Partners in UK offshore wind

MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 5, Annex 4.1: Site Selection Area of Search Identification

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F01

Image of an offshore wind farm

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Prepared by:

Mona Offshore Wind Ltd.

Prepared for:

Mona Offshore Wind Ltd.

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Glossary

Term	Meaning
Bodelwyddan National Grid Substation	This is the Point of Interconnection (POI) selected by National Grid for the Mona Offshore Wind Project.
Cable Route Protocol	This comprises a set of requirements developed by The Crown Estate, to help developers establish a transmission system infrastructure including export cabling.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Export Cable Region	The Region defined by Niras within The Crown Estate's Round 4 HRA for the Irish Sea and North Wales bidding area where preferred bidders may place cable infrastructure.
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 Array Area	The area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) forming part of the Mona Offshore Wind Project will be located.
Mona Potential Array Area	The area that was presented in the Mona Scoping Report as the area within which the wind turbines, foundations, meteorological mast, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) forming part of the Mona Offshore Wind Project were likely to be located.
Mona Offshore Transmission Infrastructure Scoping Search Area	The area that was presented in the Mona Scoping Report as 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	The area that was presented in the Mona Scoping Report as the area located between Mean High Water Springs (MHWS) at the landfall 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 Cable Corridor	The corridor located between the Mona Array Area and the landfall up to Mean High Water Springs (MHWS), in which the offshore export cables and the offshore booster substation will be located.
Mona Onshore Cable Corridor Search Area	The corridor located between Mean High Water Springs (MHWS) at the landfall and the Mona onshore substation, in which the onshore cable route will be located.
Mona 400kV Cable Corridor	The corridor from the Mona onshore substation to the Bodelwyddan National Grid substation.
Mona Proposed Onshore Development Area	The area in which the landfall, onshore cable corridor, onshore substation, mitigation areas, temporary construction facilities (such as access roads and construction compounds), and the connection to National Grid Bodelwyddan substation will be located.
Offshore Substation Platform (OSP)	The offshore substation platforms located within the Mona Array Area will transform the electricity generated by the wind turbines to a higher voltage allowing the power to be efficiently transmitted to shore.
Applicant	Mona Offshore Wind Limited.
Wind turbines	The wind turbine generators, including the foundations, tower, nacelle and rotor.

Term	Meaning
Inter-array cables	Cables which connect the wind turbines to each other and to the offshore substation platforms. Inter-array cables will carry the electrical current produced by the wind turbines to the offshore substation platforms.
Interconnector cables	Cables connecting to the Offshore Substation Platforms in order to provide redundancy in the case of cable failure elsewhere.
Intertidal area	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS).
Landfall	The area in which the offshore export cables make contact with land and the transitional area where the offshore cabling connects to the onshore cabling.
The Northern Wales and Irish Sea Bidding Area	The Northern Wales and Irish Sea Bidding Area was one of four Bidding Areas identified by The Crown Estate through the Offshore Wind Leasing Round 4 process.
Preferred Bidding Areas	The Applicant identified two Preferred Bidding Areas (Morgan and Mona) within the Northern Wales and Irish Sea Bidding Area. In February 2021, The Crown Estate awarded the Applicant the right to develop up to 1.5GW of wind capacity within each of the two Preferred Bidding Areas.
Offshore Wind Leasing Round 4	The Crown Estate auction process which allocated developers preferred bidder status on areas of the seabed within Welsh and English waters and ends when the Agreements for Lease (AfLs) are signed.

Acronyms

Acronym	Description
AfL	Agreement for Lease
AONB	Area of Outstanding Natural Beauty
AoS	Area of Search
BMAPA	British Marine Aggregate Producers Association
CIAL	Corridor Identification and Approval for Linear Activities
CRP	Cable Route Protocol
EIA	Environmental Impact Assessment
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LNR	Local Nature Reserve
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
NRW	Natural Resources Wales
OSP	Offshore Substation Platform
POI	Point of Interconnection
RIGS	Regionally Important Geological and Geomorphological Sites
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation

Acronym	Description
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay
UKHO	United Kingdom Hydrographic Office

1 Site selection area of search identification

1.1 Introduction

1.1.1 Purpose

1.1.1.1 This note summarises the work undertaken to identify the initial Areas of Search (AoS) to inform the site selection and consideration of alternatives for the following elements of the Mona Offshore Wind Project:

- Offshore Cable Corridor
- Landfall
- Onshore cable route
- Onshore substation (and associated 400 kV cable corridor connection to the Bodelwyddan National Grid substation).

1.1.1.2 Each infrastructure element is presented in turn in the following sections, with a summary of the data sets used and how each area of search was defined. The overall area of search is shown in Figure 1.2.

1.1.1.3 In addition, this note also outlines how the site selection activities comply with the relevant requirements and principles within the Cable Route Protocol (CRP). These site selection activities were also used as the basis of consultation with the Site Selection ETG as part of the site selection and consideration of alternatives process.

1.2 Cable Route Protocol

1.2.1 Overview

1.2.1.1 As the Competent Authority under the Habitats Regulations, TCE is required to conduct a plan-level Habitats Regulations Assessment (HRA) for any leasing / licencing activity that constitutes a ‘plan’. TCE completed a plan-level HRA (the Round 4 HRA) which assessed 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 CRP was an outcome of that plan-level HRA.

1.2.1.2 The CRP is a document prepared by The Crown Estate (2019) and comprises a set of requirements for offshore wind developers which are designed to manage the offshore export cable planning process with the aim of avoiding adverse effects on the integrity of Habitats Regulations sites (such as the Dee Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar, site and the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC). The CRP must be followed by developers as they progress project planning and they will be required to demonstrate compliance with the CRP as part of the transmission assets Agreement for Lease (AfL) application.

1.2.1.3 The CRP (2019) comprises a set of Requirements (compliance required as part of the AfL application) and Principles (best practice guidance) for offshore wind developers in the planning of offshore export cable routes. Offshore wind export cabling has the potential to cause impacts in marine and coastal environments, and therefore the CRP provides these Requirements and Principles on the way in which cable route planning should be undertaken by developers to ensure good management of land and seabed, and to minimise environmental impacts.

1.2.1.4 This note is intended to provide the information outlined within the CRP where it is of particular relevance to the identification of the AoS. An outline of the relevant Requirements and Principles within the CRP, in relation to the AoS, are outlined in the following sections. Requirements and Principles within the CRP that relate to the site selection process, and how those requirements have been met, is detailed in full within Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement (Document Reference F1.4).

1.2.2 Requirement 9

1.2.2.1 As stated above, compliance with the Requirements in the CRP is required as part of the AfL application.

1.2.2.2 Requirement 9 of the CRP is particularly relevant to the AoS and states "*Within the offshore AoS the developer must identify (and map where possible) the following, which are to be given significant weight in cable route planning:*

- *Habitats Regulations sites (SACs, SPAs and Ramsar sites, whether fully designated or not)*
- *Features of the Habitats Regulations sites (including priority habitats and species)*
- *Habitats Regulations sites with conservation objectives to recover features to favourable condition*
- *Areas of known Annex I habitat outside protected areas but within the AoS*
- *Habitats that are known to be irreplaceable or very difficult to replace (e.g. chalk reef).*

1.2.2.3 *Having undertaken this exercise the developer must consult with Statutory Nature Conservation Bodies (SNCBs) (and where considered appropriate other relevant non-statutory consultees) to ensure that the best available evidence about the environment and specific sensitivities has been incorporated into the AoS mapping, and that the consultees have the opportunity to provide additional narrative information about particularly sensitive areas or areas of concern to them."*

1.2.2.4 In response to this Requirement, the Applicant has identified and mapped those sites listed above to define the offshore area of search (within Volume 1, Chapter 4: Site selection and consideration of alternatives of the Environmental Statement). Features of the Habitats Regulations sites and species are outlined in Volume 1, Chapter 4: Site selection and consideration of alternatives of the Environmental Statement.

1.2.3 Requirement 10

1.2.3.1 Requirement 10 states *"Developers must prepare an outline view of the possible cabling infrastructure requirements (acknowledging that this may change as the design of the project evolves). The outline should include the potential number and capacities of the export cables with their indicative spacing requirements and the additional structures (e.g. substations and converter stations) which the project is likely to require. Where there are uncertainties in the required infrastructure these should be set out (with reasons).*

1.2.3.2 *Within the area of search, developers must identify (and where possible, map) hard engineering constraints such as existing infrastructure/licence areas, challenging ground conditions and sections of the coast where landfall is not possible. Developers should also form an initial view on the likely areas within the AoS where cable preparation works and/or cable protection may be needed (noting that this information is likely to change as survey work is undertaken). Where possible, this information should be presented alongside the environmental information from Requirement 9.*

1.2.3.3 *The developer must consult with SNCBs (and where considered appropriate, non-statutory consultees) to seek to ensure that they understand the likely infrastructure requirements and constraints, and that they have the opportunity to raise any areas of concern about placement of infrastructure (including cable protection) and specific protected sites/features*.

1.2.3.4 In response to this Requirement, the Mona Offshore Wind Project cabling infrastructure requirements were developed to aid in the site selection process and identification of the area of search and are outlined in section 1.2.4 below. Hard engineering constraints such as existing infrastructure areas have been mapped (see section 1.4) and the current position on the cable protection that is likely to be required has been outlined in section 1.2.4.

1.2.4 Principle 3

1.2.4.1 As stated above, the Principles in the CRP provide best practice guidance on the way in which cable route planning should be undertaken by developers to ensure good management of land and seabed, and to minimise environmental impacts.

1.2.4.2 Principle 3 of the CRP is particularly relevant to this AoS note and mentions how the CRP can be applied to marine and terrestrial environments. Principle 3 in the CRP states *"The Cable Route Protocol applies specifically to Habitats Regulations Sites. However, as a matter of best practice the approach set out in the CRP may also be applied to other protected sites (both marine and terrestrial) and known sensitive habitats, and this is strongly encouraged. This includes (inter alia) MCZs and SSSIs."*

1.2.4.3 In response to this Requirement, the site selection process (within Volume 1, Chapter 4: Site selection and consideration of alternatives of the Environmental Statement) specifically includes constraints mapping in relation to Habitats Regulations sites as well as other protected marine and terrestrial protected sites.

1.3 Infrastructure Requirements

1.3.1 Engineering assumptions

1.3.1.1 In response to Requirement 10, an outline view of the possible infrastructure requirements known at the start of the site selection process, are provided in Table 1.1. It is important to note that these assumptions and principles were further refined as more information was obtained about the scale of the proposed development and the constraints present. Details of the refinements (both offshore and onshore) made throughout the development of the project are outlined in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement (Document Reference: F1.4).

Table 1.1: Infrastructure requirements (including additional structures).

Parameters	Up to	Notes
Offshore Substation Platforms (OSPs)		
Maximum number of OSPs	4	Located within the Mona Array Area
Foundation options	Monopile, suction bucket monopile, gravity base, pin piled jacket foundations, suction bucket jacket foundation	A range of foundation types has been considered and presented within the Environmental Statement for the OSPs.
Maximum topside height (m above Lowest Astronomical Tide (LAT)) (including antenna structure)	95	
Maximum topside width and length (m)	60 x 80	
Offshore Cable Corridor		
Number of circuits	4	
Number of export cables per circuit	1	Assumes a 3 core subsea cable will be used
Working width required for offshore export cable lay (m)	2,000	
Cable spacing (m)		50 minimum
Landfall		
Number of transition routes from Transition Joint Bay (TJB) to offshore environment	4 (one per circuit)	May include open trench or trenchless techniques
Number of transition bays	4	One per circuit
Transition Joint Bay (TJB) construction compound (m)	100 x 150	
Onshore cable corridor		
Number of circuits	4	
Cable corridor construction swathe (m)	100	100 for 4 circuits
No. onshore transmission cables per circuit	3	3 power cables per circuit
No. of cable corridor construction compounds	Up to 2 primary compounds Up to 10 secondary compounds	Depends upon final length of onshore cable corridor
Cable corridor construction compound dimensions (m)	Primary compound = 150 x 150 Secondary compound = 150 x 100	
Cable spacing (m)		10 minimum spacing between trenches
Onshore substation		
Construction compound dimensions (sq/m)	250,000	
Indicative onshore substation footprint (sq/m)	125,000	Dimensions are for the onshore substation zone with an onshore substation building footprint within this of 105,000 m^2

1.3.1.2 It was anticipated that National Grid would be required to undertake an extension to the existing NGET GIS building and substation boundary at the existing Bodelwyddan 400 kV substation in order to accommodate the Mona Offshore Wind Project connection and reconfigure the existing 400kV overhead line circuits. National Grid have since confirmed that these alterations and extension to the existing Bodelwyddan 400kV substation require planning consent, and National Grid have applied to undertake these works, alongside the overhead line realignments, under separate applications. National Grid confirmed these plans in a consultation phase beginning September 2023. National Grid intend to apply for these works in 2024.

1.3.2 Offshore cable protection

1.3.2.1 As far as practicable, all offshore cables will be buried. Where it is not reasonably practicable to bury cables it may be necessary to install cable protection to prevent scour and minimise the risk of damage to the cable. Details of the areas, volumes and assumptions for cable protection requirements are included in Volume 1, Chapter 3: Project Description of the Environmental Statement and have been discussed with stakeholders through the Environmental Impact Assessment (EIA) Evidence Plan Process. The Environmental Statement assessment has considered the use of cable protection to be laid anywhere within the Mona Array Area and Mona Offshore Cable Corridor, with the following exceptions:

- No cable protection will be installed within the Constable Bank
- The length of export cable that can be protected within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is limited to a maximum of 10% total length
- The height of any cable protection installed within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be limited to a maximum of 0.7 m above the seabed.

1.3.2.2 An analysis of the requirement for the offshore cables to cross existing infrastructure (such as cables) has been provided within Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement along with realistic Maximum Design Scenario (MDS) parameters included within all chapters within Volume 2 of the Environmental Statement to enable a detailed assessment to be undertaken.

1.4 Area of Search

1.4.1 Overview

1.4.1.1 The following sections summarise the work undertaken to identify the areas of search for the following elements of the Mona Offshore Wind Project:

- Offshore Cable Corridor
- Landfall
- Onshore cable route
- Onshore substation.

1.4.1.2 Each infrastructure element is presented in turn in the following sections, with a summary of the data sets used and how each area of search was defined. The overall AoS is shown in Figure 1.2Figure 1.2.

1.4.1.3 The CRP identifies that the process of cable route planning begins with an understanding of the onshore point of interconnection – for the Mona Offshore Wind Project, this is Bodelwyddan – and then to consider a broad area of search for the possible onshore and offshore cable corridors from this point. Details on the selection of the point of interconnection are included in Stage 2 of Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement (Document Reference F1.4).

1.4.2 Mona Offshore Cable Corridor – area of search

1.4.2.1 The following datasets (Table 1.2) were considered in the initial identification of the AoS. The principles applied to each of the datasets and the identification of the AoS is detailed in Section 4.4 and Stage 3 (respectively) of Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement (Document Reference F1.4). Further datasets were identified as the project refinement for the Mona Offshore Wind Project developed in conjunction with studies undertaken in consultation with relevant stakeholders. All of the above were considered as part of ongoing site selection and assessment of alternatives process in combination with ongoing project refinement.

Table 1.2: Datasets for the Mona Offshore Cable Corridor AoS.

Data	Source	
Offshore oil and gas wells, surface and subsurface infrastructure	Oil and Gas Authority (2020)	https://dataogauthority.opendata.arcgis.com/datasets/ogaoffshore-zippedshapefiles-wgs84
Offshore oil and gas Pipelines including 250 m buffer of pipelines	Oil and Gas Authority (2019)	https://dataogauthority.opendata.arcgis.com/datasets/pipelines-wgs84
Offshore gas storage lease areas	The Crown Estate (2019)	https://opendatathecrownestate.opendata.arcgis.com/datasets/b01d96e60991444b9199074af2b1cad0_0
Offshore tidal stream lease areas	The Crown Estate (2019)	https://opendatathecrownestate.opendata.arcgis.com/datasets/a722b677a6754187bd018ca1292af568_0
Existing offshore wind farm lease areas, cable corridors and export cables including 250 m buffer of as built offshore wind farm cables within the vicinity	The Crown Estate (2020)	https://opendatathecrownestate.opendata.arcgis.com/datasets/d670e395b81147a4a24d10de74f71446_0 https://opendatathecrownestate.opendata.arcgis.com/datasets/8f 9dde0758b241399964c3178f025427_0
United Kingdom Hydrographic Office (UKHO) charted wrecks including 250 m buffer	UKHO (2020)	https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal – livefeature datasets
Protected Wrecks	Historic England (2019)	https://services.historicengland.org.uk/NMRDataDownload/Default.aspx
Marine Disposal Sites	Cefas (2020)	http://data.cefas.co.uk/#/View/407
Mineral aggregate areas and British Marine Aggregate Producers Association (BMAPA) dredger transit routes	The Crown Estate (2019) and BMAPA (2019)	Aggregate areas

Data	Source	
		https://opendatathecrownestate.opendata.arcgis.com/datasets/ced5788f014546b0b571e8d29b021166_0 BMAPA dredger transit - https://www.bmapa.org/
UK Military PEXA	UKHO (2020)	https://data.admiralty.co.uk/server/rest/services/Hosted/UK_PEXA/FeatureServer
Marine Conservation Zones (MCZs)	Natural England (2019)	https://naturalenglanddefra. Opendata.arcgis.com/datasets/marineconservation-zonesengland?geometry=-14.716%2C52.003%2C6.191%2C54.308
SPAs	Joint Nature Conservation Committee (JNCC) (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
SACs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
Annex 1 Reef Habitats	JNCC (2019)	https://data.gov.uk/dataset/3e72b108-0114-480f-80c7-dd76fa392fb9/annex-ireefs-in-uk-offshorewaters-public
Annex 1 Sandbank Habitats	JNCC (2019)	https://data.gov.uk/dataset/d19f631c-27c0-4c74-804fd76a4632b702/annex-isandbanks-in-the-uk-v2-public
Shellfish Waters	Cefas (2012)	https://magic.defra.gov.uk/Datasets/Dataset_Download_ShellfishWales.htm
IMO Shipping Routes	UKHO (2020)	https://data.admiralty.co.uk/server/rest/services/Hosted/Ships_Routeing_Measures/FeatureServer
Other offshore cables (marine themes dataset only received after undertaking the AoS exercise and were not included in the mapping but will be taken into account during the identification of the longlist of options).	Marine Themes (2019)	Licenced dataset

Identification of the Mona Offshore Cable Corridor AoS

1.4.2.2 The key drivers for the identification of the Mona Offshore Cable Corridor AoS are the location of the Mona Offshore Wind Project AfL area awarded by the Crown Estate (located to the northwest of the Gwynt y Môr, North Hoyle and Rhyl Flats and north of the consented Awel y Môr Offshore Windfarm), the location of the onshore point of interconnection (Bodelwyddan) and the positioning of the key ecological designations present along the coastline to the south of this area, which are:

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

1.4.2.3 Overall, the intention has been to keep the offshore cable corridor as short as possible to minimise overall potential impacts and also to avoid the current operating windfarms (Gwynt y Môr, North Hoyle and Rhyl Flats), the consented Awel y Môr Offshore Windfarm, an Aggregate Production Area and a closed disposal site. This therefore created an AoS from the southern extent of the Mona Offshore Wind Project AfL to the Welsh coastline, specifically avoiding the ecological designations listed above, with the exception of the Liverpool Bay SPA, which covers a large extent to the south east of the AfL, and the north eastern corner of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC. Due to the proximity of other operational windfarms in the area, the presence of other infrastructure (such as cable corridors) is therefore unavoidably located with the defined AoS. The offshore export cables will be located within the Offshore Cable Corridor AoS.

1.4.3 Landfall – Area of Search

1.4.3.1 The following datasets (Table 1.3) were considered in the initial identification of the AoS. Further datasets were identified as the project refinement for the Mona Offshore Wind Project developed in conjunction with studies undertaken in consultation with relevant stakeholders. All of the above was considered as part of ongoing site selection and assessment of alternatives process in combination with ongoing project refinement.

Table 1.3: Datasets for the landfall Area of Search.

Data	Source	
Existing offshore wind farm cable corridors and export cables including 250 m buffer of as built offshore wind farm cables within the vicinity of the Mona Offshore Wind Project	The Crown Estate (2020)	https://opendatathecrownestate.opendata.arcgis.com/datasets/d670e395b81147a4a24d10de74f71446_0 https://opendatathecrownestate.opendata.arcgis.com/datasets/8f9dde0758b241399964c3178f025427_0
UKHO charted wrecks including 250 m buffer	UKHO (2020)	https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal – live feature datasets
Annex 1 Reef Habitats	JNCC (2019)	https://data.gov.uk/dataset/3e72b108-0114-480f-80c7-dd76fa392fb9/annex-ireefs-in-uk-offshorewaters-public
Annex 1 Sandbank Habitats	JNCC (2019)	https://data.gov.uk/dataset/d19f631c-27c0-4c74-04fd76a4632b702/annex-isandbanks-in-the-uk-v2-public
Shellfish waters	Cefas (2012)	https://magic.defra.gov.uk/Datasets/Dataset_Download_ShellfishWales.htm
Other offshore cables	Marine Themes (2019)	Licenced dataset
SPAs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp

Data	Source	
SACs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
Ramsar Sites	JNCC (2018)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
Sites of Special Scientific Interests (SSSIs)	Natural Resources Wales (NRW) (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_SSSI
Local Nature Reserves (LNRs)	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_LNR
National Nature Reserves (NNRs)	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_NNR
Areas of Outstanding Natural Beauty (AONB)	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_AONB
National parks	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_NATIONAL_PARK
Country parks	NRW (2019)	https://datamap.gov.wales/layers/geonode:country_parks
Ancient woodland	NRW (2016)	https://datamap.gov.wales/layers/inspire-nrw:NRW_ANCIENT_WOODLAND_INVENTORY_2021
Royal Society for the Protection of Birds (RSPB) reserves	RSPB (2019)	https://opendatarspb.opendata.arcgis.com/
Geological conservation review sites	NRW (2019)	Request from enquiries@naturalresourceswales.gov.uk
Regionally Important Geological and Geomorphological Sites (RIGS)	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_RIG_SITES
Main rivers	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_MAIN_RIVERS
Flood Zones 2 & 3	NRW (2019)	https://datamap.gov.wales/layergroups/inspire-nrw:FloodMapforPlanningFloodZones2and3
Conservation areas	Welsh Government (2019)	https://datamap.gov.wales/layers/inspire-wg:conservation_areas
Predictive agricultural land classification	Welsh Government (2019)	https://datamap.gov.wales/layers/inspire-wg:wg_predictive_alc2
Listed buildings	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-wg:Cadw_ListedBuildings
Scheduled monuments	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-wg:Cadw_SAM
Historic landscape	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_LANDMAP_Historic_Landscape
Historic landfill sites	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_Historic_Landfill_Sites

Data		Source
Source protection zones	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_Source_Protection_Zones
Heritage coast	NRW (2018)	https://datamap.gov.wales/layers/inspire-nrw:NRW_HERITAGE_COAST
Key settlements	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Main roads	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Railways	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Tourist attractions (e.g. golf courses, caravan parks)	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html

Identification of the Landfall Area of Search

1.4.3.2 The key drivers for the identification of the landfall AoS were the location of the onshore point of interconnection (Bodelwyddan National Grid Substation) and the location of the Mona Offshore Cable Corridor AoS along the North Wales coastline The extent of the landfall area of search was designed to accommodate feasible offshore export cable options and to avoid the ecological designations of the Aber Dyfrdwy / Dee Estuary SAC, SPA and Ramsar to the east, and minimise the overlap with ecological designations of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC to the west. The landfall AoS was therefore positioned to avoid or minimise any direct impacts to these designations and the features protected within them. The landfall location is located within the landfall AoS.

1.4.4 Onshore Cable Route – Area of Search

1.4.4.1 The following datasets (Table 1.4) were considered in the initial identification of the AoS. Further datasets were identified as the project refinement for the Mona Offshore Wind Project develops in conjunction with studies undertaken in consultation with relevant stakeholders. All of the above was considered as part of ongoing site selection and assessment of alternatives process in combination with ongoing project refinement.

Table 1.4: Datasets for the onshore cable route Area of Search.

Data		Source
SPAs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
SACs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
Ramsar Sites	JNCC (2018)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp

Data	Source	
SSSIs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_SSSI
LNRs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_LNR
NNRs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_NNR
AONBs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_AONB
National parks	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_NATIONAL_PARK
Country parks	NRW (2019)	https://datamap.gov.wales/layers/geonode:country_parks
Ancient woodland	NRW (2016)	https://datamap.gov.wales/layers/inspire-nrw:NRW_ANCIENT_WOODLAND_INVENTORY_2021
RSPB reserves	RSPB (2019)	https://opendatarspb.opendata.arcgis.com/
Geological conservation review sites	NRW (2019)	Request from enquiries@naturalresourceswales.gov.uk
RIGS	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_RIG_SITES
Main rivers	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_MAIN_RIVERS
Flood Zones 2 & 3	NRW (2019)	https://datamap.gov.wales/layergroups/inspire-nrw:FloodMapforPlanningFloodZones2and3
Conservation areas	Welsh Government (2019)	https://datamap.gov.wales/layers/inspire-wg:conservation_areas
Predictive agricultural land classification	Welsh Government (2019)	https://datamap.gov.wales/layers/inspire-wg:wg_predictive_alc2
Listed buildings	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-wg:Cadw_ListedBuildings
Scheduled monuments	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-wg:Cadw_SAM
Historic landscape	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_LANDMAP_Historic_Landscape
Historic landfill sites	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_Historic_Landfill_Sites
Source protection zones	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_Source_Protection_Zones
Key settlements	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html

Data	Source	
Main roads	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Railways	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Existing National Grid infrastructure including overhead lines	National Grid UK (2019)	https://www.nationalgridet.com/network-andassets/network-routemaps
Tourist attractions (e.g. golf courses, caravan parks)	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html

Identification of the Onshore Cable Route Area of Search

1.4.4.2 The key influences on the onshore cable route AoS were the Landfall AoS along the Welsh coastline and the initial 5 km AoS placed around the identified National Grid connection point of Bodelwyddan substation (see section 1.2.4). A broad area of land was then identified to join these two geographical areas, which was then further refined to avoid the Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range and Dee Valley AONB. The onshore export cables are located within the Onshore Cable Route AoS.

1.4.5 Onshore Substation – Area of Search

1.4.5.1 The following datasets (Table 1.5) were considered in the initial identification of the AoS. Further datasets were identified as the project refinement for the Mona Offshore Wind Project develops in conjunction with studies undertaken in consultation with relevant stakeholders. All of the above was considered as part of ongoing site selection and assessment of alternatives process in combination with ongoing project refinement.

Table 1.5: Datasets for the onshore substation Area of Search.

Data	Source	
SPAs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
SACs	JNCC (2019)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
Ramsar Sites	JNCC (2018)	http://archive.jncc.gov.uk/ProtectedSites/SACselection/gis_data/terms_conditions.asp
SSSIs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_SSSI
LNRs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_LNR
NNRs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_NNR
AONBs	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_AONB
National parks	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_NATIONAL_PARK

Data	Source	
Country parks	NRW (2019)	https://datamap.gov.wales/layers/geonode:country_parks
Ancient woodland	NRW (2016)	https://datamap.gov.wales/layers/inspire-nrw:NRW_ANCIENT_WOODLAND_INVENTORY_2021
RSPB reserves	RSPB (2019)	https://opendatarspb.opendata.arcgis.com/
Geological conservation review sites	NRW (2019)	Request from enquiries@naturalresourceswales.gov.uk
RIGS	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_RIG_SITES
Main rivers	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_MAIN_RIVERS
Flood Zones 2 & 3	NRW (2019)	https://datamap.gov.wales/layergroups/inspire-nrw:FloodMapforPlanningFloodZones2and3
Conservation areas	Welsh Government (2019)	https://datamap.gov.wales/layers/inspire-wg:conservation_areas
Predictive agricultural land classification	Welsh Government (2019)	https://datamap.gov.wales/layers/inspire-wg:wg_predictive_alc2
Listed buildings	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-wg:Cadw_ListedBuildings
Scheduled monuments	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-wg:Cadw_SAM
Historic landscape	Historic Environment Service (Cadw) (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_LANDMAP_Historic_Landscape
Historic landfill sites	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_Historic_Landfill_Sites
Source protection zones	NRW (2019)	https://datamap.gov.wales/layers/inspire-nrw:NRW_Source_Protection_Zones
Key settlements	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Main roads	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Railways	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html
Existing National Grid infrastructure including overhead lines	National Grid UK (2019)	https://www.nationalgridet.com/network-andassets/network-routemaps
Tourist attractions (e.g. golf courses, caravan parks)	Ordnance Survey (2019)	https://www.ordnancesurvey.co.uk/opendatadownload/products.html

Identification of the Onshore Substation AoS

1.4.5.2 The guiding principles for locating the onshore substation are to achieve an economic and efficient connection (i.e. as close as possible to the National Grid connection point) whilst taking into account environmental constraints including siting principles set out within the Horlock Rules (National Grid, undated).

1.4.5.3 Engineering considerations regarding an economic and efficient connection (i.e. as close as possible to the National Grid connection point) include minimising distance as far as is reasonably practicable as it minimises the cable reactive power component and losses.

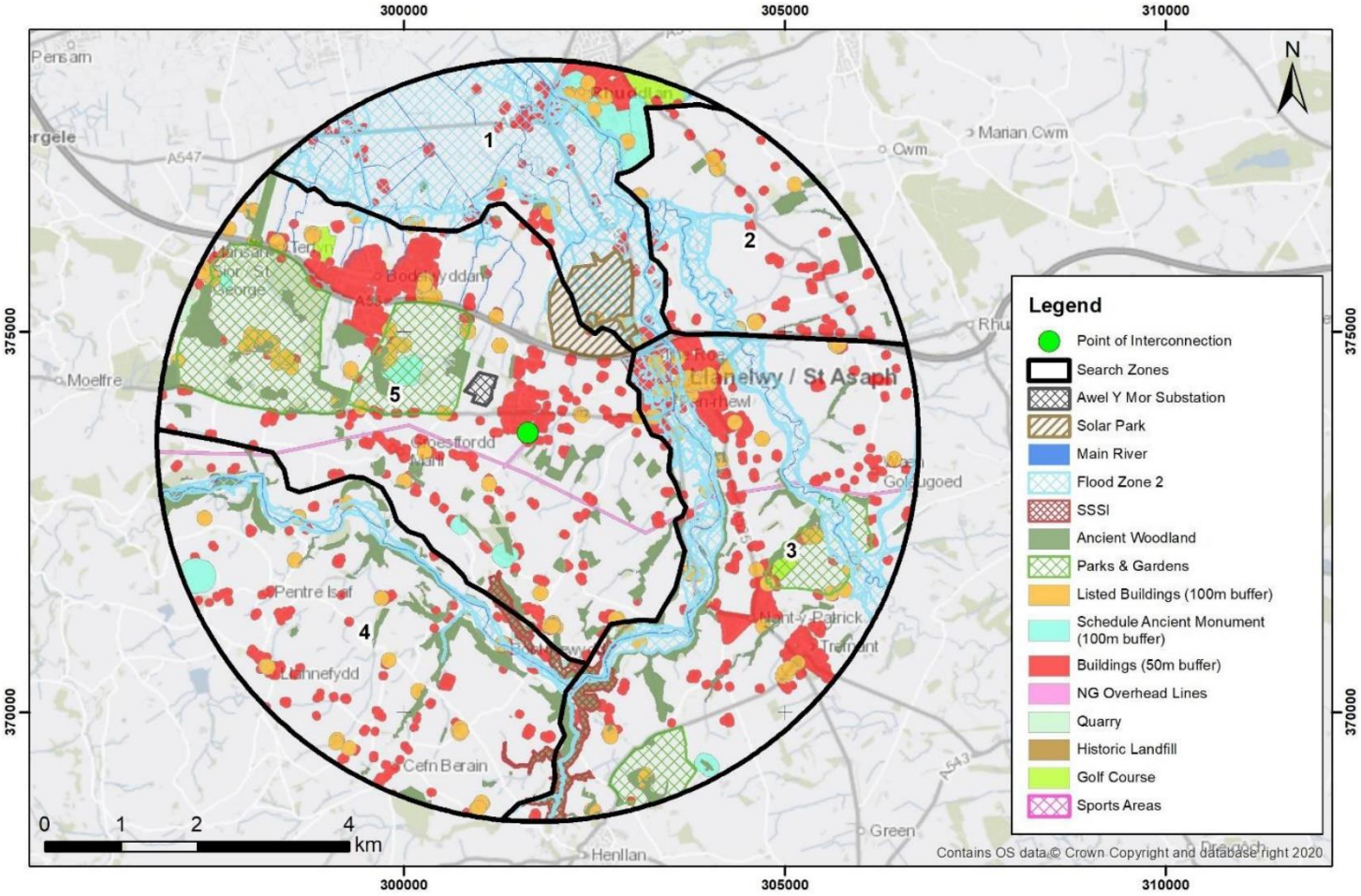
1.4.5.4 The onshore substation area of search was initially defined as a 3 km buffer around the grid connection point at Bodelwyddan National Grid Substation.

1.4.5.5 The Horlock Rules state *"Consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum…Consideration at an early point of the study should be given to placing the electrical infrastructure as close as possible to the existing National Grid connection point (if feasible) in order to minimise the landscape and visual effects associated with introducing new electricity infrastructure to the environment*."

1.4.5.6 To meet the above criteria, an initial onshore substation area of search was expanded from 3 km to 5 km. The 3 km buffer was expanded to 5 km following engineering review of the maximum electrical distance between the Mona Offshore Wind Project onshore substation and the National Grid substation.

1.2.1.1 Hard constraints such as areas of infrastructure, landfills, roads, railways, National Grid overhead lines, and other potential constraints to development and / or construction (as outlined in Table 1.5) were plotted and removed from the onshore substation area of search. These are illustrated in Figure 1.1.

Figure 1.1: Mona Offshore Wind Project onshore substation search area and zones.



1.4.5.7 Five onshore substation search zones were identified (see Figure 1.1) with zone boundaries coinciding with the perimeters of hard constraint areas. The extents of Flood Risk Zone 2 areas of higher risk flood zones were used to define the boundary of Zone 1, extending south as far as the A55. Continuing the line of the A55 to the east created Zone 2, an area of relatively sparse constraint but from which connection to the Bodelwyddan National Grid Substation would mean crossing two river crossings or circumnavigation of the planned Elwy Solar Energy park to the west (Note: planning application for the Elwy Solar Energy Park was refused after the completion of initial site selection work. This does not affect the outcomes of the site selection process).

1.4.5.8 Zone 3, south of the A55, was defined by continuing the western limit of Zone 1 to the south, following the extent of Flood Zone 2 associated with the Afon Elwy. This zone is more densely constrained than Zone 2 to the north, and connection to the Bodelwyddan National Grid Substation is complicated by the town of St. Asaph in the northwest corner as well as the river running along the western edge. The final boundary broadly follows Afon Elwy west towards its source but is defined by an area (Zone 4) of high slopes around and to the south of the river. The remaining land in the middle, surrounding the Bodelwyddan National Grid Substation and extending to the east, is Zone 5.

1.4.5.9 An appraisal of each zone was made, with conclusions as to the viability of each summarised in Table 1.6. Only Zone 5 was retained for further assessment, the other four having been discounted from further consideration for the reasons outlined in Table 1.6.

Table 1.6: Onshore substation search zone appraisal (note BRAG methodology is outlined in Volume 5, Annex 4.2: Selection and Refinement of the Onshore Infrastructure).

Zone	Appraisal	Status
1	Zone lies almost entirely within higher risk flood zones 2 and 3, conflicting with Horlock rules as well as National Grid policy – that equates to a BRAG Black finding. The increased flood risk also presents a design and construction challenge.	Discounted
2	Access to the zone from the west is all but prevented by the planned development and solar farms within the southern portion of Zone 1 – that equates to a BRAG Black finding. Access from the south is blocked by St. Asaph town and the necessity of crossing River Clwyd and Afon Elwy.	Discounted
3	South of the A55 the urban settlement of St. Asaph presents a barrier to cable connectivity and this barrier extends down the St. Asaph Road to Trefant effectively removing the land to the east of St. Asaph from further consideration – that equates to a BRAG Black finding. The western boundary of Zone 3 (where it adjoins Zone 5) runs along a ridge line in the topography. On the river Elwy side of this boundary there is a very long steep gradient slope deemed to present a highly challenging cable laying prospect – that equates to a BRAG Black finding. The remaining part of Zone 3 to the west of this slope, up to the settlement of St. Asaph Road is removed from further consideration.	Discounted
4	There are large areas of land in Zone 4 which are potentially suitable based on the constraints screened thus far. However, the northern boundary of Zone 4 (where it abuts Zone 5) traverses the foot of a steep hill line with a north facing aspect. This line of hills rises steeply to the south and then falls down into the River Elwy valley, before rising again to the south towards Llannefydd. The sequence of steep topography along the boundary with Zone 4 is deemed to represent a significant cable laying challenge and renders Zone 4 inaccessible – that equates to a BRAG Black finding.	Discounted
5	This area is relatively flat with rising topography to the south along the B5381 Roman Road and towards Plas-yn-Cefn in the south. There are increasing areas of built development in the St. Asaph Business Park, Bodelwyddan town to the north and large inaccessible areas of Registered Parks and Gardens to the west of the zone. These existing features will limit flexibility for cable routing but nevertheless the zone is deemed accessible. The land to the south of the PoI is relatively unconstrained.	Retained

1.4.5.10 Key areas removed from the area of search were the city of St. Asaph with its associated Conservation Area and listed buildings, as well as the Main River (Elwy), and the associated Flood Zones 2 and 3 to the east. The southern boundary was refined to avoid a further stretch of the River Elwy and its associated flood zones, along with the Coedwigoedd Dyffryn Elwy/Elwy Valley Woods SAC, Coedydd Ac Ogofau Elwy A Meirchion SSSI and the Lower Elwy Valley Historic Landscape, which encompasses scattered listed buildings and Scheduled Monuments.

1.4.5.11 The boundary to the northwest of the original 5 km buffer was refined to avoid the area of Bodelwyddan, including the area to the north of the A55, which includes Glan Clywd Hospital, mixed residential and commercial areas and the Bodelwyddan Conservation Area. The area to the south of the A55 was also refined, which includes First World War Practice Trenches at Bodelwyddan Park Scheduled Monument, scattered listed buildings including Bodelwyddan Castle and patches of ancient woodland.

1.4.5.12 The area of search (Zone 5) then formed the basis for the selection of available parcels of land to site potential onshore substations for site selection consideration.

1.4.5.13 The onshore substation is located within the onshore substation AoS.

1.5 Summary

1.5.1.1 This note has summarised the work undertaken to identify the initial areas of search for the Mona Offshore Wind Project and how the site selection activities complied with the relevant requirements and principles within the CRP in relation to the areas of search.

1.5.1.2 The Applicant continued to develop and refine the project design as it progressed towards the final application for Development Consent and continually reviewed the available datasets informing site selection and consideration of alternatives for all infrastructure requirements of the Mona Offshore Wind Project Details on the refinements to the project design are included within Volume 1, Chapter 4: Site Selection and Consideration of Alternatives.

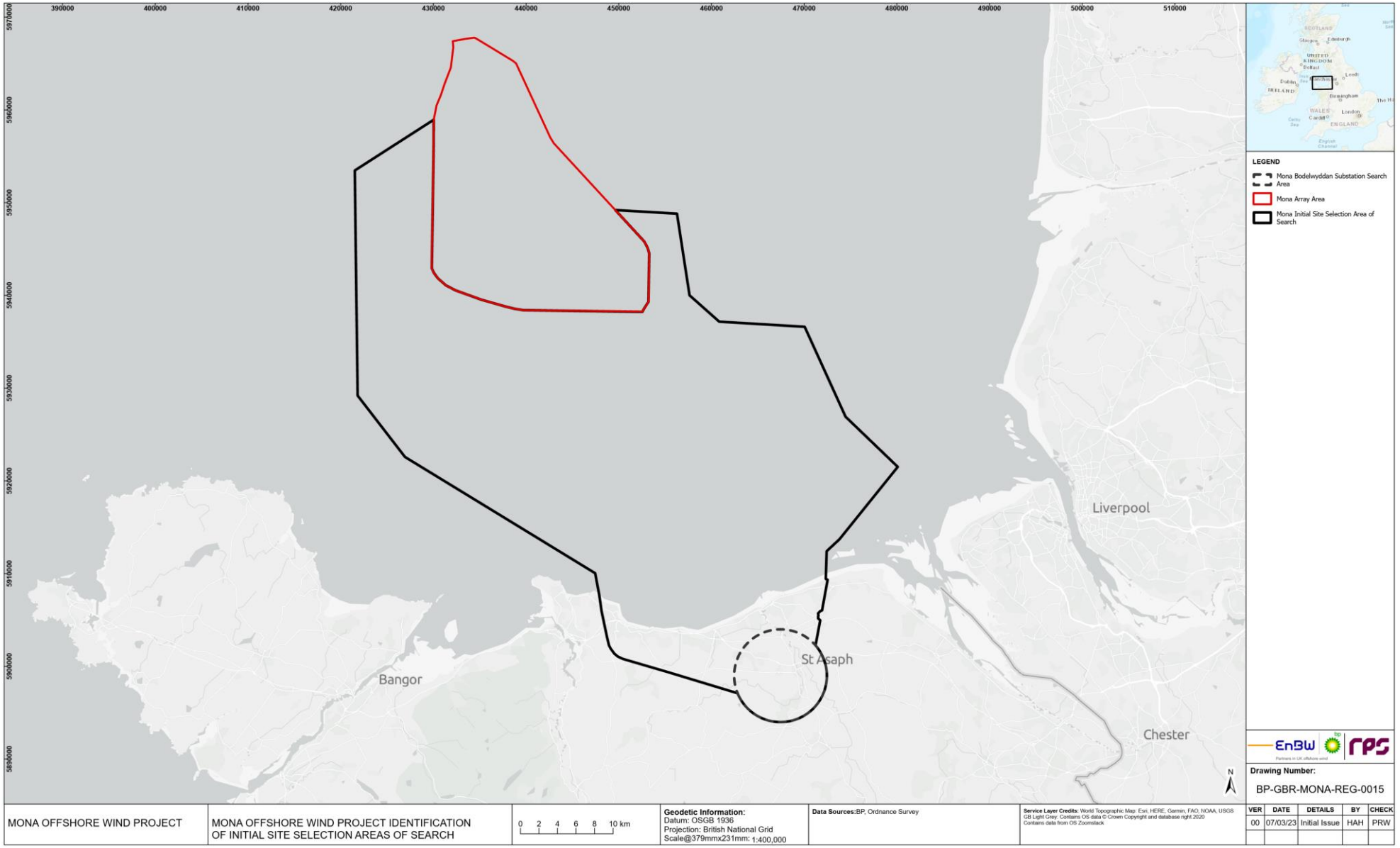


Figure 1.2: Mona Offshore Wind Project Identification of Initial Site Selection Areas of Search.

1.6 References

National Grid (undated) The National Grid Company Plc Substations and the Environment: Guidelines on Siting and Design https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf

The Crown Estate. (2021). Cable Route Identification and Leasing Guidelines. Available online: The Crown Estate – Cable Route Identification & Leasing Guidelines

The Crown Estate. (2020). Offshore Leasing Round 4: Bidding Area Report