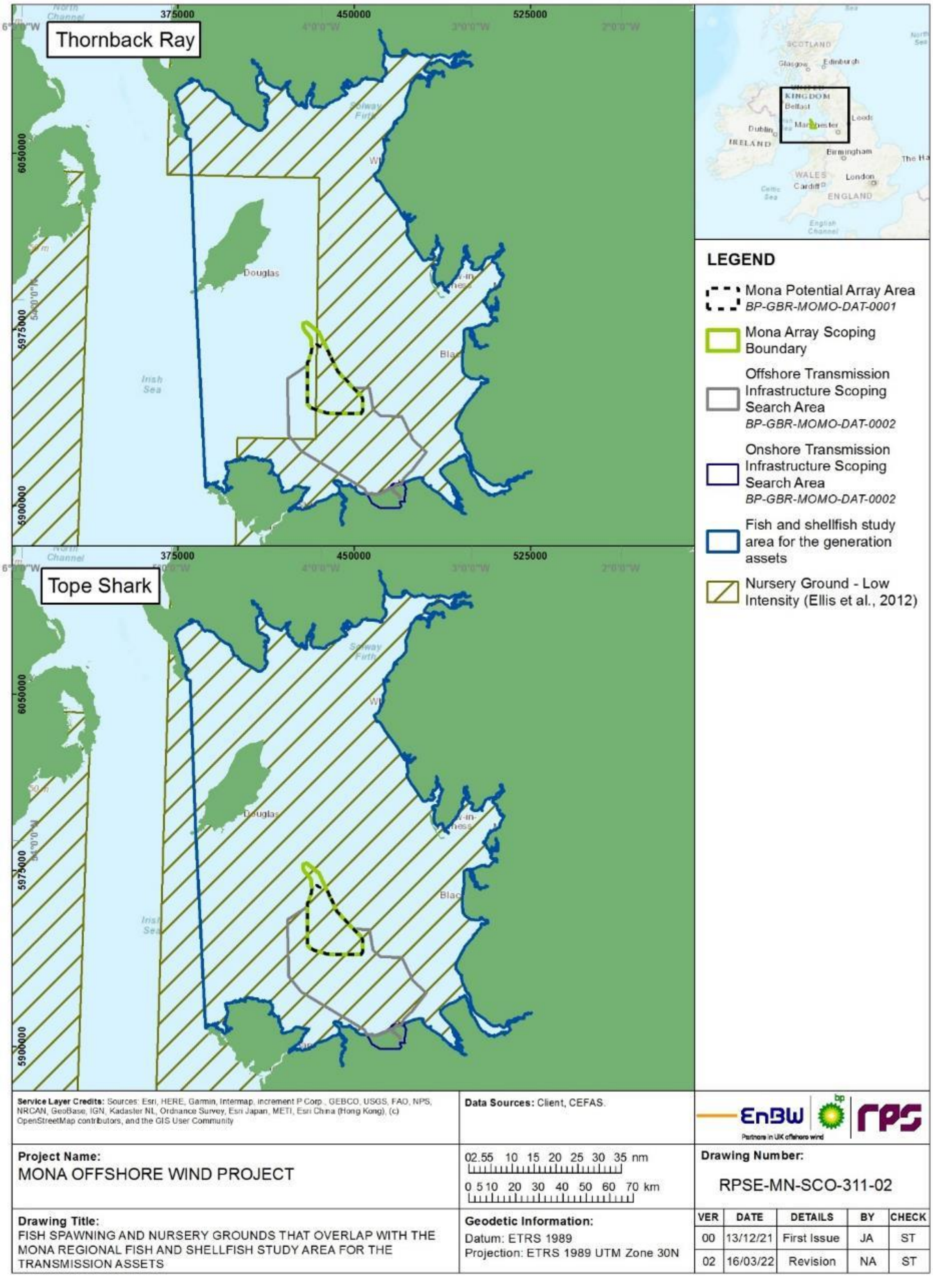


Figure 4.14: Thornback ray and tope shark spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Coull *et al*., 1998 and Ellis *et al*., 2012).

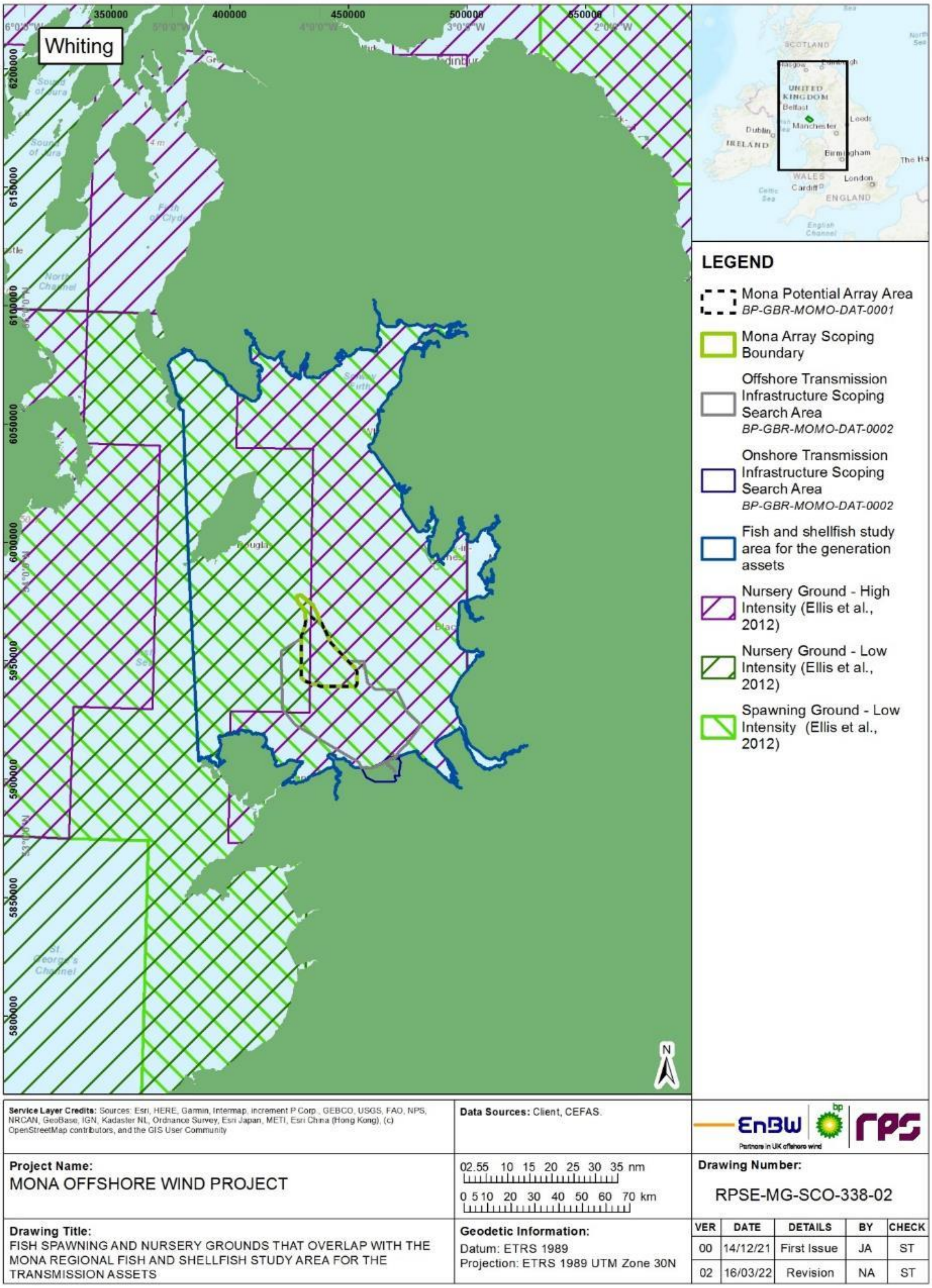


Figure 4.15: Whiting spawning and nursery grounds in the vicinity of the Mona Offshore Transmission Infrastructure Scoping Search Area (Ellis *et al*., 2012).

Designated sites

4.2.4.23 Designated sites with relevant qualifying features (i.e. fish and shellfish species) which overlap with the Mona fish and shellfish ecology study area for the transmission assets are described in this section.

4.2.4.24 Table 4.9 and Figure 4.16 provides an indication of the designated sites (including migratory fish features) that may be considered within the EIA, Likely Significant Effects (LSE) Screening Report and potentially the Report to Inform Appropriate Assessment (RIAA) if an LSE is identified. This list of designated sties will be refined in the EIA to include sites that fall within the potential ZOI of the Mona Offshore Wind Project. This will be determined as part of the EIA process as a more detailed understanding of the project activities and impacts pathway develops.

4.2.4.25 A full screening of European sites with qualifying fish features will be undertaken in the LSE Screening Report for the Mona Offshore Wind Project, as part of the HRA process. Relevant Annex II fish species of European designated sites screened into the fish and shellfish ecology assessment will be fully considered and assessed in the Fish and shellfish ecology ES chapter. The assessment on the European sites and effects on the site(s) conservation objectives will be undertaken in the RIAA.

4.2.4.26 The Fish and shellfish ecology ES chapter will also include consideration of nationally designated sites (i.e. Marine Nature Reserves (MNR), Sites of Special Scientific Interest (SSSIs), Marine Protected Areas (MPAs) and recommended and designated Marine Conservation Zones (MCZs)). Nationally designated sites and the relevant qualifying features will be fully considered and assessed in the Fish and shellfish ecology ES chapter, where there is potential for significant effects on these. MCZs and their features will be considered within a separate MCZ Assessment.

Table 4.9: Summary of designated sites with relevant fish and shellfish ecology features within the Mona fish and shellfish ecology study area for the transmission assets.

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features
Dee Estuary/Aber Dyfrdwy SAC	6.6	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC	26.7	• Sea lamprey (*Petromyzon marinus*) • Atlantic salmon (*Salmo salar*) • River lamprey (*Lampetra fluviatilis*) • Brook lampreys (*Lampetra planeri*) • Bullhead (*Cottus gobio*)*
Ribble Estuary MCZ	35	• Smelt (*Osmeridae*)
Langness MNR	42.2	• Horse mussel beds (*Modiolus modiolus*) • Icelandic clam (*Arctica islandica*) • European eel (*Anguilla anguilla*) • Cod (spawning/nursery)
Wyre-Lune MCZ	42.9	• Smelt (*Osmeridae*)

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features
Little Ness MNR	46.2	• Horse mussel beds (*Modiolus modiolus*) • Icelandic clam (*Arctica islandica*) • European eel (*Anguilla anguilla*)
Douglas Bay MNR	48.3	• European eel (*Anguilla anguilla*)
Baie Ny Carrickey MNR	50.5	• European eel (*Anguilla anguilla*) • Spiny lobster (*Palinuridae*)
Laxey Bay MNR	51	• Icelandic clam (*Arctica islandica*)
Calf and Wart Bank MNR	53.6	• Spiny lobster (*Palinuridae*) • Flame shell (*Limaria hians*) • Sand eel
Niarbyl MNR	56.0	• Icelandic clam (*Arctica islandica*)
Port Erin Bay MNR	57.1	• Flame shell (*Limaria hians*) • Icelandic clam (*Arctica islandica*)
Ramsey Bay MNR	59.5	• Icelandic clam (*Arctica islandica*) • European eel (*Anguilla anguilla*)
West Coast MNR	61.6	• European eel (*Anguilla anguilla*) • Common skate (*Dipturus batis*) • Cod (spawning/nursery) • Sand eel • Seabass nursery
River Ehen SAC	87.5	• Atlantic salmon (*Salmo salar*)
River Derwent and Bassenthwaite Lake SAC	91.9	• Sea lamprey (*Petromyzon marinus*) • Atlantic salmon (*Salmo salar*) • River lamprey (*Lampetra fluviatilis*) • Brook lampreys (*Lampetra planeri*)
Allonby Bay MCZ	112	• Blue mussel (*Mytilus edulis*) beds
Solway Firth MCZ	131	• Smelt (*Osmeridae*)
Solway Firth SAC	131	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)

*****Bull head is a wholly freshwater species therefore there is no impact-pathway for this species.

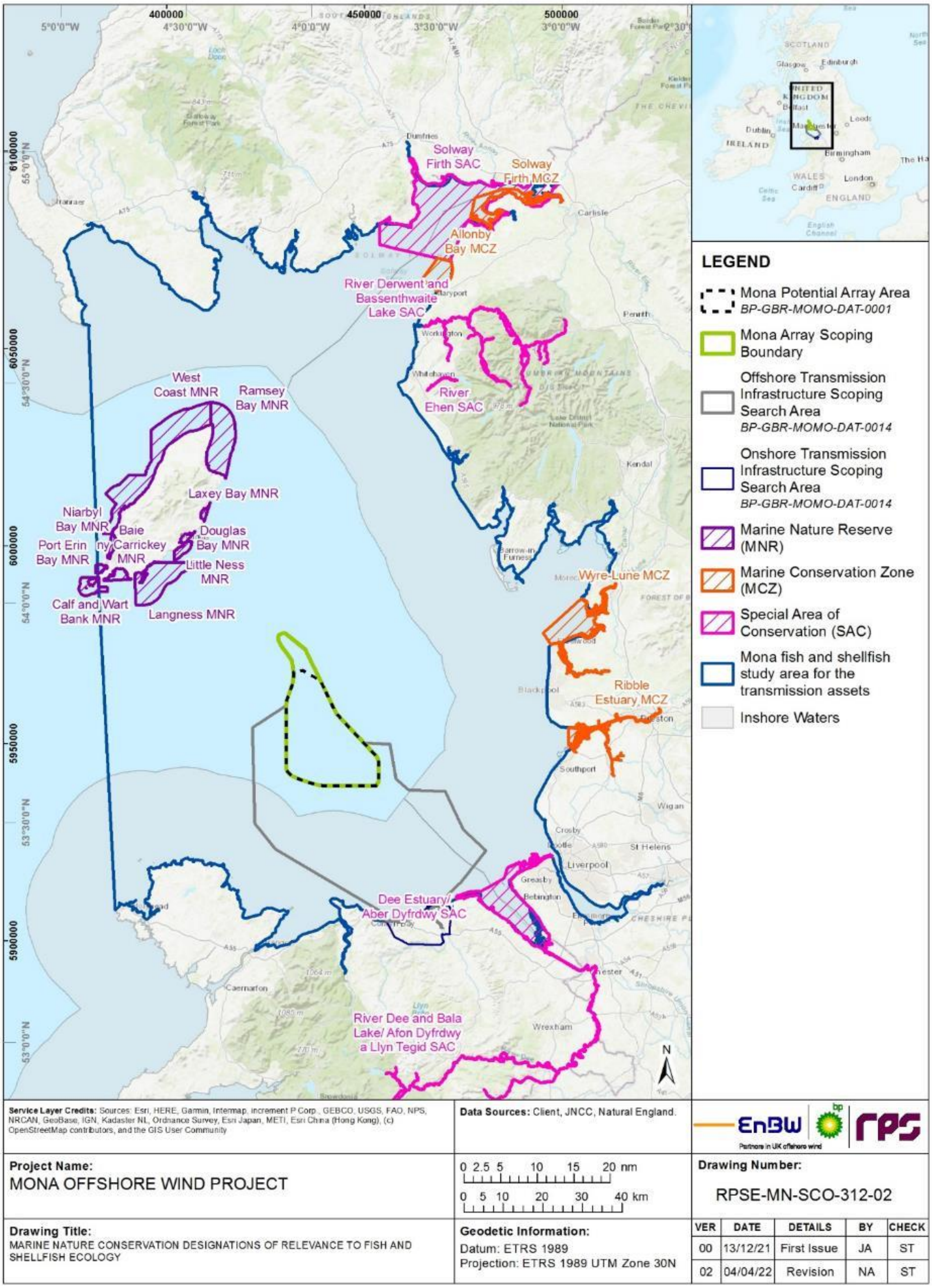


Figure 4.16: Marine nature conservation designations of relevance to fish and shellfish ecology that overlap with the Mona fish and shellfish ecology study area for the transmission assets.

Protected Species

4.2.4.27 Several species of conservation importance have been recorded or have the potential to occur within the Mona fish and shellfish ecology study area for the transmission assets. These are presented below in Table 4.10 and include. These species are protected under Annex II of the Habitats Regulations or listed as 'species of principal importance' under Section 41 in England of the Natural Environment and Rural Communities (NERC) Act 2006. Where species are afforded protection under other legislation, this has also been noted.

Table 4.10: Relevant protected fish and shellfish species within the Mona fish and shellfish ecology study area for the transmission assets.

Fish and Shellfish Species	Protection legislation
Salmon (*Salmo salar*)	• Annex II of the Habitats Regulations. • Habitat of principal importance in England under the Natural Environment and Rural Communities Act 2006 (NERC 2006 Act).
European Eel (*Anguilla anguilla)*	• Annex II of the Habitats Regulations. • Habitat of principal importance in England under the NERC 2006 Act. • UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. • Critically endangered on the International Union for Conservation of Nature (IUCN) Red List.
Allis shad (*Alosa alosa*)	• Annex II of the Habitats Regulations. • Habitat of principal importance in England under the NERC 2006 Act. • Schedule 5 of the Wildelife and Countryside Act 1981.
Twaite shad (*Alosa fallax)*	• Annex II of the Habitats Regulations. • Habitat of principal importance in England under the NERC 2006 Act. • Schedule 5 of the Wildelife and Countryside Act 1981.
River lamprey (*Lampetra fluviatilis*)	• Annex II of the Habitats Regulations. • Habitat of principal importance in England under the NERC 2006 Act.
Sea lamprey (*Petromyzon marinus*)	• Annex II of the Habitats Regulations. • Habitat of principal importance in England under the NERC 2006 Act.
Sea trout (*Salmo trutta*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016. • Habitat of principal importance in England under the NERC 2006 Act. • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
Smelt (*Osmerus eperlanus*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016. • Habitat of principal importance in England under the NERC 2006 Act.

Fish and Shellfish Species	Protection legislation
	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
Basking shark (*Cetorhinus maximus*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016. • Habitat of principal importance in England under the NERC 2006 Act. • Schedule 5 of the Wildelife and Countryside Act 1981. • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
Angel shark (*Squatina squatina*)	• Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016. • Habitat of principal importance in England under the NERC 2006 Act. • Schedule 5 of the Wildelife and Countryside Act 1981. • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
Atlantic cod (*Gadus morhua*)	• Habitat of principal importance in England under the NERC 2006 Act. • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. • OSPAR threatened and/or declining species. • Vulnerable on the IUCN Red List.
Whiting (*Merlangius merlangus*)	• Habitat of principal importance in England under the NERC 2006 Act. • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
European hake (*Merluccius merluccius*)	• Habitat of principal importance in England under the NERC 2006 Act. • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
Thornback ray (*Raja clavata*)	• Habitat of principal importance in England under the NERC 2006 Act.

4.2.5 Potential project impacts

4.2.5.1 A range of potential impacts on fish and shellfish ecological receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

4.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.11 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.2.5.3 Potential impacts scoped out of the assessment are presented in Table 4.12 with justification.

Table 4.11: Impacts proposed to be scoped into the project assessment for fish and shellfish ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Temporary habitat loss/disturbance.	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of cable installation activities (including unexploded ordnance (UXO) detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss/disturbance may occur during the operation and maintenance phase as a result of operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate offshore substation platform (OSP) and offshore booster substation component repairs etc.). The impacts associate with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove export and interconnector cables resulting in potential effects on fish and shellfish ecology.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the transmission assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario (MDS). For example, the MDS for habitat loss/disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the Mona fish and shellfish ecology study area for the transmission assets.
Underwater noise impacting fish and shellfish receptors.	✓	×	✓	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as UXO detonation, pile-driving, pre-construction geophysical surveys and similar for decommissioning activities.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the transmission assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	Underwater noise modelling will be undertaken as set out in section 3.2 inform the assessment of underwater noise impacts to fish and shellfish. This will use the most up to date best practice guidelines (i.e. Popper *et al.,* 2014) and other scientific literature to give consideration to the potential for injury and disturbance to fish and shellfish species, including disruption to spawning activity for marine fish species, disruption to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Increased suspended sediment concentrations (SSCs) and associated sediment deposition.	✓	✓	✓	Sediment disturbance arising from construction activities (e.g. foundation and cable installation – including drilling and any deposits arising, UXO detonation, and seabed preparation); maintenance operations (e.g. cable repair/reburial etc.); and decommissioning activities (e.g. cable and foundation removal) may result in indirect impacts on fish and shellfish communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects).	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the transmission assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	The outputs of numerical modelling undertaken for the physical processes assessment (section 3.2) will inform this impact assessment. This will include consideration of the potential for effects on spawning habitats (i.e. changes to sediment composition, smothering of eggs etc) and disturbance to migration of diadromous fish species. This will consider differing sensitivities of the identified receptors and life history stages to this impact. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Long term habitat loss.	✓	✓	✓	There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the export and interconnector cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase, although the impact will largely occur throughout the operation and maintenance phase. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the Mona Offshore Wind Project lifetime.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the transmission assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment , although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS.
Electromagnetic Fields (EMF) from subsea electrical cabling.	×	✓	×	EMF generated through the subsea electrical cabling may affect fish and shellfish prey/predator relationship by inhibiting/interfering with fish and shellfish behaviours due to changes in background EMFs.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the transmission assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on EMFs in the marine environment and effects on fish and shellfish ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						magnitude of the impact and the sensitivity of the receptor.
Colonisation of hard structures.	✓	✓	✓	Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and/or aggregation of fish and shellfish in the vicinity of structures.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Mona fish and shellfish ecology study area for the transmission assets (as set out in sections 4.2.3 and 4.2.4) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on colonisation of hard structures, including from offshore wind farms. This assessment will be based on information derived from the PDE. Invasive non-native species (INNS) will be considered, particularly in relation to colonisation of hard structures. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario.
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on fish and shellfish communities.	There is wide ranging and comprehensive desktop information and data sources available to characterise the Mona regional benthic ecology study area for the transmission assets. However, the majority of the available sediment chemistry data collated to date is from the Rhiannon offshore wind farm surveys and is therefore not focused over the Mona Offshore Transmission Infrastructure Scoping Search Area. This is not currently sufficient information to scope out this impact. Benthic subtidal surveys are being undertaken in spring/summer 2022 over the Mona Offshore Transmission Infrastructure Scoping Search Area. Any requirement for samples to be collected and analysed for sediment contaminants would be agreed with consultees as part of the Evidence Plan process.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the site-specific information on contaminants in the Mona Offshore Transmission Infrastructure Scoping Search Area and available scientific evidence on the effects on fish and shellfish ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.

Table 4.12: Impacts proposed to be scoped out of the project assessment for fish and shellfish ecology.

Impact	Justification
Accidental pollution during construction, operation and maintenance and decommissioning phases.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. Environmental Management Plan, including Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as MPCP. As such, this impact will be scoped out of further consideration within the Fish and shellfish ecology ES chapter.
Underwater noise from vessels during all phases.	Operational underwater noise generated from vessels is likely to be low and effects would only occur if fish species remained within immediate vicinity of the vessel (i.e. within metres) for a number of hours which is highly unlikely. As such, this impact will be scoped out of further consideration within the Fish and shellfish ecology ES chapter.

4.2.6 Measures adopted as part of the project

4.2.6.1 The following measures adopted as part of the project are relevant to fish and shellfish ecology. These measures may evolve as the engineering design and EIA progresses.

- Development and adherence to a Cable Specification and Installation Plan (CSIP) which will include cables to be buried to where possible and cable protection as necessary (The potential impact of this measure will be consulted upon with statutory consultees throughout the EIA process).
- Implementation of piling soft-start and ramp-up measures to reduce the risk of injury to fish species.
- Development and adherence to a Construction Method Statement (CMS).
- Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.

4.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

4.2.7 Proposed assessment methodology

4.2.7.1 The fish and shellfish ecology EIA will follow the methodology set out in section out in part 1 section 4: EIA Methodology of the EIA Scoping Report. Specific to the fish and shellfish ecology EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019).
- Offshore Wind Farms. Guidance Note for EIA in Respect of FEPA (Food and Environment Protection Act 1985) and CPA (Coast Protection Act 1949) Requirements (Cefas *et al*., 2004).
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al*., 2014).

4.2.7.2 For the purposes of undertaking the EIA, fish and shellfish receptors identified as having the potential to occur in the Mona fish and shellfish ecology study area for the transmission assets will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Mona offshore wind project will be assessed. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

4.2.7.3 The Fish and shellfish ecology ES chapter will include diadromous fish in the fish and shellfish ecology impact assessment, and a separate section presented discussing sensitivity of and implications of the impact on diadromous fish in each impact assessment. The approach and focus of these impact assessments will be discussed with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Evidence Plan process.

4.2.7.4 The importance of fish species (such as herring, sandeels and sprat) as key prey species will be assessed in the relevant sections of other receptor groups (section 4.4: ornithology and section 4.3: marine mammals). These will be informed by the Fish and shellfish ecology ES chapter which will provide clear outputs to inform these assessments.

4.2.7.5 Habitat suitability for sandeels and herring will be assessed using data collected as part of the site-specific benthic ecology survey in line with industry good practice guidelines and in consultation with stakeholders via the Evidence Plan process.

4.2.7.6 A fish and shellfish ecology technical report will present a detailed baseline characterisation for the Mona Offshore Wind Project using site-specific survey data and the most recent desktop data for the Mona fish and shellfish ecology study area for the transmission assets. This report will inform the Fish and shellfish ecology ES chapter.

4.2.8 Potential cumulative effects

4.2.8.1 The majority of predicted effects of construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project infrastructure within the Mona Offshore Transmission Infrastructure Scoping Search Area on fish and shellfish communities are considered to be localised to within the footprint of the Mona Offshore Wind Project. However, there is potential for cumulative effects to occur on fish and shellfish ecology from other projects or activities within the Mona fish and shellfish ecology study area for the transmission assets, where projects or plans could act collectively with the Mona Offshore Wind Project to affect fish and shellfish receptors.

4.2.8.2 The cumulative effects assessment will follow the approach outlined in part 1 section 4: EIA Methodology of the EIA Scoping Report.

4.2.9 Potential inter-related effects

4.2.9.1 The assessment of potential inter-related effects will be considered within the Fish and shellfish ecology ES chapter. It will include consideration of project lifetime effects and receptor led effects, in line with the approach outlined in part 1, section 4: EIA Methodology of the EIA Scoping Report.

4.2.10 Potential transboundary impacts

4.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon fish and shellfish ecology due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- underwater noise impacting fish and shellfish receptors
- loss of habitat (in particular, spawning and nursery habitat)
- increased suspended sediment concentrations and associated sediment deposition

4.2.10.2 These activities have the potential to directly affect Annex II species and species that are of commercial importance for fishing fleets of other states. Therefore, the potential for transboundary effects will be considered within the ES.

4.3 Marine mammals

4.3.1 Introduction

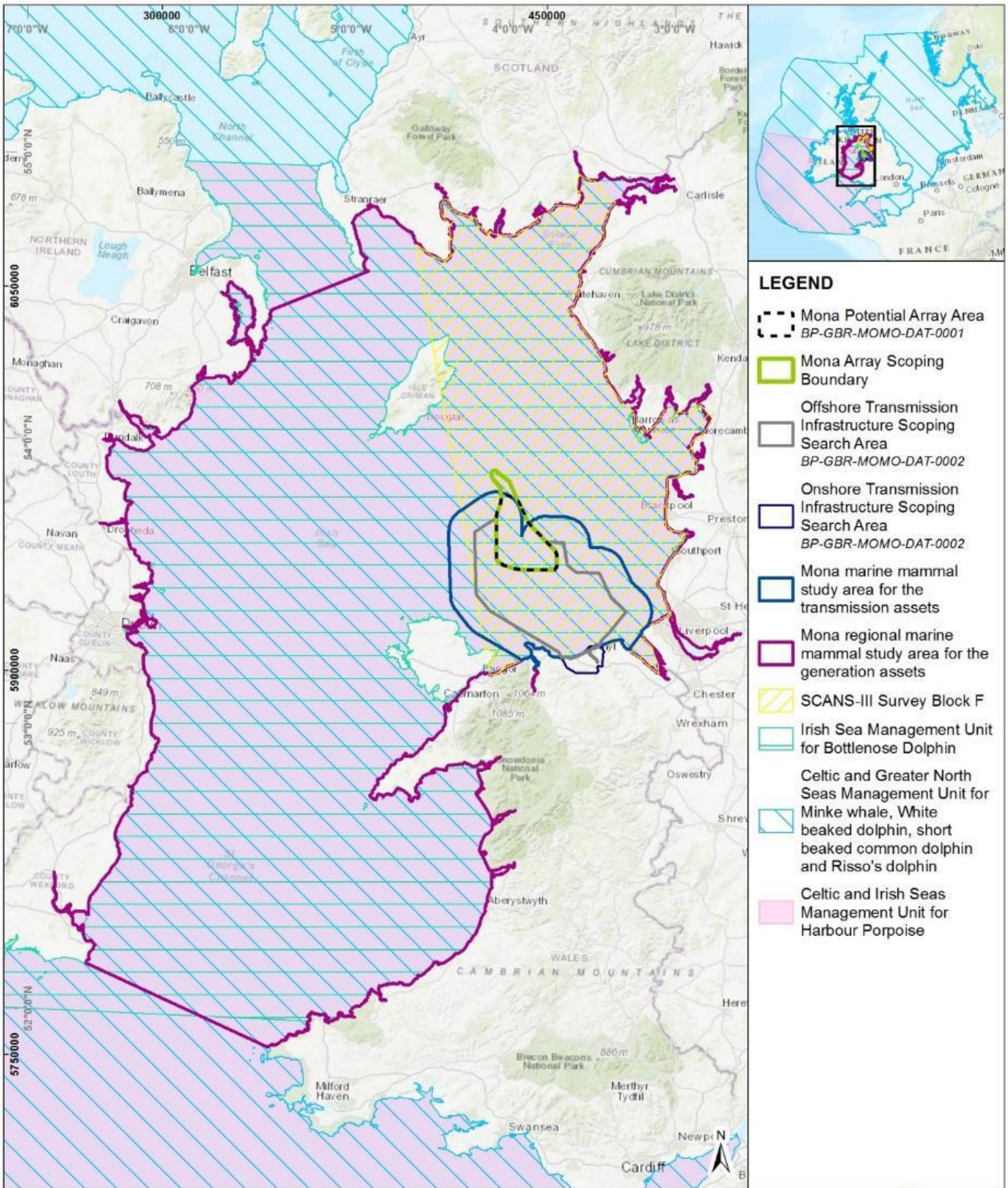
4.3.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the marine mammal ecological receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets.

4.3.2 Study area

4.3.2.1 For the purpose of the Environmental Statement (ES), two marine mammal study areas have been defined:

4.3.2.2 The Mona marine mammal study area for the transmission assets is defined as the area encompassing the Mona Offshore Transmission Infrastructure Scoping Search Area plus a buffer of 10km. A 10km buffer was recommended by the SNCBs during pre-application consultation. This buffer size was also considered appropriate as it provides better coverage for marine mammals, for the purpose of EIA and HRA baseline characterisation, than the existing best practice approach of a 4km buffer used for marine mammals on the majority of commissioned windfarms in the UK.

4.3.2.3 The Mona regional marine mammal study area for the transmission assets extends over the Irish Sea geographic region. Marine mammals are highly mobile and may range over large distances and therefore the Mona regional marine mammal study area for the transmission assets provides a wider context. The desktop review will consider the ecology, distribution and abundance of marine mammals within the wider Irish Sea region. The Mona regional marine mammal study area for the transmission assets also informs the assessment where the Zone Of Influence (ZOI) for a given impact (e.g. underwater noise) may extend beyond the Mona marine mammal study area for the transmission assets..



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, University of St Andrews, JNCC.

Project Name:
MONA OFFSHORE WIND PROJECT

0 5 10 20 30 nm
0 10 20 40 60 km

Drawing Number:
RPSE-MN-SCO-315-01

Drawing Title:
MONA MARINE MAMMAL STUDY AREA FOR THE TRANSMISSION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	17/01/22	First Issue	JA/LM	ST
01	08/03/22	Revision	NA	ST

Figure 4.17: The Mona Marine Mammal study areas for the transmission assets.

4.3.3 Data sources

Desktop data

4.3.3.1 An initial desk based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the Mona regional marine mammal study area for the transmission assets. These are summarised in Table 4.13.

Table 4.13: Summary of the key desktop datasets and reports.

Title	Source	Year	Author
Scientific advice on matters related to the management of seal populations: 2020	Sea Mammal Research Unit (SMRU), University of St Andrews	2021	Special Committee on Seals (SCOC)
Marine recorder public UK snapshot	Joint Nature Conservation Comittee (JNCC)	2020	JNCC
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017	Department of Communications, Climate Action & Environment and National Parks and Wildlife Service	2018	Rogan *et al.*
Grey Seal (Halichoerus grypus) Pup Production and Distribution in North Wales	NRW	2017	Clarke *et al*.
SCANS-III	SMRU, University of St Andrews	2016	Hammond *et al*.
Seal habitat preference maps	SMRU, University of St Andrews	2020	Carter *et al.*
JNCC Report 544: Harbour Porpoise Density	JNCC	2010-2011	Heinänen and Skov
Updated abundance estimates for cetacean management units in UK waters	JNCC	2021	Inter-Agency Marine Mammal Working Group (IAMMWG)
Joint cetacean protocol phase III	JNCC	2009-2010	Paxton *et al.*
Background information on marine mammals for Strategic Environmental Assessment 6	SMRU, Gatty Marine Laboratory, University of St Andrews	2005	Hammond *et al*.
Atlas of the Marine Mammals of Wales	Countryside Council for Wales (CCW)	2012	Baines and Evans
Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters	Irish Whale and Dolphin Group	2005-2011	Wall *et al*.
Barrow offshore wind farm (BOW) construction monitoring report	Marine Data Exchange	2006	BOW Wind
Ormonde offshore wind farm construction (Year 1) environmental monitoring	Marine Data Exchange	2010	RPS Energy
Walney and West of Duddon Sands Environmental Impact Assessment - marine mammals in the NW3 Area, Irish Sea	Marine Data Exchange	2006	DHI Water and Environment

Title	Source	Year	Author
Ormonde offshore wind farm marine mammal observers and PAM survey	Marine Data Exchange	2010	RPS Energy
Walney offshore wind farm construction monitoring	Marine Data Exchange	2010-2011	Centre for Marine and Coastal Studies Ltd (CMACS)
Burbo Bank Exensions offshore wind farm environmental statement	Marine Data Exchange	2013	Dong Energy
Skerries tidal stream array marine mammal monitoring	Marine Data Exchange	2014	SMRU Marine
Celtic Array Ltd offshore wind farm preliminary environmental information chapter 11: marine mammals, basking shark and turtles	Marine Data Exchange	2014	Celtic Array Ltd
JNCC MPA mapper	JNCC	2019	JNCC
Zone 9 Celtic Array Ltd, Bird Mammal Survey	Marine Data Exchange	2010-2012	Ecological Consultancy Ltd. (ECON)
Zone 9 Celtic Array Ltd, Hidef Aerial Bird Survey	Marine Data Exchange	2012-2013	HiDef
Morlais Tidal Array Scoping Report	Morlais Energy	2018	Morlais Energy
Manx whale and dolphin watch	Manx whale and dolphin watch	Various	Various
Cefas Pelagic ecosystem in the western English Channel and eastern Celtic Sea (PELTIC) surveys	Cefas	Various	Cefas

Site specific surveys

4.3.3.2 Aerial digital marine mammal surveys have been undertaken across the Mona Potential Array Area plus a buffer of 10km. Due to the changes in the proposed Mona Potential Array Area since the design of the aerial survey, the survey area does not extend fully to 10km in all directions around the Mona Potential Array Area. However, it will mostly reach 10km and will consistently exceed 4km. Aerial surveys commenced in March 2020 and continued until February 2022, completing a total of 24 surveys spanning two years.

4.3.3.3 The survey method was designed to optimise the data collection for marine mammals by using a grid-based collection method with 30% of the sea surface collected and 12% analysed. APEM's bespoke camera system was fitted into a twin-engine aircraft. The camera system captured still imagery along 18 survey lines spaced approximately 2km between-track. The images were analysed to enumerate marine mammals to species level, where possible.

4.3.3.4 Results of the site-specific surveys will be discussed through the Evidence Plan process to the Expert Working Group as described in part 1, section 5: Consultation of the EIA Scoping Report. Initial observations from the site-specific surveys have been presented in part 2, section 4.3: Marine Mammals of the EIA Scoping Report. The following section provides a detailed overview of other sources of data available for the Mona Offshore Wind Project. Details of site-specific data will be presented in the ES.

4.3.4 Baseline environment

4.3.4.1 The Mona Offshore Wind Project transmission assets will be located within Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 4.3: Marine Mammals of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and any offshore booster substations will be located.

Harbour porpoise Phocoena phocoena

4.3.4.2 Harbour porpoise are widespread and common in the Irish Sea throughout the year with potential for breeding (Baines and Evans, 2012). Long-term sightings between 1990 to 2009 show an average of 1.1 to 15 harbour porpoise counts per hour around Anglesey (Baines and Evans, 2012). Suitable habitat is available within the east of the Mona regional marine mammal study area for the transmission assets and harbour porpoise have been recorded there regularly (RPS Energy, 2012; CMACS, 2011; DHI Water and Environment, 2006). The most recent assessment of harbour porpoise in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential future prospects for the population (JNCC, 2019b).

4.3.4.3 The Mona Offshore Wind Project is within the Celtic and Irish Sea management unit (MU) for harbour porpoise (Figure 4.17; IAMMWG, 2021), which is estimated to have an abundance of 62,517 individuals (CV (coefficient of variation):0.13, 955 CI (confidence interval) 48,324 – 80,877) based on estimates from the Small Cetaceans in the European Atlantic and North Seas (SCANS) III survey (Hammond *et al*., 2017; Hammond *et al*., 2021). The SCANS III density estimate for the relevant survey block (Block F) was estimated to be 0.086 porpoise per km2 (CV: 0.383).

4.3.4.4 The Joint Cetacean Protocol (JCP) has undertaken analysis of 18 years of data to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the United Kingdom (UK) marine area (Heinänen and Skov, 2015). Areas of persistent high density include coastal areas off west Wales (Pembrokeshire and Cardigan Bay), and north-west Wales (Anglesey, Llŷn Peninsula), within the Mona regional marine mammal study area for the transmission assets (Heinänen and Skov, 2015). The densities of harbour porpoise are seasonal with large reductions during winter in the areas of high densities predicted for the northern Irish Sea and Cardigan Bay (Heinänen and Skov, 2015). Densities within the Mona regional marine mammal study area for the transmission assets are up to three individuals per km^2 (Heinänen and Skov, 2015).

4.3.4.5 Monitoring surveys were undertaken in 2010 for the Ormonde offshore wind farm year 1 post-construction surveys. They recorded harbour porpoise at an encounter rate of 0.014 per hour within the Ormonde offshore wind farm which is within the northeast Mona regional marine mammal study area for the transmission assets (RPS Energy, 2012). Monitoring surveys were undertaken during the construction of the Walney offshore wind between 2009 and 2010. These recorded harbour porpoise within and to the northeast of the Walney offshore wind farm which is within the Mona regional marine mammal study area for the transmission assets (CMACS, 2011).

4.3.4.6 Baseline characterisation surveys undertaken in 2012 to 2013 for the Rhiannon offshore wind farm recorded a total of 227 harbour porpoise across the wider Irish Sea Zone (as defined by The Crown Estate (TCE) Round 3 leasing process). Recording an overall density of 0.09 per km^2 for the Irish Sea Zone over the entire year. Distribution varied across the season however the greatest numbers of sightings occurred in the west of the Rhiannon offshore wind farm, outside the Mona marine mammal study area for transmission assets (Celtic Array Ltd., 2014c). Harbour porpoise are regularly recorded around the Isle of Man by the Manx whale and dolphin watch (Manx whale and dolphin watch, 2022).

4.3.4.7 Based on the review of literature including previous surveys in this region, it is considered likely that harbour porpoise occur year round within the Mona regional marine mammal study area for the transmission assets. It is therefore proposed that harbour porpoise are scoped into the EIA.

Minke whale Balaenoptera acutorostrata

4.3.4.8 Minke whale are an occasional visitor to the Irish Sea where it occurs annually in small numbers, mainly in July and August (Baines *et al*., 2012). Records of long-term sightings between 1990 to 2007 show that most minke whale encounters are in the east Irish Sea (Baines and Evans, 2012). This species is rarely recorded east of the Isle of Man and are rare in Liverpool Bay (Dong Energy, 2013).

4.3.4.9 The most recent assessment of minke whale in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC, 2019c). All minke whale in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021) which is estimated to have an abundance of 20,118 minke whale (CV: 0.18, 95% CI: 14,061 – 28,786) based on estimates from the SCANS III survey (Hammond *et al*., 2017; Hammond *et al*., 2021) and the ObSERVE survey (Rogan *et al*., 2018). The SCANS III survey did not record minke whale within the relevant survey block (Block F).

4.3.4.10 Minke whales were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). Minke whale are not regularly recorded around the Isle of Man by the Manx whale and dolphin watch however individuals were recorded in November, October and September 2021 (Manx whale and dolphin watch, 2022).

4.3.4.11 Boat-based surveys for the Rhiannon offshore wind farm recorded 19 minke whale over the two-year survey, within and to the west of the Rhiannon offshore wind farm, outside the Mona marine mammals study area for transmission assets (Celtic Array Ltd, 2014c).

4.3.4.12 Based on the review of literature including previous surveys in this region, it is considered likely that minke whale occur within the Mona regional marine mammal study area for the transmission assets. It is therefore proposed that minke whale are scoped into the EIA.

White beaked dolphin Lagenorhynchus albirostris

4.3.4.13 White beaked dolphin are common in British and Irish waters, especially to the north around Scotland. This species is also common around the west coast of Ireland, Iceland and west Norway although it is only an occasional visitor to the Irish Sea (Seawatch, 2012). The most recent assessment of white beaked dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size no to assess the potential future prospects for the population (JNCC, 2019d).

4.3.4.14 All white-beaked dolphin in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021), which has an estimated population size of 43,951 dolphins (CV: 0.22, 95% CI: 28,439 – 67,924) based on estimates from the SCANS III survey (Hammond *et al*., 2017; Hammond *et al*., 2021) and the ObSERVE survey (Rogan *et al*., 2018). The SCANS III did not record any white beaked dolphin within the relevant survey block (Block F).

4.3.4.15 White beaked dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.16 Based on the review of literature including previous surveys in this region, it is considered unlikely that white beaked dolphin are a key species within the Mona regional marine mammal study area for the transmission assets. It therefore proposed that white beaked dolphin are scoped out of the EIA.

Bottlenose dolphin Tursiops truncatus

4.3.4.17 Bottlenose dolphin use both coastal and offshore waters in the UK One of the main coastal areas is around Cardigan Bay in the southeast of the Irish Sea. The population size in Cardigan Bay has been estimated at between 130-350 individuals (UKBAP, 1999), although the JNCC have estimated that the total UK population is less than 300 (Reid *et al*., 2003). Bottlenose dolphin have also been recorded occurring off the north coast of Wales, particularly north and east of Anglesey (Baines and Evans, 2012). Casual records also show that bottlenose dolphin are present sporadically off the Isle of Man and elsewhere in the northeast Irish Sea (Manx Whale and Dolphin Group unpublished data; Sea Watch Foundation unpublished data). Long term sightings between 1990 to 2009 show an average of 2.5-5 bottlenose dolphin counts per hour around Anglesey (Baines and Evans, 2012).

4.3.4.18 The most recent assessment of bottlenose dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the population size appears to be stable, there were too few datapoints to confidently draw conclusions on current and future population trends (JNCC, 2019e).

4.3.4.19 The Mona Offshore Wind Project is within the Irish Sea MU for bottlenose dolphin (Figure 4.17; IAMMWG, 2021), which is estimated to have an abundance of 293 individuals (CV: 0.54, 95% CI: 108 - 793) based on surveys undertaken for the Cardigan Bay Special Area of Conservation (SAC) (Lohrengel et al., 2018). The SCANS III did not record any bottlenose dolphin within the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.20 Bottlenose dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.21 Aerial surveys for the Rhiannon offshore wind farm recorded bottlenose dolphin, to the east of the Rhiannon offshore wind farm, within the Mona marine mammal study area for transmission assets. Insufficient sightings were recorded to produce a local abundance (Celtic Array Ltd, 2014c). Bottlenose dolphin are regularly recorded around the Isle of Man by the Manx whale and dolphin watch (Manx whale and dolphin watch, 2022).

4.3.4.22 Given the presence of bottlenose dolphin within coastal waters in the Irish Sea, it is considered likely that bottlenose dolphin occur within the Mona regional marine mammal study area for the transmission assets. It is therefore proposed that bottlenose dolphin are scoped into the EIA.

Short beaked common dolphin Delphinus delphis

4.3.4.23 The short beaked common dolphin are the most numerous offshore cetacean species in the temperate north-east Atlantic. Off the western coasts of Britain and Ireland, the species is found in continental shelf waters, notably in the Celtic Sea and Western Approaches to the Channel, and off southern and western Ireland (Reid, 2003).

4.3.4.24 The most recent assessment of short beaked common dolphins in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019g).

4.3.4.25 There is a relatively low population of short beaked common dolphin in the Irish Sea, however they are regularly seen off the south of the Isle of Man. Long term sightings between 1990 to 2009 show an average of 0.5-1 short beaked common dolphin counts per hour around the south of the Isle of Man and the Pembroke Peninsula (Baines and Evans, 2012).

4.3.4.26 All short beaked common dolphin in UK waters is considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021), which has an estimated population size of 102,656 dolphin (CV: 0.29, 95% CI: 58,932 –178,822). The SCANS III did not record any short beaked common dolphins with the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.27 Short beaked common dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.28 Aerial surveys for the Rhiannon offshore wind farm recorded a single sighting of a pod of six short beaked common dolphin, to the west of the Rhiannon offshore wind farm, within the Mona marine mammal study area for transmission assets (Celtic Array Ltd, 2014c).

4.3.4.29 Given the presence of short beaked common dolphin within coastal waters in the Irish Sea, it is considered likely that short beaked common dolphin will occur within the Mona regional marine mammal study area for the transmission assets. It is therefore proposed that short beaked common dolphin are scoped into the EIA.

Risso's dolphin Grampus griseus

4.3.4.30 Risso's dolphin are most common around northern Scotland however they have been sighted around Ireland and in the Irish Sea. Most sightings from the Irish Sea occurred between July and September. Near-shore records off south-west Ireland were obtained primarily between May and August (Reid, 2003). Coastal areas of the Isle of Man and north Anglesey have a low sighting rate for Risso's dolphin (Baines and Evans, 2012). Long-term sightings between 1990 to 2009 show an average of 0.26-0.5 Risso's dolphin counts per hour around the south of the Isle of Man and an average of 0.04-0.1 Risso's dolphin counts per hour around the north of Anglesey (Baines and Evans, 2012).

4.3.4.31 The most recent assessment of Risso's dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019h).

4.3.4.32 All Risso's dolphin in UK waters are considered to be part of the Celtic and Greater North Seas MU (Figure 4.17; IAMMWG, 2021), which has an estimated population size of 12,262 Risso's dolphin (CV: 0.46, 95% CI: 5,227 – 28,764). The SCANS III did not record any Risso's dolphin within the relevant survey block (Block F) (Hammond *et al.,* 2017).

4.3.4.33 Risso's dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.34 Boat-based surveys for the Rhiannon offshore wind farm recorded three sightings of Risso's dolphin, outside the Rhiannon offshore wind farm, outside the Mona marine mammal study area for transmission assets (Celtic Array Ltd, 2014c). Risso's dolphin are not regularly recorded around the Isle of Man by the Manx whale and dolphin watch however individuals were recorded in September 2021 (Manx whale and dolphin watch, 2022).

4.3.4.35 Given the presence of Risso's dolphin within coastal waters in the Irish Sea, it is considered likely that Risso's dolphin occur within the Mona regional marine mammal study area for the transmission assets. It is therefore proposed that Risso's dolphin are scoped into the EIA.

Grey seal Halichoerus grypus

4.3.4.36 Grey seal have a wide distribution in the seas around Wales and are present in coastal areas throughout the year. Grey seal have been recorded at the River Dee estuary, Walney Island at the southern tip of the Isle of Man and around Cardigan Bay (SCOS, 2021). Long term sightings between 1990 to 2007 show an average of 0.5-1 grey seal counts per hour around the north coast of Wales. The most recent assessment of grey seals in UK waters concluded that the overall trend in Conservation Status was Favourable, with an overall trend in Conservation Status assessed as Improving (JNCC, 2019f).

4.3.4.37 Grey seal typically forages within 100km of a haul -out site and foraging trips can last for 30 days; however, individual tracks have shown that some grey seal can make trips several hundred kilometres offshore (SCOS, 2021). The estimated adult class population size in the regularly monitored national colonies at the start of the 2019 breeding season was 133,900 (95% CI 115,300-156,500) (SCOS, 2021). Over 400 grey seal individuals were recorded on the east Irish coast in 2017/2018 (Morris & Duck, 2019). Pup production of grey seals in Ireland (the east coast of which is within the regional marine mammal study area for the transmission assets) was estimated at 2,100 pups with an increasing population trend. Pup production of grey seals in the UK was estimated at 68,050 pups with an increasing population trend (SCOS, 2021). However, the Mona regional marine mammal study area for the transmission assets does not contain any of the main UK grey seal breeding colonies, the majority of which are in Scotland.

4.3.4.38 There are two main grey seal haul outs in the Mona regional marine mammal study area for the transmission assets: the Dee Estuary and Walney Island. In 2019 and 2020, the August count at Walney Island was 248 and 300 adults, respectively. It has been a pupping site since 2015 but numbers are currently still low (2-10 per year). Less extensive monitoring has occurred at the Dee Estuary haul-out site (SCOS, 2021).

4.3.4.39 Grey seals at sea distribution maps have been produced by Carter *et al*. (2020) based on a Global Positioning System (GPS) telemetry tagging programme by The Department for Business, Energy and Industrial Strategy (BEIS), through their Offshore Energy Strategic Environmental Assessment (OESEA) programme. This data shows that grey seal do not generally occur in high densities within the Mona regional marine mammal study area for the transmission assets however this species does occur in high densities within the southeast of the Mona marine mammal study area for the transmission assets. Densities are higher around the coasts and around the River Dee estuary, the River Mersey estuary and the southern tip of the Isle of Man (Figure 4.2; Carter *et al*., 2020; Russell *et al*., 2017).

4.3.4.40 Monitoring surveys were undertaken in 2010 for the Ormonde offshore wind farm year 1 post-construction surveys. Grey seal were recorded at an encounter rate of 0.007 per hour within the Ormonde offshore wind farm which is within the Mona regional marine mammal study area for the transmission assets (RPS Energy, 2012).

4.3.4.41 Monitoring surveys were undertaken during the construction of the Walney offshore wind from in 2010-2009. They recorded regular grey seal sightings at the southern end of Walney Island and around the Walney and Ormonde offshore wind farms which are within the Mona regional marine mammal study area for the transmission assets (CMACS, 2011).

4.3.4.42 Aerial and boat-based surveys for the Rhiannon offshore wind farm consistently recorded grey seal particularly between February and August across the Rhiannon offshore wind farm, within the Mona marine mammal study area for transmission assets (Celtic Array Ltd, 2014c).

4.3.4.43 Based on the review of literature including previous surveys in this region, it is considered likely that grey seal occurs within the Mona regional marine mammal study area for the transmission assets. It is therefore proposed that grey seal is scoped into the EIA.

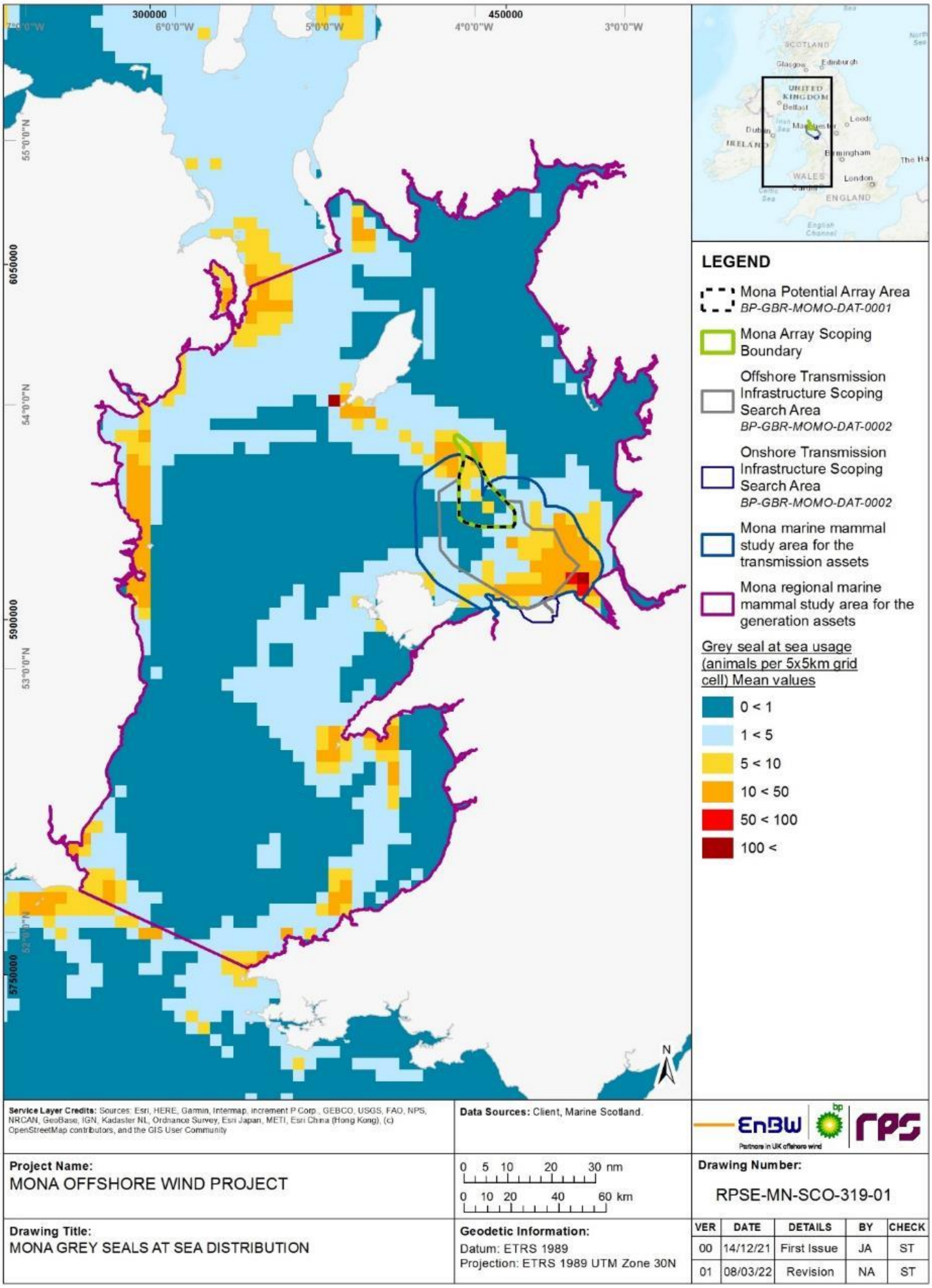


Figure 4.18: Grey seal at-sea distribution (from Russell *et al*. 2017).

Harbour seal Phoca vitulina

4.3.4.44 Harbour seal are present around the UK with a higher abundance around Scotland; approximately 80% of the UK population resides around the Scottish coast. Low numbers are also encountered along the south and west coast of England and along the coasts of Wales (JNCC, 2019i). The most recent assessment of harbour seal in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable and the population trend is good, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019i).

4.3.4.45 Harbour seal populations around Northern Ireland and Wales have been estimated at 1,000 and <10 individuals respectively (SCOS, 2021). Over 130 harbour seal individuals were recorded on the east Irish coast in 2017/2018 (Morris & Duck, 2019).

4.3.4.46 Harbour seals at sea distribution maps have been produced by Carter *et al*. (2020) and Russell *et al.* (2017). This data shows that harbour seal do not occur in high densities within the Mona regional marine mammal study area for the transmission assets. Area of high density are present around the east coast of Northern Ireland (Figure 4.18; Russell *et al*., 2017; Carter *et al*., 2020; SCOS, 2021).

4.3.4.47 The population from Carlingford Lough to Copeland Islands has been monitored more frequently from 2002 to 2018. This subset of the Irish Sea population declined slowly over the period 2002 to 2011 at an average rate of 2.7% p.a. (95% CIs: 1.8, 3.5). However, the 2018 survey suggests that since that time period there has been no significant change (SCOS, 2021).

4.3.4.48 Monitoring surveys were undertaken during the construction of the Walney offshore wind from in 2010-2009. They recorded a single harbour seal within the Walney offshore wind farm during the monitoring survey which is within the Mona regional marine mammal study area for the transmission assets (CMACS, 2011).

4.3.4.49 Harbour seal were not recorded during the aerial or boat-based surveys for the Rhiannon offshore wind farm (Celtic Array Ltd, 2014c).

4.3.4.50 Based on the review of literature including previous surveys in this region, it is considered unlikely that harbour seal are a key species within the Mona regional marine mammal study area for the transmission assets. It therefore proposed that harbour seal are scoped out of the EIA.

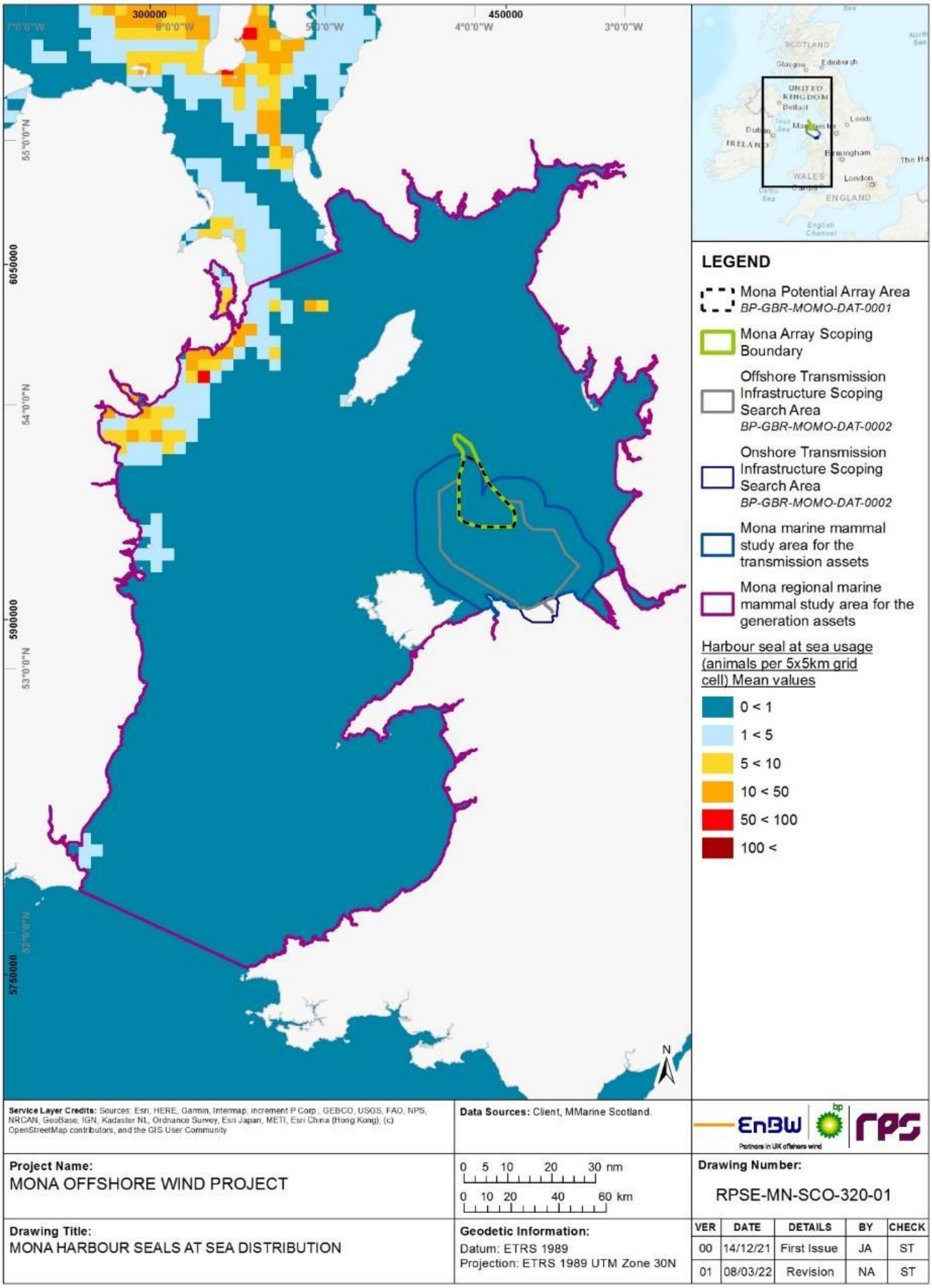


Figure 4.19: Harbour seal at-sea distribution (from Russell *et al.* 2017)

Designated Sites

4.3.4.51 Designated sites with relevant qualifying features which overlap with the Mona regional marine mammal study area for the transmission assets are described in this section.

4.3.4.52 Table 4.14 provides an early indication of the designated sites that may be considered within the EIA, Likely Significant Effects (LSE) Screening Report and potentially the Report to Inform Appropriate Assessment (RIAA) if an LSE is identified. The list of designated sites, which includes all marine mammal SACs within the Mona regional marine mammal study area for the transmission assets, will be presented in the Marine mammal ES Chapter. As a more detailed understanding of the project activities and impact pathways develops the EIA will consider potential impacts on relevant Annex II marine mammal species of European designated sites.

4.3.4.53 A full screening of European sites with qualifying marine mammal features will be undertaken in the LSE Screening Report for the Mona Offshore Wind Project, as part of the HRA process. The assessment on the European sites and effects on the site(s) conservation objectives will be undertaken in the RIAA.

Table 4.14: Summary of designated sites with relevant marine mammal features within the Mona regional marine mammal study area for the transmission assets.

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features
North Anglesey Marine/Gogledd Môn Forol SAC	7.4	• Harbour porpoise *Phocena phocoena*
Langness MNR	42.2	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus* • Basking Shark *Cetorhinus maximus* • Harbour porpoise *Phocena phocoena* • Risso's dolphin *Grampus griseus*
Pen Llyn a`r Sarnau/Llŷn Peninsula and the Sarnau SAC	44.1	• Bottlenose dolphin *Tursiops truncatus* • Grey seal *Halichoerus grypus*
Douglas Bay MNR	48.3	• Risso's dolphin *Grampus griseus* • Bottlenose dolphin *Tursiops truncatus*
Baie Ny Carrickey MNR	50.5	• Risso's dolphin *Grampus griseus* • Harbour porpoise *Phocena phocoena* • Bottlenose dolphin *Tursiops truncatus* • Basking Shark *Cetorhinus maximus*
Laxey Bay MNR	51	• Harbour porpoise *Phocena phocoena* • Minke whale *Balaenoptera acutorostrata*
Calf and Wart Bank MNR	53.6	• Risso's dolphin *Grampus griseus* • Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus*

Designated Site	Distance to the Mona Offshore Transmission Infrastructure Scoping Search Area (km)	Features
Niarbyl MNR	56.0	• Harbour porpoise *Phocena phocoena*
Port Erin Bay MNR	57.1	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus*
Ramsey Bay MNR	59.5	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
West Coast MNR	61.6	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus* • Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
West Wales Marine/Gorllewin Cymru Forol SAC	63.6	• Harbour porpoise *Phocena phocoena*
North Channel SAC	78.2	• Harbour porpoise *Phocena phocoena*
Strangford Lough SAC	108.9	• Harbour seal *Phoca vitulina*
Cardigan Bay/Bae Ceredigion SAC	109	• Bottlenose dolphin *Tursiops truncatus* • Grey seal *Halichoerus grypus*
Murlough SAC	111.2	• Harbour seal Phoca vitulina
Murlough SAC	111.2	• Harbour seal *Phoca vitulina*
Rockabill to Dalkey Island SAC	117.8	• Harbour porpoise Phocena phocoena
Lambay Island SAC	120.7	• Harbour seal Phoca vitulina • Grey seal Halichoerus grypus
Salney River Valley SAC	166.4	• Harbour seal Phoca vitulina
Pembrokeshire Marine/Sir Benfro Forol SAC	182.3	• Grey seal *Halichoerus grypus*

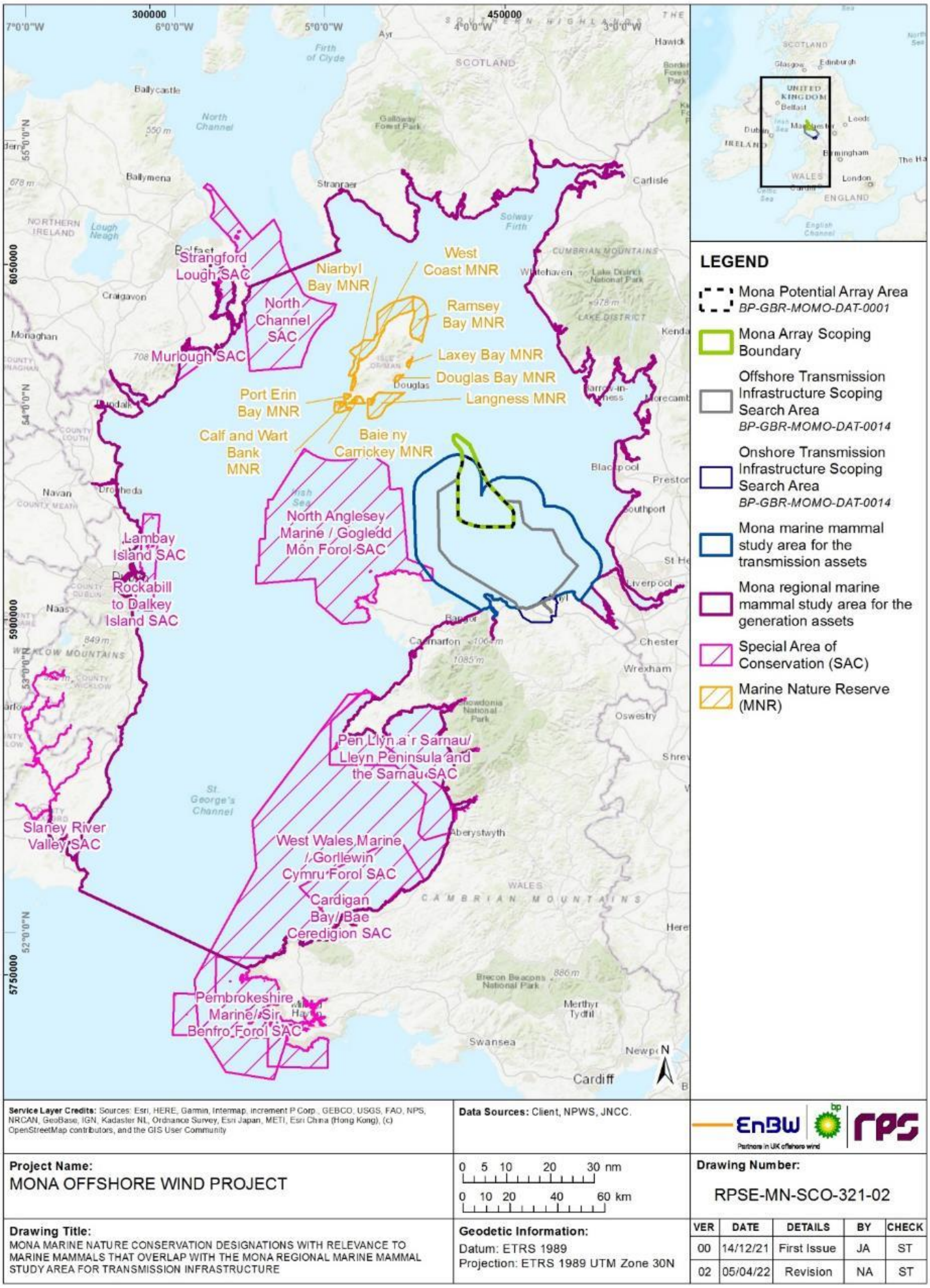


Figure 4.20: Marine nature conservation designations of relevance to marine mammals ecology that overlap with the Mona regional marine mammal study area for the transmission assets.

Protected species

4.3.4.54 Several species and habitats of conservation importance have been recorded or have the potential to occur within the Mona marine mammal study area for the transmission assets. These are presented below in Table 4.15 and include those species and habitats protected under Annex II of the Habitats Regulations. Where species are afforded protection under other legislation, this has also been noted.

Table 4.15: Relevant protected marine mammal species which have the potential to occur within the Mona benthic subtidal and intertidal ecology study area for the transmission assets.

Marine Mammal species	Protection legislation
Bottlenose dolphin (*Tursiops truncatus*)	• Annex II of the Habitats Regulations • UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Habitat of principal importance in England under the Natural Environment and Rural Communities (NERC) Act 2006 • European Protected Species under Annex IV of the European Comission habitats directive • Part II Section 28 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Harbour porpoise (*Phocoena phocoena*)	• Annex II of the Habitats Regulations • Annex V of the OSPAR (Oslo-Paris) convention • UK BAP prioity habitat that continues to be regarded as conservation priorities in the • European Protected Species under Annex IV of the European Comission habitats directive subsequent UK Post-2010 Biodiversity Framework • Schedule 6 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Grey seal (*Halichoerus grypus*)	• Annex II of the Habitats Regulations • European Protected Species under Annex IV of the European Comission habitats directive • Annex V of the European Comission habitats directive • Part II Section 28 of the Wildlife and Countryside Act 1981 • Conservation of Seals Act 1970
Harbour seal (*Phoca vitulina*)	• Annex II of the Habitats Regulations • UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Habitat of principal importance in England under the NERC 2006 Act • European Protected Species under Annex IV of the European Comission habitats directive • Annex V of the European Comission habitats directive • Conservation of Seals Act 1970
Minke whale (*Balaenoptera acutorostrata*)	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework

Marine Mammal species	Protection legislation
	• Habitat of principal importance in England under the NERC 2006 Act • European Protected Species under Annex IV of the European Comission habitats directive • Schedule 5 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Short beaked common dolphin (*Delphinus delphis*)	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • European Protected Species under Annex IV of the European Comission habitats directive • Schedule 6 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016
Risso's dolphin (*Grampus griseus*)	• UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework • Habitat of principal importance in England under the NERC 2006 Act • European Protected Species under Annex IV of the European Comission habitats directive • Schedule 5 of the Wildlife and Countryside Act 1981 • Habitat of principal importance in Wales under Section 7 of the Environment (Wales) Act 2016

4.3.5 Potential project impacts

4.3.5.1 A range of potential impacts on marine mammals have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

4.3.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.16 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.3.5.3 Potential impacts scoped out of the assessment are presented in Table 4.17, with justification.

Table 4.16: Impacts proposed to be scoped into the project assessment for marine mammals (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Injury and disturbance from underwater noise generated from piling	✓	×	×	Impact piling during construction may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals	Aerial surveys to obtain density estimates, where data allow, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Underwater noise modelling will be undertaken (as set out in section 3.1.7) to quantitatively assess the risk of auditory injury. Unless any new guidance is published prior to the impact assessment, the Southall *et al*. (2019) thresholds will be used to assess the risk of a permanent auditory injury. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (SPL^{peak}). The assessment of disturbance will be based on the good practice methodology available at the time of assessment and, making use of the best available scientific evidence. Noise contours at appropriate intervals will likely be generated by noise modelling and overlad on species density surfaces to predict the number of animals potentially affected.
Injury and disturbance from underwater noise generation from Unexploded ordnance (UXO) detonation.	✓	×	×	UXO detonation may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Underwater noise modelling will be undertaken for UXO detonation activities (as set out in section 3.1.7) will be used to inform this assessment and determine the extent of noise contours and whether these could lead to injury/disturbance effects.
Disturbance to marine mammals from vessel use and other (non-piling) noise-producing activities	✓	✓	✓	The impact of vessel use during all phases of the project may result in behavioural disturbance/ displacement (including barrier effects) of marine mammals. Other (non-piling) related noise-producing activities could also result in disturbance including construction activities (e.g. seabed preparation, trenching, and rock placement), operation and maintenance activities and decommissioning activities.	Aerial surveys to obtain density estimates, where data allow, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g., rock placement, vessel movement.
Injury to marine mammals due to collision with vessels	✓	✓	✓	Increased vessel traffic during construction activities, operation and maintenance activities and decommissioning activities may	N/A	A qualitative assessment will be undertaken, based on best available literature at the time of writing.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				result in collisions with marine mammals.		
Effects on marine mammals due to changes in prey availability	✓	✓	✓	Changes in prey abundance and distribution resulting from construction activities, operation and maintenance activities and decommissioning activities may impact on the ability of marine mammals to forage in the area.	N/A	No specific modelling required for this impact although the assessment will be based on the results of the underwater noise modelling assessment (section 3.2) and hysical processes assessment (section 3.1), and the resulting impact assessment carried out fish and shellfish receptors (section 4.2).
Disturbance to marine mammals from pre construction surveys	✓	×	×	Geophysical surveys in the construction phase may result in behavioural disturbance/ displacement of marine mammals.	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities.

Table 4.17: Impacts proposed to be scoped out of the Mona Offshore Wind Project assessment for marine mammals.

Impact	Justification
Accidental pollution during all phases.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels / vehicles and equipment/machinery. This may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. Environmental Management Plan (EMP), including Marine Pollution Contingency Plans (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at-sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning (MPCP). As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.
Increased suspended sediment concentrations (SSC) and associated sediment deposition during all phases.	Disturbance to water quality as a result of construction operations can have both direct and indirect impacts on marine mammals. Indirect impacts would include effects on prey species (which is scoped in). Direct impacts include the impairment of visibility and therefore foraging ability which might be expected to reduce foraging success. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seal in the UK have been documented foraging in areas with high tidal flows (e.g. Pierpoint, 2008; Marubini *et al*., 2009; Hastie *et al*., 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways, for example, seals can detect water movements and hydrodynamic trails with their mystacial vibrissae; while odontocetes primarily use echolocation to navigate and find food in darkness. Whilst elevated levels of SSC arising during construction of the Mona Offshore Wind Project may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is a large natural

Impact	Justification
	variability in the SSC within the Mona Marine Mammal study area for the transmission assets, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.
Impact of EMF (from surface lain or buried cables) during the operation and maintenance phase.	Based on the data available to date, there is no evidence of EMF related to marine renewable devices having any impact (either positive or negative) on marine mammals (Copping, 2018). There is no evidence that seals can detect or respond to EMF, however, some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al*., 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin (*Sotalia guianensis*) which has been shown to possess an electroreceptive system, which uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal *et al.,* 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the Mona marine mammal study area for the transmission assets. As such, this impact will be scoped out of further consideration within the Marine mammal ES chapter.

4.3.6 Measures adopted as part of the project

4.3.6.1 The following measures adopted as part of the project are relevant to marine mammals. These measures may evolve as the engineering design and the EIA progresses.

- Development of, and adherence to, an appropriate Construction Method Statement (CMS).
- Development of, and adherence to, an Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan (MPCP) which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.
- Development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP) which would include implementation of piling soft start and ramp up measures.

4.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effect and will be consulted upon with statutory consultees throughout the EIA process.

4.3.7 Proposed assessment methodology

4.3.7.1 The marine mammal offshore EIA will follow the methodology set out in part 1 section 4: EIA Methodology, of the EIA Scoping Report. Specific to the marine mammal EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019).
- European Union Guidance on Wind Energy Developments and Natura 2000 legislation (European Commission, 2010).
- Oslo Paris Convention (OSPAR) Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al.*, 2019).
- National Oceanic and Atmospheric Administration (NOAA) technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (NMFS, 2016).
- Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018).
- Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioural response to human noise (Southall *et al*., 2021)
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).

- Guidance on noise management in harbour porpoise SACs (JNCC, 2020b).
- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental status (GES) in Europe's seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." This Directive was transposed into United Kingdom (UK) law by the Marine Strategy Regulations 2010.

4.3.7.2 The impact assessment will consist of a detailed quantitative assessment for underwater noise (impulsive and non-impulsive noise sources). The assessment will include permanent auditory injury and behavioural disturbance. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (peak SPL). To assess the SEL_{cum} criterion, the predictions of received sound level over 24 hours are frequency weighted, to reflect the hearing sensitivity of each functional hearing group. The peak SPL criterion is for unweighted received sound level. The assessment of disturbance will be based on the good practice methodology available at the time of assessment, and, where possible, will include consideration of species-specific dose response curves. Noise contours at appropriate intervals will be generated by noise modelling and overlaid on species density surfaces to predict the number of animals potentially disturbed. This will allow the quantification of the number of animals that will potentially respond.

4.3.7.3 The densities to be used in the assessment process for assessing potential impacts on marine mammals, and agreement of correction factors for availability bias will be discussed with stakeholders as part of the Marine Mammal Evidence Plan process.

4.3.7.4 For the purposes of undertaking the EIA, marine mammal receptors identified as having the potential to occur in the Mona marine mammal study area for the transmission assets will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Mona Offshore Wind Project will be assessed. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

4.3.8 Potential cumulative effects

4.3.8.1 For marine mammal receptors, the approach to cumulative effects assessment will be holistic and combine all potential sources of underwater noise from other plans and projects including:

- pile driving
- disturbance from vessels
- UXO clearance
- seismic surveys
- other construction activities.

4.3.8.2 The key cumulative effect is likely to come from underwater noise from pile driving. A range of realistic scenarios for cumulative underwater noise effects will be developed for the cumulative effects assessment, based on publicly available information, liaison with other developers where possible, as well as consultation with the regulators and stakeholders.

4.3.8.3 The impacts of fishing and existing shipping activity will not be considered in the cumulative effects assessment since these activities occur throughout the baseline and are therefore already accounted for in the existing marine mammal baseline characterisation abundance and density estimates.

4.3.8.4 The cumulative effects assessment will follow the approach outlined in part 1 section 4: EIA Methodology of the EIA Scoping Report. The cumulative study area (within which the screening for other plans/projects is undertaken) will be defined as the Mona regional marine mammal study area for the transmission assets (see section 4.3.2).

4.3.9 Potential inter-related effects

4.3.9.1 The assessment of potential inter-related effects will be considered within the Marine mammals ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology of the EIA Scoping Report.

4.3.10 Potential transboundary impacts

4.3.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon marine mammals due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- Injury and disturbance from underwater noise generated from piling.
- Injury and disturbance from underwater noise generation from UXO detonation.
- Disturbance to marine mammals from vessel use and other (non-piling) noise-producing activities.
- Effects on marine mammals due to changes in prey availability.

4.3.10.2 These activities have the potential to directly affect Annex II marine mammal species that are associated with European sites of other states. Therefore, the potential for transboundary impacts will be considered within the ES.

4.4 Offshore ornithology

4.4.1 Introduction

4.4.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the offshore ornithology receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets on offshore (marine) ornithology receptors. Intertidal and terrestrial ornithology receptors are addressed in part 3, section 7.1: Terrestrial and intertidal ecology, of the EIA Scoping Report.

4.4.2 Study area

4.4.2.1 The Mona offshore ornithology study area for the transmission assets is shown in Figure 4.21, and is comprised of the Mona Offshore Transmission Infrastructure Scoping Search Area.

4.4.2.2 Minimal infrastructure with potential to impact on offshore ornithology receptors will be located within the Mona Offshore Transmission Infrastructure Scoping Search Area (e.g. infrastructure will be limited to offshore export cables and any associated cable protection and up to two offshore booster substations, their foundations, and any associated scour protection), therefore, the Mona offshore ornithology study area for the transmission assets is considered suitable for characterising the offshore ornithology features and for considering potential impacts arising from the Mona Offshore Wind Project transmission assets.

4.4.2.3 Seabirds and migratory birds are highly mobile species and there is potential for birds occurring within the Mona Offshore Transmission Infrastructure Scoping Search Area to have originated from more distant locations (e.g. breeding colony). Published foraging ranges (Woodward *et al.*, 2019) and regional population scales (Furness, 2015) will be reviewed to determine the potential connectivity of breeding and non-breeding populations with the Mona Offshore Wind Project.

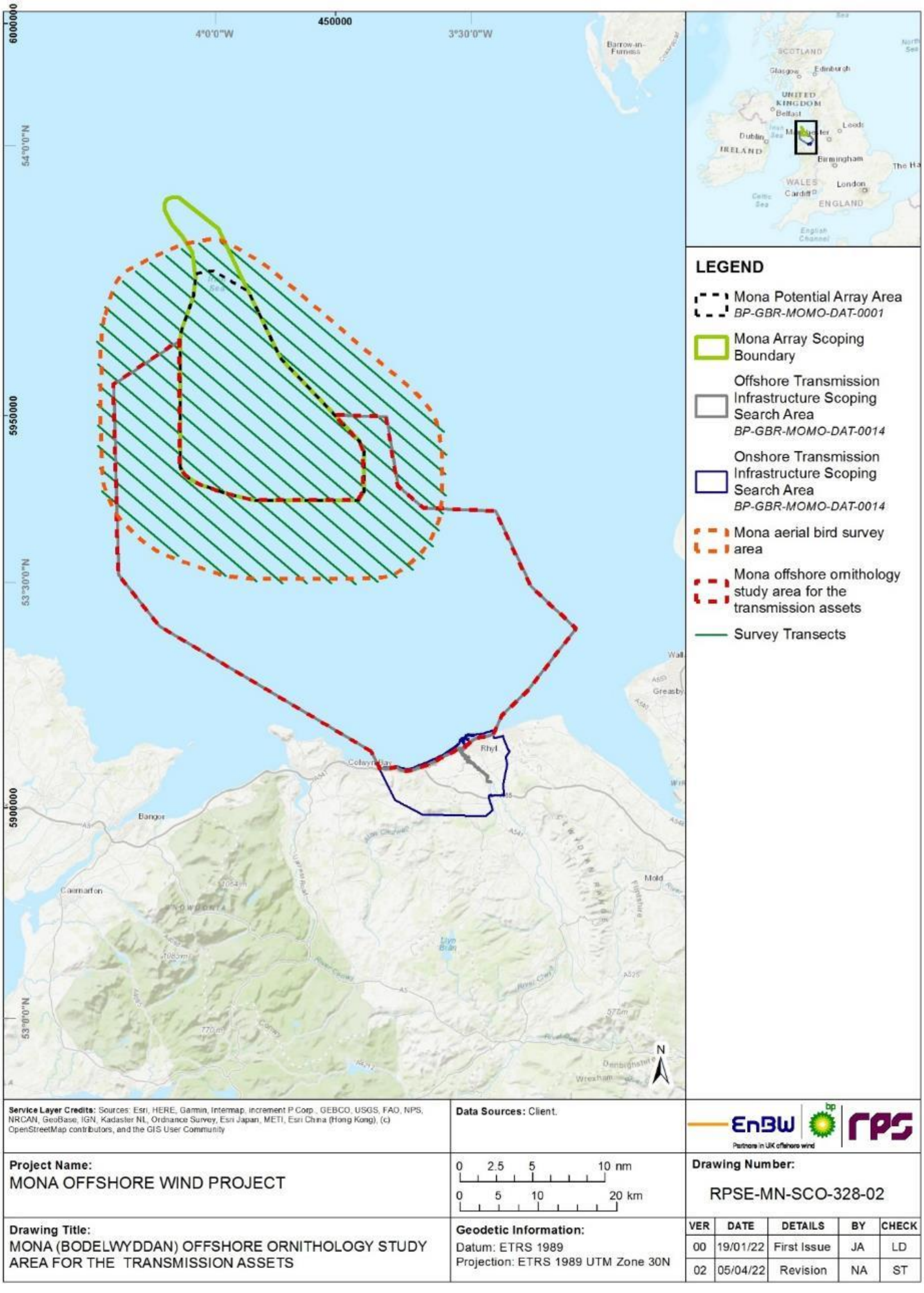


Figure 4.21: Mona offshore ornithology study area for the transmission assets.

4.4.3 Data sources

Desktop data

4.4.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of sources which provide coverage of the Mona offshore ornithology study area for the transmission assets. These are summarised in Table 4.18.

Table 4.18: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Seabird Population Trends and Causes of Change	Joint Nature Conservation Comittee (JNCC)	2021	JNCC
Seabirds Count and the Seabird Monitoring Programme	JNCC	2021	JNCC
Protected site networks	JNCC, NatureScot SiteLink (Scotland), Natural England GOV.UK (England), Natural Resources Wales (NRW) GOV.WALES (Wales), Department of Agriculture, Environment and Rural Affairs (DAERA) (Northern Ireland), National Parks and Wildlife Service (NPWS) (Ireland), Isle of Man GOV.IM (DEFA)	2021	Statutory Nature Conservation Bodies (SNCBs)
National Biodiversity Network (NBN) Atlas	NBN Atlas	2021	NBN Atlas
Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping	Biological Conservation	2020	Cleasby *et al*.
Desk-based revision of seabird foraging ranges used for Habitats regulation Assessment (HRA) screening	BTO Research Report	2019	Woodward *et al*.
Seabird Mapping and Sensitivity Tool (SeaMAST)	Natural England GOV.UK	2019	Natural England
Distribution maps of cetacean and seabird populations in the North-East Atlantic	Journal of Applied Ecology	2019	Waggitt *et al*.
Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species	Ecological Applications	2017	Wakefield *et al*.
An assessment of the numbers and distributions of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area of search	JNCC	2015	Lawson *et al*.
Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing	JNCC	2015	Parsons *et al*.
Quantifying usage of the marine environment by terns Sterna sp. around their breeding colony SPAs	JNCC	2014	Wilson *et al*.
Report to Inform Appropriate Assessment: Offshore Wind Leasing Round 4. Plan Level HRA	The Crown Estate	2021/ 2022	Niras

Title	Source	Year	Author
Morlais Project baseline boat-based seabird survey results	Morlais Project Environmental Statement	2019	Natural Power /Royal Haskoning
Walney offshore wind farm year 3 post-construction monitoring	Marine Data Exchange	2014	CMACS
Rhiannon offshore wind farm Preliminary Environmental Information Report (PEIR)	Marine Data Exchange	2012	Celtic Array Ltd
West of Duddon Sands pre-construction offshore wind farm boat-based ornithology samples	Marine Data Exchange	2012	Centre for Marine and Coastal Studies Ltd (CMACS)
Ormonde and Walney offshore wind farm ornithology surveys	Marine Data Exchange	2011-2012	Aarhus University
Round 3 Irish Sea Offshore Wind Farm Development ornithology surveys	Marine Data Exchange	2010-2012	Ecological Consultancy Ltd. (ECON)
SEA678 Data Report for offshore seabird populations	University College Cork	2006	Mackey and Giménez

Site-specific surveys

4.4.3.2 Aerial digital surveys for seabirds and marine mammals have been undertaken within the Mona offshore ornithology study area for the generation assets (see part 2, section 4.4: Offshore ornithology, of the EIA Scoping Report for further details). Surveys commenced in March 2020 and continued until February 2022. These surveys cover part of the Mona offshore ornithology study area for the transmission assets, as shown in Figure 4.21. It is expected that the bird assemblage recorded during these site-specific surveys in the 4km to 10km buffer area will also be representative for the majority of the marine areas within the Mona offshore ornithology study area for the transmission assets. An initial review of desk study data (Waggitt *et al*., 2020) indicates limited variation in seabird composition and density in the offshore parts of the Mona offshore ornithology study area for the transmission assets; however, this will be assessed through further detailed desk study as described below in paragraph 4.4.3.4.

4.4.3.3 Intertidal and nearshore waterbird surveys are being undertaken at the landfall during the non-breeding and passage seasons (September to April, but may be extended to include August and May) in 2021 to 2022 and potentially in 2022 to 2023. The intertidal and nearshore waterbird survey area covers the coastline up to 500m either side of the landfall, extending up to 1.5km (the distance that birds can reliably be surveyed) below the Mean High Water Springs (MHWS) mark. Bird counts are carried out from vantage points along the upper shore of this intertidal and nearshore survey area. The diurnal surveys comprise monthly ‘through-the-tidal-cycle’ counts covering between four and 12 snapshot surveys of the count sectors during different tidal states within the intertidal and nearshore survey area each month. Nocturnal surveys are also being undertaken to cover a tidal cycle every two months but cover a smaller range of up to 500m below the MHWS mark due to the limitations of night-vision equipment. Further details on the intertidal and nearshore waterbird surveys can be found in the part 3, section 7.1: Terrestrial and intertidal ecology, of the EIA Scoping Report.

These surveys therefore provide coverage of the nearshore parts of the Mona offshore ornithology study area for the transmission assets that are within 1.5km of the shoreline.

4.4.3.4 The baseline characterisation for the remaining parts of the Mona offshore ornithology study area for the transmission assets that are not covered by site-specific offshore aerial digital surveys and the intertidal and nearshore waterbird surveys will be derived from existing seabird datasets, including, but not necessarily limited to those listed in Table 4.18. The potential impacts arising from the installation of the Mona Offshore Wind Project transmission assets are expected to be limited to the construction and decommissioning phases. Such impacts are therefore likely to be of small spatial and temporal extent, transient in nature and highly unlikely to result in significant effects. The use of the above data sources is therefore considered to be sufficient to characterise the baseline of the Mona offshore ornithology study area for the transmission assets for the purposes of the EIA.

4.4.4 Baseline environment

4.4.4.1 The Mona Offshore Wind Project transmission assets will be located within Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the Offshore Substation Platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 4.4: Offshore ornithology, of the EIA Scoping Report. The following sections provide a high-level overview of the offshore ornithology baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and any offshore booster substation will be located, in the context of the Irish Sea bird populations.

Irish Sea

4.4.4.2 A review of ornithology surveys in the Irish Sea from 1980 to 2003 was undertaken for the Strategic Environmental Assessment (SEA) area 6 which covers the Irish Sea. A summary of the results of this review can be found in part 2, section 4.4: Offshore ornithology, of the EIA Scoping report.

Mona offshore ornithology study area for the transmission assets

4.4.4.3 Interim analysis of the aerial digital survey data collected between March 2020 and February 2021 indicates that the four most frequently recorded species occurring within the Mona offshore ornithology study area for the generation assets over this period were guillemot, razorbill, kittiwake, and Manx shearwater (see part 2, section 4.4: Offshore ornithology, of the EIA Scoping Report). Gannet, herring gull and lesser black-backed gull were recorded regularly but in lower numbers. It is expected that these species will also be present across the Mona offshore ornithology study area for the transmission assets.

4.4.4.4 Further analysis of density and abundance results using 18 months of aerial digital survey data will be undertaken and presented in the Preliminary Environmental Information Report (PEIR). Analysis of the full 24 months of aerial digital survey data will be presented in the ES chapter.

4.4.4.5 Analysis of the intertidal and nearshore waterbird surveys has not yet been carried out; however, it is expected that there will be increased abundances of non-breeding grebes, divers and seaduck, such as common scoter. Data sources used in the classification of the Liverpool Bay/Bae Lerpwl Special Protection Area (SPA) will also be used to inform this baseline characterisation (Parsons *et al.,* 2015; Wilson *et al.,* 2014*;* Lawson *et al.,* 2015). Interim results following the first winter of surveys in the 2021 to 2022 winter season will be presented in the PEIR, with full results of the surveys following in the ES chapter.

4.4.4.6 Data from desk-based sources for other parts of the Mona offshore ornithology study area for the transmission assets will also be reviewed, analysed and presented in the PEIR and ES chapter to provide a comprehensive baseline characterisation of the Mona offshore ornithology study area for the transmission assets.

Designated sites

4.4.4.7 Nature conservation designations with relevance to seabirds comprise Special Protection Area (SPAs) within the National Site Network in the UK and Natura 2000 network of European sites in the Republic of Ireland, Ramsar sites, national (e.g. Sites of Special Scientific Interest (SSSI)) and regional designations. The Mona offshore ornithology study area for the transmission assets overlaps with the Liverpool Bay/Bae Lerpwl SPA. There are also a number of SPAs along the western British coastline and eastern and northern coastlines of Ireland and Northern Ireland that support qualifying species that have been recorded during the site-specific surveys for the Mona Offshore Wind Project and therefore are likely to be present within the Mona offshore ornithology study area for the transmission assets.

4.4.4.8 Assessment of the impacts of the Mona Offshore Wind Project will focus on the generation assets which will include a search for designated sites within the species-specific foraging range distances, defined by the mean maximum (plus one standard deviation (+1 S.D.)) distance (see part 2, section 4.4: Offshore ornithology, of the EIA Scoping Report). Consideration will be given to the potential for impacts on marine and wetland SPAs that host important wintering waterbird features that may interact with the Mona offshore ornithology study area for the transmission assets. Figure 4.22 provides an initial indication of the designated sites (international and national) with relevant ornithology features that are within 100km of the Mona Potential Array Area and likely to be given consideration within the EIA and HRA. This is not an exhaustive representation of all designated sites with potential connectivity to the Mona Offshore Wind Project.

4.4.4.9 The long list of designated sites with potential connectivity to the Mona Offshore Wind Project generation assets will be refined in the EIA to include sites that fall within the potential Zone of Influence (ZoI) of the Mona Offshore Wind Project, which will be determined as part of the EIA process to include consideration of migratory bird species.

4.4.4.10 A full screening of the National Site Network and European sites with qualifying ornithology features will be undertaken in the HRA Screening Report for the Mona Offshore Wind Project. Relevant qualifying interests of these designated sites screened into the offshore ornithology assessment will be fully considered and assessed in the offshore ornithology chapter of the EIA, with the assessment on the designated sites deferred to the Report to Inform Appropriate Assessment (RIAA).

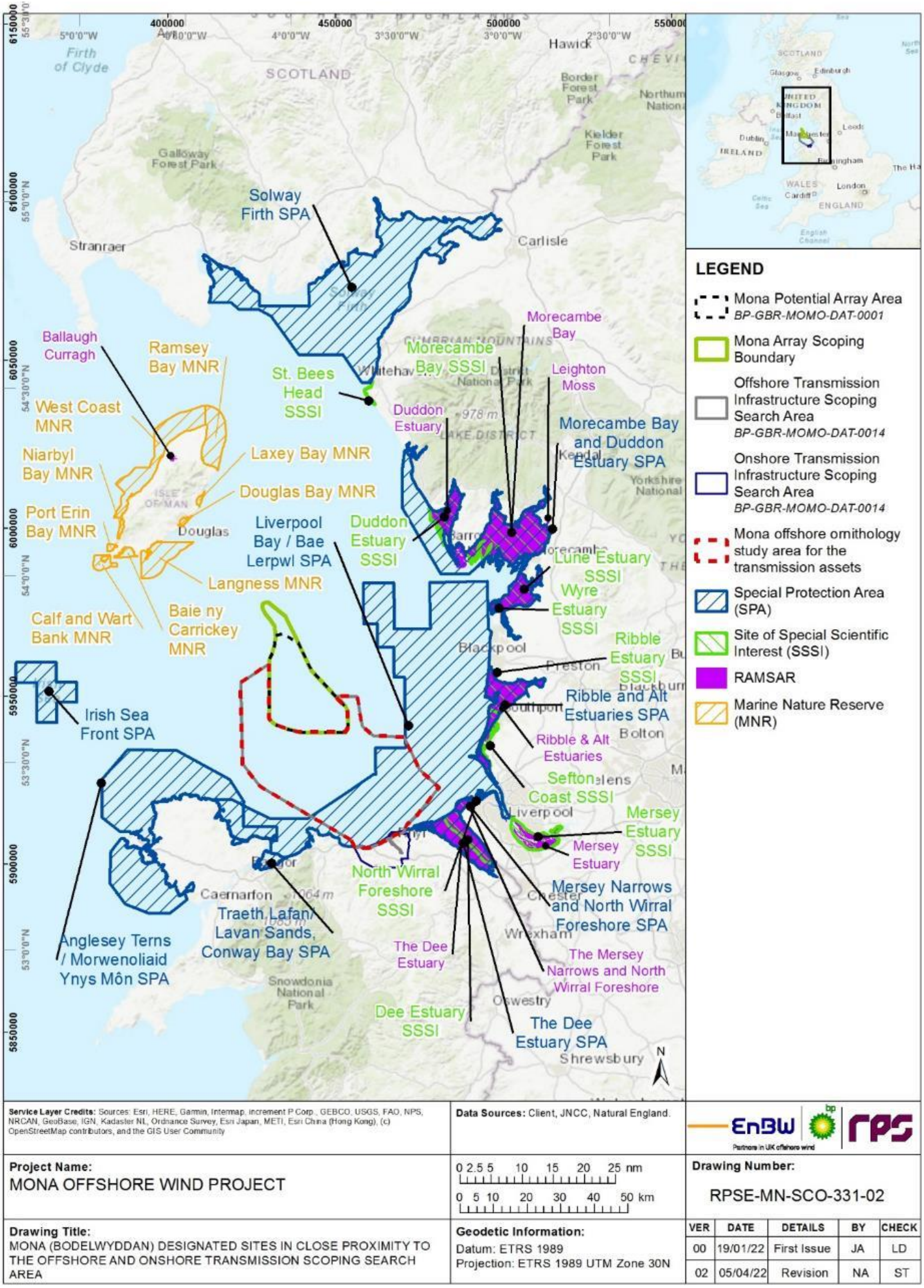


Figure 4.22: Marine nature conservation designations with relevance to offshore ornithology within proximity of the Mona Offshore Transmission Infrastructure Scoping Search Area.

4.4.5 Potential project impacts

4.4.5.1 A range of potential impacts on offshore ornithology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 4.19, together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

4.4.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, potential impacts proposed to be scoped out of the assessment are presented in Table 4.20, with justification.

Table 4.19: Impacts proposed to be scoped into the project assessment for offshore ornithology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.	✓	✓	✓	Airborne noise and underwater noise generated during construction activities (such as pile-driving), and the presence of vessels, may temporarily disturb/displace birds from foraging areas. Presence of the offshore booster substation and associated maintenance activities may disturb birds and displace them from their foraging or resting areas. The presence of vessels during the decommissioning phase may temporarily disturb birds from foraging areas.	Desk study, ornithological baseline surveys and data analysis.	Quantified assessment (e.g. modified displacement matrix) based on area disturbed during the construction, maintenance and decommissioning phases and the impacts from vessels on birds. The extent of disturbance from vessels and the species' sensitivities will be based on published literature, e.g. Furness *et al*. (2013) and Wade *et al*. (2016).
Indirect impacts from underwater noise affecting prey species.	✓	×	✓	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as pre-construction geophysical surveys, Unexploded Ordnance (UXO) detonation, and pile-driving at the offshore booster substation location. Similar impacts may arise during the decommissioning phase (although piling will not be required during the decommissioning phase). This may cause reduced energy intake affecting the productivity or survival of birds. This does not apply to the operation and maintenance phase when underwater noise emissions would not cause significant disruption to prey species.	Ornithological baseline surveys and data analysis, supported by information presented in the Fish and shellfish ecology ES chapter.	The assessment of potential effects on birds will draw upon the results from the Fish and shellfish ecology ES chapter and a qualitative assessment will be undertaken based on predicted extent of impact and known behaviour of fish to noise using the latest published literature.
Temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs).	✓	✓	✓	There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of activities during all phases (e.g. seabed preparation, UXO detonation, drilling, cable installation and repair/reburial, removal of infrastructure) (see part 3, section 4.1: Benthic subtidal and intertidal ecology, of the EIA Scoping Report). This has potential to affect the foraging efficiency of diving birds as well as	Ornithological baseline surveys and data analysis, supported by information presented in the Benthic subtidal and intertidal ecology and Fish and shellfish ecology ES chapters.	The assessment of potential effects on birds will draw upon the results from the Benthic subtidal and intertidal ecology and Fish and shellfish ecology ES chapters and a qualitative assessment will be undertaken based on predicted extent of impact on habitats.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				indirect effects from impacts on fish and shellfish prey.		

Table 4.20: Impacts proposed to be scoped out of the project assessment for offshore ornithology.

Impact	Justification
Collision risk during the operation and maintenance phase.	Significant collision risk to birds arising from the stationary offshore booster substation structures is considered to be highly unlikely. As such, it is proposed that this impact is scoped out of the EIA.
Barrier to movement during the operation and maintenance phase.	Due to the relatively small scale of the stationary offshore booster substation structures, they are highly unlikely to present a significant barrier to the movement of birds. As such, it is proposed that this impact is scoped out of the EIA.
Direct disturbance and displacement impacts from underwater noise during operation and maintenance and decommissioning phases.	Underwater noise generated during the operation and maintenance and decommissioning phases of the transmission assets will be considerably lower than that generated by piling activity during the construction phase, as piling will not be required during the operation and maintenance and decommissioning phases. As such, it is proposed that this impact is scoped out of the EIA.
Accidental pollution during all phases of the Mona Offshore Wind Project.	Pollution impacts (accidental oil/fuel spills) during all phases of the Mona Offshore Wind Project relating to the transmission assets are scoped out on the basis that the implementation of a Marine Pollution Contingency Plan will avoid the risk of significant pollution events. Consequently, seabirds and shorebirds are extremely unlikely to be significantly affected by any such pollution impacts. As such, it is proposed that this impact is scoped out of the EIA.

4.4.6 Measures adopted as part of the project

4.4.6.1 The following measures adopted as part of the project are relevant to offshore ornithology, and may evolve as the engineering design and EIA progresses.

- The development of and adherence to a Vessel Management Plan (VMP) which will include measures to minimise disturbance to rafting seabirds.
- Implementation of an Environmental Management Plan (EMP) including a Marine Pollution Contingency Plan (MPCP).

4.4.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

4.4.7 Proposed assessment methodology

4.4.7.1 The offshore ornithology EIA will follow the methodology set out in part 1, section 4: EIA methodology, of this EIA Scoping Report.

4.4.7.2 The EIA will use the source-pathway-receptor method, where likely impacts will be identified on offshore ornithology receptors resulting from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project. This method is defined as follows:

- Source: The origin of a potential impact, for example foundation installation and a resultant impact such as underwater noise.
- Pathway: The method by which the effects of the activity could impact ornithology receptors. For example, underwater noise disturbing prey species.
- Receptor: The baseline environment/species present that are impacted by the activity (e.g. prey species are unavailable for feeding birds).

Sources of guidance and information to inform the ornithological assessment will be identified within the Offshore ornithology ES chapter. The displacement matrix approach (SNCBs, 2017) may be modified (in terms of the appropriate displacement and mortality rates) to assess the potential temporary impact of disturbance during installation of the offshore export cables. Emerging guidance will be monitored and applied as appropriate to the assessment and in discussion with consultees, including as part of the ornithology Evidence Plan process.

4.4.8 Potential cumulative effects

4.4.8.1 Seabirds, wintering seaduck, divers and grebes may range over large distances and as a result, individuals and populations may interact with a number of other developments within the wider area. The majority of the predicted effects arising from the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project transmission assets on birds are considered to be mainly localised to within the footprint of the Mona Offshore Transmission Infrastructure Scoping Search Area due to the localised nature of construction, maintenance or decommissioning activity in this area and the temporary nature of the potential effects.

However, there is potential for cumulative effects to arise where other projects or plans could act collectively with the Mona Offshore Wind Project to affect offshore ornithology receptors. The cumulative effects assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

4.4.9 Potential inter-related effects

4.4.9.1 The assessment of potential inter-related effects will be considered within the Offshore ornithology ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

4.4.10 Potential transboundary impacts

4.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon offshore ornithology due to construction, operation and maintenance, and decommissioning impacts of the Mona Offshore Wind Project. These include:

- Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.
- Indirect impacts from underwater noise affecting prey species.

4.4.10.2 The potential for transboundary effects will be considered within the ES.

5 Offshore human environment

5.1 Commercial fisheries

5.1.1 Introduction

5.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the commercial fisheries receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets on commercial fisheries receptors.

5.1.2 Study area

5.1.2.1 For the purpose of identifying commercial fisheries receptors for the Mona Offshore Wind Project transmission assets, a broad study area has been defined. The Mona commercial fisheries study area for the transmission assets is presented in Figure 5.1 and described below.

5.1.2.2 The Mona Offshore Wind Project is located within the International Council for the Exploration of the Sea (ICES) Division VIIa (Irish Sea) statistical area. For the purpose of recording fisheries landings, ICES Division VIIa is divided into statistical rectangles which are consistent across all states operating in the Irish Sea. The Mona commercial fisheries study area for the transmission assets is defined by the ICES statistical rectangles that contain the Mona Offshore Transmission Infrastructure Scoping Search Area. These are ICES statistical rectangles 35E5, 35E6, 36E5 and 36E6.

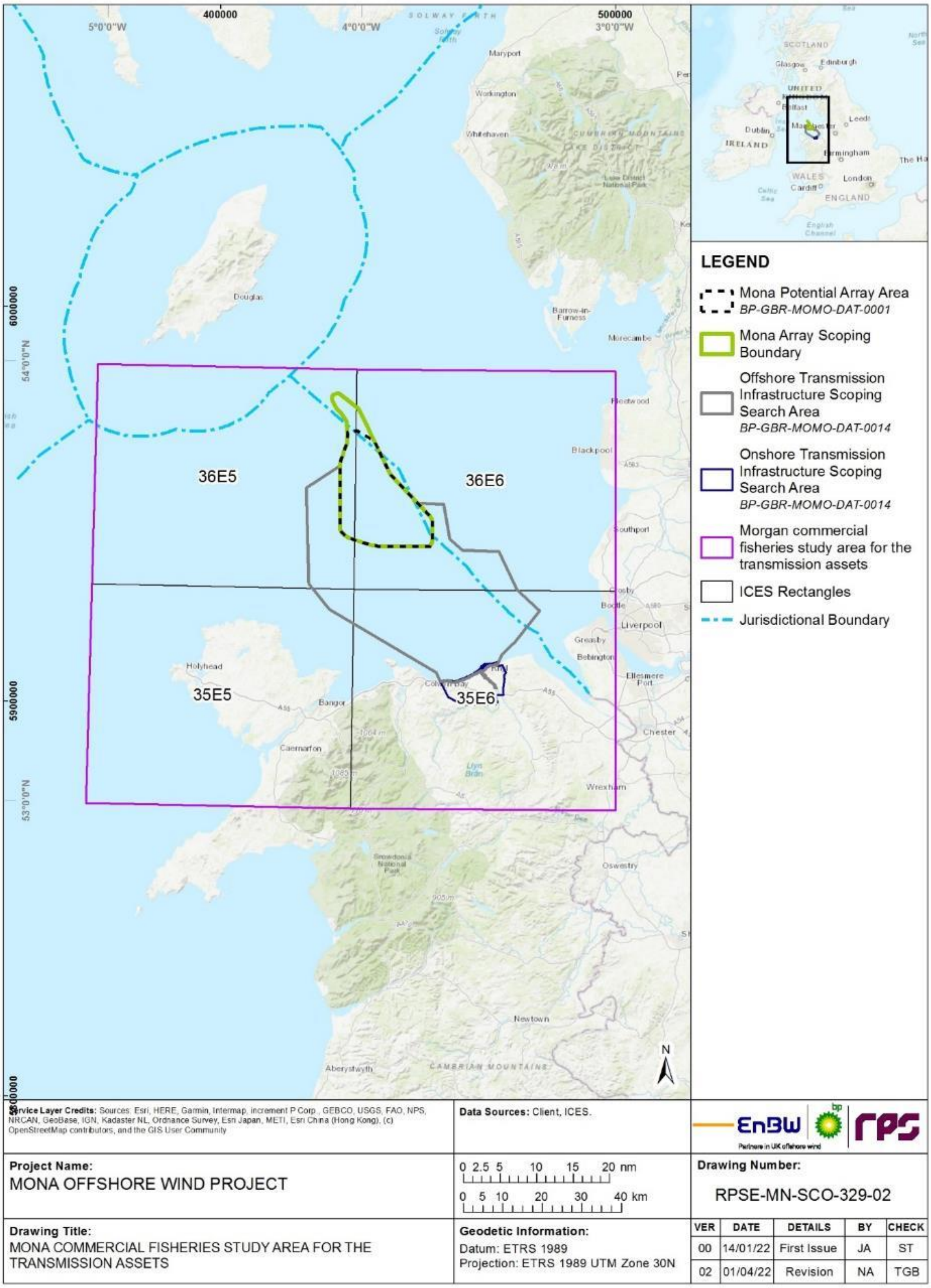


Figure 5.1: The Mona commercial fisheries study area for the transmission assets.

5.1.3 Data sources

5.1.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of sources to inform the identification of commercial fisheries receptors within the Mona commercial fisheries study area for the transmission assets. These are summarised in Table 5.1.

5.1.3.2 It should be noted that individual datasets do not cover all fishing activity in the Mona commercial fisheries study area for the transmission assets. For instance, the Marine Management Organisation (MMO) landing and effort statistics datasets generally only record data for UK and Isle of Man vessels landing in the UK and at European ports and non-UK vessels landing in the UK. As a result, landings taken by non-UK vessels landing into ports in Europe are not captured, therefore data from the European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF) will also be collated to inform the EIA.

5.1.3.3 It is acknowledged that a range of data limitations exist for the various datasets. For example, smaller vessels are excluded from Vessel Monitoring Systems (VMS) data, as only vessels with a length of ≥15m (MMO) or >12m (ICES) are captured. To ensure that smaller vessels are included within the assessment, consultation will be held with fisheries stakeholders, and further datasets will be obtained, such as the generalised fishing activity maps from the Welsh National Marine Plan and FishMap Môn.

Table 5.1: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Landing Statistics from 2010 to 2020	MMO	2021	MMO
Effort Statistics from 2010 to 2020	MMO	2021	MMO
Landings data by port	MMO	2020	MMO
Landing Statistics for EU vessels	EU STECF	2021	EU STECF
VMS Data for UK and Isle of Man vessels (≥15m)	MMO	2020	MMO
VMS Data for EU mobile bottom contacting gear vessels (>12m)	ICES	2018	ICES
Estimated relative fishing activity (Welsh waters)	Welsh National Marine Plan	2019	Welsh National Marine Plan
Generalised fishing intensity (Welsh waters)	FishMap Môn	2021	FishMap Môn
Data from site-specific 2 x 14-day Marine Vessel Traffic Surveys for the Mona generation assets (see part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report).	NASH Maritime (commissioned by the Applicant)	2021/ 2022	NASH Maritime

5.1.3.4 The key regional and national fishing organisations that will be consulted during this assessment are listed below:

- West Coast Sea Products Ltd (WCSP Ltd)

- Scottish White Fish Producers Association (SWFPA)
- Scottish Fishermen's Federation (SFF)
- Scottish Creel Fishermen's Federation (SCFF)
- National Federation of Fishermen's Organisations (NFFO)
- Whitehaven Fishermen's Cooperative Ltd
- Irish South and East Fish Producers Organisation (ISEFPO)
- Federation of Irish Fishermen (FIF)
- Irish South and West Fish Producers Organisation (ISWFPO)
- Manx Fish Producers Organisation (Manx FPO)
- Northern Irish Fish Producers Organisation (NIFPO)
- Anglo Northern Irish Fish Producers Organisation (ANIFPO)
- Welsh Fishermen's Association (WFA)
- Western Fish Producers Organisation (WFPO)
- North Devon Fisheries Association (NDFA)
- Cornish Fish Producers Organisation (CFPO)
- South West Fish Producers Organisation SWFPO)
- Rederscentrale (Belgium fisheries)[17]
- North Western Inshore Fisheries and Conservation Authority (NWIFCA).

5.1.3.5 Initial engagement has taken place with a number of fisheries stakeholders. Two rounds of meetings (in June/July 2021 and February 2022) have been held to date with regional fisheries organisations and offshore commercial fisheries operators, to provide comment at this stage of the Mona Offshore Wind Project and during the surveys of the array areas. Outputs from these initial consultations have been used to develop further understanding of existing fishing activity in the region.

5.1.4 Baseline environment

5.1.4.1 The Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 5.1: Commercial fisheries, of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping

[17] Following review of official landings/activity data, commercial fishing vessels from Belgium were identified as being active within the east Irish Sea. This was confirmed by the Fishing Industry Representative. Rederscentrale (a fish producer organisation in Belgium) is recognised as representing these vessels.

Search Area, within which the offshore export cables and offshore booster substation will be located.

5.1.4.2 The environment baseline for commercial fisheries is constantly evolving, as the fishing industry is dynamic with frequent and sometimes unpredictable changes in fish abundance and distribution, climatic conditions, management regulations and fuel costs, all of which affect activity (DECC, 2016). Anticipated trends to the baseline environment will be considered within the EIA, including changes as a result of the new EU-UK Trade and Cooperation Agreement.

5.1.4.3 The Mona commercial fisheries study area for the transmission assets is located within the ICES Division VIIa (Irish Sea) statistical area. As stated in section 5.1.2, it is defined by the ICES statistical rectangles that contain the Mona Offshore Transmission Infrastructure Scoping Search Area. These are ICES statistical rectangles 35E5, 35E6, 36E5 and 36E6. The annual average value of landings for these ICES rectangles is £2.22 million per rectangle for all UK and Isle of Man vessels for the years 2010 to 2020 (MMO, 2021).

5.1.4.4 The average total tonnage of historical landings across the Mona commercial fisheries study area for the transmission assets is presented in Figure 5.2 and the average annual value is presented in Figure 5.3. It is important to note that this data only covers landings by UK and Isle of Man-registered vessels into the UK and abroad, and foreign vessels into the UK. There may also be landings from the Mona commercial fisheries study area for the transmission assets by foreign vessels into foreign ports which would not be represented by this data.

5.1.4.5 Figure 5.4 shows the top four species landed from the Mona commercial fisheries study area for the transmission assets by weight from 2010 to 2020. Figure 5.5 shows the top four species by value from the same area over the same period. The key species in terms of both value and weight are queen scallop *Aequipecten opercularis*, king scallop *Pecten maximus* and whelk *Buccinum* undatum, with a particularly large weight of queen scallop being landed from 2010 to 2016. Herring *Clupea harengus* were the fourth key species.

5.1.4.6 While catches of king scallop are lower by weight than catches of queen scallop in every year other than 2018 and 2020, their value is similar owing to a higher market price. King scallop and queen scallop are important in the Mona commercial fisheries study area for the transmission assets and are the most valuable landings in every year other than 2018, when whelk had a higher value landed than queen scallop and 2019 and 2020, when whelk had a higher value landed than both king scallop and queen scallop.

5.1.4.7 In addition to landings and effort data, data on the type of fishing activity in the Mona commercial fisheries study area for the transmission assets has also been obtained. This is presented in Figure 5.6 for the years 2017 and 2018, and Figure 5.7 for the years 2019 and 2020. The data suggests that ≥15m mobile gear vessels are active across a larger spatial extent with higher levels of activity than ≥15m static gear vessels within the Mona commercial fisheries study area for the transmission assets. This data is only for vessels 15m in length and over from the UK and the Isle of Man, so does not capture vessels that are smaller or from other nationalities.

5.1.4.8 Higher levels of activity by ≥15m vessels occur in the northern half of the Mona commercial fisheries study area for the transmission assets. It should be noted that the spatial extent of both mobile and static gear activity fluctuates across years.

5.1.4.9 The data in Figure 5.6 and Figure 5.7 is for UK and Isle of Man vessels only. There are vessels from other nations, including the Republic of Ireland and Belgium, conducting fishing activity within the Mona commercial fisheries study area for the transmission assets. Data will be analysed further through collation of landings and VMS data from non-UK organisations, consultation, AIS data and site-specific marine vessel traffic survey data to provide a full baseline characterisation for commercial fisheries.

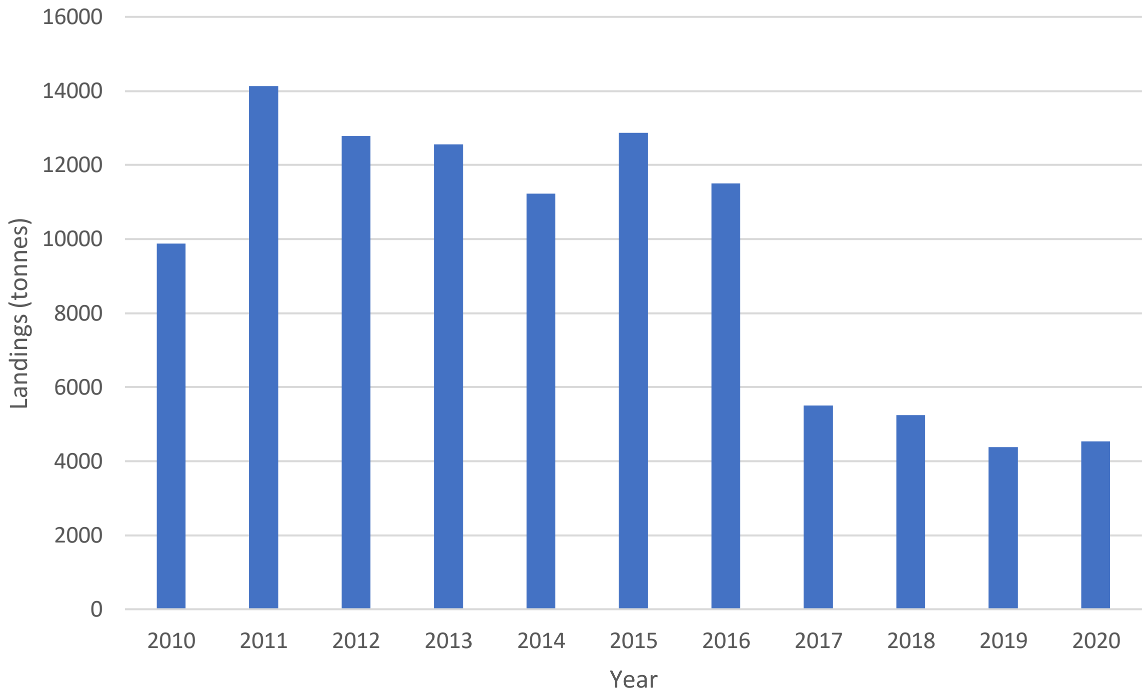


Figure 5.2: Total volume (tonnes) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

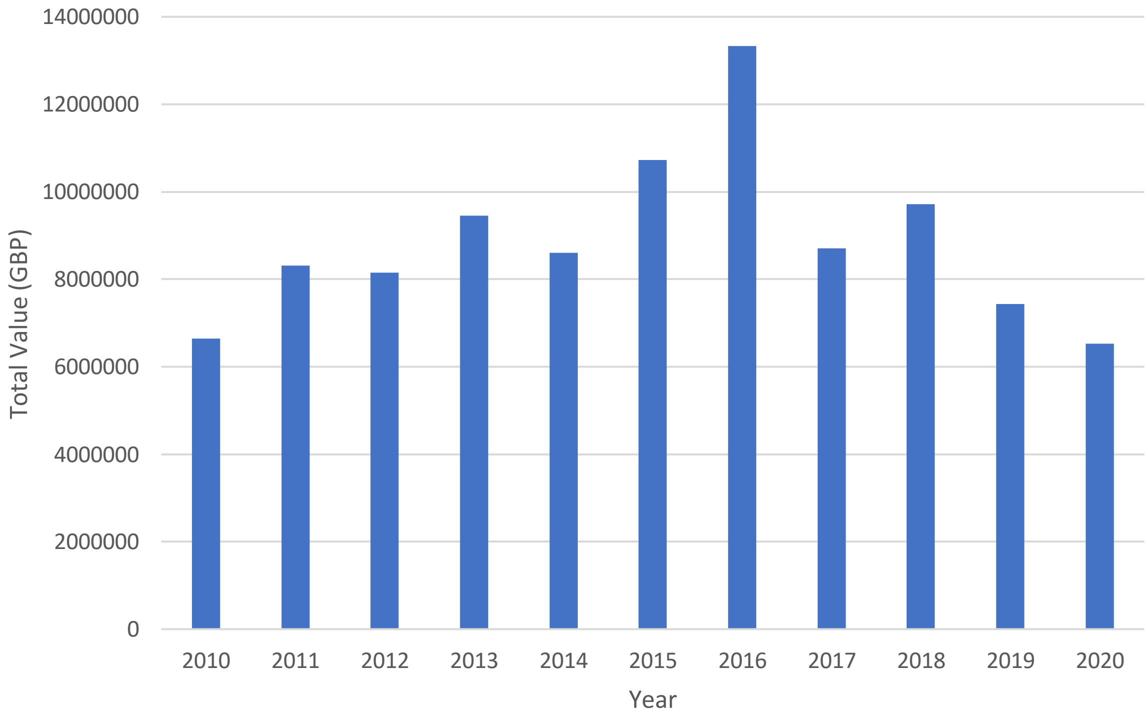


Figure 5.3: Total value (GBP) of landings from 2010 to 2020 from the Mona commercial fisheries study area for the transmission (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

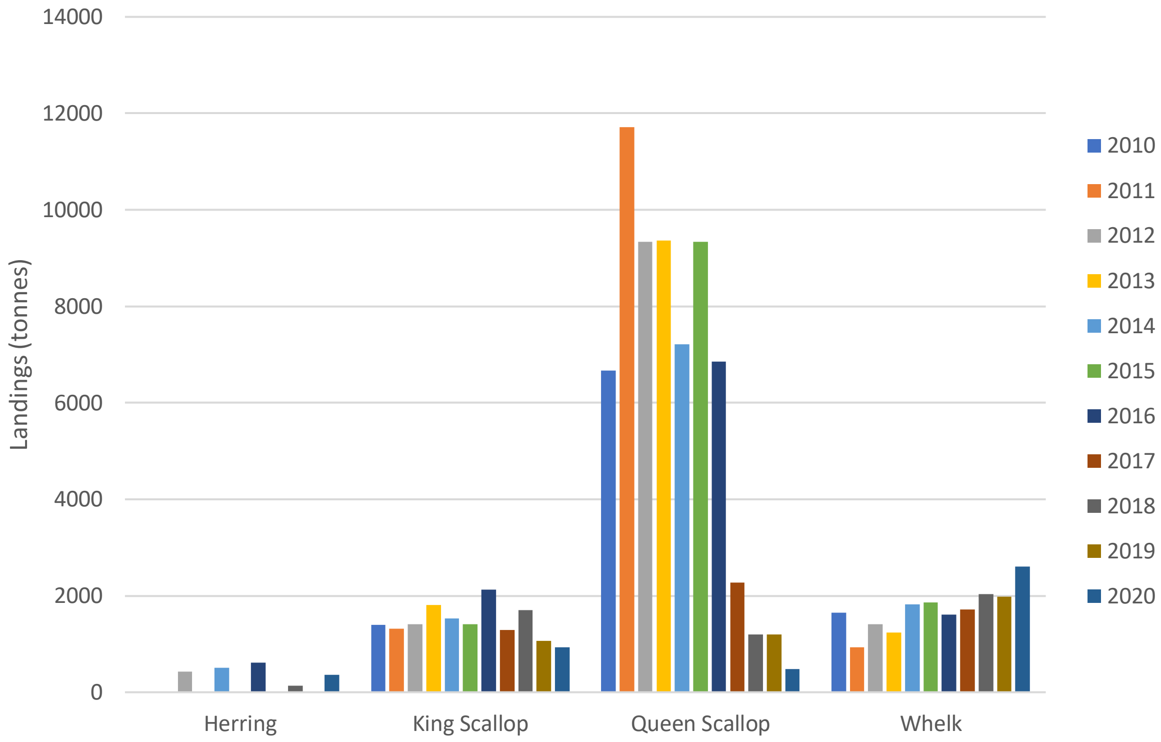


Figure 5.4: Top four species by weight (tonnes) from 2010 to 2020 landed from the Mona commercial fisheries study area for the offshore transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

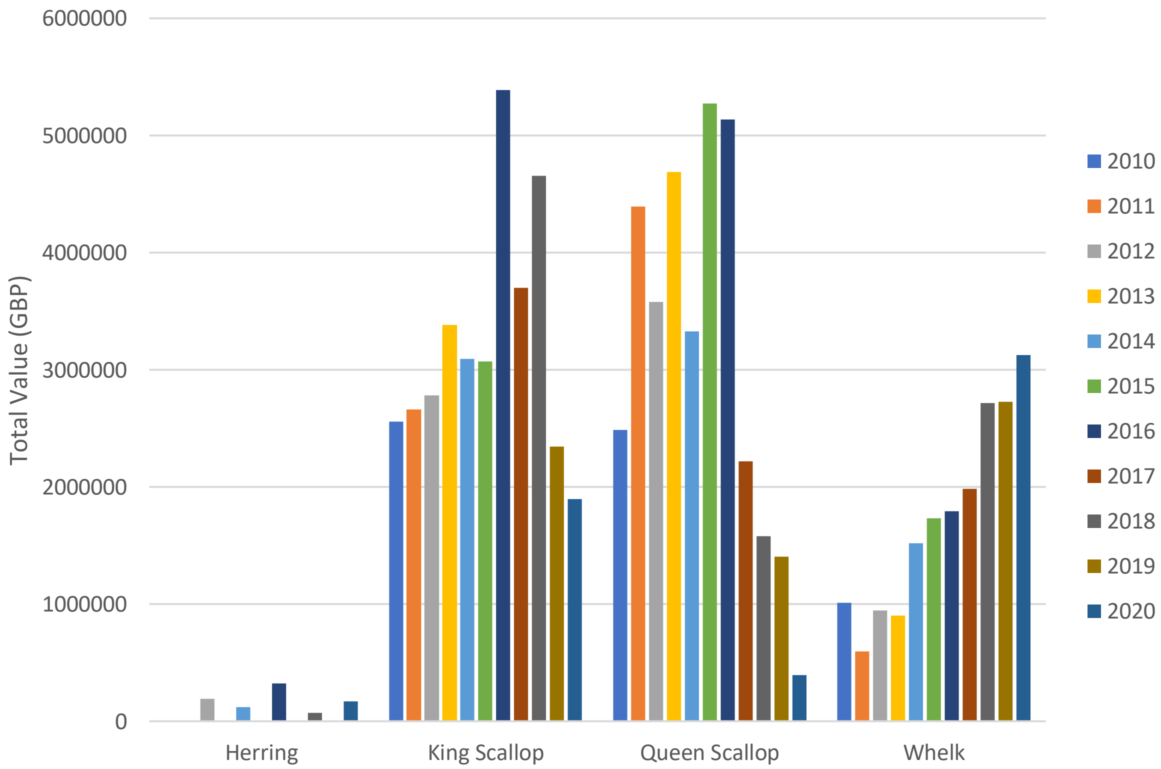


Figure 5.5: Top four species by value (GBP) from 2010 to 2020 landed from the Mona commercial fisheries study area for the offshore transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

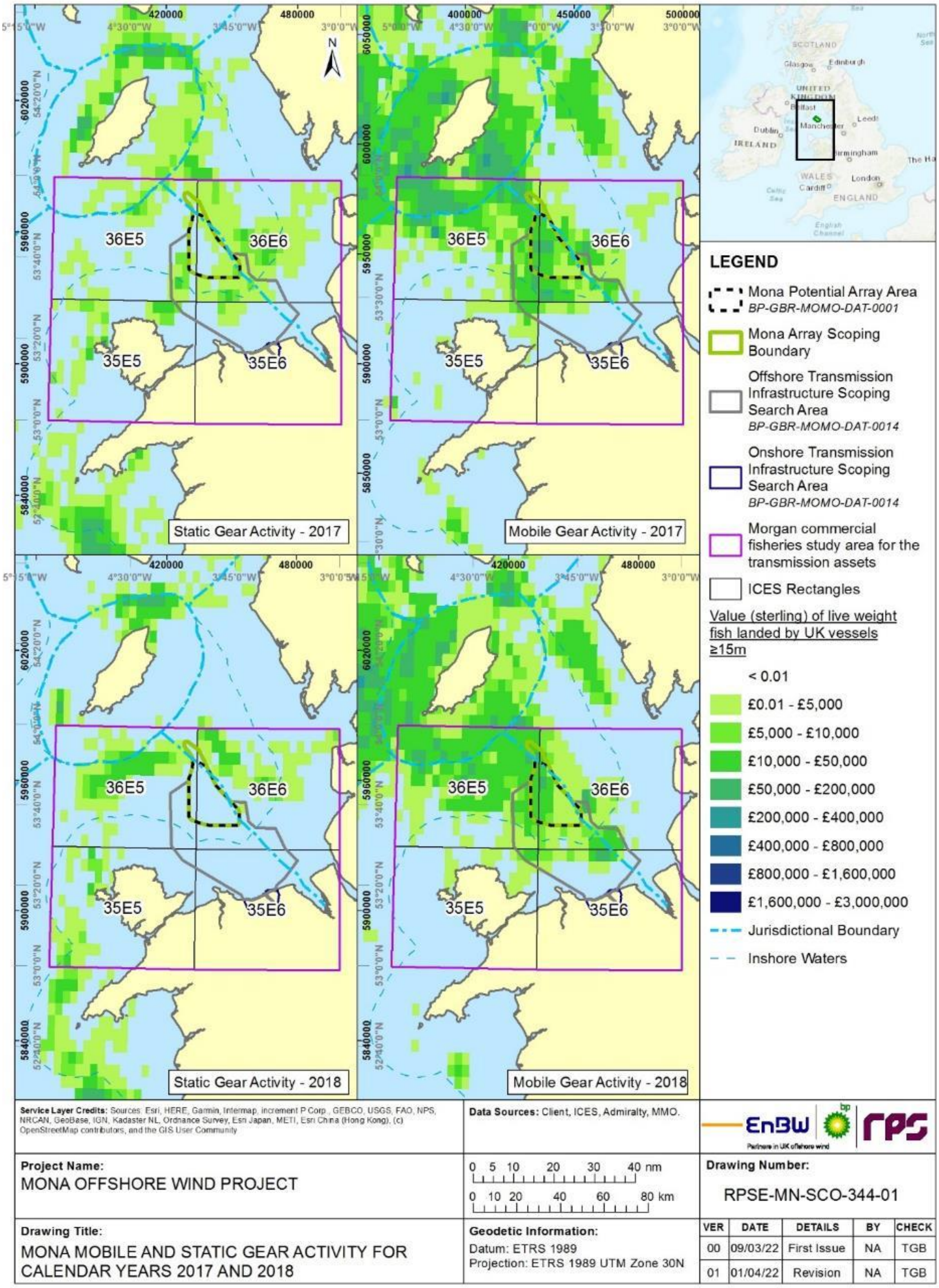


Figure 5.6: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2017 and 2018) (MMO, 2020).

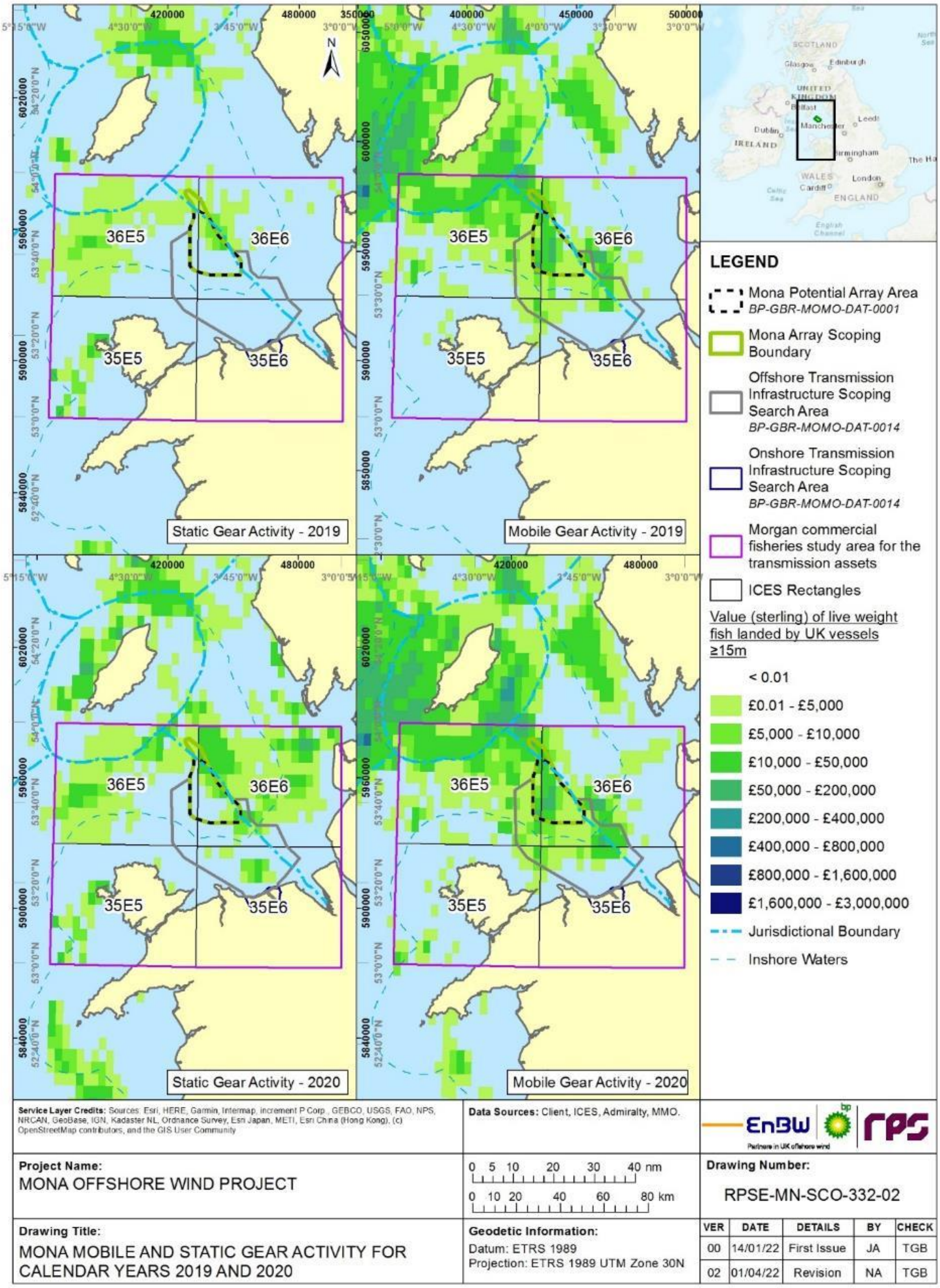


Figure 5.7: Value of landings for static and mobile gear activity in the vicinity of the Mona commercial fisheries study area for the transmission assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2019 and 2020) (MMO, 2020).

5.1.5 Potential project impacts

5.1.5.1 A range of potential impacts on commercial fisheries receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.2, together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.1.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, potential impacts proposed to be scoped out of the assessment are presented in

Table **5.3**, with justification.

Table 5.2: Impacts proposed to be scoped into the project assessment for commercial fisheries (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Loss or restricted access to fishing grounds.	✓	✓	✓	The implementation of advisory clearance distances around cable installation and maintenance vessels, and safety zones around construction, maintenance and decommissioning works at the OSPs and offshore booster substation, may result in temporary loss or restricted access to fishing grounds within the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area. The presence of OSPs and the offshore booster substation may result in loss or restricted access to fishing grounds within the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area.	Datasets are listed in section 5.1.3 and include VMS data (indicating hours fished and value of catch by area) and landing statistics by ICES rectangle. Additional datasets including maps of key fishing grounds may also be collated where available. These datasets will be requested from the relevant fishing industry representatives and stakeholders in order to inform the commercial fisheries EIA. This information will also be supplemented by results of site-specific marine vessel traffic survey data.	Detailed analysis of existing datasets will be carried out to characterise the status of historic commercial fisheries patterns within the Mona commercial fisheries study area for the transmission assets and predict the potential impacts upon future commercial fishing activities (for UK and non-UK vessels). Datasets will be analysed over 5 to 10 year time periods to account for fluctuations in the commercial fisheries activities. Qualitative assessment informed by data analysis and consultation.
Displacement of fishing activity into other areas.	✓	✓	✓	Fishing activity may be temporarily displaced to other areas due to loss or restricted access to fishing grounds.	As above.	As above.
Loss or damage to fishing gear due to snagging.	×	✓	×	Potential for snagging fishing gear on offshore export cables and interconnector cables. Safety risks for fishing vessels associated with potential gear snagging will be assessed in the shipping and navigation chapter of the EIA (see part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report).	As above.	As above.
Potential impacts on commercially important fish and shellfish resources.	✓	✓	✓	As described in part 3, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report.	As above.	Qualitative assessment informed by data analysis in addition to consideration of results of the fish and shellfish ecology assessment of the EIA.
Supply chain opportunities for local fishing vessels	✓	✓	✓	Requirement for vessels (such as guard vessels) during all phases of the Mona Offshore Wind Project may provide supply chain opportunities for local fishing vessels leading to a beneficial impact.	Engagement with local fisheries stakeholders.	Qualitative assessment informed by consultation.

Table 5.3: Impacts proposed to be scoped out of the project assessment for commercial fisheries.

Impact	Justification
Interference with fishing activity.	Increased vessel traffic within fishing grounds as a result of changes to shipping routes and project vessel traffic within the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area may result in increased interaction with fishing vessels. Offshore export cable and interconnector cable installation, maintenance, and any decommissioning activities will be temporary and the number of vessels required during installation, maintenance and any decommissioning activities associated with the offshore export cables and interconnector cables is unlikely to add significantly to the marine traffic already present within the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area. Construction, maintenance and decommissioning activities associated with the OSPs and offshore booster substation will be limited in spatial extent and temporary. Any impacts will be temporary, therefore potential effects are likely to be not significant in EIA terms. Therefore, subject to consultation with commercial fisheries stakeholders and feedback received on this EIA Scoping Report, the Applicant intends to scope this impact out of further consideration within the EIA.
Increase in steaming distances.	Offshore export cable and interconnector cable installation, maintenance, and any decommissioning activities will be temporary and therefore longer steaming distances will occur for a short period of time. Therefore, any potential impacts are unlikely to be significant in EIA terms. Construction, maintenance and decommissioning activities associated with the OSPs and offshore booster substation will be limited in spatial extent and temporary. Therefore, subject to consultation with commercial fisheries stakeholders and feedback received on this EIA Scoping Report, the Applicant intends to scope this impact out of further consideration within the EIA.

5.1.6 Measures adopted as part of the project

5.1.6.1 The following measures adopted as part of the project are relevant to commercial fisheries. These measures may evolve as the engineering design and the EIA progresses.

- Ongoing liaison with the fishing industry via the Mona Offshore Wind Project Fisheries Liaison Officer (FLO) and Fishing Industry Representative (FIR).
- Development of a Fisheries Liaison and Coexistence Plan.
- Adherence to good practice guidance with regards to fisheries liaison (e.g. Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW), 2014; 2015).
- Advance warning to fishing fleets of construction, maintenance and decommissioning activities.
- Timely and efficient distribution of Notices to Mariners (NTM) of the location and nature of construction, maintenance and decommissioning works.
- Notification to the United Kingdom Hydrographic Office (UKHO) of the works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications.
- Use of advisory clearance distances and safety zones during construction and periods of major maintenance.
- Use of guard vessels where required by risk assessment.
- Marking and lighting of the Mona Offshore Wind Project in accordance with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and in consultation with the Maritime and Coastguard Agency (MCA) and Trinity House.
- Cables to be buried to a suitable depth, where possible, to avoid interaction with fishing gear.
- Undertaking of post-lay and cable burial inspection surveys and monitoring.
- Any external cable protection to be designed, where possible, to enable trawling to occur over it. Cables will be buried where possible (target depth of 1m) and in areas where this is not achievable the cable will be protected (e.g. with rock or mattressing). Rock berms can be designed to be over-trawlable (ESCA, 2016).

5.1.6.2 The requirement for and feasibility of any further mitigation will be consulted upon with statutory consultees throughout the EIA process.

5.1.7 Proposed assessment methodology

5.1.7.1 The commercial fisheries EIA will follow the methodology set out in part 1 section 4: EIA methodology, of the EIA Scoping Report. Specific to the commercial fisheries EIA, the following guidance documents will also be considered:

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2014)
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2015)
- Best practice guidance for fishing industry financial and economic impact assessments (UKFEN, 2012)
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010)
- Fishing and Submarine Cables – Working Together (ICPC, 2009).

5.1.7.2 In order to characterize the importance of fisheries in this region, consideration will be given to the value of fisheries within the Mona commercial fisheries study area for the transmission assets. Any valuation will not be used as the basis of the impact assessment process.

5.1.8 Potential cumulative effects

5.1.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Mona Offshore Wind Project to affect commercial fisheries receptors.

5.1.8.2 The cumulative assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the Mona commercial fisheries study area for the transmission assets:

- other offshore wind farms, including the Morgan Offshore Wind Project and other existing and proposed projects
- other energy infrastructure projects, including oil and gas activities (including decommissioning) and carbon capture and storage (CCS) projects
- other infrastructure projects (e.g. cables and pipelines).

5.1.8.3 The cumulative effect assessment will follow the approach outlined in part 1 section 4: EIA methodology of the EIA Scoping Report.

5.1.9 Potential inter-related effects

5.1.9.1 The assessment of potential inter-related effects will be considered within the commercial fisheries Environmental Statement (ES) chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.1.10 Potential transboundary impacts

5.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon commercial fisheries due to construction, operation and maintenance, and decommissioning impacts of the project. These include:

- loss or restricted access to fishing grounds affecting fleets from the Republic of Ireland and Belgium
- displacement of fishing activity into other areas affecting fleets from the Republic of Ireland and Belgium.

5.1.10.2 The potential for transboundary impacts will be considered within the ES.

5.2 Shipping and navigation

5.2.1 Introduction

5.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the shipping and navigation receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets on shipping and navigation receptors.

5.2.2 Study area

5.2.2.1 For the purpose of identifying shipping and navigation receptors for the Mona Offshore Wind Project transmission assets, a broad study area has been defined. The Mona shipping and navigation study area for the transmission assets is presented in Figure 5.8 and described below.

5.2.2.2 The Mona shipping and navigation study area for the transmission assets has been defined as an area extending 10 nautical miles (nm) around the Mona Offshore Transmission Infrastructure Scoping Search Area. This reflects the potential for surface-piercing infrastructure (i.e. the offshore booster substation) to affect shipping and navigation receptors, and will provide a local context of activity within and in proximity to the Mona Offshore Transmission Infrastructure Scoping Search Area.

5.2.2.3 Additionally, the waters of the east Irish Sea to the south and east of the Isle of Man (south of 54.5 degrees north and east of 5.0 degrees west) have been considered in terms of shipping routes in these waters and their interaction with the Mona Offshore Wind Project and existing and planned offshore wind projects within this area.

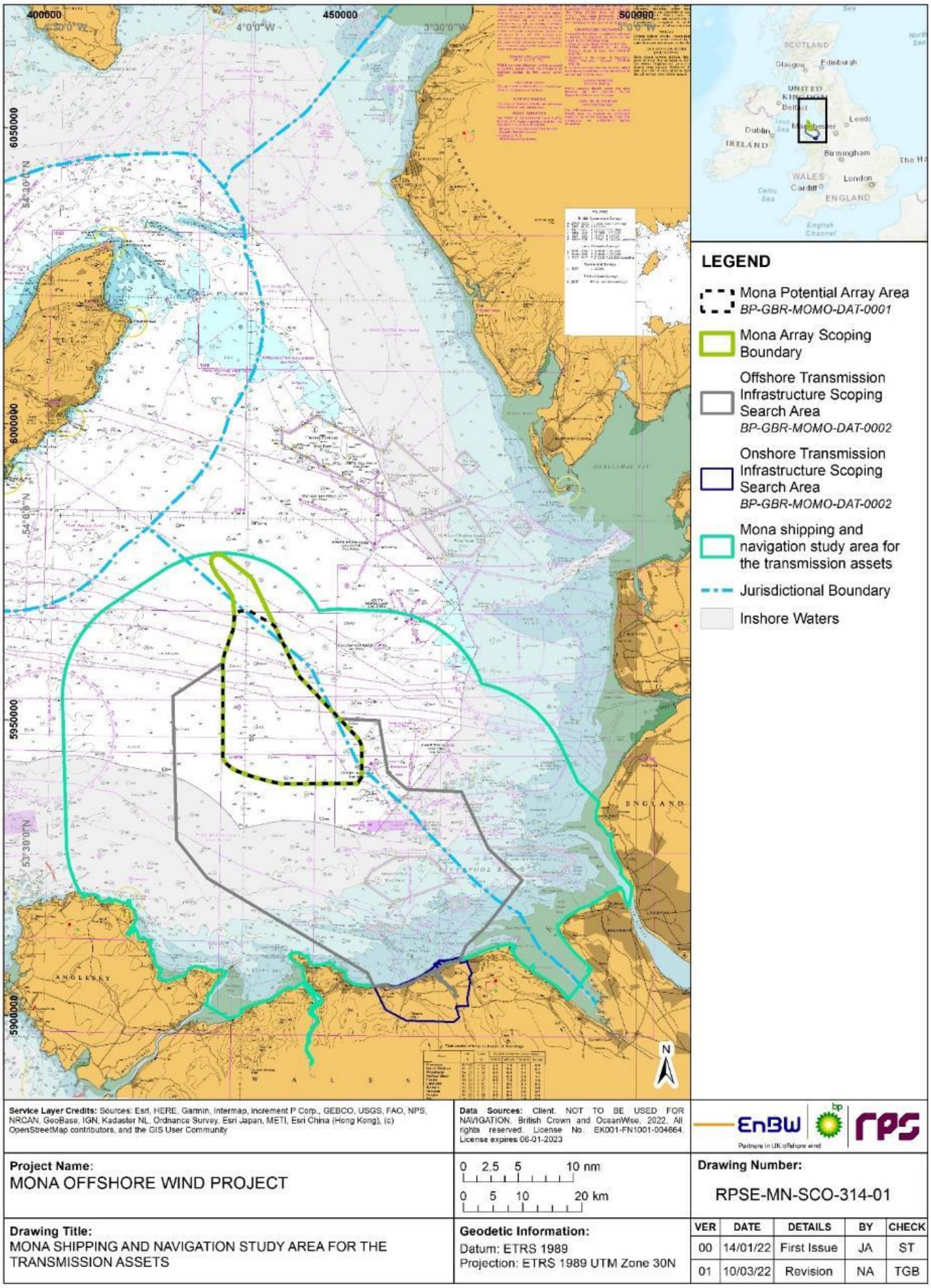


Figure 5.8: The Mona shipping and navigation study area for the transmission assets.

5.2.3 Data sources

Desktop data

5.2.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources to inform the identification of shipping and navigation receptors within the Mona shipping and navigation study area for the transmission assets. These are summarised in Table 5.4.

5.2.3.2 Vessel traffic data will be analysed around potential locations of the offshore booster substation to inform the EIA. The site-selection process for the offshore transmission assets is ongoing, as described in part 3, section 2: Site selection, of the EIA Scoping Report. This analysis will be used to inform the Navigation Risk Assessment (NRA) and EIA for the Mona Offshore Wind Project.

Table 5.4: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Admiralty charts	British Crown and OceanWise, License No. EK001-FN1001-004664	2021	British Crown
Automatic Identification System (AIS) vessel traffic data	NASH Maritime Ltd.	2019	MarineTraffic
Vessel Monitoring Systems (VMS) data	MMO	2019	MMO
International Maritime Organization (IMO) Traffic Separation Schemes (TSS)	Oceanwise	2021	Oceanwise
UK Coastal Atlas of Recreational Boating	Royal Yachting Association (RYA)	2018	RYA
Marine Incident Data	Marine Accident Investigation Branch (MAIB)	2000-2019	MAIB
Royal National Lifeboat Institution (RNLI) incident data	RNLI	2010-2019	RNLI
Helicopter Search and Rescue (SAR) locations	The Bristow Group	2021	The Bristow Group
Offshore wind farms	The Crown Estate	2021	The Crown Estate
Oil and gas platforms	Oil and Gas Authority	2021	Oil and Gas Authority
Maritime statistics	Department for Transport (DfT)	2021	DfT
Practice and exercise (PEXA) charts	Admiralty	2013	Admiralty
Cables and pipelines	Kis-Orca via Client onemap site	2021	Kis-Orca
Marine aggregate sites and disposal sites	The Crown Estate	2021	The Crown Estate

Site-specific survey data

5.2.3.3 In addition to existing data, site-specific marine vessel traffic surveys will be carried out to inform the EIA for the Mona Offshore Wind Project generation assets (see part 2, section 5.2: Shipping and navigation, of the EIA Scoping

Report) and data coverage will extend across parts of the Mona Offshore Transmission Infrastructure Scoping Search Area. The data from these surveys will be used to inform the Navigation Risk Assessment (NRA) and EIA for the Mona Offshore Wind Project.

Consultation

5.2.3.4 Supporting information and data will also be obtained from stakeholder consultation. The Applicant has established a Maritime Navigation Engagement Forum (MNEF) to provide a platform for the exchange of information, knowledge and experience that will enable marine developers and relevant shipping and navigation stakeholders to coexist in the marine environment. Specifically, the MNEF will focus on matters relating to:

- risk to safety of marine operations and navigation
- impact on marine operations and navigation.

5.2.3.5 Members of the MNEF include the MCA and Trinity House as statutory bodies, in addition to key user groups and organisations identified as having a potential shipping and navigation interface with the Mona Offshore Wind Project including: the UK and Irish Chamber of Shipping, ferry operators, port operators, representatives from other industries (oil and gas, aggregates, other offshore wind developers), with fishing interests represented by the Mona Offshore Wind Project Fisheries Liaison Officer (FLO). Other invited members include the RYA and Ministry of Defence (MOD). The MNEF is scheduled to meet quarterly during the pre-application phase and the first meeting of the MNEF took place in November 2021.

5.2.3.6 A marine hazard workshop will also be held as part of the NRA. The MCA, Trinity House and a number of local stakeholders representing all maritime interests (including ports, fishing, commercial shipping, oil and gas, recreation) will be invited to the hazard workshop.

5.2.4 Baseline environment

5.2.4.1 The Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the OSPs, interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and the offshore booster substation will be located.

Navigational features

5.2.4.2 The Mona Offshore Transmission Infrastructure Scoping Search Area is located in the east Irish Sea, where several ferry and shipping routes presently operate and safely co-exist alongside a number of notable marine assets and activities. Key marine navigation features within the east Irish Sea include:

- IMO TSS
- oil and gas activities

- commercial fishing activities
- recreational cruising routes
- commercial ship anchorages
- pilot boarding stations
- ports and marine terminals
- offshore wind farms
- marine aggregate sites and disposal sites.

5.2.4.3 The key marine navigation features and activities within the east Irish Sea are presented in

5.2.4.4 Figure **5.9**.

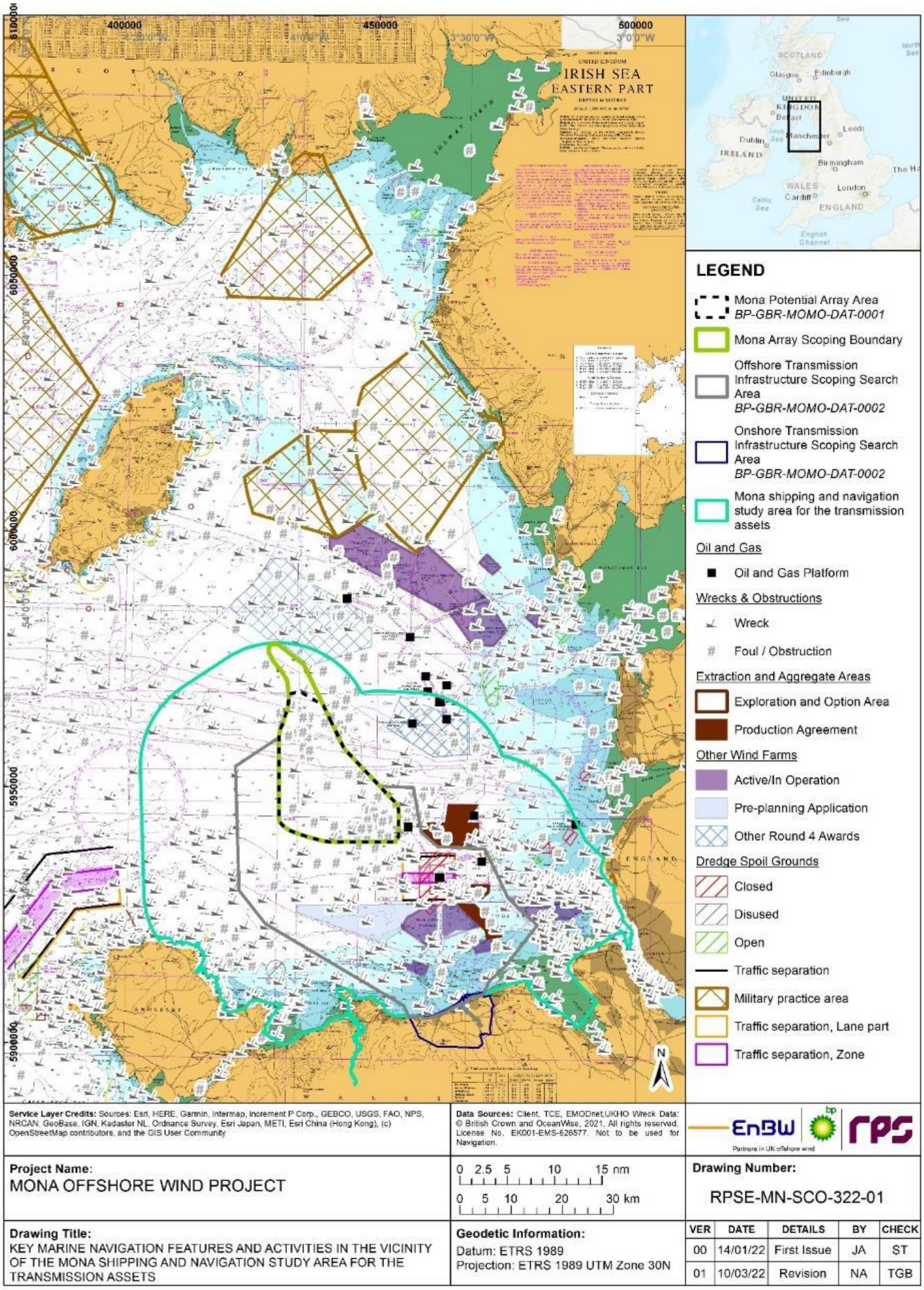


Figure 5.9: Key marine navigation features and activities in the vicinity of the Mona shipping and navigation study area for the transmission assets.

Commercial vessel and commercial passenger analysis

5.2.4.5 The main commercial vessel routes identified in the Mona shipping and navigation study area for the transmission assets are shown in Figure 5.10. It should be noted that this data is preliminary and will be further informed by site-specific data collected during the marine traffic surveys.

5.2.4.6 Large commercial vessels are concentrated in routes to the Port of Liverpool. One route passes Anglesey, to the south of the Mona Potential Array Area and through the Mona Offshore Transmission Infrastructure Scoping Search Area. Another route transits from Liverpool to the northern Irish Sea, passing to the west of the Isle of Man and intersecting with the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area. Usage of the IMO TSS ensures the separation of opposing streams of traffic to aid navigational safety. The Mona shipping and navigation study area for the transmission assets includes the principal approaches to Liverpool from the west and a busy anchorage located to the east of Anglesey.

5.2.4.7 As shown in Figure 5.10, a number of commercial ferry routes pass through the Mona shipping and navigation study area for the transmission assets. Commercial ferry routes intersect the Mona Offshore Transmission Infrastructure Scoping Search Area (namely Liverpool to Dublin, Liverpool to Douglas, Liverpool to Belfast and Heysham to Dublin) whilst another route is immediately adjacent (namely Heysham to Warrenpoint). Other passenger vessels, including cruise ship activity, is recorded in the data passing within the Mona shipping and navigation study area for the transmission assets.

5.2.4.8 Key commercial ferry operators identified to date include Isle of Man Steam Packet Company, Seatruck Ferries, P&O ferries, and Stena Line. Each of these operators are members of the MNEF and consultation is underway to further understand their activities and operational procedures.

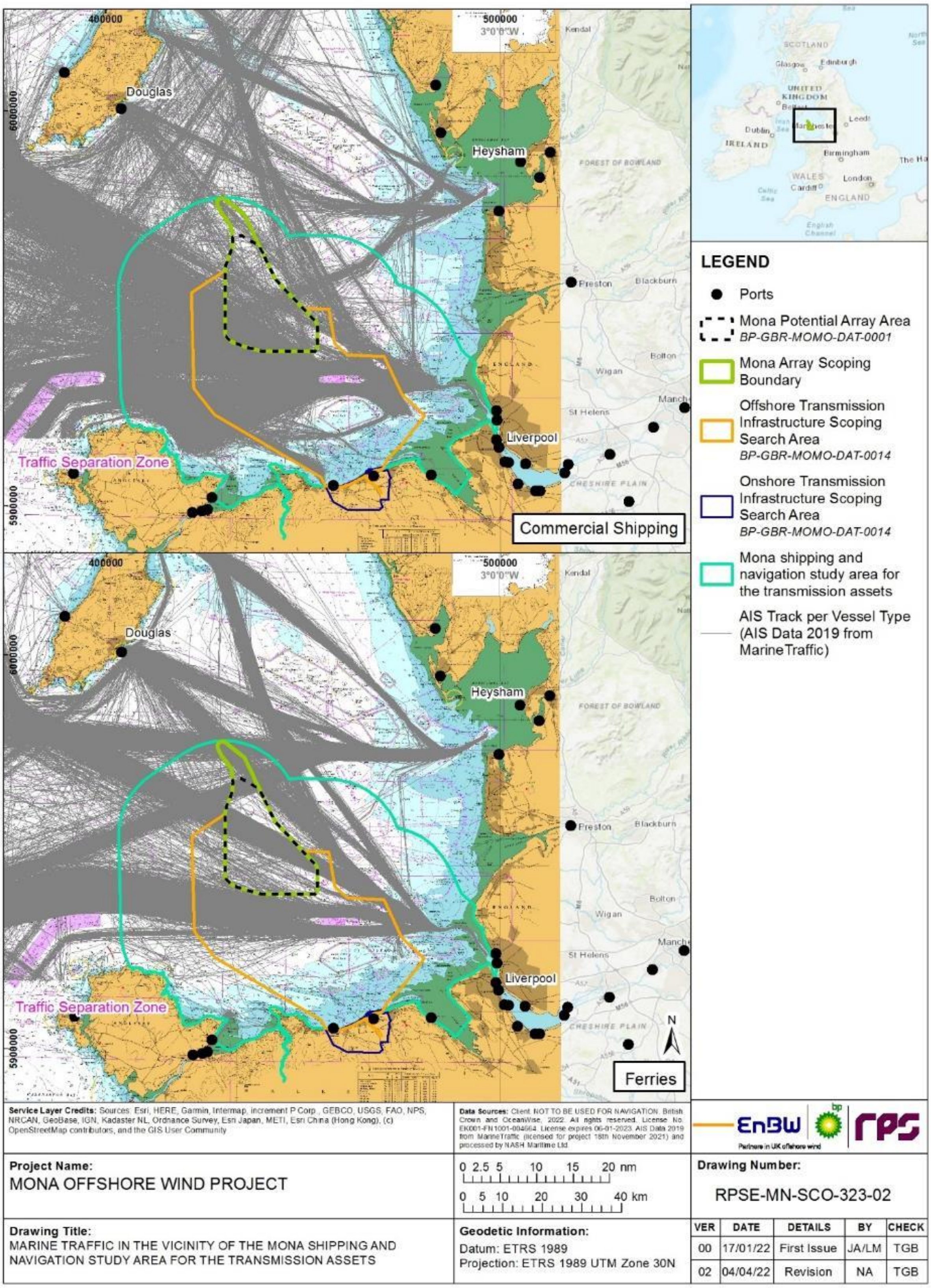


Figure 5.10: Marine traffic (commercial shipping and ferries) in the vicinity of the Mona shipping and navigation study area for the transmission assets (all AIS vessel tracks from 2019).

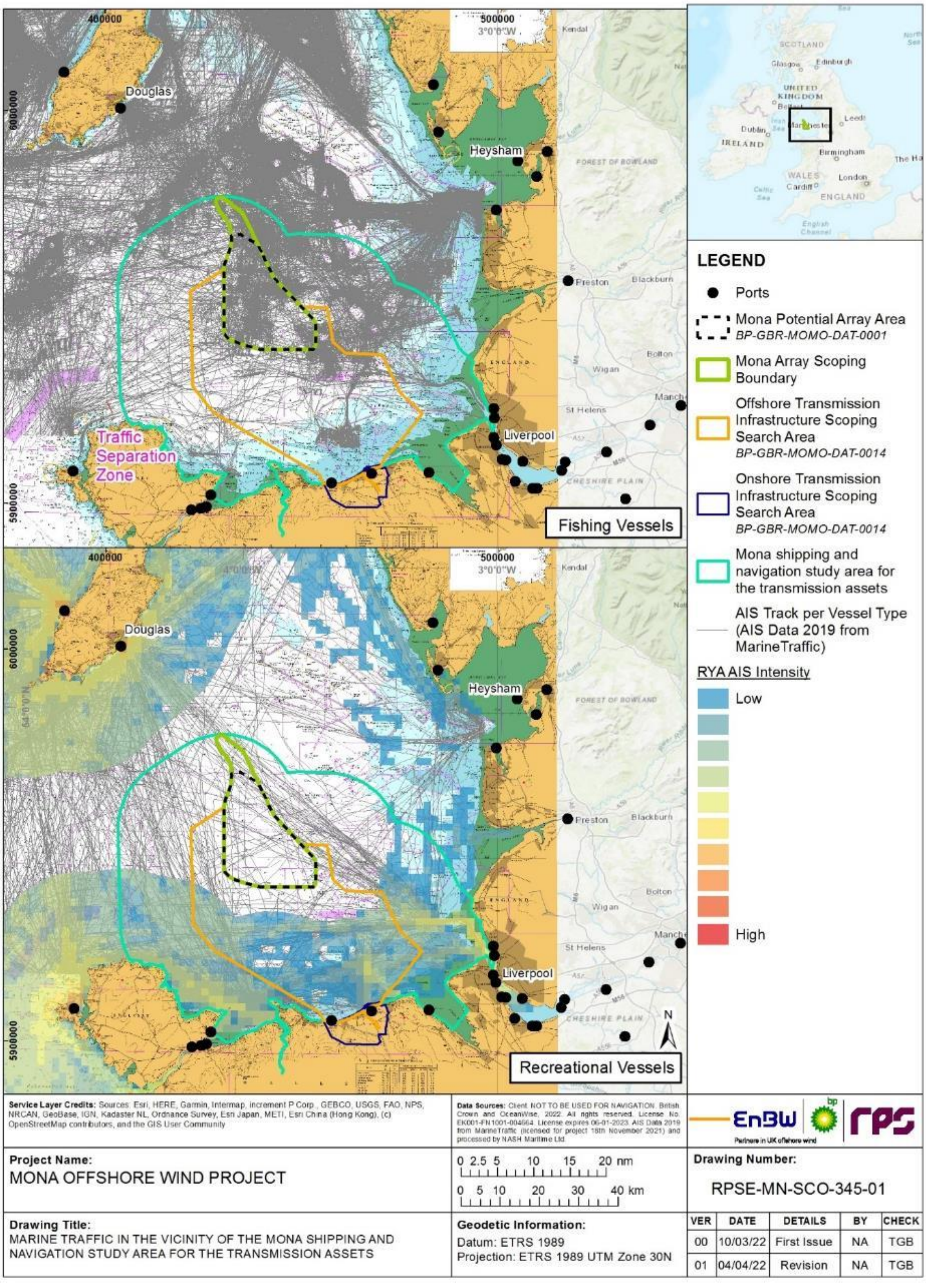


Figure 5.11: Marine traffic (fishing vessels and recreational vessels) in the vicinity of the Mona shipping and navigation study area for the transmission assets (all AIS vessel tracks from 2019).

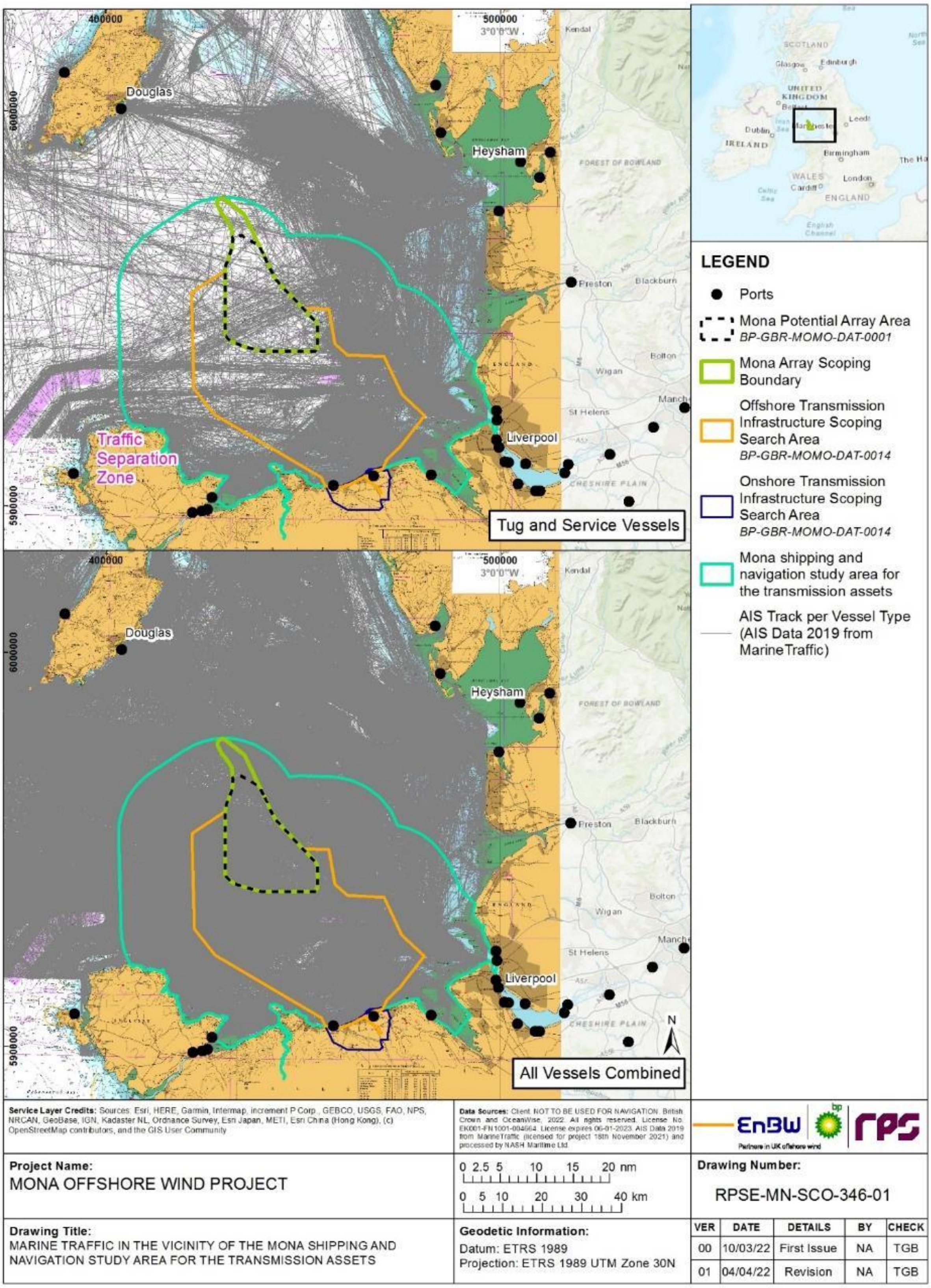


Figure 5.12: Marine traffic (tugs and service vessels and all vessels combined) in the vicinity of the Mona shipping and navigation study area for the transmission assets (all AIS vessel tracks from 2019).

Fishing vessel density

5.2.4.9 Commercial fishing occurs within the Mona shipping and navigation study area for the transmission assets, with the waters in the northeast showing a higher density of fishing vessels than surrounding waters based on AIS data (Figure 5.11). Not all fishing vessels carry AIS and therefore additional data will be collected as part of the vessel traffic surveys and through consultation with commercial fisheries stakeholders through the Mona Offshore Wind Project FLO.

5.2.4.10 Further detail on commercial fishing activity is provided in part 3, section 5.1: Commercial fisheries, of the EIA Scoping Report.

Recreational vessel activity

5.2.4.11 Recreational activity is defined for the purpose of the shipping and navigation assessment as sailing and motor craft (including those undertaking dive/fish excursions).

5.2.4.12 There is low to medium recreational vessel activity in inshore areas of the Mona shipping and navigation study area for the transmission assets based on AIS data, as shown in Figure 5.11**Figure 5.10**. Much of the recreational activity is concentrated inshore with only sporadic use of offshore cruising routes between the UK mainland and the Isle of Man. Not all recreational vessels carry AIS and therefore additional data will be collected as part of the vessel traffic surveys and through the MNEF engagement activities and hazard workshop.

Service vessels

5.2.4.13 Tugs and service vessels support ongoing operations associated with other infrastructure projects within the east Irish Sea (

5.2.4.14 Figure **5.9**). The activity of these vessels is shown in Figure 5.12 and is concentrated in harbours and within and between other offshore wind farms and oil and gas platforms.

Search and rescue

5.2.4.15 SAR within the UK is coordinated by the MCA, with other organisations providing declared assets to undertake SAR operations. These different organisations are outlined below.

5.2.4.16 The MCA provides a coordination service for SAR, counter pollution and salvage. SAR is coordinated through a network of Maritime Rescue Coordination Centres (MRCC) situated throughout the UK, a Maritime Rescue Sub Centre (MRSC) based in London, and the Joint Rescue Coordination Centre (JRCC) in Fareham. The Mona Offshore Wind Project falls within the area of responsibility of the Holyhead MRCC.

5.2.4.17 SAR helicopters, available to the MCA for use during a SAR incident, are provided by the Bristow Group. The Caernarfon SAR helicopter base is the closest to the Mona Offshore Wind Project, located 41.1km from the Mona shipping and navigation study area for the transmission assets.

5.2.4.18 The RNLI provides a 24-hour SAR service maintaining a fleet of lifeboats from stations positioned around the coast of the UK and Ireland. There are a number of lifeboat stations positioned along the coast of north Wales and northwest coast of England that operate a variety of both smaller (open-deck) inshore lifeboats and larger all-weather lifeboats that are capable of high speed and able to safely undertake operations in all weather. Due to the distance offshore it is most likely that only all-weather lifeboats would respond to an incident in the vicinity of the Mona Offshore Wind Project. The closest all-weather lifeboat stations to the Mona Offshore Wind Project are Llandudno and Moelfre Lifeboat Stations, however, given the significant number of stations surrounding the Irish Sea, other assets may respond to an incident. The Rhyl, Hoylake and West Kirby lifeboat stations are located in the vicinity of the landfall.

5.2.4.19 Other offshore operators (e.g. oil and gas and other renewable energy developments) also have resources which could be used to assist with an incident in the vicinity of the Mona Offshore Wind Project. As part of the EIA process, the Applicant will undertake further consultation with the MCA in order to inform the assessment of SAR capability in the region.

Maritime accidents and incidents

5.2.4.20 Maritime incidents in the east Irish Sea from 2010 to 2019 have been recorded by MAIB and are shown in Figure 5.13, according to vessel type. The majority of records occur in inshore waters, with several records of incidents, predominantly involving tug and service vessels, within the south and east of the Mona Offshore Transmission Infrastructure Scoping Search Area. Four incidents involving fishing vessels were also recorded in the west of the Mona Offshore Transmission Infrastructure Scoping Search Area. Data on maritime accidents and incidents will be analysed as part of the NRA for the Mona Offshore Wind Project.

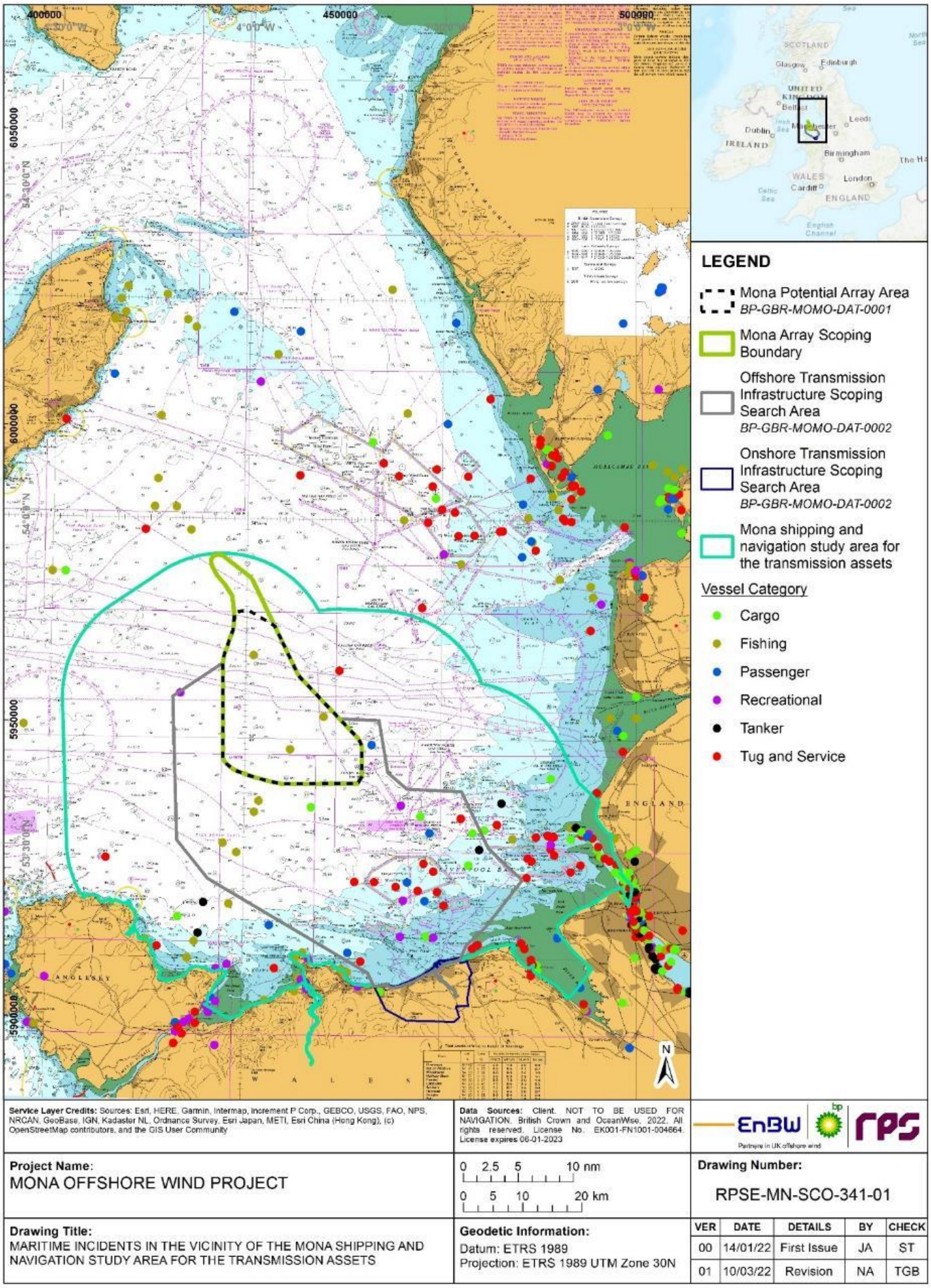


Figure 5.13: Maritime incidents in the vicinity of the Mona shipping and navigation study area for the transmission assets (MAIB data from 2010 to 2019).

5.2.5 Potential project impacts

5.2.5.1 A range of potential impacts on shipping and navigation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.5 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

5.2.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for shipping and navigation.

Table 5.5: Impacts proposed to be scoped into the project assessment for shipping and navigation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Deviations to commercial routes.	✓	✓	✓	Offshore export cable and interconnector cable installation activities and the presence of OSPs and the offshore booster subsation may require deviations to shipping routes and result in increased transit times.	Vessel traffic data will be used to inform the NRA. Consultation with commercial operators through the MNEF.	Qualitative assessment of deviations for commercial vessel routes will be undertaken in the NRA.
Increased vessel to vessel collision risk.	✓	✓	✓	Activities within the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area will increase the number of vessels operating and may increase the risk of collision between project vessels and other vessels. The deviation of existing commercial and ferry routes around the Mona Potential Array area and Mona Offshore Transmission Infrastructure Scoping Search Area may increase the number of vessel interactions, which may increase collision risk. Displacement of existing activities (such as fishing and recreational users) into adjacent shipping routes may increase the risk of collision.	Vessel traffic data will be used to inform the NRA. Consultation with commercial operators and other user groups through the MNEF.	Qualitative and quantitative assessment using vessel traffic data and consultation feedback.
Increased allision (contact) risk to vessels.	✓	✓	✓	The presence of OSPs in previously open sea areas within the Mona Potential Array Area and the offshore booster substation in previously open sea areas within the Mona Offshore Transmission Infrastructure Scoping Search Area may increase the risk of allision (contact) from passing vessels following engine failure or human error.	Vessel traffic data will be used to inform the NRA. Consultation with commercial operators and other user groups through the MNEF.	Qualitative and quantitative assessment using vessel traffic data and consultation feedback.
Increased risk of anchor and gear snagging for commercial vessels and commercial fishing vessels (in transit).	✓	✓	✓	The presence of cables associated with the Mona Offshore Wind Project may increase the likelihood of anchor and gear interaction for third party vessels including a snagging risk.	An assessment of the vessel traffic in proximity to the Mona Offshore Wind Project will be carried out including identification of areas where anchoring activity occurs frequently.	Qualitative assessment to assess potential impact, informed by the NRA.
Reduction of under keel clearance	×	✓	×	The presence of cable protection associated with the Mona Offshore Wind Project may reduce water depths and therefore reduce	An assessment of the vessel traffic in proximity to the Mona Offshore Wind Project will be carried out and assessed against	Qualitative assessment to assess potential impact, informed by the NRA.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				under keel clearance for third party vessel traffic.	water depths to identify any areas where under keel clearance may be of concern.	
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	The Mona Offshore Wind Project will increase the number of vessels in the area which may result in an increased number of incidents requiring emergency response and may reduce access for SAR responders.	MAIB and RNLI incident data and DfT SAR helicopter taskings data will be assessed to characterise baseline incident rates.	Qualitative assessment to assess potential impact, informed by the NRA. The NRA will include a section that considers the impacts of the Mona Offshore Wind Project on SAR response in line with Marine Guidance Note (MGN) 654 and its annexes based on desk-based research.
Interference with marine navigation, communications and position fixing equipment.	×	✓	×	Communication and position fixing equipment may be affected by the presence of infrastructure associated with the Mona Offshore Wind Project transmission assets.	Vessel traffic data will be used to characterise vessel movements in the area and inform the NRA. The NRA will be used to inform the assessment.	Qualitative assessment to assess potential impact, informed by the NRA.

5.2.6 Measures adopted as part of the project

5.2.6.1 The following measures to be adopted as part of the project are relevant to shipping and navigation. These measures may evolve as the engineering design and the EIA progresses.

- The use of advisory clearance distances and safety zones during construction and periods of major maintenance.
- Compliance with Marine Guidance Note (MGN) 654 Safety of Navigation Offshore Renewable Energy Installations (OREIs) – UK Navigational Practice, Safety and Emergency Response (MGN 654) (MCA, 2021a).
- The use of guard vessels where required by risk assessment.
- Notifying the United Kingdom Hydrographic Office (UKHO) of the locations of the OSPs and the offshore booster substation, for marking on Admiralty Charts.
- Marking and lighting of the Mona Offshore Wind Project in accordance with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and in consultation with the MCA and Trinity House.
- Marine coordination and promulgation of information using Notices to Mariners and fishermen's awareness charts.
- Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP) and provision of self-help capabilities.

5.2.6.2 The requirement for and feasibility of further mitigation will be consulted upon with statutory consultees throughout the EIA process.

5.2.6.3 The Applicant is also committed to implementing construction vessel traffic monitoring.

5.2.7 Proposed assessment methodology

Approach

5.2.7.1 Shipping and navigation is assessed primarily in accordance with guidance provided by the statutory consultees. The MCA require that their methodology is used as a template for undertaking the EIA (see MCA, 2021b). This template is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place in order for the assessed risk (base case and future case) to be judged as broadly acceptable or tolerable.

5.2.7.2 The following paragraphs provide an overview of the proposed approach to assessing risk to navigation receptors and how the outputs of the NRA will be carried through into the EIA in order to assess the significance of effect.

Navigation Risk Assessment and Formal Safety Assessment

5.2.7.3 The shipping and navigation EIA will be informed by a NRA undertaken in accordance with MGN 654. The NRA will be supported by stakeholder consultation and a hazard workshop in accordance with MGN 654.

5.2.7.4 The NRA will use a structured and systematic methodology to score the likelihood and consequence of different hazards occurring and is based on the IMO Formal Safety Assessment (FSA) approach (IMO, 2018).

5.2.7.5 The IMO FSA process is a structured and systematic methodology based on risk. As part of the FSA, the impact of the Mona Offshore Wind Project is considered against the baseline datasets identified.

5.2.7.6 There are five basic steps within this process:

- Step 1 – Identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes).
- Step 2 – Risk analysis (evaluation of risk factors).
- Step 3 – Risk control options (devising measures to control and reduce the identified risks).
- Step 4 – Cost benefit analysis (determining cost effectiveness of risk control measures).
- Step 5 – Recommendations for decision-making (information about the hazards, their associated risks and the cost effectiveness of alternative risk control measures).

5.2.7.7 The FSA would combine both quantitative and qualitative inputs in order to determine the level of risk. Quantitative inputs include vessel traffic analysis, historical incident analysis and risk modelling of shipping accidents. Qualitative inputs include the expertise and judgements of master mariners, regulators and wider stakeholders, elicited through extensive consultation and hazard workshops. By combining these inputs together, a holistic, collaborative approach to maritime risk assessment will be achieved.

Hazard workshop

5.2.7.8 In order to gather expert opinion and local knowledge, a hazard workshop will be undertaken, during which a project and site-specific hazard log will be prepared. The hazard log will be used to identify direct or indirect hazards relating to the development of the Mona Offshore Wind Project, the level of risk associated with the hazards, the controls to be put in place and the tolerability of the residual risks.

5.2.7.9 The hazard log will also be used to identify standard and additional mitigation measures required to demonstrate that the hazards associated with the Mona Offshore Wind Project are broadly acceptable or tolerable on the basis of As Low As Reasonably Practicable (ALARP) declarations, in line with regulatory requirements. This information is then fed into the FSA process to identify impacts associated with the development.

EIA methodology

5.2.7.10 The shipping and navigation EIA will broadly follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report, but with the assessment criteria tailored to align with MCA requirements described above. Specifically, the assessment criteria will include a combination of consequence and frequency, rather than magnitude and sensitivity, to establish significance. Significance will be determined as either broadly acceptable, tolerable, or unacceptable. This will be further described in the

Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

5.2.7.11 Specific to the shipping and navigation EIA, the following guidance documents will be considered:

- MGN 654 (M+F) Safety of Navigation: OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021a)
- Methodology for Assessing the Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI) (MCA, 2021b).

5.2.7.12 Other guidance that will be referred to during the completion of the shipping and navigation EIA include:

- MGN 372, OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008)
- G1162 ED1.0 The Marking of Offshore Man-Made Structures (IALA, 2021)
- Guidelines for FSA for use in the IMO rule-making process (IMO, 2018)
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019).

5.2.8 Potential cumulative effects

5.2.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Mona Offshore Wind Project to affect shipping and navigation receptors.

5.2.8.2 The cumulative assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the Mona shipping and navigation study area for the transmission assets:

- other offshore wind farms, including the Morgan Offshore Wind Project and other existing and proposed projects
- other energy infrastructure projects, including oil and gas activities (including decommissioning) and carbon capture and storage (CCS) projects
- other infrastructure projects (e.g. cables and pipelines).

5.2.8.3 The cumulative effect assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.2.9 Potential inter-related effects

5.2.9.1 The assessment of potential inter-related effects will be considered within the shipping and navigation ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.2.10 Potential transboundary impacts

5.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is potential for transboundary impacts upon shipping and navigation due to construction, operation and maintenance, and decommissioning impacts of the project. These include:

- Deviations to commercial routes: there is potential for transboundary impacts on ferry and commercial routes operating to/from the Republic of Ireland.

5.2.10.2 The potential for transboundary impacts will be considered within the ES.

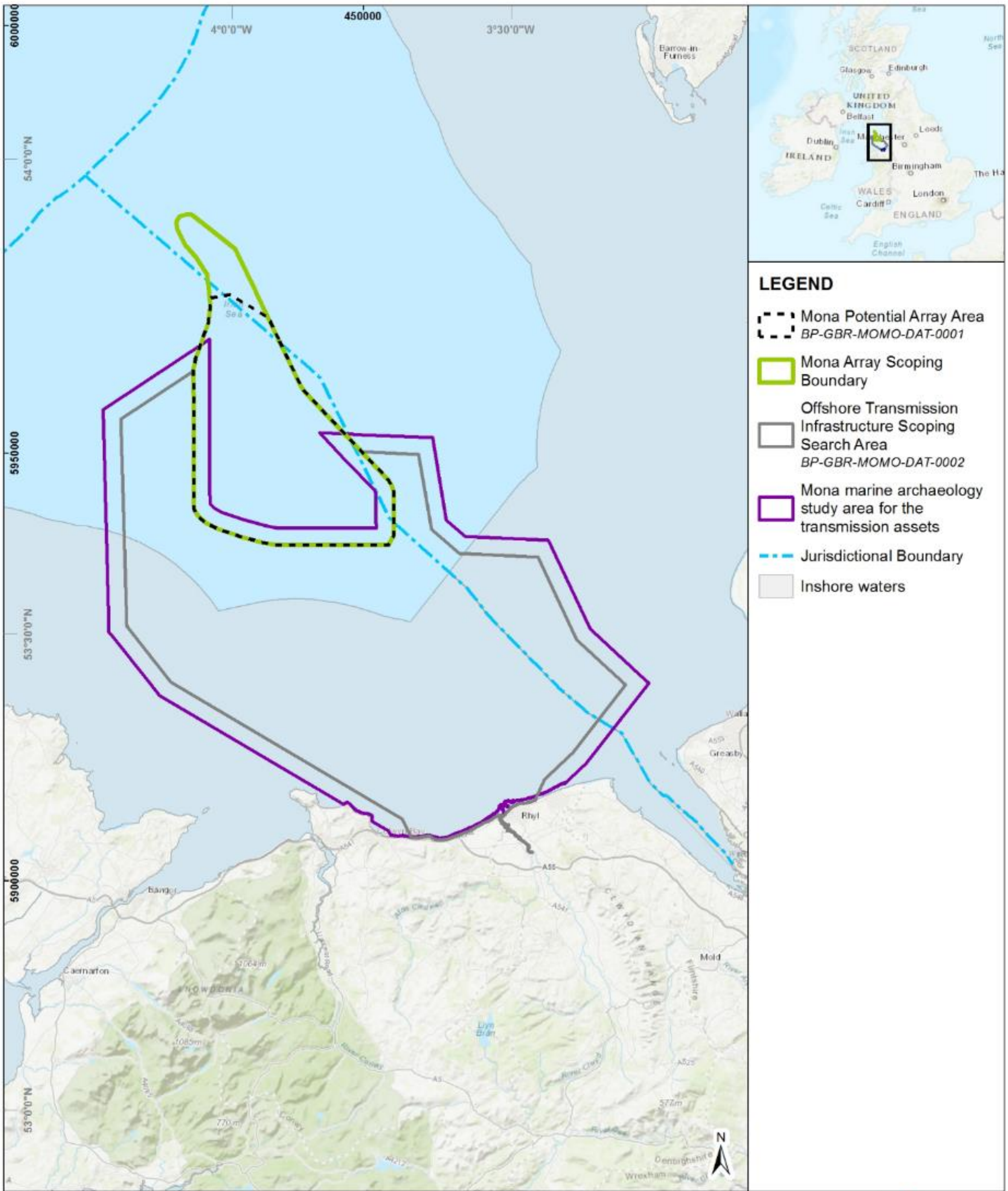
5.3 Marine archaeology

5.3.1 Introduction

5.3.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the marine archaeology receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets on marine archaeology receptors.

5.3.2 Study area

5.3.2.1 The Mona marine archaeology study area for the transmission assets is shown in Figure 5.14. The Mona marine archaeology study area for the transmission assets is defined as the Mona Offshore Transmission Infrastructure Scoping Search Area (grey) with an additional 2km buffer (purple). This encompasses the transmission assets of the Mona Offshore Wind Project and allows the site-specific data to be put into a wider context.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, Marine Management Organisation, Marine Scotland, Natural Resources Wales

EnBW bp rps — Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 nm
0 5 10 20 km

Drawing Number:
RPSE-MN-SCO-302-01

Drawing Title:
MONA (BODELWYDDAN) MARINE ARCHAEOLOGY STUDY AREA FOR THE TRANSMISSION ASSETS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	24/01/22	First Issue	NG	LD
01	08/03/22	Revision	NA	LD

Figure 5.14: The Mona marine archaeology study area for the transmission assets.

5.3.3 Data sources

Desktop data

5.3.3.1 A number of sources were consulted in order to inform the marine archaeology section of the EIA Scoping Report and will be used to inform the EIA. These comprised:

- The United Kingdom Hydrographic Office (UKHO) wrecks database, containing recorded wreck and obstruction data.
- Records held by the National Record of the Historic Environment (NRHE), which include:
  - monuments records
  - archaeological event records
  - maritime records
  - aircraft crash sites
  - find locations.
- National Monuments Records Wales (NMRW) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW).
- Relevant mapping including Admiralty Charts, British Geological Survey (BGS), Ordnance Survey and historic maps.
- Relevant primary and secondary sources and grey literature, available through the Archaeological Data Service (ADS) and other websites including published and unpublished archaeological reports relevant to the vicinity of the Mona marine archaeology study area for the transmission assets were also consulted.

5.3.3.2 In order to compile a marine archaeological baseline for the purposes of this EIA Scoping Report, these sources were compiled into gazetteers (see appendix 5.3.11).

5.3.3.3 The historic environment records have been classified between records where material is known to be on the seabed and ‘recorded losses’. Recorded losses are events of vessels that are known to have been lost in the area, but with which no accurately located remains are associated.

5.3.3.4 Where multiple entries across the datasets occur that relate to the same archaeological receptor, the coordinates from the UKHO dataset have been used as they are most frequently updated with the latest survey positions.

Site-specific surveys

5.3.3.5 Site-specific geophysical surveys are planned for summer 2022 within the Mona Offshore Transmission Infrastructure Scoping Search Area. Data from this survey will be reviewed by a marine archaeologist specialising in geophysical data interpretation and will be used to inform the marine archaeology baseline for the EIA.

5.3.4 Baseline environment

5.3.4.1 The Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area and the Mona Offshore Transmission

Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 5.4: Marine archaeology, of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and the offshore booster substation will be located.

5.3.4.2 The baseline environment is structured into the following categories:

- Submerged prehistoric archaeology: This includes palaeochannels and other inundated terrestrial landforms that may preserve sequences of sediment of palaeoenvironmental interest, Palaeolithic and Mesolithic sites and artefacts.
- Maritime archaeology: relates generally to craft or vessels and any of their associated structures and/or cargo.
- Aviation archaeology: this comprises all military and civilian aircraft crash sites and related wreckage.

5.3.4.3 A gazetteer of the known marine archaeology within the Mona marine archaeology study area for the transmission assets can be found in appendix 5.3.11.

Submerged prehistoric archaeology

5.3.4.4 There are 16 entries within the NMRW data relating to palaeolandscapes within the Mona marine archaeology study area for the transmission assets. These include flood plains, glacial tunnel valleys and the Holocene coastline, suggesting the potential for glacial features to be present. The locations of these features are shown in Figure 5.15.

Submerged prehistoric archaeological potential

5.3.4.5 The potential for submerged prehistoric archaeology within the Mona marine archaeology study area for the transmission assets is moderate with any surviving evidence likely to be found in association with the palaeolandscape features. Archaeological assessment of the geophysical survey data (see section 5.3.3.5) will provide further information on the potential for submerged prehistoric archaeology within the Mona marine archaeology study area for the transmission assets and will be presented in the PEIR and Environmental Statement (ES) chapter.

5.3.4.6 Prior to 5,500BC, fluctuations in sea level presented opportunities for early hominids to occupy and traverse the now submerged Liverpool Bay area (Fitch *et al*., 2011). When sea levels were low, the Liverpool Bay area was a landscape that connected the Isle of Man to mainland Britain (Coles 1988). These falls in sea level were associated with the last three glacial maximums and the retreat of the ice sheets.

5.3.4.7 The earliest known occupation of the area near the Mona marine archaeology study area for the transmission assets is located on the north coast of Wales, at the Pontnewydd Cave site, Llandudno. This site dates to circa 225,000BP (Before Present) and confirms that this area was being exploited during the low to mid palaeolithic period.

5.3.4.8 The Last Glacial Maximum (LGM) began circa 18,000BP and ice sheets began to retreat around 13,000BP. It is thought that human and animal reoccupation of mainland Britain was swift, and that this reoccupation came from crossing the now submerged palaeolandscape of Doggerland from mainland Europe (Fitch *et al*. 2011). There is therefore potential that this exploitation of the landscape continued across mainland Britain and over to the Isle of Man via the now submerged palaeolandscape identified within the Mona marine archaeology study area for the transmission assets.

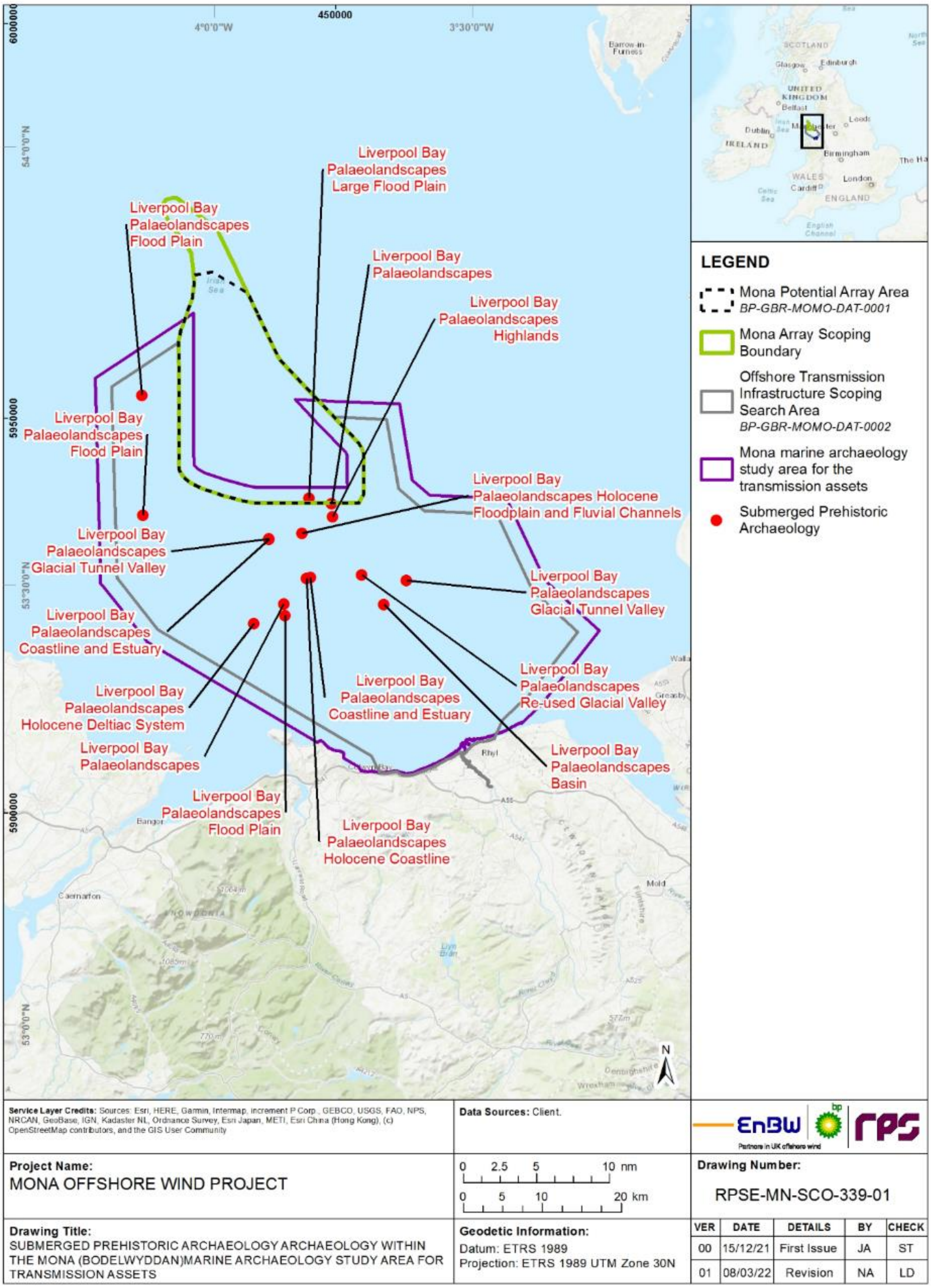


Figure 5.15: Submerged prehistoric archaeology within the Mona marine archaeology study area for the transmission assets.

Maritime archaeology

5.3.4.9 The known maritime archaeology within the Mona marine archaeology study area for the transmission assets is shown in Figure 5.16 and described below.

Designated sites

5.3.4.10 There are two designated maritime archaeology sites within the Mona marine archaeology study area for the transmission assets.

5.3.4.11 The *Resurgam* is an example of an early submarine that is designated as a Historic Wreck under the Protection of Wrecks Act 1973 (PWA). There is an area of protection around the wreck, with a radius of 300m. Diving or any interference including survey and excavation within the protected area of a designated wreck is a criminal offence, unless a licence has first been obtained from the Welsh Government. Cadw should be contacted in the first instance. The *Resurgam* is located towards the southern extent of the Mona marine archaeology study area for the transmission assets.

5.3.4.12 Motor torpedo boat MTB 539 is designated under the Protection of Military Remains Act 1986. Under the Protection of Military Remains Act 1986, all aircraft that have crashed in military service are automatically protected. Maritime vessels lost during military service are not automatically protected although the Ministry of Defence (MOD) has powers to protect any vessel that was in military service when lost. The MOD can designate ‘controlled sites’ around wrecks with a known position and can designate named vessels as ‘protected places’ even if the position of the wreck is not known. It is not necessary to demonstrate the presence of human remains at either ‘controlled sites’ or ‘protected places’. MTB 539 is located towards the northwestern extent of the Mona marine archaeology study area for the transmission assets.

Non-designated maritime archaeology

5.3.4.13 There are a further 29 ‘live’ wrecks within the Mona marine archaeology study area for the transmission assets recorded in the UKHO, NMWR and NRHE data. Of these identified wreck sites, 11 are from the post-medieval period, one was lost during World War I and six during World War II. Nine are modern shipwrecks and therefore considered less significant in archaeological terms. The remaining two wrecks are from unknown periods. The locations of the known wreck sites are shown in Figure 5.16 and further details are listed in appendix 5.3.11.

5.3.4.14 There are also 25 wreck sites which are listed as ‘dead’ in the UKHO data indicating that no remains have been located and therefore the wreck is considered not to exist at the location given. However, it is worth noting that ‘dead’ wrecks may still be present at the locations indicated but are buried or flattened and therefore no longer represent a navigational hazard. Proposed geophysical surveys will clarify the presence of any material at these locations. There are a further four sites listed as lifted or salvaged from within the Mona marine archaeology study area for the transmission assets.

5.3.4.15 There are 57 unknown wreck sites recorded in the NMRW, NRHE and UKHO data about which no further information is known. These entries are attributed unverifiable positions and therefore may not lie within the Mona marine archaeology study area for the transmission assets. Archaeological interpretation of the geophysical survey data will determine whether they relate to the presence of archaeological material.

5.3.4.16 There are 24 seabed anomalies recorded as being of man-made origin within the Mona marine archaeology study area for the transmission assets, which may indicate the presence of archaeological material.

5.3.4.17 There are also a large number of obstructions within the Mona marine archaeology study area for the transmission assets, which may relate to material of anthropogenic origin.

Maritime archaeological potential

5.3.4.18 Maritime archaeological sites and materials can be defined as the physical remains of boats and ships that have been wrecked, sunk or have foundered, and artefacts which rest upon the seabed as the result of being jettisoned or lost overboard (e.g. anchors, cannon or fishing gear).

5.3.4.19 There are an additional 121 recorded losses attributed to coordinates within the Mona marine archaeology study area for the transmission assets. These have been recorded within the NRHE and NMRW datasets. Further archaeological interpretation of the geophysical survey data will determine whether any archaeological material is present at the locations.

5.3.4.20 Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but to which no specific location can be attributed. Recorded losses are often grouped with reference to a geographic, hydrographic or other point of reference, making the positional data of these records unreliable. However, they do provide information on the historical marine traffic of the general region and therefore the archaeological potential.

5.3.4.21 Records of known wreck sites and losses in UK waters are biased towards the recent, predominantly post-medieval and modern periods. Although the existence and survival of palaeolithic watercraft are highly speculative in the UK, Bronze and Iron Age sea-going vessels are likely to have been lost in the east Irish Sea.

5.3.4.22 The potential for the survival of medieval maritime archaeology is higher than from prehistoric periods but still rare, as ship construction during the medieval period relied heavily on organic building materials that are less likely to survive on and in the seabed.

5.3.4.23 The post-medieval and modern periods present the greatest potential for unrecorded archaeology to be discovered. The increasing incorporation of metal structural elements into vessel designs during this period means that wrecks for the 19th and early 20th centuries are also often more visible on the seabed than their wooden predecessors. They are visible to bathymetric and geophysical survey, and also generate strong magnetic anomalies, and this greater visibility is reflected in the increased number of known wrecks (i.e. those that have been located on the seabed) in contrast to earlier periods.

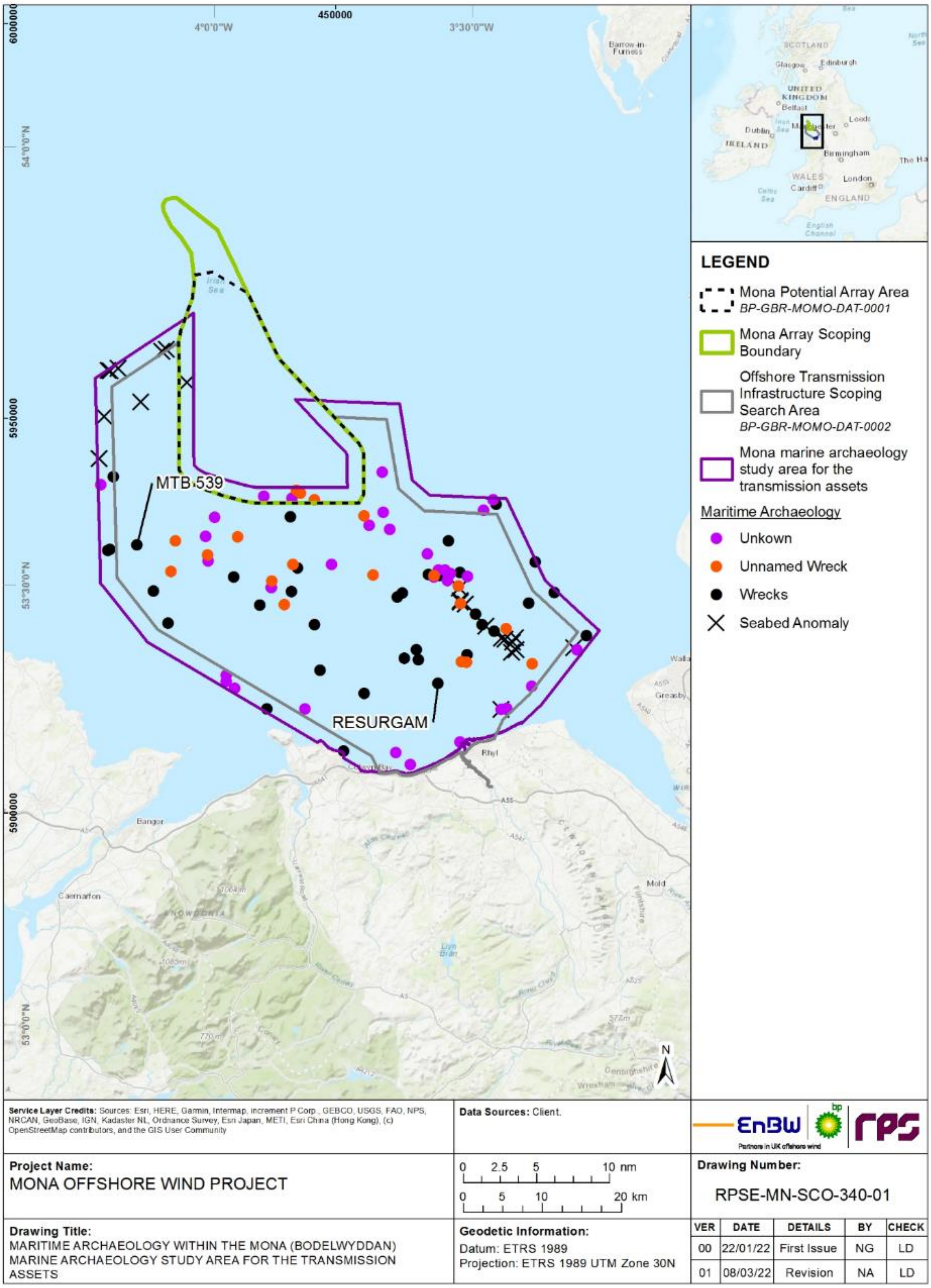


Figure 5.16: Maritime archaeology within the Mona marine archaeology study area for the transmission assets.

Aviation archaeology

5.3.4.24 There are no known aviation remains within the Mona marine archaeology study area for the transmission assets.

Aviation archaeological potential

5.3.4.25 There are 20 recorded losses of aircraft attributed to coordinates within the Mona marine archaeology study area for the transmission assets. As with maritime recorded losses, no specific location can be associated with these records. The site-specific geophysical survey analysis will clarify if aviation archaeological material is present within the Mona marine archaeology study area for the transmission assets.

5.3.4.26 Thousands of military and civilian aircraft casualties have occurred in UK waters since the advent of powered flight in the early 20th century. The bulk of these are casualties of World War II and most are concentrated off the south and southeast coasts of England. However, there is evidence for substantial numbers of aircraft casualties in the east Irish Sea (Wessex Archaeology, 2008).

5.3.4.27 Whilst this aviation archaeology record is potentially very large, the ephemeral nature of aircraft wrecks ensures that many sites remain unknown and unrecorded. In addition, although records of aircraft losses at sea are extensive, they are seldom tied to an accurate position, which further complicates any assessment of the likely presence of aircraft wreckage on any particular area of the seabed.

5.3.4.28 Since World War II, despite the volume of both military and civilian air traffic, there have been few aviation losses off the west coast of England and north Wales, in the vicinity of the Mona Offshore Wind Project. The potential for post-war aircraft remains to be discovered within the Mona marine archaeology study area for the transmission assets is therefore considered to be low. Civilian aircraft wrecks are not subject to protection under the terms of the Protection of Military Remains Act 1986.

5.3.5 Potential project impacts

5.3.5.1 A range of potential impacts on marine archaeology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.6 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.3.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for marine archaeology.

Table 5.6: Impacts proposed to be scoped into the project assessment for marine archaeology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Sediment disturbance and deposition leading to indirect impacts on archaeological receptors.	✓	✓	✓	Construction works, including seabed preparation, installation of foundations, and cable installation, may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors. Effects from decommissioning are likely to be similar to effects from construction. Maintenance operations, including cable repair activities, may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors.	Review of desktop data and archaeological assessment of geophysical survey data with reference to the results of the Physical processes chapter of the ES which will consider the extent of sediment disturbance and associated deposition. The geophysical survey data will be scanned to provide an understanding of the geological nature of the area and interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft Written Scheme of Investigation (WSI).
Direct damage to archaeological receptors.	✓	✓	✓	Construction works could directly affect any archaeological receptors present within the Mona Offshore Transmission Infrastructure Scoping Search Area. These effects will likely be localised, but should they occur, they could lead to adverse and irreversible damage to archaeological receptors. Where receptor locations are already known, measures for their avoidance and protection include implementing Archaeological Exclusion Zones (AEZs). Effects from decommissioning are likely to be similar to effects from construction.	As above.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft WSI.
Alteration of sediment transport regimes.	×	✓	×	The presence of OSPs and offshore booster substation foundations and associated scour protection, and cable protection, may interrupt sediment transport pathways, which could be directed towards or away from archaeological receptors causing damage.	As above, with reference to the Physical processes chapter of the ES which will consider the potential impact on sediment transport pathways.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft WSI.

5.3.6 Measures adopted as part of the project

5.3.6.1 The following measures adopted as part of the project are relevant to marine archaeology. The measures may evolve as the engineering design and the EIA progresses.

- The identification and implementation of AEZs around receptors identified as having a known archaeological potential. The size of the AEZ will be evidence-based and established using the precautionary principle to ensure that it is of sufficient size to protect the site from the nature of the impact (Wessex Archaeology, 2007; Wessex Archaeology for The Crown Estate, 2020).
- The development of, and adherence to, a WSI for the construction phase.
- Provision of a Protocol for Archaeological Discoveries (PAD) similar to that set out by The Crown Estate (TCE, 2014) for unexpected archaeological discoveries made during the course of the development.
- Archaeological input into specifications for and analysis of pre-construction geophysical surveys.
- Suitably qualified marine archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle (ROV) or diver surveys and, if appropriate, in the monitoring and checking of data.
- Geoarchaeological input into specifications for and analysis of pre-construction geotechnical surveys. This may include the presence of a geoarchaeologist on board the survey vessel and provision for sampling, analysis and reporting of recovered cores. The results of all geoarchaeological investigations will be complied in a final report which will include a sediment deposit model.

5.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.3.7 Proposed assessment methodology

5.3.7.1 The marine archaeology EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the marine archaeology EIA, the following guidance will also be considered:

- Standard and Guidance for Historic Environment Desk-Based Assessment, Chartered Institute for Archaeologists (CIfA) (2014).
- Historic Environment Guidance for Offshore Renewable Energy Sector, Collaborative Offshore Wind Research into the Environment (COWRIE) (2007).
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy, COWRIE (2008).
- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development, JNACP (2006).

- Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects, The Crown Estate (2010).
- Protocol for Archaeological Discoveries: Offshore Renewables Projects, The Crown Estate (2014).

5.3.8 Potential cumulative effects

5.3.8.1 The majority of the potential impacts on marine archaeological receptors arising from the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project are considered to be localised to within the footprint of the Mona Offshore Transmission Infrastructure Scoping Search Area. However, there is potential for cumulative effects to arise from other projects or activities within the east Irish Sea where projects or activities could act collectively on sediment transport regimes with the Mona Offshore Wind Project to affect marine archaeological receptors. The cumulative assessment will consider the maximum design scenarios for each of the projects or activities.

5.3.8.2 The cumulative effect assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.3.9 Potential inter-related effects

5.3.9.1 The assessment of potential inter-related effects will be considered within the marine archaeology ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.3.10 Potential transboundary impacts

5.3.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon marine archaeology due to construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project.

5.3.11 Appendix 5.3.11

Gazetteer of known marine archaeology within the Mona marine archaeology study area for the transmission assets (data has been compiled from the NMRW, NRHE and UKHO datasets as listed in section 5.3.3, The data is presented in WGS84 UTM30N).

Some of the data cannot be attributed an ID number at this stage. If these become confirmed locations of archaeological material, they will be assigned ID numbers during the geophysical data analysis.

ID	Easting	Northing	Name	Description	Period
6732 / 892845	465844.6	5930485	Alarm	Remains of the 1911 wreck of an iron-hulled lightship which foundered following a collision with the SS *Pacuare*, approximately 18 nautical miles WNW of New Brighton.	Modern
8347 / 906839	440489.2	5926317	Albanian	The *Albanian* was an iron-hulled steamship built by T Royden & Sons, Liverpool, in 1870. On 18 November 1877, the *Albanian* was on passage from Liverpool to Leghorn and then Genoa when it was in collision with the sailing barque *Nydia* off the Great Orme. The *Albanian* subsequently foundered.	Post Medieval
6717	445262.3	5931018	Amlwch Rose (Probably)	On 5 December 1940, the British cargo ship *Amlwch Rose*, built in 1931 by Van Vliet & Co and owned by Hughes Richard & Co., departed Partington for Dublin with a cargo of coal and went missing.	WWII
7004	444342.1	5937501	Ardlough	The *Ardlough* was a cargo ship built in Germany in 1968 which	Modern

ID	Easting	Northing	Name	Description	Period
				sank in 1988 after taking on water in the Irish Sea.	
6808	427024.1	5928144	Bijou	MV *Bijou* was carrying steel and general cargo from Manchester to Bilboa when she started to take in water as her plates opened up. The ship sank at a position reported as 15.5 miles ENE of Point Lynas.	Modern
6769 / 906906	463234.7	5930076	Cairnross	Remains of the 1940 wreck of an English cargo steam ship which foundered after detonating a mine laid by the German submarine U-30, approximately 19 nautical miles northwest of New Brighton. The *Cairnross* was a steel-hulled steamer, en route from Liverpool.	WWII
8567 / 8449 / 906711 / 906725	466739.2	5920041	Calcium (Probably)	Possible remains of 1940 wreck of British cargo vessel which foundered after being mined. The *Calcium* was a steel-hulled steamship built by G Brown & Sons at Greenock in 1918.	WWII
8564	447393	5923886	Chacabuco (Possibly)	The *Chacabuco* was an iron-hulled full-rigged ship built by Gourlay Brothers & Co, Dundee, in 1869. The steamship *Torch* ploughed into the *Chacabuco's* starboard side near her mizzen rigging and the *Chacabuco* began to sink.	Post Medieval

ID	Easting	Northing	Name	Description	Period
83810 / 906998	464351.8	5934446	City of Brussels	Remains of the 1883 wreck of an English liner which foundered in Liverpool Bay following a collision with the cargo vessel *Kirby Hall*. Built 1869 at Glasgow by Tod & McGregor.	Post Medieval
7044	433644	5935030	Constance	Wreck site of the *Constance*, 1907?	Modern
7103	421192.9	5933243	Cork	The *Cork* was built in 1899 by Blackwood and Gordon, Port Glasgow. The vessel was on passage from Dublin to Liverpool on 26 January 1917, when it was torpedoed by U103 - with loss of 12 lives (5 crewmen and 7 passengers).	WWI
8595	428859.9	5924036	Delfina (Probably)	In a SW gale on 16 December 1928, the Spanish steamer *Delfina* en route to Swansea from Manchester in ballast ran onto rocks near the Skerries at the north west corner of Anglesey.	Modern
6853 / 906846	457894.8	5927358	Dublin	Remains of the 1888 wreck of a British steamship, which foundered in Liverpool Bay following a collision with the paddle steamer *Longford*. Built 1866 by Walpol & Webb.	Post Medieval
-	470167.9	5923006	Find	Ballast mound	Find, Post Medieval
-	467794.6	5925173	Find	Find scatter	Post Medieval
-	468653.5	5923892	Find	Find scatter	Post Medieval
-	458763.5	5919575	Find	Fixed-pitch propellor	Modern

ID	Easting	Northing	Name	Description	Period
-	460307.7	5920696	Find	stack of slates	19th Century
6789	437172.2	5929919	Find	Anchor	Unknown
6937	475395.2	5931802	Gorsethorn	*Gorsethorn* built in 1917, foundered near the Bar Light, 13 nautical miles northwest of New Brighton in 1940.	WWII
8517	448096.1	5918058	Horizon (Possibly)	Fishing vessel lost north of Llandudno in 1996.	Modern
6907 / 1521994	474524.2	5926568	Lelia	Remains of 1865 wreck of English paddle steamer, located approximately 8 miles NNW of the Point of Ayr, in Liverpool Bay. She sprang a leak and foundered en route from Liverpool for Nassau, Bahamas with coal, iron and a general cargo on her maiden voyage.	Post Medieval
6757 / 892841	461835.5	5930201	Lugar	On 23 September 1891, the British cargo ship *Lugar*, built in 1857 by Richardson, Duck & Co. Ltd. and owned at the time of her loss by Ayr Steam & Shipping Co., on voyage from Garston to Dublin with a cargo of coal, sank after a collision in fog with the steamer SS *Saxon Prince*, at the mouth of the River Mersey.	Post Medieval
6895 / 906858	477801.7	5927911	Mersey	Remains of a British pilot vessel that was wrecked in a double shipping disaster in 1885.	Post Medieval
7219	421900.4	5942597	Miriam Thomas	The wreck was located by HMS *Fawn* in 1987 and is believed to	Modern

ID	Easting	Northing	Name	Description	Period
				be the *Miriam Thomas*, a modern steamship. The ship's log has been recovered and reported to the Receiver of Wreck.	
6955 / 506833	424904.9	5933956	MTB 539	WWII motor torpedo boat that was wrecked in a storm on 31 January 1952. The wreck is designated under the Protection of Military Remains Act.	WWII
7324 /	470429.2	5939106	Munster	Remains of the 1940 wreck of an Irish ferry which foundered 17 miles northwest of New Brighton, after detonating a mine laid by the German submarine U-30 whilst en route from Belfast to Liverpool with passengers and a general cargo.	WWII
6852 / 271604	441918.1	5928555	Nydia (Probably)	The *Nydia* was a wooden barque built by Valin at Quebec in 1863. The barque was on passage from Liverpool to Tyree and Savannah in November 1887 when it was in collision with the steamship *Albanian* and foundered 8 miles off the Great Orme.	Post Medieval
8111	460593.3	5919436	Ocean Monarch	The *Ocean Monarch* was a wooden sailing barque built by D McKay. On 24 August 1848, the ship was on passage from Liverpool to Boston when the ship caught fire and fell into the sea off of Great Orme.	Post Medieval

ID	Easting	Northing	Name	Description	Period
8528 / 271003	453671.1	5915168	Penrhos (probably)	Steamship of unspecified type, of steel construction, and registered in Liverpool, United Kingdom, carrying general cargo. Lost 1 January 1942, Liverpool Bay.	WWII
6803 / 271172	458534.2	5927890	Penstone	The *Penstone* was built in 1926 by the Manchester Dry Dock Company, Ellesmere Port and wrecked in 1948 in a collision with *Villanger*.	Modern
8336	463061.8	5916399	Resurgam	An experimental submarine built in 1879 by Reverend George William Garrett, The *Resurgam* was wrecked in 1880 en route to Gosport. This site was designated as a Historic Wreck under Protections of Wrecks Act 1973 (Designation No 1, 1996) on 6 July 1996. The protected area around the wreck is a radius of 300m.	Post Medieval
8274	451118.1	5907855	Rhosneigr	The wreck of the paddle steamer *Rhosneigr* can be found off Rhos Point, Rhos-on-Sea, North Wales. The ship went aground on 20 July 1908.	Post Medieval
-	420129.3	5944870	Seabed anomaly	Find scatter	Post Medieval
-	420129.3	5944870	Seabed anomaly	Findspot	Post Medieval
-	420757.8	5950231	Seabed anomaly	Findspot	Post Medieval
-	425393.9	5952109	Seabed anomaly	Findspot	Post Medieval
-	431274.5	5954586	Seabed anomaly	Findspot	Post Medieval

ID	Easting	Northing	Name	Description	Period
-	421561.6	5956000	Seabed anomaly	Findspot	Post Medieval
-	421290.7	5956066	Seabed anomaly	Findspot	Post Medieval
-	422569.3	5956366	Seabed anomaly	Findspot	Post Medieval
-	428063.4	5958524	Seabed anomaly	Findspot	Post Medieval
-	428656.9	5958769	Seabed anomaly	Findspot	Post Medieval
-	472937.4	5920683	Seabed anomaly	Find scatter	Post Medieval
-	466537.3	5926478	Seabed anomaly	Findspot	Post Medieval
-	466537.3	5926478	Seabed anomaly	Findspot	Post Medieval
-	465885.6	5926743	Seabed anomaly	Findspot	Post Medieval
-	465922.7	5926882	Seabed anomaly	Findspot	Post Medieval
-	465782.8	5928511	Seabed anomaly	Findspot	Post Medieval
892690	471042.5	5913116	Seabed anomaly	Sonar contact, possible wreck	Post Medieval
6900 / 906854 / 271773	444509.3	5928060	Strathrye	The *Strathrye* was a wooden steam trawler which, on 12 January 1941, was fishing out of Fleetwood when it struck a mine.	WWII
8323 / 906815	481834.9	5922455	Thorn	Remains of the 1891 wreck of a British barge lost on the East Hoyle Bank. The wreck was dispersed with explosives in 1891, and therefore it is unlikely that archaeological material remains.	Post Medieval
8178	441341.1	5913172	Torch	The *Torch* was built in 1860 by L Hill & Co, Port Glasgow. Lost 1 March 1873, the *Torch* was lost in a collision with the *Chacabuco*. Twenty-two small earthenware jars with cork	Post Medieval

ID	Easting	Northing	Name	Description	Period
				stoppers have been recovered and reported to the Receiver of Wreck.	
7922	459543.4	5906155	Unknown	Wreck	Unknown
8279	457687.3	5907653	Unknown	Wreck	Unknown
8266	465813.7	5908997	Unknown	Yacht	Unknown
8170	471042.6	5913115	Unknown	Wreck	Unknown
8175	446220.7	5913207	Unknown	Wreck	Unknown
8164	471727.6	5913235	Unknown	Wreck	Unknown
8461	437309.2	5915788	Unknown	Steam ship	Unknown
8399	474945.2	5916032	Unknown	Wreck	Unknown
8367	436249	5916668	Unknown	Wreck	Unknown
8551	436204	5917442	Unknown	Wreck	Unknown
6889	465648.3	5928725	Unknown	Wreck	Unknown
6801	464235.4	5929431	Unknown	Light ship	Unknown
6768 / 892835	462521.7	5929913	Unknown	Unidentified broken up wreck	Unknown
6773	464372.7	5930049	Unknown	Wreck	Unknown
6744	464662.3	5930344	Unknown	Wreck	Unknown
6722 / 892849	463903.1	5930774	Unknown	Unidentified broken up wreck	Unknown
6720 / 892850	463118.6	5930782	Unknown	Unidentifed wreck	Unknown
892869	449558.1	5931466	Unknown	Probably a small, broken up wreck	Unknown
7025	433932.3	5931966	Unknown	Boiler/Engine/Generator	Unknown

ID	Easting	Northing	Name	Description	Period
7079 / 892881	461701.9	5932803	Unknown	Steam ship / probably late 19th centuary steamer	Post Medieval?
6697	456963.7	5935965	Unknown	Wreck	Unknown
892887	456963.6	5935965	Unknown	Probable wreck	Unknown
892888	454337.3	5936422	Unknown	Unidentified wreck	Unknown
909480	434781.6	5937487	Unknown	Remains of a vessel	Unknown
7307	468806.1	5938345	Unknown	Wreck	Unknown
892897 / 7355	470064.6	5939696	Unknown	Small area of unidentified wreckage	Unknown
7356 / 909481	444575.6	5939896	Unknown	Obstruction / probable buried wreck	Unknown
7332	440992	5940149	Unknown	Steam ship	Unknown
7260	420322.5	5941603	Unknown	Sailing vessel	Unknown
7189	456001.6	5943206	Unknown	Wooden Vessel	Unknown
892691	471726.8	5913236	Unknown	Probable remains of small vessel	Unknown
892761	480647.1	5920700	Unknown	Remains of an old wooden barge	Unknown
906866	441917.5	5928556	Unknown	Remains of British sailing vessel, possibly *Nydia*	Unknown
892837	466761.5	5929953	Unknown	Remains of merchant steamer	Unknown
909479	433643.2	5935030	Unknown	Remains of fishing vessel	Unknown
907024	456137.5	5938106	Unknown	Remains of unidentified barge	Unknown
892894	468806.6	5938345	Unknown	Unidentified wreck	Unknown
909482	440993.6	5940156	Unknown	Remains of a vessel	Unknown
-	466025.8	5919171	Unnamed wreck	Wreck	Post Medieval

ID	Easting	Northing	Name	Description	Period
892754	474991.9	5918933	Unnamed wreck	Unidentified wreck	Unknown
-	466683.9	5919088	Unnamed wreck	Wreck	Post Medieval
-	471694.7	5923372	Unnamed wreck	Wreck	Post Medieval
-	443623.6	5926404	Unnamed wreck	Wreck	Post Medieval
-	465920.3	5926553	Unnamed wreck	Wreck	Post Medieval
-	465648.8	5928727	Unnamed wreck	Wreck	Post Medieval
-	441993.5	5929409	Unnamed wreck	Wreck	Post Medieval
-	462526.9	5930083	Unnamed wreck	Wreck	Post Medieval
-	454866.9	5930177	Unnamed wreck	Wreck	Modern
-	429253.6	5930615	Unnamed wreck	Wreck	Post Medieval
-	444679.1	5931490	Unnamed wreck	Wreck	Post Medieval
-	433848.3	5932676	Unnamed wreck	Wreck	Post Medieval
-	437700.6	5934977	Unnamed wreck	Wreck	Post Medieval
-	453724.3	5937636	Unnamed wreck	Wreck	Modern
-	447431.4	5939710	Unnamed wreck	Wreck	Post Medieval
-	445611.4	5940503	Unnamed wreck	Wreck	Post Medieval
-	445119.7	5940911	Unnamed wreck	Wreck	Post Medieval
7046	421490.9	5933423	Vignes	Torpedoed and sunk on 23 January 1945 by U-1172 (Kuhlmann) *Vigsnes* was off Anglesey when the torpedo hit the port foreship.	WWII

5.4 Other sea users

5.4.1 Introduction

5.4.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the other sea user receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets on other sea users receptors.

5.4.1.2 Potential impacts upon other sea users related to navigational safety are addressed in part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report. The other sea users Environmental Statement (ES) chapter will only consider impacts that have likely significant effects on the undertaking of a certain marine activity or the operational effectiveness of marine infrastructure.

5.4.2 Study area

5.4.2.1 The other sea users study area varies in scale depending on the receptor. Two study areas have been defined for the assessment of different groupings of other sea users receptors. These are the Mona regional other sea users study area for the transmission assets, and the Mona local other sea users study area for the transmission assets, as shown in

5.4.2.2 Figure **5.17**.

5.4.2.3 The Mona regional other sea users study area for the transmission assets is based on one tidal excursion of the Mona Offshore Transmission Infrastructure Scoping Search Area and represents the area with potential increases in suspended sediments arising from Mona Offshore Wind Project activities. This study area is relevant to the following receptors which are susceptible to increases in suspended sediment concentrations:

- aggregate extraction and disposal sites
- recreational receptors (dive sites and bathing waters).

5.4.2.4 The Mona local other sea users study area for the transmission assets is defined as the Mona Offshore Transmission Infrastructure Scoping Search Area with an additional 1km buffer. The 1km buffer has been included as oil and gas infrastructure, cables and pipelines and offshore wind farm structures undergoing maintenance will require a 500m safety zone or advisory clearance distance. This area includes the extent of potential direct physical overlap between the Mona Offshore Wind Project activities and the following receptors:

- recreational receptors (including sailing and motor cruising and recreational fishing)
- offshore energy projects (including offshore wind farms, oil and gas activities, carbon capture and storage)
- cable and pipeline operators
- offshore microwave fixed communication links.

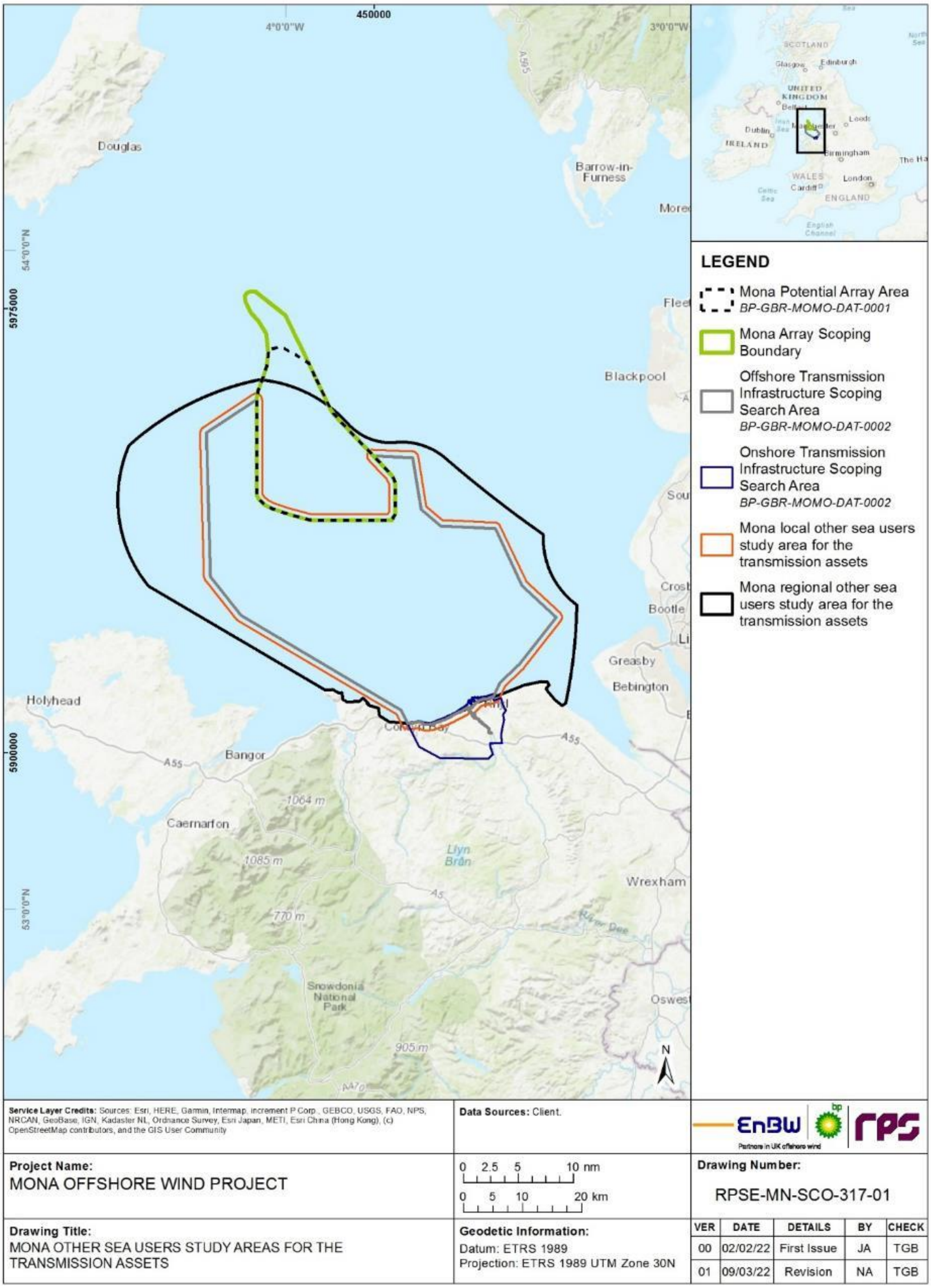


Figure 5.17: The Mona regional other sea users study area for the transmission assets and Mona local other sea users study area for the transmission assets.

5.4.3 Data sources

5.4.3.1 A number of sources were consulted to inform the other sea users section of the EIA Scoping Report and will be used to inform the EIA. These are shown in Table 5.7.

Table 5.7: Data sources for other sea users.

Title	Source	Year	Author
Cable routes	Kis-Orca	2021	Kis-Orca
Disposal sites	EMODnet	2015	EMODnet
Offshore wind farms	The Crown Estate (TCE)	2021	TCE
Aggregate extraction areas	TCE	2021	TCE
Pipelines	Oil and Gas Authority (OGA)	2021	OGA
Wells	OGA	2021	OGA
Oil and gas platforms	OGA	2021	OGA
Subsurface structures	OGA	2021	OGA
Hydrocarbon fields	OGA	2021	OGA
Oil and gas licence block	OGA	2021	OGA
United Kingdom Continental Shelf (UKCS) block	OGA	2021	OGA
Marinas	UK Coastal Atlas of Recreational Boating	2018	Royal Yachting Association (RYA)
Recreational activities	UK Coastal Atlas of Recreational Boating	2018	RYA
RYA clubs	UK Coastal Atlas of Recreational Boating	2018	RYA
RYA training centres	UK Coastal Atlas of Recreational Boating	2018	RYA
General boating areas	UK Coastal Atlas of Recreational Boating	2018	RYA
Data from site-specific 2 x 14-day Marine Vessel Traffic Surveys for the Mona generation assets (see part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report)	NASH Maritime (commissioned by the Applicant to inform the EIA)	2021/2022	NASH Maritime
Wrecks (diving sites)	UKDiving.co.uk	2010	UK Diving
Communication links	Ofcom, communication	2019	Ofcom
Recreational fishing	Cefas British sea fishing	2021 2020	Cefas British sea fishing

Consultation

5.4.3.2 Supporting data and information will also be obtained through consultation with relevant other sea users receptors with activities and interests in proximity to the Mona Offshore Transmission Infrastructure Scoping Search Area.

5.4.4 Baseline environment

5.4.4.1 The Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 5.5: Other sea users, of the EIA Scoping Report. The following sections provide a high-level overview of the other sea users baseline environment relevant to the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and the offshore booster substation will be located.

Mona regional other sea users study area for the transmission assets

5.4.4.2 Other sea users receptors within the Mona regional other sea users study area for the transmission assets include aggregate extraction and disposal sites and recreational receptors (dive sites). The baseline environment for these receptors is described below.

<u>Marine aggregate extraction</u>

5.4.4.3 There are two marine aggregate production agreement areas within the Mona regional other sea users study area for the transmission assets (Figure 5.18).

<u>Disposal sites</u>

5.4.4.4 There are a number of dredge disposal sites located within the east Irish Sea, including 10 within the Mona regional other sea users study area for the transmission assets (Figure 5.18).

5.4.4.5 There are no disposal sites for explosive material, chemical munitions disposal sites (post 1945) or radioactive waste sites (1946 to 1993) located within the Mona regional other sea users study area for the transmission assets, according to DECC, 2011 (see Figure A3h.21 in DECC, 2011).

<u>Scuba diving</u>

5.4.4.6 There are seven recreational dive sites within the Mona regional other sea users study area for the transmission assets (www.ukdiving.co.uk) (Figure 5.19).

<u>Bathing waters</u>

5.4.4.7 There are nine designated bathing water sites within the Mona regional other sea users study area for the transmission assets (Environment Agency, 2021) (Figure 5.19).

Mona local other sea users study area for the transmission assets

5.4.4.8 Other sea users receptors within the Mona local other sea users study area for the transmission assets include recreational receptors (sailing and motor cruising, recreational fishing and inshore water sports), offshore energy projects (offshore wind farms, oil and gas activities, carbon capture and storage), cable and pipeline operators and communication links. The baseline environment for these receptors is described below.

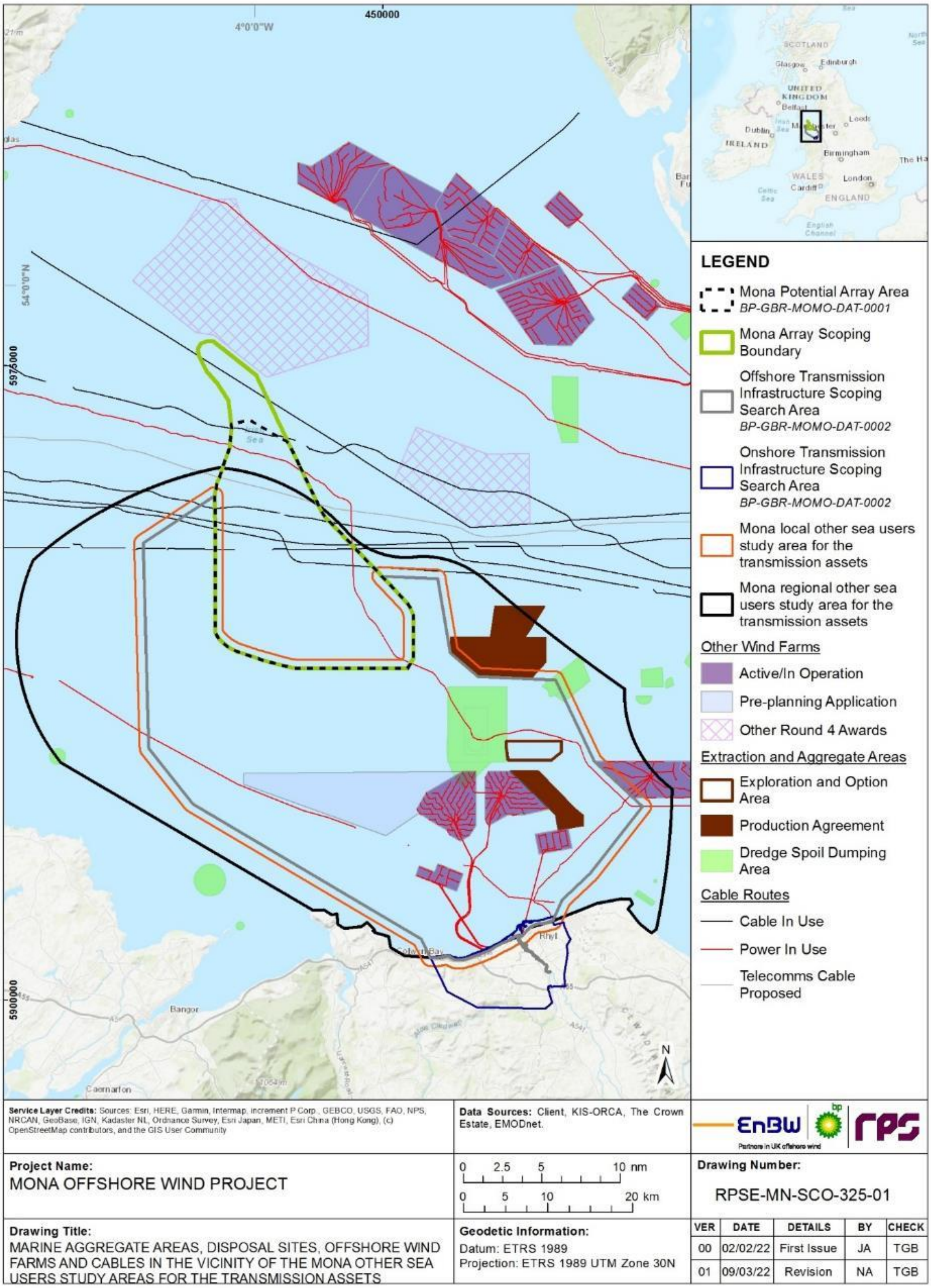


Figure 5.18: Marine aggregates, disposal sites, offshore wind farms and cables within the Mona regional other sea users study area for the transmission assets and the Mona local other sea users study areas for the transmission assets.

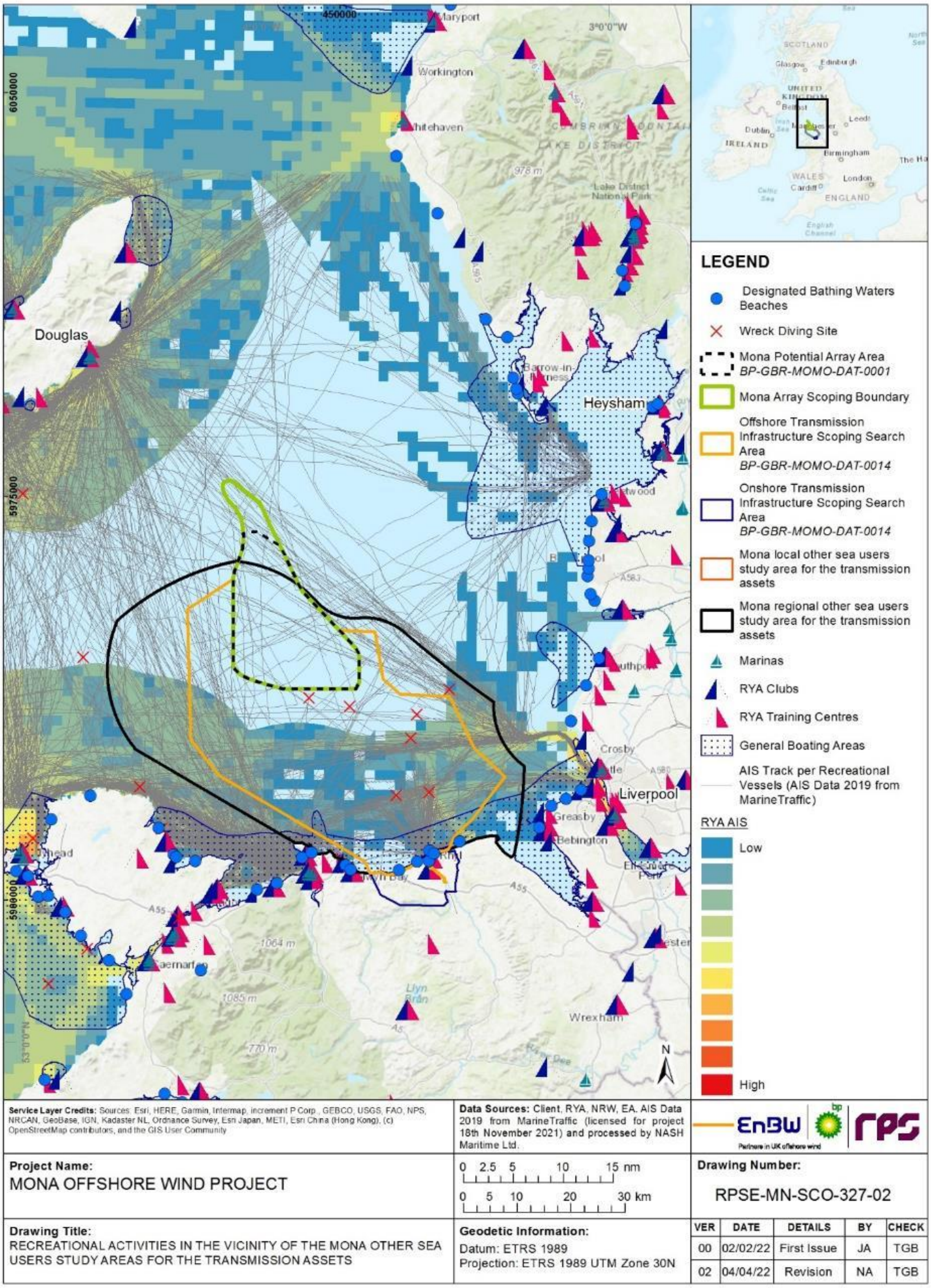


Figure 5.19: Recreational activities in the Morgan regional other sea users study area for the transmission assets and the Morgan local other sea users study area for the transmission assets.

Recreational sailing and motor cruising

5.4.4.9 Recreational sailing is generally divided into two categories: offshore and inshore. Offshore sailing is usually undertaken by yachts in the form of either cruising or organised offshore racing. Inshore sailing is typically undertaken by smaller vessels including dinghies and recreational vessels that are used for either cruising at leisure or racing. Cruising may include day trips between local ports and often includes a return journey to the home port on the same day. Inshore racing takes place around racing marks and navigational buoyage.

5.4.4.10 As noted in section 5.4.1, navigational safety and risk to recreational vessels is considered in part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report. The other sea users ES chapter will only consider receptors undertaking recreational sailing and motor cruising as an activity.

5.4.4.11 Figure 5.19 illustrates that recreational sailing and motor cruising in inshore and coastal areas is of a low to medium intensity. The RYA data is limited to inshore waters, but Automatic Identification System (AIS) data tracks show that recreational vessels also transit through offshore waters within the Mona local other sea users study area for the transmission assets. There is a general boating area overlapping with the south of the Mona local other sea users study area for the transmission assets. There are also several marinas, RYA clubs and training centres situated in proximity to the landfall.

5.4.4.12 Data collection and consultation activities carried out to inform the Navigation Risk Assessment (NRA) (see part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report) will be used as an additional data source to inform the assessment on recreational sailing and motor cruising receptors.

Recreational fishing

5.4.4.13 Sea fishing trips run from Conwy, North Wales and specialise in wreck fishing, deep sea fishing and reef fishing from Anglesey to Liverpool Bay (www.sea-fishing-trips.co.uk). Sea fishing trips also operate from the Isle of Man (https://www.manxseafishing.com/) and Fleetwood, Lancashire (http://www.blueminkboatcharters.co.uk/) amongst other ports along the coasts of the east Irish Sea. Consultation will take place with local operators to further understand activities and operational range.

Inshore water sports

5.4.4.14 Water sports such as kite surfing, surfing, wind surfing and kayaking occur almost entirely in coastal waters, usually within one nautical mile (nm) of the shore.

5.4.4.15 Pks Watersports centre is located in the south of the Mona local other sea users study area for the transmission assets (www.pkswatersports.com). Therefore, a variety of water sports including surfing and windsurfing may occur within the Morgan local other sea users study area for the transmission assets.

Offshore wind farms

5.4.4.16 Offshore wind farms in the east Irish Sea are shown in Figure 5.18. There are four operational offshore wind farms within the Mona local other sea users study area for the transmission assets (Burbo Bank Extension, Rhyl Flats, North Hoyle and Gwynt y Môr). In addition, the Awel y Môr offshore wind farm (in the pre-planning application stage) overlaps with the Mona local other sea users study area for the transmission assets. The offshore cable corridor within the Mona local other sea users study area will be routed to avoid the operational and proposed offshore wind farm array areas.

5.4.4.17 Consultation will take place with offshore wind developers and operators to further understand the nature of their operations.

Oil and gas operations

5.4.4.18 The Mona local other sea users study area for the transmission assets overlaps with eight licence blocks (109/10, 109/15, 110/7b, 110/11 and 110/12c licenced by Chrysaor North Sea Ltd., 110/12a licenced by Eni UK Ltd. and 110/13a and 110/13b licenced by Eni UK Ltd. and Eni ULX Ltd.) currently licenced for the exploration and extraction of oil and gas (Figure 5.20). There are four hydrocarbon fields located within the Mona local other sea users study area for the transmission assets with six associated hydrocarbon producing platforms (Conwy, Hamilton, Hamilton North, Douglas DW, Douglas DA and Douglas DP), all operated by Eni. Initial consultation carried out by the Applicant with Eni has confirmed that the Conwy platform is planned to be decommissioned. Radar Early Warning Systems (REWS) may be used on oil and gas platforms to detect approaching vessels and prevent vessel collision with a platform.

5.4.4.19 Subsea structures (including protective structures, pipe junctions, manifolds, wellheads, trees and valves) are usually protected by a 500m safety zone. There are seven subsurface structures located within the Mona local other sea users study area for the transmission assets.

5.4.4.20 Wells are classified into the following four categories: completed wells (ready for production), drilling wells (wells in the process of being drilled), plugged and abandoned wells (where work has ceased because it has become non-productive or non-viable) and suspended wells (a well may be temporarily suspended if an operator intends to carry out further operations at a later date). Completed and drilling wells typically have a 500m safety zone. Plugged and abandoned and suspended wells do not have safety zones attached to their location. There are 31 completed wells and 43 plugged and abandoned wells located within the Mona local other sea users study area for the transmission assets (Figure 5.20).

5.4.4.21 Consultation will take place with Chrysaor North Sea Ltd, Eni UK Ltd. and Eni ULX Ltd. to further understand the nature of their operations.

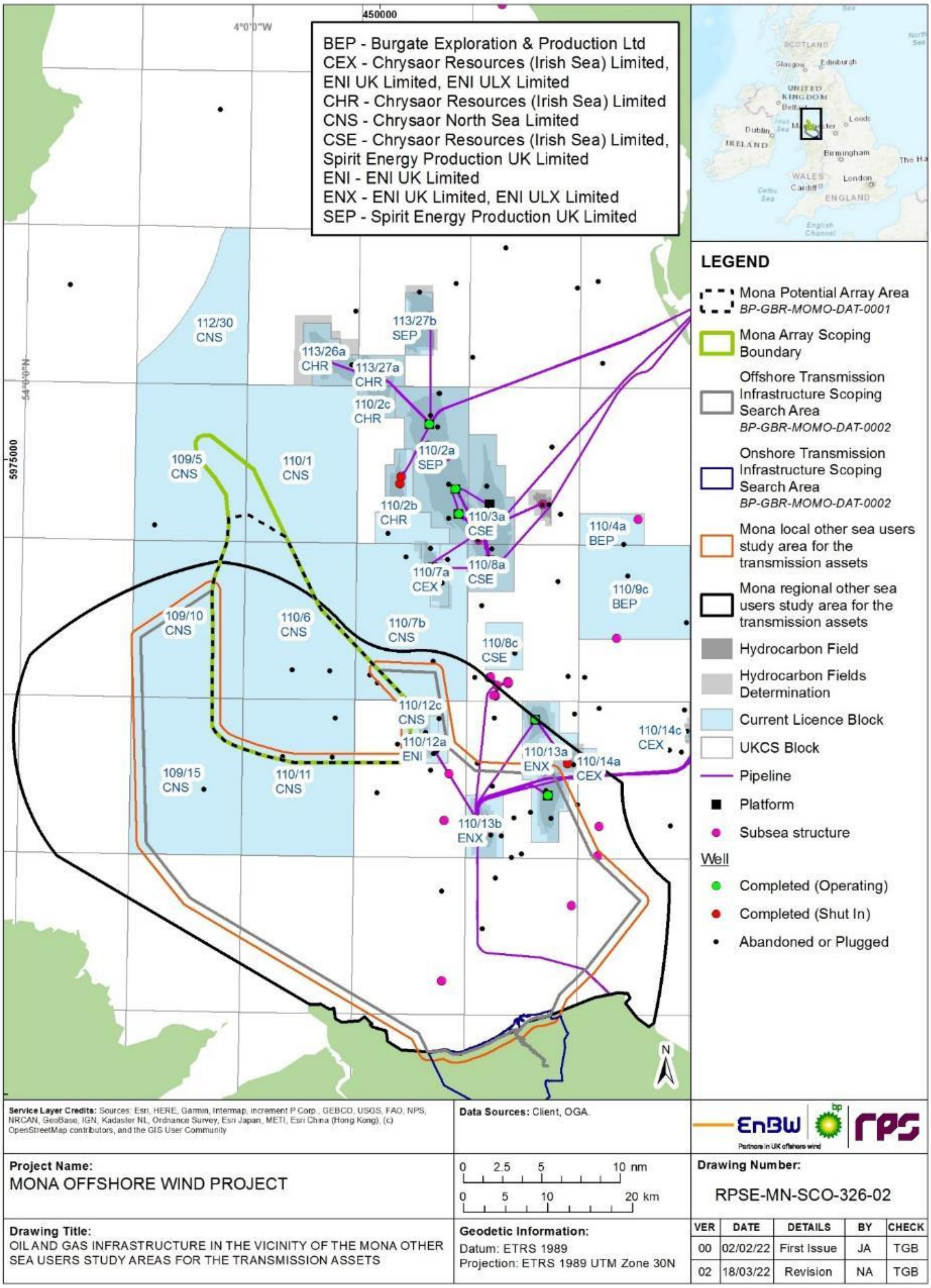


Figure 5.20: Oil and gas infrastructure within the Mona local other sea users study area for the transmission assets.

Cables

5.4.4.22 There are 18 operational cables that cross the Mona local other sea users study area for the transmission assets (Figure 5.18). Of these, several are associated with the existing offshore wind farms in the Mona local other sea users study area for the transmission assets.

5.4.4.23 Where the Mona Offshore Wind Project offshore export cables and interconnector cables will be required to cross an active cable, it is intended that a commercial ‘crossing agreement’ will be entered into with the cable operator. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely. A crossing agreement based upon the International Cable Protection Committee (ICPC) Recommendation 3-10C ‘Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria’ will be used for any cable crossings. Where a cable is inactive, the Applicant will consult with the cable operator to ascertain if such a crossing agreement is required.

Pipelines

5.4.4.24 There are 18 pipelines that intersect the Mona local other sea users study area for the transmission assets (Figure 5.20). Where the Mona Offshore Wind Project offshore export cables are required to cross an active pipeline, it is intended that a commercial ‘crossing agreement’ will be entered into with the pipeline operator. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely. A crossing agreement based upon the Oil and Gas UK ‘oil and gas crossing agreement template’ will be used for the pipeline crossings.

Carbon capture and storage

5.4.4.25 In October 2020, the OGA awarded Eni a six-year appraisal licence which targets Eni’s offshore fields in Liverpool Bay to be utilised as a permanent store for CO_2 (www.eni.com). The development is part of ‘HyNet North West’, a low carbon cluster project to help UK decarbonisation which also operates a carbon capture and storage (CCS) facility off the north coast of Wales (www.hynet.co.uk).

5.4.4.26 Consultation will take place with Eni to further understand the location and nature of their plans.

Offshore microwave fixed communication links

5.4.4.27 Communication systems considered within this section include offshore microwave fixed links, which may be used to facilitate communications between offshore oil and gas platforms. Marine navigation, communications and position fixing equipment is addressed in part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report.

5.4.4.28 There is potential for offshore microwave fixed links to be operating between the oil and gas platforms located within the Mona local other sea users study area for the transmission assets (Figure 5.20). This will be further explored through desk study and consultation for the EIA.

5.4.5 Potential project impacts

5.4.5.1 A range of potential impacts on other sea users receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 5.8, together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.4.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for other sea users.

Table 5.8: Impacts proposed to be scoped into the project assessment for other sea users (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Displacement of recreational activities.	✓	✓	✓	Safety zones and advisory clearance distances established during construction, maintenance and decommissioning activities may displace recreational activities.	Review of desktop data, supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition affecting recreational diving sites and designated bathing water sites.	✓	✓	✓	Increased suspended sediment concentrations and associated deposition arising from construction, maintenance and decommissioning activities associated with the Mona Offshore Wind Project may affect recreational diving sites and designated bathing water sites.	Review of desktop data supported by the outcome of consultation, with reference to the results of the physical processes chapter of the EIA which will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed from the results of baseline data review, consultation, and the physical processes chapter of the EIA.
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines.	✓	✓	✓	There are 18 active cables within the Mona Offshore Transmission Infrastructure Scoping Search Area and therefore there is potential for impact to existing cables or restrictions on access to cables from installation, maintenance and decommissioning activities.	Review of desktop data supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	✓	✓	✓	Installation, maintenance and decommissioning of the transmission assets has the potential to lead to increased suspended sediment concentrations and deposition, which could cause a change in aggregate resource in aggregate extraction areas.	Review of desktop data, with reference to the results of the physical processes chapter of the EIA which will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed from the results of baseline data review and the physical processes chapter of the EIA.
Alterations to sediment transport pathways affecting aggregate extraction areas.	×	✓	×	The presence of OSPs and the offshore booster substation has the potential to affect sediment transport pathways, which could affect aggregate resource in aggregate extraction areas.	Review of desktop data, with reference to the results of the physical processes chapter of the EIA which will consider the extent of changes to sediment transport pathways.	Qualitative assessment informed from the results of baseline data review and the physical processes chapter of the EIA.
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Mona Offshore	✓	✓	✓	The installation, presence and decommissioning of infrastructure associated with the Mona Offshore Wind Project may reduce or restrict oil and gas exploration activities within the Mona Potential Array Area	Review of desktop data. Consultation with each potentially affected licence block operator will be undertaken to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Transmission Infrastructure Scoping Search Area.				and Mona Offshore Transmission Infrastructure Scoping Search Area.		
Interference with offshore microwave fixed communication links.	×	✓	×	Presence of associated with the Mona Offshore Wind Project may affect offshore microwave fixed links between offshore oil and gas platforms.	Review of desktop data. Consultation with Ofcom and oil and gas operators to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.

5.4.6 Measures adopted as part of the project

5.4.6.1 The following measures adopted as part of the project are included as part of the Mona Offshore Wind Project in relation to other sea users, and will evolve over the development process as the EIA progresses.

- Promulgation of information advising on the nature, timing and location of activities, including through Notices to Mariners.
- Navigational aids and marine charting.
- Consultation with oil and gas operators and other energy infrastructure operators to promote and maximise cooperation between parties and minimise both spatial and temporal interactions between conflicting activities.
- Installation of infrastructure over or adjacent to existing or future cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the start of the construction phase.

5.4.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.4.7 Proposed assessment methodology

5.4.7.1 The other sea users EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the other sea users EIA, the following guidance documents will also be considered:

- The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019)
- European Subsea Cables UK Association (ESCA) guideline no 6, the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters (ESCA, 2016)
- ICPC recommendations:
  - recommendation No.2-11B: Cable routing and reporting criteria (ICPC, 2015)
  - recommendation No.3-10C: Telecommunications cable and oil pipeline/power cables crossing criteria (ICPC, 2014)
  - recommendation No.13-2C: The proximity of offshore renewable wind energy installations and submarine cable infrastructure in national waters (ICPC, 2013)
- Pipeline crossing agreement and proximity agreement pack (Oil and Gas UK, 2021)
- Submarine cables and offshore renewable energy installations proximity study (TCE, 2012).

5.4.8 Potential cumulative effects

5.4.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Mona Offshore Wind Project to affect other sea users receptors. The cumulative assessment will consider the maximum design scenarios for each of the projects or activities.

5.4.8.2 The cumulative effect assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.4.9 Potential inter-related effects

5.4.9.1 The assessment of potential inter-related effects will be considered within the other sea users ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

5.4.10 Potential transboundary impacts

5.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon other sea users due to construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project.

6 Onshore physical environment

6.1 Geology, hydrogeology and ground conditions

6.1.1 Introduction

6.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the geological, hydrogeological and ground conditions receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance and decommissioning of the onshore transmission assets.

6.1.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of geology, hydrogeology and ground conditions.

6.1.2 Study area

6.1.2.1 The study area to be used for the assessment of geology, hydrogeology and ground conditions (the geology, hydrogeology and ground conditions study area for the transmission assets) will focus on areas located above Mean High Water Springs (MHWS) where potential impacts are most likely to occur on geology, hydrogeology and ground conditions receptors.

6.1.2.2 As such, the geology, hydrogeology and ground conditions study area for the transmission assets to be used in the assessment will be defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Geology, hydrogeology and ground conditions receptors within 1km of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore transmission assets. The 1km buffer was used as impacts on geological, hydrogeological and ground conditions receptors are most likely to occur within this distance.

6.1.2.3 The geology, hydrogeology and ground conditions study area for the transmission assets will be reviewed and modified in response to refinements made to the onshore transmission asset boundary and additional environmental and/or design constraints identified during the EIA process.

6.1.3 Data sources

6.1.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available online and data that is available to purchase from Natural Resources Wales (NRW) and environmental data providers.

6.1.3.2 An initial desk-based review has identified a number of data sources which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 6.1 of this EIA Scoping Report below.

Table 6.1: Baseline data sources.

Source	Summary
Baseline chemistry of groundwater in UK aquifers	Results of studies by British Geological Survey (BGS) to define baseline chemistry of groundwater from certain aquifers in England, Wales and Scotland
BGS Aquifer Designation Map	Identifies the type of aquifer designation using the classification system from the Water Framework Directive (WFD)
BGS borehole records obtained from BGS website	Site-specific characterisation of the geological strata
BGS GeoIndex Onshore viewer	Online geological datasets including borehole records
BGS Geology of Britain Viewer	Online geological information for the British Isles
BGS Hydrogeology Map 19: Clwyd and Cheshire Basin (1:100,000)	Identifies the hydraulic and hydro-chemical characteristics of the rocks and their usefulness for groundwater supply
BGS Online Hydrogeological maps	Where available provides hydrogeological information
British Geological Survey (BGS) Map 95: Rhyl and Map 107:Denbigh (1:50,000)) Bedrock and Superficial	Identifies the bedrock and superficial geology
County Geodiversity Sites (formerly Regionally Important Geological and Geomorphological Sites, RIGS)	Identifies the location of regionally/locally designated geological sites
Department for Environment, Food and Rural Affiars (Defra) MAGIC Interactive Mapping System	Provides information regarding: statutory and non-statutory designated sites (e.g. geological Sites of Special Scientific Interest (SSSIs), water dependent sites designated for nature conservation); bedrock and superficial aquifer classification by the BGS; and source protection zones defined for important groundwater abstractions
Environment Agency (EA) Catchment Data Explorer	Obtain WFD catchment data for all waterbodies in England
EA Water Quality Archive	The Water Quality Archive provides data on water quality measurements. Samples are taken at sampling points around England and can be from coastal or estuarine waters, rivers, lakes, ponds, canals or groundwaters
Environment Agency Water Framework Directive (WFD) Groundwater Bodies Cycle 2	Identifies the WFD status of designated ground water bodies.
Geo-Portal for Wales - Lle	Provides information regarding: statutory and non-statutory designated sites (e.g. geological SSSIs, water dependent sites designated for nature conservation); bedrock and superficial aquifer classification by the BGS; and source protection zones defined for important groundwater abstractions
UK Soil Observatory (UKSO) Online Viewer	UK Soils Observatory providing information about the diverse soil types of the UK

6.1.3.3 In addition to the baseline data sources identified above, site-specific data will be obtained from a third-party provider (e.g. Envirocheck, Groundsure) for the geology, hydrogeology and ground conditions study area for transmission. This will include historical mapping and aerial photography where available.

6.1.3.4 The relevant local authority planning portals for the geology, hydrogeology and ground conditions study area for the transmission assets will be reviewed to identify any reports that may have been submitted in support of recent planning applications that could be used to characterise baseline ground conditions.

6.1.3.5 The following organisations shall be consulted in relation to relevant baseline datasets that they maintain:

- NRW – licensed water abstractions, including details of the national water monitoring network and associated datasets
- relevant local authorities – private (non-licensed) abstractions and contaminated land register
- Coal Authority – where the onshore transmission assets coincide with a coal mining reporting area.

6.1.3.6 The list of organisations identified above will be reviewed and modified in response to refinements made to the onshore transmission asset boundary and additional environmental and/or design constraints identified during the EIA process.

6.1.4 Baseline environment

6.1.4.1 An initial review of the published geology mapping identified in Table 6.1 of the EIA Scoping Report shows that the Mona Onshore Transmission Infrastructure Scoping Search Area is variously underlain by the following superficial deposits:

- alluvial fan deposits
- alluvium
- glacial till
- localised glaciofluvial sheet deposits
- tidal flats deposits.

6.1.4.2 The mixed glacial till and tidal flat deposits are classified as Secondary Undifferentiated aquifer units reflecting their variable importance for groundwater resources. The other superficial deposits are of local importance for groundwater and are designated Secondary A aquifer units.

6.1.4.3 Superficial deposits are underlain by the bedrock geology. BGS data sources indicate that the bedrock in the Mona Onshore Transmission Infrastructure Scoping Search Area to comprise:

- basal Carboniferous mudstones, siltstones and sandstones of the Ffernant Formation
- Carboniferous limestones of the Clwyd Limestone Group
- Permian/Carboniferous mudstones, siltstones and sandstones of the Warwickshire Group
- Permian/Triassic sandstones of the Kinnerton Sandstone Formation
- Silurian mudstones, siltstones and sandstones of the Elwy Formation.

6.1.4.4 The Permian/Triassic sandstones and Carboniferous Limestones constitute nationally important groundwater bodies and are designated as Principal aquifer units. The mudstone, siltstones and sandstones of the Warwickshire

Group and the basal carboniferous bedrock yield less groundwater and are designated a Secondary A aquifer unit of local importance. The Silurian bedrock in the southeast of the Mona Onshore Transmission Infrastructure Scoping Search Area are typically of low productivity and are therefore, designated a Secondary B aquifer unit.

6.1.4.5 Groundwater resources may be susceptible to pollution from certain land-based activities. To protect groundwater quality, NRW regulates certain potentially polluting activities in groundwater Source Protection Zones (SPZs). SPZs are designated around important potable water abstractions. No SPZs have been designated in the Mona Onshore Transmission Infrastructure Scoping Search Area.

6.1.4.6 Land use within the Mona Onshore Transmission Infrastructure Scoping Search Area is predominantly agricultural although, there may be existing and historical uses with the potential to cause contamination (e.g. landfill sites or petrol filling stations). The potential for contamination to exist will be confirmed by a review of historical Ordnance Survey (OS) maps and other environmental information, such as the location of waste management facilities and industrial land uses and recorded pollution incidents.

Designated sites

6.1.4.7 The Mona Onshore Transmission Infrastructure Scoping Search Area does not coincide with a statutory designated site for geomorphology.

6.1.4.8 Sites designated for ecology and nature conservation are presented in part 3, section 7: Onshore biological environment, of the EIA Scoping Report. Following the submission of the EIA Scoping Report, a screening exercise will be undertaken to identify if the qualifying features of the ecologically designated sites are related to groundwater.

6.1.5 Potential project impacts

6.1.5.1 A range of potential impacts on geology, hydrogeology and ground conditions have been identified which may occur within the geology, hydrogeology and ground conditions study area for the transmission assets during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

6.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 6.2 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

6.1.5.3 Potential impacts scoped out of the assessment are presented in Table 6.3, with justification for why the impact should be scoped out.

Table 6.2: Impacts proposed to be scoped into the project assessment for geology, hydrogeology and ground conditions (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

<table>
<tr><th rowspan="2">Impact</th><th colspan="3">Project phase</th><th rowspan="2">Justification</th><th rowspan="2">Data collection and analysis required to characterise the baseline environment</th><th rowspan="2">Summary of proposed approach to assessment</th></tr>
<tr><th>C</th><th>O</th><th>D</th></tr>
<tr><td>The impact of partial or total loss of or damage to designated geological and geomorphological sites during the construction phase</td><td>✓</td><td>×</td><td>×</td><td>Construction of the onshore transmission assets (e.g. onshore export cable, access roads and supporting structures) may damage designated geological and geomorphological sites, in particular exposures of rock and coastal dune systems.</td><td>Geological and geomorphological sites located within the geology, hydrogeology and ground conditions study area for the transmission assets will be identified using desk-based analysis, once the location of the onshore transmission assets (e.g. landfall, onshore export cable) has been refined.</td><td>The impact of partial or total loss of designated geological and geomorphological sites would be assessed qualitatively, using a desk-based assessment. The desk-based assessment would consider the design and construction specifications of the onshore transmission assets, in relation to the location, size and importance of geological and geomorphological sites.</td></tr>
<tr><td>The impact on groundwater levels or flow in sensitive groundwater dependent sites during the construction and decommissioning phase.</td><td>✓</td><td>×</td><td>✓</td><td>Activities required to facilitate construction and decommissioning of the onshore transmission assets (e.g. subsurface excavations, dewatering) may affect groundwater levels and groundwater flow (direction and quantity) in sensitive groundwater dependent sites (e.g. coastal due systems).</td><td>The location and hydrogeological setting of all groundwater dependent sites within the geology, hydrogeology and ground conditions study area for the transmission assets will be identified using desk-based analysis.</td><td>The impact on groundwater levels or flow in sensitive groundwater dependent sites would be assessed qualitatively, using a desk-based risk assessment.

The desk-based risk assessment would be supported by further site-specific data, where groundwater dependent sites are at high risk during construction and decommissioning of the onshore transmission assets.</td></tr>
<tr><td>The impact of mobilisation of existing source areas of contamination causing a deterioration of groundwater quality in underlying superficial secondary aquifer units during the construction, and decommissioning phase</td><td>✓</td><td>×</td><td>✓</td><td>Direct impacts may occur during the construction and decommissioning of the onshore transmission assets due to the nature of below ground trenching and other construction activities. This may result in the introduction of hazardous or non-hazardous substances to shallow groundwater, causing pollution or the deterioration/change in groundwater WFD status.</td><td rowspan="2">The location and extent of current and historical contamination sources within the geology, hydrogeology and ground conditions study area for the transmission assets will be identified using desk-based analysis. The position of licensed or non-licensed abstractions will be mapped.

In addition, the anticipated hydrogeological conditions and baseline water quality of the underlying aquifers located within the geology, hydrogeology and ground conditions study area for the transmission assets will be evaluated.</td><td>The impact of mobilisation of existing source areas of contamination would primarily be assessed qualitatively, using a desk-based risk assessment. A tiered approach would be adopted for the assessment of risk associated with sources of existing contamination.</td></tr>
<tr><td>The impact of mobilisation of existing source areas of contamination and possible creation of new transport pathways causing a deterioration in groundwater quality and quantity of in the underlying bedrock Principal aquifer units, during the</td><td>✓</td><td>✓</td><td>✓</td><td>Direct impacts may occur from vertical hydraulic connections between shallow perched groundwater in superficial deposits and underlying bedrock aquifer units during open trench construction.

Direct impacts to the Principal aquifer may also occur from deep ground workings associated to horizontal drilling operations beneath surface infrastructure. This may</td><td>The impact of mobilisation of existing source areas of contamination would primarily be assessed qualitatively, using a desk-based risk assessment. A tiered approach would be adopted for the assessment of risk associated with sources of existing contamination. No intrusive site investigations or quantitative risk assessments are proposed.</td></tr>
</table>

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
construction, operation and maintenance and decommissioning phase				result from the construction works or from the mobilisation of existing contaminants. The mobilisation of contaminants may result in the introduction of hazardous or non-hazardous substances to shallow groundwater, causing pollution or the deterioration/change in groundwater WFD status.		
The impact of reduced groundwater quantity or quality in aquifer units, on protected groundwater abstractions (licensed or non-licensed) and/or change in groundwater resources status, during the construction, operation and maintenance and decommissioning phase	✓	✓	✓	Certain construction activities and design, most notably short-term dewatering requirements or long-term groundwater level control, have the potential to result in impacts on groundwater quality (see above) and/or groundwater levels and flow. These effects could have the potential to: put abstractions (i.e. protected rights) at risk ; affect the groundwater resource value/availability; change the WFD status of groundwater bodies.	The location and hydrogeological setting of all licenced and non-licensed abstractions within the geology, hydrogeology and ground conditions study area for the transmission assets will be identified using desk-based analysis, supported by third party consultation.	The impact of reduced groundwater quantity or quality in aquifer units would primarily be assessed qualitatively, using a desk-based risk assessment of construction, operation and maintenance activities.
The impact of a reduction in the quantity and quality of surface waters fed by groundwater and other groundwater dependent sites, during the construction and decommissioning phase.	✓	×	✓	Indirect impacts may occur from hydraulic connections between shallow perched groundwater affected by trenching, piling and/or the management of dewatered groundwater.	The location of areas with potential hydraulic connectivity between aquifers and surface waters within the geology, hydrogeology and ground conditions study area for the transmission assets will be identified using desk-based analysis. In addition, the desk-based analysis will include the baseline characterisation of water quality, including WFD status.	
The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances, during the construction and decommissioning phase	✓	×	✓	The accidental emission of potentially polluting substances used/stored/handled during construction or decommissioning phase has the potential to impact groundwater quality and abstraction sources.	The location of the most sensitive groundwater receptors within the geology, hydrogeology and ground conditions study area for the transmission assets will be identified using desk-based analysis, including a review of the proposed location/approach for the use of potentially polluting materials.	The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances will be assessed qualitatively, using a desk-based risk assessment of construction and decommissioning activities. The desk-based assessment will identify areas/receptors of particular sensitivity to this impact and determine the mitigation requirements necessary to manage that risk.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of heat generated by the onshore export cables on groundwater quality, during the operation and maintenance phase	×	✓	×	The transmission cables must be kept within safe operating temperatures. Heat from the cables dissipates into the surrounding soil and can affect the local surrounding environment.	A desk-based study would be undertaken of the Secondary and Principal Aquifer properties potentially affected including baseline quality and location of other sensitive receptors (e.g. groundwater abstractions and/or groundwater dependents sites and water courses)	The impact of heat generated by the onshore export cables on groundwater quality and groundwater dependent receptors would primarily be assessed qualitatively, using a desk-based risk assessment of operation and maintenance activities.
The impact of ground gas generation on human health and other environmental receptors, during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Contamination source areas and certain natural soils have the potential to generate hazardous ground gases. Construction activities have the potential to expose sensitive receptors to these gases and generate new pathways for ground gas migration.	A desk-based review of the ground gas generating potential of current or historical contamination source areas and certain natural soils located within the geology, hydrogeology and ground conditions study area for the transmission assets.	Should the desk-based review identify potential risk associated with ground gas generation assets within the the geology, hydrogeology and ground conditions study area for the transmission assets, further site investigations and monitoring may be required. The resulting dataset would be subject to an appropriate risk assessment compliant with relevant guidance.

Table 6.3: Impacts proposed to be scoped out of the project assessment for geology, hydrogeology and ground conditions.

Impact	Justification
The impact of accidental spillages/contaminant release on the quality of groundwater ground receptors during operation and maintenance of the onshore transmission assets.	Activities associated with the operation and maintenance of the onshore transmission assets are unlikely to require the transport or storage of harmful substances. Therefore, the potential impact of spills/contaminant releases on the quality of groundwater receptors during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for geology, hydrogeology and ground conditions.

6.1.6 Measures adopted as part of the project

6.1.6.1 The following measures adopted as part of the project are relevant to geology, hydrogeology and ground conditions. These measures may evolve as the engineering design and the EIA progresses.

- Code of Construction Practice (CoCP): Construction of the onshore transmission assets would be undertaken in accordance with the relevant best practice measures as recommended in CIRIA C648 (CIRIA, 2006) – 'Control of water pollution from linear construction projects' and other relevant guidance, including measures for handling oils, fuels or other harmful substances as to avoid pollution of surface and ground water receptors due to accidental spillages/contaminant release.
- Development of a Discovery Strategy to manage unexpected areas of land contamination should they be identified during excavation works.

6.1.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

6.1.6.3 Requirements for additional mitigation measures will be determined through discussions with the NRW and Contaminated Land Officers from each local authority likely to be affected as part of the geology, hydrogeology and ground conditions assessment.

6.1.7 Proposed assessment methodology

6.1.7.1 The geology, hydrogeology and ground conditions assessment will follow the relevant legislative requirements, including Part IIA of the Environmental Protection Act 1990, the Water Framework Directive (WFD) (2000/60/EC), Groundwater Directives (GWD) (2006/118/EC) and the Environmental Permitting (England and Wales) Regulations 2016).

6.1.7.2 In addition, the geology, hydrogeology and ground conditions assessment will be undertaken with due regard to the framework outlined in relevant regulatory and industry guidance, most notably:

- Assessing Risks Posed by Hazardous Ground Gases to Buildings, CIRIA C665 (CIRIA, 2007)
- Contaminated Land Risk Assessment: A Guide to Good Practice, CIRIA 552 (CIRIA, 2001a)
- Control of water pollution from linear construction projects: Site guide, CIRIA C649 (CIRIA, 2006)
- Control of water pollution from linear construction projects: Technical guidance CIRIA C648 (CIRIA, 2006)
- Design Manual for Roads and Bridges (DMRB) LA 104 - Environmental assessment and monitoring (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020)
- DMRB LA 109 – Geology and soils (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2019)

- DMRB LA 113 - Road drainage and the water environment (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020)
- Groundwater protection technical guidance (EA, 2017)
- The Environment Agency's approach to groundwater protection, Version 1.2 (EA, February 2018).

6.1.7.3 With regards to consideration of land and groundwater contamination the geology, hydrogeology and ground conditions assessment shall adopt the standard pollutant (source–pathway-receptor) linkage approach. This approach identifies potential sources of contamination within the geology, hydrogeology and ground conditions study area for the transmission assets, the location and sensitivity of environmental receptors and the pathways by which the receptors may be affected.

6.1.8 Potential cumulative effects

6.1.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to geology, hydrogeology and ground conditions will be considered within the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

6.1.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

6.1.9 Potential inter-related effects

6.1.9.1 The assessment of potential inter-related effects will be considered within the geology, hydrogeology and ground conditions chapter of the ES. It will include consideration of project lifetime effects and receptor-led effects in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Terrestrial ecology and intertidal birds:
  - The contamination of groundwater receptors during the construction of the onshore transmission assets may impact groundwater dependent habitats or sites designated for conservation, within the geology, hydrogeology and ground conditions study area for the transmission assets.
- Hydrology and flood risk
  - Surface watercourses are often hydraulically linked to groundwater; contamination of groundwater or reduction in groundwater levels as a result of dewatering may impact on the quality and flow of surface watercourses.

6.1.10 Potential transboundary impacts

6.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon geology, hydrogeology and ground conditions due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

6.2 Hydrology and flood risk

6.2.1 Introduction

6.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the hydrology and flood risk receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance and decommissioning of the onshore transmission assets.

6.2.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of the hydrology and flood risk for the onshore transmission assets.

6.2.2 Study area

6.2.2.1 The study area to be used for the assessment of hydrology and flood risk ('the hydrology and flood risk study area for the transmission assets') will focus on areas (landward of Mean High Water Springs (MHWS)) where potential impacts are most likely to occur on surface water and flood risk receptors.

6.2.2.2 As such, the hydrology and flood risk study area for the transmission assets to be used in the assessment will be defined as:

- The area of land to be temporarily or permanently occupied during construction, operation and maintenance, and decommissioning of the onshore transmission assets.
- Surface water receptors located within 250m of land temporarily or permanently occupied during construction, operation and maintenance and decommissioning of the onshore transmission assets. The 250m buffer is considered appropriate for data collection taking into account the likely zone of influence on hydrological receptors.
- Flood risk receptors located within 1km of the onshore transmission assets. The 1km buffer was chosen primarily to identify any existing receptors, assets or infrastructure that have the potential to be affected by flood risk as a result of the Mona Offshore Wind Project.

6.2.2.3 The hydrology and flood risk study area for the transmission assets for surface water receptors will include temporary accesses, access routes (including haul roads), storage areas and construction compounds required to facilitate construction, operation and maintenance and decommissioning of the onshore transmission assets.

6.2.2.4 The hydrology and flood risk study area for the transmission assets will be reviewed and modified in response to refinements made to the onshore transmission asset boundary and additional environmental and/or design constraints identified during the EIA process.

6.2.3 Data sources

6.2.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available online and data that is available to purchase from Natural Resources Wales (NRW). An initial desk-based review has identified a number of data sources which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 6.4 below.

Table 6.4: Baseline data sources.

Source	Summary
Conwy Deposit Local Development Plan 2007 – 2022 (Revised edition 2011) REVISED BACKGROUND PAPER 17 - Conwy Strategic Flood Consequences Assessment 2012	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.
Conwy Local Flood Risk Management Strategy 2013	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding as the legislative context and local strategy for managing flood risk.
Defra and Environment Agency Catchment Data Explorer	Provides information regarding the water environment, including relevant River Basin Management Plans and associated waterbodies.
Defra MAGIC Interactive Mapping System	Provides information regarding statutory and non-statutory designated sites (e.g. water dependent sites designated for nature conservation).
Denbighshire Flood Consequence Assessment - Level 1 2018	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding as the legislative context and local strategy for managing flood risk.
Denbighshire Local Flood Risk Management Strategy 2014	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.
NRW Flood Map for Planning	Provides information regarding flood risk from rivers, sea, surface water, reservoirs, flood defences and sewers.
OS Digital Terrain Model (DTM) 50	Provides information regarding the topography of the study area allow the overall land slope and specific levels to be assessed.
OS Open Rivers Mapping Data	Provides information regarding the water environment, including freshwater rivers, tidal estuaries, and canals.
Shoreline Management Plan 22 Great Ormes Head to Scotland	Provides information regarding risks associated with coastal processes and strategic mitigation measures.
Western Wales River Basin Management Plan 2015 – 2021 Summary December 2015	Provides information regarding the policies and measured enacted to protect and improve the water environment (includes rivers, lakes, canals, groundwater, wetlands, estuaries and coastal waters) for the wider benefits to people and wildlife.
Dee River Basin Management Plan 2015 – 2021 Summary October 2015	Provides information regarding the policies and measured enacted to protect and improve the water environment (includes rivers, lakes, canals, groundwater, wetlands, estuaries and coastal waters) for the wider benefits to people and wildlife.

6.2.3.2 The baseline data sources identified in the EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

6.2.4 Baseline environment

6.2.4.1 The Mona Onshore Transmission Infrastructure Scoping Search Area is located on the coast of north Wales. The Mona Onshore Transmission Infrastructure Scoping Search Area coincides with the local authority areas of Denbighshire County Council and Conwy County Borough Council.

6.2.4.2 There are several existing settlements located within the Mona Onshore Transmission Infrastructure Scoping Search Area. These include the towns (or villages) of Aberegele, Rhyl, Llanddulas, Rhyd-yfoel, Bodelwyddan and Rhuddlan. The town of Prestatyn is also located adjacent to the eastern boundary of the Mona Onshore Transmission Infrastructure Scoping Search Area.

6.2.4.3 Existing infrastructure within the Mona Onshore Transmission Infrastructure Scoping Search Area includes several major roads, such as the A55, A547, A525, A548 and A5151.There is also a railway line broadly routing east to west along the coastline.

Topography

6.2.4.4 The OS Terrain 50 Digital Terrain Map indicates that land within the central and eastern portion of the Mona Onshore Transmission Infrastructure Scoping Search Area is at lower elevations of 5 – 15m Above Ordnance Datum (AOD), which generally slopes toward the coastline to the north.

6.2.4.5 Land within the western portion of the Mona Onshore Transmission Infrastructure Scoping Search Area is more variable, with peaks ranging from 150-300m AOD and flatter areas of 130-160m AOD.

6.2.4.6 In addition, there is a river valley associated with the River Dulas (Afon Dulas) located toward the eastern most extent of the Mona Onshore Transmission Infrastructure Scoping Search Area, which has a base elevation of 20-25m AOD.

Surface water features

6.2.4.7 There are several named main rivers located within the Mona Onshore Transmission Infrastructure Scoping Search Area. NRW are responsible for the management of main rivers in Wales. The main rivers are set out in Table 6.5 below.

Table 6.5: Named watercourses.

Watercourse
River Dulas (Afon Dulas)
River Gele (Afon Gele)
River Elwy (Afon Elwy) – which is a tributary of the River Clwyd
River Clwyd (Afon Clwyd)

6.2.4.8 In addition, there are many unnamed watercourses located within the Mona Onshore Transmission Infrastructure Scoping Search Area, most of which flow directly into the Afon Clywd or its tributaries. Notably, the central portion of the Mona Onshore Transmission Infrastructure Scoping Search Area has a highly complex watercourse system consisting of a large number of interconnected rhynes.

6.2.4.9 There are further unnamed watercourses located within the eastern portion of the Mona Onshore Transmission Infrastructure Scoping Search Area, which are tributaries of the Afon Douglas (also known as the River Asland or Astland).

6.2.4.10 There is also a number of number of ponds and lakes located within the Mona Onshore Transmission Infrastructure Scoping Search Area including a man-made reservoir (Marine Lake) located at the mouth of the Afon Clwyd.

6.2.4.11 The location of key surface water features within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 6.1.

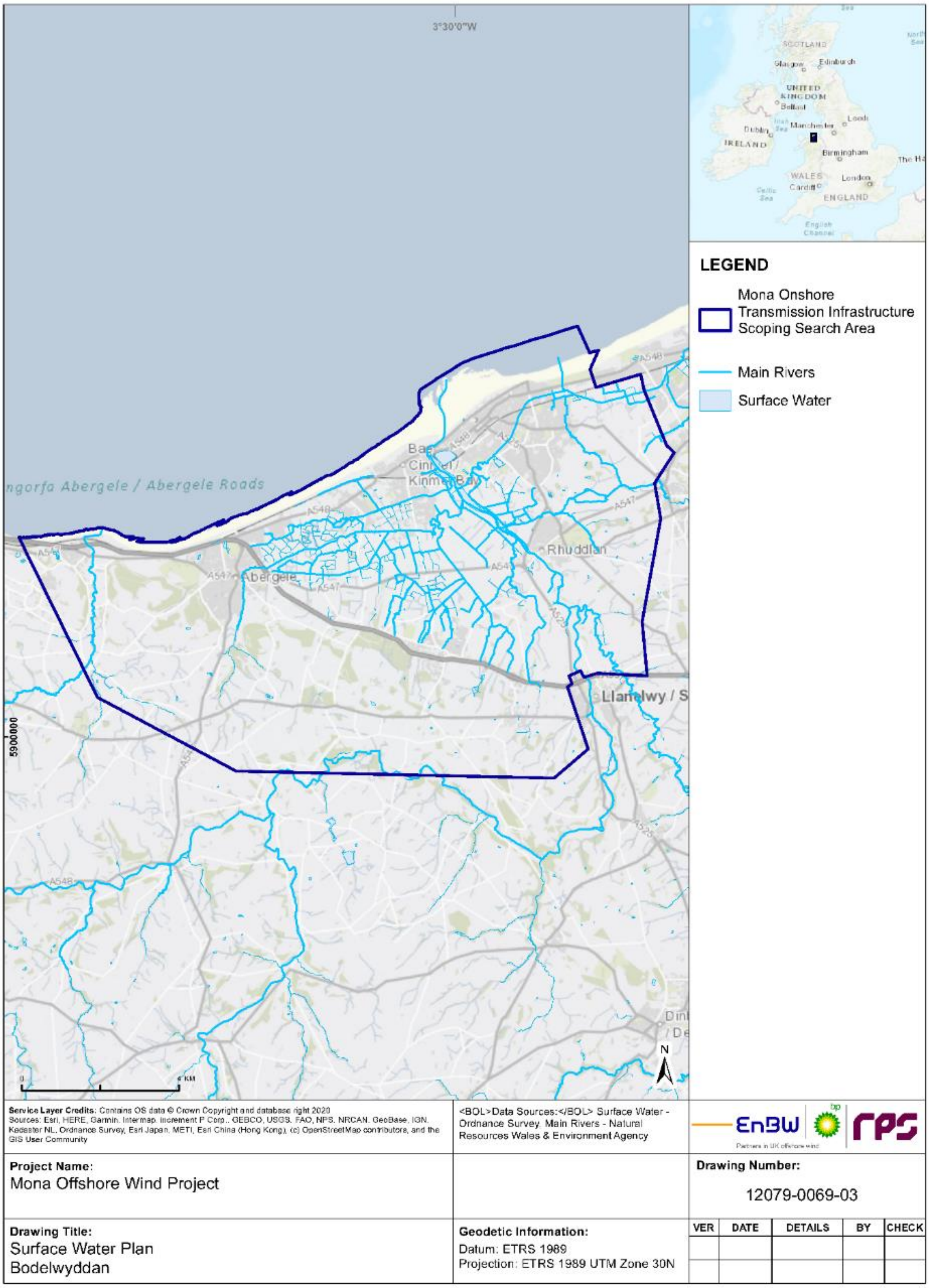


Figure 6.1: Surface water plan for the Mona Onshore Transmission Infrastructure Scoping Search Area.

Flood risk

Fluvial flooding

6.2.4.12 The NRW Flood Map for Planning indicates that several areas within the Mona Onshore Transmission Infrastructure Scoping Search Area are at risk of fluvial flooding.

6.2.4.13 There are large areas of medium flood risk (between 1 in 100 and 1 in 1,000 annual probability of fluvial flooding) and high flood risk (between 1 in 100 or greater annual probability of fluvial flooding) located within the northern portion of the Mona Onshore Transmission Infrastructure Scoping Search Area. These fluvial flood zones are associated with the Afon Clwyd and its tributaries, where riverbank overtopping would result in extended areas of flooding on both sides of the river, in some cases this may be up to 4km.

6.2.4.14 There are also large areas of fluvial flooding in the eastern portion of the Mona Onshore Transmission Infrastructure Scoping Search Area, which are attributed to the rhyne system. The mechanism of the flood risk is not clear but is likely to be influenced by the Afon Clwyd from the east and its tributary the River Gele from the west.

6.2.4.15 As the other named and unnamed watercourses and tributaries have not been included on the flood map; it is assumed that these watercourses are likely to have catchment areas of less than 3km^2 and therefore, have not been modelled by NRW.

6.2.4.16 The areas of fluvial flood risk within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 6.2.

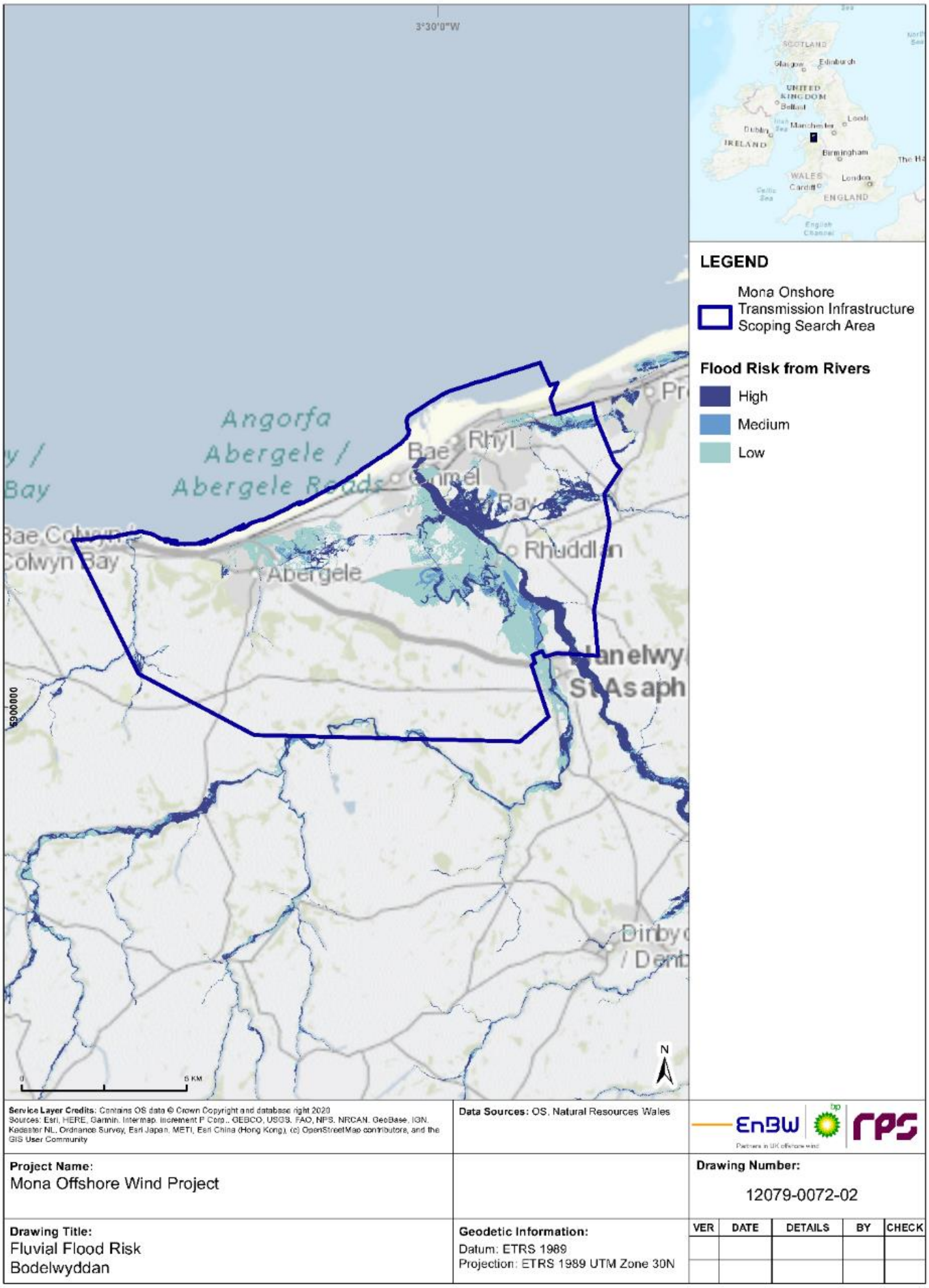


Figure 6.2: Fluvial flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area.

Tidal flooding

6.2.4.17 The NRW Flood Map for Planning indicates that several areas within the Mona Onshore Transmission Infrastructure Scoping Search Area are at risk of tidal flooding.

6.2.4.18 There are large areas at high risk and low risk of tidal flooding located along the northern portion of the of the Mona Onshore Transmission Infrastructure Scoping Search Area, which coincide with areas susceptible to fluvial flooding. The high-risk tidal flooding area encroaches up to 7km in land and encompasses over 25km of land.

6.2.4.19 The location of areas susceptible to tidal flooding within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 6.3.

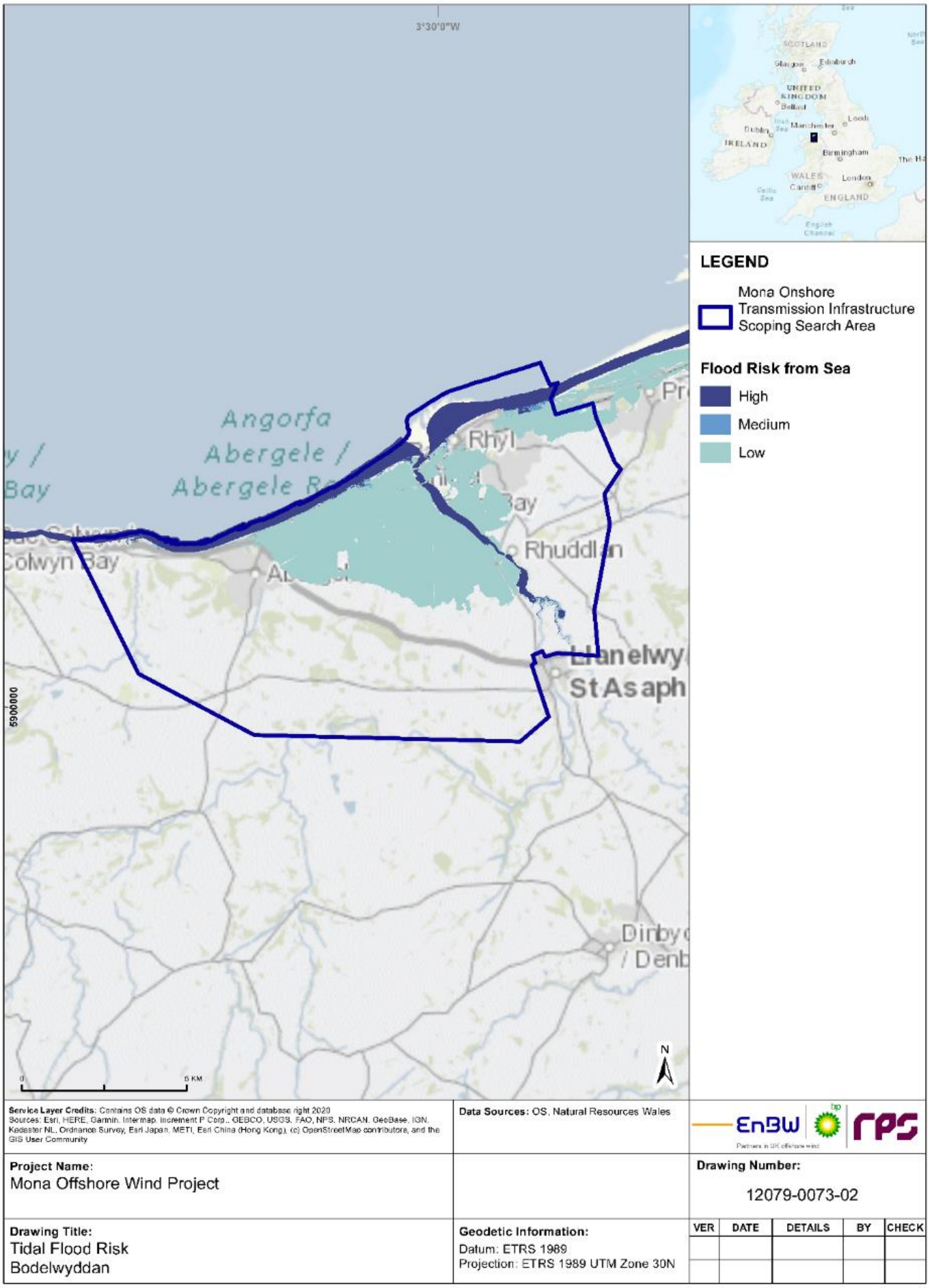


Figure 6.3: Tidal flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area.

Surface water flooding

6.2.4.20 The NRW Flood Map for Planning indicates that multiple areas within the Mona Onshore Transmission Infrastructure Scoping Search Area are at risk of surface water flooding.

6.2.4.21 There are a large number of isolated areas of high and medium risk associated with surface water flooding corresponding to topographic low points often following the routes of smaller, unmodelled watercourses.

6.2.4.22 The location of areas susceptible to surface water flooding within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 6.4.

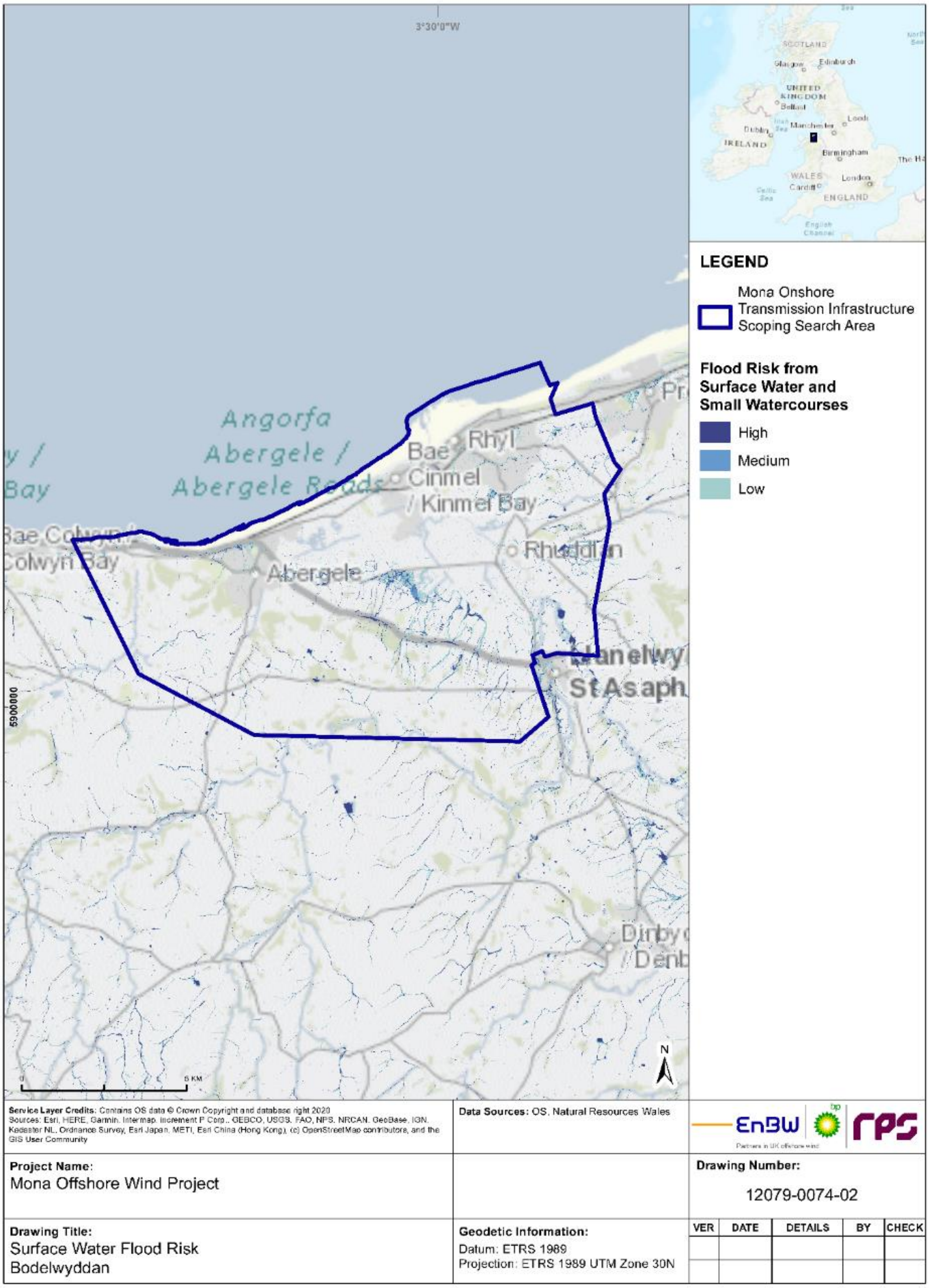
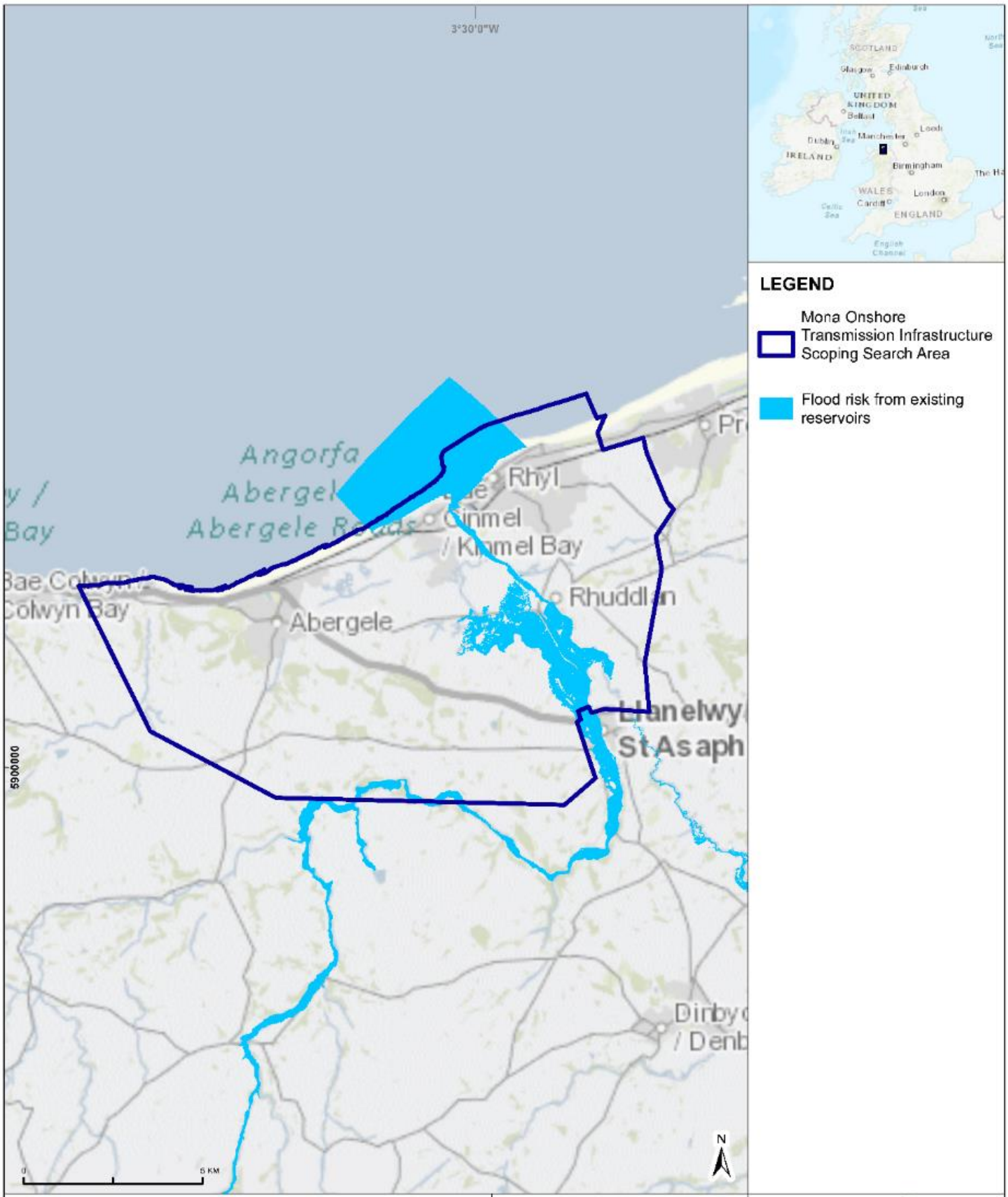


Figure 6.4: Surface water flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area.

Reservoir flooding

6.2.4.23 The NRW Flood Map for Planning indicates there is area at risk of reservoir flooding located within the northeastern portion of the Mona Onshore Transmission Infrastructure Scoping Search Area. Reservoir flooding in this area would occur as a result of a breach in Llyn Aled (a natural lake with a dam at its northern outlet), which would result in flooding primarily around the Afon Clwyd.

6.2.4.24 The location of areas susceptible to reservoir flooding within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 6.5.



Service Layer Credits: Contains OS data © Crown Copyright and database right 2020
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: OS, Natural Resources Wales

EnBW bp Partners in UK offshore wind rps

Project Name:
Mona Offshore Wind Project

Drawing Number:
12079-0075-03

Drawing Title:
Reservoir Flood Risk
Bodelwyddan

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK

Figure 6.5: Reservoir flood risk areas within the Mona Onshore Transmission Infrastructure Scoping Search Area.

Flood defences

6.2.4.25 In addition, a large area in the northeastern portion of the Mona Onshore Transmission Infrastructure Scoping Search Area benefits from significant tidal and river flood defence infrastructure and has been designated as a Technical Advice Note (TAN)15 Defended Zone.

Historic flooding

6.2.4.26 The NRW Flood Map for Planning indicates that several areas within the Mona Onshore Transmission Infrastructure Scoping Search Area have records of historic flooding associated with the tidal and fluvial flood zones.

Designated sites

6.2.4.27 The Mona Onshore Transmission Infrastructure Scoping Search Area coincides with multiple sites designated for nature conservation. These designated sites for nature conservation are listed in Table 6.6 and

6.2.4.28 Table 6.7 below.

Table 6.6: Statutory designated sites.

Site Name	Designation
Liverpool Bay	Special Protection Area (SPA)
Traeth Pensarn	Site of Special Scientific Interest (SSSI)
Coed y Gopa	
Llanddulas Limestone and Gwrych Castle Wood	

Table 6.7: Non-statutory designated sites.

Site Name	Designation
Numerous Ancient Woodlands	Ancient Woodland Inventory
Kinmel Dunes	Local Nature Reserve (LNR)
Brickfield Ponds	
Rhuddlan Ponds	

6.2.4.29 Following submission of the EIA Scoping Report, a further screening exercise will be undertaken in order to identify which statutory and non-statutory designated sites for nature conservation located within the hydrology and flood risk study area for the transmission assets are water dependent and those which can be excluded from the hydrology and flood risk assessment in the Environmental Statement (ES).

6.2.4.30 The location of statutory and non-statutory designated sites for nature conservation within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in part 3, section 7: Onshore biological environment, of the EIA Scoping Report.

6.2.5 Potential project impacts

6.2.5.1 A range of potential impacts on hydrology and flood risk have been identified which may occur within the hydrology and flood risk study area for the transmission assets during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

6.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 6.8 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

6.2.5.3 Potential impacts scoped out of the assessment are presented in Table 6.9, with justification as to why the impact can be scoped out.

Table 6.8: Impacts proposed to be scoped into the project assessment for hydrology and flood risk (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of contaminated runoff on the quality of 'Main Rivers' arising from the construction and decommissioning of the onshore transmission assets.	✓	✗	✓	Activities required to facilitate the construction and decommissioning of the onshore transmission assets (e.g. removal of surface vegetation, excavations, dewatering, stockpiling) may generate contaminated runoff which could impact the chemical and biological status of Main Rivers.	Main Rivers located within the hydrology and flood risk study area for the transmission assets will be identified using desk-based analysis. The chemical/biological status and the use of the surface watercourses (e.g. abstractions) will also be identified from desk-based information where available	The impact of contaminated runoff and spills/contaminant releases on the water quality of main rivers and ordinary and private watercourses will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 4: EIA Methodology, of this Scoping Report, in addition to the application of professional judgement where required. No water sampling or analysis is proposed.
The impact of contaminated runoff on the quality of ordinary and private watercourses arising from the construction and decommissioning of the onshore transmission assets.	✓	✗	✓	Activities required to facilitate the construction and decommissioning of the onshore transmission assets (e.g. removal of surface vegetation, excavations, dewatering, stockpiling) may contaminated runoff which could impact the chemical and biological status of ordinary and private watercourses.	Ordinary and private watercourses located within the hydrology and flood risk study area for the transmission assets will be identified using desk-based analysis. The use of the surface watercourses (e.g. abstractions) will also be identified from desk-based information where available	
The impact of accidental spillages/ contaminant release on the quality of surface water and ground receptors during construction and decommissioning of the onshore transmission assets.	✓	✗	✓	Activities required to facilitate the construction and decommissioning of the onshore transmission assets may result in accidental spills/contaminant release which could impact the chemical and biological status of Main rivers and ordinary watercourses	Main rivers and ordinary watercourses located within the hydrology and flood risk study area for the transmission assets will be identified using desk-based analysis.	
The impact of increased flood risk arising from additional surface water runoff during construction of the onshore transmission assets.	✓	✗	✗	Activities required to facilitate the construction of the onshore transmission assets (e.g. temporary construction compounds, removal of surface vegetation, compaction of soils, excavations, dewatering) may alter drainage patterns and surface water runoff rates onsite, increasing the risk of flooding posed to the surrounding area.	Baseline flood risk within the hydrology and flood risk study area for the transmission assets will be determined using desk-based analysis of flood risk mapping data published by NRW and site specific data obtained to inform the Flood Consequence Assessment (FCA).	The potential impact of flood risk arising from additional surface water runoff will be assessed and mitigated appropriately based on the results of FCA, which is to be submitted alongside the ES. This FCA will comprise desk-based assessment of flood risk from all sources of flooding, including appropriate allowances for climate change. Where appropriate, site specific surface water attenuation modelling would be undertaken, using MicroDrainage Software (or similar), to analyse surface water runoff and inform suitable mitigation measures, including the
The impact of increased flood risk arising from additional surface water runoff during	✗	✓	✗	The installation of the onshore substation would result in additional impermeable land, which may alter drainage patterns and surface water runoff rates onsite, increasing	Baseline flood risk within the hydrology and flood risk study area for the transmission assets will be determined using desk-based	

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
operation of the onshore substation.				the risk of flooding within the site and the surrounding area.	analysis and site specific data obtained to inform the FCA.	design of Sustainable Drainage Systems (SuDS). It is anticipated that modelling would primarily be limited to above ground permanent infrastructure (e.g. onshore substation).
The impact of increased flood risk arising from damage to existing flood defences during the construction and decommissioning of the onshore transmission assets.	✓	×	✓	If the onshore transmission assets are located within or near existing flood defences, activities required to facilitate construction and decommissioning of the onshore transmission assets may impact the integrity (or efficacy) of flood defence infrastructure and increase the risk of flooding within the site and the surrounding area.	Existing flood defences within the hydrology and flood risk study area for the transmission assets will be determined using desk-based analysis of flood risk mapping data published by the NRW and site specific data obtained to inform the FCA.	The potential impact of increased flood risk arising from damage to existing flood defences will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 4: EIA Methodology, of this Scoping Report, in addition to the application of professional judgement where required. In addition, detailed consultation with the Lead Local Flood Authorities (LLFA) and NRW would be undertaken to discuss works on or near existing flood defences.
The impact of damage to existing field drainage during the construction and decommissioning of the onshore transmission assets.	✓	×	✓	If the onshore transmission assets are located on or near existing drainage infrastructure, activities required to facilitate construction and decommissioning of the onshore transmission assets may damage field drainage.	Existing field drainage infrastructure located within the hydrology and flood risk study area for the transmission assets will be identified using a desk-based analysis and site specific data obtained to inform the FCA.	The impact of increased flood risk arising from damage to existing field drainage will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 4: EIA Methodology, of this Scoping Report, in addition to the application of professional judgement where required. In addition, detailed consultation with the relevant stakeholders would be undertaken to discuss works on or near existing field drainage.
The impact of damage to existing water pipelines during the construction and decommissioning of the onshore transmission assets.	✓	×	✓	If the onshore transmission assets are located on or near existing water pipelines, activities required to facilitate construction and decommissioning of the onshore transmission assets may damage existing pipelines, interrupting the local water supply.	Existing water pipelines located within the hydrology and flood risk study area for the transmission assets will be identified using a desk-based analysis and site specific data obtained to inform the FCA.	The impact of increased flood risk arising from damage to existing water pipelines will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 4: EIA Methodology, of this Scoping Report, in addition to the application of professional judgement where required. In addition, detailed consultation with the relevant stakeholders would be undertaken to discuss works on or near existing water pipelines.

Table 6.9: Impacts proposed to be scoped out of the project assessment for hydrology and flood risk.

Impact	Justification
The impact of contaminated runoff on the chemical and biological status of surface water receptors arising from the operation and maintenance of the onshore transmission assets.	Activities associated with the operation and maintenance of the onshore transmission assets are unlikely to generate contaminated runoff. Therefore, the potential impact of contaminated runoff on the quality of surface water receptors during the operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for hydrology and flood risk.
The impact of accidental spillages/contaminant release on the quality of surface water and ground receptors during operation and maintenance of the onshore transmission assets.	Activities associated with the operation and maintenance of the onshore transmission assets are unlikely to require the transport or storage of harmful substances. Therefore, the potential impact of spills/contaminant releases on the quality of surface water receptors during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for hydrology and flood risk.
The impact of increased flood risk arising from damage to existing flood defences during the operation and maintenance of the onshore transmission assets.	Activities required to facilitate the operation and maintenance of the onshore transmission assets are unlikely to impact the integrity (or efficacy) of existing flood defences. Therefore, the potential impact of increased flood risk arising from damage to existing flood defence infrastructure during the operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for hydrology and flood risk.
The impact of increased flood risk arising from additional surface water runoff during the operation and maintenance of the onshore export cable.	The operation and maintenance of the onshore export cable and associated infrastructure may result in a minor increase in the total area of impermeable land. However, the increase in impermeable land arising from the installation of the onshore export cable is unlikely to result in a notable change in drainage patterns and surface water runoff rates. Therefore, the potential impact of flood risk arising from additional surface water runoff during the operation and maintenance of the onshore export cable is unlikely to be significant and is proposed to be scoped out of the assessment.

6.2.6 Measures adopted as part of the project

6.2.6.1 The following measures adopted as part of the project are relevant to hydrology and flood risk. These measures may evolve as the engineering design and the EIA progresses.

- Surface Water Management Plan: This would set out a long-term action plan to manage surface water, including measures to prevent or mitigate surface water flooding and the implementation of SuDS where appropriate.
- Code of Construction Practice (CoCP): Construction of the onshore transmission assets would be undertaken in accordance with the relevant best practice measures such as those recommended in CIRIA C648 (CIRIA, 2006) – 'Control of water pollution from linear construction projects' and other relevant guidance, including measures for handling oils, fuels or other harmful substances as to avoid pollution of surface and ground water receptors due to accidental spillages/contaminant release.

6.2.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

6.2.6.3 Requirements for additional mitigation measures will be determined through discussions with the Environmental Health Officers from each local authority likely to be affected as part of the hydrology and flood risk assessment.

6.2.7 Proposed assessment methodology

6.2.7.1 The hydrology and flood risk assessment for the onshore transmission assets will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, in addition to the following policy and guidance:

- Planning Policy Wales, Edition 11 (Welsh Government, 2021)
- Technical Advice Note (TAN) 15 (Welsh Government, 2004)
- Emerging TAN 15: development, flooding and coastal erosion (Welsh Government, coming into force June 2023)
- Revised Background Paper 17 - Conwy Strategic Flood Consequence Assessment (Conwy County Borough Council, 2012)
- Conwy Local Flood Risk Management Strategy (Conwy County Borough Council, 2013)
- Control of water pollution from linear construction projects. Site guide (C649D) (CIRIA, 2006)
- Design Manual for Roads and Bridges (DMRB) LA 104 - Environmental assessment and monitoring (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020)
- DMRB LA 113 - Road drainage and the water environment (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020)

- Denbighshire Local Flood Risk Management Strategy (Denbighshire County Council, 2014).

6.2.7.1 In accordance with the TAN15 (Welsh Government, 2004), an FCA will be undertaken for the transmission assets to determine baseline and future flood risk from all sources of flooding. The FCA will include calculations of surface water run-off rates and evidence of how surface water will be attenuated within the transmission asset boundary. The methodology and scope of the FCA, including mitigation proposals, will be agreed through consultation with the NRW and LLFA.

6.2.7.2 The FCA will be used to inform the design of the transmission assets and mitigation measures, including the Surface Water Management Plan. The conclusions of the FCA will be referred to in the assessment of hydrology and flood risk in the ES where relevant. The FCA will form a technical appendix of ES.

6.2.8 Potential cumulative effects

6.2.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to hydrology and flood risk will be considered within the Preliminary Environmental Information Report (PEIR) and ES.

6.2.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

6.2.9 Potential inter-related effects

6.2.9.1 The assessment of potential inter-related effects will be considered within the hydrology and flood risk chapter of the ES. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology of the EIA Scoping Report. For example:

- Terrestrial ecology and intertidal birds:
  - The contamination of surface water receptors within the hydrology and flood risk study area for the transmission assets during the construction of the onshore transmission assets may impact water dependent sites designated for conservation, which could support protected or notable species.
- Air quality:
  - Dust and air emissions generated during the construction of the onshore transmission assets may impact the quality of surface water receptors located within the hydrology and flood risk study area for the transmission assets.
- Geology, hydrogeology and ground conditions:
  - The mobilisation of existing contaminants or the release of contaminants into soil and groundwater during construction of the onshore transmission assets may impact hydraulically linked

surface water receptors within the hydrology and flood risk study area for the transmission assets.

6.2.10 Potential transboundary impacts

6.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon hydrology and flood risk due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

7 Onshore biological environment

7.1 Terrestrial ecology and intertidal birds

7.1.1 Introduction

7.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the terrestrial ecology and intertidal bird receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the onshore transmission assets.

7.1.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of the terrestrial ecology and intertidal birds for the onshore transmission assets.

7.1.1.3 The potential impacts on the offshore biological environment during the construction, operation and maintenance and decommissioning of the offshore transmission assets are described in part 3, section 4: Offshore biological environment of the EIA Scoping Report.

7.1.1.4 The potential impacts on ecology and intertidal birds during the construction, operation and maintenance, and decommissioning of the generation assets are described in part 2, section 4: Offshore biological environment, of the EIA Scoping Report.

7.1.2 Study area

7.1.2.1 The study area to be used for the assessment of terrestrial ecology and intertidal birds (‘the Mona terrestrial ecology and intertidal birds study area for the transmission assets’) will focus on areas (landward of Mean Low Water Springs (MLWS) for intertidal birds and landward of Mean High Water (MHWS) for terrestrial ecology) where potential impacts are most likely to occur on terrestrial ecology and intertidal bird receptors. It will follow the guidance set out from the Chartered Institute of Ecology and Environmental Management (CIEEM) (see section 7.1.3 of the EIA Scoping Report below).

7.1.2.2 As such, the Mona terrestrial ecology and intertidal birds study area for the transmission assets used in the assessment will be defined as:

- The area of land that will be temporarily or permanently occupied during construction, operation and maintenance, and decommissioning of the onshore transmission assets.
- A surrounding impact zone or “zone of influence” (ZoI) (CIEEM, 2018) that will be vary according to the ecological receptors being considered (see paragraph 7.1.3.6 below). The ZoI relating to the Mona terrestrial ecology and intertidal birds study area for the transmission assets will consider the following:
  - Internationally designated sites, including Special Areas of Conservation (SAC), possible SAC (pSAC), Special Protection Areas (SPA), possible SPA (pSPA) and Ramsar sites, located within 10km of the onshore transmission assets boundary. This

distance will be increased to 20km and 30km for those sites designated for birds and bats respectively.

- Nationally designated sites, including Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR), located within 5km of the onshore transmission assets boundary.
- Locally designated sites, including Local Nature Reserves (LNR) and Local Wildlife Sites (LWS), located within 2km of the onshore transmission assets boundary.

7.1.2.3 The Mona terrestrial ecology and intertidal birds study area for the transmission assets will be reviewed and modified in response to the selection and refinement of the boundary of the onshore transmission assets and additional environmental and/or design constraints identified during the EIA process.

7.1.3 Data sources

7.1.3.1 The data sources used to inform the baseline assessment will primarily comprise published material, which is publicly available online, supported by additional data from local wildlife records centres and specialist groups.

7.1.3.2 An initial desk-based review has identified a number of data sources which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 7.1 below.

Table 7.1: Baseline data sources.

Source	Summary
British Trust for Ornithology (BTO)	Provides information regarding RSPB reserves and the Wetland Bird Survey (WeBS) data.
Defra MAGIC interactive mapping system	Provides information regarding international, national and regionally designated sites, and historic protected species licences.
Natural Resources Wales Lle interactive mapping system	Provides information regarding international, national and regionally designated sites, and historic protected species licences.
Joint nature conservation committee (JNCC)	Provides information regarding the qualifying features of internationally designated sites, including SAC, SPA and Ramsar sites.
Local Wildlife Trust Groups	Provide information relating to local nature reserves, conservation projects/programmes and objectives, protected species presence.
Cofnod - North Wales Environmental Information Service.	Provides information regarding international, national and regionally designated sites, and historic protected species licences.
National Biodiversity Network Atlas	Provides information relating to historic records of protected species.
Other local specialist groups that do not report records of species to the local records centres (to be confirmed by the local record centres).	Provide information relating to protected or otherwise notable species records, including areas of interest for target species groups.
Other organisations responsible for managing sites of nature conservation interest / managing conservation projects in the potential zone of influence	Potential to provide information relating to the ecological interest and value of the site, information relating to the conservation project, any sensitivities and/or potential opportunities for enhancement/contribution to the objectives for the site/of the project.

Source	Summary
Relevant local authorities – Biodiversity / Environment Division	Information relating to locally designated sites, sites of interest, and local /regional conservation objectives and plans/projects.
Royal Society for the Protection of Birds (RSPB)	Provides further ornithological data in addition to BTO WeBS data and relating to RSPB nature reserves.

7.1.3.3 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

7.1.3.4 In addition to the data sources identified above, the following site-specific surveys are proposed to inform the baseline assessment for terrestrial ecology and intertidal birds in the Environmental Statement (ES):

- UK Habitat Classification survey:
  - This survey would identify and map habitats and assess their ecological condition and value, and importance to protected/notable species. The UK Habitat Classification survey may be informed by an Extended Phase 1 habitat survey (in accordance with JNCC 2010) if required.
- Habitat condition survey:
  - These surveys would collate more information on habitat condition and the value of ecological sites/areas that may be impacted by the construction, operation and maintenance and decommissioning of onshore transmission assets. These surveys would be used to inform mitigation proposals.
- Botanical surveys, including lower plants and National Vegetation Classification (NVC) surveys:
  - These surveys would target areas of high potential interest (i.e. high species diversity, or where there is a plant community or species of high conservation interest), that may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
  - The presence of Invasive non-native species (INNS) listed on schedule 9 of the Wildlife and Countryside Act 1981 (e.g. Japanese knotweed, Himalayan balsam, rhododendron) would also be recorded as part of the botanical surveys.
- Hedgerow surveys:
  - This survey is required under The Hedgerow Regulations 1997 and would map hedgerows of high potential value that may be directly impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Wintering and migratory bird surveys (intertidal):
  - Wintering and migratory bird surveys would primarily be undertaken within the proposed landfall site and surrounding ZoI. These surveys commenced in 2021 and are being carried out in

accordance with the methodology described in the bp/EnBW Morgan and Mona Offshore Wind Farm, Intertidal and Nearshore Waterbird Survey Methodology (RPS, 2021) that was agreed with Natural Resources Wales.

- Winter bird surveys (onshore):
  - These surveys would be used to identify wintering bird species and map activity, with the aim of assessing the importance of areas of high potential value, which may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Breeding bird surveys (onshore):
  - These surveys would be used to identify breeding bird species, (e.g. nearshore, intertidal terns, seabirds and barn owls) and map activity, with the aim of assessing the importance of areas of high potential value, which may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Bat surveys:
  - These surveys would include a preliminary roost assessment and surveys of trees and built structures to identify bat roosts that could be lost or disturbed by the construction or operation of the onshore transmission assets.
  - If the preliminary roost assessment finds evidence of bats, then targeted bat activity surveys would be undertaken, including emergence and re-entry surveys and transect and fixed-point surveys where required. Targeted bat activity surveys would identify areas of high potential value that may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
  - If the preliminary roost assessment identifies potential for hibernating bats, then further bat hibernation roost surveys would be undertaken.
  - All bat surveys would be undertaken in accordance with Bat Surveys for Professional Ecologists Good Practice Guidelines 3rd Edition (Bat Conservation Trust, 2016).
- Otter surveys:
  - These surveys would confirm the presence/likely absence of otters, map areas of significant activity and identify holts/resting sites in areas that may be impacted (directly or indirectly) during construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Hazel dormouse survey:
  - These surveys would be undertaken in accordance with the Dormouse Conservation Handbook, Second Edition (English Nature, 2006) (or subsequent updates) and would confirm the presence/absence in areas of woodland, hedgerows and scrub of potential value to dormice that could be directly impacted by the

construction, operation and maintenance and decommissioning of the onshore transmission assets.

- Badger surveys:
  - These surveys would confirm the presence and map signs of badger activity in areas that may be impacted (directly or indirectly) during construction, operation and maintenance and decommissioning of the onshore transmission assets.
  - These surveys are to be undertaken by a suitably experienced ecologist and would include a badger sett assessment to identify the location, usage and likely value of badger setts which may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Water vole surveys:
  - These surveys would be undertaken in accordance with The Water Vole Mitigation Handbook (Dean *et al.* 2016) and would identify habitat areas used by water vole and potential dispersal areas that may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Great Crested Newt (GCN) surveys:
  - These surveys would include a GCN Habitat Suitability Index (HSI) assessment of waterbodies located within 250m from the construction of the onshore transmission assets boundary. HSI surveys would be undertaken in accordance with the Amphibian and Reptile Group UK Advice Note 5 (AN5) Great Crested Newt Habitat Suitability Index (Amphibian and Reptile Group UK (ARG UK, 2010)).
  - Population size class surveys would be undertaken on those waterbodies where a positive eDNA result was recorded or where waterbodies are recorded as of positive value.
  - eDNA and population size class surveys would be undertaken in accordance with Using eDNA to develop a national citizen science-based monitoring programme for great crested newt (Triturus cristatus) (Biggs *et al.* 2014) and Great Crested Newt Mitigation Guidelines (English Nature, 2001).
- Natterjack toad surveys:
  - These surveys would be undertaken in areas that may be impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets, where natterjack toads had previously been recorded, to confirm their presence/absence.
- Reptile surveys, including sand lizard:
  - These surveys would be used to confirm the presence or absence of reptiles and would primarily focus on high value habitat that would be directly impacted by the construction, operation and maintenance and decommissioning of the onshore transmission assets. Where presence of reptile species is confirmed, population class size surveys would be undertaken.

  - Reptile surveys would be undertaken in accordance the Herpetofauna Workers' Manual (Gent and Gibson, 2003), Froglife Advice Sheet 10 – Reptile Survey (Froglife, 1999) and Common Standards Monitoring Guidance for Reptiles and Amphibians (JNCC, 2004).
- Terrestrial invertebrates:
  - These surveys are likely to vary according to the habitats present and target species identified. Notwithstanding, this survey would identify terrestrial invertebrate species present and the value of the habitat area. Surveys of high value habitat located outside of the Mona terrestrial ecology and intertidal birds study area for the transmission assets may also be undertaken to inform a potential enhancement strategy.

7.1.3.5 It is proposed that the detailed scope, methodologies and extents of the site-specific surveys listed above will be agreed with Natural Resources Wales in advance of survey commencement. The results of the surveys will be used to inform the assessment of terrestrial ecology and intertidal birds, mitigation requirements and enhancement strategy.

7.1.3.6 Where large areas of woodland and main watercourses cannot be avoided, trenchless methodologies would be used where possible during the construction of the onshore export cable, as to prevent direct impacts on these sensitive receptors.

7.1.3.7 However, if this construction technique is not feasible, and where large areas of woodland and main watercourses cannot be avoided, additional surveys may be required to assess the impact of the onshore transmission assets on terrestrial ecology and intertidal birds.

7.1.4 Baseline environment

Designated sites

The Mona Onshore Transmission Infrastructure Scoping Search Area coincides with multiple sites designated for nature conservation. These designated sites for nature conservation are presented in Table 7.2 below.

Table 7.2: Designated sites.

Site Name	Designation
International Designations	
Liverpool Bay	SPA
National Designations	
Traeth Pensarn	SSSI
Coed y Gopa	
Llanddulas Limestone and Gwrych Castle Wood	
Local Designations	
Numerous Ancient Woodlands	Ancient Woodland Inventory

Site Name	Designation
Kinmel Dunes	LNR
Brickfield Ponds	
Rhuddlan Ponds	

7.1.4.1 Additional ecologically designated sites may be identified within the Mona terrestrial ecology and intertidal birds study area for the transmission assets when the location of the onshore transmission assets has been refined. The ecologically designated sites to be considered in the assessment of terrestrial ecology and intertidal birds will be agreed with the relevant stakeholders.

7.1.4.2 The location of sites designated for nature conservation within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 7.1.

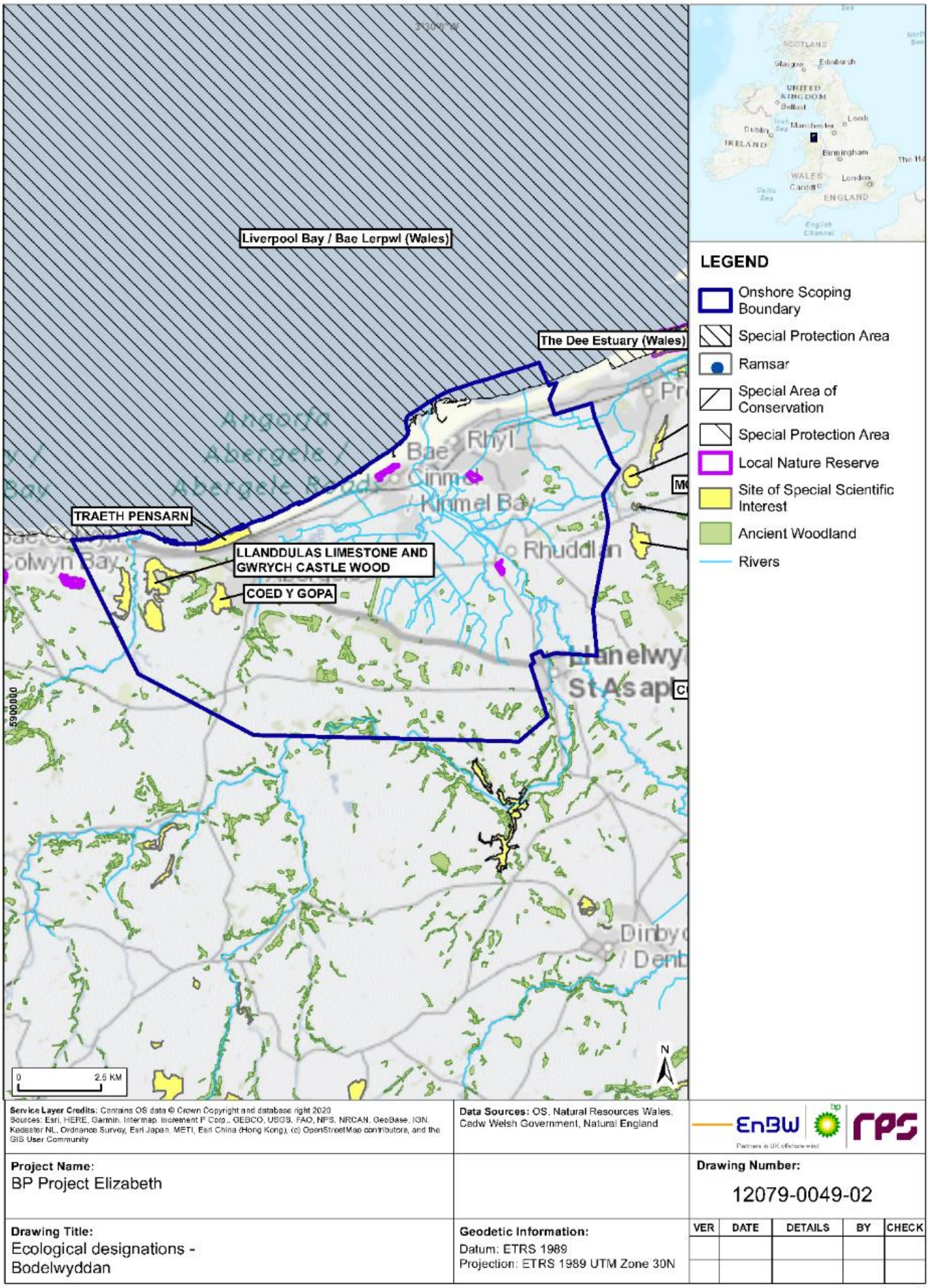


Figure 7.1: Ecologically designated sites within the Mona Onshore Transmission Infrastructure Scoping Search Area.

Priority habitats

7.1.4.3 There are a range of habitat types located within the Mona Onshore Transmission Infrastructure Scoping Search Area, which are listed as habitats of principle importance under Section 7 of the Environment (Wales) Act (2016). These include the following habitat types:

- coastal and floodplain grazing marsh
- coastal saltmarsh
- coastal sand dunes
- eutrophic standing waters
- lowland fens
- hedgerows
- intertidal mudflats
- limestone pavements
- lowland calcareous grassland
- lowland dry acid grassland
- lowland heathland
- lowland meadows
- lowland mixed deciduous woodland
- ponds
- reedbeds
- inland rock outcrop
- upland heathland
- upland oak woodland
- wet woodland
- wood pasture and parkland.

7.1.4.4 The location of priority habitats within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 7.2.

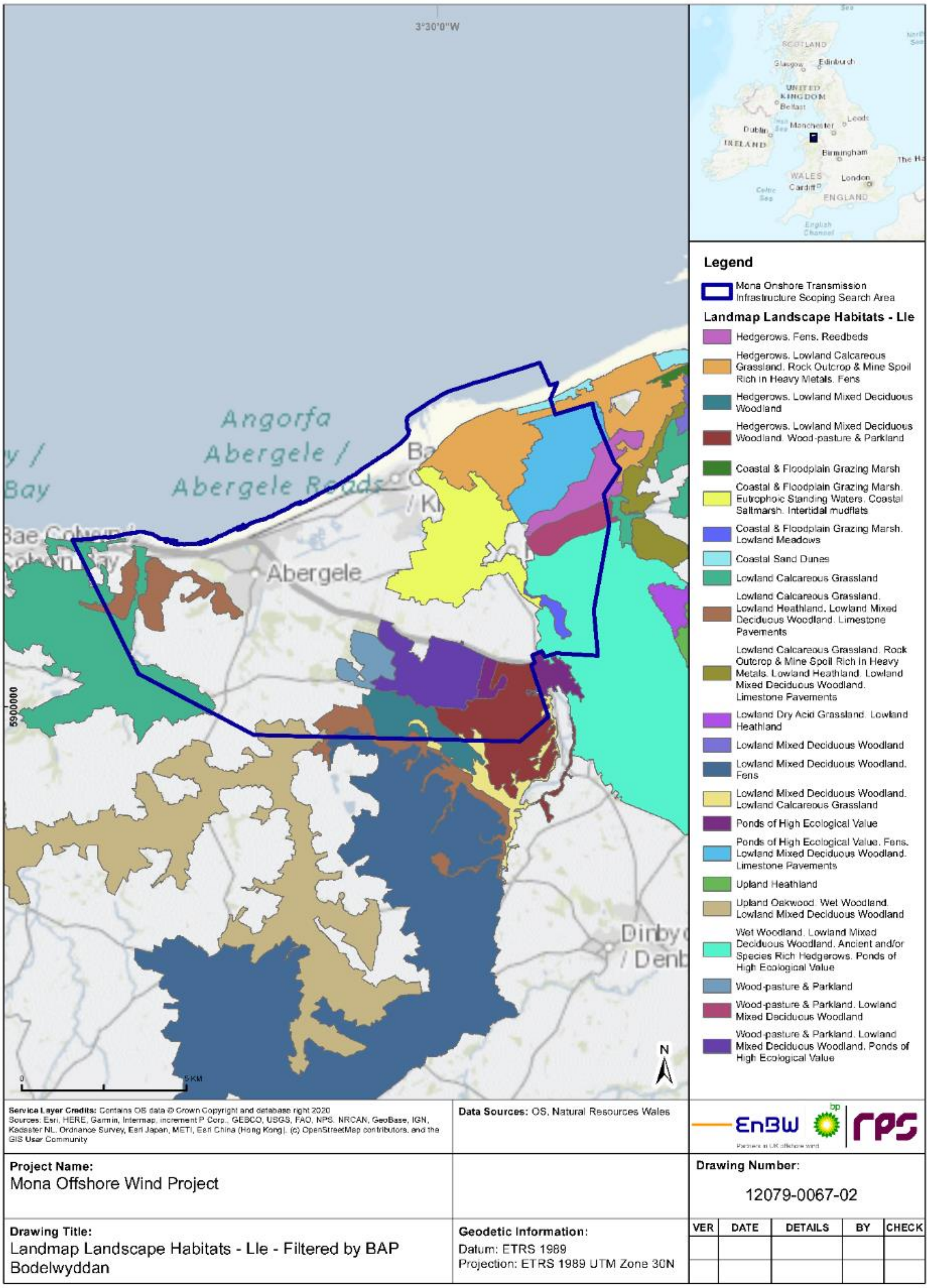


Figure 7.2: Priority habitats within the Mona Onshore Transmission Infrastructure Scoping Search Area.

7.1.5 Potential project impacts

7.1.5.1 A range of potential impacts on terrestrial ecology and intertidal birds have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

7.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 7.3 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.1.5.3 Potential impacts scoped out of the assessment are presented in Table 7.4, with justification for why the impact should be scoped out.

Table 7.3: Impacts proposed to be scoped into the project assessment for terrestrial ecology and intertidal birds (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of temporary and permanent habitat loss during construction, operation and maintenance and decommissioning of the onshore transmission assets.	✓	✓	✓	Construction and decommissioning of the onshore transmission assets may result in the temporary (e.g. onshore export cable) or permanent (e.g. onshore substation) loss of habitat, which may support protected or notable species.	Ecological receptors and intertidal birds located within the Mona terrestrial ecology and intertidal birds study area for the transmission assets will be identified using a Preliminary Ecological Appraisal (PEA). The PEA will be undertaken in accordance with CIEEM Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017). In addition, the baseline assessment will be further informed through site-specific surveys for protected and notable habitats and species. The requirement for further site-specific surveys will be determined as part of the PEA and would be undertaken in accordance with the relevant established guidance (see section 7.1.7 of this EIA Scoping Report).	The findings of the PEA and site-specific surveys will be used to inform the ecological mitigation strategy and subsequent EIA. The EIA will assess the impact of temporary and permanent habitat loss on protected or notable habitats and species identified within the Mona terrestrial ecology and intertidal birds study area for the transmission assets. The EIA will be undertaken in accordance with CIEEM Guidelines for Ecological Impact Assessment (2018).
The impact of habitat disturbance during construction, operation and maintenance and decommissioning of the onshore transmission assets.	✓	✓	✓	Construction, operation and maintenance and decommissioning of the onshore transmission assets may result in the disturbance of habitat (e.g. movement, noise, light spill, vibration), which may support protected or notable species.		
The impact of habitat fragmentation and species isolation during construction, operation and maintenance and decommissioning of the onshore transmission assets.	✓	✓	✓	Construction, operation and maintenance and decommissioning of the onshore transmission assets may result in the fragmentation of habitat, which may limit population movements and isolate protected or notable species.		
The impact of pollution caused by accidental spills/ contaminant release during construction and decommissioning of the onshore transmission assets.	✓	×	✓	Activities required for the construction and decommissioning of the onshore transmission assets may result in accidental spills/contaminant release which could adversely affect protected or notable habitats and species.		
The impact of spreading INNS during construction and decommissioning of the onshore transmission assets.	✓	×	✓	Construction and decommissioning of the onshore transmission assets may cause the spread of INNS, which could adversely affect the status of native protected or notable habitats and species.	INNS located within the Mona terrestrial ecology and intertidal birds study area for the transmission assets will be identified during the PEA. The PEA will be undertaken in accordance with CIEEM Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017).	The findings of the PEA and site-specific surveys will be used to inform the ecological mitigation strategy and subsequent EIA. The EIA will assess the impact of INNS on native protected or notable habitats and species identified within the Mona terrestrial ecology and intertidal birds study area for the transmission assets. The EIA will be undertaken in accordance with CIEEM Guidelines for Ecological Impact Assessment (2018).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						Controls to avoid the spread of INNS, including biosecurity measures, would be incorporated into the Code of Construction Practice (CoCP).

Table 7.4: Impacts proposed to be scoped out of the project assessment for terrestrial ecology and intertidal birds.

Impact	Justification
The impact of temporary and permanent habitat loss on protected habitats and species during operation and maintenance of the onshore transmission assets.	Activities associated with the operation and maintenance of the onshore transmission assets are unlikely to result in the temporary or permanent loss of large areas of habitat. Therefore, the potential impact on protected habitats and species arising from the temporary and permanent habitat loss during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for terrestrial ecology and intertidal birds.
The impact of pollution caused by accidental spills/contaminant release on protected habitats and species during operation and maintenance of the onshore transmission assets.	Activities associated with the operation and maintenance of the onshore transmission assets are unlikely to result in accidental spills/ contaminant release. Notwithstanding, best practice measures to be incorporated into an Ecological Management Plan would include measures to avoid or minimise the significance of any accidental pollution event. Therefore, the potential impact of pollution on protected habitats and species arising from accidental spills/ contaminant release during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for terrestrial ecology and intertidal birds.
The impact of construction, operation and maintenance and decommissioning of the onshore transmission assets on species not listed in paragraph 7.1.3.4 of this EIA Scoping Report, including red squirrel, brown hare, fish, and aquatic invertebrates.	As part of the site selection and route refinement process, the onshore transmission assets would be located and designed to avoid large parcels of woodland and main watercourses. Where the onshore export cable is required to cross watercourses, environmentally sensitive construction techniques would be used (e.g. horizontal directional drilling) as to avoid or reduce potential impacts on habitats and species. In addition, due to the limited extent and temporary nature of habitat disturbance associated with construction and decommissioning of the onshore export cable, and the requirement for land to be reinstated post- construction, significant impacts on species not listed in paragraph 7.1.3.4 of this EIA Scoping Report are unlikely to occur and are proposed to be scoped out of the assessment for terrestrial ecology and intertidal birds. However, should it not be feasible to utilise environmentally sensitive construction techniques (e.g. horizontal directional drilling), the list of survey requirements and species to be considered in the assessment for terrestrial ecology and intertidal birds will be reassessed.

7.1.6 Measures adopted as part of the project

7.1.6.1 The following measures adopted as part of the project are relevant to ecology and nature conservation. These measures may evolve as the engineering design and the EIA progresses.

- Site selection and micro-siting of the onshore transmission assets as to avoid sites designated for nature conservation and habitats/areas of high ecological value where practicable.
- Utilisation of environmentally sensitive construction techniques (e.g. horizontal directional drilling) where practicable to avoid impacts on sites designated for nature conservation and habitats/areas of high ecological value, particularly areas of ancient woodland, large parcels of other woodland types, and main watercourses.
- Reduction in the width of the onshore export cable corridor where practicable, to reduce the impact of habitat loss and minimise impacts on habitats / areas and species of high ecological interest.
- Ecology Mitigation Strategy (EMS) – The EMS will be informed by the results of the ecology and nature conservation assessment, including baseline surveys. The EMS will detail all mitigation, including enhancement measures, that will be undertaken and evidence how this will achieve an overall benefit for biodiversity. The EMS would be developed in consultation with NRW and relevant local authorities. If NRW or the local authorities request an assessment of the benefit of the EMS to biodiversity, this will be undertaken using either an internal biodiversity net gain calculation tool (as recommended by NRW or the Local Authority) or The Biodiversity Metric 3.0 calculation tool (Natural England, 2021). One of these net gain calculation tools would then be used to provide evidence of the overall benefit of the EMS to biodiversity. The EMS will also be used to inform the Ecology Management Plan (see below).
- Ecological Management Plan (EMP) – The EMP will be developed in consultation with stakeholders, and other relevant technical specialists, including landscape consultants to ensure that landscape mitigation proposals maximise the overall benefit to biodiversity. The EMP will include best practice and enhancement measures during the construction (aftercare/establishment period), operation and maintenance phase. The plan will include details of responsibilities, confirmation of funding commitments, monitoring, and reporting requirements. The EMP will be designed to be flexible to enable amendments/updates to be made in response to the results of ecological monitoring and to ensure that objectives are met.
- Soil Management Plan (SMP) – The SMP would include measures to ensure the protection, retention and potential enhancement (as part of any potential mitigation strategy) of soils during construction of the onshore transmission assets, including any potential mitigation areas required as part of the EMS.
- Protected Species licence applications (if required) which will be agreed with Natural Resources Wales and include detailed method statements,

mitigation strategies and post-construction monitoring and management requirements.

- Code of Construction Practice (CoCP) – Construction of the onshore transmission assets would be undertaken in accordance with the relevant best practice measures. Ecology best practice measures, including a Biosecurity Method Statement, will be incorporated into the CoCP. The EMS and other standalone documents supporting the assessment of terrestrial ecology and intertidal birds (e.g. protected species licenses) will be referenced and/or appended to the CoCP where relevant.
- Ecology Clerk of Works (ECoW) – An ECoW will be a requirement of the CoCP. The ECoW will instruct, oversee, and manage ecology measures to be included in the CoCP during the construction of the onshore transmission assets. The ecology measures to be included in the CoCP will be explained to construction workers/staff during Ecology Toolbox Talks by the ECoW.

7.1.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

7.1.6.3 Detailed requirements of the measures identified above and additional mitigation requirements will be developed through consultation with relevant stakeholders, including Natural Resources Wales, local authority ecologists, the RSPB and Wildlife Trusts.

7.1.7 Proposed assessment methodology

7.1.7.1 The terrestrial ecology and intertidal bird assessment for the onshore transmission assets will be undertaken in accordance with the methodology set out in Part 1, Section 4: EIA Methodology, of the EIA Scoping Report, in addition to the following established guidance:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018)
- Guidelines for Preliminary Ecological Appraisal Second Edition (CIEEM December, 2017)
- Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, 1995)
- Advice on Ecological Assessment of Air Quality Impacts (CIEEM, 2021)
- The Biodiversity Metric 3.0 (JP039) (Natural England, 2021).

7.1.8 Potential cumulative effects

7.1.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to terrestrial ecology and intertidal birds will be considered within Preliminary Environmental Information Report (PEIR) and the Environmental Statement (ES).

7.1.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report and CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (2018).

7.1.9 Potential inter-related effects

7.1.9.1 The assessment of potential inter-related effects will be considered in the terrestrial ecology and intertidal birds chapter of the ES. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Geology and Ground Conditions:
  - Impacts from the disturbance of contaminated land, spillages of contaminants or changes in groundwater levels during construction and decommissioning of the onshore transmission assets may impact sites designated for nature conservation and protected or notable habitats and species within the Mona terrestrial ecology and intertidal birds study area for the transmission assets.
- Hydrology and flood risk:
  - Impacts on ground and surface water quality, levels, flow, and drainage, during the construction and decommissioning of the onshore transmission assets may adversely affect sites designated for nature conservation, habitats of ecological value, and protected or otherwise notable species within the Mona terrestrial ecology and intertidal birds study area for the transmission assets.
- Land use and recreation:
  - Impacts on soil quality during construction and decommissioning of the onshore transmission assets may cause damage to habitats and reduce the success of habitat reinstatement within the Mona terrestrial ecology and intertidal birds study area for the transmission assets.
- Noise and Vibration:
  - Noise and vibration emissions generated during construction, operation and maintenance, and decommissioning of the onshore transmission assets may cause habitat disturbance and displacement of protected or notable species within the Mona terrestrial ecology and intertidal birds study area for the transmission assets.
- Air quality:
  - Dust and air emissions generated during construction of the onshore transmission assets may impact sites designated for nature conservation and protected habitats and species within the Mona terrestrial ecology and intertidal birds study area for the transmission assets.
- Seascape, landscape and visual resources:

- Light spill onto adjacent retained habitats during the construction, operation and maintenance and decommissioning of the onshore transmission assets may result in habitat disturbance and displacement of protected or notable species within the Mona terrestrial ecology and intertidal birds study area for the transmission assets.

7.1.10 Potential transboundary impacts

7.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon terrestrial ecology and intertidal birds due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

8 Onshore human environment

8.1 Historic environment

8.1.1 Introduction

8.1.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the historic environment resources of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the onshore transmission assets.

8.1.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of historic environment impacts for the onshore transmission assets.

8.1.1.3 The potential impacts on marine archaeology during the construction, operation and maintenance, and decommissioning of the generation assets are described in in part 2, section 5.3: Marine Archaeology, of this EIA Scoping Report.

8.1.1.4 The potential impacts on marine archaeology during the construction, operation and maintenance, and decommissioning of the offshore transmission assets are described in in part 3, section 5.3: Marine Archaeology, of this EIA Scoping Report.

8.1.2 Study area

8.1.2.1 The study area for the assessment of historic environment impacts in the Environmental Statement (ES) ('the Mona historic environment study area for the transmission assets') will focus on areas (landward of Mean Low Water Springs (MLWS)) where potential impacts are most likely to occur on historic environment receptors.

8.1.2.2 As such, the Mona historic environment study area for the transmission assets to be used in the EIA assessment will be defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Designated historic assets within 1km of the landfall and onshore cable route corridor.
- Designated historic assets within 5km of the onshore substation. This buffer allows for temporary and permanent impacts on the significance of designated historic assets and on the character of the historic landscape. A buffer of more than 5km may be considered where there are designed views in which the substation may be visible.
- Buried archaeology and undesignated historic assets within the landfall site, the onshore substation site and the onshore cable route corridor with a focus on a smaller core area of 250m either side of the cable route corridor.

8.1.2.3 The Mona historic environment study area for the transmission assets will be reviewed and modified in response to refinements made to the onshore transmission asset boundary and onshore substation dimensions and additional environmental and/or design constraints identified during the EIA process.

8.1.3 Data sources

8.1.3.1 The data sources used to inform the baseline assessment will be a combination of published material which is publicly available and site visits undertaken by appropriately qualified archaeologists. An initial desk-based review has identified several data sources, which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 8.1 below.

Table 8.1: Baseline Data Sources.

Source	Summary
Cadw and Archwilio – The Historic Environment Records of Wales	Provided details of listed buildings, Scheduled Monuments, Battlefields, Registered Parks and Gardens, Registered Landscapes of Outstanding Historic Interest, Designated Wrecks and World Heritage Sites.
Natural Resources Wales – Lle – Landmap Historic Landscape	Provided details of Historic Landscape Aspect Area within the Mona Onshore Transmission Infrastructure Scoping Search Area.
Published and unpublished historic mapping, including manuscript maps, historic Ordnance Survey (OS) maps and historic charts held by the United Kingdom Hydrographic Office.	Provided details of historic land use within the Mona Onshore Transmission Infrastructure Scoping Search Area.
Conservation Area Character Appraisals produced by the relevant local authorities.	Provided details of Conservation Areas, including reasons for the designation and features of architectural and historical interest.
Documentary resources from the Archaeology Data Service Website.	Provided details of local archaeological sites, finds, historic buildings and historic landscapes, including Conservation Areas.

8.1.3.2 A review of relevant documentary and archival material held in libraries and archives will be undertaken. An iterative approach will be adopted during this process to determine the scope of the above consultations/searches.

8.1.3.3 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.1.4 Baseline environment

8.1.4.1 Historic environment receptors which will be considered in the EIA assessment include:

- World Heritage Sites
- listed buildings (both nationally and locally listed)
- Conservation Areas
- Registered Parks and Gardens

- Registered Landscapes of Outstanding Historic Interest
- Scheduled Monuments
- designated wrecks
- buried and above ground historic assets.

8.1.4.2 An initial review of baseline data shows that the Mona Onshore Transmission Infrastructure Scoping Search Area coincides with multiple above ground historic assets. These designated historic assets are presented in Table 8.2 below.

Table 8.2: Historic assets.

Site Name	Designation
Bodrhyddan Hall	Grade I Listed Building
Gwrych Castle	
Kinmel	
Llwyni Lodge	
Rhuddlan Castle	
Bodelwyddan	Grade II Registered Park and Garden
Bodelwyddan Castle	Grade II* Listed Building
Church of St Mary at Rhuddlan	
Church of St Mary at Towyn	
Church of St Michael	
Entrance screen, coach-house and stable range at Kinmel	
Faedre	
Faenol-bach	
Gwernigron dovecote.	
Hen Wrych Lodge	
Icehouse at Bodelwyddan Castle	
Kinmel Bay Youth Club	
Main barn, cowhouse and workshop range at Abbey Farm	
Morfa Lodge	
Pen-isa’r-Glascoed Farmhouse	
Plas Kinmel with east range and west range of farmyard buildings	
Plas Newydd	
Plas Tan-yr-Ogof	
Rhuddlan Bridge	

Site Name	Designation
Saint Mary's Well	
Tan-yr-Ogof Farmhouse	
Tan-yr-Ogof Lodge	
Ty'n Llan Nursing Home	
Gwrych Castle	Grade II* Registered Park and Garden
Kinmel Hall	
Castell Cawr hillfort	Scheduled Monument
First World War practice trenches at Bodelwyddan Park	
Parts of the norman Borough at Rhuddlan, the motte and bailey known at Twthill at Rhuddlan	
Pen-y-Corddyn Camp hillfort	
Rhuddlan Bridge	
The Mount (Abergele)	
The Town Banks at Rhuddlan	
Tyddyn Bleiddyn chambered long cairn	

8.1.4.3 In addition to the historic assets identified in Table 8.2 above, there are six Conservation Areas which coincide with the Mona Onshore Transmission Infrastructure Scoping Search area. These Conservation Areas are located at Abergele, St George (Kinmel), Seabank Road (Rhyl), River Street (Rhyl), Rhyl Central and Rhuddlan.

8.1.4.4 Lower Elwy Valley Registered Historic Landscape is also located within the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.1.4.5 The location of historic assets and Conservation Areas within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 8.1.

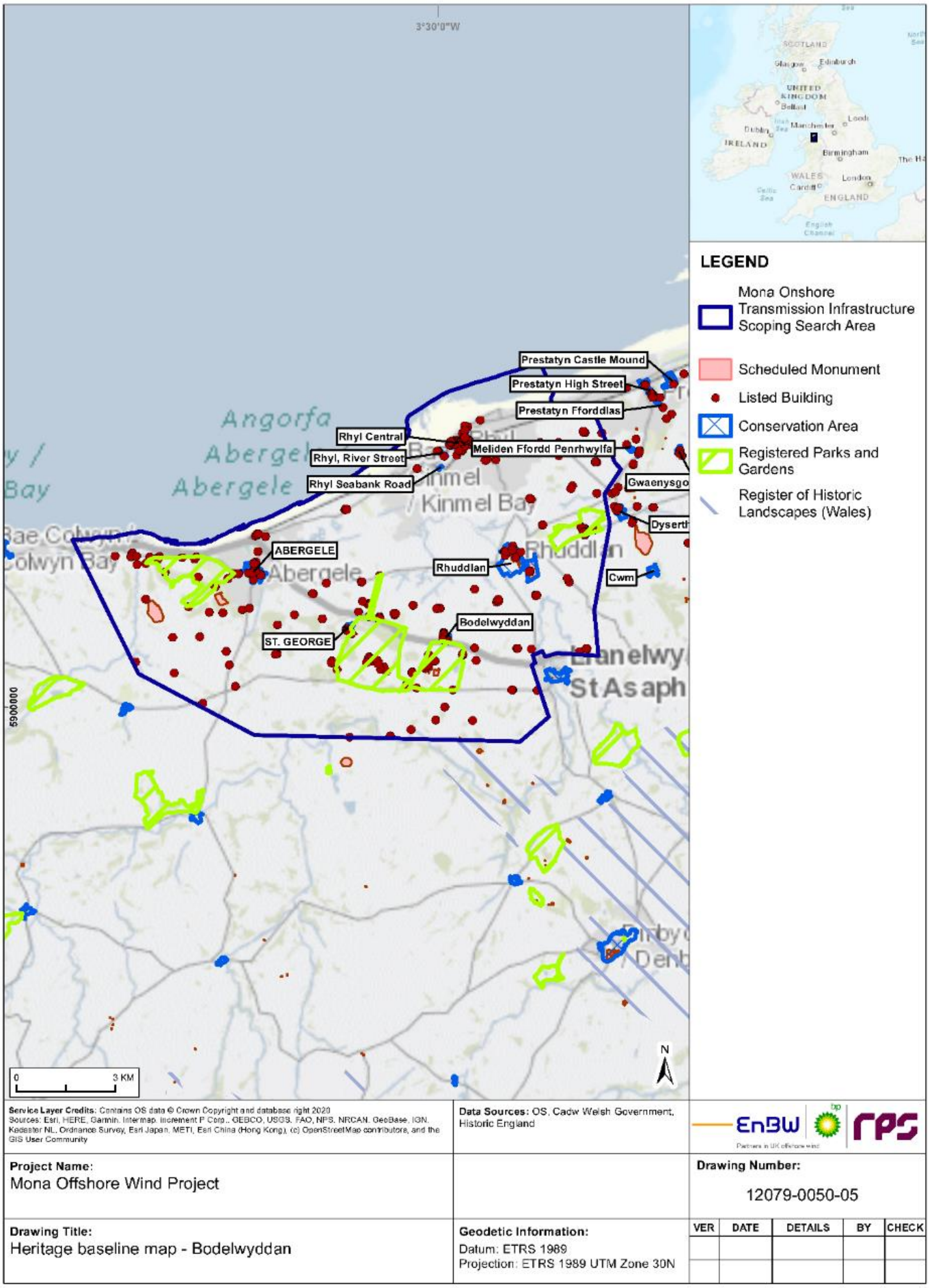


Figure 8.1: Designated historic assets and Conservation Areas within the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.1.5 Potential project impacts

8.1.5.1 A range of potential impacts on the historic environment have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

8.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.3 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

8.1.5.3 Potential impacts scoped out of the assessment are presented in

8.1.5.4 Table 8.4, with justification for why the impacts should be scoped out.

Table 8.3: Impacts proposed to be scoped into the project assessment for historic environment (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of construction of the onshore transmission assets on buried archaeology resource	✓	✗	✗	Activities required for the construction of the onshore transmission assets (e.g. excavation) could result in damage or the permanent loss of buried archaeological resource.	Historic assets and buried archaeology within the Mona historic environment study area for the transmission assets will be identified using a desk-based assessment. The desk-based assessment will be undertaken in accordance with the Chartered Institute for Archaeologists' Standard and guidance for historic environment desk-based assessments (CIfA, 2014). Based on the results of the desk-based assessment and subject to consultation with Local Authority archaeological advisors, the following survey surveys may be undertaken if appropriate: a walkover by experienced and qualified archaeologist of all designated historic assets; agreement of subsequent fieldwork potentially including targeted geophysical survey and targeted trial trenching. The scope of field surveys will be agreed with the Welsh Archaeological Trust and Cadw prior to any works being undertaken.	The impact of construction on the buried archaeology resource will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Heritage Impact Assessment in Wales (Cadw, 2017) and Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021).
The impact of construction and decommissioning of the onshore transmission assets on the setting of above ground historic assets.	✓	✓	✓	Activities required for the construction and decommissioning of the onshore transmission assets could result in temporary impacts on the setting of above ground historic assets.		The impact of construction and decommissioning on the setting of above ground heritage assets will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Heritage Impact Assessment in Wales (Cadw, 2017) and Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021).
The impact of operation and maintenance of the onshore substation on the setting of above ground historic assets.	✗	✓	✗	Operation of the onshore substation could result in long term but reversible impacts on the setting of above ground historic assets.		The impact of the operation and maintenance of the onshore substation on the setting of historic assets will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Heritage Impact Assessment in Wales (Cadw, 2017) and Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021).
The impact of construction and decommissioning of the onshore transmission assets on the character of the historic landscape	✓	✗	✓	Construction and decommissioning of the onshore transmission assets could result in temporary impacts on the character of the historic landscape.		The impact of construction and decommissioning on the character of the historic landscape will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Heritage Impact Assessment in Wales (Cadw, 2017) and Principles of cultural heritage impact

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						assessment guidance (IEMA, IHBC, CiFA, 2021).
The impact of operation and maintenance of the onshore substation on the character of the historic landscape	×	✓	×	Operation of the onshore substation could result in long term but reversible impacts on the character of the historic landscape.		The impact of operation of the onshore substation on the character of the historic landscape will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Heritage Impact Assessment in Wales (Cadw, 2017) and Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021).

Table 8.4: Impacts proposed to be scoped out of the project assessment for historic environment.

Impact	Justification
The impact on the buried archaeological resource (damage and permanent loss) arising from the operation and maintenance and decommissioning of the onshore transmission assets.	Activities associated with operation and maintenance and decommissioning of the onshore transmission assets are unlikely to damage or result in the permanent loss of buried archaeological resource. Therefore, the potential impact on buried archaeological resource during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for historic environment.
The impact on the setting of above ground historic assets arising from operation and maintenance of the onshore transmission assets (excluding the onshore substation), including the onshore export cables and associated infrastructure.	Activities associated with operation and maintenance of the onshore export cables and associated infrastructure are unlikely to impact the setting of above ground historic assets. Therefore, the potential impact on the setting of above ground historic assets during operation and maintenance of the onshore export cable and associated infrastructure is unlikely to be significant and is proposed to be scoped out of the assessment for historic environment.

8.1.6 Measures adopted as part of the project

8.1.6.1 The following measures adopted as part of the project are relevant to the historic environment. These measures may evolve as the engineering design and the EIA progresses.

- A key mitigation measure would be the micro-siting of the onshore cable route and substation site selection process. This will include avoidance of important historic assets, where practicable.
- Code of Construction Practice (CoCP) – The CoCP may include potential ‘no-strip’ zones to protect buried archaeological remains. The CoCP may include measures to control temporary lighting and manage the reinstatement of land associated with the onshore export cable and temporary construction works areas.
- Landscape Management Plan (LMP) – The LMP may include landscaping proposals planting as to avoid or reduce the potential impact of the onshore substation on above ground heritage receptors.
- Cultural Heritage Management Plan (CHMP) – The CHMP will identify the scope and extent of further archaeological survey works (e.g. trial trenching, geophysical survey) if required.

8.1.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.1.6.3 Requirements for additional historic environment mitigation measures will be determined through discussions with the Welsh Archaeological Trust and Cadw.

8.1.7 Proposed assessment methodology

8.1.7.1 As set out above, the baseline survey and impact assessment will be guided by the CIfA Standard and guidance for historic environment desk-based assessment. Guidance on impact assessment has been published by Cadw (2017) and the Institute of Environmental Management and Assessment (IEMA, with others, 2021).

Sensitivity of historic assets

8.1.7.2 The sensitivity of historic assets will depend on factors such as the condition of the site and the perceived heritage value/importance of the site. The importance of the receptor will in part be assessed in terms of national, regional or local statutory or non-statutory protection and grading of the asset.

Assessment of asset importance

Archaeological assets

8.1.7.3 There are no national government guidelines for evaluating the importance of historic assets.

8.1.7.4 For archaeological assets, the Department of Digital, Culture, Media and Sport (DCMS) has adopted a series of recommended (i.e. non-statutory) criteria for use in the determination of national importance when scheduling monuments. These are expressed in the document Scheduled Monuments - Identifying, Protecting, Conserving and Investigating Nationally Important Archaeological Sites under the Ancient Monuments and Archaeological Areas Act 1979.

<u>Historic buildings</u>

8.1.7.5 For historic buildings, assessment of importance is usually based on the designations used in the Listed Building process. Where historic buildings are not listed professional judgement will be used, along with review of any 'local lists' that may have been published by or on behalf of local planning authorities.

<u>Historic landscapes</u>

8.1.7.6 The sub-topic of historic landscape is recognised as having significant overlaps with other topics, such as landscape and townscape and therefore a multi-disciplinary approach to the EIA assessment will be adopted. This is to avoid double counting and duplication of effort and to ensure a cohesive assessment. There are also significant overlaps with the other cultural heritage sub-topics of archaeological remains and historic buildings.

Assessment of impact magnitude

<u>Archaeological assets</u>

8.1.7.7 The magnitude of an impact is assessed without regard to the value of the historic asset. In considering the magnitude of impact, the principle established in Section 6 of the Planning Policy Wales (PPW) that preservation of the asset is preferred, and that total physical loss of the asset is least preferred, has been taken into account in the EIA assessment.

8.1.7.8 It is not always possible to assess the physical impact in terms of percentage loss and therefore it can be important in such cases to try to assess the capacity of the historic asset to retain its character and significance following any impact. Similarly, impacts resulting from changes within the settings of buried archaeological assets may also be more difficult to assess as they do not involve physical loss of the resource and may be reversible.

<u>Historic buildings</u>

8.1.7.9 As for archaeological assets, the magnitude of impact in relation to historic buildings is assessed without regard to the importance of the asset, so the total destruction of an insignificant historic building has the same degree of magnitude of impact as the total loss of a high value historic building. Determination of the magnitude of impact is based on the principle that preservation of the asset and its setting is preferred and that total physical loss of the asset and/or its setting is the least preferred.

<u>Historic landscapes</u>

8.1.7.10 Historic landscapes cannot be destroyed or damaged but impacts on them can change their character. Impacts are assessed using evaluated HLC units, not the elements/parcels/components that contribute towards the character. There may be impacts resulting from changes within the settings of identified units, especially with regard to designated historic landscapes.

8.1.8 Potential cumulative effects

8.1.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to the historic environment will be considered within the ES.

8.1.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

8.1.9 Potential inter-related effects

8.1.9.1 The assessment of potential inter-related effects will be considered in the historic environment ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Seascape, landscape and visual resources:
  - Landscape and visual impacts during construction, operation and maintenance, and decommissioning of the onshore transmission assets may impact above ground historic assets located within the Mona historic environment study area for the transmission assets. In addition, the Zone of Theoretical Visibility (ZTV) determined as part of the seascape, landscape and visual resources assessment will be used to inform the Mona historic environment study area for the transmission assets.
- Noise and Vibration:
  - Noise and vibration impact during construction, operation and maintenance, and decommissioning of the onshore transmission assets may impact above ground and below ground historic assets located within the Mona historic environment study area for the transmission assets.

8.1.10 Potential transboundary impacts

8.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon historic environment resources due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

8.2 Land use and recreation

8.2.1 Introduction

8.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the land use and recreation receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the onshore transmission assets.

8.2.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and methodology to be used in the assessment of land use and recreation impacts for the onshore transmission assets.

8.2.2 Study area

8.2.2.1 The study area to be used for the assessment of land use and recreation ('the Mona land use and recreation study area for the transmission assets') will be defined as land (landward of Mean High Water Springs (MHWS)) to be temporarily or permanently occupied during construction, operation and maintenance, and decommissioning of the onshore transmission assets.

8.2.2.2 The recreational study area for the transmission assets will also include land immediately adjacent to the onshore transmission assets or linking to it and any areas that may be required to mitigate for any temporary or permanent effects arising from the Mona Offshore Wind Project.

8.2.2.3 The agricultural study area for the transmission assets will also include the areas of wider agricultural land holdings associated with any land affected by the Mona Offshore Wind Project.

8.2.2.4 With regard to the amenity of recreational resources, the potential impact of the onshore transmission assets (e.g. traffic, noise, vibration, air quality, visual effects) will be considered in relevant topic chapters of the ES.

8.2.2.5 The Mona land use and recreation study area for transmission assets will be reviewed and modified in response to refinements to the Mona offshore wind farm project boundary and additional environmental or design constraints identified during the EIA process.

8.2.3 Data sources

8.2.3.1 The data sources used to inform the baseline assessment will include published material, which is publicly available online. An initial desk-based review has identified a number of data sources which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 8.5 below.

Table 8.5: Baseline data sources.

Source	Summary
British Geological Survey (BGS) Geology of Britain Viewer (classic)	Provides information regarding superficial and bedrock geology.
Definitive Public Rights of Way (PRoW) maps produced by the relevant local authorities	Provides information regarding the location of PRoW.
High resolution satellite imagery	Provides information regarding the location of recreational resources.
OS mapping data	Provides mapping data for land and recreational resources.
Soil Survey of England and Wales County of Anglesey, Soils and Agriculture Map (1:63,360)	Provides information regarding soil types and agricultural land.
Soil Survey of England and Wales National Soils Map (1:250,000) Sheet 2 - Wales	Provides information regarding soil types and agricultural land.

Source	Summary
Welsh Government Agricultural small area statistics, 2002 – 2020: tables	Provides information regarding statistics on agricultural land areas, numbers of livestock and numbers of agricultural workers in Wales.
Welsh Government Data Map of the Active Travel Network; Sustrans Interactive Mapping System Great Britain	Provides information regarding the location of National Cycle Networks (NCNs).
Welsh Government LLe Geo-Portal	Provides predictive Agricultural Land Classification (ALC) maps.
Welsh Government LLe Geo-Portal	Provides post-1988 Agricultural Land Classification (Wales) Surveys.

8.2.3.2 In addition to the desk-based sources detailed above, site visits would be undertaken to verify the data. These surveys would be undertaken to establish the specific characteristics of agricultural land and soils, the nature of farm holdings affected and to provide an understanding of the use of recreational resources within and linking to the Mona Offshore Wind Project land use and recreation study area for the transmission assets.

8.2.3.3 All surveys will be subject to gaining land access. Where access to land cannot be reasonably achieved, these surveys will be supplemented using secondary data sources and consultation with relevant stakeholders where possible.

8.2.3.4 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.2.4 Baseline environment

8.2.4.1 The assessment will consider the potential land use and recreation impacts of the onshore transmission assets on the following sensitive receptors:

- Soil types and patterns of soils which are located within the Mona land use and recreation study area for the transmission assets.
- The quality of agricultural land within the Mona land use and recreation study area for the transmission assets, in accordance with the Ministry of Agriculture, Fisheries and Food Agricultural Land Classification (ALC) Guidelines (MAFF, 1988), including ‘best and most versatile’ Grade 1, 2 and 3a ALC land.
- Farm holdings and/or enterprises which are located within the Mona land use and recreation study area for the transmission assets.
- Recreational resources (e.g. recreational facilities, areas of public access and PRoW) located within the Mona land use and recreation study area for the transmission assets.
- Users of recreational resources, including pedestrians, cyclists, equestrians and other recreational users.

Agricultural land

8.2.4.2 The Welsh Government predictive ALC viewer indicates that land within the Mona Onshore Transmission Infrastructure Scoping Search Area predominantly comprises Subgrades 3a and 3b good to moderate quality land, with comparatively smaller areas of excellent and very high-quality Grades 1 and 2 land.

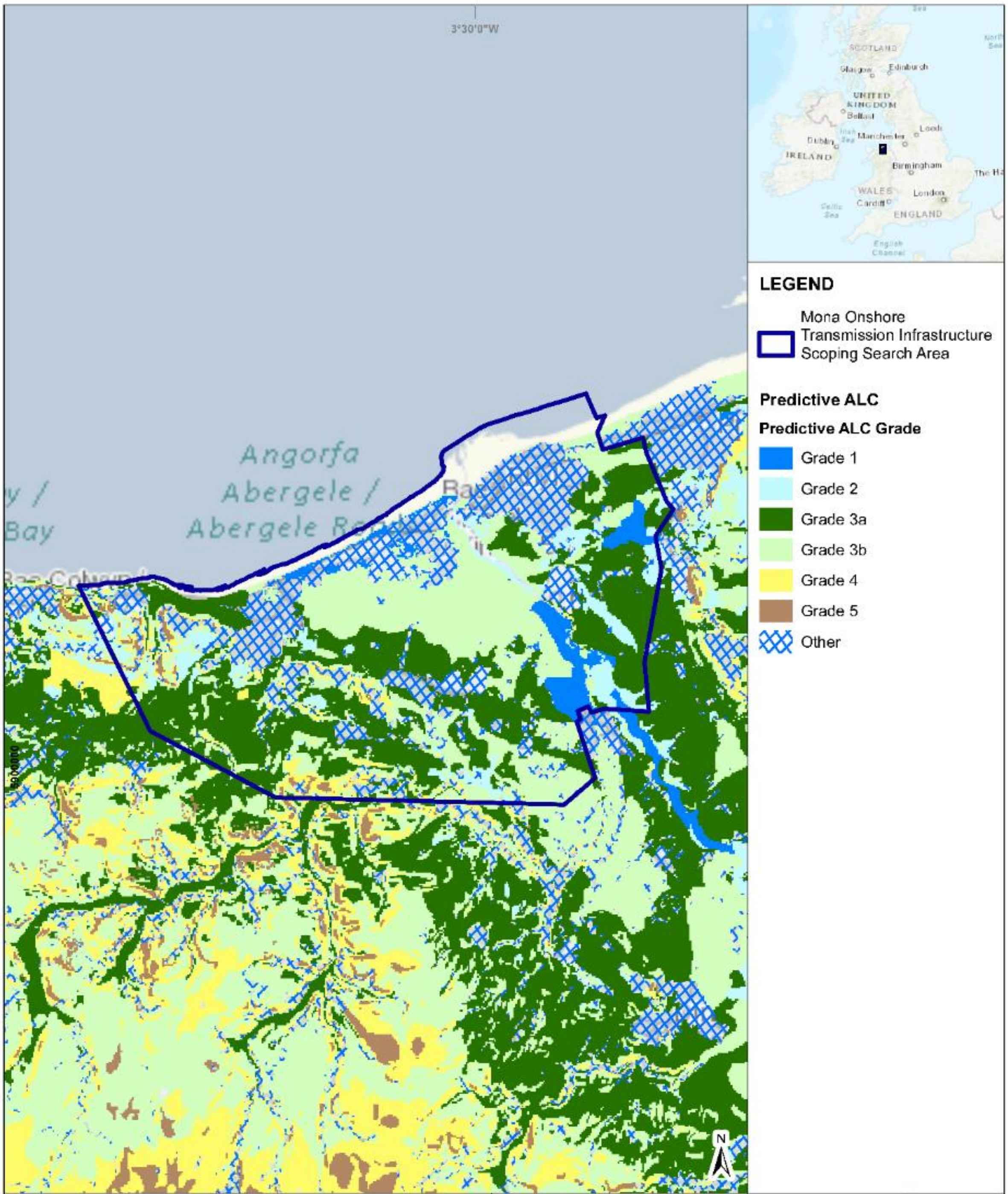
8.2.4.3 In addition, the Welsh Government predictive ALC viewer shows smaller areas of poor and very poor-quality Grades 4 and 5 land located within the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.2.4.4 The quality of agricultural land within the Mona Onshore Transmission Infrastructure Scoping Search Area, according to the Welsh Government predictive ALC viewer, is presented in Figure 8.2 below.

8.2.4.5 Detailed ALC survey work has also been undertaken at some locations within the Mona Onshore Transmission Infrastructure Scoping Search Area. Detailed ALC surveys around the city of Saint Asaph and towns of Ryhl, Bodelwyddan and Abergele indicate that these areas comprise Best and Most Versatile (BMV) Subgrade 3a land, smaller areas of Grade 2 land to the south of Rhyl and significant areas of lower quality Subgrade 3b land.

8.2.4.6 The quality of agricultural land within the Mona Onshore Transmission Infrastructure Scoping Search Area, according to the detailed ALC survey work, is presented in Figure 8.3 below.

8.2.4.7 The Welsh Government Small Area Farming Statistical data indicates that the Mona Onshore Transmission Infrastructure Scoping Search Area is dominated by agricultural grassland supporting mainly livestock-based farming enterprises, with more limited areas of arable cultivation.



Service Layer Credits: Contains OS data © Crown Copyright and database right 2020
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: OS, Cadw Welsh Government

EnBW bp rps
Partners in UK offshore wind

Project Name:
Mona Offshore Wind Project

Drawing Number:
12079-0061-01

Drawing Title:
Agriculture Plan - Predictive ALC
Bodelwyddan

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
01	07/12/21	First Issue	RD	JT

Figure 8.2: Quality of agricultural land within the Mona Onshore Transmission Infrastructure Scoping Search Area, according to the Welsh Government predictive ALC viewer.

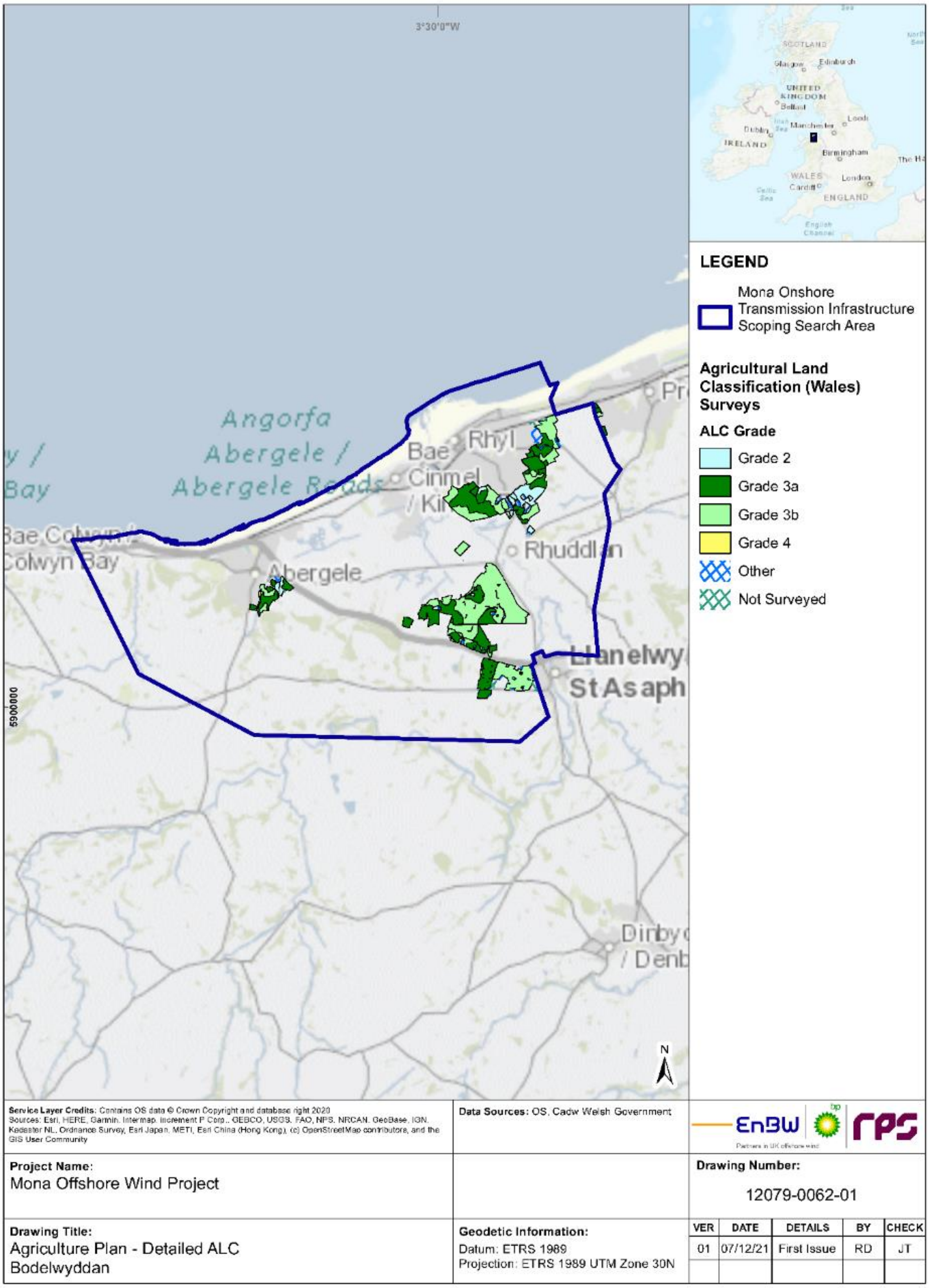


Figure 8.3: Quality of agricultural land within the Mona Onshore Transmission Infrastructure Scoping Search Area, according to the detailed ALC survey work.

Access land, common land and village greens

8.2.4.8 There are two areas of Access and Registered Common Land as defined by the Countryside and Rights of Way (CRoW) Act (2000) located within the Mona Onshore Transmission Infrastructure Scoping Search Area. These include one area of steeply sloping woodland located to the south-west of the town of Abergele and a strip of land located on the southern bank of the River Clwyd to the south of Rhyll.

8.2.4.9 The location of Access and Registered Common Land within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 8.4 below.

PRoW, cycle routes and travel routes

8.2.4.10 There are numerous PRoW located within the Mona Onshore Transmission Infrastructure Scoping Search Area. These include the Wales Coast Path (also known as the Isle of Anglesey Coastal Path), which runs predominantly adjacent to the coast between the towns of Llanddulas and Rhyl, in addition to the North Wales Coast Path, which runs to the south of the town of Rhyl before joining the Wales Coast Path at Kinmel Bay.

8.2.4.11 No National Trails are located within the Mona Onshore Transmission Infrastructure Scoping Search Area. However, the following NCN Routes are located within the Mona Onshore Transmission Infrastructure Scoping Search Area:

- Route 5:
  - This NCN Route runs adjacent to the coast between the towns of Rhyl and Llandullas, utilising a predominantly traffic free route.
- Route 84:
  - This NCN Route adjoins Route 5 and runs alongside the River Clwyd between the towns of St Asaph and Rhyl, utilising a predominantly traffic free route.

8.2.4.12 In addition, there are a number of on-road and traffic-free cycle routes associated with the towns of Rhyl and Abergele, which do not form part of the NCN but are located within the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.2.4.13 Active Travel Areas around the towns of Rhyl, Rhuddlan, Kinmel Bay, Abergele and Llandullas are located within the Mona Onshore Transmission Infrastructure Scoping Search Area. Within each of these Active Travel Areas there are several Active Travel Routes, which typically follow the existing highway network.

8.2.4.14 The location of PRoW, Active Travel Areas, Active Travel Routes and NCN Routes within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in Figure 8.4.

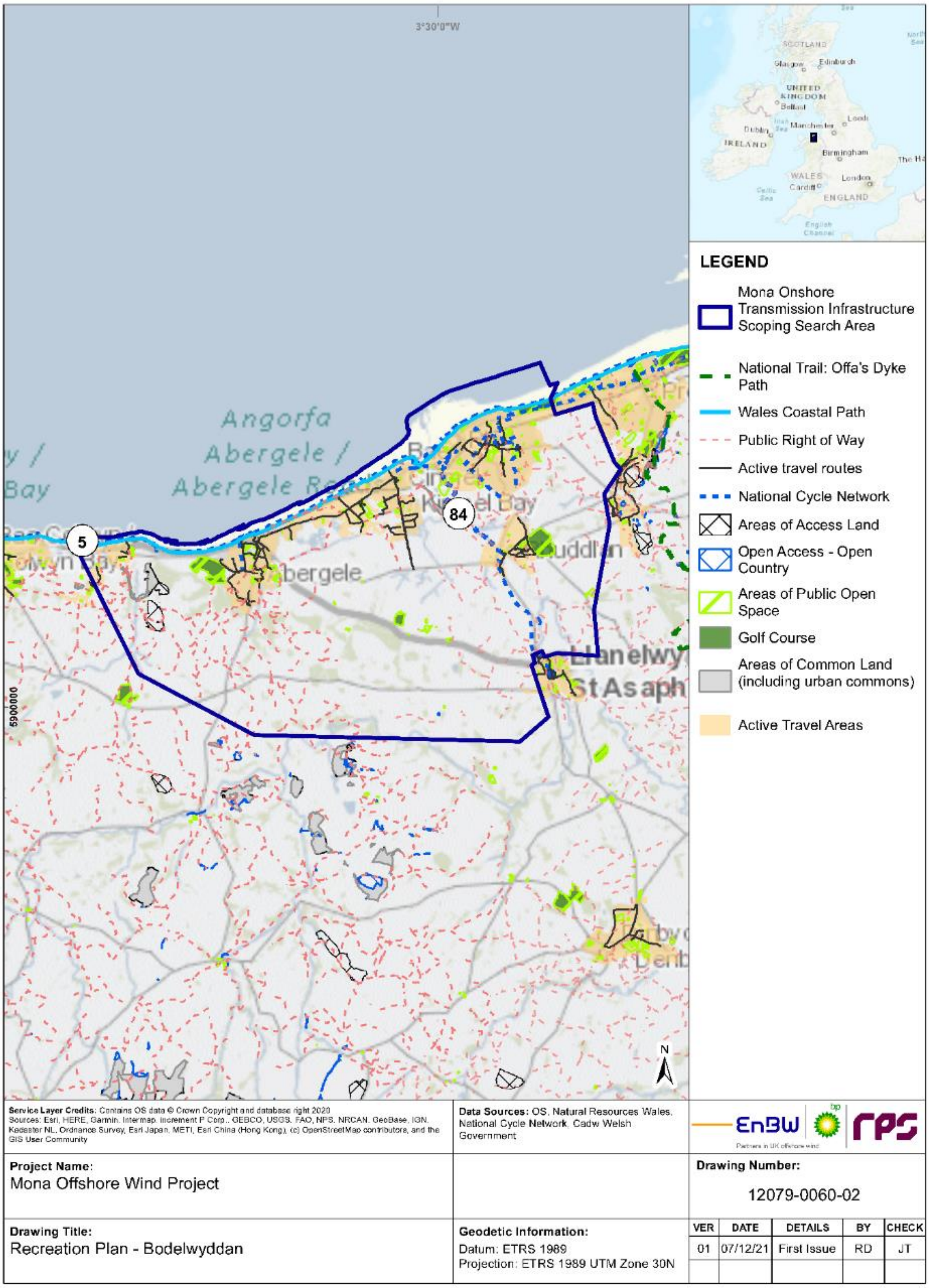


Figure 8.4: Land use and recreation receptors within the Mona Onshore Transmission Infrastructure Scoping Search Area.

Other recreational resources

8.2.4.15 Other recreational resources of note located within the Mona Onshore Transmission Infrastructure Scoping Search Area include:

- Wide areas of coastal beach between the towns of Rhyl and Llandullas, including Rhyl Sands, Kinmey Bay and Abergele.
- Kinmel Dunes Local Nature Reserve (LNR) located at the beach in Kinmel Bay.
- The Grade I listed building Bodrhyddan Hall. Bodrhyddan Hall is a 17th century home, gardens and tearoom, which is open to the public during the summer.
- Rhuddlan Castle, which is normally open to the public throughout the year but is understood to be closed on a temporary basis.
- Graig Fawr Site of Special Scientific Interest (SSSI) located near the seaside town of Prestatyn, which is managed by the National Trust.
- Several golf courses, including Rhuddlan Golf Club, Kinmel Park, Abergele Golf Club and the western part of Rhyl Golf Club.

8.2.5 Potential project impacts

8.2.5.1 A range of potential impacts on land use and recreation have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

8.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.6 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

8.2.5.3 Potential impacts scoped out of the assessment are presented in

8.2.5.4 Table 8.7, with justification for why the impact should be scoped out.

Table 8.6: Impacts proposed to be scoped into the project assessment for land use and recreation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The permanent loss of agricultural land arising from the Project	✓	×	×	Construction of substation infrastructure.	The quality and area of agricultural land within the Mona land use and recreation study area for the transmission assets to be permanently lost as a result of construction will be determined using desk-based analysis and ALC surveys (if existing baseline data provides insufficient coverage). The desk-based analysis and ALC surveys will be undertaken in accordance with the MAFF Agricultural Land Classification (ALC) Guidelines (1988). The presence of peaty and organic soil materials will also be determined through the desk-based analysis and the ALC surveys targeted to consider soil characteristics within identified soil types. In addition, the impact on farm holdings and farming operations within the Mona land use and recreation study area for the transmission assets will be informed through direct discussions with farmers and their representatives	The impact of loss of land and disruption and reduced access to agricultural land on farming operations will be assessed in accordance with the Design Manual for Roads and Bridges (DMRB) – LA 109 Geology and Soils (Welsh Government *et al*., 2019) and DMRB – LA 112 Population and Human Health (Welsh Government *et al*., 2020). The assessment will also consider information provided during discussions with farmers and/or representatives where relevant.
The impact of disruption and reduced access to agricultural land during construction and decommissioning of the onshore transmission assets.	✓	×	✓	Construction and decommissioning of the onshore transmission assets would cause disruption to agricultural land quality, soils (including peaty and organic soil types) and farming operations and reduce the area of land available to farmers during the construction and decommissioning phase.	The quality and area of agricultural land within the Mona land use and recreation study area for the transmission assets to be temporarily or permanently lost during construction will be determined using desk-based analysis and targeted ALC surveys (if existing baseline data provides insufficient coverage). The desk-based analysis and ALC survey will be undertaken in accordance with the MAFF Agricultural Land Classification (ALC) Guidelines (1988). The presence of peaty and organic soil materials will also be determined through the desk-based analysis and the ALC surveys targeted to consider soil characteristics within identified soil types. In addition, the impact on farm holdings and farming operations within the Mona land use and recreation study area for the transmission assets	The impact of temporary disruption and reduced access to agricultural land on farming operations will be assessed in accordance with the DMRB – LA 109 Geology and Soils (Welsh Government *et al*., 2019) and DMRB – LA 112 Population and Human Health (Welsh Government *et al*., 2020). The assessment will also consider information provided during discussions with farmers and/or representatives where relevant.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					will be informed through direct discussions with farmers and their representatives.	
The impact of disruption and reduced access to recreational resources (e.g. access land, common land and village greens, PRoW, cycle routes, other recreational resources) during construction and decommissioning of the onshore transmission assets.	✓	×	✓	Construction and decommissioning of the onshore transmission assets would cause disruption and reduce access to recreational resources during the construction and decommissioning phase.	Recreation resources located within the Mona land use and recreation study area for the transmission assets will be identified using desk-based analysis. In addition, targeted on-site surveys may be undertaken (where required) to establish the relative importance of recreational resources within the Mona land use and recreation study area for the transmission assets to the wider community.	The impact of disruption and reduced access to recreational resources will be assessed qualitatively, utilising professional judgement where required to determine the impact magnitude and sensitivity of identified receptors. The assessment will be undertaken in accordance with methodology set out in part 1, section 4: EIA Methodology and will also consider information acquired from targeted on-site surveys where relevant.

Table 8.7: Impacts proposed to be scoped out of the project assessment for land use and recreation.

Impact	Justification
The impact of disruption and reduced access to agricultural land during operation and maintenance of the onshore transmission assets.	Impacts arising during of the operation of the onshore transmission assets will be limited to maintenance and repair activities (e.g. investigation of onshore export cables) and would be small in magnitude, short term and infrequent. In addition, any land impacted during maintenance and repair activities would be reinstated to its original condition. Any permanent effects on agricultural land would occur during the construction phase and would be assessed as part of the assessment of effects for construction. Therefore, the potential impact on agricultural land during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the project assessment for land use and recreation.
The impact of disruption and reduced access to recreation resources (e.g. access land, common land and village greens, PRoW, cycle routes, other recreational resources) during operation and maintenance of the onshore transmission assets.	Impacts arising during of the operation of the onshore transmission assets will be limited to maintenance and repair activities (e.g. investigation of onshore export cables) and would be small in magnitude, short term and infrequent. Therefore, the potential impact on recreation resources during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the project assessment for land use and recreation.

8.2.6 Measures adopted as part of the project

8.2.6.1 The following measures adopted as part of the project are relevant to land use and recreation. These measures may evolve as the engineering design and the EIA progresses.

- Construction Traffic Management Plan (CTMP) – The measures to address any requirement to temporarily divert a public right of way or any other recreational route would be included in the CTMP. In addition, the CTMP would also set out any traffic management measures/procedures required to mediate the interface between construction vehicles and members of the public accessing recreational resources.
- Code of Construction Practice (CoCP) – Construction of the onshore transmission assets would be undertaken in accordance with the relevant best practice measures as recommended in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Department for Environment, Food & Rural Affairs, Defra, 2009) and the Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021).

8.2.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.2.7 Proposed assessment methodology

8.2.7.1 The land use and recreation assessment for the onshore transmission assets will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, in addition to the following established guidance:

- Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988)
- DMRB LA 109 - Geology and Soils (Welsh Government, Highways England, Transport Scotland, Department for Infrastructure, 2019)
- DMRB LA 112 - Population and Human Health (Welsh Government, Highways England, Transport Scotland, Department for Infrastructure, 2020)
- Active Travel Act Guidance (Welsh Government, 2021)
- A New Perspective on Land and Soil in Environmental Impact Assessment (IEMA, 2022).

8.2.7.2 Although principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, including the onshore transmission assets (e.g. onshore export cables).

8.2.8 Potential cumulative effects

8.2.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to land use and recreation will be considered within the ES.

8.2.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

8.2.9 Potential inter-related effects

8.2.9.1 The assessment of potential inter-related effects will be considered in the land use and recreation ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Seascape, landscape and visual resources:
  - Construction and operation of the onshore transition assets would impact the visual amenity of PRoW and other recreational resources within the Mona land use and recreation study area for the transmission assets.
- Traffic and transport:
  - Additional vehicle movements required to facilitate construction of the onshore transmission assets would impact the accessibility of PRoW and other recreational resources.
- Noise and vibration:
  - Noise generated during the construction and operation of the onshore transmission assets would impact the amenity of PRoW and other recreational resources within the Mona land use and recreation study area for the transmission assets.
- Socio-economics and community:
  - Construction of the onshore transmission assets would cause disruption and reduce the area of land available to farmers, which may impact the economic viability of farming operations within the Mona land use and recreation study area for the transmission assets.

8.2.10 Potential transboundary impacts

8.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon land use and recreation due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

8.3 Traffic and transport

8.3.1 Introduction

8.3.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the traffic and transport receptors of relevance to the onshore transmission assets and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning phase.

8.3.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of the traffic and transport impacts for the onshore transmission assets.

8.3.1.3 A Transport Assessment will be prepared to support the EIA process. The Transport Assessment will be prepared in accordance with its own relevant guidance and best practice and will be subject to a separate scoping exercise with the relevant highway authorities.

8.3.2 Study area

8.3.2.1 The initial study area to be used for the assessment of traffic and transport (‘the Mona traffic and transport study area for the transmission assets’) will focus on areas (landward of Mean High Water Springs (MHWS)) where potential impacts are most likely to occur. This includes areas located near construction sites and access routes where construction traffic would not be dispersed across the highway network.

8.3.2.2 As such, the Mona traffic and transport study area for the transmission assets to be used in the EIA assessment will be defined as:

- The area of land to be temporarily or permanently occupied during construction, operation and maintenance and decommissioning of the onshore transmission assets, including the local highway network.
- The Local Road Network (LRN) to be used by construction traffic, including highways located within 1km of the construction work area for the onshore transmission assets.
- The Strategic Road Network (SRN) to be used by construction traffic, including highways located within 1km of the construction work area for the onshore transmission assets.

8.3.2.3 The Mona traffic and transport study area for the transmission assets will also include additional temporary accesses and/or road improvements required to facilitate the construction of the onshore transmission assets. Agreement will be sought with the relevant highway authorities regarding any additional parts of the LRN and SRN that may need to be considered in the traffic and transport assessment.

8.3.2.4 The Mona traffic and transport study area for the transmission assets will be reviewed and modified in response to refinements to the onshore transmission asset boundary and any additional environmental or design constraints identified during the EIA process.

8.3.3 Data sources

8.3.3.1 The data sources used to inform the baseline assessment will primarily comprise published material, which is publicly available and material available to purchase from the relevant highway authorities. These data sources will be supplemented by site visits to be undertaken by competent experts and the analysis of newly commissioned traffic survey data.

8.3.3.2 An initial desk-based review has identified a number of existing data sources which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 8.8 of the EIA Scoping Report below.

Table 8.8: Baseline data sources.

Source	Summary
Local Highway Authority and Welsh Government	Existing traffic flow information from the Local Highway Authority (and Welsh Government where relevant) to identify the current operation of the road network. This will include results from Automatic Traffic Counts (ATCs) and Manual Classified Counts (MCCs).
www.crashmap.co.uk and the Local Highway Authority	Personal Injury Accident data for road traffic accidents will also be obtained from Crashmap and the Local Highways Authority.
Bus and rail service operators	Records of existing bus and rail services will be obtained from a desktop analysis of route maps and timetables published by the relevant service operators.
Local Highway Authority	Records of existing Public Rights of Way (PRoWs) and cycle routes will be obtained from the Local Highway Authority.
	Records of the adopted highway boundary along the LRN will be obtained from the Local Highway Authority.
Sustrans Interactive Mapping System Great Britain: NCN Map	Details of NCN routes located within each Local Authority area within the Mona traffic and transport study area for the transmission assets.

8.3.3.3 Existing traffic flow information for the LRN and SRN, including ATCs and MCCs, will be obtained from the local and national highway authorities.

8.3.3.4 In addition to the baseline data sources identified above, site-specific traffic surveys are proposed in early 2022 to inform the baseline assessment for traffic and transport.

8.3.3.5 Traffic surveys will be undertaken to obtain traffic flow data at key locations on the highway where the highway authorities do not hold any such data. ATCs will record total traffic volumes, vehicle classifications and vehicle speeds via pneumatic tubes installed across the carriageway at key sections of the highway over a two-week period. MCCs will record total traffic turning movements and vehicle classifications at key junctions via video cameras over a daily period.

8.3.3.6 The scope of the site-specific surveys will be agreed with the local and national highway authorities.

8.3.3.7 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.3.4 Baseline environment

8.3.4.1 The traffic and transport assessment will consider the potential impact of the onshore transmission assets on receptors sensitive to changes in traffic located within the Mona traffic and transport study area for the transmission assets.

8.3.4.2 Effects will be assessed on users of the LRN, SRN, railways (where relevant), PRoW and other active or promoted travel routes.

8.3.4.3 The following receptors will be used to determine the sensitivity of highway links for assessment:

- people located at home or within the workplace, including sensitive groups such as children, the elderly and the disabled
- hospitals, churches, schools or historical buildings
- recreational resources, including public open spaces, shopping areas and tourist attractions
- sites designated for nature conservation.

Road network

8.3.4.4 The Mona Onshore Transmission Infrastructure Scoping Search Area is bisected by the A55 North Wales Expressway, which forms part of the SRN providing strategic access along the north Wales coast.

8.3.4.5 The A525 routes north to south through the eastern section of the Mona Onshore Transmission Infrastructure Scoping Search Area between Rhyl and St Asaph and beyond.

8.3.4.6 The A547 routes east to west through the Mona Onshore Transmission Infrastructure Scoping Search Area from Prestatyn through Rhuddlan and Abergele and along the north Wales coast.

8.3.4.7 The A548 routes broadly north to south through the Mona Onshore Transmission Infrastructure Scoping Search Area between Abergele and Llanrwst.

8.3.4.8 The B5381 routes broadly east to west through the Mona Onshore Transmission Infrastructure Scoping Search Area between St Asaph and the A548 and beyond.

8.3.4.9 The B5118 and B5119 route within Rhyl in the northeastern section of the Mona Onshore Transmission Infrastructure Scoping Search Area providing local access.

8.3.4.10 All other roads within the Mona Onshore Transmission Infrastructure Scoping Search Area are of a lower classification and provide access to the local areas. These will be considered within the assessment process as the location of the onshore transmission infrastructure is finalised.

Other transport receptors

8.3.4.11 There is one railway line located within the Mona Onshore Transmission Infrastructure Scoping Search Area. This is the Crewe to Holyhead North Wales Coast Line, which routes broadly east to west along the coastline.

8.3.4.12 There are numerous PRoW located within and surrounding the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.3.4.13 NCN Route 5 travels broadly east to west through the Mona Onshore Transmission Infrastructure Scoping Search Area along the coastline, whilst NCN Route 84 travels broadly north to south through its western section between Rhyl and St Asaph.

8.3.4.14 The A55 North Wales Expressway provides access into the Mona Onshore Transmission Infrastructure Scoping Search Area bypassing the built up areas and sensitive receptors along its route.

8.3.4.15 There are some built up areas within the Mona Onshore Transmission Infrastructure Scoping Search Area, within which there are a range of sensitive receptors, such as Rhyl, Kinmel Bay, Towyn, Pensarn, Llanddulas, Abergele, Rhuddlan and Bodelwyddan.

8.3.4.16 The location of other transport receptors, including NCN and PRoW within the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in part 3, Section 8.2: Land use and recreation of the EIA Scoping Report.

8.3.5 Potential project impacts

8.3.5.1 A range of potential impacts on traffic and transport have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

8.3.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.9 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.3.5.3 In the event that any new junctions are required to access construction works areas or the substation, the effects of these in terms of traffic flow and safety will be considered within the Transport Assessment.

8.3.5.4 Potential impacts scoped out of the assessment are presented in

8.3.5.5 Table 8.10, with justification for why the impact should be scoped out.

Table 8.9: Impacts proposed to be scoped into the project assessment for traffic and transport (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of driver and pedestrian delay/pedestrian amenity caused by construction works or construction traffic using the LRN and SRN.	✓	×	×	Additional vehicle movements or works, such as trenching, required to facilitate construction of the onshore transmission assets may impact the effective operation of the LRN, SRN and other transport receptors (e.g. PRoW) and cause driver and pedestrian delay/pedestrian amenity.	The LRN, SRN and other transport receptors located within the Mona traffic and transport study area for the transmission assets will be identified using desk based analysis. Records of existing public transport services will be obtained from the relevant public transport service operators. Existing traffic flow information for the LRN and SRN, including ATCs and MCCs, will be obtained from the local and national highway authorities. In addition, existing traffic data will be supplemented by further site-specific surveys to be undertaken by suitably qualified experts in early 2022. The scope of site-specific surveys will be agreed with the local and national highway authorities.	The type, number, frequency and distribution of additional vehicle movements on the LRN and SRN generated during construction of the onshore transmission assets will be predicted. The location of any crossings, such as areas where cable trenching may cross a local road, will be identified. Where predicted traffic flows exceed Rule 1 and Rule 2 of the Guidance for Environmental Assessment of Road Traffic (IEMA, 1993), these areas will be subject to further detailed impact assessment. The impact of additional vehicle movements on the effective operation of the LRN and SRN will be assessed in a separate Transport Assessment (to be submitted alongside the ES), which will undergo an independent scoping process in consultation with the local and national highway authorities. The impact of additional vehicle movements and construction works on the environment, including the sensitive receptors identified above, will be assessed in the ES chapter. Assessments will be undertaken in accordance with Planning Practice Guidance: Travel Plans, Transport Assessments and Statements (MHCLG, 2014), Guidance for Environmental Assessment of Road Traffic (IEMA, 1993) and DMRB LA104: Environmental Assessment and Monitoring (Welsh Government, National Highways, Transport Scotland and Department for Infrastructure Northern Ireland, 2020).
The impact of community severance caused by construction works or construction traffic using the LRN and SRN and the disruption of other transport receptors.	✓	×	×	Additional vehicle movements or works, such as trenching., required to facilitate construction of the onshore transmission assets could limit the mobility/access of users of the LRN, SRN and other transport receptors (e.g. PRoW), causing severance between communities (including community facilities).		
The impact of temporary delays to public transport services caused by construction of the onshore transmission assets.	✓	×	×	Construction of the onshore transmission assets may disrupt public transport services (e.g. bus, railway) due to the construction works themselves or additional vehicles movements causing delays.		
The impact of construction traffic on accidents and safety	✓	×	×	Additional vehicle movements required to facilitate construction of the onshore transmission assets could impact the safety	The LRN, SRN and other transport receptors located within the Mona traffic and transport	The type, number, frequency and distribution of additional vehicle movements on the LRN and SRN generated during construction of

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
for users of the LRN, SRN and other transport receptors.				of users of the LRN, SRN and other transport receptors (e.g. PRoW).	study area for the transmission assets will be identified using desk based analysis. Personal Injury Accident data for the LRN and SRN will be obtained using a combination of Crash Map and records held by the Local Highway Authorities. Records of existing public transport services will be obtained from the relevant public transport service operators.	the onshore transmission assets will be predicted. An analysis of Personal Injury Accident data, including CrashMap, will be undertaken to identify locations on the LRN and SRN which exhibit concentrations of collisions with similar patterns or collisions rates above the national average. These locations on the LRN and SRN will be considered as receptors sensitive to changes in traffic flows and will be subject to further detailed impact assessment. The impact of additional vehicle movements on accidents and safety will be assessed in accordance with the methodology set out in part 1, section 4: EIA Methodology, of this EIA Scoping Report, in addition to the application of professional judgement where required.
The impact of Abnormal Indivisible Loads (AILs) on the safety of users of the LRN, SRN and other transport receptors.	✓	×	×	Construction of the onshore transmission assets may require the transportation of AILs, which may impact the safety of users of the LRN, SRN and other transport receptors (e.g. PRoW).	The LRN, SRN and other transport receptors located within the Mona traffic and transport study area for the transmission assets will be identified using desk-based analysis.	Once the haul route has been identified, a qualitative assessment of the impact of AILs on accidents and the safety of users of the LRN, SRN and other transport receptors will be undertaken. This will comprise analysis to identify sections of the haul route which may require modifications to facilitate the transport of AILs to the construction site. The impact of AILs on accidents and safety will be assessed in accordance with the methodology set out in part 1, section 4: EIA Methodology, of this EIA Scoping Report, in addition to the application of professional judgement where required.

Table 8.10: Impacts proposed to be scoped out of the project assessment for traffic and transport.

Impact	Justification
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, community severance, public transport delay and accidents and safety during operation and maintenance of the onshore transmission assets.	Operation and maintenance of the onshore transmission assets is likely to generate a limited number of additional vehicle movements on the LRN and SRN. The onshore transmission assets do not require any manned facilities and would be monitored remotely, requiring only maintenance activities. Therefore, the potential impact of additional vehicle movements on the LRN, SRN and other transport receptors during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for traffic and transport.
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, community severance, public transport delay and accidents and safety during decommissioning of the onshore transmission assets.	Decommissioning of the onshore transmission assets will generate a lower number of additional vehicle movements on the LRN and SRN than the construction phase. This is because retired infrastructure/ equipment will either be left *in situ* or transported away from site in bulk, reducing the number of additional vehicle movements required to facilitate decommissioning of the onshore transmission assets. In addition, measures will be included in the CTMP, updated as necessary. Therefore, the potential impact of additional vehicle movements on the LRN, SRN and other transport receptors during decommissioning of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for traffic and transport.

8.3.6 Measures adopted as part of the project

8.3.6.1 The following measures adopted as part of the project are relevant traffic and transport. These measures may evolve as the engineering design and the EIA progresses.

- Construction Traffic Management Plan (CTMP) – The movement of construction vehicles entering or exiting construction sites and utilising the LRN and SRN would be controlled, as to avoid or reduce potential impacts on sensitive receptors.

8.3.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.3.6.3 Requirements for additional mitigation measures will be determined through discussions with the Local Highways Authorities likely to be affected as part of the traffic and transport assessment.

8.3.7 Proposed assessment methodology

8.3.7.1 It is anticipated that the onshore export cable may be required to cross public highways and/or railways located within the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.3.7.2 Where the onshore export cable is required to cross major roads and/or infrastructure, it is anticipated that trenchless construction techniques will be used where possible as to avoid direct impacts on these receptors.

8.3.7.3 The proposed method for the installation of the onshore export cable will be developed in consultation with the relevant highway authorities, network rail and/or the rail operator where appropriate.

8.3.7.4 The potential impact of disruption to highway and rail services because of onshore export cable construction will be assessed in consultation with the relevant highway authorities and network rail where appropriate.

8.3.7.5 Additional vehicle movements generated during construction of the onshore transmission assets will be determined once the location of the onshore export cable route, onshore substation and associated infrastructure has been defined.

8.3.7.6 A detailed analysis of the LRN and SRN will then be undertaken to identify key locations where potential traffic and transport impacts may occur. This analysis will identify road network constraints and inform the access strategy for construction and decommissioning related vehicles (i.e. types, numbers, frequency and timings).

8.3.7.7 The access strategy to be utilised during the construction and decommissioning of the onshore transmission assets will be consulted and agreed upon with the local and national highways authorities.

8.3.7.8 The traffic and transport assessment will predict the traffic flows generated on the LRN and SRN during the construction of the onshore transmission assets. These predicted traffic flows will be assessed against forecast baseline traffic data to determine if an impact is likely to occur. The scope and duration of predicted impacts will be quantified for each phase of the construction programme.

8.3.7.9 A precautionary approach will be adopted for the traffic and transport assessment regarding the proportion of the haul road and construction compounds that will require aggregate surfacing and the timescale and phasing of construction.

8.3.7.10 In addition, the ES will include an outline construction compound strategy, which will be further developed once the route is finalised, to indicate the potential size and broad spread of construction compounds that are likely to be required.

8.3.7.11 The traffic and transport assessment will be based on the following guidance:

- Planning Policy Wales Technical Advice Note (TAN) 18: Transport (Welsh Assembly Government, 2007).
- Planning Policy Wales Edition 11 (Welsh Government, 2021).
- Guidelines for the Environmental Assessment of Road Traffic Guidance Note No. 1 (IEMA, 1993).
- DMRB LA104: Environmental Assessment and Monitoring (Welsh Government, National Highways, Transport Scotland and Department for Infrastructure Northern Ireland, 2020).

Assessment process

8.3.7.12 In terms of the assessment of the environmental impacts of traffic, the IEMA guidelines states that the following two 'rules' should be followed:

- Rule 1 - Include highway links where traffic flows will increase by more than 30% or where the number of Heavy Goods Vehicles (HGVs) will increase by more than 30%.
- Rule 2 - Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

8.3.7.13 The assessment will therefore, identify the sensitivity of affected transport routes, taking into account the presence and location of sensitive receptors or route users.

8.3.7.14 Rules 1 and 2 are used as a screening tool to determine whether or not a full assessment of effects is required for any identified highway link. Where predicted changes in traffic flow fall beneath these levels, a full assessment of effects will not be required and no significant effects upon that highway link can be concluded.

8.3.7.15 Consistent with the IEMA guidelines, the following will be considered within the traffic and transport assessment:

- driver delay
- severance of routes
- pedestrian delay
- pedestrian amenity
- accidents and road safety
- hazardous, dangerous and abnormal loads.

8.3.8 Potential cumulative effects

8.3.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to traffic and transport will be considered within the ES.

8.3.8.2 The cumulative effect assessment will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

8.3.8.3 Other emerging developments that are predicted to generate traffic within the Mona traffic and transport study area for the transmission assets during construction of the onshore transmission assets, which may contribute to a cumulative effect, will be identified in the cumulative effect assessment.

8.3.8.4 Other development proposals that emerge at the same time will be treated together and will be cumulatively assessed against the baseline scenario to determine their cumulative effect and any cumulative highway and transport mitigation requirements (if required).

8.3.8.5 The predicted traffic flows generated within the Mona traffic and transport study area for the transmission assets by each relevant emerging development will be quantified and a cumulative effect assessment will be undertaken using the same methodology as that set out section 8.3.7.

8.3.9 Potential inter-related effects

8.3.9.1 The assessment of potential inter-related effects will be considered in the traffic and transport ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Terrestrial ecology and intertidal birds:
  - Noise, vibration and air emissions generated by additional vehicle movements on the LRN and SRN during construction may impact sites designated for conservation and protected habitats and species within the Mona traffic and transport study area for the transmission assets.
- Land use and recreation:
  - Access to recreational resources may be disrupted by additional vehicle movements on the LRN and SRN during construction of the onshore transmission assets.
- Noise and vibration:
  - Additional vehicle movements predicted as part of the Transport Assessment will be used to identify areas within the Mona noise and vibration study area for transmission assets which require further detailed noise and vibration assessment.
- Air quality:
  - Additional vehicle movements predicted as part of the Transport Assessment will be used to identify areas within the Mona air quality

study area for the transmission assets which require further detailed air quality assessment.

- Effects of dust generated by construction vehicles will be considered in the detailed air quality assessment.

8.3.10 Potential transboundary impacts

8.3.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon traffic and transport due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

8.4 Noise and vibration

8.4.1 Introduction

8.4.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the noise and vibration receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning phase of the generation and transmission assets.

8.4.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and methodology to be used in the assessment of noise and vibration impacts for the generation and transmission assets.

8.4.1.3 The potential impacts arising from underwater noise and vibration generated during the construction, operation and maintenance, and decommissioning of the generation assets are described in part 2: section 3.2, of the EIA Scoping Report.

8.4.1.4 The potential impacts arising from underwater noise and vibration generated during the construction, operation and maintenance, and decommissioning of the offshore transmission assets are described in Part 3: Section 3.2, of the EIA Scoping Report.

8.4.2 Study area

8.4.2.1 The study area for the assessment of noise and vibration impacts (‘the Mona noise and vibration study area for the generation and transmission assets’) will consider the potential impacts on noise sensitive receptors arising from the construction, operation and maintenance, and decommissioning of both the generation assets and transmission assets.

8.4.2.2 The Mona noise and vibration study area for generation and transmission assets will focus on receptors (landward of Mean High Water Springs (MHWS)) where potential impacts are most likely to occur on receptors sensitive to noise and vibration.

8.4.2.3 As such, the Mona noise and vibration study area for the generation and transmission assets to be used in the EIA assessment and will be defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore transmission assets.
- Noise sensitive receptors located within 1km of the landfall and onshore substation.
- Noise sensitive receptors located within 250m of the onshore cable corridor.
- Noise sensitive receptors located within 2km of the offshore export cable corridor.
- Noise sensitive receptors located within 50km of the offshore generation assets where construction piling is required. This is due to the larger study area distances required to assess noise generated during the construction of generation assets (e.g. foundation piling), which may coincide with noise sensitive receptors located landward of MHWS.
- Vibration sensitive receptors located within 100m of the construction of the onshore transmission assets.

8.4.2.4 The Mona noise and vibration study area for the generation and transmission and assets will be reviewed and modified in response to refinements made to the generation and transmission assets boundary and additional environmental and/or design constraints identified during the EIA process.

8.4.3 Data sources

8.4.3.1 Sound monitoring surveys will be undertaken to characterise the baseline sound levels. The location of baseline sound surveys will be determined through a desk-based review of OS mapping data and satellite imagery to identify sensitive receptors within the Mona noise and vibration study area for the generation and transmission assets, which are most likely to be impacted by noise generated during construction, operation and maintenance and decommissioning of the generation and transmission assets.

8.4.3.2 The location of baseline sound surveys will be suitably representative and agreed with the relevant the Environmental Health Officers (EHOs) from the relevant Local Authority.

8.4.3.3 In addition, a weather station will be deployed at one (or more) locations to record site-specific meteorological conditions whilst baseline sound surveys are being undertaken. The meteorological information collected during baseline surveys would be reviewed and if appropriate data will be removed from the dataset to ensure that representative ambient and background noise levels can be derived.

8.4.3.4 The baseline sound surveys (and data scoping) will be undertaken in accordance with British Standard (BS) 4142:2014 Methods for rating and assessing industrial and commercial sound and BS 7445:1991 Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use.

8.4.4 Baseline environment

8.4.4.1 A large proportion of the Mona Onshore Transmission Infrastructure Scoping Search Area is located within a rural and agricultural setting, which may be indicative of low ambient sound levels. However, ambient sound levels within the Mona Onshore Transmission Infrastructure Scoping Search Area are likely to increase in areas located in proximity to urban areas, such as towns and villages.

8.4.4.2 In addition, higher ambient sound levels are likely to be experienced by sensitive receptors located in proximity to the local highway network or other forms of transport infrastructure (e.g. railways, airports) present within the Mona Onshore Transmission Infrastructure Scoping Search Area.

8.4.4.3 There are no statutory or non-statutory designations specifically related to matters of noise and vibration, or how it should be controlled. However, early engagement with the relevant Local Authority EHO will facilitate the identification of sensitive receptors to ensure the noise and vibration assessment is robust and proportionate.

8.4.5 Potential project impacts

8.4.5.1 A range of potential impacts on noise and vibration have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the generation and transmission assets.

8.4.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.11, together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.4.5.3 Potential impacts scoped out of the assessment are presented in

8.4.5.4 Table 8.12, with justification for why the impact should be scoped out.

Table 8.11: Impacts proposed to be scoped into the project assessment for noise and vibration (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of noise and vibration generated by onshore and offshore construction and decommissioning activities on human receptors.	✓	×	✓	Activities required for the construction and decommissioning of the generation and transmission assets would generate noise and vibration emissions which could adversely affect the health of human receptors.	Human receptors sensitive to noise and vibration located within the Mona noise and vibration study area for the generation and transmission assets will be identified using desk-based analysis. Where existing baseline data coverage is insufficient, baseline sound levels would be obtained through sound monitoring surveys. The locations and durations of baseline sound surveys would be suitably representative and agreed with the EHO from the relevant Local Authority.	Predicted noise and vibration levels arising from onsite construction and decommissioning activities will be calculated using modelling, in accordance with the methodology in BS 5228, where applicable. In some cases, such as where separation distances exceed the threshold in BS 5228 an alternative methodology such as International Standard Organisation (ISO) 9613-2 or Nord2000 may be used. The impact of noise and vibration on human receptors and historic assets, will be assessed in accordance with BS 5228 guidance. The significance of likely effects will be determined in accordance with IEMA Guidelines for Environmental Noise Impact Assessment (2014).
The impact of noise generated by additional vehicle movements on the local highway network during the construction and decommissioning phase on human receptors.	✓	×	✓	Additional vehicle movements on the local highway network required to facilitate construction and decommissioning of the onshore transmission assets would generate noise emissions which could adversely affect the health of human receptors.	Human receptors sensitive to noise and vibration located within the Mona noise and vibration study area for the generation and transmission assets will be identified using desk-based analysis. Where existing baseline data coverage is insufficient, baseline sound levels would be obtained through sound monitoring surveys. The locations and durations of baseline sound surveys would be suitably representative and agreed with the EHO from the relevant Local Authority. The number of additional vehicle movements required to facilitate construction and decommissioning of the onshore transmission assets will determined as part of the assessment for Traffic and Transport (see section 8.3 of the EIA Scoping Report).	Predicted noise levels arising from additional vehicle movements during the construction and decommissioning phase will likely be calculated using the Calculation of Road Traffic Noise (CRTN). If the traffic volumes fall below the thresholds of CRTN then an alternative method may be used, or corrections may be applied to the data, as appropriate. The guidance in DMRB LA 111 Noise and Vibration will be used as a basis for the impact of traffic noise on human receptors. However, as this is not a new road scheme, this guidance is not directly applicable, and a full assessment would not be required. The details of the scenarios to be assessed will be evaluated following receipt of the traffic data. The significance of likely effects will be determined in accordance with the IEMA

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						Guidelines for Environmental Noise Impact Assessment (2014).
The impact of noise generated during operation of the onshore substation on human receptors.	×	✓	×	Operation of the onshore substation would generate noise emissions which could adversely affect the health of human receptors.	Human receptors sensitive to noise located within the Mona noise and vibration study area for the generation and transmission assets will be identified using desk-based analysis. Where existing baseline data coverage is insufficient, baseline sound levels would be obtained through sound monitoring surveys. The locations and durations of baseline sound surveys would be suitably representative and agreed with the EHO from the relevant Local Authority.	Predicted noise levels arising from operation of the onshore substation will be calculated using modelling implementing the methodology in ISO 9613-2. The impact of noise on human receptors will be assessed in accordance with BS 4142 and relevant World Health Organisation guidance. The significance of likely effects will be determined in accordance with the IEMA Guidelines for Environmental Noise Impact Assessment (2014).

Table 8.12: Impacts proposed to be scoped out of the project assessment for noise and vibration.

Impact	Justification
The impact on human receptors and historic assets arising from vibration generated by additional vehicle movements on the local highway network during construction and decommissioning of the onshore transmission assets.	Additional vehicle movements on the local highway network during construction and decommissioning of the onshore transmission assets are unlikely to generate high levels of vibration. Therefore, the potential impact of vibration from additional vehicle movements on human receptors and historic assets during construction of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the onshore transmission assets assessment for noise and vibration.
The impact on human receptors and historic assets arising from vibration generated during operation and maintenance of the onshore transmission assets.	Operation and maintenance of the onshore transmission assets is unlikely to generate high levels vibration. In addition, the impact of vibration on sensitive receptors during maintenance activities would be intermittent, short term and temporary in nature. Therefore, the potential impact on human receptors and historic assets during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the onshore transmission assets assessment for noise and vibration.
The impact of noise and vibration generated during operation and maintenance of the onshore export cable.	Operation and maintenance of the onshore export cable and associated infrastructure is unlikely to generate high levels of noise and vibration. The impact of noise and vibration on sensitive receptors during maintenance activities would be intermittent, short term and temporary in nature. Additional vehicle movements associated with operation and maintenance of the onshore export cable and associated infrastructure would also be intermittent, short term and temporary in nature and unlikely to exceed the thresholds that would warrant an assessment with the DMRB LA 111. Therefore, the potential impact on human receptors and historic assets during operation and maintenance of the onshore export cable and associated infrastructure is unlikely to be significant and is proposed to be scoped out of the onshore transmission assets assessment for noise and vibration.

8.4.6 Measures adopted as part of the project

8.4.6.1 The following measures adopted as part of the project are relevant to noise and vibration. These measures may evolve as the engineering design and the EIA progresses.

- Construction Traffic Management Plan (CTMP) – The movement of construction vehicles entering or exiting construction sites and utilising the local highway network would be controlled as to avoid or reduce potential impacts of noise emissions on sensitive receptors.
- Code of Construction Practice (CoCP) – Construction of the onshore transmission assets would be undertaken in accordance with the relevant best practice measures as recommended in BS 5228.

8.4.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.4.6.3 Requirements for additional noise and vibration mitigation measures will be determined through discussions with the EHOs from each Local Authority likely to be affected as part of the noise and vibration assessment.

8.4.7 Proposed assessment methodology

8.4.7.1 The noise and vibration assessment for the generation and transmission assets will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, in addition to the following established guidance:

- BS 4142 – Methods for rating and assessing industrial and commercial sound (2019)
- BS 5228 - Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration (2014)
- BS 7445 – Part 1 Description and measurement of environmental noise. Guide to quantities and procedures (2003)
- BS 7445 – Part 2 Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use (1991)
- BS 7445 – Part 3 Description and measurement of environmental noise. Guide to application to noise limits (1991)
- Calculation of Road Traffic Noise (1988)
- DMRB – LA111 – Noise and Vibration (Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland, 2020)
- IEMA - Guidelines for Environmental Noise Impact Assessment (2014)
- ISO 9613 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation (1996)
- Nord2000 - Comprehensive Sound Propagation Model - Part 1: Propagation in an Atmosphere without Significant Refraction and Part 2: Propagation in an Atmosphere with Refraction (2006)

- World Health Organisation - Guidelines for Community Noise (2000).

8.4.7.2 Although principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, including the onshore transmission assets (e.g. onshore export cables).

8.4.8 Potential cumulative effects

8.4.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to noise and vibration will be considered within the ES.

8.4.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

8.4.9 Potential inter-related effects

8.4.9.1 The assessment of potential inter-related effects will be considered in the noise and vibration ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Terrestrial ecology and intertidal birds:
  - Noise and vibration emissions generated during construction, operation and maintenance, and decommissioning of the onshore transmission assets may impact sites designated for nature conservation and protected habitats and species within the Mona noise and vibration study area for the generation and transmission assets.
- Historic environment:
  - Noise and vibration generated during construction, operation and maintenance, and decommissioning of the onshore transmission assets may impact the setting/integrity of designated historic assets located within the Mona noise and vibration study area for the generation and transmission assets.
- Traffic and transport:
  - Additional vehicle movements generated during construction of the onshore transmission assets would be used to identify areas within the Mona noise and vibration study area for the generation and transmission assets which required further detailed assessment.

8.4.10 Potential transboundary impacts

8.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon noise and vibration due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

8.5 Air quality

8.5.1 Introduction

8.5.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the air quality receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the onshore transmission assets.

8.5.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of air quality impacts for the onshore transmission assets.

8.5.2 Study area

8.5.2.1 The study area for the assessment of air quality impacts in the ES ('the Mona air quality study area for the transmission assets') will be based on the relevant Environmental Protection UK (EPUK), Welsh Government and Institute of Air Quality Management (IAQM) guidance (see section 8.5.7 of the EIA Scoping Report below).

8.5.2.2 The air quality assessment will consider the potential impacts of the onshore transmission assets on the following sensitive receptors (landward of Mean High Water Springs (MHWS)):

Dust

- People and property located within 350m of the construction work area for the onshore transmission assets.
- Ecological receptors sensitive to dust located within 50m of the construction work area for the onshore transmission assets.
- People, property and ecological receptors sensitive to dust located within 50m of roads used by construction vehicles.
- People, property and ecological receptors sensitive to dust located within 500m of the entrance to a construction work area for the onshore transmission assets.

Vehicle emissions

- People, property and ecological receptors sensitive to vehicle emissions within 200m of the road network to be used by construction vehicles where either of the following indicative criteria are satisfied:
  - A change in light duty vehicle (LDV) flows of more than 100 annual average daily traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA), or more than 500 AADT elsewhere.
  - A change in heavy duty vehicle (HDV) flows of more than 25 AADT within or adjacent to an AQMA, or more than 100 AADT elsewhere.

8.5.2.3 With regards to vehicle emissions, sensitive receptors located within 200m of the affected road network will be considered in the air quality assessment. IAQM guidance states that concentrations of air emissions originating from vehicles decreases with distance, whereby beyond 200m the road source contribution is typically indiscernible from background fluctuations.

8.5.2.4 The Mona air quality study area for transmission assets will be reviewed and modified in response to refinements made to the onshore transmission asset boundary and additional environmental and/or design constraints identified during the EIA process.

8.5.3 Data sources

8.5.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available online. An initial desk-based review has identified several data sources, which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 8.13 below.

Table 8.13: Baseline data sources.

Source	Summary
Department for Environment, Food & Rural Affairs (Defra)	2018-based background mapping data for NO2, PM10 and PM2.5
Welsh Government Air Quality in Wales Interactive Air Quality Management Areas.	Air Quality Management Area (AQMA Boundaries Map based on information reported by local authorities for 2021.
Relevant Local Authority websites	Air Quality Progress Reports and Annual Status Reports (ASRs) which describe the status of air quality, including AQMAs within each Local Authority area.
Air Pollution Information System (APIS)	Site-relevant critical loads, background pollution concentrations and deposition rates at ecological sites.

8.5.3.2 The baseline data sources identified in the EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.5.4 Baseline environment

8.5.4.1 People and property to be considered in the air quality assessment include residential and commercial properties (e.g. places of work), educational facilities (e.g. nurseries, schools, colleges), medical facilities (e.g. hospitals, care homes, GP surgeries) and recreational facilities (e.g. golf clubs, parks, Public Rights of Way (PRoW)).

8.5.4.2 Ecological receptors to be considered in the air quality assessment include statutory and non-statutory sites designated for nature conservation and protected habitats and species of ecological importance, where these are sensitive to air pollution.

AQMAs

8.5.4.3 There are no AQMAs located within the Mona Onshore Transmission Infrastructure Scoping Search Area. Therefore, background levels of pollutants within the Mona Onshore Transmission Infrastructure Scoping Search Area are likely to be below national air quality objectives, and are unlikely to be exceeded during construction, operation and maintenance and decommissioning of the onshore transmission assets.

Ecological receptors

8.5.4.4 The Mona Onshore Transmission Infrastructure Scoping Search Area coincides with a number of statutory and non-statutory sites designated for nature conservation. These designated sites for nature conservation are presented in Table 8.14 and

8.5.4.5 Table 8.15 below.

Table 8.14: Statutory designated sites.

Site Name	Designation
Liverpool Bay	Special Protection Area (SPA)
Traeth Pensarn	Site of Special Scientific Interest (SSSI)
Coed y Gopa	
Llanddulas Limestone and Gwrych Castle Wood	

Table 8.15: Non-statutory designated sites.

Site Name	Designation
Numerous Ancient Woodlands	Ancient Woodland Inventory
Kinmel Dunes	Local Nature Reserve (LNR)
Brickfield Ponds	
Rhuddlan Ponds	

8.5.4.6 Following submission of the EIA Scoping Report, a screening exercise will be undertaken in order to identify which ecological receptors are located within the Mona air quality study area for the transmission assets (informed by the selected onshore transmission route corridor and substation location) and which are specifically sensitive to air pollution. This will also identify those sites which can be excluded from the air quality assessment in the ES.

8.5.4.7 The location of statutory and non-statutory sites designated for nature conservation in relation to the Mona Onshore Transmission Infrastructure Scoping Search Area is presented in part 3, section 7.1: Terrestrial ecology and intertidal birds, of the EIA Scoping Report.

8.5.4.8 Further information regarding the ecological baseline and potential impacts of the onshore transmission assets on sites designated for nature conservation is presented in part 3, section 7.1: Terrestrial ecology and intertidal birds, of the EIA Scoping Report.

People and property

8.5.4.9 People and property located within the Mona Onshore Transmission Infrastructure Scoping Search Area include residential properties and occupants associated with towns (or villages), including Llanddulas, Abergele, Bodelwyddan, Towyn, Rhyl, Rhuddlan and St Asaph. Rural properties and occupants situated outside of existing settlements, but within the Mona air quality study area for the transmission assets, will be considered in the air quality assessment.

8.5.4.10 Other sensitive receptors located within the Mona Onshore Transmission Infrastructure Scoping Search Area include commercial properties, education facilities and medical facilities.

8.5.5 Potential project impacts

8.5.5.1 A range of potential impacts on air quality have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

8.5.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.16 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. risk assessments and modelling) that will be required to enable a full assessment of the impacts.

8.5.5.3 Potential impacts scoped out of the assessment are presented in

8.5.5.4 Table 8.17, with justification for why the impact should be scoped out.

Table 8.16: Impacts proposed to be scoped into the project assessment for air quality (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of dust soiling (nuisance) on property arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓	Activities required for the construction and decommissioning of the onshore transmission assets (e.g. earthworks, vehicle track-out) would generate dust emissions which could result in dust soiling effects on human receptors, including people and property.	Property sensitive to dust located within the Mona air quality study area for the transmission assets will be identified using desk-based analysis.	The impact of dust deposition on people and property will be assessed qualitatively, utilising a risk-based assessment to assess the potential impacts of dust generated by construction and decommissioning activities and the relative sensitivity of identified receptors. The risk-based assessment of dust will be undertaken in accordance with guidance set out in the Assessment of dust from demolition and construction (IAQM, 2014) guidance.
The impact of an increase in suspended particulate matter on people arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓	Activities required for the construction and decommissioning of the onshore transmission assets (e.g. earthworks, vehicle track-out) would generate dust emissions which could result in adverse effects on the health of people.	People located within the Mona air quality study area for the transmission assets will be identified using desk-based analysis.	The impact of suspended particulate matter on people and property will be assessed qualitatively, utilising a risk-based assessment to assess the potential impacts of dust generated by construction and decommissioning activities and the relative sensitivity of identified receptors. The risk-based assessment of dust will be undertaken in accordance with the Guidance on the assessment of dust from demolition and construction (IAQM, 2014).
The impact on human receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓	Additional vehicle movements required to facilitate construction and decommissioning of the onshore transmission assets would generate air emissions (e.g. NO_2, PM_{10} and $PM_{2.5}$) which could result in adverse effects on the health of human receptors.	Human receptors located within the Mona air quality study area for the transmission assets will be identified using desk-based analysis.	An initial screening assessment will be undertaken to identity areas which may require more detailed assessment of road traffic emissions. The screening assessment will utilise screening criteria set out in the Land-use planning and development control: Planning for air quality (EPUK & IAQM, 2017) guidance document. The approach to the detailed assessment of road traffic emissions will be consistent with Local Air Quality Management Technical Guidance: LAQM.TG16 (Defra, 2018) and the Land-Use Planning & Development Control: Planning for Air Quality document (EPUK & IAQM, 2017).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact on ecological receptors arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓	Activities required for the construction and decommissioning of the onshore transmission assets (e.g. earthworks, vehicle track-out) would generate dust emissions which could result in adverse effects on ecological receptors.	Ecological receptors sensitive to dust located within the Mona air quality study area for the transmission assets will be identified using desk-based analysis.	The impact of dust deposition on ecological receptors will be assessed qualitatively, utilising a risk-based assessment to assess the potential impacts of dust generated by construction and decommissioning activities and the relative sensitivity of identified receptors. The risk-based assessment of dust will be undertaken in accordance with the guidance in the Assessment of dust from demolition and construction (IAQM, 2014).
The impact on ecological receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓	Additional vehicle movements required to facilitate construction and decommissioning of the onshore transmission assets would generate air emissions (e.g. , NO_2, PM_{10} and $PM_{2.5}$) which could result in adverse effects on ecological receptors.	Ecological receptors located within the Mona air quality study area for the transmission assets will be identified using desk-based analysis.	An initial screening assessment will be undertaken to identity areas which may require more detailed assessment of road traffic emissions. The screening assessment will use screening criteria set out in the DMRB LA 105 – Air Quality (Welsh Government *et al.,* 2019) guidance. The approach to the detailed assessment of road traffic emissions will be consistent with DMRB LA 105 – Air Quality (Welsh Government *et al.,* 2019) guidance document.

Table 8.17: Impacts proposed to be scoped out of the project assessment for air quality.

Impact	Justification
The impact on human and ecological receptors (dust soiling and human health) arising from fugitive dust emissions generated during operation and maintenance of the onshore transmission assets.	Activities associated with the operation and maintenance of the onshore transmission assets are unlikely to generate large quantities of dust. Therefore, the potential impact on human or ecological receptors arising from fugitive dust emissions generated during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the onshore transmission assets assessment for air quality.
The impact on human and ecological receptors arising from air emissions generated by vehicle traffic during operation and maintenance of the onshore transmission assets.	Operation of the onshore transmission assets will generate a small number of additional two-way vehicle movements as result of staff trips and occasional maintenance activities. However, the additional two-way vehicle movements associated with operation and maintenance of the onshore transmission assets are unlikely to exceed the EPUK & IAQM indicative criteria for an air quality assessment (see section 8.5.7 of the EIA Scoping Report), irrespective of whether the Mona air quality study area for the transmission assets was located within or adjacent to an AQMA. Therefore, the potential impact on human or ecological receptors arising from air emissions generated by vehicle traffic during operation and maintenance of the onshore transmission assets is unlikely to be significant and is proposed to be scoped out of the assessment for air quality.

Impact	Justification
The impact on human and ecological receptors arising from air emissions generated by plants or stacks during operation and maintenance of the onshore transmission assets.	The Mona Offshore Wind Project does not include proposals for the construction of plants or stacks which could give rise to air emissions during operation of the onshore transmission assets. Therefore, the potential impact on human or ecological receptors arising from plant or stack emissions is unlikely to be significant and is proposed to be scoped out of the assessment for air quality.

8.5.6 Measures adopted as part of the project

8.5.6.1 The following measures adopted as part of the project are relevant to air quality. These measures may evolve as the engineering design and the EIA progresses.

- Code of Construction Practice (CoCP) – Construction of the onshore transmission assets would be undertaken in accordance with the appropriate best practice measures set out in the Guidance on the assessment of dust from demolition and construction (IAQM, 2014). The CoCP would include the development of a Dust Management Plan (DMP).
- Construction Traffic Management Plan (CTMP – The movement of construction vehicles entering or exiting construction sites and utilising the local highway network would be suitably managed, as to avoid or reduce the potential impacts of air emissions on sensitive receptors.

8.5.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.5.6.3 Requirements for additional air quality and/or dust mitigation measures will be determined through discussions with the EHOs from each Local Authority likely to be affected as part of the air quality assessment.

8.5.7 Proposed assessment methodology

8.5.7.1 The air quality assessment for the onshore transmission assets will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, in addition to the following established guidance:

- Local Air Quality Management Technical Guidance: LAQM.TG16 (Defra, 2018)
- Land-Use Planning & Development Control: Planning for Air Quality (EPUK & IAQM, 2017)
- Guidance on the assessment of dust from demolition and construction (IAQM, 2014)
- DMRB LA 105 – Air Quality (Welsh Government *et al*., 2019).

8.5.7.2 Although principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, including the onshore transmission assets (e.g. onshore export cables). In this case, the assessment of vehicle emissions at ecological sites will be undertaken in accordance with DMRB guidance.

8.5.8 Potential cumulative effects

8.5.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to air quality will be considered within the ES.

8.5.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

8.5.9 Potential inter-related effects

8.5.9.1 The assessment of potential inter-related effects will be considered in the air quality ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Terrestrial ecology and intertidal birds:
  - Dust and air emissions generated during construction of the onshore transmission assets may impact sites designated for nature conservation which support protected habitats and species.
- Historic environment:
  - Dust generated during construction of the onshore transmission assets may impact designated above ground historic assets located within the Mona air quality study area for the transmission assets.
- Traffic and transport
  - Additional vehicle movements generated during construction of the onshore transmission assets would be used to identify sites within the Mona air quality study area for the transmission assets which require further detailed air quality assessments.

8.5.10 Potential transboundary impacts

8.5.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon air quality due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

9 Offshore and onshore combined topics

9.1 Seascape, landscape and visual resources

9.1.1 Introduction

9.1.1.1 This section of the EIA Scoping Report identifies the seascape, landscape and visual resources and receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the generation and transmission assets.

9.1.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the Seascape, Landscape and Visual Impact Assessment (SLVIA) and the methodology to be used in the assessment of seascape, landscape and visual effects of both the generation and transmission assets.

9.1.2 Study area

9.1.2.1 The study area to be used in the assessment of seascape, landscape and visual resources ('the Mona seascape, landscape and visual study area for the generation and transmission assets') will be based on the findings of an analysis of the Zone of Theoretical Visibility (ZTV) for the generation and transmission assets, which will also inform the identification of representative viewpoints.

9.1.2.2 Once the location of generation and transmission assets has been identified and the ZTV determined, representative viewpoints will be agreed with the relevant stakeholders, including local authorities, Natural Resources Wales (NRW), National Park authorities and Areas of Outstanding Natural Beauty (AONB) partnerships.

9.1.2.3 Taking into account the known parameters of the generation and transmission assets, the following is likely to form the basis of the Mona seascape, landscape and visual study area for the generation and transmission assets when considered in combination with the relevant ZTVs:

Onshore transmission assets

- Land to be temporarily occupied during construction of the onshore transmission assets, with and additional 1km buffer either side of the offshore export cable corridor, landfall and construction compounds. At the landfall site, the Mona seascape, landscape and visual study area for the generation and transmission assets will consider the intertidal zone where appropriate (landward of MLWS).
- Land to be permanently occupied during operation of the onshore transmission assets, with an additional 10km buffer around the onshore substation.

Offshore generation assets

- Land to be temporarily and permanently occupied during construction, operation and maintenance and decommissioning of the generation assets, with an additional 50km buffer from the outer edge of the wind turbine array area.

Offshore transmission assets

- Land to be temporarily and permanently occupied during construction, operation and maintenance and decommissioning of the offshore transmission assets, with an additional 1km buffer either side of the offshore export cable corridor and a 20km buffer around the offshore substations.

9.1.2.4 The Mona seascape, landscape and visual study area for the generation and transmission assets will be reviewed and modified, if necessary, in response to refinements made to the final location of generation and transmission assets, any additional environmental and/or design constraints identified in the EIA process and once the ZTV has been determined.

9.1.3 Data sources

9.1.3.1 The data sources used to inform the baseline assessment will comprise a combination of published material publicly available online and site visits undertaken by competent experts.

9.1.3.2 An initial desk-based review has identified several data sources, which provide baseline data coverage of the Mona Array Scoping Boundary, Offshore Transmission Infrastructure Scoping Search Area and Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 9.1 below.

Table 9.1: Baseline data sources.

Source	Summary
Published national and local seascape and landscape character assessments and studies.	Provides information regarding the character of the landscape at the national and local scale.
MAGIC (interactive mapping website), NRW and Cadw websites. AONB Management Boards/National Park Authority management plans United Nations Educational, Scientific and Cultural Organisation (UNESCO) world heritage list. Local Plan designations, including heritage coast.	Descriptions of internationally and nationally designated landscapes, including publicly accessible Registered Parks and Gardens (RPaGs). Provides information regarding the nature of the internationally and nationally designated landscapes, including publicly accessible RPaGs.
Ordnance survey 1:25,000 maps and Definitive Public Rights of Way (PRoW) maps produced by the relevant local authorities.	Provides information regarding the location of visual receptors, including PRoW.
Arial photography.	Provides information regarding the location of visual receptors, including PRoW.
NRW LANDMAP data sets (aspect areas).	Provides information regarding the character of the landscape at the national and local scale.

9.1.3.3 In addition, site visits will be undertaken to survey the landfall and onshore cable corridor, the onshore substation and the surrounding areas to verify the documented seascape, landscape and visual baseline, particularly the local landscape and seascape character. Site visits would be used to select and take photographs from the agreed representative viewpoints. This would include viewpoints of the location of the generation and onshore/offshore transmission assets.

9.1.3.4 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

9.1.4 Baseline environment

9.1.4.1 This section provides a high-level overview of the internationally and nationally designated landscapes within the Mona Array Scoping Boundary, Offshore Transmission Infrastructure Scoping Search Area and Onshore Transmission Infrastructure Scoping Search Area.

9.1.4.2 Not all the landscapes detailed below will be impacted by the generation and transmission assets. Those affected by the transmission assets and those with theoretical visibility of any part of the project will be identified following an analysis of the ZTV once the location of the offshore and onshore export cable has been finalised.

Offshore generation and transmission assets

9.1.4.3 The following internationally and nationally designated landscapes are located within 50km of the Mona Array Scoping Boundary:

- The Castles of Edward I in Gwynedd (Beaumaris, and Conwy Castle and Town Walls) World Heritage Site (WHS) 374
- Slate Landscape of North West Wales (Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn) WHS 1633
- Snowdonia National Park
- Ynys Môn/Anglesey AONB
- Bryniau Clwyd a Dyffryn Dyfrdwy/Clwydian Range and Dee Valley AONB.

9.1.4.4 In addition to the designated landscapes identified above, large areas of the Isle of Mann, which is a Crown Dependency, have been designated as having high landscape or coastal value and scenic significance and are located within 50km of the Mona Array Scoping Boundary.

9.1.4.5 The following RPaGs are located within 50km of the Mona Array Scoping Boundary:

- Ashton Gardens
- Benarth Hall
- Birkenhead Park
- Bodelwyddan Castle
- Bodnant

- Bodrhyddan
- Bodysgallen
- Bryn Eisteddfod
- Brynbella
- Bryngwyn Hall
- Bryn-y-Neuadd
- Caer Rhun Hall
- Carreglwyd
- Cestyll
- Churchtown Botanic Gardens
- Coed Coch
- Cotswold, Brackley Avenue and The Flagstaff, Colwyn Bay
- Downing; Flaybrick Memorial Gardens
- Foxhall Newydd
- Garthewin; Gloddaeth (St. David's College)
- Golden Grove
- Gwaynynog
- Gwyrch Castle
- Gyrn Castle
- Hafodunos
- Hesketh Park
- Ince Blundell Park
- King's Gardens and South Marine Gardens
- Kinmel Park
- Condover House, Happy Valley and Haulfre Gardens, Llandudno;
- Llanerch Hall
- Lytham Hall
- Mostyn Hall
- Oakbank and Bulkeley Mill
- Pantasaph; Penryhn Castle
- Perth-y-Maen
- Plas Berw;Plas Gwyn
- Pas Heaton
- Plas Madoc

- Plas Newydd
- Plas Rhianfa
- Plas Uchaf, LLannefydd; Plas-yn-Llan
- Promenade Gardens, Lytham St. Anne
- St. Bueno’s College
- Stanley Park, Blackpool
- Talacre
- Vaynol
- Wern Isaf (Rosebriars)
- Amlwch and Parys Mountain
- Creuddyn and Conwy
- Dinowig
- Holywell Common and Halkyn Mountain
- Lower Conwy Valley
- Lower Elwy Valley
- North Arllechwedd; Ogwen Valley
- Penmon
- The Vale of Clwyd.

9.1.4.6 The following internationally and nationally designated landscapes are located within 20km of the Mona Offshore Transmission Infrastructure Scoping Search Area:

- The Castles of Edward I in Gwynedd (Beaumaris and Conwy Castle and Town Walls) WHS 374
- Snowdonia National Park
- Ynys Môn/Anglesey AONB
- Bryniau Clwyd a Dyffryn Dyfrdwy/Clwydian Range and Dee Valley AONB.

9.1.4.7 The following RPaGs are located within 20km of the Mona Offshore Transmission Infrastructure Scoping Search Area:

- Benarth Hall
- Birkenhead Park
- Bodelwyddan Castle
- Bodnant
- Bodrhyddan
- Bodysgallen
- Bryn Eisteddfod

- Brynbella; Bryngwyn Hall
- Bryn-y-Neuadd
- Caer Rhun Hall
- Coed Coch
- Cotswold, Brackley Avenue and The Flagstaff, Colwyn Bay
- Pierce Memorial Garden, Denbigh
- Downing
- Flaybrick Memorial Gardens
- Foxhall Newydd
- Garthewin; Gloddaeth (St. David’s College)
- Golden Grove
- Gwaynynog
- Gwrych Castle
- Gwydir
- Gyrn Castle
- Hafodunos
- Ince Blundell Park
- Kinmel Park
- Condover House, Happy Valley and Haulfre Gardens, Llandudno
- Llannerch Hall
- Llanrhaiadr Hall
- Mostyn Hall
- Oakbank and Bulkeley Mill
- Pantasaph
- Penbedw
- Perth-y-maen
- Plas Heaton
- Plas Madoc
- Plas Uchaf
- Llannefydd
- Plas-yn-Llan
- St. Bueno’s College
- Talacre
- Wern Isaf (Rosebriars)

- Amlwch and Parys Mountain
- Creuddyn and Conwy
- Denbigh Moors
- Holywell Common and Halkyn Mountain
- Lower Conwy Valley
- Lower Elwy Valley
- North Arllechwedd;
- Ogwen Valley
- Penmon
- The Vale of Clwyd.

Onshore transmission assets

9.1.4.8 The following internationally and nationally designated landscapes are located within 10km of the Mona Onshore Transmission Infrastructure Scoping Search Area:

- Bryniau Clwyd a Dyffryn Dyfrdwy/Clwydian Range and Dee Valley AONB.

9.1.4.9 The following RPaGs are located within 10km of the Mona Onshore Transmission Infrastructure Scoping Search Area:

- Talacre
- Golden Grove
- Gyrn Castle
- Bodrhyddan
- Gwrych Castle
- Kinmel Park
- Bodelwyddan Castle
- St. Bueno's College
- Bryngwyn Hall
- Coed Coch
- Garthewin
- Plas Uchaf Llannefydd
- Llanerch Hall
- Brynbella; Plas Heaton
- Foxhall Newydd
- Gwaynynog
- Perth-y-maen
- Denbigh Moors

- the Vale of Clwyd
- Pierce Memorial Garden, Denbigh.

9.1.4.10 Once the location of the generation and transmission assets has been identified, the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) will provide details of the baseline conditions within the seascape, landscape and visual study area for generation and transmission assets, including the following seascape, landscape and visual receptors:

- National and local seascape and landscape character areas, including designated sites.
- Users of rights of way and areas of Access Land (as defined under the Countryside and Rights of Way Act 2000.
- Other recreational users of land, such as those people involved in outdoor sports.
- Dynamic users of transport routes, including both those people within motor vehicles as well as walkers, horse riders and cyclists.
- Residents, where there is the potential for such receptors to experience significant adverse effects. It is noted that, in addition, many views important to the community will also be captured by the above and below representative viewpoints.
- Tourists visiting specific destinations, including publicly accessible RPaGs and other historic assets.
- People on marine vessels or installations at sea, such as those people at work, passengers on ferries and recreational yachtsmen and other recreational users/those involved in watersports.

9.1.4.11 There are no designated landscapes or national trails located within the Mona Onshore Transmission Infrastructure Scoping Search Area. The closest designated landscape is the Dee Valley AONB, which is located approximately 150m east of the Mona Onshore Transmission Infrastructure Scoping Search Area. The closest national trail is Offa's Dyke Path, which is located 1km east of the Mona Onshore Transmission Infrastructure Scoping Search Area.

9.1.4.12 The location and extent of landscape designations within and surrounding the Mona Onshore Transmission Infrastructure Scoping Search Area are presented in Figure 9.1 of the EIA Scoping Report.

9.1.4.13 The location and extent of heritage assets, including WHS and RPaGs within the Mona Onshore Transmission Infrastructure Scoping Search Area are presented in part 3, section 8.1: Historic environment, of the EIA Scoping Report.

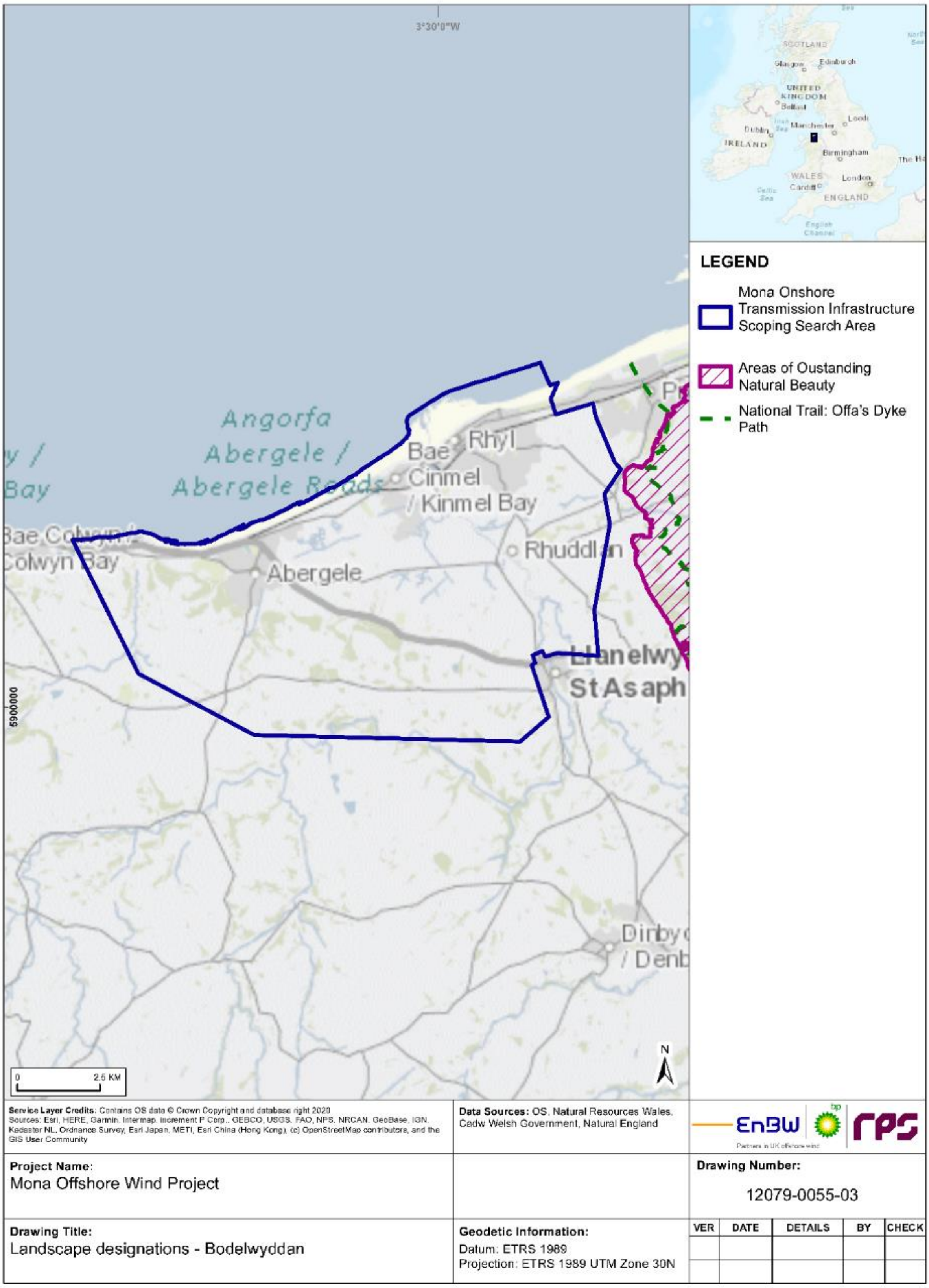


Figure 9.1: Landscape designations within and surrounding the Mona Onshore Transmission Infrastructure Scoping Search Area.

9.1.5 Potential project impacts

9.1.5.1 A range of potential impacts on seascape, landscape and visual resources have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project.

9.1.5.2 The seascape, landscape and visual assessment will consider two key areas:

Seascape and landscape character

- A review of the seascape and landscape character (features, elements and characteristics) of the site and its surroundings will be undertaken with reference to published landscape assessment documents and field survey, as well as individual landscape features and elements.

Visual receptors

- Considering the findings of the site visits and field appraisal, a range of viewpoint locations will be identified and agreed with the relevant statutory consultees. Photographs from viewpoint locations will be representative of views towards the generation and transmission assets from areas identified by the ZTV. Photographs from representative viewpoint locations will be undertaken in both the summer and winter months. However, this may be dependent on the programme of submission and prevailing weather conditions at the time photographs are due to be undertaken.
- Night-time photography, from selected representative viewpoints, may also be undertaken if deemed necessary by the relevant statutory consultees.

9.1.5.3 The impacts that have been scoped into the assessment are outlined in Table 9.2 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

9.1.5.4 Potential impacts scoped out of the assessment are presented in

9.1.5.5 Table 9.3, with justification.

Table 9.2: Impacts proposed to be scoped into the project assessment of effects on seascape, landscape and visual resources (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of the generation and transmission assets on seascape and landscape character during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Activities required to facilitate the construction, operation and maintenance and decommissioning of the generation and transmission assets, including temporary and permanent lighting, may result in direct impacts upon the upon seascape and landscape character (designations, types, areas).	The seascape and landscape character within the seascape, landscape and visual study area for generation and transmission assets will be determined using desk-based analysis, supported by contextual photography. The desk-based analysis will be undertaken in accordance with Using LANDMAP in Landscape and Visual Impact Assessments GN46 (LANDMAP GN46, NRW) and Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013). In addition, the seascape and landscape character within the seascape, landscape and visual study area for generation and transmission assets will be confirmed and refined during site visits undertaken by competent experts.	The impact of the generation and transmission assets on seascape and landscape character will be assessed in accordance with Using LANDMAP in Landscape and Visual Impact Assessments GN46 (NRW) and Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3) (Landscape Institute and IEMA, 2013). The assessment will be informed by the ZTV, which will identify the seascape and landscape character areas that may be impacted during construction, operation and maintenance and decommissioning of the generation and transmission assets.
The impact of the generation and transmission assets on publicly accessible views during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Activities required to facilitate the construction, operation and maintenance and decommissioning of the generation and transmission assets, including temporary and permanent lighting, may impact publicly accessible views from visual receptors, including users of PRoW, Access Land, transport routes and other land and marine recreational resources.	Visual receptors located within the seascape, landscape and visual study area for generation and transmission assets will be identified using desk-based analysis, supported by photography taken from representative viewpoints. The desk-based analysis will be undertaken in accordance with LANDMAP in Landscape and Visual Impact Assessments GN46 (NRW) and Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3) (Landscape Institute and IEMA, 2013). In addition, the visual receptors within the seascape, landscape and visual study area for generation and transmission assets will be confirmed and refined during	The impact of the generation and transmission assets on publicly accessible views will be assessed in accordance with LANDMAP in Landscape and Visual Impact Assessments GN46 (NRW) and Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3) (Landscape Institute and IEMA, 2013). The assessment will be informed by the ZTV, which will identify the visual receptors that may be impacted during construction, operation and maintenance and decommissioning of the generation and transmission assets. Representative viewpoints from publicly accessible locations would be agreed with the relevant statutory consultees and the impact to these views would be assessed. Potential impacts on more general views available by receptor groups would also be assessed.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					site visits undertaken by competent experts.	The assessment of operational effects will be further informed using wirelines and photomontages (where appropriate) to illustrate views of the generation and transmission assets from the perspective of representative viewpoints.

Table 9.3: Impacts proposed to be scoped out of the project assessment for seascape, landscape and visual resources.

Impact	Justification
The impact of construction, operation and maintenance and decommissioning of the generation and transmission assets on seascape and landscape character and visual resources located beyond the seascape, landscape and visual study area for generation and transmission assets.	The potential impact of the generation and transmission assets on seascape and landscape character and visual resources located beyond the seascape, landscape and visual study area for generation and transmission assets during the construction, operation and maintenance and decommissioning phase is unlikely to be significant and is proposed to be scoped out of the assessment for seascape, landscape and visual resources.
The impact of operation and maintenance of the offshore and onshore export cables on seascape and landscape character and visual resources.	Offshore and onshore export cables would be fully submerged or buried underground respectively. Therefore, the potential impact of the offshore and onshore export cables on seascape and landscape character and visual resources during the operation and maintenance phase is unlikely to be significant and is proposed to be scoped out of the assessment for seascape, landscape and visual resources.
The impact of decommissioning of the offshore and onshore export cables on seascape and landscape character and visual resources.	Activities required to facilitate decommissioning of the offshore and onshore export cables are unlikely to result in significant impacts on seascape and landscape character and visual resources. It is anticipated that only structures above the seabed or ground level will be decommissioned.. Therefore, the potential impact of the offshore and onshore export cables on seascape and landscape character and visual resources during the decommissioning phase is unlikely to be significant and is proposed to be scoped out of the assessment for seascape, landscape and visual resources.

9.1.6 Measures adopted as part of the project

9.1.6.1 The following measures to be adopted as part of the project are relevant to seascape, landscape and visual resources. These measures may evolve as the engineering design and the EIA progresses.

- Site selection and micro-siting of the generation and transmission assets (where practicable), including the onshore export cable and substation, as to avoid or reduce potential impacts on seascape and landscape character and visual resources.
- Where possible, the alignment and layout of the wind turbine array will be designed to minimise the potential impact of 'stacking' on the most sensitive receptors. This may be supported by further analysis to identify receptors susceptible to stacking during operation of the wind turbine array.
- Code of Construction Practice (CoCP) – including control of temporary lighting and reinstatement of temporary earthworks associated with the onshore export cable and temporary construction works areas.
- Development of a Landscape Master Plan or Landscape Strategy Plan primarily in relation to the landscape proposals at the onshore substation site, but also to reinstate hedgerows through which the cable corridor passes.

9.1.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

9.1.7 Proposed assessment methodology

9.1.7.1 The principal objectives of the assessment of seascape, landscape and visual resources in the ES will be:

- To identify the existing seascape, landscape and visual resources that may be impacted during the construction, operation and maintenance and decommissioning of the generation and transmission assets.
- To assess the significance of the effects on seascape, landscape and visual resources, taking into account the measures proposed to mitigate any of the potential impacts identified.

9.1.7.2 The assessment will be undertaken in accordance with established guidelines, principally LANDMAP GN46 (NRW) and GLVIA3 (Landscape Institute and IEMA, 2013).

9.1.7.3 LANDMAP GN46 provides guidance with respect to how LANDMAP information should be used to inform an LVIA. GLVIA3 sets out the underlying principles and methodology to be used when undertaking an LVIA of a proposed development.

9.1.7.4 The seascape, landscape and visual impact assessment will consider the likely significant effects of the generation and transmission assets on the following sensitive receptors:

- individual seascape, landscape and townscape features, elements and characteristics

- seascape, landscape and townscape character
- visual receptors (people) for whom the generation and transmission assets might be visible during the construction, operation and maintenance and decommissioning phase.

9.1.7.5 As set out in GLVIA3, the seascape/landscape and visual effects will be assessed separately. However, the procedure for assessing each of these areas is closely linked. A clear distinction will be drawn between seascape/landscape and visual effects as described below:

- Seascape/landscape effects relate to the effects of the generation and transmission assets on the physical and other characteristics of the landscape and its resulting character and quality.
- Visual effects relate to the impacts on publicly accessible views experienced by visual receptors (e.g. users of PRoW, open space or roads) and private views (e.g. occupiers of residential or commercial properties).

9.1.7.6 The short-term effects of the construction and decommissioning phases and the long-term effects relating to the operation and maintenance phase will be assessed. ZTVs will be generated to show the theoretical extent of visibility of the generation and transmission assets within the Mona seascape, landscape and visual study area for the generation and transmission assets.

9.1.7.7 Consideration will be given to the likely seasonal variations in the visibility of the generation and transmission assets, including variations in weather conditions and deciduous vegetation. Consideration will also be given to changes in the level of effects likely to take place as mitigation planting proposals mature and existing vegetation continues to grow.

9.1.7.8 The assessment process will take into account the overall assessment methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, in addition to established guidance, such as LANDMAP GN46 and GLVIA3.

9.1.7.9 The sensitivity of seascape, landscape and visual resources and receptors will be identified, together with the predicted magnitude of impact on that resource or receptor. Taking this into account, the significance of effect will be described for each resource (or receptor) during the construction, operation and maintenance and decommissioning of the generation and transmission assets. In addition, the significance of effect will be described upon maturity (up to 10 years establishment) of mitigation planting proposals where relevant.

9.1.7.10 The evaluation of significance will be underpinned by a narrative approach, based on professional judgement.

9.1.8 Potential cumulative effects

9.1.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Mona Offshore Wind Project and other developments. The potential cumulative effects between the generation and transmission assets and other developments with respect to seascape, landscape and visual resources will be considered within the PEIR and the ES.

9.1.8.2 This will include other onshore and offshore developments, including the cumulative effect with other proposed offshore wind farms. The scope of the cumulative assessment (in terms of proposed developments to be included) will be identified in consultation with stakeholders, including NRW and Relevant Planning Authorities.

9.1.8.3 The cumulative effect assessment will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, LANDMAP GN46 and GLVIA3.

9.1.8.4 In accordance with LANDMAP GN46 and GLVIA3, the types of cumulative effects that would be considered in the assessment of seascape, landscape and visual resources would include:

- effects of extension to an existing development
- filling an area with the same development or different types of development over time
- interactions between different types of development
- incremental change as a result of successive individual development
- temporal cumulative effects
- indirect effects of development such as enabling other further development
- future actions that remove elements which may have consequences for other existing or proposed development.

9.1.8.5 The cumulative impact assessment would consider potential effects arising from the generation and transmission assets, where these may interact with the construction, operation and maintenance and decommissioning phase of other proposed developments located within the Mona seascape, landscape and visual study area for the generation and transmission assets, including other wind farms.

9.1.8.6 It is not considered that operation, maintenance and decommissioning of the offshore and onshore export cables will result in significant effects on seascape, landscape and visual resources either alone or cumulatively with other developments. Therefore, it is proposed that the potential cumulative effects arising from operation, maintenance and decommissioning of the offshore and onshore export cables are scoped out of the cumulative effect assessment for seascape, landscape and visual resources.

9.1.9 Potential inter-related effects

9.1.9.1 The potential inter-related effects of the generation and transmission assets with respect to seascape, landscape and visual resources will be considered in relevant topic chapters of the ES. For example:

- Historic environment:
  - Seascape, landscape and visual impacts associated with construction, operation and maintenance and decommissioning of the generation and transmission assets may impact the setting of above ground heritage assets and historic landscape patterns.

- Land use and recreation:
  - Seascape, landscape and visual impacts associated with construction, operation and maintenance and decommissioning of the generation and transmission assets may impact the visual amenity of users of PRoW and other recreational resources.

9.1.10 Potential transboundary impacts

9.1.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon seascape, landscape and visual resources due to construction, operational and maintenance, and decommissioning impacts of the Mona Offshore Wind Project.

9.2 Aviation and radar

9.2.1 Introduction

9.2.1.1 This section of the Environmental Impact Assessment (EIA) Scoping Report identifies the aviation and radar receptors of relevance to the Mona Offshore Wind Project and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the transmission assets on aviation and radar receptors.

9.2.2 Study area

9.2.2.1 For the purposes of identifying aviation and radar receptors for the Mona Offshore Wind Project transmission assets, a broad study area has been defined. The Mona aviation and radar study area for the transmission assets is presented in Figure 9.2 and described below.

9.2.2.2 The Mona aviation and radar study area for the transmission assets has been defined as the airspace encompassing the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area, plus a 2nm buffer which is used to define obstruction effects to helicopter main routes (HMRs).

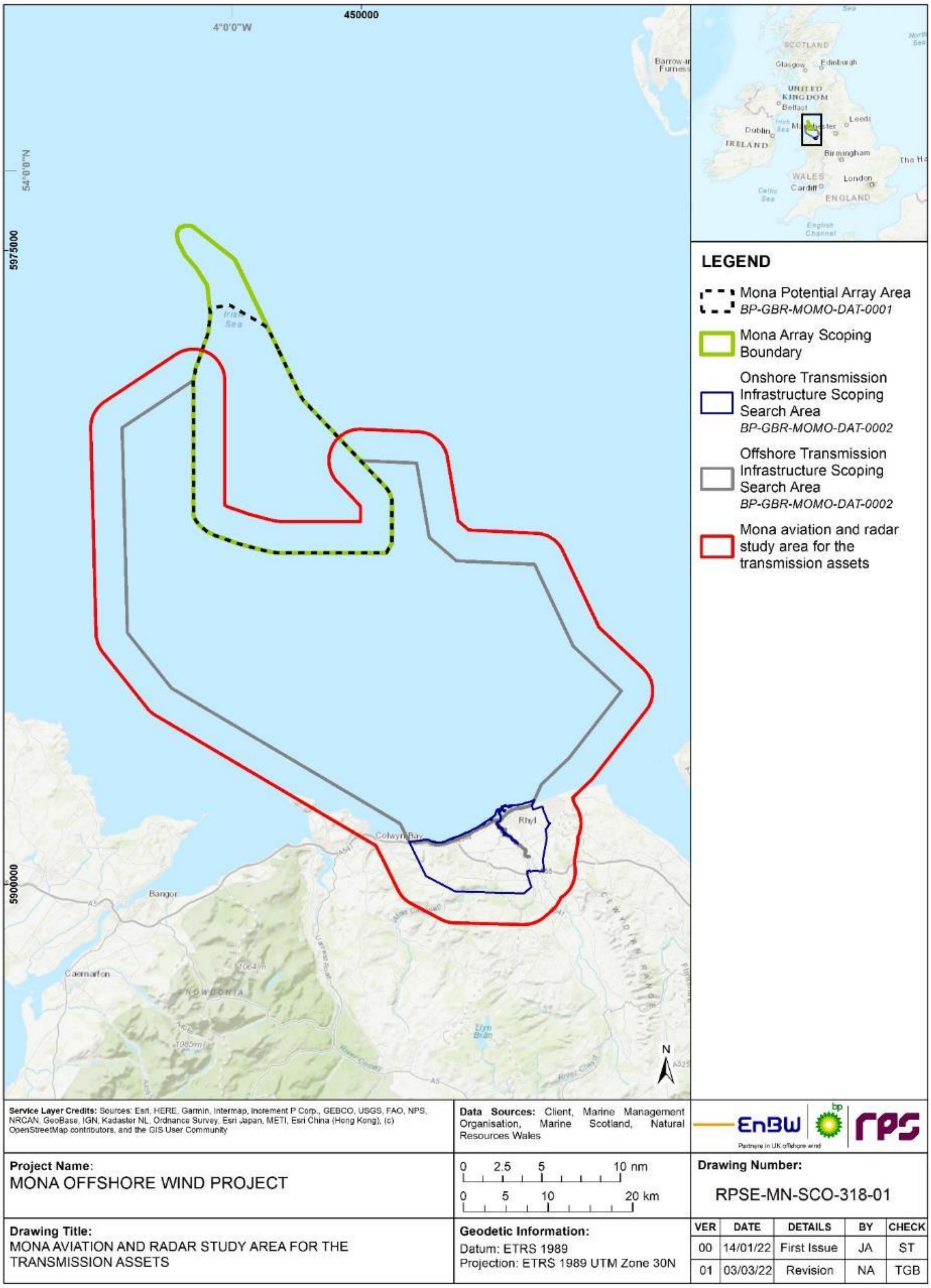


Figure 9.2: The Mona aviation and radar study area for the transmission assets.

9.2.3 Data sources

9.2.3.1 A number of sources were consulted in order to inform the aviation and radar section of the EIA Scoping Report and will be used to inform the EIA. These are summarised in Table 9.4.

9.2.3.2 In addition to existing data, the assessment will be informed through stakeholder consultation.

Table 9.4: Summary of key desktop datasets and reports.

Title	Source	Year	Author
Search and Rescue (SAR) Locations	The Bristow Group	2021	The Bristow Group
Helicopter Main Routes (HMRs)	NATS En-Route charting	2019	NATS
Aerodromes and Ground Aids (AGA), Surveillance Radars, Navigational Aid areas	NATS Safeguarding	2012	NATS
Airfields	UK General Aviation (UKGA) Environmental Systems Research Institute (ESRI) Ordnance Survey Open Data	2022 2015 2021	UKGA ESRI Ordnance Survey
Military Practice and Exercise Areas (PEXAs)	Oceanwise	2021	Emapsite
Offshore platforms and consultation zones	Oil and Gas Authority	2021	Oil and Gas Authority

9.2.4 Baseline environment

9.2.4.1 The Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area, the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. The baseline environment within the Mona Potential Array Area, within which the offshore substation platforms (OSPs), interconnector cables and part of the offshore export cables will be located, is fully described in part 2, section 6.3: Aviation and radar, of the EIA Scoping Report. The following sections describe the baseline environment within the Mona Offshore Transmission Infrastructure Scoping Search Area, within which the offshore export cables and the offshore booster substation will be located, and the Mona Onshore Transmission Infrastructure Scoping Search Area, within which the onshore substation and onshore export cables will be located.

Civil aviation

9.2.4.2 HMRs support the transport of personnel and equipment to offshore oil and gas installations. HMRs are routes typically and routinely flown by helicopters operating to and from offshore destinations and are promulgated for the purpose of signposting concentrations of helicopter traffic to other airspace users. HMR promulgation does not predicate the flow of helicopter traffic. Whilst HMRs have no airspace status and assume the background airspace classification within which they lie (in the case of the Irish Sea, Class G), they are used by the Air Navigation Service Provider (ANSP) and helicopter operators for flight planning and management purposes. Civil

Aviation Publication (CAP) 764 CAA Policy and Guidance on Wind Turbines (Civil Aviation Authority (CAA), 2016) states that HMRs have no defined lateral dimensions (only route centre-lines are charted on navigation charts) and that 2nm either side of the route centre-line should be kept obstacle free (CAA, 2016). One HMR slightly overlaps with the Mona Offshore Transmission Infrastructure Scoping Search Area, as shown in Figure 9.3.

9.2.4.3 In order to maintain a safe operating environment, the CAA recommend a consultation zone of 9nm radius around offshore installations serviced by helicopters (CAA, 2016). This consultation zone is not considered a prohibition on development, but a trigger for consultation between offshore helicopter operators, the operators of existing installations and developers of proposed offshore wind farms, in order to determine a solution that maintains safe offshore helicopter operations. The Mona Offshore Transmission Infrastructure Scoping Search Area extends into the 9nm consultation zones established around six platforms as presented in Figure 9.3. A 9nm consultation zone should also be a trigger for consultation with the operators of any subsea infrastructure and wells where mobile drilling rigs or vessels may require helicopter access.

Civil and military radar

9.2.4.4 All offshore and onshore surface infrastructure comprising the Mona Offshore Wind Project transmission assets will be stationary and therefore civil, military and meteorological radar systems have not been identified as sensitive receptors in relation to the transmission assets.

Airfields

9.2.4.5 The Mona Onshore Transmission Infrastructure Scoping Search Area is located in proximity to the Gypsy Lane Helipad (Figure 9.4).

Airborne search and rescue operations

9.2.4.6 The SAR helicopter force provides constant SAR cover in the UK from ten bases located across the UK. The bases are positioned close to SAR hotspots so aircraft can provide support as quickly and efficiently as possible. Bristow Helicopters was awarded the contract to provide helicopter SAR services for the UK in 2013, with the closest SAR base to the Mona Offshore Transmission Infrastructure Scoping Search Area being at Caernarfon Airport, Gwynedd, 41.1km away. The Mona Offshore Wind Project has the potential to effect airborne SAR operations due to the creation of obstructions.

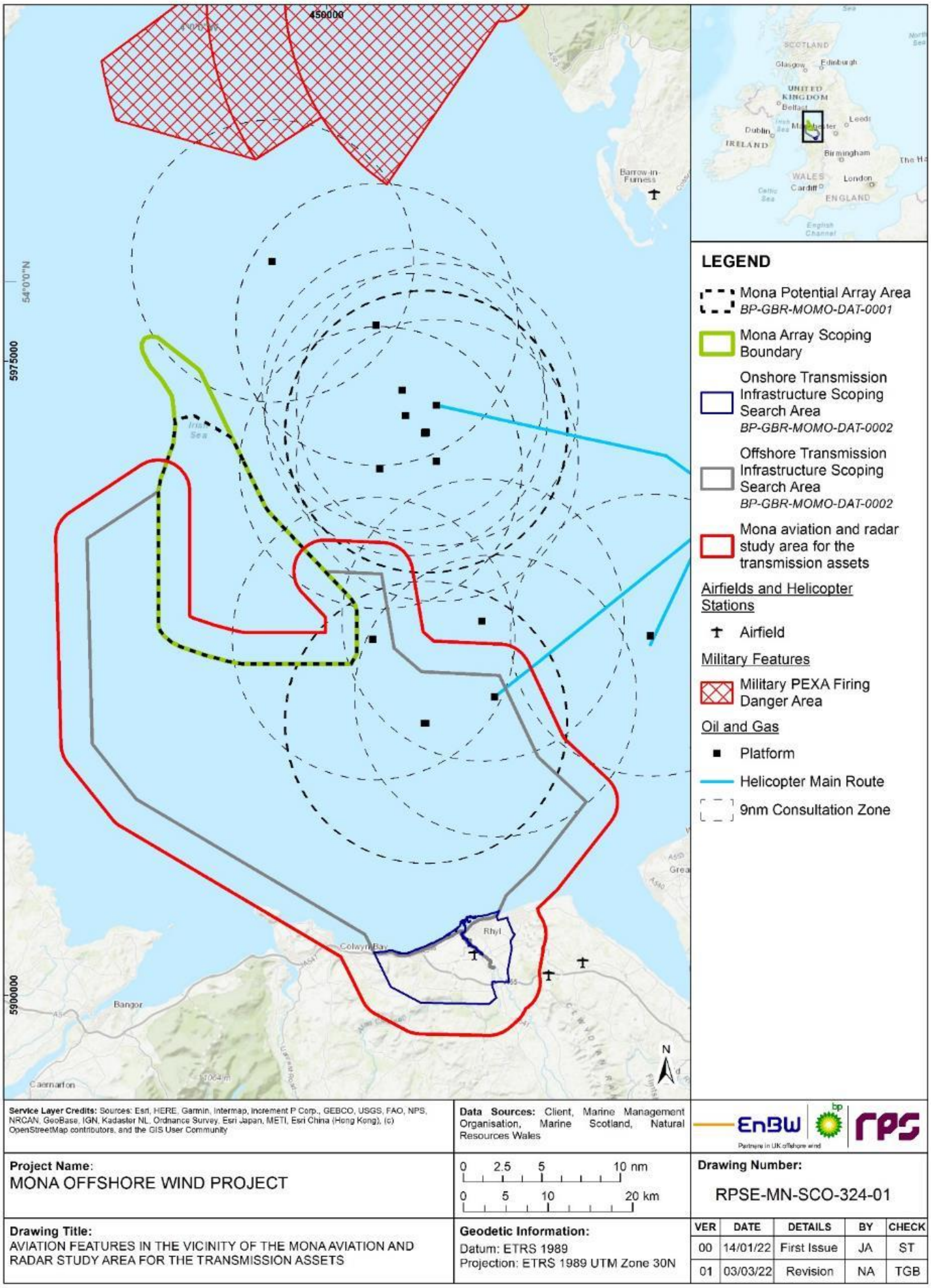
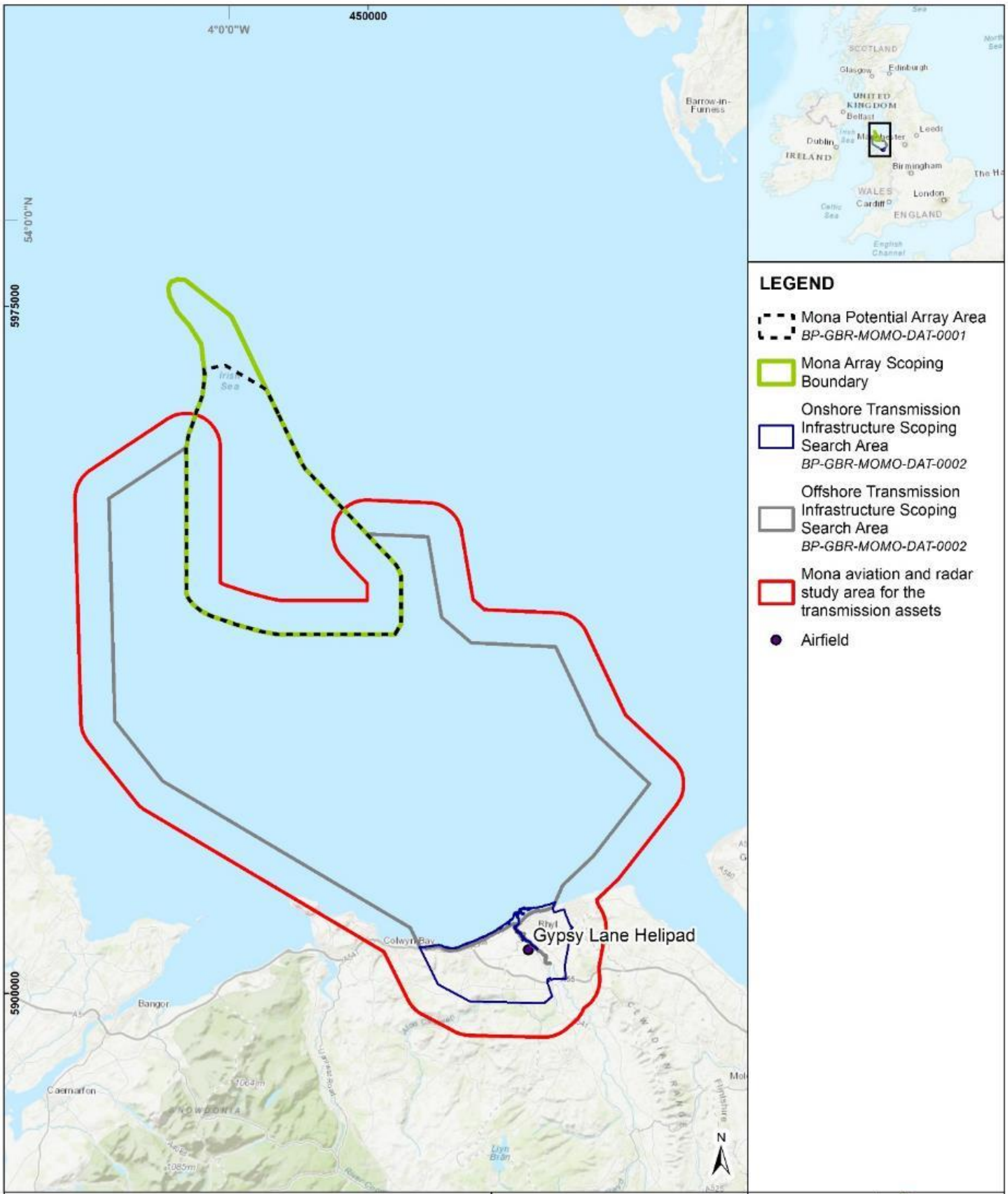


Figure 9.3: Aviation features in the vicinity of the Mona aviation and radar study area for the transmission assets.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Data Sources:** Client.	EnBW bp rps Partners in UK offshore wind
Project Name: MONA OFFSHORE WIND PROJECT	0 2.5 5 10 nm 0 5 10 20 km	**Drawing Number:** RPSE-MN-SCO-343-01
Drawing Title: AIRFIELDS IN PROXIMITY TO THE MONA ONSHORE TRANSMISSION INFRASTRUCTURE SCOPING SEARCH AREA	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N	

VER	DATE	DETAILS	BY	CHECK
00	14/01/22	First Issue	JA	TGB
01	03/03/22	Revision	NA	TGB

Figure 9.4: Airfields in proximity to the Mona Onshore Transmission Infrastructure Scoping Search Area.

9.2.5 Potential project impacts

9.2.5.1 A range of potential impacts on aviation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Mona Offshore Wind Project. The impacts that have been scoped into the assessment are outlined in Table 9.5 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

9.2.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 3: Project description, of the EIA Scoping Report, potential impacts to be scoped out of the assessment are presented in Table 9.6, with justification.

Table 9.5: Impacts proposed to be scoped into the project assessment for aviation and radar (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Creation of a physical obstacle to low flying aircraft.	✓	✓	✓	The OSPs and the offshore booster substation may create a physical obstruction to low flying aircraft operating offshore.	Consultation with airspace users to understand current airspace usage potential for impact.	Qualitative assessment informed by consideration of the outcomes of consultation, ATC service provision and the rules of the air.
Physical obstruction and potential for disruption to helicopter access/egress to/from offshore oil and gas platforms.	✓	✓	✓	The OSPs and the offshore booster substation may be located within the 9nm consultation zones of offshore oil and gas platforms. The presence of a physical obstruction in proximity to the airspace utilised by helicopters operating to and from oil and gas platforms may disrupt helicopter operations to and from the potentially affected platforms.	Consultation with the operators of these platforms and their helicopter service providers to understand current and future helicopter access requirements (including any temporary access requirements to drilling rigs and vessels), and to understand any plans for decommissioning of assets.	In the event that an OSP or the offshore booster substation is located within 9nm of an existing offshore oil and gas platform and dependent on the outcomes of consultation, a helicopter access report considering routine and emergency access procedures may be prepared for those platforms where ongoing helicopter operations will be required during all phases of the Mona Offshore Wind Project.
Obstruction to SAR helicopter operations.	✓	✓	✓	The presence of infrastructure (and associated construction equipment) within a previously open sea area may cause an obstruction to SAR operations.	Consultation will be carried out with SAR operators and the Maritime and Coastguard Agency (MCA) to understand requirements and to inform the assessment.	Qualitative assessment based on industry guidance informed through review of the project description against the outcomes of consultation with SAR operators and the MCA.
Impacts to the Gypsy Lane Helipad.	✓	✓	✓	Construction activities and the presence of infrastructure associated with the onshore transmission assets during the construction phase of the Mona Offshore Wind Project may have the potential to impact the functioning of the Gypsy Lane Helipad.	Consultation with the helipad operator to understand operations and discuss potential for impact.	Qualitative assessment for the aviation receptor (if required) in order to establish if relevant aviation safeguarded areas may be affected by construction infrastructure.

Table 9.6: Impacts proposed to be scoped out of the project assessment for aviation and radar.

Impact	Justification
Potential disruption to HMRs due to the presence of the OSPs or the offshore booster substation.	One HMR slightly overlaps with the Mona Offshore Transmission Infrastructure Scoping Search Area. In the event that an OSP or the offshore booster substation is located in proximity to this HMR, consultation would take place with the relevant helicopter and platform owner in order to promote coexistence and as such this impact is unlikely to lead to a significant effect in EIA terms. Therefore, it is proposed that this potential impact is scoped out of the assessment for the transmission assets.

Impact	Justification
Increased helicopter traffic within the Mona Offshore Transmission Infrastructure Scoping Search Area may affect available airspace for other users.	The Mona Offshore Wind Project may require helicopter operations during the construction, operation and maintenance and decommissioning phases, which may affect the available airspace for other users. The Mona Offshore Wind Project will be located within Class G (uncontrolled airspace) where pilots are responsible for the avoidance of terrain, obstacles and other aircraft. The present operation of low flying aircraft in the Irish Sea is safe. This, together with the availability of an air traffic service, will remove aviation traffic risk therefore it is proposed that this impact is scoped out of the EIA.

9.2.6 Measures adopted as part of the project

9.2.6.1 The following measures to be adopted as part of the project are relevant to aviation and radar. These measures may evolve as the engineering design and the EIA progresses.

- Appropriate lighting and marking of the OSPs and the offshore booster substation will be established in accordance with CAA regulations and guidance (CAA, 2016; 2021) and in consultation with the CAA and the Defence Infrastructure Organisation (DIO).
- Prior to the start of construction and decommissioning, the UK Hydrographic Office (UKHO) will be informed of the location, height and lighting status of the OSPs and the offshore booster substation, including estimated and actual dates of activities, and the maximum height of any equipment to be used, to allow inclusion on Aviation Charts.
- The DIO will be informed of the construction start and end dates; the maximum height of construction equipment; and the latitude and longitude of the OSPs and the offshore booster substation.
- Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP), including consideration of helicopters undertaking SAR operations.
- The Mona Offshore Wind Project operator will issue, as necessary, requests to the UK Aeronautical Information Service to submit Notice to Airmen (NOTAM) in the event of any failure of aviation lighting.

9.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

9.2.7 Proposed assessment methodology

9.2.7.1 The aviation and radar EIA will follow the methodology set out in part 1, section 4: EIA methodology, of the EIA Scoping Report. Specific to the aviation and radar EIA, the following guidance documents will also be considered:

- CAP 168: Licensing of Aerodromes (CAA, 2022)
- CAP 393: Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation 2016 (CAA, 2021)
- CAP 670: Air Traffic Services Safety Requirements, Third Issue Amendment 1/2019 (CAA, 2019)
- OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response, MGN 654 (M+F) (MCA, 2021a)
- Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response (MCA, 2021b).

9.2.8 Potential cumulative effects

9.2.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea and within the Mona Onshore Transmission Infrastructure Scoping Search Area where projects or activities could act collectively with the Mona Offshore Wind Project to affect aviation and radar receptors.

9.2.8.2 The cumulative assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the Mona aviation and radar study area for the transmission assets:

- other offshore and onshore wind farms, including the Morgan Offshore Wind Project
- other infrastructure projects (e.g. cables and pipelines).

9.2.8.3 The cumulative effects assessment will follow the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

9.2.9 Potential inter-related effects

9.2.9.1 The assessment of potential inter-related effects will be considered within the aviation and radar Environmental Statement (ES) chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA methodology, of the EIA Scoping Report.

9.2.10 Potential transboundary impacts

9.2.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon aviation and radar due to construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project.

9.3 Climate change

9.3.1.1 The impact of construction, operation and maintenance and decommissioning of the generation and transmission assets on climate change has been described in part 2: section 6.4: Climate change, of the EIA Scoping Report.

9.4 Socio-economics and community

9.4.1 Introduction

9.4.1.1 This section of the EIA Scoping Report identifies the socio-economic and community receptors of relevance to both the offshore generation and transmission assets and onshore transmission assets and considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of these assets.

9.4.1.2 This section of the EIA Scoping Report also sets out the proposed scope of the EIA and the methodology to be used in the assessment of socio-economic and community impacts for the offshore generation and the offshore and onshore transmission assets.

9.4.2 Study area

9.4.2.1 The study area to be used for the assessment of socio-economic and community impacts ('the Mona socio-economic and community study area for the generation and transmission assets') will be based on the multiple spatial scales at which impacts to receptors (landward of MHWS) are likely to occur.

9.4.2.2 The spatial scales to be used in the socio-economic and community assessment will be defined according to the receptor type. These receptors comprise tourism and recreation receptors, employment and economy receptors, including Gross Value Added (GVA) and community receptors.

9.4.2.3 The approach to defining Local Impact Areas (LIAs) is focused on the likely centres of impact. This will ensure the assessment of impacts relative to the baseline is meaningful and is not masked as a result of large and high-level LIAs which are unrelated to the location of the potential impact.

Tourism and recreation receptors

9.4.2.4 It is considered that the potential impacts on tourism and recreation receptors will primarily be limited LIAs centred on the location of landfall and onshore transmission assets, hub ports which will support the construction, operation and maintenance and decommissioning of offshore generation and transmission assets and locations.

9.4.2.5 The LIA will be informed by findings of other relevant topic chapters of the Environmental Statement (ES), such as seascape, landscape and visual resources, land use and recreation, and noise and vibration.

The LIA will include offshore recreational users as determined by the other sea users assessment (see part 3, section 5.4: Offshore human environment – other sea users of the EIA Scoping Report) and tourism and recreation receptors located within the ZTV of the offshore generation assets, as determined in the SLVIA (see part 3, section 9.1: Seascape, landscape and visual resources, of the EIA Scoping Report).

9.4.2.6 Table 9.7 sets out potential centres around which LIAs will be drawn. To ensure consistency with LIAs for other socio-economic and community receptors, LIAs will be based on Local Authority areas falling predominantly within a 60-minute drive time of the impact centres.

9.4.2.7 The selection of port locations to support construction, operation and maintenance and decommissioning of offshore generation and transmission assets and onshore transmission assets is unlikely to be completed prior to completion of the EIA. On this basis, LIAs relevant to the port locations under consideration that fall within England and Wales will be considered. An initial short list of ports under consideration has been provided by the Applicant.

Table 9.7: LIA impact centres.

Basis	Locations
Landfall	Denbighshire County Council Conwy County Borough Council
Onshore transmission assets	Denbighshire County Council Conwy County Borough Council
Construction and decommissioning ports	Holyhead
Operation and maintenance ports	Barrow-in-Furness Heysham Liverpool/Birkenhead Mostyn Holyhead

9.4.2.8 The LIA impact centres relevant to the port locations identified in

9.4.2.9 Table 9.7 are not definitive and other port locations remain under consideration by the Applicant. The LIA impact centres and the short list of ports will be refined as the design of the Mona Offshore Wind Project progresses.

Employment and economy related receptors

9.4.2.10 It is considered that the potential impacts on employment and economy receptors, including GVA, would occur both locally and over a much larger geographic area, because of the various stages in the supply chain during construction, operation and maintenance and decommissioning of the offshore generation and offshore/onshore transmission assets.

9.4.2.11 Given the national significance and scale of investment required to facilitate the construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets and onshore transmission assets, it is considered appropriate to include a spatial scale that considers socio-economic impacts at the national level. The nations to be impacted by the onshore transmission assets will form the National Impact Area (NIA). Employment and economy receptors, including GVA within the NIA will be considered in the assessment of socio-economics and community.

9.4.2.12 The LIAs will be centred on onshore transmission assets and port locations that have the potential to support the construction, operation and maintenance and decommissioning of offshore generation and offshore/onshore transmission assets. LIAs will be based on Local Authority areas falling predominantly within a 60-minute drive time of the impact centres to capture effect travel to work areas for assessing employment and labour market impacts.

9.4.2.13 The LIA and NIA identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

Community receptors

9.4.2.14 It is considered that potential community level effects will primarily fall within LIAs centred on onshore transmission assets and port locations that have the potential to support the construction, operation and maintenance and decommissioning of the offshore generation and offshore/onshore transmission assets.

9.4.3 Data sources

9.4.3.1 The data sources used to inform the baseline assessment will primarily comprise of published material which is publicly available online. An initial desk-based review has identified several data sources, which provide baseline data coverage of the Mona Onshore Transmission Infrastructure Scoping Search Area. These data sources are summarised in Table 9.8 below.

Table 9.8: Baseline data sources.

Source	Summary
Census data	Information regarding commuting patterns, housing tenure profiles
Gov.uk Compare School Performance Services	Data relating to primary and secondary school pupil populations
House price statistics for small areas in England and Wales	Data relating to median house prices and affordability ratios
Local Authority websites	Data on school capacities and other local surveys and monitoring
NHS Digital	Data relating to healthcare facility registered patients
Office for National Statistics (ONS) mid-year population estimates	Information regarding population structure, dependency ratios, changes over time and population projections.
ONS Annual Population Survey	Information regarding economic activity (e.g. full-time, part-time, unemployed) and occupational breakdown.
ONS Annual Survey of Hours and Earnings	Information regarding workplace and residence-based earnings.
ONS Business Register and Employment Survey (BRES)	Sectoral and size band structure of the employment base, including change over time and location quotients.
ONS Jobs Density	Jobs density is the number of jobs in an area divided by the resident population aged 16-64 in that area.
ONS regional and local GVA estimates	Information regarding trends in GVA for the main industrial sectors.
UK Marine Energy Council	Various documents on capacity of sector and supply chain
Visit Britain	Data relating to levels of tourism activity.

9.4.3.2 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

9.4.4 Baseline environment

Tourism and recreation receptors

LIA

9.4.4.1 The following baseline information will be identified and considered in the assessment of tourism and recreation receptors:

- tourism sector employment based on Office for National Statistics Business Register and Employment Survey (ONS BRES)
- the number of businesses in the sector based on ONS Business Demography
- the number of visitors (day and overnight) and primary recreation activity – data availability dependent on local authority records and Visit Britain (or Visit Wales/ England/ North West) surveys
- the number of hotel/B&B beds and occupancy rates – the data availability will be dependent on local authority records and Visit Britain (or Visit England/ North West) surveys
- the key attractions or assets.

Employment and economy receptors

<u>LIAs and NIA</u>

9.4.4.2 The following baseline information will be identified and considered in the assessment of employment and economy receptors for the LIAs and the NIA:

- total employment and recent employment change based on ONS BRES and Jobs Density measures
- employment and recent employment change within sectors of relevance to the offshore wind industry based on ONS BRES
- total GVA and recent change based on ONS
- GVA and recent change within sectors of relevance to the offshore wind industry based on ONS
- local labour market participation indicators including economic activity, inactivity and unemployment based on ONS APS
- local labour market profile indicators including occupations and qualifications based on ONS APS
- travel to work data based on ONS Census of Population
- other relevant data available at local level, particularly related to offshore wind industry and supply chain.

Community receptors

<u>LIA</u>

9.4.4.3 The following baseline information will be identified and considered in the assessment of socio-economics and community:

- total population and how it has changed in recent years based on ONS
- the education capacity, which will comprise a list of primary/ secondary schools and colleges, with roll size and places available.

- healthcare capacity, which will comprise a list of hospitals/health centres and GP surgeries and capacities. Individual healthcare facilities data can be extracted and analysed from NHS Digital data sources, but this is likely too much detail for scoping stage
- housing stock and tenure profile sourced from Census 2011 data, which will act as a guide
- house prices and affordability ratios, which can be sourced from ONS
- the use of the Welsh language within the community

Designated sites

9.4.4.4 There are no statutory or non-statutory designations specifically related to matters of socio-economics and community, or how it should be controlled. However, some designated sites may attract visitors (e.g. national parks, world heritage sites) which may be of relevance to the assessment of socio-economics and community.

9.4.4.5 These designated sites will be identified in the relevant topic chapters of the ES. The socio-economics and community assessment will consider the potential impacts of the offshore generation and transmission assets and onshore transmission assets on visitor numbers to designated sites located within the LIA.

9.4.5 Potential project impacts

9.4.5.1 A range of potential impacts on socio-economics and community have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the project.

9.4.5.2 The impacts that have been scoped into the assessment are outlined in Table 9.9 together with a description of any additional data collection (e.g. site-specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

9.4.5.3 Potential impacts scoped out of the assessment are presented in

9.4.5.4 Table 9.10, with justification.

Table 9.9: Impacts proposed to be scoped into the project assessment for socio-economics and community (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of disruption on tourism and recreation receptors during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓	Construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets and onshore transmission assets could lead to the disruption of tourism and recreation receptors.	Tourism and recreation receptors located within the LIA will be identified using desk-based analysis and informed by the relevant topic chapters of the ES. The desk-based analysis will be further informed through consultation with the relevant stakeholders.	A mixture of qualitative and quantitative approaches will be used to assess the impact of disruption on tourism and recreation receptors. The assessment will be further informed by the relevant topic chapters of the ES, other impacts to be considered in assessment of socio-economics and community (e.g. workforce accommodation needs) and consultation with the relevant stakeholders.
The impact on economic receptors including employment, GVA, and supply chain demand during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓	Construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets and onshore transmission assets could create additional economic activity which could impact economic receptors, including employment, GVA, and increase demand on supply chains.	Employment receptors, including GVA located within the LIAand NIA will be identified using desk-based analysis. The desk-based analysis will be further informed through consultation with the relevant stakeholders.	The impact on economic receptors including employment, GVA, and supply chain demand will be assessed using a bespoke economic impact model. This economic impact model will be used to estimate the direct, indirect, and induced employment impacts of expenditure during the construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets and onshore transmission assets.
The impact of increased employment opportunities arising from the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets and onshore transmission assets could increase the range and supply of employment opportunities accessible to residents in the local area.	A desk-based analysis of the current labour market capacity and the existence of appropriately skilled residents in local impact areas. Desk-based analysis will be enhanced with stakeholder consultation.	The impact of increased local employment opportunities will be assessed using a bespoke economic impact model. This economic impact model will be used to estimate the direct, indirect, and induced employment impacts of expenditure during the construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets and onshore transmission assets. The local employment (workplace based) will be assessed against local labour market capacity and informed by stakeholder consultation.
The impact on the demand for housing, accommodation and local services	✓	✓	✓	Direct and indirect employment generated by the construction, operation and maintenance, and decommissioning of the offshore generation and transmission assets	A desk-based analysis of current capacity of local services and housing market. Consultation with relevant local authority officers to ascertain current conditions and	The assessment will draw on the modelling of economic impacts, local labour market impacts and planned construction, operation and maintenance and decommissioning

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				and onshore transmission assets could increase the demand for housing accommodation and local services and cause other community and social effects.	capacity in the supply of housing, accommodation and local services as well as other community and social effects.	activities in order to assess the likely extent of temporary or permanent relocation of workers and/or demand for local services.
The impact on the Welsh language	✓	✓	✓	Temporary or permanent relocation of workers to support the construction, operation and maintenance and decommissioning of the offshore generation and transmission assets and onshore transmission assets could impact on the use of the Welsh language within local communities.	A desk-based analysis of data on the current use of the Welsh language. Consultation with relevant local authority officers and community representatives to ascertain conditions and the potential community effects under different scenarios.	The assessment will draw on the modelling of potential employment impacts local labour market impacts and planned construction, operation and maintenance, and decommissioning activities in order to assess the likely extent of temporary or permanent relocation of workers..

Table 9.10: Impacts proposed to be scoped out of the project assessment for socio-economics and community.

Impact	Justification
Tourism and community effects within the NIA	Tourism and community effects will be concentrated within particular localities related to the physical location of onshore and offshore generation and transmission assets, epicentres of activity during the construction, operation and maintenance, and decommissioning phases. These are not anticipated to have any significant effects on tourism and community receptors outside the LIAs.

9.4.6 Measures adopted as part of the project

9.4.6.1 The following measures to be adopted as part of the project are relevant to socio-economics and community. These measures may evolve as the engineering design and the EIA progresses.

- CoCP
- Construction Traffic Management Plan (CTMP)
- Local Procurement Plan
- Local Skills Development Plan
- Local Recruitment Plan.

9.4.6.2 The requirement and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

9.4.7 Proposed assessment methodology

9.4.7.1 There is no established or industry specific guidance which can referred to when undertaking an assessment of socio-economics and community. Notwithstanding, the overarching NPS for energy (NPS EN-1) does provide guidance on how a socio-economic assessment should be undertaken, including the nature of impacts that may need to be considered. The approach to the assessment will also informed by the following:

- Guidance on assessing the socio-economic impacts of offshore wind farms Glasson, J; Durning B; Olorundami, T; and Welch, K (2020)
- UK Offshore Wind: Charting the Right Course: Building the Offshore Wind Supply Chain (BWEA, 2009)
- A Guide to an Offshore Wind Farm (The Crown Estate, TCE, 2012)
- Socio-economic indicators of marine-related activities in the UK economy (TCE, 2008)
- State of the Sector: Economics for Wales (Marine Energy Wales, 2019)
- Working for a Greener Britain: Vol 2 – Future Employment and Skills in the UK Wind and Marine Industries (RenewableUK, 2011)
- Offshore Wind. Forecasts of future costs and benefits (RenewableUK, 2011).

9.4.7.2 The socio-economics and community assessment will be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report, in addition to NPS EN-1 where relevant.

9.4.8 Potential cumulative effects

9.4.8.1 There is potential for cumulative effects to occur on sensitive receptors between the offshore generation and transmission assets and onshore transmission assets and other developments. The potential cumulative effects between the onshore transmission assets and other developments with respect to socio-economics and community will be considered within the ES.

9.4.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 4: EIA Methodology, of the EIA Scoping Report.

9.4.8.3 It is not considered that operation and maintenance of the onshore transmission assets will result in significant impacts on socio-economics and community either alone or cumulatively with other developments. Therefore, it is proposed that the potential effects arising from operation of the onshore transmission assets are scoped out of the cumulative effect assessment for socio-economics and community.

9.4.9 Potential inter-related effects

9.4.9.1 The assessment of potential inter-related effects will be considered within the socio-economics and community chapter of the ES. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 4: EIA Methodology, of the EIA Scoping Report. For example:

- Commercial fisheries:
  - Impacts on commercial fisheries associated with construction, operation and maintenance and decommissioning of the generation and transmission assets may impact socio-economic and community receptors located within the LIA.
- Seascape, landscape and visual resources:
  - The ZTV of the offshore generation assets and onshore transmission assets will be used to inform the LIA and the identification of tourism and recreation receptors to be considered in the socio-economics and community assessment.
- Land use and recreation:
  - Receptors identified within the land use and recreation assessment (e.g. recreational resources) will also be considered in the socio-economics and community assessment, where these receptors are located within the LIA.
- Historic environment:
  - Receptors identified within the historic environment assessment (e.g. world heritage sites) will also be considered in the socio-economics and community assessment, where these receptors are located within the LIA.

9.4.10 Potential transboundary impacts

9.4.10.1 A screening of transboundary impacts has been carried out and is presented in Annex A. This screening exercise identified that there is no potential for transboundary impacts upon socio-economics and community due to construction, operational and maintenance, and decommissioning impacts of the project.

10 Other Environmental Topics

10.1 Introduction

10.1.1.1 This section sets out the approach for the other environmental topics that are required to be considered within the Environmental Impact Assessment (EIA) process under Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and Schedule 3 of The Marine Works (Environmental Impact Assessment Regulations) 2007 (as amended), for which no Environmental Statement (ES) chapter is proposed. The section identifies the following:

- Environmental topics where information will be submitted in support of the Development Consent Order (DCO) and marine licence applications for the Mona Offshore Wind Project.
- Environmental topics which are proposed to be scoped out of the EIA.
- Environmental topics which are considered elsewhere in the ES.

10.2 Topics with supporting information in the ES

10.2.1 Human health

10.2.1.1 The potential impacts on human health arising from the construction, operation and maintenance, and decommissioning of the transmission assets will be considered in the following topic chapters of the ES where relevant:

- geology and ground conditions
- hydrology and flood risk
- land use and recreation
- traffic and transport
- noise and vibration
- air quality
- climate change
- socio-economics and community.

10.2.1.2 Therefore, the details in relation to impacts on health will be provided in the main topic chapters within the ES. In addition, the potential inter-related effects between the environmental topics listed above on human health will also be considered within the topic chapters of the ES where relevant.

10.2.1.3 It is proposed that a technical appendix be provided to draw the information relevant to human health together and to sign post where further details can be found. This appendix will include an overall conclusion regarding the significance of effects on human health.

Approach to assessment

10.2.1.4 It is proposed that a population and human health statement will be produced in the form of a technical appendix to the ES. The statement will investigate the potential activities and health determinants with the potential to influence health.

10.2.1.5 The appendix will draw from relevant topic chapters of the ES and will therefore utilise each topic's study area and baseline information.

10.2.1.6 The scope of the population and human health statement will be modified in response to refinements made to the transmission asset boundary and informed through consultation with the relevant statutory and non-statutory consultees, such as the Health and Safety Executive (HSE) and Environmental Health Officers (EHOs) from the local authorities.

Proposed scope of the assessment

10.2.1.7 The proposed scope of the assessment for the transmission assets will be as follows:

- Construction and decommissioning phases:
  - impacts resulting from emissions to air (including dust emissions and other pollutants, such as emissions from traffic)
  - impacts resulting from emissions to water (including runoff or spillages from construction areas to ground or surface water)
  - impacts resulting from emissions to land and soil (including runoff or spillages from construction areas)
  - impacts arising from any contamination risk to construction workers or the public (such as from existing areas of contaminated land)
  - impacts resulting from noise emissions and vibration
  - impacts arising from construction of any new or amended highways junctions and/or from changes in traffic flow (severance/disruption)
  - impacts arising from changes to access to Public Rights of Way (PRoW) or open space
  - impacts arising from employment opportunities and the impacts of the construction work force.
- Operation and maintenance phase:
  - impacts resulting from emissions to water (i.e. surface runoff) from the operation of the onshore substation)
  - impacts resulting from noise emissions and vibration associated with operation of the onshore substation
  - impacts arising from operation of any new or amended highways junctions.

Topics to be scoped out of the assessment

10.2.1.8 The following topics are proposed to be scoped out of the assessment:

- Operation and maintenance phase:
  - Impacts resulting from emissions to air (including dust emissions and other pollutants, such as emissions from traffic). No new dust emissions would be generated during the operational phase. No

significant traffic flows would be associated with operation or maintenance of the transmission assets.

- Impacts resulting from emissions to water, land and soil (including runoff or spillages from construction areas). No new emissions to land or soil would occur during the operational and maintenance phase.
- Impacts arising from any contamination risk to workers or the public (such as from existing areas of contaminated land). No new disturbance to land would be required during the operation and maintenance phase and, as such, no areas of contaminated land would be affected.
- Impacts arising from changes to access to PRoW or open space. Once construction is completed, no further disruption to PRoW or areas of land would be required.
- Impacts arising from employment opportunities. These are unlikely to result in significant effects for the transmission assets (these would be considered primarily for the operation and maintenance phase for the transmission assets, where significant long term employment opportunities would be provided).

Health effects of electromagnetic fields (heat and radiation)

10.2.1.9 Details of the potential effects in relation to electric and magnetic fields (EMFs) are provided below. Effects are not likely to be significant. However, the human health appendix will consider the effects of EMF through a 'risk perception' section within the technical appendix. This section will detail how and why EMF will not constitute a credible health risk in this instance, taking into account the information presented below.

Heat

10.2.1.10 Construction, operation and maintenance, and decommissioning of the transmission assets are unlikely to generate significant levels of heat.

10.2.1.11 The technical specification of the onshore substation will take into account any heat generated within the design and this would, as is usual practice, prevent any overheating or heat effects.

10.2.1.12 With these measures in place, it is not considered likely that significant effects in relation to heat will occur

Radiation

10.2.1.13 EMFs are part of the natural world, and are also produced wherever electricity is generated, transmitted or used. Public exposure to power-frequency EMFs comes from a range of sources including household wiring and appliances, low-voltage distribution power lines or underground cables, and high-voltage transmission power lines or underground cables. Exposure to static EMFs comes from the earth’s natural magnetic field, atmospheric electrical field, and human sources such as appliances and electric rail lines.

10.2.1.14 Activities required to facilitate the construction and decommissioning of the transmission assets would not generate any EMFs.

10.2.1.15 Operation and maintenance of the offshore and onshore export cables and onshore substation would produce EMFs due to the voltage and flow of current through electrical infrastructure.

10.2.1.16 The UK Government has adopted the 1988 Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection (ICNIRP, 1988). This guidance was subsequently updated in the form of the 2020 Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz) (ICNIRP, 2020). The 2020 ICNIRP guidance provides occupational and public exposure limits for EMF radiation.

10.2.1.17 EMF strengths drop rapidly with distance from the source. The distances will depend on voltage but, in general, the strength of a magnetic field is well within international guidelines within a few metres. Underground cables do not produce an external electric field at ground level due to the shielding of the cable sheath and burial material.

10.2.1.18 Due to the distance between the onshore substation components and the closest publicly-accessible point (the perimeter fence), the greatest EMFs exposure in the vicinity of substations is typically from the overhead lines or underground cables entering and exiting them. Perimeter fencing provides screening of the electric field, and this would not be expected to exceed the public exposure guidelines.

10.2.1.19 All of the electrical infrastructure associated with the transmission assets would be designed to comply with current guidelines on levels of public exposure and design of electrical infrastructure.

10.2.1.20 Taking the above into account, the potential impact of EMFs produced during the operation and maintenance of the transmission assets is likely to be negligible and any consequent effects would not be significant.

10.2.1.21 Therefore, the effects of heat and radiation are not proposed to be assessed in detail in the human health appendix. Potential health effects will be addressed through a 'risk perception' section within the technical appendix. This section will detail how and why EMF will not constitute a credible health risk in this instance.

10.2.2 Waste

10.2.2.1 The Applicant intends to submit a Site Waste Management Plan (SWMP) in support of the application for development consent for the Mona Offshore Wind Project, which would be included as a technical appendix to the ES.

10.2.2.2 Contractors will be required to follow the measures for managing waste set out in the SWMP and recording the movement of waste from the area of construction to the waste management facilities. On that basis, the potential impacts arising from the disposal and recovery of waste during construction of the transmission assets are unlikely to give rise to significant effects. Therefore, no standalone chapter within the ES is considered to be necessary.

10.2.2.3 The SWMP will identify the likely waste arisings from the construction of the transmission assets and set out appropriate measures for managing the waste in accordance with the waste hierarchy principle. These measures will include measures to reduce waste; to use less harmful alternative materials; opportunities to use materials with recycled content; to provide appropriate waste storage; and the utilisation licensed/ registered waste carriers.

10.2.2.4 The SWMP will be prepared in accordance with the relevant legislation, policy, and guidance including:

- Environmental Protection Act 1990
- Environment Act 1995
- Hazardous Waste (England and Wales) Regulations 2005 (as amended)
- Waste Management (England and Wales) Regulations 2006
- Waste (England and Wales) Regulations 2011 (as amended)
- The Environmental Permitting (England and Wales Regulations) 2016.

10.2.2.5 The roles and responsibilities of person(s) overseeing the implementation of waste management procedures during the construction phase will be identified in the SWMP, including relevant mandatory training requirements (e.g. toolbox talks, method statements).

10.2.2.6 The SWMP will also set out requirements for ongoing monitoring (e.g. regular site inspections) to ensure that construction waste is being managed appropriately according to the waste management procedures prescribed in the SWMP.

Waste impacts proposed to be scoped out

Operational waste

10.2.2.7 Operation and maintenance of the transmission assets will generate limited amounts of operational waste (e.g. materials from maintenance activities). However, operational waste would be segregated, recycled (where possible) and disposed of in accordance with collection procedures as agreed by the relevant regulator and local authorities, including Natural Resources Wales (NRW). These waste collection procedures will be included in an Operational Management Plan (OMP) for the transmission assets.

10.2.2.8 On this basis the potential impact arising from operational waste is unlikely to be significant and is proposed to be scoped out of the EIA.

10.3 Topics proposed to be scoped out of the ES

10.3.1.1 The following topics are proposed to be scoped out of the EIA process. Details are provided below.

10.3.1 Local planning policy context

10.3.1.1 A description of the consenting process and the Planning Act will be provided within the introductory chapters of the ES.

10.3.1.2 For each environmental topic, the relevant legislative and planning policy context will be described within each topic chapter of the ES. The assessment of each topic included in the ES will consider the requirements and objectives set out in national, regional and local planning policy where relevant and appropriate.

10.3.1.3 In addition, a Planning Statement will be submitted in support of the application for development consent, which will outline how the transmission assets comply with relevant local plans and planning policy.

10.3.1.4 Taking the information above into account, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing local planning policy context is not required and should be scoped out of the EIA process.

10.3.2 Daylight, sunlight and microclimate

10.3.2.1 The transmission assets will comprise offshore substations, offshore export cables, onshore export cables, onshore substation and associated infrastructure.

10.3.2.2 The above ground elements do not include tall buildings. Any built elements, such as the onshore substation, would not be sufficiently tall or close to other buildings to result in significant effects in relation to daylight and sunlight. In addition, given the nature of the transmission assets, these are not likely to result in microclimate changes and therefore this topic is proposed to be scoped out of the EIA.

10.3.2.3 The effects of the Mona Offshore Wind Project on climate change would be considered separately in a climate change chapter of the ES, as described in part 2, section 9.4: Climate change, of this EIA Scoping Report.

10.4 Topics covered elsewhere in the ES

10.4.1.1 In order to avoid duplication and to ensure a proportionate EIA process, the following topics are not proposed to be subject to stand alone chapters or appendices within the ES.

10.4.1.2 These environmental topics are already covered within the scope of work proposed in part 3, sections 3 to 9, of this EIA report. Therefore, no further assessment is required.

10.4.1 Other residues and emissions

10.4.1.1 The potential impacts of residues and emissions (e.g. dust, pollutants, light, noise, vibration) arising from the construction, operation and maintenance, and decommissioning of the transmission assets will be considered in the following topic chapters of the ES where relevant:

- geology and ground conditions (impacts of emissions/residues to land on soil quality)
- hydrology and flood risk (impacts of surface water runoff on water quality and flood risk)
- terrestrial ecology and intertidal birds (impacts of emissions to water, land or air and noise emissions on ecological receptors)

- benthic subtidal and intertidal ecology; fish and shellfish ecology; marine mammals and offshore ornithology (impacts of emissions to water and noise emissions on ecological receptors)
- noise and vibration (impacts of noise emissions and vibration)
- air quality (impacts of emissions to air, including dust and other pollutants).

10.4.1.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely effects of emissions and residues is not required.

10.4.2 Material assets

10.4.2.1 The potential impacts on material assets arising from the construction, operation and maintenance, and decommissioning of the transmission assets will be considered in the following topic chapters of the ES:

- other sea users
- historic environment
- land use and recreation
- socio-economics and community.

10.4.2.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely significant effects of the transmission assets on material assets is not required and should be scoped out of the EIA process.

10.4.2.3 Major accidents and disasters

10.4.2.4 The 2017 EIA Regulations require that the significant effects to be assessed on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape, include, where relevant, those significant effects arising from the vulnerability of the proposed development to major accidents and disasters.

10.4.2.5 As such, risk of major accidents and disasters will be considered, where applicable, in the relevant topic chapter of the EIA.

10.4.2.6 A description of how major accidents and disasters have been considered in the design of the Mona Offshore Wind Project is outlined in part 1, section 3: Project description, of the EIA Scoping Report.

Physical environment

10.4.2.7 The physical environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Reduction in groundwater quality and quantity:
  - part 3, section 6.1: Geology, hydrogeology and ground conditions, of the EIA Scoping Report.
- Impact on quality of surface water and watercourses:

  - part 3, section 6.2: Hydrology and flood risk, of the EIA Scoping Report.
- Increased flood risk: addressed in section 6.2:
  - part 3, section 6.2: Hydrology and flood risk, of the EIA Scoping Report.
- The vulnerability of the Mona Offshore Wind Project to climate change:
  - part 3, section 9.4: Climate change, of the EIA Scoping Report.

Biological environment

10.4.2.8 The biological environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Accidental pollution:
  - part 3, section 4.1: Benthic subtidal and intertidal ecology, of the EIA Scoping Report
  - part 3, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report
  - part 3, section 4.3: Marine mammals, of the EIA Scoping Report
  - part 3, section 7.1: Terrestrial ecology, of the EIA Scoping Report.

Human environment

10.4.2.9 The human environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Vessel to vessel collision risk:
  - part 3, section 5.2: Shipping and Navigation, of the EIA Scoping Report.
- Vessel allision (contact) risk:
  - part 3, section 5.2: Shipping and Navigation, of the EIA Scoping Report.
- Risk of vessel anchor and gear snagging:
  - part 3, section 5.2: Shipping and Navigation, of the EIA Scoping Report.
- Reduction of under keel clearance:
  - part 3, section 5.2: Shipping and Navigation, of the EIA Scoping Report.
- Reduction of emergency response capability and reduced access for SAR responders:
  - part 3, section 5.2: Shipping and Navigation, of the EIA Scoping Report.
- Impact of construction traffic on accidents and safety:
  - part 3, section 8.3: Traffic and transport, of the EIA Scoping Report.
- Impact of Abnormal Indivisible Loads on safety:
  - part 3, section 8.3: Traffic and transport, of the EIA Scoping Report.

10.4.2.10 A description of how major accidents and disasters during the construction, operation and maintenance and decommissioning of the generation assets will be considered is provided in part 2, section 7: Other environmental topics, of the EIA Scoping Report.

11 Transmission assets summary

11.1 Overview

11.1.1.1 The information set out in this Environmental Impact Assessment (EIA) Scoping Report is provided to support the Applicant's request for a Scoping Opinion from the Secretary of State and Natural Resources Wales (NRW) in relation to the development of the Mona Offshore Wind Project transmission assets.

11.1.1.2 As the Mona Offshore Wind Project is an offshore generating station with a capacity of greater than 350MW located in both Welsh and English waters, it is a Nationally Significant Infrastructure Project (NSIP) requiring a Development Consent Order (DCO) under the Planning Act 2008. The application for development consent for the Mona Offshore Wind Project will cover all elements of the project, including those within Welsh inshore waters as well as all onshore aspects of the Mona Offshore Wind Project.

11.1.1.3 A Marine Licence is required before carrying out any licensable marine activity under the Marine and Coastal Access Act 2009. Licensable activities within 12nm of the Welsh coast require a separate marine licence from NRW. A separate application will therefore be made to NRW for a marine licence for the offshore export cables and related works between the Mona Potential Array Area and the landfall at MHWS. This EIA Scoping Report has been prepared in support of the EIA to be undertaken for both the DCO and marine licence applications.

11.1.1.4 The application for development consent and marine licence will comprise full details of the Mona Offshore Wind Project and will be accompanied by an Environmental Statement (ES), which will present the findings of the EIA process.

11.1.1.5 The Mona Offshore Transmission Infrastructure Scoping Search Area is 1561km^2 in area and extends between the Mona Potential Array Area and the proposed landfall along the coast of north Wales. The Mona Onshore Transmission Infrastructure Scoping Search Area is 113km^2 in area and extends from the landfall to the onshore National Grid substation at Bodelwyddan.

11.1.1.6 It should be noted that the Mona Offshore Wind Project transmission assets will be located within the Mona Potential Array Area, the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. The EIA Scoping relevant to the Mona Potential Array Area is presented in part 2, Generation assets, of the EIA Scoping Report.

11.1.1.7 This EIA Scoping Report has identified the main aspects of the offshore and onshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project transmission assets.

11.1.1.8 Table 11.1 provides an overview of the potential impacts that are proposed to be scoped into (considered further) or scoped out of (not considered further) the EIA process for the Mona Offshore Wind Project transmission assets.

Table 11.1: Summary of potential impacts of the Mona Offshore Wind Project transmission assets (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase		
	C	O	D
Section 3: Offshore physical environment			
Physical processes			
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓
Increase in suspended sediments due to construction, operation and maintenance, and decommissioning related activities, and the potential impact to physical features.	✓	✓	✓
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.	✓	✓	✓
Impacts to sediment transport and sediment pathways at the export cable landfall.	✓	✓	✓
Changes to bathymetry due to depressions left by jack-up vessels.	×	×	×
Scour of seabed sediments during the operation and maintenance phase.	×	×	×
Underwater noise			
Effects of underwater noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	✓	✓	✓
Effects of underwater noise on marine life due to impact driven and drilled pile installations for the OSPs and offshore booster substation foundations.	✓	×	×
Effects of underwater noise on marine life due to jacket or monopile cutting and removal.	×	×	✓
Effects of underwater noise on marine life due to clearance of unexploded ordnance (UXO) detonation.	✓	×	×
Effects of the particle motion element of underwater noise on fish and shellfish receptors.	✓	×	✓
Effects of the particle motion element of underwater noise on marine mammals during all phases.	×	×	×
Section 4: Offshore biological environment			
Benthic subtidal and intertidal ecology			
Increased suspended sediment concentrations (SSCs) and associated deposition.	✓	✓	✓
Temporary habitat loss/disturbance.	✓	✓	✓
Long term habitat loss.	✓	✓	×
Increased risk of introduction and spread of invasive non-native species (INNS).	✓	×	✓
Colonisation of hard structures.	×	✓	×
Changes in physical processes.	×	✓	×
Removal of hard substrates.	×	×	✓
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓
Impacts to benthic invertebrates due to electromagnetic fields (EMF).	×	×	×
Accidental pollution during construction, operation and maintenance and decommissioning.	×	×	×
Fish and shellfish ecology			

Impact	Project phase		
	C	O	D
Temporary habitat loss/disturbance.	✓	✓	✓
Underwater noise impacting fish and shellfish receptors.	✓	×	✓
Increased suspended sediment concentrations (SSCs) and associated sediment deposition.	✓	✓	✓
Long term habitat loss.	✓	✓	✓
Electromagnetic Fields (EMF) from subsea electrical cabling.	×	✓	×
Colonisation of hard structures.	✓	✓	✓
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓
Accidental pollution during construction, operation and maintenance and decommissioning phases.	×	×	×
Underwater noise from vessels during all phases.	×	×	×
Marine mammals			
Injury and disturbance from underwater noise generated from piling	✓	×	×
Injury and disturbance from underwater noise generation from Unexploded ordnance (UXO) detonation.	✓	×	×
Disturbance to marine mammals from vessel use and other (non-piling) noise-producing activities	✓	✓	✓
Injury to marine mammals due to collision with vessels	✓	✓	✓
Effects on marine mammals due to changes in prey availability	✓	✓	✓
Disturbance to marine mammals from pre-construction surveys	✓	×	×
Accidental pollution during all phases.	×	×	×
Increased suspended sediment concentrations (SSC) and associated sediment deposition during all phases.	×	×	×
Impact of EMF (from surface lain or buried cables) during the operation and maintenance phase.	×	×	×
Offshore ornithology			
Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.	✓	✓	✓
Indirect impacts from underwater noise affecting prey species.	✓	×	✓
Temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs).	✓	✓	✓
Collision risk during the operation and maintenance phase.	×	×	×
Barrier to movement during the operation and maintenance phase.	×	×	×
Direct disturbance and displacement impacts from underwater noise during operation and maintenance and decommissioning phases.	×	×	×
Accidental pollution during all phases of the Mona Offshore Wind Project.	×	×	×
Section 5: Offshore human environment			
Commercial fisheries			
Loss or restricted access to fishing grounds.	✓	✓	✓
Displacement of fishing activity into other areas.	✓	✓	✓
Loss or damage to fishing gear due to snagging.	×	✓	×

Impact	Project phase		
	C	O	D
Potential impacts on commercially important fish and shellfish resources.	✓	✓	✓
Supply chain opportunities for local fishing vessels	✓	✓	✓
Interference with fishing activity.	×	×	×
Increase in steaming distances.	×	×	×
Shipping and navigation			
Deviations to commercial routes.	✓	✓	✓
Increased vessel to vessel collision risk.	✓	✓	✓
Increased allision (contact) risk to vessels.	✓	✓	✓
Increased risk of anchor and gear snagging for commercial vessels and commercial fishing vessels (in transit).	✓	✓	✓
Reduction of under keel clearance	×	✓	×
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓
Interference with marine navigation, communications and position fixing equipment.	×	✓	×
Marine archaeology			
Sediment disturbance and deposition leading to indirect impacts on archaeological receptors.	✓	✓	✓
Direct damage to archaeological receptors.	✓	✓	✓
Alteration of sediment transport regimes.	×	✓	×
Other sea users			
Displacement of recreational activities.	✓	✓	✓
Increased suspended sediment concentrations and associated deposition affecting recreational diving sites and designated bathing water sites.	✓	✓	✓
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines.	✓	✓	✓
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	✓	✓	✓
Alterations to sediment transport pathways affecting aggregate extraction areas.	×	✓	×
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Mona Offshore Transmission Infrastructure Scoping Search Area.	✓	✓	✓
Interference with offshore microwave fixed communication links.	×	✓	×
Section 6: Onshore physical environment			
Geology, hydrogeology and ground conditions			
The impact of partial or total loss of or damage to designated geological and geomorphological sites during the construction phase	✓	×	×
The impact on groundwater levels or flow in sensitive groundwater dependent sites during the construction and decommissioning phase.	✓	×	✓
The impact of mobilisation of existing source areas of contamination causing a deterioration of groundwater quality in underlying superficial secondary aquifer units during the construction, and decommissioning phase	✓	×	✓
The impact of mobilisation of existing source areas of contamination and possible creation of new transport pathways causing a deterioration in groundwater quality and quantity of in the	✓	✓	✓

Impact	Project phase		
	C	O	D
underlying bedrock Principal aquifer units, during the construction, operation and maintenance and decommissioning phase			
The impact of reduced groundwater quantity or quality in aquifer units, on protected groundwater abstractions (licensed or non-licensed) and/or change in groundwater resources status, during the construction, operation and maintenance and decommissioning phase	✓	✓	✓
The impact of a reduction in the quantity and quality of surface waters fed by groundwater and other groundwater dependent sites, during the construction and decommissioning phase.	✓	×	✓
The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances, during the construction and decommissioning phase	✓	×	✓
The impact of heat generated by the onshore export cables on groundwater quality, during the operation and maintenance phase	×	✓	×
The impact of ground gas generation on human health and other environmental receptors, during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of accidental spillages/contaminant release on the quality of groundwater ground receptors during operation and maintenance of the onshore transmission assets.	×	×	×
Hydrology and flood risk			
The impact of contaminated runoff on the quality of 'Main Rivers' arising from the construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of contaminated runoff on the quality of ordinary and private watercourses arising from the construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of accidental spillages/ contaminant release on the quality of surface water and ground receptors during construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of increased flood risk arising from additional surface water runoff during construction of the onshore transmission assets.	✓	×	×
The impact of increased flood risk arising from additional surface water runoff during operation of the onshore substation.	×	✓	×
The impact of increased flood risk arising from damage to existing flood defences during the construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of damage to existing field drainage during the construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of damage to existing water pipelines during the construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of contaminated runoff on the chemical and biological status of surface water receptors arising from the operation and maintenance of the onshore transmission assets.	×	×	×
The impact of accidental spillages/contaminant release on the quality of surface water and ground receptors during operation and maintenance of the onshore transmission assets.	×	×	×
The impact of increased flood risk arising from damage to existing flood defences during the operation and maintenance of the onshore transmission assets.	×	×	×
The impact of increased flood risk arising from additional surface water runoff during the operation and maintenance of the onshore export cable.	×	×	×
Section 7: Onshore biological environment			
Terrestrial ecology and intertidal birds			
The impact of temporary and permanent habitat loss during construction, operation and maintenance and decommissioning of the onshore transmission assets.	✓	✓	✓
The impact of habitat disturbance during construction, operation and maintenance and decommissioning of the onshore transmission assets.	✓	✓	✓
The impact of habitat fragmentation and species isolation during construction, operation and maintenance and decommissioning of the onshore transmission assets.	✓	✓	✓
The impact of pollution caused by accidental spills/ contaminant release during construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of spreading INNS during construction and decommissioning of the onshore transmission assets.	✓	×	✓

Impact	Project phase		
	C	O	D
The impact of temporary and permanent habitat loss on protected habitats and species during operation and maintenance of the onshore transmission assets.	×	×	×
The impact of pollution caused by accidental spills/contaminant release on protected habitats and species during operation and maintenance of the onshore transmission assets.	×	×	×
The impact of construction, operation and maintenance and decommissioning of the onshore transmission assets on species not listed in paragraph 7.1.3.4 of this EIA Scoping Report, including red squirrel, brown hare, fish, and aquatic invertebrates.	×	×	×
Section 8: Onshore human environment			
Historic environment			
The impact of construction of the onshore transmission assets on buried archaeology resource	✓	×	×
The impact of construction and decommissioning of the onshore transmission assets on the setting of above ground historic assets.	✓	✓	✓
The impact of operation and maintenance of the onshore substation on the setting of above ground historic assets.	×	✓	×
The impact of construction and decommissioning of the onshore transmission assets on the character of the historic landscape	✓	×	✓
The impact of operation and maintenance of the onshore substation on the character of the historic landscape	×	✓	×
The impact on the buried archaeological resource (damage and permanent loss) arising from the operation and maintenance and decommissioning of the onshore transmission assets.	×	×	×
The impact on the setting of above ground historic assets arising from operation and maintenance of the onshore transmission assets (excluding the onshore substation), including the onshore export cables and associated infrastructure.	×	×	×
Land use and recreation			
The permanent loss of agricultural land arising from the Project	✓	×	×
The impact of disruption and reduced access to agricultural land during construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of disruption and reduced access to recreational resources (e.g. access land, common land and village greens, PRoW, cycle routes, other recreational resources) during construction and decommissioning of the onshore transmission assets.	✓	×	✓
The impact of disruption and reduced access to agricultural land during operation and maintenance of the onshore transmission assets.	×	×	×
The impact of disruption and reduced access to recreation resources (e.g. access land, common land and village greens, PRoW, cycle routes, other recreational resources) during operation and maintenance of the onshore transmission assets.	×	×	×
Traffic and transport			
The impact of driver and pedestrian delay/pedestrian amenity caused by construction works or construction traffic using the LRN and SRN.	✓	×	×
The impact of community severance caused by construction works or construction traffic using the LRN and SRN and the disruption of other transport receptors.	✓	×	×
The impact of temporary delays to public transport services caused by construction of the onshore transmission assets.	✓	×	×
The impact of construction traffic on accidents and safety for users of the LRN, SRN and other transport receptors.	✓	×	×
The impact of Abnormal Indivisible Loads (AILs) on the safety of users of the LRN, SRN and other transport receptors.	✓	×	×
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, community severance, public transport delay and accidents and safety during operation and maintenance of the onshore transmission assets.	×	×	×

Impact	Project phase		
	C	O	D
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, community severance, public transport delay and accidents and safety during decommissioning of the onshore transmission assets.	×	×	×
Noise and vibration			
The impact of noise and vibration generated by onshore and offshore construction and decommissioning activities on human receptors.	✓	×	✓
The impact of noise generated by additional vehicle movements on the local highway network during the construction and decommissioning phase on human receptors.	✓	×	✓
The impact of noise generated during operation of the onshore substation on human receptors.	×	✓	×
The impact on human receptors and historic assets arising from vibration generated by additional vehicle movements on the local highway network during construction and decommissioning of the onshore transmission assets.	×	×	×
The impact on human receptors and historic assets arising from vibration generated during operation and maintenance of the onshore transmission assets.	×	×	×
The impact of noise and vibration generated during operation and maintenance of the onshore export cable.	×	×	×
Air quality			
The impact of dust soiling (nuisance) on property arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓
The impact of an increase in suspended particulate matter on people arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓
The impact on human receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓
The impact on ecological receptors arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓
The impact on ecological receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓
The impact on human and ecological receptors (dust soiling and human health) arising from fugitive dust emissions generated during operation and maintenance of the onshore transmission assets.	×	×	×
The impact on human and ecological receptors arising from air emissions generated by vehicle traffic during operation and maintenance of the onshore transmission assets.	×	×	×
The impact on human and ecological receptors arising from air emissions generated by plants or stacks during operation and maintenance of the onshore transmission assets.	×	×	×
Section 9: Offshore and onshore combined topics			
Seascape, landscape and visual resources			
The impact of the generation and transmission assets on seascape and landscape character during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of the generation and transmission assets on publicly accessible views during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of construction, operation and maintenance and decommissioning of the generation and transmission assets on seascape and landscape character and visual resources located beyond the seascape, landscape and visual study area for generation and transmission assets.	×	×	×
The impact of operation and maintenance of the offshore and onshore export cables on seascape and landscape character and visual resources.	×	×	×
The impact of decommissioning of the offshore and onshore export cables on seascape and landscape character and visual resources.	×	×	×

Impact	Project phase		
	C	O	D
Aviation and radar			
Creation of a physical obstacle to low flying aircraft.	✓	✓	✓
Physical obstruction and potential for disruption to helicopter access/egress to/from offshore oil and gas platforms.	✓	✓	✓
Obstruction to SAR helicopter operations.	✓	✓	✓
Impacts to the Gypsy Lane Helipad.	✓	✓	✓
Potential disruption to HMRs due to the presence of the offshore booster substation.	×	×	×
Increased helicopter traffic within the Mona Offshore Transmission Infrastructure Scoping Search Area may affect available airspace for other users.	×	×	×
Socio-economics and community			
The impact of disruption on tourism and recreation receptors during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓
The impact on economic receptors including employment, GVA, and supply chain demand during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓
The impact of increased employment opportunities arising from the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact on the demand for housing, accommodation and local services	✓	✓	✓
The impact on the Welsh language	✓	✓	✓
Tourism and community effects within the NIA	×	×	×
Topics to be scoped out			
Daylight, sunlight and microclimate	×	×	×
Operational waste	×	×	×
Local planning policy context	×	×	×
Heat	×	×	×
Radiation	×	×	×

11.2 Cumulative effects

11.2.1.1 This EIA Scoping Report has proposed an approach to Cumulative Effects Assessment (CEA) that is consistent with the Planning Inspectorate's Advice Note Seventeen: Cumulative Effects Assessment (The Planning Inspectorate, 2019) and the RenewableUK Cumulative Impact Assessment Guidelines, specifically Guiding Principle 4 and Guiding Principle 7 (RenewableUK, 2013).

11.2.1.2 A detailed CEA will be undertaken to support the ES, in line with the methodology outlined in part 1, section 4: EIA methodology, of this EIA Scoping Report.

11.3 Transboundary impacts

11.3.1.1 A transboundary screening assessment for the Mona Offshore Wind Project has been undertaken and is presented in part 4, Annex A: Transboundary Impacts Screening, of the EIA Scoping Report. This screening has been carried out in accordance with the Planning Inspectorate's Advice Note Twelve: Transboundary Impacts and Process (The Planning Inspectorate, 2020).

11.3.1.2 Based on what is currently known of the likely spatial scale of effects arising from the Mona Offshore Wind Project and the economic interests of other states in the vicinity, transboundary impacts have been screened into the EIA process for the following topics:

- fish and shellfish ecology
- marine mammals
- offshore ornithology
- commercial fisheries
- shipping and navigation
- climate change.

11.4 Water Framework Directive screening

11.4.1.1 A preliminary Water Framework Directive (WFD) screening has been carried out and is presented in part 4, Annex B: WFD Screening, of the EIA Scoping Report. This screening has identified rivers and water bodies that could potentially be affected by the Mona Offshore Wind Project.

11.5 Marine Conservation Zone screening

11.5.1.1 A preliminary screening of designated Marine Conservation Zones (MCZs) has been completed and is presented in part 4, Annex C: MCZ Screening, of the EIA Scoping Report. No MCZs coincide with the Mona MCZ screening boundary described in part 4, Annex C: MCZ Screening, of the EIA Scoping Report. Therefore, based on this preliminary screening, it is concluded that an MCZ assessment is not required for the Mona Offshore Wind Project.

11.6 Consultation

11.6.1.1 Before an application for a DCO is submitted to the Secretary of State extensive consultation with key stakeholders (local authorities, statutory bodies, local communities and interest groups) is required. The proposed approach to stakeholder consultation during the pre-application phase is outlined in part 1, section 5: Consultation process, of the EIA Scoping Report.

11.6.1.2 Feedback provided within the Scoping Opinion, co-ordinated by the Secretary of State and NRW, will be taken into account as part of the EIA process for the Mona Offshore Wind Project. In parallel to seeking a Scoping Opinion, the Applicant will carry out its Phase 1 public consultation. Over the consultation period, a number of events are proposed, which are likely to include online events, public exhibitions and pop-up events. Anyone who could potentially be affected by, or may have an active interest in, the Mona Offshore Wind Project is encouraged to participate.

11.7 Next steps

11.7.1.1 Consultees are invited to consider the information presented in this EIA Scoping Report and advise on whether or not they agree with the conclusions. Several broad questions are presented below to encourage reflection of the key elements discussed in this EIA Scoping Report:

- Are there any additional baseline data sources available that could be used to inform the EIA?
- Does the reader agree that the proposed study areas are appropriate for each of the EIA topics?
- Have all potential impacts resulting from the Mona Offshore Wind Project transmission assets been identified for each of the EIA topics within this EIA Scoping Report?
- Does the reader agree with the impacts to be scoped in, and out, of the assessment?
- For those impacts scoped in, does the reader agree that the methods described are sufficient to inform a robust impact assessment?
- Are there any specific developments or infrastructure schemes which should be taken into account when considering potential cumulative impacts?

11.7.1.2 Following receipt of the Scoping Opinion from the Secretary of State and NRW, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted on during Q4 2022/Q1 2023. The PEIR will provide an initial statement of the environmental information available for the Mona Offshore Wind Project, including descriptions of the likely environmental effects and measures adopted as part of the project. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the Mona Offshore Wind Project, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process.

11.7.1.3 The Applicant expects it will further refine the Mona Offshore Wind Project based upon the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the applications for development consent and marine licence which are planned to be submitted to the Secretary of State and NRW, respectively, in Q4 2023.

12 References

12.1 Introduction

None.

12.2 Site selection and alternatives

None.

12.3 Offshore physical environment

12.3.1 Physical processes

ABPmer (2008) WebVision Atlas of UK Marine Renewable Energy Resources. Available: https://www.renewables-atlas.info/explore-the-atlas/. Accessed: December 2021

ABPmer (2018) Data Explorer. Available: https://www.seastates.net/explore-data/ Accessed: December 2021.

BOWind (2008) Barrow Offshore Wind Farm Post Construction Monitoring Report. First annual report. 15 January 2008, 60pp.

Brooks, AJ., Whitehead, PA., and Lambkin, DO. (2018) Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects, NRW Report No: 243, 119 pp

CEFAS Report, (2016) Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme.

Celtic Array Ltd., (2014) Environmental Impact Assessment Offshore Scoping Report, Section 6: Physical Processes.

Coughlan, M., Guerrinid, M., Creanece, S., O'Sheade, M., Ward, S., Van Landeghem, K., Murphy, J., Doherty, P. (2021) A new seabed mobility index for the Irish Sea: Modelling seabed shear stress and classifying sediment mobilisation to help predict erosion, deposition, and sediment distribution. Continental Shelf Research, Vol 229, 104574. November 2021.

EMODnet (2020) Bathymetry. Available: https://www.emodnet-bathymetry.eu/. Accessed December 2021.

EMU (2013) Irish Sea Zone, Hydrodynamic measurement campaign October 2010-October 2012. Report issued to Centrica Energy Renewable Investments.

GEMS (2011) Metocean data collection, Ormonde wind farm project. Report prepared for: Offshore Design Engineering Ltd. Document number: GSL10108-FIN-001-01

Haigh, I., Wadey, M., Gallop, S., Loehr, H., Nicholls, R., Horsburgh, K., Brown, J., Bradshaw, E. (2015) A user-friendly database of coastal flooding in the United Kingdom from 1915–2014, Scientific data 2 150021.

Howarth, M.J. (2005) Hydrography of the Irish Sea, SEA6 Technical Report, POL Internal document 174.

Lambkin, D.O., Harris, J.M., Cooper, W.S., and Coates, T. (2009) Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide. COWRIE.

Mellett, C., Long, D., Carter, G., Chiverell, R., and Van Landeghem, K. (2015) Geology of the seabed and shallow subsurface: The Irish Sea. British Geological Survey Commissioned Report, CR/15/057. 52pp

Met Office (2018) UK Climate Projections (UKCP).

Pye, K., Blott, S.J., and Brown, J. (2017) Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments. NRW Report No 208, 139pp.

Ramsay, D.L., and Brampton, A.H. (2000) Coastal Cells in Scotland: Cell 1 - St Abb's Head to Fife Ness. Available at: http://www.dynamiccoast.com/links.html. Accessed June 2020.

12.3.2 Underwater Noise

Andersson, M., Sigray, P. and Persson, L. (2011) Operational Wind Farm Noise and Shipping Noise Compared with Estimated Zones of Audibility for Four Species of Fish. Journal of The Acoustical Society of America. Vol.129. 10

Bailey, H., Senior, B., Simmons, D., Rusin, J., Picken, G., and Thompson, P. (2010) Assessing Underwater Noise Levels during Pile-Driving at an Offshore Windfarm and Its Potential Effects on Marine Mammals. Marine Pollution Bulletin 60 (6): 888–97.

Boisseau, O., McGarry, T., Stephenson, S., Compton, R., Cucknell, A. C., Ryan, C., McLanaghan, R. and Moscrop, A. (2021) Minke whales *Balaenoptera acutorostrata* avoid a 15 kHz acoustic deterrent device (ADD). Marine Ecology Progress Series, 667, 191-206.

Etter, P.C. (2018) Underwater acoustic modelling and simulation. CRC press.

Nedwell J.R., Collett A.G., Barham R.J., Mason T.I., and Bird H.V. (2012) Measurement and Assessment of Underwater Noise during Ormonde Offshore Wind Farm's Operational Phase. Subacoustech Report No. E354R0104

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf.

JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available online at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.

JNCC (2020) Guidance on noise management in harbour porpoise SACs. Available online at: https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784.

National Physical Laboratory (2014) Good Practice Guide No. 133 – Underwater Noise Measurement. Available online at: https://www.npl.co.uk/special-pages/guides/gpg133underwater. Accessed October 2021.

Nedwell, J.R., Collett, A.G., Barham, R.J., Mason, T.I., Bird, H.V. (2012) Measurement and Assessment of Underwater Noise during Ormonde Offshore Wind Farm's Operational Phase, Subacoustech Report No. E354R0104.

NMFS (2018) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. National Marine Fisheries Service (NOAA).

Otani, Seiji and Naito, Yasuhiko and Kato, Akiko and Kawamura, Akito. (2001) Oxygen consumption and swim speed of the harbor porpoise *Phocoena phocoena*. Fisheries Science. 67. 894-898. 10.1046/j.1444-2906.2001.00338.x.

Popper, Arthur, N., Anthony, D., Hawkins, Richard, R., Fay, David, A., Mann, Soraya Bartol, Thomas, J., Carlson, and Sheryl Coombs (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. Springer.

Schulkin, M., and J. A. Mercer. (1985) Colossus Revisited: A Review and Extension of the Marsh-Schulkin Shallow Water Transmission Loss Model (1962). DTIC Document.

Sigray, P. and Andersson, M. (2011) Particle Motion Measured at an Operational Wind Turbine in Relation to Hearing Sensitivity in Fish. The Journal of the Acoustical Society of America. 130. 200-7.

Sims, D.W., Speedie, C.D. and Fox, A.M. (2000) Movements and growth of a female basking shark resighted after a three year period. Journal of the Marine Biological Association of the U.K. 80: 1141-1142.

Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, A., Bejder, L., Tyack, P.L. (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise, Aquatic Mammals 27:421-464.

Southall, B., Finneran, J. J., Reichmuth, C., Nachtigall, P. E., Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D., and Tyack, P., (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Southall, B, L., Bowles, A.E., Ellison, T.W., Finneran, J.J., Gentry, R.L., Greene Jr, C.R., Kastak, D., (2007) Marine Mammal Noise-Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals 33 (4): 411–521.

Thompson, D., Brownlow, A., Onoufriou, J. & Moss, S. (2015) Collision Risk and Impact Study: Field tests of turbine blade-seal carcass collisions. Sea Mammal Research Unit, University of St Andrews, Report to Scottish Government, no. MR 5, St Andrews, 16pp.

Toso, Giovanni, Paolo Casari, and Michele Zorzi. (2014) The Effect of Different Attenuation Models on the Performance of Routing in Shallow-Water Networks. In Underwater Communications and Networking (UComms), 2014, 1–5. IEEE.

Weston D.E. (1976) Propagation in water with uniform sound velocity but variable-depth lossy bottom, J. Sound Vib., 47, pp.473-483, 1976.

Wang, Heaney, Pangerc, Theobald, Robinson and Ainslie. (2014) Review of underwater acoustic propagation models. National Physical Laboratory AC 12.

12.4 Offshore biological environment

12.4.1 Benthic subtidal and intertidal ecology

Camacho-Ibar, V. (1991) Trace elements and polychlorinated biphenyls (PCB) congeners in Liverpool Bay Sediments. PhD. Thesis. University of Wales, Bangor.

Cefas (2021) OneBenthic web app. Available: https://rconnect.cefas.co.uk/onebenthic_dashboard/. Accessed: December 2021

Celtic Array Ltd (2014a) Rhiannon Offshore Wind Farm, Environmental Statement PEI- Benthic Ecology. Rev03

Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland. {online] Available at: https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/

CMACS (2005) Burbo Bank offshore wind farm pre construction contaminants investigation. Document: J3034 Contaminants v1.0

CMACS (2012) Ormonde Offshore Wind Farm Year 1 post construction benthic monitoring technical survey report (2012 survey). Report to RPS Energy. November 2012.

CMACS (2013) Walney Offshore Wind Farm Year 2 post construction benthic monitoring technical survey report. (2013 survey). Report to Walney Offshore Wind Farms (UK) Ltd/DONG Energy. November 2013.

CMACS (2014) Walney Offshore Wind Farm Year 3 post construction benthic monitoring technical survey report (2014 survey). Report to Walney Offshore Wind Farms (UK) Ltd/DONG Energy. December 2014.

Cole, S., Codling, I.D., Parr, W. and Zabel, T. (1991) Guidelines for managing water quality impacts within UK European marine sites. Prepared for the UK Marine SAC Project.

Covey, R. (1998) Marine Nature Conservation Review Sector 11. Liverpool Bay and the Solway Firth: area summaries. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series).

CSA Ocean Sciences Inc. and Exponent (2019) Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA. OCS Study BOEM 2019-049. 59 pp.

Dong Energy (2013) Walney Extension offshore wind farm, vol 1 environmental statement, chapter 10 benthic ecology.

European Marine Observation and Data Network (EMODnet) (2016) [online] Available at: https://www.emodnet-seabedhabitats.eu/ [Accessed November 2021].

Howarth, G., Westerberg-Liptrot, K. & Evans, J. (2001) Urban Waste Water Treatment Directive: Dee Estuary Sensitive Area (Eutrophic) Designation. Buckley: Environment Agency

Irving, R. (2009) Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive. Summary of an Inter Agency Workshop 26-27 March 2008. Joint Nature Conservation Committee, JNCC Report No. 432, 28pp.

Leah, R.T., Evans, S.J., and Johnson, M.S. (1992). Arsenic in plaice (*Pleuronectes platessa*) and whiting (*Merlangius merlangus*) from the North east Irish Sea. Marine Pollution Bulletin. 24.pp 544-9.

Limpenny, D.S., Foster-Smith, R.L., Edwards, T.M., Hendrick, V.J., Diesing, M., Eggleton, J.D., Meadows, W.J., Crutchfield, Z., Pfeifer, S. and Reach, I.S. (2010) Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef. Natural England Supported Through Defra's Aggregates Levy Sustainability Fund, ALSF Ref No. MAL0008, 149pp.

Jenkins, C., Eggleton J., Barry, J., O'Connor, J., Advances in assessing Sabellaria spinulosa reefs for ongoing monitoring, Ecology and Evolution, Vol8, Issue 15, July 2018.

JNCC, 2022, Marine Habitat Classification for Britain and Ireland, available: https://mhc.jncc.gov.uk/. Accessed March 2022.

Moore J., Jones J. and Robinson, K. (2017) NRW Rhiannon *Modiolus* survey 2015: video and still image analysis. NRW Evidence Report Series, Report No: 215, 31pp.

Nagpal, N.K., Pommen, L.W. and Swain, L.G. (2001) A compendium of working water quality guidelines for British Columbia. Water Management Branch, Environmental and Resource Management Department, Ministry of Environment, Lands and Parks.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (Reference number: 2008-3).

Thornton, I., Watling, H. and Darracott, A. (1975) Geochemical studies in several rivers and estuaries used for oyster rearing. Science of the total environment. Vol 4, pp 325-345.

Tyler, A. O., Millward, G. E., Jones, G. E, & Turner, A. (1994) Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzofurans in sediments from U.K. estuaries. Estuarine, Coastal and Shelf Science. Vol. 39 (1) pp.1-13.

Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T. (2018) Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, pp. 91. Available from https://www.marlin.ac.uk/publications.

12.4.2 Fish and Shellfish

Aires, C., Gonzales-Irusta, J.M., and Watret, R., (2014) Updating Fishereis Sensitivity Maps in British Waters. Scottish Marine and Freshwater Science Report Volume 5 Number 10

Brown and May Marine Ltd (2009) Walney Offshore Wind Farm Pre Construction Fish Survey.

Brown and May Marine Ltd (2012) West of Duddon Sands Offshore Wind Farm, Adult and Juvenile Fish and Epibenthic Pre Construction Surveys.

Brown and May Marine Ltd (2013) Walney Offshore Wind Farm, Year 2 Post construction Monitoring Fish and Epibenthic Survey, FINAL Ref WOWPCOB03.

Cefas (2004) Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements, June 2004.

Cefas and Environment Agency (2017) Assessment of Salmon Stocks and Fisheries in England and Wales.

CIEEM (2019) Guidelines for ecological impact assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.1 - updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

Celtic Array Ltd (2014b) Celtic Array offshore wind farm preliminary environmental information chapter 10: fish and shellfish ecology. Document number SE-D-EV-075-0002-000000-010.

CMACS (2006) Burbo Bank offshore wind farm, pre construction commercial fish survey (2m beam trawl).

CMACS (2007) Burbo Bank Offshore Wind Farm, Electromagnetic Fields and Marine Ecology Study. Prepared for Seascape Energy. Report reference J3034 EMF v2 (09-07).

CMACS (2010a) Burbo Bank Offshore Wind Farm, Post construction (Year 3) Commercial Fish Survey.

CMACS (2010b) Celtic Array (Zone 9) Autumn fish trawl survey. CMACS ref: J3152(Irish Sea Zone R3 Autumn Benthic Trawl Survey v1).

CMACS (2011) Gwynt y Môr Offshore Wind Farm baseline pre- construction benthic survey report (2010 survey). Report to Gwynt y Môr OWF Ltd. July 2011.

Coastal Fisheries Conservation and Management (2006) Rhyl Flats Offshore Wind Farm, Fish and Fisheries baseline study. Prepared for Npower Renewables.

Coull, K.A., Johnstone, R., and S.I. Rogers (1998) Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

Delargy, A., Hold, N., Lambert, G.I., Murray L.G., Hinz H., Kaiser M.J., McCarthy, I., and Hiddink J.G. (2019) – Welsh waters scallop surveys and stock assessment. Bangor University, Fisheries and Conservation Report No. 75. pp 48.

Dickey-Collas, M., Nash, R.D.M. and Brown, J. (2001) The location of spawning Irish Sea herring (*Clupea harengus*). Journal of the Marine Biological Association of the United Kingdom, 81: 713–714.

Doherty P.D., J. M. Baxter, F. R. Gell, B. J. Godley, R. T. Graham, G. Hall, J. Hall, L. A. Hawkes, S. M. Henderson, L. Johnson, C. Speedie and M. J. (2017) Witt Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic, Scientific Reports, article number 42837

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012) Mapping the spawning and nursery grounds of selected fish for spatial planning. Report for Cefas, Science Series Technical Report no. 147.

Gardiner, R., Main, R., Davies, I., Kynoch, R., Gilbey, J., Adams, C., and Newton M. (2018) Recent Investigations into the Marine Migration of Salmon Smolts in the Context of Marine Renewable Development. Conference Presentation. Environmental Interactions of Marine Renewables (EIMR) Conference, Kirkwall, 24-26 April 2018.

ICES. (2021) ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2020 meeting) ICES Scientific Reports. 3:14. 31pp. https://doi.org/10.17895/ices.pub.7910.

JNCC (2019) MPA Mapper, Available: https://jncc.gov.uk/mpa-mapper/ Accessed: October 2021.

JNCC (2020) Marine Recorder Public UK Snapshot. Available: https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307 Accessed: October 2021.

Judd (2012) Guidelines for data acquisition to support marine environmental assessment of offshore renewable energy projects, Final, issued 2 May 2012.

Lambert, G.I., Murray L.G., Kaiser M.J., Salomonsen H., and Cambie, G. (2013) Welsh waters scallop survey – Cardigan Bay to Liverpool Bay July-August 2013. Bangor University, Fisheries and Conservation Report No. 30. pp 44.

Moore, A.B.M., Bater R., Lincoln H., Simpson S.J., Brewin, J., Chapman, T., Heney, C., Southworth, L., Spencer, J., Hold, N., and McCarthy I.D. (2020). Bass and ray ecology in Liverpool Bay. Bangor University Sustainable Fisheries and Aquaculture Group, Fisheries Report 3. 56 pages.

NBN Atlas (2019) Species records, Available: https://nbnatlas.org/ Accessed: October 2021.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. (Reference number: 2008-3). Available at: http://www.vliz.be/imisdocs/publications/ocrd/224682.pdf. Accessed October 2021.

Popper, Arthur, N., Anthony, D., Hawkins, Richard, R., Fay, David, A., Mann, Soraya Bartol, Thomas, J., Carlson, and Sheryl Coombs (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. Springer.

RPS Energy (2010) Ormonde Offshore Wind Farm, Construction (Year 1) Environmental Monitoring. Volume 1 Main Report.

Southall E.J., D.W., Sims J.D., Metcalfe O .J.I., Doyle P , S. Fanshawe P.C., Lacey J., Shrimpton, J.L., Solandt P., and C.D., Speedie (2005) Spatial distribution patters of basking sharks on the European shelf, preliminary comparison of satellite-tag geolocation, survey and public sightings data. Journal of Marine Biology Associate UK., Vol 85, p1083-1088.

Titan Environmental Surveys Ltd (2005) Walney and West of Duddon Sands Offshore Wind Farms, Baseline Benthic Survey – Epifaunal Beam Trawl Results.

12.4.3 Marine mammals

Baines, M.E. and Evans, P.G.H. (2012) Atlas of Marine Mammals of Wales. CCW Monitoring Report No. 68. 2nd edition. 139pp.

BOWind (2006) Barrow offshore wind farm construction monitoring report, 02 November 2006 Rev01.

Brasseur, S., Aarts, G., Meesters, E., van Polanen Petel, T., Dijkman, E., Cremer, J. and Reijnders, P. (2012) Habitat preference of harbour seals in the Dutch coastal area: analysis and estimate of effects of offshore wind farms.

Carter, M. I. D. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78.

CEFAS (2010) Strategic review of offshore wind farm monitoring data associated with FEPA licence conditions – annex 4: underwater noise., Cefas report ME1117.

Celtic Array Ltd (2014c) Rhiannon Offshore Wind Farm, Environmental Statement PEI- Chapter 11 marine mammals, basking shark and turtles. Document number: SE-D-EV-001-0002-000000-001

CIEEM (2019) Guidelines for ecological impact assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.1 - updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

CMACS (2011) Walney offshore wind farm marine mammal mitigation during construction, final report v3.

Copping, A. (2018) The State of Knowledge for Environmental Effects Driving Consenting/Permitting for the Marine Renewable Energy Industry. Prepared for Ocean Energy Systems On behalf of the Annex IV Member Nations, January 2018.

Czech-Damal, N. U., Dehnhardt, G., Manger, P. and Hanke, W. (2013) Passive electroreception in aquatic mammals. Journal of Comparative Physiology A-Neuroethology Sensory Neural and Behavioural Physiology 199:555-563.

DHI Water and Environment (2006) Walney and West of Duddon Sands Environmental Impact Assessment - Marine Mammals in the NW3 Area, Irish Sea.

Diederichs, A., Nehls, G., Dähne, M., Adler, S., Koschinski, S. and Verfuß, U. (2008) Methodologies for measuring and assessing potential changes in marine mammal behaviour, abundance or distribution arising from the construction, operation and decommissioning of offshore windfarms.

Dong Energy (2013) Burbo Bank offshore wind farm Environmental Statement Volume 2- Chapter 14: Marine Mammals.

European Commission (2010) Guidance Document: Wind Energy Developments and Natura 2000.

Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J., Vingada, J. and Øie. N. (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys - revised June 2021.

Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J.,. Vingada, J., and Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.

Hastie, G. D., Russell, D. J., Benjamin, S., Moss, S., Wilson, B., and Thompson, D., (2016) Dynamic habitat corridors for marine predators; intensive use of a coastal channel by harbour seals is modulated by tidal currents. Behavioural Ecology and Sociobiology:1-14.

Heinänen, S. and Skov, H. (2015) The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No.544 JNCC, Peterborough.

IEEM (2010) Guidelines For Ecological Impact Assessment In Britain And Ireland Marine And Coastal Guidelines For Ecological Impact Assessment In The United

Kingdom. Winchester: Chartered Institute of Ecology and Environmental Management.

IAMMWG (2021) Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680, JNCC Peterborough, ISSN 0963-8091.

JNCC (2020a) Marine Recorder Public UK Snapshot. Available https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307. Accessed November 2021

JNCC (2020b) Guidance on noise management in harbour porpoise SACs. Available online at: https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784.

JNCC (2019a) JNCC MPA mapper. Available: https://jncc.gov.uk/our-work/marine-protected-area-mapper/ Accessed November 2021

JNCC (2019b) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1351 - Harbour porpoise (*Phocoena phocoena*) United Kingdom.

JNCC (2019c) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2618 - Minke whale (*Balaenoptera acutorostrata*) United Kingdom.

JNCC (2019d) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2032 - White beaked dolphin (*Lagenorhynchus albirostris*) United Kingdom.

JNCC (2019e) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1349 - Bottlenose dolphin (*Tursiops truncatus*) United Kingdom.

JNCC (2019f) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1364 - Grey seal (*Halichoerus grypus*) United Kingdom.

JNCC (2019g) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1350 - Common dolphin (*Delphinus delphis*) United Kingdom.

JNCC (2019h) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2030 - Risso's dolphin (*Grampus griseus*) United Kingdom.

JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available online at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf.

Lindeboom, H. J., Kouwenhoven, H. J., Bergman, M. J. N., Bouma, S. Brasseur, S., Daan, R., Fijn, R.C., de Haan, D., Dirksen, S., van Hal, R., Hille Ris Lambers, R., ter Hofstede, R., Krijgsveld, K.L., Leopold, M. and Scheidat, M. (2011) Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. Environmental Research Letters 6:1-13.

Lohrengel, K., Evans, P.G.H., Lindenbaum, C.P., Morris, C.W. and Stringell, T.B. (2018) Bottlenose dolphin monitoring in Cardigan Bay 2014-2016. NRW Evidence Report No: 191, Natural Resources Wales, Bangor. Available at: https://naturalresources.wales/evidence- and-data/research-and-reports/marine-reports/marine-and-coastal-evidencereports/?lang=en

Madsen, P. T., Wahlberg, M., Tougaard, J., Lucke, K. and Tyack, P.(2006) Wind turbine underwater noise and marine mammals: implications of current knowledge and data needs. Marine Ecology Progress Series 309:279-295.

Manx whale and dolphin watch (2022) Recent sightings in Max waters. Available: https://www.mwdw.net/recent-sightings/?frm-page-3048=15 Accessed: February 2022

Marubini, F., Gimona, A., Evans, P. G.,, P. J. and Pierce G. J. (2009) Habitat preferences and interannual variability in occurrence of the harbour porpoise *Phocoena phocoena* off northwest Scotland. Marine Ecology Progress Series 381:297-310.

C.D. Morris & C.D. Duck (2019) Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018. Irish Wildlife Manuals, No. 111 National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

National Biodiversity Network (2019) Available: https://nbn.org.uk/ Accessed: November 2021.

National Marine Fisheries Service (2018) 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

National Marine Fisheries Service (2016) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p

Normandeau Inc, Exponent Inc, Tricas, T. and Gill, A. (2011) Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. (Reference number: 2008-3). Available at: http://www.vliz.be/imisdocs/publications/ocrd/224682.pdf. Accessed November 2021.

Paxton, C. G. M., Scott-Hayward, L., Mackenzie, M., Rexstad, E., and Thomas L. (2016) Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources. JNCC Report No. 517, JNCC, Peterborough.

Pierpoint, C. (2008) Harbour porpoise (*Phocoena phocoena*) foraging strategy at a high energy, nearshore site in southwest Wales, UK. Journal of the Marine Biological Association of the UK 88:1167-1173.

Plunkett, R, Sparling, C. and Kidney, D. (2014) Anglesey skerries marine mammal monitoring: land based vantage point survey trial. report number smrum-mct-2014-012 provided to MCT, November 2014 (unpublished).

Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003) Atlas of Cetaceans Distributions in North-west European Waters, Joint Nature Conservation Committee, Peterborough.

Riley, T., Waggitt, J., and Davies, A. (2020). Distribution modelling of the Eurasian Otter (*Lutra lutra*) on the Isle of Anglesey, Wales. OTTER, the Journal of the International Otter Survival Fund, 6, 30-39. https://www.otter.org/public/MediaAndResources_Resources_Journal.aspx

RPS Energy (2012) Ormonde offshore wind farm 2010 construction (year 1) environmental monitoring report, Volume 1: main report.

Russell, D. J., Brasseur, S. M., Thompson, D., Hastie, G. D., Janik, V. M., Aarts, G., McClintock, B. T., Matthiopoulos, J., Moss, S. E.and McConnell B. (2014) Marine mammals trace anthropogenic structures at sea. Current Biology 24:R638-R639.

Russell D.J.F., Jones E.L. and Morris C.D., (2017) Updates Sea Usage Maps: The estimates at -sea distribution of grey and harbour seals, Scottish Marine and Freshwater Science Report Vol 8 No 25.

Seawatch Foundation (2012) The White-beked dolphin in UK waters fact sheet. Available: https://seawatchfoundation.org.uk/wp-content/uploads/2012/07/White-beaked_Dolphin.pdf Accessed: December 2021

Scheidat, M., Tougaard, J., Brasseur, S., Carstensen, J., van Polanen Petel, T., Teilmann, J. and Reijnders P. (2011) Harbour porpoises (*Phocoena phocoena*) and wind farms: a case study in the Dutch North Sea. Environmental Research Letters 6:1-10.

SCOS (2021) Scientific Advice on Matters Related to the Management of Seal Populations: 2020.

Southall, B., Finneran, J. J., Reichmuth, C., Nachtigall, P. E.,Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D. and Tyack, P. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, A., Bejder, L., Tyack, P.L. (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise, Aquatic Mammals 27:421-464.

Teilmann, J., Tougaard, J. and Carstensen J. (2006a) Summary on harbour porpoise monitoring 1999-2006 around Nysted and Horns Rev Offshore Wind Farms.

Teilmann, J., Tougaard, J., Cartensen, J., Dietz, R. and Tougaard S. (2006b) Summary on seal monitoring 1999-2005 around Nysted and Horns Rev Offshore Wind Farms.

UKBAP (1999) UK Biodiversity Group, Tranche 2 Action Plans. Maritime Species and habitats.

Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D.,Whooley P., and Berrow, S. (2013) Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011. Irish Whale and Dolphin Group, Merchants Quay, Kilrush, Co Clare.

12.4.4 Offshore ornithology

Celtic Array Ltd (2012) Round 3 Irish Sea Zone Rhiannon Wind Farm Ltd Preliminary Environmental information.

Cleasby, I. R., Owen, E., Wilson, L., Wakefield, E. D., O'Connell, P. and Bolton, M. (2020) Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping. Biological Conservation, 241, 108375.

CMACS (2012) West of Duddon Sands offshore wind farm ornithology survey report 2012. Prepared for DONG Energy.

CMACS (2014) Walney I & III & II Ornithology Final Report. Prepared for: Walney (UK) Offshore Wind Farms Ltd.

Ecological Consultancy Ltd. (2012) Zone 9 Celtic Array bird and marine mammal surveys.

Furness, R.W. (2015) Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, No. 164. Available at: http://publications.naturalengland.org.uk/publication/6427568802627584.

Furness, R.W., Wade, H.M. and Masden, E.A., (2013) Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management, 119, pp. 56-66.

JNCC (2021a) Marine Recorder Public UK Snapshot. Available https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307. Accessed November 2021.

JNCC (2021b) Seabird Population Trends and Causes of Change: 1986–2019 Report (https://jncc.gov.uk/our-work/smp-report-1986-2019). Joint Nature Conservation Committee, Peterborough. Updated 20 May 2021.

Lawson, J., Kober, K., Win, I., Allcock, Z., Black, J., Reid, J.B., Way, L. & O'Brien, S.H. (2015) An assessment of the numbers and distributions of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area of search, JNCC Report No. 576. JNCC, Peterborough, ISSN 0963-8091.

Mackey and Giménez (2006) SEA678 Data Report for Offshore Seabird Populations. Coastal & marine resources centre environmental research institute university college cork.

National Biodiversity Network (NBN) Atlas, 2019, Available https://nbnatlas.org/. Accessed November 2021.

Natural England (2015) Written Submission for Deadline 4. Hornsea Offshore Wind Farm - Project Two Application. Planning Inspectorate Reference: EN010053. Natural England, Peterborough.

Parsons, M., Lawson, J., Lewis, M., Lawrence, R. & Kuepfer, A. (2015) Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing, JNCC Report No. 548, JNCC, Peterborough, ISSN 0963-8091.

Peterson K., Groom G., Stjernholm M., Nielsen D. (2012) Ornithological surveys in the Walney and Ormond offshore wind farm areas, January 2012. Department of Bioscience, University of Aarhus, Report commissioned by DONG Energy.

Searle, K., Mobbs, D., Daunt, F. & Butler, A. (2019) A Population Viability Analysis Modelling Tool for Seabird Species. Report by Centre for Ecology & Hydrology. Natural England Commissioned Report NECR274. Available at: http://publications.naturalengland.org.uk/file/6217749003239424.

Searle, K., Mobbs, D., Butler,A., Furness, R., Trinder, M and F Daunt. (2018) Finding out the Fate of Displaced Birds. Scottish Marine and Freshwater Science Vol 9 No 8, 149pp.

Statutory Nature Conservation Bodies (SNCBs) (2017) Joint SNCB Interim Displacement Advice Note. Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm (OWF) developments January 2017.

Thaxter, C.B. & Burton, N.H.K. (2009) High Definition Imagery for Surveying Seabirds and Marine Mammals: A Review of Recent Trials and Development of Protocols. British Trust for Ornithology Report Commissioned by Cowrie Ltd.

Thaxter, Lascelles and Cook (2012) Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation 156. December 2012.

Wade H.M., Masden. E.A., Jackson, A.C. and Furness, R.W. (2016). Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. Marine Policy 70, 108–113. Available online at doi:10.1016/j.marpol.2016.04.045.

Waggitt, J. J., Evans , P. G. H., Andrade, J., Banks, A. N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C. J., Durinck, J., Felce, T., Fijn, R. C., Garcia-Baron, I., Garthe, S., Geelhoed, S. C. V., Gilles, A., Goodhall, M., Haelters, J., Hamilton, S. and Hiddink, J. G. (2020) Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology, 57(2), 253-269. Available at: https://doi.org/10.1111/1365-2664.13525.

Wakefield, E.D., Owen, E., Baer, J., Carroll, M.J., Daunt, F., Dodd, S.G., Green, J.A., Guilford, T., Mavor, R.A., Miller, P.I., Newell, M.A., Newton, S.F., Robertson, G.S., Shoji, A., Soanes, L.M., Votier, S.C., Wanless, S. and Bolton, M. (2017) Breeding density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species. Ecological Applications, 27(7), 2074-2091.

Wilson, L.J., Black, J., Brewer, M.J., Potts, J.M., Kuepfer, A., Win, I., Kober, K., Bingham, C., Mavor, R. & Webb, A. (2014) Quantifying usage of the marine environment by terns Sterna sp. around their breeding colony SPAs, JNCC Report No. 500, JNCC, Peterborough, ISSN 0963-8091.

Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. Report by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate. BTO Research Report No. 724.

12.5 Offshore human environment

12.5.1 Commercial Fisheries

Blyth-Skyrme, R.E. (2010) Options and opportunities for marine fisheries mitigation associated with windfarms. Final report for Collaborative Offshore Wind Research Into the Environment contract FISHMITIG09. COWRIE Ltd, London. 125 pp. Available: https://tethys.pnnl.gov/sites/default/files/publications/Blyth-Skyrme-2010.pdf. [Accessed 02/03/2022]

Department of Energy and Climate Change (DECC) (2016) UK Offshore Energy Strategic Environmental Assessment. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536672/OESEA3_Post_Consultation_Report.pdf [Accessed 02/03/2022]

European Subsea Cables Association (ESCA) (2016) ESCA Guideline No.7 Guidelines for the Use of Rock Placement. Available: https://www.escaeu.org/guidelines/. [Accessed 02/03/2022]

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2014) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison. Available: https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for-Offshore-Renewables-Developments-Jan-2014.pdf. [Accessed 02/03/2022]

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2015) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Available: https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf. [Accessed 02/03/2022]

International Cable Protection Committee (ICPC) (2009) Fishing and Submarine Cables – Working Together. Available: https://www.iscpc.org/documents/?id=142. [Accessed 02/03/2022]

The Marine Management Organisation (MMO) (2021) UK sea fisheries annual statistics report 2020. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020. [Accessed 02/03/2022]

United Kingdom Fisheries Economics Network (UKFEN) (2012) Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments. Available: https://www.seafish.org/document/?id=AA0CB236-1E2A-4D2A-9F86-49CEB2B6DD5E. [Accessed 02/03/2022]

12.5.2 Shipping and navigation

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) (2021) G1162 ED1.0 The Marking of Man-Made Offshore Structures. Available: https://www.iala-aism.org/product/g1162-ed1-0-the-making-of-offshore-man-made-structures/. [Accessed 18/03/2022]

International Maritime Organization (IMO) (2018) Formal Safety Assessment. Available: https://wwwcdn.imo.org/localresources/en/OurWork/Safety/Documents/MSC-MEPC%202-Circ%2012-Rev%202.pdf/.[Accessed 02/03/2022]

Marine and Coastguard Agency (MCA) (2008) Marine Guidance Notice 372, OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940185/MGN_372.pdf. [Accessed 02/03/2022]

Marine and Coastguard Agency (MCA) (2021a) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf. [Accessed 02/03/2022]

Marine and Coastguard Agency (MCA) (2021b) Methodology for Assessing Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI). Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980900/MGN_654_Annex_1_NRA_Methodology_2021.pdf. [Accessed 02/03/2022]

Royal Yachting Association (RYA) (2019) The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – wind energy. Available: https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001778-MMC237%20MOR-POL-DOC-040%20RYA%20Position%20OREI%20Wind%20Energy.pdf. [Accessed 02/03/2022]

12.5.3 Marine Archaeology

Coles, B.J. (1998) 'Doggerland: a speculative survey', Proceedings of the Prehistoric Society, 64: 45-81.

Fitch, S., Gaffney, V., Ramsey, E., and Kitchen, E. (2011) West Coast Palaeoloandscapes Survey. Online, available at: https://www.dyfedarchaeology.org.uk/lostlandscapes/WCPStechnical.pdf. [Accessed 03/03/2022]

The Crown Estate (TCE) (2014) Protocol for Archaeological Discoveries: Offshore Renewables Projects. Available at: 03-PAD Offshore Renewables_Crown Estate (thecrownestate.co.uk).

Wessex Archaeology. (2007) COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector.

Wessex Archaeology. (2008) Aircraft Crash Sites at Sea: A Scoping Study. Archaeological Desk-based Assessment, Unpublished Report 66641.02.

Wessex Archaeology for The Crown Estate. (2021) Archaeological Mitigation for Offshore Wind Farms: Model Clauses for Written Schemes of Investigation. Available online:guide-to-archaeological-requirements-for-offshore-wind.pdf (thecrownestate.co.uk). [Accessed 03/03/2022]

12.5.4 Other sea users

Blue Mink Boat Charters. Available at: blueminkboatcharters.co.uk. [Accessed 28/02/2022]

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2021) Participation, effort, and catches of sea anglers resident in the UK in 2018 & 2019. Available at: https://www.substance.net/wp-content/uploads/Sea_angling-_2018-19_report_final.pdf. [Accessed 28/02/2022]

Department of Energy & Climate Change (DECC) (2011) UK Offshore Energy Strategic Environmental Assessment 2: Environmental Report. Available at: https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-2-environmental-report. [Accessed 28/02/2022]

Eni (2020) Eni Liverpool Bay Project: a clean growth opportunity for the UK, Available at: https://www.eni.com/en-IT/operations/united-kingdom-liverpool-bay.html. [Accessed 28/02/2022]

Environment Agency (2021) Locations of designated bathing water sites. Available at: https://environment.data.gov.uk/wales/bathing-waters/profiles/. [Accessed 28/02/2022]

European Subsea Cables UK Association (ESCA) (2016) Guideline No. 6, the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters. Available at: https://www.escaeu.org/download/?Id=123&source=guidelines. [Accessed 28/02/2022]

HyNet (2021) What is HyNet? Available at: https://hynet.co.uk/about/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2015) Recommendation No.2-11B: Cable routing and reporting criteria. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2014) Recommendation No. 3-10C: Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2013) Recommendation No.13-2C: The proximity of offshore renewable wind energy installations and submarine cable infrastructure in national waters. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

Manx Sea Fishing, Available at: www.manxseafishing.com. [Accessed 28/02/2022]

Oil and Gas Authority (OGA) (2020) Energy integration in action: Eni project awarded carbon storage licence. Press release. Available at: Oil and Gas Authority: Energy integration in action: Eni project awarded carbon storage licence - 2020 - News - News &
publications (ogauthority.co.uk). [Accessed 28/02/2022]

Oil and Gas UK (2015) Guidelines for the Abandonment of Wells, Issue 5. Available at: http://oilandgasuk.co.uk/product/op071/. [Accessed 28/02/2022]

Oil and Gas UK (2021) Pipeline crossing agreement and proximity agreement pack. Available at: https://oguk.org.uk/product/pipeline-crossing-agreement-proximity-agreement-pack/. [Accessed 28/02/2022]

Pks Watersports. Available at: https://www.pkswatersports.com/ [Accessed 02/03/2022]

Royal Yachting Association (RYA) (2019) The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy. Available at: https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001778-MMC237%20MOR-POL-DOC-040%20RYA%20Position%20OREI%20Wind%20Energy.pdf. [Accessed 28/02/2022]

Royal Yachting Association (RYA) (2019) UK Coastal Atlas of Recreational Boating. Available at: https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating. [Accessed 28/02/2022]

Sea Fishing Trips in North Wales. Available at: https://sea-fishing-trips.co.uk/. [Accessed 28/02/2022]

The Crown Estate (TCE) (2012) Submarine cables and offshore renewable energy installations proximity study. Available at: https://www.thecrownestate.co.uk/media/1784/submarine-cables-and-offshore-renewable-energy-installations-proximity-study.pdf. [Accessed 28/02/2022]

UK Diving, Map of North Wales. Available at: www.ukdiving.co.uk. [Accessed 28/02/2022]

12.6 Onshore physical environment

12.6.1 Geology, hydrogeology and ground conditions

British Geological Survey (BGS) (2015) Baseline chemistry of groundwater in UK aquifers. Available: https://www2.bgs.ac.uk/groundwater/quality/BaselineUK/home.html Accessed: December 2021.

British Geological Survey (BGS) Aquifer designation data. Available: https://www.bgs.ac.uk/datasets/aquifer-designation-data/ Accessed: December 2021.

British Geological Survey (BGS) BGS maps portal – maps and sections 1832 to 2014. Available: https://webapps.bgs.ac.uk/data/maps/?_ga=2.213553372.975515887.1642429324-310520161.1642429324 Accessed: December 2021.

British Geological Survey (BGS) Borehole records. Available: https://www.bgs.ac.uk/information-hub/borehole-records/ Accessed: December 2021.

British Geological Survey (BGS) GeoIndex (Onshore). Available: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ Accessed: December 2021.

British Geological Survey (BGS) Geology of Britain Viewer. Available: https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/ Accessed: December 2021.

British Geological Survey (BGS) Hydrogeological maps of the United Kingdom. Available:

https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=listResults&mapName=&series=HYDRO&scale=&pageSize=100 Accessed: December 2021.

CIRIA (2001) Contaminated Land Risk Assessment: A Guide to Good Practice. CIRIA (552). Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

CIRIA (2006) Control of water pollution from linear construction projects: Site guide CIRIA (C649). Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

CIRIA (2006) Control of water pollution from linear construction projects: Technical guidance. CIRIA (C648). Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

CIRIA (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings CIRIA (C665). December 2007. Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: December 2021.

Environment Agency (2017) Groundwater protection technical guidance. March 2017. Available: https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance Accessed: December 2021.

Environment Agency (2018) The Environment Agency's approach to groundwater protection. February 2018. Available: https://www.gov.uk/government/publications/groundwater-protection-position-statements Accessed: December 2021.

Environment Agency (2021) Land contamination risk management (LCRM). April 2021. Available: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm Accessed: December 2021.

Environment Agency (2021) Risk assessments for your environmental permit. March 2021. Available: https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit Accessed: December 2021.

Environment Agency (2021) Water quality data archive. Available: https://environment.data.gov.uk/water-quality/view/landing Accessed: December 2021.

Environment Agency (2021) WFD Groundwater Bodies Cycle 2. Available: https://data.gov.uk/dataset/2a74cf2e-560a-4408-a762-cad0e06c9d3f/wfd-groundwater-bodies-cycle-2 Accessed: December 2021.

Environment Agency. Catchment Data Explorer. Available: https://environment.data.gov.uk/catchment-planning/ Accessed: December 2021.

European Parliament (2000) Water Framework Directive (WFD) 2000/60/EC. October 2000. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L00 Accessed: December 2021.

European Parliament (2006) Groundwater Directive (GWD) 2006/118/EC. Available: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0019:0031:EN:PDF Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA104 Environmental assessment and monitoring. Available: https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA109 Geology and soils. Available. https://www.standardsforhighways.co.uk/dmrb/search/adca4c7d-4037-4907-b633-76eaed30b9c0 Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA113 Road drainage and the water environment Available. https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727. Accessed: December 2021

UK Government (1990) The Environmental Protection Act 1990. Available: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed: December 2021.

UK Government (2010) The Environmental Permitting (England and Wales Regulations) Regulations 2016. Available: https://www.legislation.gov.uk/uksi/2016/1154/contents/made Accessed: December 2021.

UK Soil Observatory (UKSO) UKSO map viewer. Available: http://www.ukso.org/ Accessed: December 2021.

12.6.2 Hydrology and flood risk

CIRIA (2006) C648 – Control of water pollution from linear construction projects. Available: https://www.ciria.org/ProductExcerpts/C648.aspx Accessed: December 2021.

Conwy County Borough Council (2012) Conwy Deposit Local Development Plan 2007 – 2022 (Revised edition 2011). REVISED BACKGROUND PAPER 17 - Conwy Strategic Flood Consequences Assessment. Available: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Evidence-Base/Natural-Environment/BP17-Conwy-Strategic-Flood-Consequences-Assessment.pdf Accessed: December 2021.

Conwy County Borough Council (2013) Conwy Local Flood Risk Management Strategy. Available: https://www.conwy.gov.uk/en/Resident/Crime-and-emergencies/Preparing-for-Emergencies/Flooding/documents/Conwy-Local-Flood-Risk-Management.pdf Accessed: December 2021.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: December 2021.

Defra and Environment Agency (2021) Catchment Data Explorer. September 2021. Available: https://environment.data.gov.uk/catchment-planning Accessed: December 2021.

Denbighshire County Council (2018) Denbighshire Flood Consequence Assessment - Level 1 Available: https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/evidence-monitoring-and-information/strategic-flood-consequence-assessment-final-report-january-2018.pdf Accessed: December 2021.

Denbighshire County Council (2014) Denbighshire Local Flood Risk Management Strategy Available: https://www.denbighshire.gov.uk/en/your-council/strategies-plans-and-policies/strategies/local-flood-risk-management-strategy.aspx Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA104 Environmental assessment and monitoring. Available. : https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a .

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA113 Road drainage and the water environment Available. https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727. Accessed: December 2021

NRW Flood Map for Planning. Available: https://flood-map-for-planning.naturalresources.wales/ Accessed: December 2021.

NRW (2015) Dee River Basin Management Plan 2015-2021. Available: https://naturalresourceswales.gov.uk/media/675062/dee-rbmp.pdf Accessed December 2021

North West and North Wales Coastline (2019) SMP (shoreline management plan) 22 Great Ormes Head to Scotland. Available: https://www.mycoastline.org.uk/shoreline-management-plans/ Accessed: December 2021

Ordnance Survey (OS) Open Rivers. Available: https://www.ordnancesurvey.co.uk/business-government/products/open-map-rivers Accessed: December 2021.

OS DTM 50. Available: https://www.ordnancesurvey.co.uk/business-government/products/terrain-50 Accessed: December 2021.

Welsh Government (2021) Emerging TAN 15: Not Available, see: https://gov.wales/technical-advice-note-tan-15-development-flooding-and-coastal-erosion Accessed: December 2021.

Welsh Government (2021) Planning Policy Wales Edition 11: Available: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf Accessed: December 2021.

Welsh Government (2004) Technical Advice Note 15: Development and Flood Risk. Available: https://gov.wales/sites/default/files/publications/2018-09/tan15-development-flood-risk.pdf Accessed: December 2021.

Western Wales River Basin Management Plan 2015 – 2021. Summary December 2015. Available: https://naturalresources.wales/media/676165/wwrbdsummary.pdf Accessed: December 2021.

12.7 Onshore biological environment

12.7.1 Terrestrial ecology and intertidal birds

Amphibian and Reptile Groups of the United Kingdom (ARG UK) (2010) ARG UK Advice Note 5. Great Crested Newt Habitat Suitability Index. May 2010. Available: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file Accessed: December 2021.

Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014) Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Bright, P., Morris, P. and Mitchell-Jones, T (2006) The dormouse conservation handbook second edition. English Nature.

CIEEM (2017) Guidelines for Preliminary Ecological Appraisal. Second Edition. December 2017. Available: https://cieem.net/wp-content/uploads/2019/02/Guidelines-for-Preliminary-Ecological-Appraisal-Jan2018-1.pdf Accessed: November 2021.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Available: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf Accessed: November 2021.

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists Good Practice Guidelines (3rd edn) Bat Conservation Trust, London. Available: https://www.bats.org.uk/resources/guidance-for-professionals/bat-surveys-for-professional-ecologists-good-practice-guidelines-3rd-edition Accessed: December 2021.

Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: November 2021.

English Nature (2001) Great Crested Newt Mitigation Guidelines. English Nature: Peterborough Available: https://cieem.net/resource/great-crested-newt-mitigation-guidelines/ Accessed: December 2021.

Froglife (1999) Reptile Survey: and introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Halesworth.

Gent,T. & Gibson, S. (eds) (2003) Herpetofauna Workers' Manual (revised reprint). JNCC, Peterborough. Available: https://hub.jncc.gov.uk/assets/9d7da8c4-9d76-4b65-8263-6b925b3433a4 Accessed: December 2021.

JNCC (2004) Common Standards Monitoring Guidance for Reptiles and Amphibians, Version. Available: https://hub.jncc.gov.uk/assets/43e8e8ed-5f05-4613-a277-f116b34829f4 Accessed: December 2021.

Natural England (2021) The Biodiversity Metric 3.0 (JP039). Available: http://nepubprod.appspot.com/publication/6049804846366720 Accessed: December 2021.

UK Government (1981) The Wildlife and Countryside Act 1981. Available: https://www.legislation.gov.uk/ukpga/1981/69 Accessed: December 2021.

UK Government (1997) The Hedgerows Regulations 1997. Available: https://www.legislation.gov.uk/uksi/1997/1160/contents/made Accessed: December 2021.Amphibian and Reptile Groups of the United Kingdom (ARG UK) (2010) ARG UK Advice Note 5. Great Crested Newt Habitat Suitability Index. May 2010. Available: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file Accessed: December 2021.

12.8 Onshore human environment

12.8.1 Historic Environment

CIfA (2014) Standard and Guidance for Historic Environment Desk-Based Assessment. December 2014. Available: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf Accessed: December 2021.

Cadw (2017) Heritage Impact Assessment in Wales. May 2017. Available: https://cadw.gov.wales/sites/default/files/2019-05/20170531Heritage%20Impact%20Assessment%20in%20Wales%2026917%20EN.pdf Accessed: December 2021.

IEMA, IHBC, CIfA (2021) Principles of Cultural Heritage Impact Assessment in the UK. July 2021. Available: https://ihbconline.co.uk/toolbox/docs/Principles%20of%20Cultural%20Heritage%20Impact%20Assessment.pdf Accessed: December 2021.

12.8.2 Land use and recreation

Anglesey Tourist Information (2021) Available at https://www.visitanglesey.co.uk. Accessed: November 2021.

British Geological Survey (BGS) (2021) Geology of Britain Viewer (classic). Available: https://mapapps.bgs.ac.uk/geologyofbritain/home.html Accessed: November 2021.

Defra (2011) Construction code of practice for the sustainable use of soils on construction sites. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716510/pb13298-code-of-practice-090910.pdf Accessed: November 2021.

IEMA (2022) A New Perspective on Land and Soil in Environmental Impact Assessment

Institute of Quarrying (2021) Good Practice Guide for Handling Soils on Mineral Sites. Available: https://www.quarrying.org/soils-guidance Accessed: November 2021.

MAFF (1988) Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. October 1988.

Available: http://publications.naturalengland.org.uk/publication/6257050620264448 Accessed: November 2021

Ordnance Survey (OS) mapping data. Available: https://osmaps.ordnancesurvey.co.uk/ Accessed: November 2021.

Soil Survey of England and Wales (2021a) County of Anglesey, Soils and Agriculture 1:63,360. Accessed November 2021.

Soil Survey of England and Wales (2021b) National Soils Map Sheet 2 (1:250,000). Accessed: November 2021.

Sustrans (2021) Interactive Mapping System Great Britain: National Cycle Network Map. Available: https://www.sustrans.org.uk/national-cycle-network Accessed: November 2021.

UK Government (2000) Countryside and Rights of Way Act. 2000. Available: https://www.legislation.gov.uk/ukpga/2000/37/contents Accessed: November 2021.

Welsh Government (2021a) Post 1988 ALC surveys. Available: Lle - Post 1988 Agricultural Land Classification (Wales) Surveys (gov.wales) Accessed: November 2021.

Welsh Government (2021b) Predictive ALC Viewer. Available: Lle - Predictive Agricultural Land Classification (ALC) Map 2 (gov.wales) Accessed: November 2021.

Welsh Government (2021c) Small Area Statistics. Available: https://gov.wales/agricultural-small-area-statistics-2002-2020 Accessed: November 2021.

Welsh Government (2021d) Active Travel Approved Areas and Routes. Available: https://datamap.gov.wales Accessed: November 2021

Welsh Government, Highways England, Transport Scotland and Department for Infrastructure Northern Ireland (2019) DMRB Sustainability and Environment Appraisal LA 109 Geology and Soils. Available: https://www.standardsforhighways.co.uk/prod/attachments/adca4c7d-4037-4907-b633-76eaed30b9c0?inline=true Accessed: November 2021.

Welsh Government, Highways England, Transport Scotland and Department for Infrastructure Northern Ireland (2020) DMRB Sustainability and Environment Appraisal LA 112 Population and Human Health. Available: https://www.standardsforhighways.co.uk/dmrb/search/1e13d6ac-755e-4d60-9735-f976bf64580a Accessed: November 2021.

12.8.3 Traffic and transport

CrashMap (2020) UK Road Safety Map. 2020. Available: https://www.crashmap.co.uk/ Accessed: December 2021.

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2014). Planning Practice Guidance: Travel Plans, Transport Assessments and Statements. March 2014. Available: https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements Accessed: December 2021.

IEMA (1993) Guidelines for the Environmental Assessment of Road Traffic.

Welsh Government, National Highways, Transport Scotland and Department for Infrastructure Northern Ireland (2020). Design Manual for Roads and Bridges LA104:

Environmental Assessment and Monitoring. August 2020. Available: https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a Accessed: December 2021.

Welsh Government (2007) Planning Policy Wales Technical Advice Note (TAN) 18: Transport. Available: https://gov.wales/technical-advice-note-tan-18-transport Accessed December 2021.

Welsh Government (2021) Planning Policy Wales Edition 1. Available: https://gov.wales/planning-policy-wales Accessed: December 2021.

12.8.4 Noise and vibration

BS (2019) 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound. June 2019. Available: https://www.bsigroup.com/en-GB/standards/bs-4142/ Accessed: November 2021.

BS (2014) 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Noise. February 2014. Available: https://shop.bsigroup.com/products/code-of-practice-for-noise-and-vibration-control-on-construction-and-open-sites-noise Accessed: November 2021.

BS (2014) 5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Vibration. June 2014. Available: https://shop.bsigroup.com/products/code-of-practice-for-noise-and-vibration-control-on-construction-and-open-sites-noise Accessed: November 2021.

BS (2003) 7445-1:2003. Part 1 - Description and measurement of environmental noise. Guide to quantities and procedures. December 2003. Available: https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%207445 Accessed: November 2021.

BS (2003) 7445-2:1991. Part 2 - Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use. 1991. Available: https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%207445 Accessed: November 2021.

BS (2003) 7445-3:1991. Part 3 - Description and measurement of environmental noise. Guide to application of noise limits. 1991. Available: https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%207445 Accessed: November 2021.

Berglund, B. *et al*. Guidelines for Community Noise. World Health Organisation. 2000.

Department of Transport. Calculation of Road Traffic Noise. HMSO. 1988.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) LA 111 – Noise and Vibration. May 2020. Available: https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364 Accessed: November 2021.

IEMA (2014) Guidelines for Environmental Noise Impact Assessment 2014. November 2014. Available: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/2014-Noise-and-EIA-IEMA.pdf Accessed: November 2021.

International Standard Organisation (ISO) 9613-2:1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. 1996.

Plovsing B. and Kragh, J. Nord2000. Comprehensive Sound Propagation Model. Part 1: Propagation in an Atmosphere without Significant Refraction, DELTA Acoustics & Vibration, Revised Report AV 1849/00, 2006.

Plovsing B. and Kragh J. Nord2000. Comprehensive Sound Propagation Model. Part 2: Propagation in an Atmosphere with Refraction, DELTA Acoustics & Vibration, Revised Report AV 1851/00, 2006.

12.8.5 Air quality

Defra (2018a) Local Air Quality Management Technical Guidance (TG16). Available: https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf Accessed: November 2021.

Defra (2018b) Background mapping data for local authorities, 2018-based background maps for years 2018 to 2030. Available: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018. Accessed: November 2021.

EPUK and IAQM (2017) Guidance on land-use planning and development control: Planning for air quality. January 2017. Available: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf Accessed: November 2021.

IAQM (2014) Guidance on the assessment of dust from demolition and construction. 2014. Available: https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf Accessed: November 2021.

Welsh Government (2021) Air Quality in Wales Interactive Map of Air Quality Management Areas. Available: https://airquality.gov.wales/laqm/air-quality-management-areas Accessed: November 2021.

Welsh Government, Highways England, Transport Scotland and Department for Infrastructure Northern Ireland (2019) LA 105 – Air Quality. November 2019. Available: https://www.standardsforhighways.co.uk/dmrb/search/10191621-07df-44a3-892e-c1d5c7a28d90 Accessed: November 2021.

12.9 Offshore and onshore combined topics

12.9.1 Seascape, landscape and visual resources

Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment: Third Edition. April 2013. Available: https://www.landscapeinstitute.org/technical/glvia3-panel/ Accessed: December 2021.

NRW. Using LANDMAP in Landscape and Visual Impact Assessments GN46. Available: https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/evidence-to-inform-development-planning/using-landmap-in-landscape-and-visual-impact-assessments-gn46/?lang=en Accessed: December 2021.

12.9.2 Aviation and radar

Civil Aviation Authority (CAA) (2019) CAP 670: Air Traffic Services Safety Requirements Third Issue Amendment 1/2019. Available:

http://publicapps.caa.co.uk/docs/33/CAP670%20Issue3%20Am%201%202019(p).pdf [Accessed 08/03/2022]

Civil Aviation Authority (CAA) (2022) CAP 168: Licensing of Aerodromes. Available: https://publicapps.caa.co.uk/docs/33/CAP%20168%20Licensing%20of%20Aerodromes%20v12.pdf [Accessed 08/03/2022]

Civil Aviation Authority (CAA) (2021) CAP 393: The Air Navigation Order 2016. Available: https://publicapps.caa.co.uk/docs/33/Air%20Navigation%20Order%202016%20Sept%202021.pdf [Accessed 08/03/2022]

Marine and Coastguard Agency (MCA) (2021a) MGN 654 (M+F): Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf [Accessed 08/03/2022]

Marine and Coastguard Agency (MCA) (2021b) Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034158/OREI_SAR_Requirements_v3.pdf [Accessed 08/03/2022]

The Bristow Group (2021) United Kingdom Locations for SAR bases. Available: https://www.bristowgroup.com/locations/bristow-locations/country/united-kingdom [Accessed 08/03/2022]

12.9.3 Climate change

None.

12.9.4 Socio-economics and community

British Wind Energy Association (BWEA) (2009) UK Offshore Wind: Charting the Right Course: Building the Offshore Wind Supply Chain.

BVG Associates, Catapult Offshore Renewable Energy, The Crow Estate (TCE) (2012) A Guide to an Offshore Wind Farm. Available: https://guidetoanoffshorewindfarm.com/ Accessed: December 2021.

BVG Associates, RenewableUK (2011) Offshore Wind: Forecasts of future costs and benefits. Available: https://bvgassociates.com/cases/offshore-wind-forecasts-future-costs-benefits/ Accessed: December 2021.

Depart of Energy & Climate Change (2011) Overarching National Policy Statement for Energy (EN-1). Available: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure Accessed: December 2021.

Glasson, J; Durning B; Olorundami, T; and Welch, K (2020) Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs).

Marine Energy Wales (2019) State of the Sector: Economics for Wales. Available: https://www.marineenergywales.co.uk/about/state-of-the-sector-2019/ Accessed: December 2021.

NHS Digital. NHS Digital Data. Available: https://digital.nhs.uk/data Accessed: December 2021.

Office for National Statistics (2011) 2011 Census Data. Available: https://www.ons.gov.uk/census/2011census Accessed: December 2021.

Office for National Statistics (2012) Annual population survey (APS) QMI. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/annualpopulationsurveyapsqmi Accessed: December 2021.

Office for National Statistics (2017) Regional economic activity by gross value added (balanced), UK:1998 to 2017. Available: https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedbalanceduk/1998to2017 Accessed: December 2021.

Office for National Statistics (2020) Employees in the UK Statistical bulletins. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/businessregisterandemploymentsurveybresprovisionalresults/previousReleases Accessed: December 2021.

Office for National Statistics (2020) Population estimates for the UK, England and Wales, Scotland and Norther Ireland: mid-2020. Available: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2020 Accessed: December 2021.

Office for National Statistics (2021) Employee earnings in the UK Statistical bulletins. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/previousReleases Accessed: December 2021.

Office for National Statistics (2021) House price statistics for small areas in England and Wales Statistical bulletins. Available: https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/housepricestatisticsforsmallareas/previousReleases Accessed: December 2021.

Office for National Statistics (2021) Labour market in the regions of the UK: December 2021. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/regionallabourmarket/december2021 Accessed: December 2021.

RenewableUK (2011) Working for a Green Britain - Volume 2. Available: https://www.renewableuk.com/news/309147/Working-for-a-Green-Britain---Volume-2.htm Accessed: December 2021.

The Crown Estate (2008) Socio-economic indicators of marine-related activities in the UK economy.

UK Government. Find and compare schools in England. Available: https://www.gov.uk/school-performance-tables?_ga=2.29580476.2051004004.1642412336-685822578.1642412336 December 2021.

UK Marine Energy Council. Available: http://www.marineenergycouncil.co.uk/ Accessed: December 2021.

Visit Britain (2021) Visit Britain Official statistics. Available: https://www.visitbritain.org/official-statistics Accessed: December 2021.

12.10 Other environmental topics

CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice. Available: https://www.claire.co.uk/ Accessed: December 2021.

European Union (1993) Waste Framework Directive (1993/31/EC). Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0031 Accessed: December 2021.

ICNIRP (1988) Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection. Available: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf Accessed: December 2021.

International Commission on Non-ionising Radiation Protection (ICNIRP) (2020) 2020 Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz). Available: https://www.icnirp.org/en/publications/index.html Accessed: December 2021.

UK Government (1990) Environmental Protection Act 1990. Available: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed: December 2021.

UK Government (1995) Environment Act 1995. Available: https://www.legislation.gov.uk/ukpga/1995/25/contents Accessed: December 2021.

UK Government (2005) The Hazardous Waste (England and Wales) Regulations 2005. Available: https://www.legislation.gov.uk/uksi/2005/894/contents/made Accessed: December 2021.

UK Government (2006) The Waste Management (England and Wales Regulations 2006. Available: https://www.legislation.gov.uk/uksi/2006/937/made Accessed: December 2021.

UK Government (2011) The Waste (England and Wales) Regulations 2011. Available: https://www.legislation.gov.uk/uksi/2011/988/contents/made Accessed: December 2021.

UK Government (2016) The Environmental Permitting (England and Wales) Regulations 2016. Available: https://www.legislation.gov.uk/uksi/2016/1154/contents/made Accessed: December 2021.

Welsh Government (2014) Technical advice note (TAN) 21: waste. Available: https://gov.wales/sites/default/files/publications/2018-09/tan21-waste.pdf Accessed: December 2021.

Welsh Government (2014) Waste Planning Practice Guide. Available: https://gov.wales/sites/default/files/publications/2018-09/tan21-practice-guidance.pdf Accessed: December 2021.

12.11 Transmission assets summary

RenewableUK (2013) Cumulative Impact Assessment Guidelines - Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms.

The Planning Inspectorate (2019) Advice Note Seventeen: Cumulative Effects Assessment.

The Planning Inspectorate (2020) Advice Note Twelve: Transboundary Impacts and Process.

Part 4: Annexes

Table of Contents

1 Annex A Transboundary Impacts Screening 7
1.1 Introduction 7
1.1.1 Background 7
1.2 Legislative context 7
1.3 Consultation 10
1.4 Screening of transboundary impacts 10
1.4.2 Offshore transboundary impacts 11
1.4.3 Onshore transboundary impacts 21
1.4.4 Offshore and onshore combined topics transboundary impacts 26
1.5 Conclusions 29
2 Annex B – Water Framework Directive Screening 30
2.1 Introduction 30
2.1.1 Background 30
2.1.2 Project overview 31
2.2 Methodology 32
2.2.1 Legislation 32
2.2.2 WFD compliance assessment scope 34
2.3 Identification of relevant water bodies 37
2.3.1 Introduction 37
2.3.2 Water bodies within the zone of influence 37
2.3.3 WFD water body status classification 37
2.3.4 Protected areas for the WFD 40
2.4 Screening of potential impacts on WFD objectives 41
2.5 Conclusion 46
3 Annex C – Marine Conservation Zone Screening 47
3.1 Introduction 47
3.1.1 Background 47
3.2 Methodology 47
3.2.2 Preliminary Screening 47
3.2.3 Stage 1 Assessment 51
3.2.4 Stage 2 Assessment 52
3.3 Results: Preliminary MCZ screening 53
4 References 55
4.1 Annex A Transboundary Impacts Screening 55
4.2 Annex B – Water Framework Directive Screening 55
4.3 Annex C – Marine Conservation Zone Screening 55

Table of tables

Table 1.1: Summary of approximate distance to the nearest applicable states 11

Table 1.2: Offshore transboundary screening matrix for the Mona Offshore Wind Project – offshore physical and biological environment. 15
Table 1.3: Offshore transboundary screening matrix for the Mona Offshore Wind Project – offshore human environment. 20
Table 1.4: Onshore environment transboundary screening matrix for the Mona Offshore Wind Project. 24
Table 1.5: Offshore and onshore combined topics transboundary screening matrix for the Mona Offshore Wind Project. 28
Table 2.1: WFD status classification for surface water (river, transitional and coastal) and groundwater bodies that overlap with the Mona Onshore Transmission Infrastructure Scoping Search Area and Mona Offshore Transmission Infrastructure Scoping Search Area, and the key elements driving status classification. 39
Table 2.2: Protected Areas for the WFD within water bodies that overlap with the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area. 40
Table 2.3: Potential impacts associated with the construction, operation and decommissioning of the Mona Offshore Wind Project on surface and coastal water bodies. 43
Table 2.4: Potential impacts associated with the construction, operation and decommissioning of the Mona Offshore Wind Project on groundwater bodies. 46
Table 3.1: Summary of MCZs within the vicinity of the Mona Offshore Wind Project. 53

Table of figures

Figure 1.1: Location of the proposed Mona Offshore Wind Project and relevant jurisdictional boundaries. 9
Figure 2.1: Flow chart illustrating the WFD compliance assessment process. 36
Figure 2.2: Mona Onshore Transmission Infrastructure Scoping Search Area and Mona Offshore Transmission Infrastructure Scoping Search Area overlapping with WFD surface waters (river, transitional and coastal water bodies) and bathing waters. 38
Figure 3.1: Proposed Mona Marine Conservation Zone (MCZ) screening boundary. 50

Revision history

Amendment Date	Revision Number	Amender Initials	Amendment

Glossary

Term	Meaning
Crown Dependency	The Crown Dependencies are not part of the UK but are self-governing dependencies of the Crown. This means they have their own directly elected legislative assemblies, administrative, fiscal and legal systems and their own courts of law.
European Economic Area	The European Economic Area was established via the Agreement on the European Economic Area, an international agreement which enables the extension of the European Union's single market to member states of the European Free Trade Association.
Exclusive Economic Zone	An Exclusive Economic Zone (EEZ) is an area of the sea under the territorial ownership of a single country. This area is guaranteed by UN Convention on the Law of the Sea (UNCLOS).
Interbasin	Between, relating to, or involving two or more basins.
Mona Array Scoping Boundary	The Preferred Bidding Area that the Applicant was awarded by The Crown Estate as part of UK Offshore Wind Round 4.
Mona Onshore Transmission Infrastructure Scoping Search Area	The Mona Onshore Transmission Infrastructure Scoping Search Area is the area between the landfall and the onshore National Grid substation, in which the onshore export cables and onshore substation will be located.
Mona Offshore Transmission Infrastructure Scoping Search Area	The Mona Offshore Transmission Infrastructure Scoping Search Area encompassing and location between the Mona Array Scoping Boundary and the landfall up to Mean High Water Springs (MHWS), in which the offshore export cables and any offshore booster substations will be located.
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets and offshore and onshore transmission assets and associated activities. This covers all elements within the Development Consent Order (i.e. both the offshore and onshore components)
Mona Potential Array Area	The Mona Potential Array Area is the area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) are likely to be located.
Transboundary Impact	Impacts that may arise from an activity within one state that affect the environment or other interests of another state.
Water Framework Directive (WFD)	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations). The WFD promotes water management through river basin planning. It covers inland surface waters, estuarine waters, coastal waters and groundwater. The Water (Amendment) (Northern Ireland) (EU Exit) Regulations 2019 ensure that the Water Framework Directive (as transposed) and the various supporting pieces of water legislation continue to operate in Wales after 1 January 2021.-

Acronyms

Acronym	Meaning
CAA	Civil Aviation Authority
DCO	Development Consent Order
dML	Deemed Marine License
EA	Environmental Agency
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EMF	Electromagnetic Fields
EQR	Ecological Quality Ratio
ES	Environmental Statement
EU	European Union
FIR	Flight Information Region

Acronym	Meaning
GHG	Green House Gas
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
HWWB	Heavily Modified Water Body
IOMCAA	Isle of Man Civil Aviation Administration
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organization
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report
PSR	Primary Surveillance Radar
RBMP	River Basin Management Plan
rMCZ	Recommended MCZs
SAC	Special Area of Conservation
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay
TRaC	Transitional and Coastal
UNECE	United Nations Economic Commission for Europe
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Units

Unit	Description
GW	Gigawatt
km	Kilometres
km^2	Kilometres squared
kV	Kilovolt
m	Metre
nm	Nautical Mile

1 Annex A Transboundary Impacts Screening

1.1 Introduction

1.1.1 Background

1.1.1.1 Energie Baden-Württemberg (EnBW) and bp are jointly developing the Mona Offshore Wind Project through their project company Mona Offshore Wind Limited (the Applicant). The Mona Potential Array Area (the area within which the offshore wind turbines will be located) is 449.97km^2 in area and is located in the east Irish sea, 28.2km from the north coast of Wales, 39.9km from the northwest coast of England and 42.6km from the Isle of Man. The Mona Offshore Transmission Infrastructure Scoping Search Area extends from the Mona Potential Array Area to a landfall between Colwyn Bay and Rhyl in north Wales. In accordance with the Round 4 bid the proposed capacity of the Mona Offshore Wind Project is 1500MW (Figure 1.1).

1.1.1.2 Transboundary impacts relate to those impacts that may arise from an activity within one state that affect the environment or other interests of another state. This transboundary screening annex of the Environmental Impact Assessment (EIA) Scoping Report sets out the screening assessment of the potential for such effects to occur on the environment or interests of other states as a result of the Mona Offshore Wind Project, based on what is currently known of the likely spatial scale of effects drawing on information presented in part 2: Generation assets, of the EIA Scoping Report, and part 3: Transmission assets, of the EIA Scoping Report, and the interests of other states in the vicinity.

1.1.1.3 This annex is intended to provide information to the Planning Inspectorate such that the Secretary of State can evaluate the likelihood of such effects occurring and the need, if any, for transboundary consultation with other states during the pre-application period. The screening of transboundary effects will be revisited during the Mona Offshore Wind Project pre-application phase once the preliminary assessments are completed to ensure that any significant transboundary effects are fully considered within the Environmental Statement (ES) submitted alongside the application for Development Consent.

1.2 Legislative context

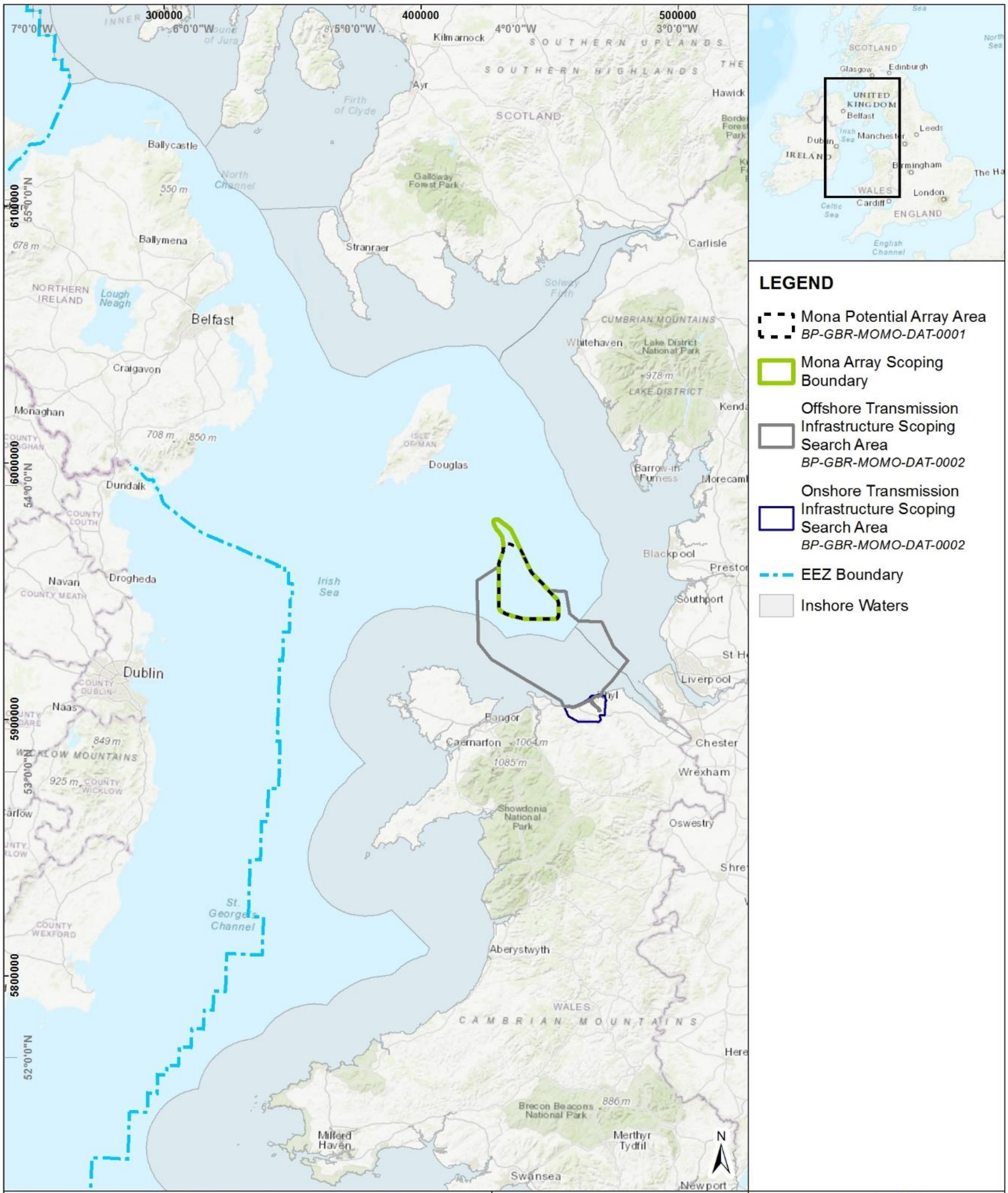
1.2.1.1 The need to consider transboundary impacts has been embodied by The United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, adopted in 1991 in the Finnish city of Espoo and commonly referred to as the 'Espoo Convention'. The Convention requires that assessments are extended across borders between Parties to the Convention when a planned activity may cause significant adverse transboundary impacts.

1.2.1.2 The Espoo Convention has been ratified by the United Kingdom (on behalf of the United Kingdom of Great Britain and Northern Ireland, the Bailiwick of Jersey, the Bailiwick of Guernsey, the Isle of Man and Gibraltar) and the European Union (EU). It is aimed at preventing, mitigating and monitoring environmental damage by ensuring that explicit consideration is given to transboundary environmental factors before a final decision is made as to whether to approve a project. The Espoo Convention requires that the Party of origin notifies affected Parties about activities listed in Appendix I of the Convention (which includes ‘major installations for the harnessing of wind power for energy production (wind farms)’) and likely to cause a significant adverse transboundary impact.

1.2.1.3 The Isle of Man is Crown Dependency of the UK and is therefore not considered to be a transboundary consultee for the Mona Offshore Wind Project. As such, potential impacts upon environmental receptors within the Isle of Man, which will be fully addressed in the EIA, are not considered to be transboundary.

1.2.1.4 The Espoo Convention has been implemented by EU Directive 2011/92/EU, as amended by Directive 2014/52/EU, on the assessment of the effects of certain public and private projects on the environment (the EIA Directive). As noted in part 1, section 2: Policy and legislation, of the EIA Scoping Report, following the UK’s departure from the EU, the United Kingdom (UK) has no direct obligations under the Directive, however, the requirements established under the Directive (as transposed into UK law) continue to apply.

1.2.1.5 The EIA Directive is transposed into UK law by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) for Nationally Significant Infrastructure Projects (NSIPs) (the 2017 EIA Regulations) and the Marine Works (Environmental Impact Assessment) Regulations 2007 for activities requiring a Marine Licence in Welsh waters (the 2007 EIA Regulations). Regulation 32 of the 2017 EIA Regulations and Regulation 18 to 20 of the 2007 EIA Regulations set out a prescribed process of consultation and notification in relation to transboundary impacts. In addition, The Planning Inspectorate’s Advice Note Twelve: Transboundary Impacts (The Planning Inspectorate, 2020) sets out the procedures for consultation in association with an application for a Development Consent Order (DCO) where such a development may have significant transboundary impacts.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, Marine Management Organisation, Marine Scotland, Natural Resources Wales

EnBW bp rps
Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 5 10 20 30 nm
0 10 20 40 60 km

Drawing Number:
RPSE-MN-SCO-042-01

Drawing Title:
LOCATION OF THE PROPOSED MONA ARRAY SCOPING BOUNDARY AND RELEVANT JURISDICTIONAL BOUNDARIES.

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	25/01/22	First Issue	LM	SS
01	17/03/22	Revision	NG	TGB

Figure 1.1: Location of the proposed Mona Offshore Wind Project and relevant jurisdictional boundaries.

1.2.1.6 The Planning Inspectorate's Advice Note Twelve (The Planning Inspectorate, 2020) sets out the procedures for consultation in association with an application for a DCO, where such development may have significant transboundary impacts. The note sets out the roles of the Planning Inspectorate, other states and developers. Developers have no formal role under the Regulation 32 process, as the duties prescribed by Regulation 32 in notifying and consulting with other states on potential transboundary impacts are the responsibility of the Secretary of State. However, developers are advised to:

- Consider, when preparing documents for consultation and application, that The Planning Inspectorate may notify the relevant state of their particular project.
- Carry out preparatory work to complete a transboundary screening matrix to assist the Secretary of State in determining the potential for likely significant effects on the environment in other states.
- Submit the transboundary screening matrix along with the scoping request, if a scoping opinion is sought by the developer.

1.2.1.7 This transboundary annex is provided in response to this advice. It provides information about the Mona Offshore Wind Project which will be the subject of the DCO application and sets out information relating to the potential effects of the scheme and the interests of the other states in the vicinity, in order to assist the Planning Inspectorate in forming a view on the likelihood of significant transboundary effects arising from the Mona Offshore Wind Project. The information contained within the Annex to Advice Note Twelve, which sets out the criteria and relevant considerations that will be taken into account by the Planning Inspectorate during screening, have also been used in the preparation of this transboundary screening annex.

1.3 Consultation

1.3.1.1 The Applicant will conduct pre-application consultation for the Mona Offshore Wind Project in accordance with the Planning Act 2008 plus associated guidance and regulations, including the 2017 EIA Regulations. If there are potential transboundary impacts, the Applicant will consider how best to consult with the relevant states.

1.4 Screening of transboundary impacts

1.4.1.1 A series of screening matrices for potential transboundary impacts associated with the Mona Offshore Wind Project are presented for the offshore physical and biological environment (Table 1.2), offshore human environment (Table 1.3), onshore environment (Table 1.4) and offshore and onshore combined topics (Table 1.5). These screening matrices have been based upon an initial understanding of the potential impacts arising from the Mona Offshore Wind Project (on the basis of the project description presented in part 1, section 3: Project description, of the EIA Scoping Report) gathered during the EIA Scoping process and follow the suggested format set out by The Planning Inspectorate (2020).

1.4.1.2 The screening matrices consider all potential transboundary impacts that may occur from all phases of the Mona Offshore Wind Project (i.e. construction, operation and maintenance, and decommissioning phases). The matrices also address the predicted spatial and temporal scale of potential transboundary impacts for those interests that are proposed to be screened into the assessment within the ES.

1.4.1.3 Potential effects upon European designated sites within other states are considered separately within the screening process for the Habitats Regulations Assessment (HRA).

1.4.1.4 The distance of the Mona Offshore Wind Project from the jurisdictional boundary of the nearest other state is presented in Table 1.1 and shown on Figure 1.1.

Table 1.1: Summary of approximate distance to the nearest applicable states.

State	Distance from the Mona Potential Array Area to nearest border (km)	Distance from the Mona Offshore Transmission Infrastructure Scoping Search Area to nearest border (km)
Ireland	80.2	71.6

1.4.2 Offshore transboundary impacts

Physical and biological environment

1.4.2.1 A transboundary screening matrix has been completed for offshore transboundary effects for the offshore physical and biological environment and is presented in Table 1.2. The conclusions of the transboundary screening for each offshore physical and biological environment topic are presented in the following sections, together with additional justification.

Physical processes

1.4.2.2 The offshore components of the Mona Offshore Wind Project are located entirely within UK territorial waters. Any impacts on physical processes are likely to be confined to within one tidal excursion of the Mona Offshore Wind Project (i.e. potential changes to the wave regime, tidal regime and sediment transport due to the presence of infrastructure, and potential changes in suspended sediment concentrations due to construction and maintenance activities). Therefore, no transboundary impacts upon physical processes are anticipated and it is proposed that transboundary impacts upon physical processes are screened out of the EIA process.

Benthic subtidal and intertidal ecology

1.4.2.3 It is considered that there is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could significantly affect the benthic subtidal or intertidal ecology of another state. The extent of any predicted impacts upon benthic subtidal and intertidal ecological receptors is likely to be limited to the footprint of the Mona Offshore Wind Project (for temporary and long term habitat loss and colonisation or removal of hard substrates) and within one tidal excursion of the Mona Offshore Wind

Project (for changes in suspended sediment concentrations and associated deposition and changes in physical processes). Therefore, potential transboundary impacts upon benthic subtidal and intertidal ecology are not anticipated and it is proposed that transboundary impacts on benthic subtidal and intertidal ecology are screened out of the EIA process.

Fish and shellfish ecology

1.4.2.4 There is potential for transboundary impacts upon fish and shellfish ecology due to construction, operation and maintenance and decommissioning impacts of the Mona Offshore Wind Project.

1.4.2.5 These include direct impacts due to underwater noise from piling operations and indirect impacts caused by loss of fish and shellfish habitat or disturbance to habitat due to increased suspended sediment concentrations (SSCs) and associated sediment deposition from the installation and decommissioning of foundations and cables.

1.4.2.6 These activities have the potential to directly affect Annex II migratory fish species that are listed as features of European sites in other states, or species that are of commercial importance for fishing fleets of other states. Indirect effects may include loss of or disturbance to fish spawning and nursery habitats in the Irish Sea that are important for migratory fish species either designated as Annex II species or of commercial importance to other states. The fish and shellfish receptors likely to be present within the Mona fish and shellfish study area for the generation assets and transmission assets are outlined in part 2, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report and part 3, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report respectively, and include a number of commercially important species as well as diadromous species likely to be found in the area. Part 2, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report and part 3, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report also identify the spawning and nursery grounds located within and around the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area.

1.4.2.7 The probability of impacts occurring during construction is high, particularly as a result of underwater noise from piling, although the extent cannot be determined at this stage and will be subject to the EIA. The majority of impacts during construction are however considered likely to be short term and temporary. The operation and maintenance phase is considered less likely to result in significant impacts, due to effects being highly limited spatially (i.e. within the boundaries of the Mona Offshore Wind Project), although the effects associated with long term habitat loss are, by nature, longer term effects which may be reversible depending on the decommissioning strategy.

1.4.2.8 Therefore, it is proposed that transboundary impacts on fish and shellfish ecology and their nature conservation interests are screened into the EIA process. Potential impacts upon fish as a qualifying feature of European sites and the National Site Network occurring within the Mona fish and shellfish ecology study area for the generation assets and transmission assets or where there is a clear impact/receptor pathway on these sites and features, or both, will be assessed within the HRA.

Marine mammals

1.4.2.9 There is potential for transboundary impacts upon marine mammals due to the mobile nature of marine mammal species and the proximity of the Mona Offshore Wind Project to the border of Ireland. The marine mammal species likely to be present in the Mona marine mammal study area for the generation assets and transmission assets are outlined in part 2, section 3.5: Marine mammals, of the EIA Scoping Report, and part 3, section 3.5: Marine mammals of the EIA Scoping Report respectively, and include harbour porpoise, bottlenose dolphin and grey seal.

1.4.2.10 Direct impacts may occur due to underwater noise generated during construction and decommissioning, including noise associated with construction activities and vessel activity. Pile driving during the installation of foundations and pre-construction clearance of unexploded ordnance (UXO) are key impacts linked to elevated subsea noise. Indirect impacts to marine mammal receptors from changes in prey availability could occur as a result of e.g. habitat loss, underwater noise, increased suspended sediment concentrations (SSCs) and associated sediment deposition and other impacts scoped in for fish and shellfish receptors. The operation and maintenance phase is considered less likely to result in significant effects.

1.4.2.11 The probability of impacts to marine mammals occurring during construction is high, particularly as a result of underwater noise from piling and UXO clearance, although the extent cannot be determined at this stage and will be subject to the EIA. The majority of impacts during construction are however considered likely to be short term and temporary.

1.4.2.12 Therefore, it is proposed that transboundary impacts upon marine mammals and their nature conservation interests are screened into the EIA process. Potential impacts upon marine mammals as a qualifying feature of European sites and the National Site Network occurring within the Mona regional marine mammal study area for the generation assets and transmission assets and/or where there is a clear impact/receptor pathway on these sites and features, will be assessed within the HRA.

Offshore ornithology

1.4.2.13 There is potential for transboundary impacts upon ornithological receptors due to the wide foraging and migratory ranges of typical bird species in the Irish Sea. In addition, a number of bird species that have been recorded in the vicinity of the Mona Offshore Wind Project include those that are listed as qualifying features of European sites in other states. The bird species likely to be present in the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area are outlined in part 2, section 4.4: Offshore ornithology, of the EIA Scoping Report and part 3, section 4.4: Offshore ornithology, of the EIA Scoping Report, respectively and include true pelagic seabirds (e.g. kittiwake, guillemot and gannet), other species that spend part of their annual life cycle at sea (e.g. divers and gulls) as well as non-seabird migrants (e.g. wildfowl, waders and passerines).

1.4.2.14 The key direct impacts for ornithological receptors are likely to arise during the operation and maintenance phase as a result of collision risk with rotating turbine blades which may result in direct mortality of individuals and barrier to movement caused by the physical presence of structures which may prevent clear transit of birds between foraging and breeding sites, or on migration. Direct impacts to ornithological receptors may, however, also occur due to temporary habitat loss/disturbance across all phases of the Mona Offshore Wind Project and permanent habitat loss during the operation and maintenance phase. Indirect impacts may cause disturbance to prey (fish) species from important bird feeding areas or changes to prey availability due to changes to physical processes and habitat as a result of the presence of operational infrastructure.

1.4.2.15 It is likely that there will be impacts to ornithological receptors occurring during the operation and maintenance phase, particularly as a result of disturbance and displacement and collision risk. The magnitude of these impacts is not known at this stage and will be subject to assessment in the EIA. Unlike the majority of impacts during construction, which are considered likely to be short term and temporary, impacts during the operation and maintenance phase are likely to be long term, continuous and of varying spatial extent depending on the species, although it is likely that they will be reversible following the decommissioning of the Mona Offshore Wind Project.

1.4.2.16 Therefore, it is proposed that transboundary impacts upon birds and their nature conservation interests are screened into the EIA process. Potential impacts upon birds as a qualifying feature of European sites and the National Site Network, that are within foraging range of the Mona Offshore Wind Project, will be assessed within the HRA.

Table 1.2: Offshore transboundary screening matrix for the Mona Offshore Wind Project – offshore physical and biological environment.

<table>
<tr><th>Screening criteria</th><th>Physical processes</th><th>Benthic subtidal and intertidal ecology</th><th>Fish and shellfish ecology</th><th>Marine mammals</th><th>Offshore ornithology</th></tr>
<tr><td>Characteristics of the development</td><td colspan="5">For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report.
In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1500MW. Key components of the Mona Offshore Wind Project include: offshore wind turbines, foundations, scour protection, inter-array cables, interconnector cables, offshore substation platforms, offshore export cables, an offshore booster substation, onshore export cables and onshore substation.
The Mona Offshore Wind Project will include all associated offshore infrastructure (including up to 107 wind turbines) and onshore infrastructure. The Mona Offshore Transmission Infrastructure Scoping Search Area extends from the Mona Potential Array Area to the selected landfall between Colwyn Bay and Rhyl on the north coast of Wales. Within the Mona Onshore Transmission Infrastructure Scoping Search Area, the onshore transmission infrastructure will connect the offshore wind farm to an existing National Grid substation.</td></tr>
<tr><td>Location of development (including existing use) and geographical area</td><td colspan="5">The Mona Potential Array Area is 449.97km2 and is located in the east Irish Sea, 28.2km from the north coast of Wales, 39.9km from the northwest coast of England, 42.6km from the Isle of Man and 80.2km from the Irish EEZ (i.e. the median line between UK and Irish waters).
The Mona Offshore Transmission Infrastructure Scoping Search Area is 808km^2.
The Mona Onshore Transmission Infrastructure Scoping Search Area is 58km^2.</td></tr>
<tr><td>Environmental importance</td><td rowspan="3">No significant transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="3">No significant transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="3">Potential transboundary impact (see section 1.4.2).</td><td rowspan="3">Potential transboundary impact (see section 1.4.2).</td><td rowspan="3">Potential transboundary impact (see section 1.4.2).</td></tr>
<tr><td>Potential impacts and carrier</td></tr>
<tr><td>Extent</td></tr>
<tr><td>Magnitude</td><td colspan="5">The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.</td></tr>
<tr><td>Probability</td><td rowspan="4">No significant transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="4">No significant transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="4">Potential transboundary impact (see section 1.4.2).</td><td rowspan="4">Potential transboundary impact (see section 1.4.2).</td><td rowspan="4">Potential transboundary impact (see section 1.4.2).</td></tr>
<tr><td>Duration</td></tr>
<tr><td>Frequency</td></tr>
<tr><td>Reversibility</td></tr>
<tr><td>Cumulative impacts</td><td>See part 2, section 3.1: Physical processes, of the EIA Scoping Report and part 3, section 3.1: Physical processes, of the EIA Scoping Report.</td><td>See part 2, section 4.1: Benthic subtidal and intertidal ecology, of the EIA Scoping Report and part 3, section 4.1: Benthic subtidal</td><td>See part 2, section 4.2: Fish and shellfish ecology of the EIA Scoping Report and part 3, section 4.2: Fish and shellfish ecology of the EIA Scoping Report.</td><td>See part 2, section 4.3: Marine mammals of the EIA Scoping Report and part 3, section 4.3: Marine mammals of the EIA Scoping Report.</td><td>See part 2, section 4.4: Offshore ornithology of the EIA Scoping Report and part 3, section 4.4: Offshore ornithology of the EIA Scoping Report.</td></tr>
</table>

Screening criteria	Physical processes	Benthic subtidal and intertidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology
		and intertidal ecology, of the EIA Scoping Report.			

Human environment

1.4.2.17 A transboundary screening matrix has been completed for offshore transboundary effects for the offshore human environment and is presented in Table 1.3. The conclusions of the transboundary screening for each offshore human environment topic are presented in the following sections, together with additional justification.

Commercial fisheries

1.4.2.18 The commercial fisheries likely to be operating in the Mona commercial fisheries study areas for the generation assets and transmission assets are outlined in part 2, section 5.1: Commercial fisheries, of the EIA Scoping Report and part 3, section 5.1: Commercial fisheries, of the EIA Scoping Report, respectively, and include fleets from other states, including Ireland and Belgium. Due to the highly mobile nature of both commercial fish species and fishing fleets, there is the potential for transboundary impacts upon commercial fisheries to arise from two sources:

- Effects on commercial fishing fleets as a result of impacts from the Mona Offshore Wind Project on commercially important fish and shellfish resources.
- Effects on commercial fishing fleets as a result of constraints on commercial fishing activities operating in the vicinity of the Mona Offshore Wind Project. These effects may include loss or restricted access to fishing grounds and potential displacement of fishing activity into other areas.

1.4.2.19 The probability of impacts occurring during the operation and maintenance phase is likely to be high, particularly as a result of the presence of the offshore infrastructure associated with the Mona Offshore Wind Project, although the extent cannot be determined at this stage and will therefore be subject to assessment in the EIA. Although such impacts have the potential to be long term, it is likely that following completion of construction some fishing activity may be able to resume, depending upon the final design of the infrastructure, and that any impacts would be reversible after decommissioning. The construction phase is considered less likely to result in significant impacts although the effects associated with the presence of infrastructure will progressively increase as the development is progressed.

1.4.2.20 Therefore, it is proposed that transboundary impacts upon commercial fisheries are screened into the EIA process.

Shipping and navigation

1.4.2.21 The Mona Offshore Wind Project is situated in the east Irish Sea where a number of shipping routes presently operate. The shipping and navigation baseline for the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area is outlined in part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report and part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report, respectively.

1.4.2.22 There is potential for transboundary impacts upon shipping routes which transit to/from other states, including Ireland. The probability of impacts occurring during the operation and maintenance phase is likely to be high, particularly as a result of the presence of the offshore infrastructure associated with the Mona Offshore Wind Project, and the extent of the impact will be subject to assessment in the EIA. Although such impacts would be long term, it is likely that they would be reversible after decommissioning, as it is anticipated that all structures above the seabed will be completely removed. The construction phase is considered less likely to result in significant impacts although the effects associated with the presence of infrastructure on shipping and navigation will progressively increase as the development is progressed.

1.4.2.23 Therefore, it is proposed that transboundary impacts upon shipping and navigation are screened into the EIA process.

Marine archaeology

1.4.2.24 The marine archaeology baseline for the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area is outlined in part 2, section 5.3: Marine archaeology, of the EIA Scoping Report and part 3, section 5.3: Marine archaeology, of the EIA Scoping Report, respectively.

1.4.2.25 The extent of any predicted impacts upon marine archaeology receptors are likely to be limited to the Mona Offshore Wind Project footprint. As the Mona marine archaeology study area for the generation assets and the Mona marine archaeology study area for the transmission assets are located entirely within UK territorial waters, there is considered to be no pathway for transboundary impacts.

1.4.2.26 Therefore, there is no potential for transboundary impacts upon marine archaeology and it is proposed that transboundary impacts on marine archaeology are scoped out of the EIA process.

Other sea users

1.4.2.27 The other sea users baseline for the Mona other sea users study area for the generation assets and the Mona other sea users study area for the transmission assets is outlined in part 2, section 5.4: Other sea users, of the EIA Scoping Report and part 3, section 5.4: Other sea users, of the EIA Scoping Report, respectively.

1.4.2.28 Potential transboundary impacts associated with the Mona Offshore Wind Project identified for other sea users receptors include displacement of recreational sailing and motor cruising activities between the UK and Ireland and potential impacts to existing cables between the UK, Ireland (ESAT2, Havingsten 1.1 and Rockabill cables) and the United States (Hibernia Atlantic Seg. A cable). The extent of any potential impacts on recreational activities is likely to be localised and short term, as individual vessels may be displaced along their routes due to construction, maintenance or decommissioning activities occurring at any one location. Potential impacts on recreational activities are also likely to be infrequent, due to the likely lower levels of offshore cruising and racing between the UK and Ireland. The extent of any potential impacts on existing cables is also likely to be localised, short term and infrequent, associated with any construction, maintenance or decommissioning activities which may overlap or cross the existing cables; any such activities would be subject to standard cable crossing agreements as described in part 2, section 5.4: Other sea users, of the EIA Scoping Report and part 3, section 5.4: Other sea users, of the EIA Scoping Report.

1.4.2.29 Therefore, it is considered that there is no potential for significant transboundary impacts upon other users receptors and it is proposed that transboundary impacts upon other sea users are screened out of the EIA process.

Table 1.3: Offshore transboundary screening matrix for the Mona Offshore Wind Project – offshore human environment.

Screening criteria	Commercial fisheries	Shipping and navigation	Marine archaeology	Other sea users
Characteristics of the development	For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report. In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1500MW. Key components of the Mona Offshore Wind Project include: offshore wind turbines, foundations, scour protection, inter-array cables, interconnector cables, offshore substation platforms, offshore export cables, an offshore booster substation, onshore export cables and onshore substation. The Mona Offshore Wind Project will include all associated offshore infrastructure (including up to 107 wind turbines) and onshore infrastructure. The Mona Offshore Transmission Infrastructure Scoping Search Area extends from the Mona Potential Array Area to the selected landfall between Colwyn Bay and Rhyl on the north coast of Wales. Within the Mona Onshore Transmission Infrastructure Scoping Search Area, the onshore transmission infrastructure will connect the offshore wind farm to an existing National Grid substation.			
Location of development (including existing use) and geographical area	The Mona Potential Array Area is 449.97km2 and is located in the east Irish Sea, 28.2km from the north coast of Wales, 39.9km from the northwest coast of England, 42.6km from the Isle of Man and 80.2km from the Irish EEZ (i.e. the median line between UK and Irish waters). The Mona Offshore Transmission Infrastructure Scoping Search Area is 808km2. The Mona Onshore Transmission Infrastructure Scoping Search Area is 58km2.			
Environmental importance Potential impacts and carrier Extent	Potential transboundary impact (see section 1.4.2).	Potential transboundary impact (see section 1.4.2).	No significant transboundary impacts are predicted (see section 1.4.2).	No significant transboundary impacts are predicted (see section 1.4.2).
Magnitude	The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.			
Probability Duration Frequency Reversibility	Potential transboundary impact (see section 1.4.2).	Potential transboundary impact (see section 1.4.2).	No significant transboundary impacts are predicted (see section 1.4.2).	No significant transboundary impacts are predicted (see section 1.4.2).
Cumulative impacts	See part 2, section 5.1: Commercial fisheries, of the EIA Scoping Report and part 3, section 5.1: Commercial fisheries, of the EIA Scoping Report.	See part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report and part 3, section 5.2: Shipping and navigation, of the EIA Scoping Report.	See part 2, section 5.3: Marine archaeology, of the EIA Scoping Report and part 3, section 5.3: Marine archaeology, of the EIA Scoping Report.	See part 2, section 5.4: Other sea users, of the EIA Scoping Report and part 3, section 5.4: Other sea users, of the EIA Scoping Report.

1.4.3 Onshore transboundary impacts

1.4.3.1 A transboundary screening matrix has been completed for onshore transboundary effects and is presented in Table 1.4. The conclusions of the transboundary screening for each onshore topic are presented, together with additional justification, in the following sections.

Geology and ground conditions

1.4.3.2 Any impacts on geology and ground conditions arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area within the footprint of the Mona Onshore Transmission Infrastructure Scoping Search Area. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could significantly affect the geology or ground conditions of another state. It is therefore proposed that transboundary impacts on geology and ground conditions are scoped out of the EIA process.

Hydrology and flood risk

1.4.3.3 Any impacts on hydrology and flood risk arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area within the footprint of the Mona Onshore Transmission Infrastructure Scoping Search Area. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could significantly affect the hydrology and flood risk of another state. It is therefore proposed that transboundary impacts on hydrology and flood risk are scoped out of the EIA process.

Terrestrial ecology and intertidal birds

1.4.3.4 Any impacts on terrestrial ecology and intertidal birds arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area (e.g. up to 500m) around the footprint of the Mona Onshore Transmission Infrastructure Scoping Search Area. Estuarine Special Protection Areas (SPAs) and Ramsar sites in close proximity to the Mona Onshore Transmission Infrastructure Scoping Search Area may include a number of migratory species of bird as qualifying interest features. These species are migratory and will occur as qualifying interests in their own right, or as important assemblage features, in numerous Natura 2000 sites in other states. Therefore, there is potential for transboundary, or long range, effects. However, guidelines relating to transboundary effects make it clear that proximity is an important factor and that transboundary effects are primarily concerned with offshore wind energy developments where effects on highly mobile seabird species could be associated with protected sites in other states (Department for Business, Energy and Industrial Strategy (DECC), 2015). This implies that the qualifying feature potentially affected should originate from the protected site in the other state, rather than the idea that the qualifying feature potentially affected might also spend some of its time at a protected site in another state.

1.4.3.5 The Mona onshore transmission infrastructure has the potential to affect the qualifying features of estuarine or terrestrial European sites and the National Site Network through short-term disturbance during construction, operation and maintenance activities and decommissioning. Due to the large distance between the Mona Onshore Transmission Infrastructure Search Area and Natura 2000 sites located outside the UK, it is not considered feasible that migratory birds directly associated with Natura 2000 sites in other states would be disturbed or suffer from loss of foraging or resting opportunities in any way that would result in likely significant effects on those Natura 2000 sites. It is therefore proposed that transboundary impacts on terrestrial ecology and intertidal birds are scoped out of the EIA process.

Historic environment

1.4.3.6 Any impacts on the onshore historic environment arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area within the footprint of the Mona Onshore Transmission Infrastructure Scoping Search Area. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could significantly affect the onshore historic environment of another state. It is therefore proposed that transboundary impacts on the onshore historic environment are scoped out of the EIA process.

Land use and recreation

1.4.3.7 Any impacts on land use and recreation arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area within the footprint of the Mona Onshore Transmission Infrastructure Scoping Search Area. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could significantly affect the land use and recreation of another state. It is therefore proposed that transboundary impacts on land use and recreation are scoped out of the EIA process.

Traffic and transport

1.4.3.8 Any impacts on traffic and transport arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area of the UK road infrastructure. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could significantly affect traffic and transport in another state. It is therefore proposed that transboundary impacts on traffic and transport are scoped out of the EIA process.

Noise and vibration

1.4.3.9 Any noise and vibration impacts arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project will be confined to a localised area in the vicinity of the Mona Onshore Transmission Infrastructure Scoping Search Area. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project could result in significant noise and vibration effects in another state. It is therefore proposed that transboundary impacts on noise and vibration are scoped out of the EIA process.

Air quality

1.4.3.10 Potential transboundary impacts to air quality arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project are anticipated to be minor and localised in extent and will be confined to the duration of the construction phase only. It is therefore proposed that transboundary impacts on air quality are scoped out of the EIA process.

Table 1.4: Onshore environment transboundary screening matrix for the Mona Offshore Wind Project.

Screening criteria	Geology and ground conditions	Hydrology and flood risk	Terrestrial ecology and intertidal birds	Historic environment	Land use and recreation	Traffic and transport	Noise and vibration	Air quality
Characteristics of the development	For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report. In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1500MW. Key components of the Mona Offshore Wind Project include: offshore wind turbines, foundations, scour protection, inter-array cables, interconnector cables, offshore substation platforms, offshore export cables, an offshore booster substation, onshore export cables and onshore substation. The Mona Offshore Wind Project will include all associated offshore infrastructure (including up to 107 wind turbines) and onshore infrastructure. The Mona Offshore Transmission Infrastructure Scoping Search Area extends from the Mona Potential Array Area to the selected landfall between Colwyn Bay and Rhyl on the north coast of Wales. Within the Mona Onshore Transmission Infrastructure Scoping Search Area, the onshore transmission infrastructure will connect the offshore wind farm to an existing National Grid substation.							
Location of development (including existing use) and geographical area	The Mona Potential Array Area is 449.97km^2 and is located in the east Irish Sea, 28.2km from the north coast of Wales, 39.9km from the northwest coast of England, 42.6km from the Isle of Man and 80.2km from the Irish EEZ (i.e. the median line between UK and Irish waters). The Mona Offshore Transmission Infrastructure Scoping Search Area is 808km^2. The Mona Onshore Transmission Infrastructure Scoping Search Area is 58km^2.							
Environmental importance	No significant transboundary impacts are predicted (see section 1.4.3).							
Potential impacts and carrier								
Extent								
Magnitude	The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.							
Probability	No significant transboundary impacts are predicted (see section 1.4.3).							
Duration								
Frequency								
Reversibility								
Cumulative impacts	See part 3, section 6.1: Geology and ground	See part 3, section 6.2: Hydrology and flood risk, of the	See part 3, section 7.1: Terrestrial ecology and	See part 3, section 8.1: Historic environment, of	See part 3, section 8.2: Land use and recreation, of	See part 3, section 8.3: Traffic and transport, of the	See part 3, section 8.4: Noise and vibration, of the	See part 3, section 8.5: Air quality, of the

Screening criteria	Geology and ground conditions	Hydrology and flood risk	Terrestrial ecology and intertidal birds	Historic environment	Land use and recreation	Traffic and transport	Noise and vibration	Air quality
	conditions, of the EIA Scoping Report.	EIA Scoping Report.	intertidal birds, of the EIA Scoping Report.	the EIA Scoping Report.	the EIA Scoping Report.	EIA Scoping Report.	EIA Scoping Report.	EIA Scoping Report.

1.4.4 Offshore and onshore combined topics transboundary impacts

1.4.4.1 A transboundary screening matrix has been completed for those topics falling under the offshore and onshore combined topics and this is presented in Table 1.4. The conclusions of the transboundary screening for each combined topic are presented in the following sections, together with additional justification.

Seascape, landscape and visual resources

1.4.4.2 The seascape, landscape and visual resources baseline for the Mona seascape, landscape and visual resources study area for the generation assets and transmission assets is outlined in part 2, section 6.1: Seascape, landscape and visual resources, of the EIA Scoping Report, and part 3, section 9.1: Seascape, landscape and visual resources of the EIA Scoping Report, respectively.

1.4.4.3 The extent of potential impacts to seascape, landscape and visual resources receptors arising from the Mona Offshore Wind Project generation assets and offshore transmission assets is considered to be focused on receptors based in the UK and the Isle of Man, with any potential impacts at the UK/Ireland boundary considered to be transient and negligible.

1.4.4.4 Any impacts on landscape and visual resources arising from the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project onshore transmission assets will be confined to a localised area in the vicinity of the Mona Onshore Transmission Infrastructure Scoping Search Area. There is no pathway by which direct or indirect effects arising from the Mona Offshore Wind Project onshore transmission assets could significantly affect the landscape and visual resources of another state.

1.4.4.5 Therefore, significant transboundary impacts upon seascape, landscape and visual resources are not anticipated and it is proposed that transboundary impacts on seascape, landscape and visual resources are scoped out of the EIA process.

Socio-economics and community

1.4.4.6 The socio-economics baseline for the Mona Offshore Wind Project is outlined in part 2, section 6.2: Socio-economics and community, of the EIA Scoping Report and part 3, section 9.4: Socio-economics and community, of the EIA Scoping Report.

1.4.4.7 There is unlikely to be potential transboundary impacts upon socio-economics and community due to the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project. The short list of ports identified in part 3, section 9.4: Socio-economics and community, of the EIA Scoping Report, to support the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project are located within the UK. The Mona Offshore Wind Project will also promote opportunities for local procurement and local skills and recruitment through the preparation and implementation of mitigation measures.

1.4.4.8 Therefore, significant transboundary impacts upon socio-economics and community are not anticipated and it is proposed that transboundary impacts on socio-economics and community are scoped out of the EIA process. Aviation and radar.

1.4.4.9 The aviation and radar baseline for the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area is outlined in part 2, section 6.3: Aviation and radar, of the EIA Scoping Report and part 3, section 9.3: Aviation and radar, of the EIA Scoping Report, respectively.

1.4.4.10 Potential impacts upon aviation and radar include interference with Primary Surveillance Radar (PSR), creation of physical obstacles to low flying aircraft, obstruction and potential for disruption to helicopter access/egress to/from oil and gas platforms, and obstruction to Search and Rescue (SAR) operations. All potential receptors identified are located in the UK and the Isle of Man and therefore no transboundary effects are predicted.

1.4.4.11 Therefore, no transboundary impacts upon aviation and radar are anticipated and it is proposed that transboundary impacts upon aviation and radar are screened out of the EIA process.

Climate change

1.4.4.12 The climate change baseline for the Mona Offshore Wind Project is outlined in part 2, section 8.2: Climate change, of the EIA Scoping Report.

1.4.4.13 Potential transboundary impacts associated with the Mona Offshore Wind Project have been identified in part 2, section 8.2: Climate change, of the EIA Scoping Report, whilst noting that over the lifetime of the Mona Offshore Wind Project, potential transboundary impacts will be beneficial. All development processes which emit Green House Gases (GHGs) have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a transboundary impact on climate change. Transboundary effects due to other specific international development projects will be taken into account when evaluating the impact of the Mona Offshore Wind Project by defining the atmospheric mass of GHGs as a high sensitivity receptor.

1.4.4.14 It is therefore proposed that transboundary impacts on climate change are screened into the EIA process.

Table 1.5: Offshore and onshore combined topics transboundary screening matrix for the Mona Offshore Wind Project.

Screening criteria	Seascape, landscape and visual resources	Socio-economics and community	Aviation and radar	Climate change
Characteristics of the development	For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report. In accordance with the Round 4 bid, the proposed capacity of the Mona Offshore Wind Project is 1500MW. Key components of the Mona Offshore Wind Project include: offshore wind turbines, foundations, scour protection, inter-array cables, interconnector cables, offshore substation platforms, offshore export cables, an offshore booster substation, onshore export cables and onshore substation. The Mona Offshore Wind Project will include all associated offshore infrastructure (including up to 107 wind turbines) and onshore infrastructure. The Mona Offshore Transmission Infrastructure Scoping Search Area extends from the Mona Potential Array Area to the selected landfall between Colwyn Bay and Rhyl on the north coast of Wales. Within the Mona Onshore Transmission Infrastructure Scoping Search Area, the onshore transmission infrastructure will connect the offshore wind farm to an existing National Grid substation.			
Location of development (including existing use) and geographical area	The Mona Potential Array Area is 449.97km^2 and is located in the east Irish Sea, 28.2km from the north coast of Wales, 39.9km from the northwest coast of England, 42.6km from the Isle of Man and 80.2km from the Irish EEZ (i.e. the median line between UK and Irish waters). The Mona Offshore Transmission Infrastructure Scoping Search Area is 808km^2. The Mona Onshore Transmission Infrastructure Scoping Search Area is58km^2.			
Environmental importance	No significant transboundary impacts are predicted (see section 1.4.4).	No significant transboundary impacts are predicted (see section 1.4.4).	No significant transboundary impacts are predicted (see section 1.4.4).	Potential transboundary impact (see section 1.4.4).
Potential impacts and carrier				
Extent				
Magnitude	The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.			
Probability	No significant transboundary impacts are predicted (see section 1.4.4).	No significant transboundary impacts are predicted (see section 1.4.4).	No significant transboundary impacts are predicted (see section 1.4.4).	Potential transboundary impact (see section 1.4.4).
Duration				
Frequency				
Reversibility				
Cumulative impacts	See part 2, section 6.1: Seascape, landscape and visual resources, of the EIA Scoping Report and part 3, section 9.1: Seascape, landscape and visual resources, of the EIA Scoping Report.	See part 2, section 6.2: Socio-economics and community, of the EIA Scoping Report and part 3, section 9.2: Socio-economics and community, of the EIA Scoping Report.	See part 2, section 6.3: Aviation and radar, of the EIA Scoping Report and part 3, section 9.3: Aviation and radar, of the EIA Scoping Report.	See part 2, section 6.4: Climate change, of the EIA Scoping Report and part 3, section 9.4: Climate change, of the EIA Scoping Report.

1.5 Conclusions

1.5.1.1 This annex has been prepared in accordance with The Planning Inspectorate’s Advice Note twelve and associated Annex. The primary purpose of this annex is to provide a screening assessment of potential transboundary impacts which have the potential to affect other states.

1.5.1.2 On the basis of the current information available, as detailed within the Mona Offshore Wind Project EIA Scoping Report, the Mona Offshore Wind Project is considered likely to have a significant effect on the environment in other states for the following topics, which have been screened into the EIA process:

- fish and shellfish ecology
- marine mammals
- offshore ornithology
- commercial fisheries
- shipping and navigation
- climate change.

2 Annex B – Water Framework Directive Screening

2.1 Introduction

2.1.1 Background

2.1.1.1 This annex reports on the scope for a site-specific Water Framework Directive (WFD) assessment that will be prepared for the Mona Offshore Wind Project. The onshore infrastructure will comprise the landfall area, onshore export cable corridor, and the onshore substation which will be located within the Mona Onshore Transmission Infrastructure Scoping Search Area. The compounds, storage areas and access roads will also require consideration. The relevant offshore infrastructure is likely to comprise the offshore export cable corridor and landfall area which will be located within the Mona Offshore Transmission Infrastructure Scoping Search Area. Offshore works beyond 1nm from the coast are not relevant to the WFD compliance assessment and have not been considered. The remit of the offshore infrastructure will be up to Mean High Water Springs (MHWS) and the remit of the onshore infrastructure will be down to Mean Low Water Springs (MLWS). Further detail on the infrastructure that will be included within the Mona Offshore Wind Project are described in parts 2 and 3, Section 1 of the EIA Scoping Report.

2.1.1.2 As outlined in section 3 of this annex, the WFD (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in December 2000. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations). The WFD is retained EU legislation' and is still applicable in England and Wales as set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 and the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019.

2.1.1.3 Whilst Environmental Impact Assessment (EIA) is an efficient mechanism to gather the relevant information for a WFD compliance assessment, it still needs to be interpreted in relation to WFD. The Natural Resources Wales (NRW) guidance for assessing activities and projects for compliance with the Water Framework Directive (OGN 72) states that "*activities or projects that have the potential to affect water bodies (or schemes which lead to modifications of water bodies) should be assessed against the Directive's environmental objectives to determine whether they have the potential to prevent these objectives from being met which includes whether they may cause deterioration.*" (NRW, 2018). Therefore, a WFD compliance assessment will be undertaken to demonstrate how any impact on WFD receptors caused by the different activities associated with the Mona Offshore Wind Project fits with the objectives of any affected WFD water bodies. The compliance assessment will also provide the opportunity to inform the detailed design of the Mona Offshore Wind Project to avoid, minimise, mitigate, or compensate for the risks to WFD water body receptors where risk assessment determines that the activities have the potential to:

1. Cause a surface water body, including coastal water bodies or groundwater body to deteriorate from one WFD status class to another or cause significant localised impacts that could contribute to this happening.
2. Prevent or undermine action to get surface water bodies or groundwater bodies to good status (e.g. compromise the programme of measures put in place to achieve the ultimate water body objective).

2.1.2 Project overview

2.1.2.1 This report outlines the approach that will be taken for the screening of the Mona Offshore Wind Project transmission assets. The approach to the assessment is included in Section 2.2.

2.1.2.2 Whilst the Mona Offshore Wind Project design has not been finalised, typical components of the transmission assets that have the potential to impact on the WFD objectives are outlined below. These are for indicative purposes only to present an understanding of the nature of the construction works and how these have the potential to impact on the environmental objectives of the water bodies affected. More detail on the nature of these activities is provided in part 1, section 3: Project description of the EIA Scoping Report.

- Offshore cable corridor - The offshore export cables will be buried where possible and protected where burial is not possible. Any offshore cable crossing will also be protected. The cables will be installed within the Mona Offshore Transmission Infrastructure Scoping Search Area.
- Landfall area - The offshore cables will be connected to the onshore cables at the Transition Joint Bays (TJBs). The techniques used to carry out the landfall works broadly fall into two categories: open cut installation or trenchless techniques (e.g., Horizontal Direction Drill, HDD).
- Onshore cable corridor - The onshore export cables will be buried for the entirety of the onshore cable corridor. The cables will be installed within the Mona Offshore Transmission Infrastructure Scoping Search Area (this includes both the permanent installation area and temporary working area).
- Joint Bays and link boxes - These are typically concrete lined pits that provide a clean and dry environment for jointing the sections of cable together.
- Crossings - The onshore cable corridor may cross infrastructure and obstacles such as roads, railways and rivers. The method employed will depend on the sensitivity and the scale of the feature crossed. Where trenchless crossings are used it is likely that these components of the scheme can be screened out of the WFD compliance assessment in accordance with NRW Guidance on WFD compliance assessments (NRW, 2018).
- Access routes and temporary haul roads – These are particularly important if they cross water courses and the method of construction to be used, e.g., clear span bridge verses temporary culverts.

- Construction compounds - Construction compounds will be required along the onshore cable corridor, for laydown and storage of materials, plant and staff, as well as space for small temporary offices, welfare facilities, security and parking. These will occur within the Mona Onshore Transmission Infrastructure Scoping Search Area.
- Substation.

2.1.2.3 From the key components of onshore and offshore elements of the Mona Offshore Wind Project outlined above, the activities which have the potential to impact the achievement of the WFD objectives will be identified for consideration within the WFD Compliance Assessment. An initial review of the Mona Offshore Wind Project description has identified the following activities that may potentially pose a detrimental risk to the water environment in the absence of mitigation:

- Topsoil stripping, excavation, and stockpiled earth (including reinstatement) for the cable corridors, crossings, substations and landfall.
- Use of oils, chemicals, and cement.
- Construction and operation of temporary bridges and culverts to facilitate crossing of watercourses by machinery should this be required resulting in temporary impacts to the morphology of the channel and banks.
- Morphological impacts resulting from watercourse service crossings.
- De-watering of trenches.
- Temporary abstractions from surface water/groundwater.
- Offshore cable installation and maintenance, methods including pre-lay ploughing, trenching or jetting.
- Landfall cable installation and maintenance, trenchless or trenching methods are currently under consideration.
- Installation and maintenance of cable protection in the nearshore subtidal environment.
- Seabed clearance in the nearshore subtidal environment.
- Use of jack-up vessels for cable installation and maintenance in the nearshore subtidal or intertidal environment.
- Unexploded ordnance detonation in the nearshore subtidal or intertidal environment.

2.2 Methodology

2.2.1 Legislation

2.2.1.1 The WFD requires the prevention of deterioration and to protect, enhance, and restore all bodies of water. This means that new development should not adversely impact upon on the ability of a water body to achieve its environmental objectives.

2.2.1.2 The 2017 Regulations provide for the implementation of the WFD through the designation of all surface waters (rivers, lakes, transitional (estuarine) and coastal waters) and groundwaters as water bodies and the establishment of targets to achieve their environmental objectives.

2.2.1.3 The WFD applies to WFD water bodies. The consideration of the proposals under the WFD will therefore apply to all surface water bodies and groundwater bodies that have the potential to be impacted by the Mona Offshore Wind Project.

Water body classification

2.2.1.4 The WFD specifies the quality elements that are used to assess the ecological and chemical status of a water body. Quality elements are generally biological (e.g., fish, invertebrates, macrophytes) or chemical (e.g., heavy metals, pesticides, nutrients). Classifications indicate where the quality of the environment is good, where it may need improvement, and what may need to be improved. They can also be used, over the years, to plan improvements, show trends and to monitor the effectiveness of the programme of measures identified. There are three status classifications which are commonly reported, chemical, ecological and quantitative.

2.2.1.5 Chemical status is assessed from compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances for surface water and groundwater bodies. These are known as 'Annex X' substances listed in the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations). Chemical status is recorded as 'good' or 'fail'. The chemical status of groundwater also considers electrical conductivity. Chemical status for a water body is determined by the worst scoring chemical (one-out-all-out approach).

2.2.1.6 Ecological status classifications can be composed of up to four different assessments and apply to surface water bodies only:

- An assessment of status indicated by a biological quality element such as fish, invertebrates, or algae. The presence of invasive species is also assessed as a separate test.
- An assessment of compliance with environmental standards for supporting physio-chemical conditions, such as dissolved oxygen, phosphorus, or ammonia.
- An assessment of compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic (these are known as 'Annex VIII' substances).
- In determining high status only, a series of tests is included to make sure that hydromorphology is largely undisturbed.

2.2.1.7 Ecological status is recorded as high, good, moderate, poor or bad. 'High' represents 'largely undisturbed conditions'. Other classes show increasing deviation from undisturbed or reference conditions. This deviation must be expressed as an Ecological Quality Ratio (EQR) which ranges from zero for bad status to one for high status. As with chemical status, ecological status is determined by the worst scoring component (one-out-all-out approach).

2.2.1.8 Biological status is a sub-set of ecological status where the results of the biological quality elements are assessed (and so ignore physio-chemical and Annex VIII substances and hydromorphology). The one-out-all-out rule is applied again here to give a biological status classification.

2.2.1.9 Quantitative status measures the degree to which a body of groundwater is affected by direct and indirect abstractions (i.e. the available groundwater resource must not be exceeded by the long-term annual average rate of abstraction). Groundwater abstraction must also not cause failure of ‘Good’ ecological status in dependent surface waters. This also applies to surface water bodies.

2.2.1.10 Overall status is a composite measure that looks at ecological status, chemical status and quantitative status dependent on the water body type. So, in assessing overall status all four assessment types under ecological status (biology, physio-chemical, Annex VIII substances and hydromorphology) as well as incorporating the results of the chemical status assessment (priority substances) and quantitative status (for groundwater bodies). The one-out-all-out rule is applied again here, so a water body must be of good (pass) or better ecological status, good chemical status and good quantitative status assessment to be given a good overall status.

Water body objectives

2.2.1.11 The completion of a WFD compliance assessment is a staged process where data on the study area and work proposals are assessed with respect to the requirements of the WFD to ascertain if the proposals will or will not have a detrimental impact on the status of water bodies associated with the proposal. If the assessment concludes, after taking account of the mitigation proposed, that the proposal may either reduce the quality status of the water bodies or prevent them from reaching the required status, then this represents a failure to achieve the WFD objectives and it should not go ahead unless justification for the new modification is demonstrated under Article 4.7 of the Directive. The four objectives of the WFD compliance assessment are:

- Objective 1: To prevent deterioration in the ecological status of the water body.
- Objective 2: To prevent the introduction of impediment to the attainment of Good WFD status for the water body.
- Objective 3: To ensure the attainment of the WFD objectives for the water body are not compromised.
- Objective 4: To ensure the achievement of WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised.

2.2.2 WFD compliance assessment scope

2.2.2.1 The WFD surface water and groundwater assessment that will be undertaken as part of the Preliminary Environment Information Report (PEIR) and Environmental Statement (ES) will draw upon a number of other disciplines in determining the potential impact to the environmental objectives of the water bodies that have the potential to be impacted. These will include hydrology and water quality, terrestrial and aquatic ecology, Habitat Regulations Assessment and hydrogeology.

2.2.2.2 To achieve the aims outlined within section 2.1.1, a staged approach will be adopted in undertaking the WFD compliance assessment in accordance with NRW's guidance document OGN 72, *Guidance for assessing activities and projects for compliance with the Water Framework Directive* and the Planning Inspectorate (2018) Advice Note Eighteen: Water Framework Directive (https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-18/).

2.2.2.3 The WFD compliance assessment is typically undertaken in three stages:

- Screening – excludes any activities that do not need to go through the scoping or impact assessment stages.
- Scoping – identifies the receptors that are potentially at risk from your activity and need impact assessment.
- Impact assessment – considers the potential impacts of your activity, identifies ways to avoid or minimise impacts, and shows if your activity may cause deterioration or jeopardise the water body achieving good status.

2.2.2.4 A flow chart, taken form the Planning Inspectorate Advice Note 18 for assessing activities and projects for compliance with the WFD has been included below in Figure 2.1. This provides an overview of the recommended process to address the WFD during the pre-application process. This process will be followed for the WFD compliance assessment to be presented in the PEIR/ES for the Mona Offshore Wind Project.

2.2.2.5 An initial screening has been undertaken in this annex to review each component of the grid connection within the Mona Onshore Transmission Infrastructure Scoping Search Area Mona Offshore Transmission Infrastructure Scoping Search Area in terms of potential impact to the water environment. This initial screening summarises potential impact to the water environment for each component of each WFD quality element. This screening will assist in defining the scope of the detailed assessment required for the PEIR/ES, identifying potential issues and provides an opportunity to engage with the Competent Authority to agree the scope of the detailed assessment.

2.2.2.6 The detailed WFD compliance assessment of the Mona Offshore Wind Project transmission assets will then examine the potential impact on water bodies (including cumulative impacts) and suggest mitigation measures and enhancements where appropriate. The WFD compliance assessment will also consider whether the scheme will contribute to the delivery of the relevant River Basin Management Plan (RBMP).

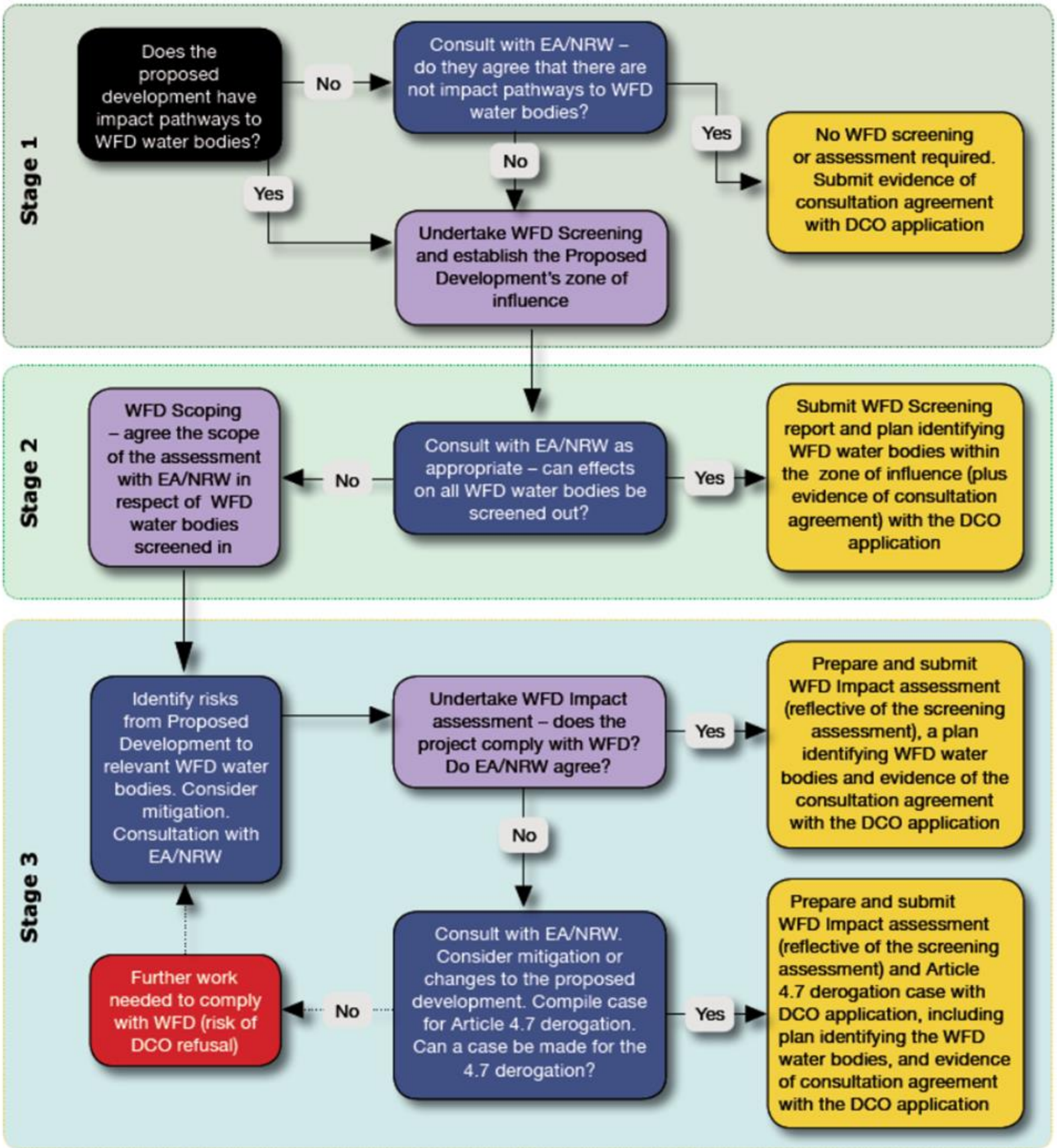


Figure 2.1: Flow chart illustrating the WFD compliance assessment process.

2.3 Identification of relevant water bodies

2.3.1 Introduction

2.3.1.1 For the purposes of this initial WFD screening, water bodies that are within, intersect or which are hydrologically connected to the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area have been identified and considered as relevant water bodies for the different stages of the WFD compliance assessment.

2.3.1.2 There are sections of the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area that fall within the small coastal interbasins that drain directly, or via smaller streams, to the transitional and coastal water bodies. These areas are not within a formal WFD water body but the potential impact of the Mona Offshore Wind Project transmission assets will be considered in the potential for impact to the downstream marine (transitional or coastal) water bodies.

2.3.2 Water bodies within the zone of influence

2.3.2.1 The water bodies that occur within by the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area are included in Figure 2.2. These water bodies may fall within the zone of influence of the Mona Offshore Wind Project. These water bodies will be refined in discussion and agreement with NRW once the cable route corridor for the Mona Offshore Wind Project has been identified. The impact of the different project components on these water bodies will be considered in the WFD compliance assessment which will be submitted as an annex to the PEIR/ES. Groundwater bodies are not included in this figure but will be considered in the WFD compliance assessment, their current status classification is included in Table 2.1.

2.3.3 WFD water body status classification

2.3.3.1 The overall, ecological and chemical status of the surface water bodies listed in Table 2.1 has been established through consultation with the Water Watch Wales geo-portal (https://waterwatchwales.naturalresourceswales.gov.uk/en/).

2.3.3.2 Table 2.1 highlights the overall, ecological, and chemical status as well as the contributing elements to the status classification based on the 2018 baseline. The RBMP states that the 2018 water body classification is the baseline from which deterioration should be avoided. This table form the basis of the initial screening from which activities associated with the different components of the grid connection are scoped into the detailed WFD compliance assessment.

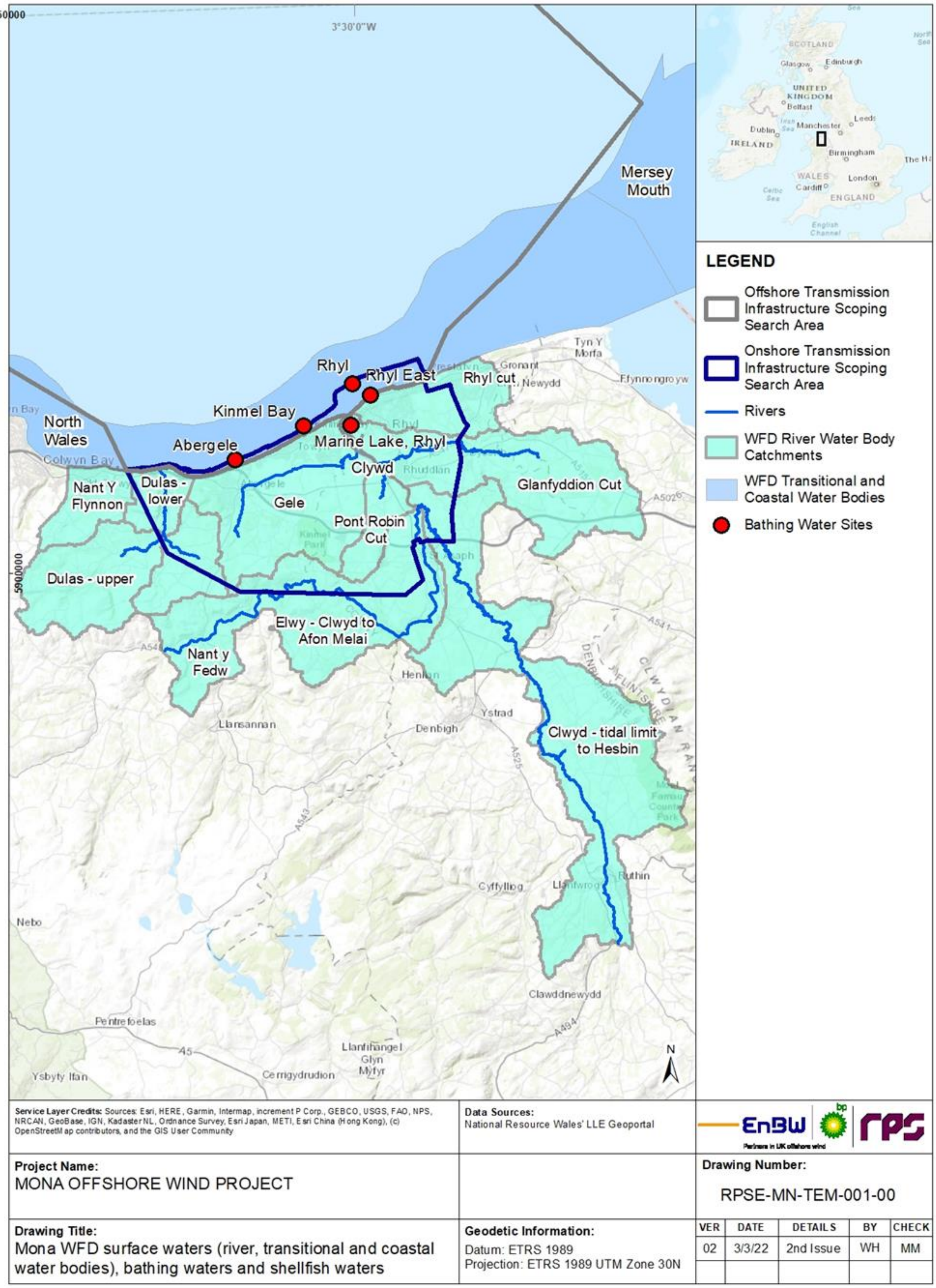


Figure 2.2: Mona Onshore Transmission Infrastructure Scoping Search Area and Mona Offshore Transmission Infrastructure Scoping Search Area overlapping with WFD surface waters (river, transitional and coastal water bodies) and bathing waters.

Table 2.1: WFD status classification for surface water (river, transitional and coastal) and groundwater bodies that overlap with the Mona Onshore Transmission Infrastructure Scoping Search Area and Mona Offshore Transmission Infrastructure Scoping Search Area, and the key elements driving status classification.

Operational Catchment	Water Body Name & ID	Water Body Type	HMWB	Supporting elements (Surface Water)	Other Pollutants	Specific Pollutants	Physio-Chemical quality elements	Biological quality elements	Overall Ecological Status	Overall Chemical Status	Qualitative Groundwater Status	Quantitative Groundwater Status	Overall Groundwater Status
Dulas Ganol	Dulas - upper, GB110066059810	River	No	Supports Good	-	-	Good	-	Good	Good	-	-	-
Dulas Ganol	Nant y Fedw (Dulas), GB110066059830	River	No	Supports Good	-	-	Moderate	-	Moderate	Good	-	-	-
Dulas Ganol	Dulas - lower, GB110066059860	River	No	Supports Good	-	-	Moderate	Poor	Poor	Good	-	-	-
Clwyd Lower	Clwyd - tidal limit to Hesbin, GB110066059960	River	Yes	Supports Good	Good	High	Moderate	Moderate	Moderate	Good	-	-	-
Gele	Pont Robin Cut (Bodelwyddan), GB110066059970	River	No	Supports Good	-	-	Moderate	-	Moderate	Good	-	-	-
Gele	Gele, GB110066059980	River	Yes	Supports Good	-	-	Moderate	Good	Moderate	Good	-	-	-
Clwyd Lower	Glanfyddion Cut, GB110066059990	River	No	Supports Good	-	-	Moderate	Good	Moderate	Good	-	-	-
Elwy	Elwy - Clwyd to Melai, GB110066060020	River	No	Supports Good	Good	High	Good	High	Good	Good	-	-	-
Western Wales	CLYWD, GB541006608000	Transitional	Heavily Modified	-	-	-	Moderate	High	Moderate		-	-	-
Northwest Region Coastal Waters	Mersey Mouth, GB641211630001	Coastal	Heavily Modified	-	-	High	Moderate	Good	Moderate	Fail	-	-	-
Western Wales	North Wales, GB641011650000	Coastal	Heavily Modified	-	-	High	Good	Good	Good	Good	-	-	-
Clwyd Permo-Triassic Sandstone	Clwyd Permo-Triassic Sandstone, GB41001G202100	Groundwater	-	-	-	-	-	-	-	-	Good	Good	Good
Conwy OC	Conwy, GB41002G203000	Groundwater	-	-	-	-	-	-	-	-	Poor	Good	Poor
Clwyd Silurian	Clwyd Silurian, GB41002G200100	Groundwater	-	-	-	-	-	-	-	-	Good	Good	Good

2.3.4 Protected areas for the WFD

2.3.4.1 A number of waters in the Mona Offshore Transmission Infrastructure Scoping Search Area and Mona Onshore Transmission Infrastructure Scoping Search Area are protected under other existing EU legislation which applied directly or indirectly to the UK before December 2020 and have been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. These water dependent protected areas require special protection due to their sensitivity to pollution or their particular economic, social or environmental importance. All of the areas requiring special protection have been identified by NRW, mapped and listed in a register of protected areas (required under Article 5 of the WFD). The register of protected areas includes:

- Drinking Water Areas
- Economically Significant Waters (including shellfish waters)
- Recreational Waters (including bathing waters)
- Nutrient Sensitive Areas
- Special Protection Areas (SPAs)
- Special Areas of Conservation (SACs).

2.3.4.2 Protected areas for the WFD are the areas of land and bodies of water that have specific uses which require special protection (relevant areas listed in Table 2.2). These include waters used for drinking water, bathing (recreational waters), commercial shellfish harvesting (economically significant), nutrient sensitive (both in terms of the Urban Wastewater Treatment Directive and the Nitrates Directive) and those that sustain the most precious wildlife species and habitats (European sites). These areas have legally binding objectives in place that protect those uses from potentially harmful activities and new developments.

2.3.4.3 Table 2.2 and Figure 2.1 show that there are five bathing waters located in 2 water bodies, Glanfyddion Cut and North Wales coastal water body, within the scoping search area. These are Abergele, Kinmel Bay, Rhyl, Rhyl East and Marine Lake, Rhyl.

Table 2.2: Protected Areas for the WFD within water bodies that overlap with the Mona Offshore Transmission Infrastructure Scoping Search Area and the Mona Onshore Transmission Infrastructure Scoping Search Area.

Water Body Name & ID	Protected Area Type					
	Drinking waters	Recreational waters (Bathing Waters)	Economically significant waters (Shellfish Waters)	Nutrient Sensitive Areas	SACs	SPAs
Dulas - upper, GB110066059810	×	×	×	×	×	×
Nant y Fedw (Dulas), GB110066059830	×	×	×	×	×	×

Water Body Name & ID	Protected Area Type					
	Drinking waters	Recreational waters (Bathing Waters)	Economically significant waters (Shellfish Waters)	Nutrient Sensitive Areas	SACs	SPAs
Dulas - lower, GB110066059860	×	×	×	×	×	×
Clwyd - tidal limit to Hesbin, GB110066059960	×	×	×	✓	×	×
Un-named Clwyd estuary west, GB110066059970	×	×	×	×	×	×
Gele, GB110066059980	×	×	×	×	×	×
Glanfyddion Cut, GB110066059990	×	✓	×	✓	×	×
Elwy - Clwyd to Melai, GB110066060020	×	×	×	×	✓	×
CLYWD, GB541006608000	×	×	×	×	×	×
Mersey Mouth, GB641211630001	×	×	×	×	✓	✓
North Wales, GB641011650000	×	✓	×	×	✓	✓
Clwyd Permo-Triassic Sandstone, GB41001G202100	×	×	×	×	✓	✓
Conwy, GB41002G203000	×	×	×	×	✓	✓
Clwyd Silurian, GB41002G200100	×	×	×	×	✓	✓

2.4 Screening of potential impacts on WFD objectives

2.4.1.1 Guidance for assessing activities and projects for compliance with the Water Framework Directive (OGN 072) identifies certain activities that can be screened out for WFD compliance assessments. One of the key activities for the Mona Offshore Wind Project are water course crossings. OGN 072 states that where a bridge or service crossing is classed as an exempt activity under the Flood Risk Activity Permitting (FRAP) process that this activity can be screened out as there is no risk to WFD objectives and no further WFD compliance assessment required. In relation to main river crossings "*the erection of a service crossing below the bed of a main river by directional drilling not involving an open cut technique*" is considered an exempt activity, however at this stage of the Mona Offshore Wind Project development the number and nature of the crossings is not known and therefore these crossings cannot be screened out. On this basis the potential for impact on the hydromorphological supporting conditions, biology and physico-chemical elements of ecological status cannot be screened out. Should the design confirm that all crossings will be undertaken using trenchless techniques avoiding the potential physical changes to the water body, then this screening in can be revisited.

2.4.1.2 Table 2.3 and Table 2.4 summarise the potential impacts associated with the Mona Offshore Wind Project on the surface water bodies and groundwater bodies affected. Detailed justification for the inclusion of these impacts can be found in the relevant chapters of the EIA Scoping Report. The detailed WFD compliance assessment will be based on these activities and water bodies.

Table 2.3: Potential impacts associated with the construction, operation and decommissioning of the Mona Offshore Wind Project on surface and coastal water bodies.

Impact	Transitional and Coastal (TRaC) Water Bodies			River Water Bodies							
	CLYWD	Mersey Mouth	North Wales	Dulas – upper	Nant y Fedw (Dulas)	Dulas – lower	Clwyd - tidal limit to Hesbin	Pont Robin Cut (Bodelwyddan)	Gele	Glanfyddion Cut	Elwy - Clwyd to Melai
Increase in suspended sediments due to construction, operational and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Temporary habitat loss/disturbance during construction.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Long term habitat loss .	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Increased risk of introduction and spread of invasive and invasive non-native species (INNS) during construction and decommissioning phases.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Impact	Transitional and Coastal (TRaC) Water Bodies			River Water Bodies							
	CLYWD	Mersey Mouth	North Wales	Dulas – upper	Nant y Fedw (Dulas)	Dulas – lower	Clwyd - tidal limit to Hesbin	Pont Robin Cut (Bodelwyddan)	Gele	Glanfyddion Cut	Elwy - Clwyd to Melai
Changes in physical processes including alterations to tidal/flow regime and impacts to shoreline and riparian zone associated with construction and operational and decommissioning phases.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Changes in physical processes/hydromorphology associated with structures or alterations to the physical characteristics of a water body during construction, operational and decommissioning phases.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The impact of contaminated runoff on the quality of 'Main Rivers' arising from the construction and decommissioning of the onshore transmission assets.	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓

Impact	Transitional and Coastal (TRaC) Water Bodies			River Water Bodies							
	CLYWD	Mersey Mouth	North Wales	Dulas – upper	Nant y Fedw (Dulas)	Dulas – lower	Clwyd - tidal limit to Hesbin	Pont Robin Cut (Bodelwyddan)	Gele	Glanfyddion Cut	Elwy - Clwyd to Melai
The impact of contaminated runoff on the quality of ordinary and private watercourses arising from the construction and decommissioning of the onshore transmission assets.	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓
The impact of increased surface water runoff on the hydromorphology of water bodies during construction and operation of the onshore transmission assets.	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓

Table 2.4: Potential impacts associated with the construction, operation and decommissioning of the Mona Offshore Wind Project on groundwater bodies.

Impact	Clwyd Permo-Triassic Sandstone	Conwy	Clwyd Silurian
Disturbance of existing contamination and deterioration of groundwater quality in secondary aquifers Also reduction in WFD status.	✓	✓	✓
Deterioration in groundwater quality and quantity of the principal aquifer including at Source Protection Zones. Also, reduction in WFD status.	✓	✓	✓
Reduction in quantity and deterioration in quality of surface waters fed by groundwater. Also, reduction in WFD status.	✓	✓	✓
Thermal effects from the underground cables on groundwater quality.	✓	✓	✓

2.5 Conclusion

2.5.1.1 The water bodies and impacts that have been initial screened in this WFD Screening Annex will be further refined as the Mona Offshore Wind Project is further defied, in particular the location of the transmission assets. This refinement will be undertaken in discussion and agreement with NRW through the Evidence plan process. A full WFD compliance assessment following the stages outlines in Figure 2.1 will be presented in the ES, with a draft presented within the PEIR.

3 Annex C – Marine Conservation Zone Screening

3.1 Introduction

3.1.1 Background

3.1.1.1 Consideration of Marine Conservation Zones (MCZs) is required for any Marine Licence application or Development Consent Order (DCO) application which includes a deemed Marine Licence (dML). Under section 126 of the Marine and Coastal Access Act 2009, Natural Resources Wales (NRW) has specific duties in Welsh waters with regards to MCZs and marine licence decision making.

3.1.1.2 Guidelines issued by the MMO in 'Marine Conservation Zones and marine licensing' (MMO, 2013) outline how MCZ assessments can be undertaken and recommends a staged approach. Initially a screening exercise should be undertaken to identify whether Section 126 should apply to the Mona Offshore Wind Project and which MCZs may potentially be impacted. If the Mona Offshore Wind Project is screened in it is then considered under a two-staged assessment process, specifically a 'Stage 1 Assessment' followed by a 'Stage 2 Assessment'. Further detail on these stages is provided in section 3.2 below.

3.1.1.3 This report (in section 3.2) provides a summary of the proposed approach to the MCZ assessment for the Mona Offshore Wind Project, which will be presented in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

3.1.1.4 This report (in section 3.3) also presents the results of a preliminary screening of MCZs, which the Applicant proposes to carry forward for consideration in the MCZ assessment in the PEIR and ES. This report undertakes the preliminary screening of MCZs for the Mona Offshore Wind Project as a whole and includes both the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area.

3.2 Methodology

3.2.1.1 A standalone MCZ assessment will be prepared and presented as an appendix to the PEIR and ES.

3.2.1.2 The following sections outline the proposed approach to the Mona Offshore Wind Project MCZ assessment.

3.2.2 Preliminary Screening

3.2.2.1 To determine whether Section 126 of the MCAA 2009 applies and an MCZ assessment is required for the Mona Offshore Wind Project, a preliminary screening has been carried out within this MCZ Screening Annex. According to the MMO (2013) guidance, Section 126 of the MCAA will apply if both of the below apply:

- The licensable activity is taking place within or near an area being put forward or already designated as an MCZ.

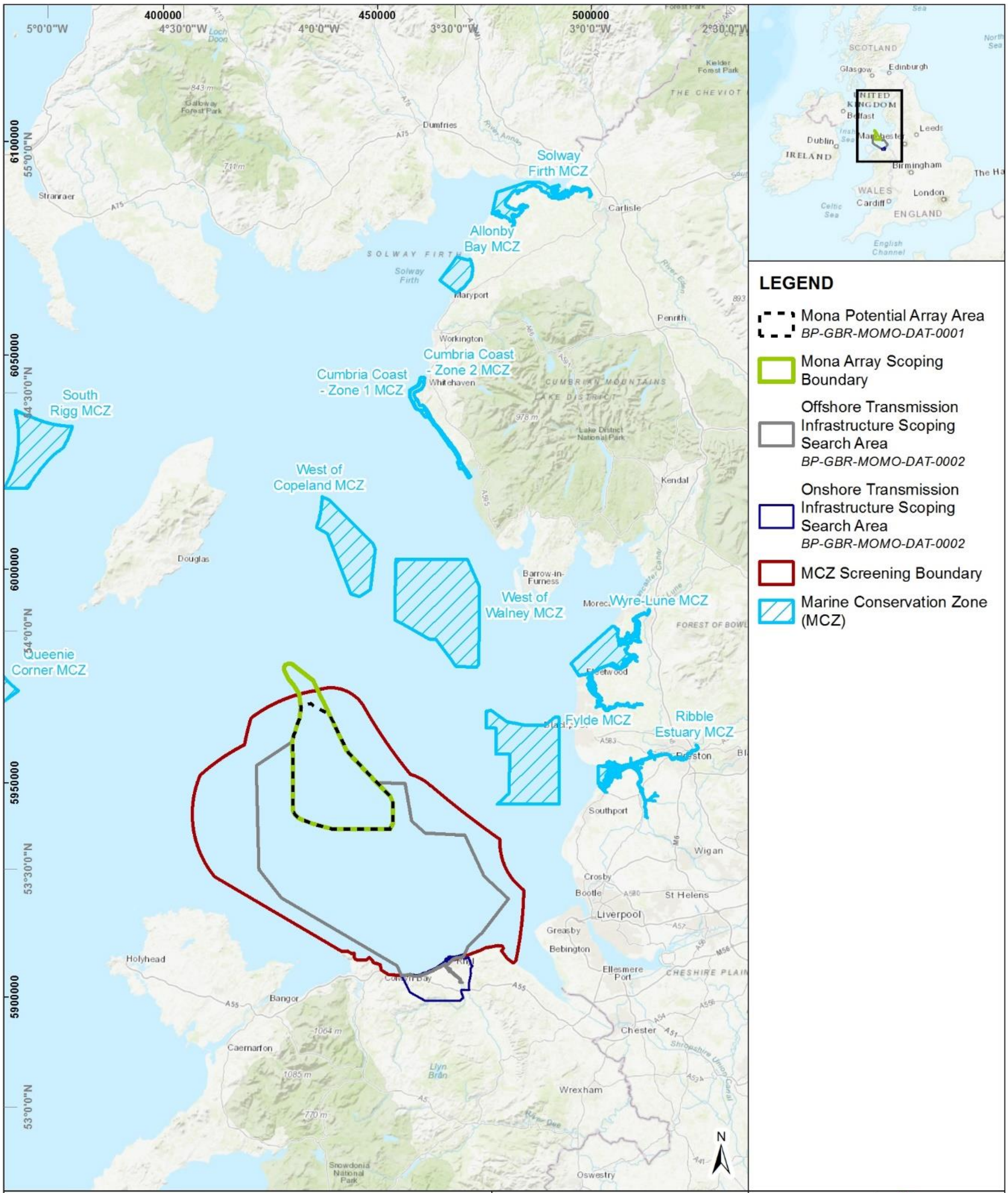
- The activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

3.2.2.2 The MMO recommends the use of a risk based approach when determining the ‘nearness’ of an activity to MCZs, including applying an appropriate buffer zone to the MCZ features under consideration as well as a consideration of risks associated with activities occurring at greater distances from features of the MCZ(s). The preliminary screening stage undertaken in this MCZ Screening Annex considers the proximity of the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area to MCZs. To determine the 'nearness' of the activities associated with the Mona Offshore Wind Project, the following screening criteria are proposed.

- Direct impacts will only occur as a result of the Mona Offshore Wind Project and therefore will be within the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area.
- Indirect impacts to benthic features of the MCZs e.g. increases in suspended sediment concentrations and associated deposition may occur within one spring tidal excursion from the Mona Potential Array Area and the Mona Offshore Transmission Infrastructure Scoping Search Area. One spring (mean) tidal excursion from the Mona Potential Array Area and Mona Offshore Transmission Infrastructure Scoping Search Area is therefore predicted to be the maximum extent of the zone of influence for benthic ecology MCZ features. This distance will be used as the screening boundary for MCZs (Figure 3.1).

3.2.2.3 In addition to benthic features of MCZs, there are also some MCZs with fish species as features. MCZs in the eastern Irish Sea that are designated for fish features are designated for smelt (*Osmeridae*). Smelt are coastal and estuarine species and are unlikely to travel offshore into the Mona Potential Array Area (48.25km from the nearest MCZ designated for smelt) or the Mona Offshore Transmission Infrastructure Scoping Search Area (33.39km from the nearest MCZ designated for smelt) (Fish Base, 2022). Underwater noise is expected to originate mainly within the Mona Potential Array Area. Underwater noise originating within Mona Potential Array Area is therefore not expected to extend to the MCZs designated for smelt which occur along the coast or in estuaries. Underwater noise originating in the Mona Potential Array Area associated with piling of wind turbine and offshore substation platform foundations will be greater and extend over a longer period of time compared to cable installation activities and piling of offshore booster substations within the Mona Offshore Transmission Infrastructure Scoping Search Area Therefore, only MCZs that overlap with the Mona MCZ Screening Boundary have been screened in.

3.2.2.4 Within the MCZ assessment undertaken in the PEIR and ES, further screening criteria will be considered. If the preliminary screening stage identifies that the proposed activity is within, or near to, an MCZ, consideration will be given as to whether there is the potential for a significant impact upon the MCZ. In determining 'insignificance', the MMO (2013) guidance states that this should take into account the likelihood of an activity causing an effect, the magnitude of the effect should it occur, and the potential risk any such effect may cause on either the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant. It is proposed that this will be determined for the Mona Offshore Wind Project through the assessments made in the appropriate offshore ecology technical ES chapter, and cross referenced in the MCZ assessment which will accompany the PEIR and ES.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, Natural England.

EnBW bp rps Partners in UK offshore wind

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 nm
0 5 10 20 30 40 km

Drawing Number:
RPSE-MN-SCO-330-01

Drawing Title:
MONA PRELIMINARY MCZ SCREENING

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
00	14/12/21	First Issue	JA	ST
01	08/03/22	Revision	NA	ST

Figure 3.1: Proposed Mona Marine Conservation Zone (MCZ) screening boundary.

3.2.3 Stage 1 Assessment

3.2.3.1 The Stage 1 Assessment (if/as required) will be presented in the PEIR and ES and will consider whether the condition in section 126(6) of the Marine and Coastal Access Act 2009 can be met, namely can the decision maker be satisfied there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ. Between the preliminary screening and the stage 1 assessment, there may be a level of refinement of the Mona Offshore Wind Project design. The preliminary screening has been undertaken on a precautionary basis, on the maximum design scenario therefore any potential impacts on MCZs will be less than presented in the preliminary screening. This is further described in part 1, section 4: EIA methodology of the EIA Scoping Report. The MMO (2013) guidelines suggest the decision maker would use the information supplied by the applicant with the licence application, advice from the Statutory Nature Conservation Bodies (SNCBs) and any other relevant information to determine whether:

- There is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ.
- In addition, the MMO can exercise its functions to further the conservation objectives stated for the MCZ.

3.2.3.2 At this stage, the conservation objectives for the MCZ features will need to be considered. The conservation objectives for MCZ features are high level criteria describing the desired condition of the MCZ features. There are two objectives for features within an MCZ:

- Whether the features are in the desired favourable condition and need to be maintained in this condition.
- Whether the features are not in the desired favourable condition and need to be recovered to that condition.

3.2.3.3 The MCZ assessment will therefore consider whether the Mona Offshore Wind Project could potentially affect, and hinder, these conservation objectives for each of the MCZs screened into the assessment. Within this stage of the assessment the MMO advise that “hinder‟ would be any act that could, either alone or in combination:

- In the case of a conservation objective of “maintain”, increase the likelihood that the current status of a protected feature would go downwards (e.g. from favourable to degraded) either immediately or in the future (i.e. these protected features would be placed on a downward trend), or
- In the case of a conservation objective of “recover”, decrease the likelihood that the current status of a protected feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. these protected features would be placed on a flat or downward trend.

3.2.3.4 If neither of the criteria in section 126(6) of the Marine and Coastal Access Act 2009 can be met, the Stage 1 assessment will also consider whether the condition in section 127(7)(a) can be met and must determine whether:

- There is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ. This should include proceeding with it (a) in another manner, or (b) at another location.

3.2.3.5 If mitigation to reduce the impacts to an acceptable level cannot be secured, and there are no other alternative locations, then a Stage 2 assessment will be required.

3.2.4 Stage 2 Assessment

3.2.4.1 The Stage 2 MCZ assessment (if/as required) will be presented in the PEIR and ES and considers whether the conditions in section 126(7)(b) and (c) of the Marine and Coastal Access Act 2009 can be met, and the socio-economic impact of the plan or project together with the risk of environmental damage. There are two parts to the Stage 2 assessment process:

- Does the public benefit in proceeding with the project clearly outweigh the risk of damage to the environment that will be created by proceeding with it?
- If the above is true, can the applicant satisfy that they can secure, or undertake arrangements to secure, measures of equivalent environmental benefit for the damage the project will have on the MCZ features?

3.2.4.2 In determining 'public benefit' the MMO will consider benefits at a national, regional or local level. Guidance from the MMO on what constitutes measures of equivalent environmental benefit states that measures can be based on those considered appropriate when securing compensatory habitat for projects deemed to have an adverse effect on internationally designated sites under the Habitats Directive.

3.3 Results: Preliminary MCZ screening

3.3.1.1 No MCZs coincide with the Mona MCZ screening boundary shown in Figure 3.1 and Table 3.1. Therefore, the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project is considered unlikely to have the potential to directly or indirectly affect the interest features of any MCZ. Based on this preliminary screening, it is concluded that an MCZ assessment is not required for the Mona Offshore Wind Project.

Table 3.1: Summary of MCZs within the vicinity of the Mona Offshore Wind Project.

Designated Site	Distance to the Mona MCZ Screening Boundary (km)	Features
Fylde MCZ	6.33	• Subtidal sand • Subtidal mud
West of Walney MCZ	20.10	• Subtidal sand • Subtidal mud • Sea pen and burrowing megafauna communities
West of Copland MCZ	22.14	• Subtidal coarse sediment • Sibtidal sand • Subtidal mixed sediment
Ribble Estuary MCZ	26.48	• Smelt (*Osmeridae*)
Wyre Lune MCZ	38.28	• Smelt (*Osmeridae*)
Queenie Corner MCZ	46.78	• Sea pen and burrowing megfauna communties • Subtidal mud
Cumbria Coast MCZ	57.49	• High energy intertidal rock • Honeycomb worm (*Sabellaria alveolata*) reefs • Intertidal biogenic reefs • Intertidal sand and muddy sand • Intertidal underboulder communities • Moderate energy infralittoral rock • Peat and clay exposures • Razorbill (*Alca torda*)
South Rigg MCZ	74.90	• Moderate energy circalittoral rock • Subtial coarse sediment • Subtidal sand • Subtidal mud • Subtidal mixed sediment • Sea pen and burrowing megfauna communties
Allonby Bay MCZ	96.56	• Blue mussel (*Mytilus edulis*) beds
Solway Firth MCZ	115.37	• Smelt (*Osmeridae*)

3.3.1.2 A full screening exercise will be undertaken and presented in the PEIR and ES to confirm that the following is correct and that a Stage 1 Assessment will not be required:

- The licensable activities will not take place within or near an area being put forward for or already designated as an MCZ.
- The licensable activities are not capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

4 References

4.1 Annex A Transboundary Impacts Screening

Department of Energy and Climate Change (DECC) (2015) Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK. Department of Energy and Climate Change, London.

The Planning Inspectorate (2020), Advice Note Twelve: Transboundary Impacts and Process: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/. [Accessed 25 January 2022].

4.2 Annex B – Water Framework Directive Screening

NRW (2018) Guidance for assessing activities and projects for compliance with the Water Framework Directive, OGN72, Summer 2018.

Environment Agency (2017) *WFD Assessment of estuarine (transitional) and coastal waters, 'Clearing the waters for All'*. https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

Environment Agency (2010) *Assessing new modifications for compliance with WFD: Detailed supplementary guidance*. NEAS Supplementary Guidance 488_10_SD01. Environment Agency, Bristol.

Planning Inspectorate (2018) *Advice Note Eighteen: The Water Framework Directive*. (https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-18/)

4.3 Annex C – Marine Conservation Zone Screening

Fish Base, (2022) Osmerus eperlanus, European Smelt. Available: https://www.fishbase.se/summary/osmerus-eperlanus.html. Accessed January 2022

Marine Management Organisation (2013). Marine conservation zones and marine licensing. April 2012. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/410273/Marine_conservation_zones_and_marine_licensing.pdf