MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 4, Annex 2.1: Socio-economics technical report

September 2024
Rev: ES Issue

MOR001-FLO-CON-ENV-RPT-0121
MRCNS-J3303-RPS-10154

PINS Reference: EN020028
APFP Regulations: 5(2)(a)
Document Reference: F4.2.1

Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
ES	Final	AS	September 2024	IM	September 2024

Prepared by:

Hardisty Jones Associates

Prepared for:

Morgan Offshore Wind Limited
Morecambe Offshore Windfarm Ltd

Contents

Tables

Figures

Appendices

Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the proposed onshore substations to the existing National Grid Penwortham substation.
CAPEX	Capital expenditure
DECEX	Decommissioning expenditure
DEVEX	Development (and project management) expenditure
Epicentres of impact	Locations from where impacts 'radiate'.
Full time equivalent (FTE)	Indicates the work time of an employed person in a way that makes jobs comparable e.g., an FTE of 1.0 is equivalent to a full time worker, while an FTE of 0.5 signals half a full time worker.
Gross Value Added	Gross Value Added is the measure of the value of goods and services produced by a business, area, industry, or sector of an economy.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
OPEX	Operational expenditure
Outline Employment and Skills Plan	A plan identifying opportunities for the employment and skills development of local people in relation to Morgan and Morecambe Offshore Wind Farms: Transmission Assets.
Tier 1 supplier	Tier 1 suppliers are those that have a direct contract with the ultimate developer. These companies are hired by the developer and are responsible for most aspects of the project from start to finish. This includes coordinating subcontractors, scheduling inspections, obtaining permits, managing budgets and timelines, and ensuring all safety protocols are adhered to.
TOTEX	Total expenditure

Acronyms

Acronym	Meaning
FTE	Full time equivalent
GVA	Gross Value Added
ONS	Office for National Statistics
ORE	Offshore Renewable Energy
UK	United Kingdom

Units

Unit	Description
%	Percentage
GW	Gigawatt
MW	Megawatt

1 Socio-economics technical report

1.1 Introduction

1.1.1.1 This document forms Volume 4, Annex 2.1: Socio-economics technical report of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. The ES presents the findings of the Environmental Impact Assessment process for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets).

1.1.1.2 This technical report provides supplementary information regarding methodology and outputs which inform the assessment of economic and social impacts within Volume 4, Chapter 2: Socio-economics of the ES.

1.1.1.3 Specifically, this technical impact report considers the potential impact of expenditure associated with the Transmission Assets on employment and Gross Value Added (GVA), and the related potential workforce impacts on housing, accommodation, and population.

1.1.1.4 This report considers the potential economic and social impacts of the Transmission Assets as follows:

- part 1 – economic impacts: covering the employment and GVA impacts associated with the Transmission Assets; and
- part 2 – social impacts: covering the impacts of the workforce associated with the Transmission Assets on housing, accommodation, and population.

1.1.1.5 The approach to separating potential economic and social impacts is consistent with the best available and non-binding industry guidance, Glasson *et al*. (2020) Guidance on assessing the socio-economic impacts of offshore wind farms, and Marine Scotland (2022) guidance Defining 'Local Area' for assessing impact of offshore renewables and other marine developments.

1.1.1.6 Potential economic impacts associated with changes to aviation activities at Blackpool Airport and Blackpool Airport Enterprise Zone impacts are considered fully within Volume 4, Chapter 2: Socio-economics of the ES. This is because the effect-receptor pathways between the Transmission Assets and conditions at Blackpool Airport and Blackpool Airport Enterpsie Zone include aviation, and there is no effect-receptor linkages between project expenditure and this receptor.

1.1.1.7 Potential tourism impacts are considered fully within Volume 4, Chapter 2: Socio-economics of the ES, and are not considered within this report. This is because the effect-receptor pathways between the Transmission Assets and tourism conditions include visual amenity, temporary overnight accommodation and recreation, so there is limited effect-receptor linkages between project expenditure and this receptor. Where linkages do exist, specifically by way of temporary overnight

accommodation impacts, this relationship is explored fully within Volume 4, Chapter 2: Socio-economics of the ES.

1.1.1.8 With respect to consideration of potential offshore and onshore impacts, the approach of this assessment is focused on the 'source' of a potential impact, rather than the ultimate location where the impact occurs. This is consistent with the broader approach to separating onshore and offshore effects.

- Offshore: if physical infrastructure and civil works are located offshore, any resulting impacts are categorised as offshore. This includes the manufacture of export cables and installation and staging of the offshore export cables.
- Onshore: if physical infrastructure and civil works are located onshore, any resulting impacts are categorised as onshore. This includes onshore export cable installation, installation and operation and maintenance of the onshore substations, 400 kV grid connection cables installation and landfall[1].

1.1.1.9 Reference to offshore impacts in this technical impact report relate solely to offshore transmission assets. Separate technical impact assessments have been carried out for the generation assets of both the Morgan Offshore Wind Project and the Morecambe Offshore Wind Farm.

[1] Volume 1, Chapter 3: Project description of the ES sets out the landfall elements of the Transmission Assets, in addition to onshore and offshore elements. The approach to estimating socio-economic impacts (set out in section 1.3) allows for the seperation of onshore and offshore elements only, therefore landfall elements are not assessed seperately within this technical annex.

PART 1 – Economic Impacts

1.2 Economic study areas

1.2.1 National economic study areas – offshore and onshore

1.2.1.1 National economic study areas are defined to reflect the wider reach of employment and GVA impacts that may materialise through the supply chain and demand for labour. As such, the following national economic study area has been identified:

- UK

1.2.1.2 Although UK level employment and GVA results are presented in **section 1.4**, potential impacts at the UK level are estimated to be negligible and are not anticipated to be of material consideration. To ensure the assessment remains proportional, potential UK level impacts have been scoped out of the assessment in Volume 4, Chapter 2: Socio-economics of the ES. Results are presented in this chapter as understanding the UK content of potential economic impacts associated with offshore wind farm developments is an important aspect of considering a project's potential benefits.

1.2.2 Sub-national economic study areas – offshore assessment

1.2.2.1 To ensure the assessment of potential socio-economic impacts is proportionate, the offshore assessment considers sub-national study areas which concentrate on locations in England and Wales that are in proximity to the Irish Sea. Therefore, locations in North Wales and North West England are considered as part of this assessment[2].

1.2.2.2 The various components which contribute to the delivery of the Transmission Assets will have different 'epicentres of impact' – locations from where the potential impacts 'radiate'. Industry best practice guidance 'Defining 'Local Area' for assessing impact of offshore renewables and other marine developments' (Marine Scotland, 2022) sets out that economic impacts can be geographically linked to a range of epicentres, including construction and operation and maintenance ports involved in the delivery of offshore infrastructure.

1.2.2.3 In this assessment, the sub-national economic study areas are linked to the selection of potential construction, operation and maintenance, and decommissioning ports within North Wales and North West England that have the capability to support the associated supply of inputs, products and services for the Transmission Assets. These ports, and their socio-economic catchment areas, are potential epicentres of impact on economic receptors. Due to the infrastructure requirements of large components (e.g., laydown and storage areas), it is likely that multiple fabrication and marshalling ports will be utilised during project

[2] The selection process associated with the identification of ports, inputs, and services will not conclude until the post-consent phase for the Transmission Assets, which is typical for offshore wind farms. It is likely that fabrication and marshalling ports elsewhere in the UK and internationally will be utilised for the delivery of some components.

delivery. This is likely to include ports outside North Wales and North West England given the port capabilities set out within **Appendix A**. The assessment also considers a situation where no Tier 1 port contracts are secured within North Wales or North West England.

1.2.2.4 The following approach has been followed to define potential sub-national study areas:

- step 1: identification of port facilities that are potential options for construction, operation and maintenance, or decommissioning bases; and
- step 2: assessment of economic study areas associated with potential port facilities.

1.2.2.5 The approach to considering these steps is set out in more detail in **Appendix A**.

1.2.2.6 The following sub-national economic study areas have been defined for the purposes of assessing potential offshore impacts:

- North Wales sub-national offshore economic study area (hereafter referred to as 'North Wales'); and
- North West England sub-national offshore economic study area (hereafter referred to as 'North West England').

1.2.2.7 The offshore economic study areas for the socio-economics assessment are shown in **Figure 1.1**.

1.2.3 Sub-national economic study areas – onshore assessment

1.2.3.1 The following approach has been followed to define the regional socio-economics study area for assessing potential impacts associated with onshore infrastructure.

- step 1: Identification of the onshore substation sites. The permanent onshore infrastructure for the Transmission Assets includes the onshore export cables, the onshore substations and the 400kV grid connection cables that will connect the Transmission Assets to the National Grid substation at Penwortham.
- step 2: Assess economic study areas associated with the onshore substation sites. The labour catchment area associated with the location of the onshore substation sites has been defined using a 60 minute drive time catchment as a proxy. This 60 minute drive time catchment has been converted to a best fit study area.

1.2.3.2 The following economic study area has been defined for the purposes of assessing potential onshore impacts.

- Onshore economic study area: the 60 minute drive time catchment covers the local authorities within Lancashire and the majority of Greater Manchester and Merseyside. The full list of local authority areas included within the onshore economic study area is presented in **Table 1.1**.

Table 1.1: Local authority areas within the onshore economic study area

Local authority areas		
Blackburn with Darwen	Lancaster	Salford
Blackpool	Liverpool	Sefton
Bolton	Manchester	South Ribble
Burnley	Oldham	St. Helens
Bury	Pendle	Trafford
Fylde	Preston	Warrington
Halton	Ribble Valley	West Lancashire
Hyndburn	Rochdale	Wigan
Knowsley	Rossendale	Wyre

1.2.3.3 The onshore economic study area for the socio-economics assessment is shown in **Figure 1.2**.

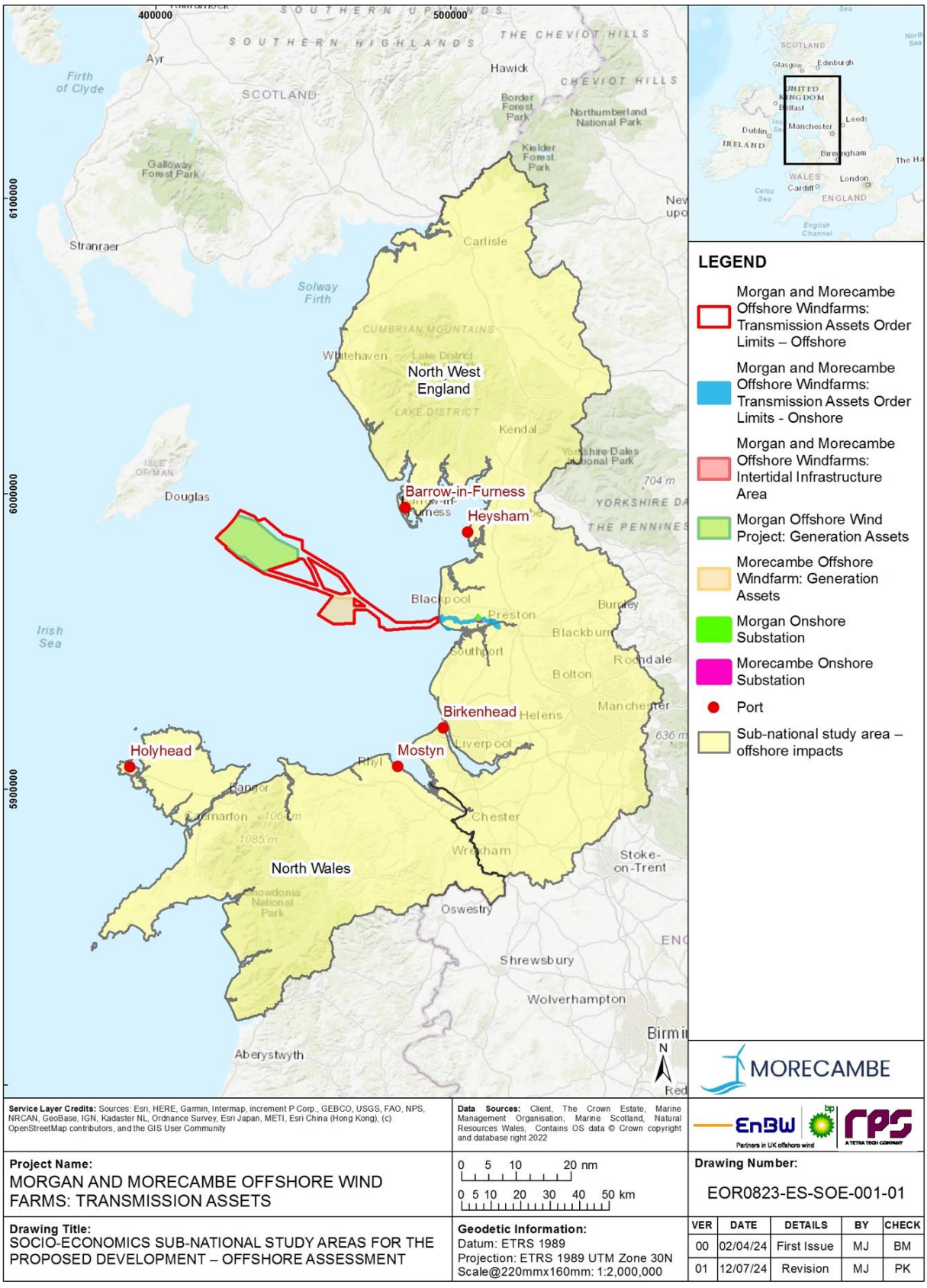

Figure 1.1: Offshore socio-economic study areas

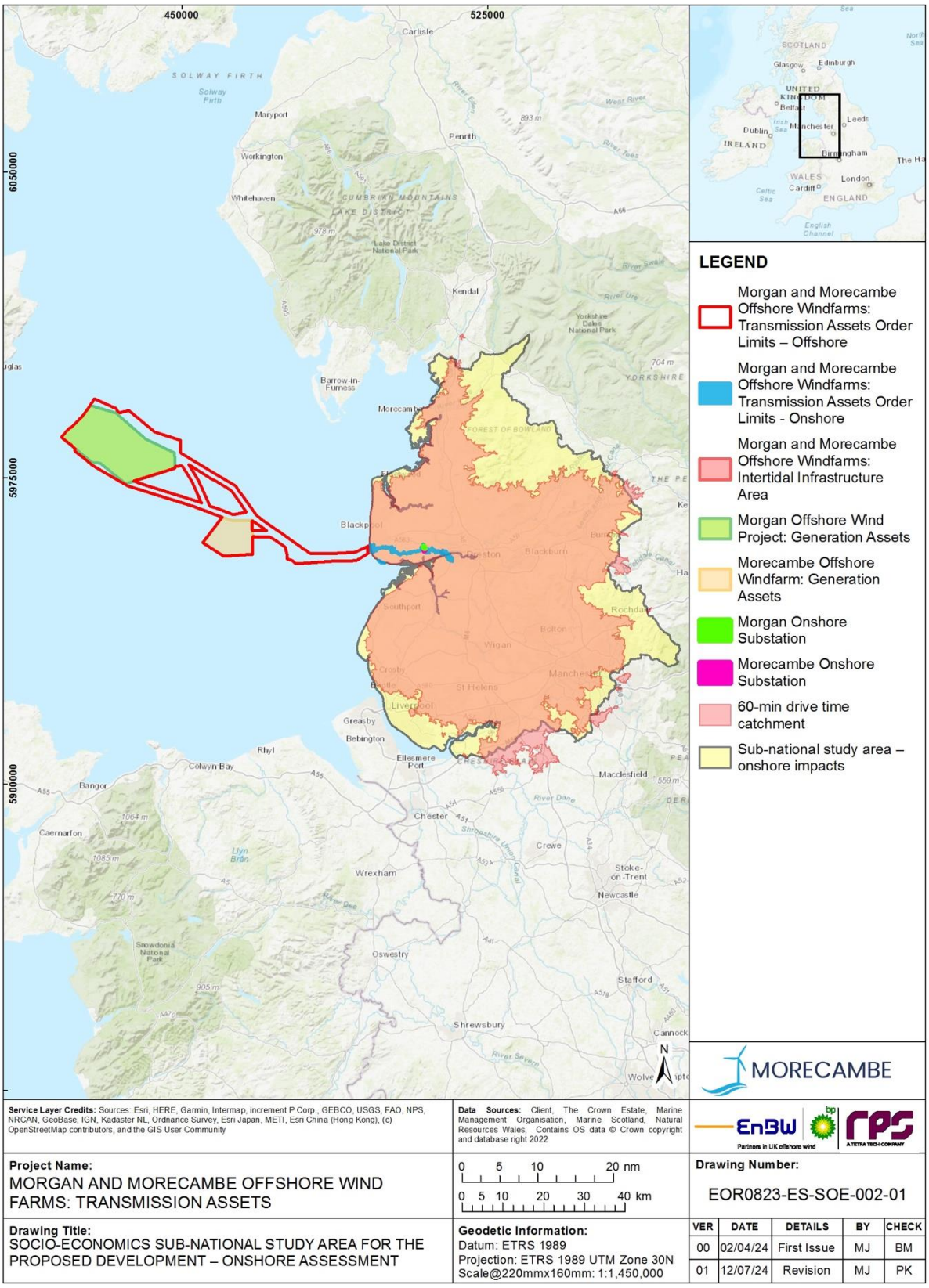

Figure 1.2: Onshore socio-economic study areas

1.3 Methodology

1.3.1 Introduction

1.3.1.1 The methodology adopted for estimating potential economic impacts as part of this assessment is set out in **Figure 1.3**.

1.3.1.2 The approach to estimating potential socio-economic impacts has been updated since PEIR stage to incorporate the latest industry data, so employment and GVA estimates may differ to those presented previously.

1.3.1.3 There is no formal guidance or standard approach for assessing the potential economic impacts of an offshore wind farm. However, this methodology reflects industry best practice for delivering a robust estimate of economic impacts, as summarised by the best available and non-binding industry guidance document Glasson *et al*. (2020).

1.3.1.4 This methodology also utilises the following industry guidance documentation to underpin headline assumptions:

- Crown Estate and Offshore Renewable Energy (ORE) Catapult (2019) Guide to an offshore wind farm; and
- BVG Associates (2023) Guide to an offshore wind farm: online interactive tool.

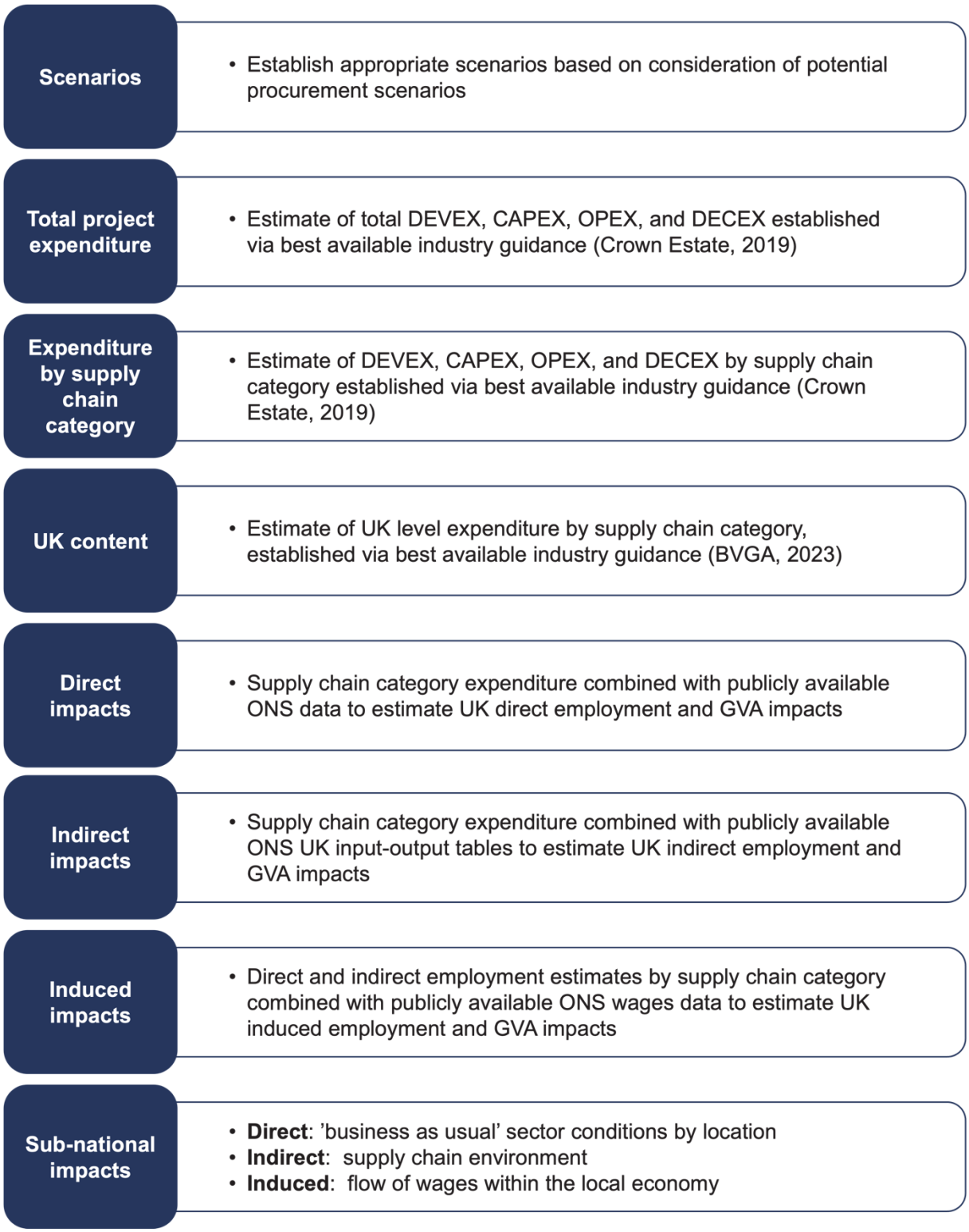

Figure 1.3: Technical impact assessment methodology

1.3.2 Assessment scenarios

1.3.2.1 A scenario represents a potential future outcome based on a set of assumptions. A range of scenarios are developed by changing the assumptions. Socio-economics looks at different scenarios to identify potential impacts and outcomes associated with various assumptions that may come about relating to economic and social factors.

Most likely – 'current capability' scenario

1.3.2.2 This assessment considers a 'current capability' scenario to represent the 'most likely' potential economic and social impacts.

1.3.2.3 The current capability scenario is based on a set of assumptions derived from evidence of impacts associated with existing conditions and capabilities in the offshore wind sector, and typical expenditure levels.

1.3.2.4 The current capability scenario assumes that where the capability already exists within the sector to deliver a certain supply chain category (as set out in **Appendix B**), the associated impacts are captured within national and sub-national content figures, where relevant.

1.3.2.5 The current capability scenario has been quantitatively assessed to represent the 'most likely' economic and social impacts associated with the Transmission Assets under current sector conditions.

1.3.2.6 This approach is consistent with Glasson *et al*. (2020), which recommends specifying the 'more likely' scenario in order to avoid wide ranges of economic impact estimates which can 'make life very difficult for decision makers and host authorities[3]'.

Minimum – 'low' scenario

1.3.2.7 Within Volume 4, Chapter 2: Socio-economics of the ES the assessment considers a 'low' scenario to represent the 'worst case' potential economic impacts. The low scenario considers a situation where no contracts are secured with a Tier 1 supplier (a direct supplier of a product or service) within North Wales and North West England for the delivery of development, fabrication, or marshalling activities.

1.3.2.8 The low scenario has been qualitatively assessed to represent the 'minimum' – or 'worst case' – economic impacts associated with the Transmission Assets.

1.3.2.9 As it would result in no change to the receiving environment, the low scenario is not assessed for social impacts.

[3] Although this is not defined in the guidance, this is taken to mean the local authorities which host the offshore windfarm infrastructure.

Maximum scenario

1.3.2.10 A 'maximum' scenario would cover a situation where greater sector investment would lead to an increase in national and regional content.

1.3.2.11 There is no information available at this stage to provide a basis for the assumptions that would be required to define a 'maximum' scenario.

1.3.2.12 Assessing a maximum scenario would provide a set of impact estimates above the current capability scenario. There is a risk that assessing a 'maximum' scenario could overstate potentially beneficial economic impacts.

1.3.2.13 In the case of socio-economics, the maximum scenario can therefore be considered an unhelpful scenario upon which to base an EIA. For this reason, the maximum scenario has not been assessed within Volume 4, Chapter 2: Socio-economics of the ES.

1.3.3 Total project expenditure

1.3.3.1 No project specific expenditure information for the Transmission Assets is available due to the early stage of the project development cycle.

1.3.3.2 The Crown Estate and ORE Catapult (2019) Guide to an offshore wind farm, establishes project expenditure estimates based on typical costs associated with offshore wind farm components. This guidance has been utilised to provide expenditure estimates for the socio-economic assessment of consented projects e.g., Awel-y-Môr Offshore Wind Farm.

1.3.3.3 The Crown Estate and ORE Catapult component-based expenditure figures are provided on the basis of a 1 GW capacity project, using 10 MW wind turbine generators. To ensure the assessment is project-specific, the Crown Estate and ORE Catapult expenditure estimates have been adapted according to the project description (refer to Volume 1, Chapter 3: Project description of the ES).

1.3.3.4 Expenditure by component estimates have been inflated to 2023 prices using Office for National Statistics (ONS, 2023) data on inflation rates of input and output producer price inflation and are aggregated by project phase to establish estimates of project expenditure used in the assessment of economic impacts. These are set out in **Table 1.2**.

1.3.4 Expenditure by supply chain category

1.3.4.1 The Crown Estate and ORE Catapult (2019) guidance sets out very detailed indicative costs by component of a typical offshore wind farm. The supply chain framework upon which these indicative costs are based is set out in **Appendix B**.

1.3.4.2 The next step is to establish a detailed estimate of project expenditure by component based on the key stages of:

- development and project management;
- construction;

- operation and maintenance; and
- decommissioning.

1.3.4.3 These stages involve inputs from a wide variety of industries throughout the supply chain. Different industries are subject to varying assumptions in relation to how expenditure translates into the number of jobs supported and the level of GVA output (i.e., the value of goods and services) that flows back into the economy. Therefore, the more detailed the breakdown of expenditure by component, the more reliable the estimate of impacts is likely to be.

1.3.5 UK content

1.3.5.1 The next step is to establish an estimate of UK content.

1.3.5.2 'UK content' is a measure of the proportion of materials, labour, and services sourced domestically in the development, construction, operation and maintenance, and decommissioning of offshore wind farms. Quantifying the UK content of offshore wind investment is an important measure in assessing the impact of the offshore wind sector on the national economy.

1.3.5.3 Measurement of the UK content in offshore wind investment relies on detailed supply chain analysis. This involves tracking the origin of components, assessing the location of fabrication facilities, and analysing the utilisation of local labour and services. Accurate measurement requires a comprehensive data collection system, collaboration between industry stakeholders, and transparent reporting standards. Measurement of UK content typically takes place following project delivery. Developers agreed that from 2015 all UK offshore wind farms would report their UK content data for aggregation by RenewableUK (BVG Associates, 2023).

1.3.5.4 The BVG Associates (2023) guide to an offshore wind farm online interactive tool provides an estimate of UK content by project expenditure category, which is set out in **Table 1.3**.

1.3.5.5 The BVG Associates UK content estimates for each expenditure category have been applied to supply chain categories to estimate UK expenditure for the Transmission Assets.

1.3.6 UK impacts

1.3.6.1 Best practice principles involve assessing the direct, indirect, and induced economic impacts of an offshore wind farm in terms of employment and GVA.

1.3.6.2 Direct economic impacts are directly attributable to a development. For example, the direct employment impacts are the jobs supported by activities associated with delivering each phase of a project.

1.3.6.3 Indirect economic impacts are secondary impacts that occur as a result of the interactions between a development and other parts of the economy. For example, the project will require fabrication of components and subcomponents, and supply of equipment and

transportation, all of which increases sector demand leading to economic impacts throughout the supply chain.

1.3.6.4 Induced economic impacts result from changes in household spending patterns as a consequence of direct and indirect economic impacts. For example, the employment opportunities supported by the project (including those throughout the supply chain) result in workers having income to spend, leading to further economic impacts in other parts of the economy.

Employment

Direct

1.3.6.5 UK expenditure estimates have been combined with turnover per full time equivalent (FTE) data to provide an estimate of direct employment for each supply chain category at the UK level.

Indirect

1.3.6.6 UK supply chain expenditure data from the ONS United Kingdom Input-Output Analytical Tables (ONS, 2023a) has been combined with turnover per FTE data to provide an estimate of indirect employment for each supply chain category at the UK level.

Induced

1.3.6.7 Induced employment impacts supported by both direct and indirect wage impacts have been combined with detailed household expenditure to estimate overall induced employment impacts.

GVA

Direct

1.3.6.8 Direct employment estimates have been combined with GVA per FTE data to provide an estimate of direct GVA for each supply chain category at the UK level.

Indirect

1.3.6.9 UK level indirect GVA impacts have been estimated on the basis of GVA coefficients within the ONS United Kingdom Input-Output Analytical Tables (ONS, 2023a).

Induced

1.3.6.10 Induced employment estimates have been combined with GVA per worker data to provide an estimate of induced GVA impacts.

1.3.7 Sub-national impacts

Direct

1.3.7.1 The current capability scenario (see **section 1.3.2**) has been estimated based on the potential level of expenditure in each sub-national economic study area under 'business as usual' circumstances.

1.3.7.2 The BVG Associates (2023) Guide to an offshore wind farm online interactive tool provides an indicative list of companies and suppliers with proven capabilities of operating within the UK offshore wind supply chain. This list correlates with the supply chain framework set out in **Appendix B**.

1.3.7.3 This list has been analysed to identify the supply chain capabilities of each sub-national economic study area – North West England and North Wales.

Indirect

1.3.7.4 It is assumed that competitive UK contracting would distribute indirect impacts according to existing sectoral profiling. Therefore, UK indirect employment and GVA impacts have been distributed within sub-national study areas according to their existing shares of UK activity.

Induced

1.3.7.5 Induced impacts supported by both direct and indirect wage impacts have been combined with detailed household expenditure to estimate overall induced impacts in each sub-national economic study area.

1.4 Results

1.4.1 Estimates of total project expenditure

1.4.1.1 Estimates of expenditure by supply chain category have been inflated to 2023 prices and aggregated to development expenditure (DEVEX), construction expenditure (CAPEX), operations expenditure (OPEX), decommissioning expenditure (DECEX), and total expenditure (TOTEX) to establish estimates of project expenditure set out in **Table 1.2**. These figures are estimates derived through the approach set out above, and are not actual project costs.

Table 1.2: Estimates of total project expenditure, 2023 prices

Source: HJA analysis following Crown Estate and ORE Catapult (2019) guidance.

Note: figures may not sum due to rounding

Phase	Expenditure category	Expenditure estimate
Development and project management	DEVEX	£0.3 bn
Construction	CAPEX	£1.1 bn
Operation and maintenance	OPEX	£2.8 bn
Decommissioning	DECEX	£0.1 bn

Phase	Expenditure category	Expenditure estimate
Total	**TOTEX**	**£4.4 bn**

1.4.2 UK, national, and regional content

1.4.2.1 As per **paragraph 1.3.5.5**, the BVG Associates (2023) guide to an offshore wind farm online interactive tool provides an estimate of UK content by project expenditure category. These estimates are presented in **Table 1.3**, along with the content estimates for each economic study area. Given that UK and local/regional/national content can only be accurately measured post-contracting, these figures should be treated as estimates only, and are based on assumptions which draw on previously delivered offshore windfarms in the UK.

Table 1.3: Content estimates, 2023 prices

Source: HJA analysis, partly adapted from BVGA (2023)

Note: figures may not sum due to rounding

Expenditure category	North Wales	North West England	UK
DEVEX	4%	7%	72%
CAPEX	10%	10%	25%
OPEX	28%	46%	77%
DECEX	29%	29%	29%
TOTEX	**22%**	**34%**	**61%**

1.4.3 Offshore impacts

Construction

1.4.3.1 Construction phase economic impacts reflect both DEVEX and CAPEX project expenditure categories, and are summarised in **Table 1.4**. The inclusion of expenditure associated with project development and management captures the impacts on employment and GVA during the earliest stages of the Transmission Assets.

Table 1.4: Construction phase economic impacts – offshore

Note: figures may not sum due to rounding[4]

	North Wales	North West England	UK
Employment (FTE years)			
Direct	170	160	1,100
Indirect	10	120	1,100
Induced	70	90	420
Total	**260**	**370**	**2,600**
GVA			
Direct	£30 m	£30 m	£95 m
Indirect	£1 m	£8 m	£80 m
Induced	£4 m	£5 m	£25 m
Total	**£35 m**	**£45 m**	**£200 m**

Operation and maintenance

1.4.3.2 Operation and maintenance phase economic impacts reflect the OPEX project expenditure category and are summarised in **Table 1.5**.

Table 1.5: Operation and maintenance phase economic impacts (per annum) – offshore

Note: some figures may not sum due to rounding

	North Wales	North West England	UK
Employment (FTE years)			
Direct	35	35	35
Indirect	–	5	45
Induced	6	7	15
Total	**40**	**45**	**95**
GVA			
Direct	£4.7 m	£4.7 m	£4.7 m
Indirect	£0.0 m	£0.4 m	£4.2 m
Induced	£0.4 m	£0.4 m	£0.8 m
Total	**£5.1 m**	**£5.6 m**	**£9.7 m**

[4] Figures are rounded as follows:
< 10 – unrounded
10 < 100 – rounded to nearest 5
100 < 1000 – rounded to nearest 10
> 1000 – rounded to nearest 100

Decommissioning

1.4.3.3 Decommissioning phase economic impacts reflect the DECEX project expenditure category and are summarised in **Table 1.6**.

Table 1.6: Decommissioning phase economic impacts – offshore

Note: some figures may not sum due to rounding

	North Wales	North West England	UK
Employment (FTE years)			
Direct	55	55	55
Indirect	3	35	280
Induced	30	35	65
Total	**85**	**120**	**400**
GVA			
Direct	£13 m	£13 m	£13 m
Indirect	–	£2 m	£20 m
Induced	£2 m	£2 m	£4 m
Total	**£15 m**	**£17 m**	**£36 m**

1.4.4 Onshore impacts

Construction

1.4.4.1 Construction phase economic impacts reflect both DEVEX and CAPEX project expenditure categories, and are summarised in **Table 1.7**. The inclusion of expenditure associated with project development and management captures the impacts on employment and GVA during the earliest stages of the Transmission Assets.

Table 1.7: Construction phase economic impacts – onshore

Note: Some figures may not sum due to rounding

	Onshore economic study area	UK
Employment (FTE years)		
Direct	190	590
Indirect	30	310
Induced	35	190
Total	**260**	**1,100**
GVA		
Direct	£15 m	£40 m
Indirect	£2 m	£25 m
Induced	£2 m	£10 m
Total	**£20 m**	**£75 m**

Operation and maintenance

1.4.4.2 Operation and maintenance phase economic impacts reflect the OPEX project expenditure category and are summarised in **Table 1.8**.

Table 1.8: Operation and maintenance phase economic impacts (per annum) – onshore.

Note: Some figures may not sum due to rounding

	Onshore economic study area	UK
Employment (FTE years)		
Direct	25	120
Indirect	15	140
Induced	6	50
Total	**50**	**310**
GVA		
Direct	£1.7 m	£15 m
Indirect	£1.3 m	£15 m
Induced	£0.3 m	£3 m
Total	**£3.4 m**	**£33 m**

Decommissioning

1.4.4.3 Decommissioning phase economic impacts reflect the DECEX project expenditure category. No supply chain category within the framework (**Appendix B**) can be categorised as onshore expenditure given the associated descriptions within the guidance. Given the exclusion of onshore decommissioning activities from the guidance, onshore decommissioning phase impacts are not assessed.

PART 2 – Social Impacts

1.5 Social study area(s)

1.5.1.1 Social impacts can be understood as how certain activities and actions affect surrounding people and communities.

1.5.1.2 The most likely cause of social impacts are related to the implications of economic impacts, i.e., the movement of labour. Therefore, the theoretical underpinnings of the economic study areas – with a focus on epicentres of impact by way of potential port(s) and onshore infrastructure locations – are also applicable in defining suitable social study areas.

1.5.1.3 Social impacts are not assessed at a national level, therefore the UK study area is not considered within the assessment.

1.5.2 Sub-national social study area(s) – offshore assessment

1.5.2.1 Having identified potential port facilities in Part 1, the same list has been utilised in determining appropriate sub-national offshore social study area(s). The extent of the offshore economic study areas has been determined on the basis of labour catchment areas using a 60 minute drive time catchment as a proxy.

1.5.2.2 Therefore, the same 60 minute drive catchments for the same long list of port facilities results in the same best fit sub-national social study areas, as follows:

- North Wales; and
- North West England.

1.5.3 Sub-national social study area(s) – onshore assessment

1.5.3.1 Having identified potential onshore substation locations in Part 1, the same locations have been utilised in determining an appropriate sub-national onshore social study area. The extent of the onshore economic study area was determined on the basis of labour catchment areas using a 60 minute drive time catchment as a proxy.

1.5.3.2 Therefore, the same 60 minute drive catchments for the same potential onshore substation locations results in the same best fit sub-national social study area, as follows:

- onshore economic study area (see **Figure 1.2**).

1.6 Methodology

1.6.1 Construction phase – offshore

1.6.1.1 Potential primary construction port facilities could support the following activities:

- offshore export cable staging and installation.

1.6.1.2 During the construction phase the roles associated with these activities are anticipated to be based largely offshore, with workers

accommodated within vessels. However, these workers have the potential to give rise to demand for temporary accommodation at the start and end of typical shift periods at sea within the catchments of the relevant transfer port(s) before or after spending time at their home location. Some roles e.g., assembly or management, will be based onshore, and have the potential to give rise to further demand for temporary accommodation, and possibly short-term rented accommodation.

1.6.1.3 Construction phase social impacts are therefore assessed in terms of the maximum number of temporary overnight stays arising within the social impact study areas.

1.6.1.4 Potential workforce impacts associated with the Transmission Assets have been estimated based on assumptions relating to the following variables:

- maximum activities within a single socio-economics sub-national study area;
- maximum vessel numbers;
- vessel crew size;
- share of non-local workers;
- shift arrangements;
- shifts per annum; and
- nights of accommodation required per shift.

1.6.1.5 The assumptions underlying each variable are set out below.

Maximum activities within a single sub-national social study area

1.6.1.6 In line with the assessment of economic impacts, the assessment of social impacts adopts a current capability impact scenario. This assumes that no single port can deliver all activities associated with the construction phase of the Transmission Assets. Port capacity and capabilities determine the facilities at which the installation of individual components can take place. The capabilities of the ports within the sub-national offshore social study areas are set out within **Appendix A**.

1.6.1.7 The current capability scenario assumes the maximum activity that could occur within a single sub-national social study area is the installation and marshalling of the export cable.

1.6.1.8 Under the current capability impact scenario it is assumed that procurement and contracting decisions are taken in line with the current competitiveness of the UK offshore wind sector. Employment related to fabrication is assumed to draw on the standing workforces of existing enterprises. This will not have any impact on the demand for housing, accommodation, and local services above current baseline activity.

1.6.1.9 No permanent (i.e., long term), relocation of workers is anticipated during the offshore construction phase based on the mobile nature of large parts of the offshore workforce.

Maximum vessel numbers, vessel crew size, shift arrangements, and accommodation requirements

1.6.1.10 The maximum vessel numbers associated with delivery of the export cable has been taken from the project design envelope and inform the maximum design scenario set out in Volume 4, Chapter 2: Socio-economics of the ES.

1.6.1.11 Typical vessel crew sizes have been estimated on the basis of industry guidance and advice from project engineers.

1.6.1.12 Based on standard industry practice, it is assumed that vessel crews will work according to four week on/off shift patterns. On this basis, it is assumed each construction vessel will support 13 shifts per annum.

1.6.1.13 It is assumed that roles associated with these activities will be based offshore, with workers accommodated within vessels.

1.6.1.14 It is assumed each crew member will require a maximum of two nights of overnight accommodation per shift. This consists of one night before and one night after a shift period. It is assumed crew members will stay at their permanent residence elsewhere for the remainder of their 'off shift' period.

1.6.1.15 It is assumed that a minimum of one third of workers would not require local overnight accommodation, on the basis these workers are permanently based close enough to the relevant port(s) as to remove the need for overnight accommodation.

1.6.2 Operation and maintenance phase – offshore

1.6.2.1 Potential operation and maintenance port facilities are expected to support the following activities:

- offshore export cable staging and maintenance.

1.6.2.2 It is assumed that a small operational base will be located at the selected operation and maintenance port, whilst operational headquarters will be located elsewhere in the UK, as this activity is not geographically dependant on port selection.

1.6.2.3 The Transmission Assets is likely to directly create new roles within operation and maintenance activities. It is assumed that indirect and induced employment impacts will draw on the existing resident workforce in each area. Given these impacts are expected to take place in the wider economy, the contribution of these impacts to labour migration is expected to reflect typical migration patterns associated with economic growth. Indirect and induced employment impacts are therefore expected to have a negligible impact on population, housing and accommodation.

1.6.2.4 Direct roles could be filled through a number of routes including:

- local workers transitioning from the offshore oil and gas sector;
- local resident entrants to the sector resulting from training activities;
- non-local commuting to the selected locality; and

- non-local worker relocation to the selected locality.

1.6.2.5 Operation and maintenance phase social impacts are assessed in terms of the number of workers relocating to the social study area and its associated impact on the population size.

Local workers transitioning from the offshore oil and gas sector

1.6.2.6 To estimate the number of workers transitioning from the oil and gas sector, the following steps have been undertaken:

1. Estimate the number of oil and gas industry jobs currently based in each social study area from OEUK (2022) research
2. Estimate the number of transitioning oil and gas workers in each social study area based on forecast job losses in related sectors from Robert Gordon University (RGU) (2023) research.

1.6.2.7 This adjustment has been applied to the estimated operational phase employment impacts.

Local resident entrants to the sector resulting from training activities

1.6.2.8 There is no established benchmark for assuming the contribution of local residents to the operation and maintenance workforce of an offshore energy scheme. This figure may vary between projects depending on several factors, including the project characteristics, location, local labour market conditions, developer approach, and government policy.

1.6.2.9 With a lead time of approximately four years before commencement of operations there is time to train a substantial part of the remaining workforce from the local labour market. The Applicant has committed to an Employment and Skills Plan which will set out an action plan to increase the level of new local entrants to the sector. An outline of this plan is included with the application (document reference J10).

1.6.2.10 In the absence of an industry standard benchmark, in this assessment it is assumed that 50% of the remaining workforce will be sourced locally through new entrants to the sector resulting from training activities.

Non-local worker relocation to the selected locality

1.6.2.11 The proportion of the operation and maintenance workforce commuting from outside the project locality for their shifts can vary significantly depending on various factors, including the project characteristics, location, accessibility, housing market conditions, and developer approach.

1.6.2.12 In the absence of an industry standard benchmark, in this assessment it is assumed a maximum of 50% of the remaining workforce will be recruited from outside the relevant social impact study area, and will choose to permanently relocate to the locality. This assumption is conservative so that the number of relocations is not under-estimated. It is assumed that any migrating workers would also relocate their

families. The assessment of population impact assumes an average household size of 2.4 persons (ONS, 2022).

Non-local commuting to the selected locality

1.6.2.13 The remaining 50% of non-local workers are assumed to travel from outside the relevant social study area for their shift. Workers in this category will either require overnight accommodation for one night before and after their shift in proximity to the port (i.e., within the social study area), or their commute will be sufficiently short as to not require overnight accommodation. Overnight accommodation demand in this category is considered negligible relative to the scale of existing overnight stays in any of the social study areas and does not warrant further consideration.

1.6.3 Construction phase – onshore

1.6.3.1 Development associated with potential onshore infrastructure sites could support the following activities:

- landfall;
- onshore export cable installation;
- onshore substations installation; and
- 400kV grid connection cables installation.

1.6.3.2 Roles associated with these activities are anticipated to be based onshore. These workers have the potential to give rise to demand for temporary accommodation during the period of their on-site activity. This could be a period of a few days, weeks, or months, depending on the component being installed.

1.6.3.3 Onshore construction activities are anticipated to draw on a more localised labour market. No permanent (i.e., long term) relocation of workers is anticipated during the onshore construction phase based on the mobile nature of large parts of the onshore workforce.

1.6.4 Operation and maintenance phase – onshore

1.6.4.1 Development associated with potential onshore infrastructure sites could support the following activities:

- landfall;
- onshore export cable operation and maintenance;
- onshore substations operation and maintenance; and
- 400kV grid connection cables operation and maintenance.

1.6.4.2 Potential impacts associated with operation and maintenance of onshore infrastructure are estimated to be negligible and are not anticipated to be of material consideration (see **Table 1.12**).

1.7 Results

1.7.1 Offshore impacts

Construction

1.7.1.1 Based on the detailed methodology set out in **section 1.6**, the potential offshore social impacts during the construction phase of the Transmission Assets under a current capability impact scenario are set out in **Table 1.9**.

Table 1.9: Construction phase social impacts – offshore

	North Wales	North West England
Maximum temporary overnight stays (nights per annum)	24,200	24,200

Operation and maintenance

1.7.1.2 Based on the detailed methodology set out in **section 1.6**, the potential offshore social impacts during the operation and maintenance phase of the Transmission Assets are set out in **Table 1.10**.

Table 1.10: Operation and maintenance phase social impacts – offshore

	North Wales	North West England
Non-local worker relocation to the selected locality	–	–
Estimated household population increase	–	–

1.7.1.3 Potential offshore economic impacts during the operation and maintenance phase are anticipated to be so low (see **Table 1.5**) that employment roles associated with the Transmission Assets are anticipated to be filled by workers transitioning from the offshore oil and gas sector, or local resident entrants to the sector resulting from training activities.

1.7.1.4 As a result, there is anticipated to be no non-local worker relocation to the selected locality.

1.7.2 Onshore impacts

Construction

1.7.2.1 Based on the detailed methodology set out in **section 1.6**, the potential onshore social impacts during the construction phase of the Transmission Assets under a current capability impact scenario are set out in **Table 1.11**.

Table 1.11: Construction phase social impacts – onshore

	Social study area
Maximum temporary overnight stays (nights per annum)	49,700
Maximum medium term housing requirement (dwellings)	191

Operation and maintenance

1.7.2.2 Based on the detailed methodology set out in **section 1.6**, the potential offshore social impacts during the operation and maintenance phase of the Transmission Assets are set out in **Table 1.12**.

Table 1.12: Operation and maintenance phase social impacts – onshore

	Social study area
Maximum direct jobs per annum (FTE years)	25
Non-local worker relocation to the selected locality	12
Estimated household population increase	30

1.8 Summary

1.8.1.1 This technical impact report has summarised the potential socio-economic impacts of the Transmission Assets within the following categories:

- **economic**: assessing the potential employment and GVA impacts associated with the Transmission Assets and the associated impacts on local employment opportunities; and
- **social**: assessing the potential impacts of the workforce associated with the Transmission Assets on housing, accommodation and population (including local services).

1.8.1.2 The impacts assessed within this technical report are the basis for an assessment of significant socio-economic effects of the Transmission Assets which can be found in Volume 4, Chapter 2: Socio-economics of the ES.

1.8.1.3 Potential tourism impacts are considered within Volume 4, Chapter 2: Socio-economics of the ES.

1.9 References

BVG Associates (2023) Guide to an offshore windfarm (online interactive tool).

Crown Estate and ORE Catapult (2019) Guide to an offshore wind farm. Available: https://www.thecrownestate.co.uk/media/2861/guide-to-offshore-wind-farm-2019.pdf. Accessed October 2023.

Department for Levelling Up, Housing and Communities (2022) Levelling Up the United Kingdom. Available: https://www.gov.uk/government/publications/levelling-up-the-united-kingdom. Accessed October 2023.

Glasson, J., Durning, B., Olorundami, T. and Welch, K. (2020) Guidance on assessing the socio-economic impacts of offshore wind farms.

Marine Scotland (2022) Defining 'Local Area' for assessing impact of offshore renewables and other marine developments. Available: https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2022/06/defining-local-area-assessing-impact-offshore-renewables-marine-developments-guidance-principles/documents/defining-local-area-assessing-impact-offshore-renewables-marine-developments-final-report/defining-local-area-assessing-impact-offshore-renewables-marine-developments-final-report/govscot%3Adocument/defining-local-area-assessing-impact-offshore-renewables-marine-developments-final-report.pdf. Accessed October 2023.

OEUK (2022) Workforce Insight 2022: The people powering the energy transition offshore. Available: https://oeuk.org.uk/wp-content/uploads/2022/11/OEUK-Workforce-Insight-2022.pdf. Accessed October 2023.

ONS (2009) UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007): Structure and explanatory notes. Available: https://www.ons.gov.uk/file?uri=/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007/uksic2007web.pdf. Accessed October 2023.

ONS (2022) Census 2021. Available: https://www.nomisweb.co.uk/default.asp. Accessed October 2023.

ONS (2023a) United Kingdom Input-Output Analytical Tables, product by product, 2019. Available: https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesdetailed. Accessed October 2023.

ONS (2023b) Annual Business Survey: UK non-financial business economy, UK, 2008 to 2021. Available: https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/uknonfinancialbusinesseconomyannualbusinesssurveysectionsas. Accessed October 2023.

ONS (2023c) Business Register and Employment Survey. Available: https://www.nomisweb.co.uk/default.asp. Accessed October 2023

ONS (2023d) Data tables for: Retail Sales Index – Internet Reference Tables. Available: https://www.ons.gov.uk/file?uri=/businessindustryandtrade/retailindustry/datasets/retailsalesindexinternetsales/current/previous/v85/internetsales.xlsx. Accessed October 2023.

ONS (2023e) Earnings and hours worked, all employees: ASHE Table 16. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/earningsandhoursworkedallemployeesashetable16. Accessed October 2023.

ONS (2023f) Family Spending: Workbook 1 – Detailed Expenditure and Trends. Available: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends. Accessed October 2023.

ONS (2023g) Inflation rates of input and output producer price inflation, 1996 to 2023. Available: https://www.ons.gov.uk/economy/inflationandpriceindices/datasets/growthratesofoutputandinputproducerpriceinflation. Accessed October 2023.

ONS (2023h) Regional gross value added (balanced) by industry: all International Territorial Level (ITL) regions. Available: https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry. Accessed October 2023

RGU (2023) Powering up the Workforce: The future of the UK offshore energy workforce.

Welsh Government (2021) Future Wales: The National Plan 2040. Available: https://www.gov.wales/future-wales-national-plan-2040. Accessed October 2023.

Appendix A: Economic impact study area definition

This appendix sets out the approach to defining economic study areas.

A.1 Step 1: identify potential port facilities

Assumptions adopted as part of this analysis are to inform the assessment alone and have been determined based on a consideration of ports within the defined study area that have the potential to service offshore developments within the Irish Sea. The final selection of ports, potential manufacturing and fabrication facilities, and delivery models required for the Transmission Assets has not been determined at the point of application. It is, however, likely that more than one port will be used to support elements of the construction, operation and maintenance, and decommissioning phases of the Transmission Assets as part of a wider supply chain.

Final selection of ports, potential manufacturing and fabrication facilities, and delivery models will be subject to ongoing engineering and procurement considerations – the use of assumptions for the purposes of this assessment does not indicate any commercial preference or imply any decision.

The ports involved in the project lifetime of an offshore wind farm can vary depending on the size and location of the project. Typically, an offshore wind farm project will require multiple ports throughout its lifetime, broadly covering the following:

- Fabrication port (construction phase): as technology develops and the size of offshore wind farm components continues to increase, the need to manufacture components in close proximity to the waterside also grows due to the challenges of transporting large components by road or rail. Components such as cables will therefore typically require fabrication at a port, within reasonable proximity of the waterside. Components are typically built at the fabrication port(s) and can subsequently be transferred directly to the offshore site, or to an intermediate marshalling port(s). Due to the infrastructure requirements of large components (e.g., laydown and storage areas), it is likely that multiple fabrication ports will be utilised during project delivery. The fabrication port(s) delivering any component can be based anywhere in the world.
- Marshalling port (construction phase): this facility serves as a hub for the coordination of components, equipment, and workforce during the construction phase, including storage and distribution. The marshalling port(s) will also serve as the staging area for installation and support vessels. Due to the infrastructure requirements of large components, it is likely that multiple marshalling ports will be utilised during project delivery. Where marshalling ports are required, these will typically be located within reasonable proximity of the offshore site.
- Operation and maintenance port: when an offshore wind farm has been commissioned, a port is selected as the primary hub for ongoing maintenance of components, along with other operational requirements. The operation and maintenance port will typically be located within close proximity of the offshore site.

There are a number of considerations when identifying ports that have the potential to support fabrication and/or marshalling activities during the construction phase. It is

possible that some ports will be better suited to the fabrication and marshalling requirements of certain components, whilst being unsuitable for other components. Considerations regarding port suitability include:

- Water depth: as the size of offshore wind farm components increases, so does the size of the associated transportation and installation vessels. A port should have adequate water depth to accommodate vessels and equipment.
- Infrastructure: a port should have the necessary infrastructure and facilities, including laydown areas, cranes capable of lifting and moving equipment and components, storage areas (indoor and outdoor), workshops, and offices.
- Transport links: a port should have suitable road and rail connectivity to allow for the efficient transfer of smaller components/subcomponents, equipment, workforce, and raw materials.
- Labour market: consideration can also be given to the availability of skilled labour within the labour market catchment of the port.

Given the many variables associated with port(s) selection during the construction phase, typical delivery models incorporate multiple ports which will each deliver the fabrication and/or marshalling needs of specific components, depending on requirements (e.g. export cables).

A long list of ports located in North Wales and North West England, and their potential to support each of the various activities associated with delivery of the Transmission Assets is set out in **Appendix Table 1**.

Assumptions regarding port capabilities are based on non-statutory consultation responses from industry experts within the Offshore Energy Alliance region – the offshore energy industry cluster for the North Wales and North West England Region.

Appendix Table 1: Long list of capabilities of potential construction, operation and maintenance, and decommissioning port facilities in North Wales and North West England

Note: X = current capability to support delivery of component. Blank indicates not currently capable to support delivery of component.

	Holyhead	Mostyn	Birkenhead	Heysham	Barrow-in-Furness
Construction[5]					
Wind turbine					
Fabrication					
Marshalling					
Foundations					
Fabrication					
Marshalling					
Offshore substations					
Fabrication					
Marshalling					
Export cables					
Fabrication					
Marshalling	X	X	X	X	X
Array cables					
Fabrication					
Marshalling	X	X	X	X	X
Operation and maintenance					
Operations base	X	X	X	X	X
Decommissioning					
Wind turbine					
Foundations					
Offshore substations					
Cables	X	X	X	X	X

Identified potential port facilities deemed to be suitable bases for components of the construction phase are also assumed to be suitable for the decommissioning phase, given the similarities between activities associated with both phases.

[5] Generation infrastructure included within this table because multiple ports will be required for Morgan Offshore Wind Project, Morecambe Offshore Windfarm in addition to the Transmission Assets.

A.2 Step 2: assess economic study area(s) associated with potential port facilities

Labour catchment areas[6] associated with each longlisted port facility have been defined using a 60 minute drive time catchment as a proxy[7].

As per Glasson *et al.* (2020) and Marine Scotland (2022), adopting a methodology which defines sub-national economic study area(s) associated with offshore wind farm projects on the basis of local authority areas is necessary given that government data sources are structured to reflect conditions at local authority level. Below this level of governance, data becomes increasingly scarce and can be less reliable when dealing with survey based data, for example. It is also necessary to take account of wider policy and administrative designations in determining appropriate areas for consideration.

Therefore, 60 minute drive time catchments for each facility have been converted to the following best fit sub-national economic study areas:

- North Wales: together, the Holyhead and Mostyn ports' 60 minute drive time catchments cover (at least partially) the six local authorities which de facto constitute 'North Wales'. As per the Welsh Government's National Development Framework (Welsh Government, 2021), these local authorities constitute the 'North' strategic planning region. North Wales is therefore an appropriate definition for a sub-national economic study area. It is appropriate to define North Wales as a 'region' of Wales (although it should be noted that 'North Wales' does not meet the statistical definition of a UK region).
- North West England: together, the Barrow-in-Furness, Heysham, and Birkenhead ports' 60 minute drive time catchments cover (at least partially) 37 of 39 local authorities in the North West region – the two exclusions being Allerdale and the City of Carlisle in north Cumbria. Levelling Up the United Kingdom (Department for Levelling Up, Housing and Communities, 2022) – the UK government's social and economic programme for government – utilises regional definitions for the purposes of identifying the next steps the Government will take to deliver its programme. North West England is therefore an appropriate definition for a sub-national economic study area (note: North West England does meet the statistical definition of a UK region).

[6] Labour catchment areas are commonly defined based on the locations from which people are typically drawn to an employment location such as a business, an employment centre (such as a port), or an entire town or city.

[7] As per non-statutory guidance in Glasson, J. et al. (2020).

Appendix B: Expenditure by component – supply chain framework

Appendix Table 2: Offshore wind farm supply chain categories (Crown Estate and ORE Catapult, 2019)

Level 1	Level 2	Level 3
(P) Development and project management	(P.1) Development and consenting services	(P1.1) Environmental impact assessments
	(P.2) Environmental surveys	Benthic environmental surveys
		(P.2.2) Fish and shellfish surveys
		(P.2.3) Ornithological environmental surveys
		(P.2.4) Marine mammal environmental surveys
		(P.2.5) Onshore environmental surveys
		(P.2.6) Human impact studies
	(P.3) Resource and metocean assessment	(P.3.1) Structure
		(P.3.2) Sensors
		(P.3.3) Maintenance
	(P.4) Geological and hydrographical surveys	(P.4.1) Geophysical surveys
		(P.4.2) Geotechnical surveys
		(P.4.3) Hydrographic surveys
	(P.5) Engineering and consultancy	(P.5) Engineering and consultancy
(T) Wind turbine	(T.1) Nacelle	(T.1.1) Bedplate
		(T.1.2) Main bearing
		(T.1.3) Main shaft

Level 1	Level 2	Level 3
		(T.1.4) Gearbox
		(T.1.5) Generator
		(T.1.6) Power take-off
		(T.1.7) Control system
		(T.1.8) Yaw system
		(T.1.9) Yaw bearing
		(T.1.10) Nacelle auxiliary systems
		(T.1.11) Nacelle cover
		(T.1.12) Small engineering components
		(T.1.13) Structural fasteners
		(T.1.14) Condition monitoring system
	(T.2) Rotor	(T.2.1) Blades
		(T.2.2) Hub casting
		(T.2.3) Blade bearings
		(T.2.4) Pitch system
		(T.2.5) Spinner
		(T.2.6) Rotor auxiliary systems
		(T.2.7) Fabricated steel components
	(T.3) Tower	(T.3.1) Steel
		(T.3.2) Tower internals
(B) Balance of plant	(B.1) Cables	(B.1.1) Export cable
		(B.1.2) Array cable

Level 1	Level 2	Level 3
		(B.1.3) Cable protection
	(B.2) Turbine foundation	(B.2.1) Monopile[8]
		(B.2.2) Jacket
		(B.2.3) Transition piece[9]
		(B.2.4) Corrosion protection
		(B.2.5) Scour protection
	(B.3) Offshore substation	(B.3.1) Electrical system
		(B.3.2) Facilities
		(B.3.3) Structure
	(B.4) Onshore substation	(B.4.1) Buildings, access and security
	(B.5) Operations base	
(I) Installation and commissioning	(I.1) Foundation installation	(I.1.1) Foundation installation vessel
	(I.2) Offshore substation installation	(I.2.1) Substation installation vessel
	(I.3) Onshore substation installation	
	(I.4) Onshore export cable installation	
	(I.5) Offshore cable installation[10]	(I.5.1) Cable-laying vessel
		(I.5.2) Cable burial

[8] Not included as an option within project design envelope – excluded from the assessment.

[9] Since monopile foundations option is excluded, transition piece is also excluded from the assessment.

[10] Offshore cable installation costs are not provided separately for export and array cables. These costs have therefore been split on the basis of the equivalent share of each in terms of balance of plant cost estimates.

Level 1	Level 2	Level 3
		(I.5.3) Cable pull-in
		(I.5.4) Electrical testing and termination
	(I.6) Turbine installation	(I.6.1) Turbine installation vessel
		(I.6.2) Commissioning
	(I.7) Construction port[11]	
	(I.8) Offshore logistics	(I.8.1) Sea-based support
		(I.8.2) Marine coordination
		(I.8.3) Weather forecasting and metocean data
(O) Operation, maintenance and service	(O.1) Operations	(O.1.1) Training
		(O.1.2) Onshore logistics
		(O.1.3) Offshore logistics
		(O.1.4) Health and safety inspections
	(O.2) Maintenance and service	(O.2.1) Turbine maintenance and service
		(O.2.2) Balance of plant maintenance and service
(D) Decommissioning	(D.1) Turbine decommissioning	
	(D.2) Foundation decommissioning	
	(D.3) Cable decommissioning	
	(D.4) Substation decommissioning	

[11] Construction port cost estimates are not provided, and have therefore been excluded from the assessment.

Appendix C: Impact industries definitions

Appendix Table 3: Employment impact industry definitions

SIC07 Class/ Subclass	Description	C	O	D
03.11	Marine fishing			
06.10	Extraction of crude petroleum			
06.20	Extraction of natural gas			
09.10	Support activities for petroleum and natural gas extraction			
23.61	Manufacture of concrete products for construction purposes			
24.10	Manufacture of basic iron and steel and of ferro-alloys			
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel			
24.31	Cold drawing of bars			
24.32	Cold rolling of narrow strip			
24.33	Cold forming or folding			
24.34	Cold drawing of wire			
24.42	Aluminium production			
24.43	Lead, zinc and tin production			
24.44	Copper production			
24.45	Other non-ferrous metal production			
24.52	Casting of steel			
24.53	Casting of light metals			
24.54	Casting of other non-ferrous metals			

25.11	Manufacture of metal structures and parts of structures			
25.50	Forging, pressing, stamping and roll-forming of metal; powder metallurgy			
25.61	Treatment and coating of metals			
25.93	Manufacture of wire products, chain and springs			
25.94	Manufacture of fasteners and screw machine products			
25.99	Manufacture of other fabricated metal products n.e.c.			
27.11	Manufacture of electric motors, generators and transformers			
27.12	Manufacture of electricity distribution and control apparatus			
27.20	Manufacture of batteries and accumulators			
27.31	Manufacture of fibre optic cables			
27.32	Manufacture of other electronic and electric wires and cables			
28.11	Manufacture of engines and wind turbines, ex. aircraft, vehicle and cycle engines			
28.15	Manufacture of bearings, gears, gearing and driving elements			
28.22	Manufacture of lifting and handling equipment			
28.29	Manufacture of other general-purpose machinery n.e.c.			
28.41	Manufacture of metal forming machinery			
28.91	Manufacture of machinery for metallurgy			
28.99	Manufacture of other special-purpose machinery n.e.c.			
30.11	Building of ships and floating structures			
33.11	Repair of fabricated metal products			
33.13	Repair of electronic and optical equipment			
33.14	Repair of electrical equipment			
33.15	Repair and maintenance of ships and boats			

33.20	Installation of industrial machinery and equipment			
35.11	Production of electricity			
35.12	Transmission of electricity			
35.21	Manufacture of gas			
38.31	Dismantling of wrecks			
38.32	Recovery of sorted materials			
39.00	Remediation activities and other waste management services			
39.00	Remediation activities and other waste management services			
42.22	Construction of utility projects for electricity and telecommunications			
42.91	Construction of water projects			
43.13	Test drilling and boring			
50.10	Sea and coastal passenger water transport			
50.20	Sea and coastal freight water transport			
52.10/1	Operation of warehousing and storage facilities for water transport activities			
52.22	Service activities incidental to water transportation			
52.24/1	Cargo handling for water transport activities of division 50			
77.32	Renting/leasing of construction and civil engineering machinery and equipment			
77.34	Renting and leasing of water transport equipment			
77.39	Renting and leasing of other machinery, equipment and tangible goods n.e.c.			