Sectoral Marine Plan for Offshore Wind Energy

Social and Economic Impact Assessment Report – Final

December 2019

Scottish Government
Riaghaltas na h-Alba
gov.scot

Sectoral Marine Plan for Offshore Wind Energy

Social and Economic Impact Assessment Report – Final

December 2019

Report prepared by:

ABP mer & RPA Risk & Policy Analysts

For:

Scottish Government
Riaghaltas na h-Alba
gov.scot

marinescotland

Draft Sectoral Marine Plan for Offshore Wind Energy consultation

This document forms part of the consultation on the draft Sectoral Marine Plan for Offshore Wind Energy. The draft plan is accompanied by many supporting assessments under a Sustainability Appraisal. These documents are all available online at:

https://consult.gov.scot/marine-scotland/draft-sectoral-marine-plan-for-offshore-wind/

They can also be found individually at the links below:

Draft Sectoral Marine Plan for Offshore Wind Energy
http://www.gov.scot/ISBN/9781839603747

Strategic Environmental Assessment Environmental Report
http://www.gov.scot/ISBN/9781839603761

Social and Economic Impact Assessment (this report)
http://www.gov.scot/ISBN/9781839603792

Strategic Habitat Regulations Appraisal (HRA): Screening and Appropriate Assessment Information Report
http://www.gov.scot/ISBN/9781839603754

Regional Locational Guidance
http://www.gov.scot/ISBN/9781839603778

Sustainability Appraisal
http://www.gov.scot/ISBN/9781839603785

Non-Technical Summary

Introduction

The Scottish Government is developing a plan for future commercial-scale offshore wind development in Scottish waters in the period to 2050. The plan builds on the previous draft plan for offshore wind published in 2013 and also seeks to provide opportunities for deep water wind technologies which may become commercially viable over this time period.

The geographical scope of the plan covers Scottish Waters (0-200 nautical miles, NM) (Figure 1). This includes Scottish Territorial Waters (0-12 NM) and the Scottish Marine Area (12-200 NM) which is executively devolved to Scottish Ministers under the Marine and Coastal Access Act 2009.

What is Socio-Economic Impact Assessment?

Socio-economic impact assessment (SEIA) aims to identify and assess the potential economic and social effects of a proposed development or policy on the lives and circumstances of people, their families and their communities. The assessment investigates the potential cumulative positive and negative economic impacts, and associated potential social impacts, of implementing the Sectoral Marine Plan. It also considers the potential positive and negative economic impacts, and associated potential social impacts, of implementing the suite of measures overall.

The assessment provides Marine Scotland with evidence on economic and social effects to inform a Sustainability Appraisal for the Sectoral Marine Plan for Offshore Wind.

What is the plan?

The sectoral marine planning process is an iterative process, informed through stakeholder engagement and evidence from the related social, economic and environmental assessments. All of the information and consultation feedback gathered supports the Scottish Ministers in identifying Draft Plan Option areas (DPOs) to progress to the next phase of the plan process.

Currently the majority of offshore wind farms have been built using conventional fixed bottom substructure technology. The maximum depth considered economically and technically feasible for these to be installed is approximately up to 60 m of depth, although technological development may increase this to around 80 m. This depth requirement significantly limits the amount of seabed space that can be exploited. New technology such as floating wind turbines attached to the seabed by chains and anchors can potentially open up new areas of sea as they are theoretically not limited by depth. The maximum depth considered for offshore deployment is considered to be around 800 m.

An Areas of Search Scoping study was undertaken to identify areas for potential consideration, including the full range of water depths down to 800 m. The Scoping report identified an initial 24 Areas of Search (AoS) that could provide suitable locations for conventional and deep water wind options. These 24 AoS were subsequently reviewed and updated, through an examination of spatial data considerations in addition to advice and other related information provided by members of the Steering Groups and stakeholders, resulting in the identification of 17 Draft Plan Options (DPOs) taken forward for further assessment. (Figure NTS1)

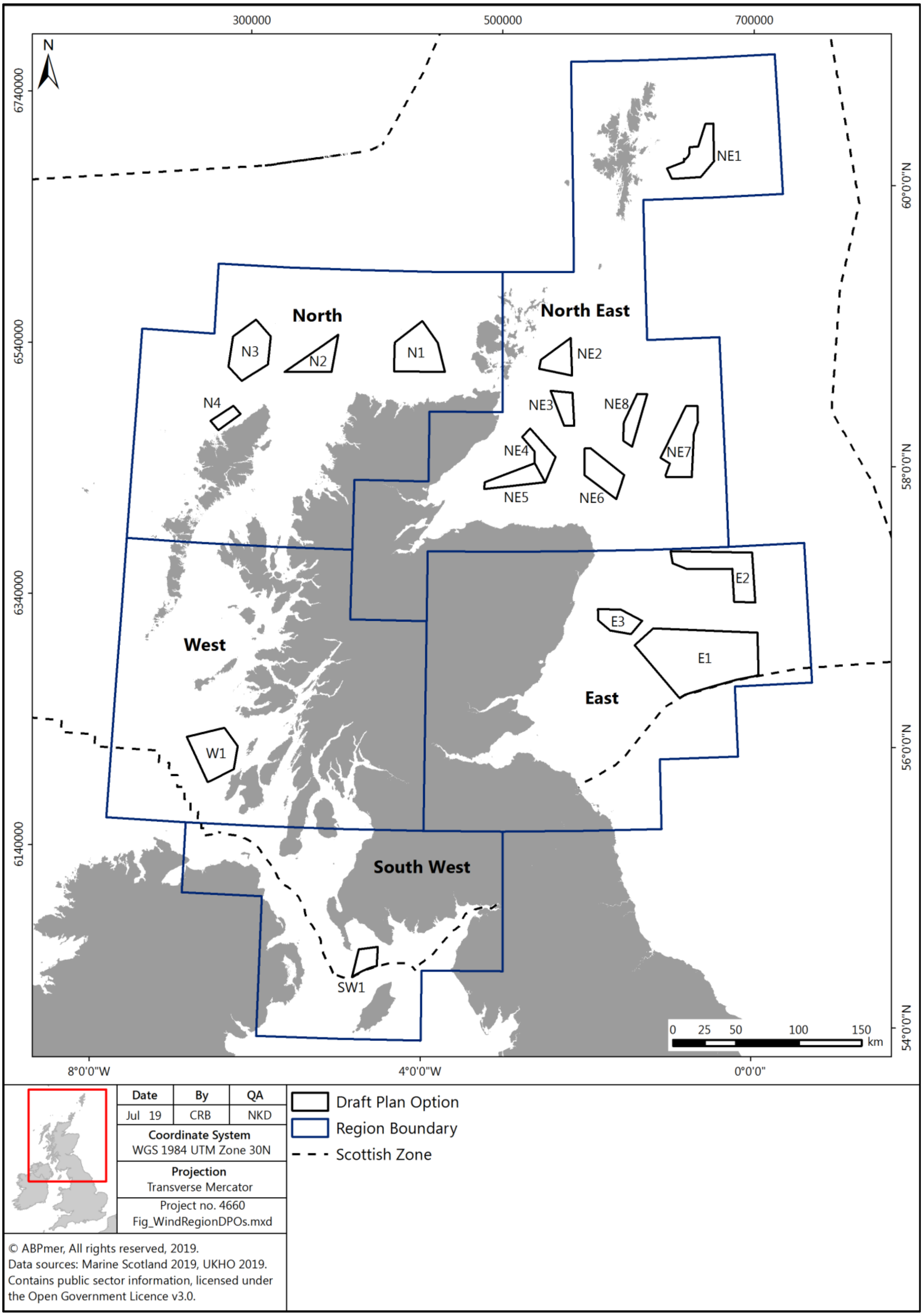

Figure NTS1 Map of Offshore Wind Draft Plan Options and Regions

How was the Socio-Economic Impact Assessment undertaken?

The methodology for the assessment of social and economic impacts built on similar previous studies and previous EIAs for offshore developments. It followed wider guidance on impact assessment including Scottish Government guidance on Business and Regulatory Impact Assessment and HM Treasury's Green Book methodology.

The methodology covers the following steps:

- Scenarios relating to future offshore wind development;
- Defining relevant marine activities for inclusion in the assessment;
- Establishing a baseline;
- Scoping of impacts;
- Assessing negative economic impacts to marine activities;
- Assessing positive economic impacts to marine activities;
- Assessing social impacts on individuals, communities and society; and
- Approach to assessing combined impacts.

Which scenarios have been assessed?

Three scenarios (termed 'Low Case', 'Medium Case' and 'High Case') are applied to reflect the different scales of possible future offshore development within the DPOs at national level in the period 2020 to 2050 as follows (in terms of additional capacity beyond existing lease agreements):

- Low Case: 3 GW installed capacity;
- Medium Case: 5 GW installed capacity;
- High Case: 10 GW installed capacity;

In order to carry out a realistic assessment of the potential social and economic impact of possible development under the Plan, consideration has been given both to possible scales of development within each DPO and possible scales of development at regional and national levels. These assumptions are set out in Table NTS1.

The assessment of the potential negative impacts of development within individual DPOs has assumed that development occurs at a 'maximum realistic level' (column 5 of Table NTS1) having regard to the overall capacity of the DPO and the anticipated overall scale of likely development under the Plan at regional and national levels.

At regional scale, it is unlikely that development will occur in every DPO in a region and some locations will be taken forward in preference to others. Table NTS1 therefore also includes assumed realistic regional scales of development under the scenarios. To quantify impacts at regional level the sum of the project-level impacts has been scaled back *pro rata* to the regional scenario totals. To quantify impacts at national level, further scaling back of the regional totals has been undertaken in line with the overall scale of likely development under the Plan at national level under each scenario.

Table NTS1 Indicative Capacity and Occupancy of Draft Option Plan Areas

Region	DPO	Area (km²)	Potential installed capacity (GW)	Realistic maximum development scenario for DPO (GW)	Regional Low Scenario (GW)	Regional Medium Scenario (GW)	Regional High Scenario (GW)
East	E1	3816	19.1	3			
	E2	1287	6.4	2			
	E3	474	2.4	1			
	Sub-total	5577	27.9	6	1	2	3
North East	NE1	776	3.9	2			
	NE2	464	2.3	1			
	NE3	339	1.7	1			
	NE4	440	2.2	1			
	NE5	496	2.5	1			
	NE6	699	3.5	2			
	NE7	1027	5.1	3			
	NE8	401	2.0	1			
	Sub-total	4641	23.2	12	1.5	3	4.5
North	N1	1163	5.8	2			
	N2	560	2.8	2			
	N3	1106	5.5	2			
	N4	200	1.0	1			
	Sub-total	3030	15.1	7	1	2	3
West	W1	1107	5.5	2			
	Sub-total	1107	5.5	2	0.5	1	2
South West	SW1	292	1.5	1			
	Sub-total	292	1.5	1	0.3	0.6	1
Total		**14646**	**73.2**	**28**	**4.3**	**8.6**	**13.5**
Scaled back in national scenario to:					**3**	**5**	**10**

What are the likely significant economic and social impacts of the proposals?

The socio-economic assessment captures:

- Positive GVA and job impacts from spending across the supply chain;
- Negative impacts on GVA and jobs from adverse economic impacts on marine activities; and
- Social impacts on individuals, communities and wider society from both the positive and negative impacts.

Positive GVA and job impacts are based on identifying the change in output due to spending on planning, construction, and operations (positive impacts) or reduction in activity or increased costs (negative impacts). These are estimated as impacts on marine sectors and, using the GVA effect and employment effect multipliers, the direct and indirect (Type I) and induced effects (Type II). They enable the knock-on effects to other sectors or society as a whole to be estimated. The impacts are quantified as change in GVA (£) and change in number of jobs (as full-time equivalents, FTEs). All impacts are assessed for the low, medium and high scenarios across the project assessment timescale from 2020 to 2059. An assessment is made of the amount of money that would be retained (retention rates) in each region based on the level of development over time, the expected capacity of the supply chain in 2020 and the extent to which this may grow due to the levels of spending along the supply chain.

The social impacts are assessed using social clusters, which are groupings of impacts intended to capture those effects that have been identified as being most significant to individuals and communities, and which align with national indicators and sustainable development goals from Scotland's National Performance Framework. Social impacts are described and a rating is assigned to enable comparison of the expected magnitude of impacts. The ratings range from major negative (- - - -), which is associated with impacts that are expected to have a noticeable effect that is sufficient to cause complaints or protests from the community through to major positive (+ + + +), which is defined as having a noticeable effect that supports new services or activities within the community. The assessment also includes a distributional analysis where those groups that may be impacted more than others (positively or negatively) are highlighted.

<u>Potential negative economic impacts on marine activities</u>

Within the plan there is a variation in impacts between different DPOs and regions, with some DPOs having significantly higher potential negative economic impacts, and therefore likely constraints on development. Table NTS2 summarises the present value of potential negative economic impacts across all sectors and direct GVA impacts (for commercial fisheries) for each DPO.

Table NTS2 Potential negative economic impacts across all sectors per DPO (present value of total costs and direct GVA over assessment period 2020-2059, £000s, 2019 prices)

DPO	Maximum Development Scenario (GW)	Cost (£000s)	Cost per GW installed (£000s)	Direct GVA cost (£000s)	Direct GVA cost per GW installed (£000s)
SW1	1	17,642	17,642	432	432
W1	2	5,131	2,565	1,482	741
N1	2	8,896	4,448	1,392	696
N2	2	418	209	823	411
N3	2	318	159	1,991	995
N4	1	4,159	4,159	675	675
NE1	3	2,273	1,137	1,378	689
NE2	1	9,269	9,269	399	399
NE3	1	2,048	2,048	600	600
NE4	1	2,639	2,639	808	808
NE5	1	6,435	6,435	803	803
NE6	2	19,712	9,856	345	173
NE7	2	3,082	1,541	2,967	1,483
NE8	1	777	777	1,786	1,786
E1	3	1,916	639	326	109
E2	2	786	393	659	330
E3	1	5,456	5,456	74	74

The highest quantified potential negative economic impacts (on costs) under the maximum development scenario are in NE6 at £19.7 million, whilst per GW SW1 is highest at £17.6 million.

Negative economic impacts on commercial shipping and commercial fishing make up the vast majority of the total potential impacts at all DPOs with smaller impacts from watersports, tourism and power interconnectors within certain regions.

Impacts on commercial fisheries show relatively high impacts on direct GVA (over £1 million present value over the assessment period) for a number of DPOs under the maximum development scenario (W1, N1, N3, NE1, NE7 and NE8). When considered in relation to the impact per GW installed, NE4, NE5 and N4 also have a relatively high impact per GW. These DPOs affect a range of different fleet segments (demersal trawl/seine, pelagic trawl, mechanical dredge, pots) mostly for over-12m vessels but some also for 12m and under vessels (N4, NE4, NE5). The potential for a combined impact on individual fleet segments within a region is limited by the distribution of the

DPOs, which tend to affect different fleet segments. The exceptions are NE4 and NE5, which are in close proximity and both affect over-12m mechanical dredgers, and N2 and N3 which both affect over-12m demersal trawlers and pelagic trawlers.

Whilst the quantified potential cost impact in certain DPOs is low this may, but does not necessarily, indicate a region of lower constraint, as unquantified impacts, such as requirements to divert helicopter routes around offshore wind developments, may have the potential to be of significant constraint.

In addition, spatial planning within DPOs has the potential to avoid areas of larger impacts, and hence reduce overall potential impacts to sectors. i.e. through the application of MGN 543 to design safe shipping lanes through offshore wind arrays and therefore reduce potential impacts to commercial shipping. The impact of such spatial planning cannot be assessed within this document, so a worst-case scenario has been used for the purposes of the calculations. However spatial planning can be defined at plan level as a requirement on project development.

At regional and national scales it is recognised that not all DPOs will be developed, and not all to their maximum development scenario. Therefore, it is appropriate to scale the potential negative economic impacts identified above against individual DPOs when combining them at a regional and national scale. Table NTS3 summarises the total present value potential impacts for all sectors (excluding commercial fishing which is included within Table NTS4 as direct GVA impacts) combined and scaled as per the regional and national scenarios.

Table NTS3 Potential negative economic impacts to all sectors (excluding fisheries) (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Low Scenario (GW)	Low Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	High Scenario (GW)	High Scenario (£000s)
South West	0.3	5,295	0.6	9,317	1	15,529
West	0.5	1,288	1	2,565	2	4,516
North	1	1,734	2	3,468	3	4,569
North East	1.5	5,372	3	9,241	4.5	13,861
East	1	1,360	2	2,502	3	3,463
National	**3**	**8,638**	**5**	**13,636**	**10**	**27,704**

Table NTS4 Potential negative economic to commercial fisheries (direct GVA impacts over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Low Scenario (GW)	Low Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	High Scenario (GW)	High Scenario (£000s)
South West	0.3	130	0.6	228	1	380
West	0.5	371	1	741	2	1,304
North	1	614	2	1,227	3	1,617
North East	1.5	1,000	3	1,756	4.5	2,634
East	1	177	2	311	3	409
National	3	**1,353**	5	**2,125**	10	**4,284**

Positive economic impacts

Supply chain impacts are reported by region and nationally, with GVA impacts given as a total across the study timescale and a maximum in any one year[1]. National GVA impacts range from £515 million (low scenario, Type I) to £2,137 million (high scenario, Type II). The maximum national GVA impacts in any one year are £46 million (low scenario, Type I) to £162 million (high scenario, Type II).

The GVA impacts vary considerably across the regions due to the amount of development that is expected and the retention rates that have been applied. Retention is expected to be greatest in the East and North East, but all regions see some growth in their supply chains over the project timescale. Highest levels of discounted GVA impacts from 2020 to 2059 are therefore also seen in the East and North East:

- East: £389 million (low, Type I) to £1,386 million (high, Type II);
- North East: £645 million (low, Type I) to £2,259 million (high, Type II);
- North: £139 million (low, Type I) to £497 million (high, Type II);
- West: £49 million (low, Type I) to £288 million (high, Type II); and
- South West: £30 million (low, Type I) to £149 million (high, Type II).

Maximum GVA impacts in any one year are also greatest in the North East, but due to timing of spending and growth of supply chains are of a similar magnitude in the East and North:

- East: £20 million (low, Type I) to £78 million (high, Type II);
- North East: £77 million (low, Type I) to £189 million (high, Type II);
- North: £21 million (low, Type I) to £50 million (high, Type II);

[1] All GVA impacts are given as Present Value (discounted) estimates over the study timescale from 2020 to 2059 using the HM Treasury discount rates.

- West: £3.4 million (low, Type I) to £40 million (high, Type II); and
- South West: £2.6 million (low, Type I) to £21 million (high, Type II).

Employment impacts are given as the maximum number of FTEs in any one year. Total jobs over the timescale cannot be simply summed over the 2020 to 2059 period as some jobs are likely to be provided for more than one year. The maximum number of FTEs generated or supported nationally is estimated at 864 (low, type I) to 3,821 (high, Type II). As with GVA impacts, the highest number of FTEs are seen in North East, East and North regions:

- East: 282 (low, Type I) to 1,849 (high, Type II);
- North East: 1,255 (low, Type I) to 4,250 (high, Type II);
- North: 373 (low, Type I) to 1,126 (high, Type II);
- West: 51 (low, Type I) to 808 (high, Type II); and
- South West: 38 (low, Type I) to 426 (high, Type II).

It is important to note that the sum across the regions is different to the national estimate due to the overall sum spent at the national level being scaled back.

<u>Social impacts on individuals, communities and society</u>

The socio-economic impacts have been assessed at both the national and regional scales. For all clusters, the ratings assigned to positive impacts from increased GVA and jobs in a region and nationally suggest these are at least equal to, and in many cases are greater than, the ratings for negative impacts. Overall the combined positive social impacts are expected to be slightly significant nationally and in the East and North East, and not very significant for the North, West and South West. Distributionally, both positive and negative impacts are likely to be centered around those ports with facilities to support wind farm activities, or where there are opportunities for expansion.

Positive community impacts range from negligible (+) to moderate (+ + +). The largest impacts are seen in the East and North East in terms of local industries, community sustainability and education. An influx of new people to take up jobs in the North East could also help support services such as shops, again helping to improve community sustainability. Overall, impacts in the North East and to some extent the East and nationally will see expansion of some services helping to lead to positive effects for local communities. The impacts may be affected by the transition from construction to operational phase if there is a significant reduction in number of workers. Overall, the impacts are expected to be not very significant in the North, West and South West and slightly significant in the East and North East.

Negative community impacts range from negligible (-) to moderate (- - -). Moderate negative impacts occur in the North East due to potential impacts on ferry services and possible congestion due to large numbers of people moving into the area to take up jobs. Demands for services such as housing and education may also result in negative impacts (although over time, expansion of such services may lead to positive impacts for the community). Although most negative impacts in the North, West and South West are minor (i.e. noticed by the community but accepted by the majority), there may be some local unease over changes to landscapes and seascapes, and perceived impacts on recreational opportunities that may have some distributional effects on specific groups within local communities. Nationally, the overall negative impacts are expected to be negligible (-) to minor (- -). Overall, the impacts are expected to be slightly significant in the North East and not very significant in the East, North, West, South West and nationally.

How do I respond to the consultation?

We are inviting responses to this consultation by **25 March 2020**.

Please respond to this consultation using the Scottish Government's consultation hub, Citizen Space (http://consult.gov.scot). You can access and respond to this consultation online at https://consult.gov.scot/marine-scotland/draft-sectoral-marine-plan-for-offshore-wind/. You can save and return to your responses while the consultation is still open. Please ensure that consultation responses are submitted before the closing date of **25 March 2020**.

If you are unable to respond using our consultation hub, please complete the Respondent Information Form to:

Sectoral Marine Plan for Offshore Wind Energy Consultation
Scottish Government
Marine Planning and Policy Division
Area GB North
Victoria Quay
Edinburgh EH6 6QQ

Handling your response

If you respond using the consultation hub, you will be directed to the About You page before submitting your response. Please indicate how you wish your response to be handled and, in particular, whether you are content for your response to published. If you ask for your response not to be published, we will regard it as confidential, and we will treat it accordingly.

All respondents should be aware that the Scottish Government is subject to the provisions of the Freedom of Information (Scotland) Act 2002 and would therefore have to consider any request made to it under the Act for information relating to responses made to this consultation exercise.

If you are unable to respond via Citizen Space, please complete and return the Respondent Information Form included in this document.

To find out how we handle your personal data, please see our privacy policy: https://beta.gov.scot/privacy/

Next steps in the process

Where respondents have given permission for their response to be made public, and after we have checked that they contain no potentially defamatory material, responses will be made available to the public at http://consult.gov.scot. If you use the consultation hub to respond, you will receive a copy of your response via email.

Following the closing date, all responses will be analysed and considered along with any other available evidence to help us. Responses will be published where we have been given permission to do so. An analysis report will also be made available.

Comments and complaints

If you have any comments about how this consultation exercise has been conducted, please send them to the contact address above or at sectoralmarineplanning@gov.scot.

Scottish Government consultation process

Consultation is an essential part of the policymaking process. It gives us the opportunity to consider your opinion and expertise on a proposed area of work.

You can find all our consultations online: http://consult.gov.scot. Each consultation details the issues under consideration, as well as a way for you to give us your views, either online, by email or by post.

Responses will be analysed and used as part of the decision making process, along with a range of other available information and evidence. We will publish a report of this analysis for every consultation. Depending on the nature of the consultation exercise the responses received may:

- indicate the need for policy development or review
- inform the development of a particular policy
- help decisions to be made between alternative policy proposals
- be used to finalise legislation before it is implemented

While details of particular circumstances described in a response to a consultation exercise may usefully inform the policy process, consultation exercises cannot address individual concerns and comments, which should be directed to the relevant public body.

Consultation on the draft Sectoral Marine Plan for Offshore Wind Energy
RESPONDENT INFORMATION FORM

Please Note this form **must** be completed and returned with your response.

To find out how we handle your personal data, please see our privacy policy: https://beta.gov.scot/privacy/

Are you responding as an individual or an organisation?

☐ Individual

☐ Organisation

Full name or organisation's name

Phone number	

Address

Postcode	

Email	

The Scottish Government would like your permission to publish your consultation response. Please indicate your publishing preference:

☐ Publish response with name

☐ Publish response only (without name)

☐ Do not publish response

Information for organisations:

The option 'Publish response only (without name)' is available for individual respondents only. If this option is selected, the organisation name will still be published.

If you choose the option 'Do not publish response', your organisation name may still be listed as having responded to the consultation in, for example, the analysis report.

We will share your response internally with other Scottish Government policy teams who may be addressing the issues you discuss. They may wish to contact you again in the future, but we require your permission to do so. Are you content for Scottish Government to contact you again in relation to this consultation exercise?

☐ Yes

☐ No

Table of Contents

Appendices

Tables

Figures

1 Introduction

1.1 Background

1.1.1 The Scottish Government is developing a plan for future commercial-scale offshore wind development in Scottish waters in the period to 2050. The plan builds on the previous draft plan for offshore wind published in 2013[2] and also seeks to provide opportunities for deep water wind technologies which may become commercially viable over this time period.

1.1.2 The geographical scope of the plan covers Scottish Waters (0-200 nautical miles, NM) (Figure 1). This includes Scottish Territorial Waters (0-12 NM) and the Scottish Marine Area (12-200 NM) which is executively devolved to Scottish Ministers under the Marine and Coastal Access Act 2009.

[2] The Scottish Government, 2013. Planning Scotland's Seas - Sectoral Marine Plans for Offshore Wind, Wave and Tidal Energy in Scottish Waters Consultation Draft. Available at: https://beta.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2013/07/draft-sectoral-marine-plans-offshore-renewable-energy-scottish-waters-consultation/documents/00428241-pdf/00428241-pdf/govscot:document/

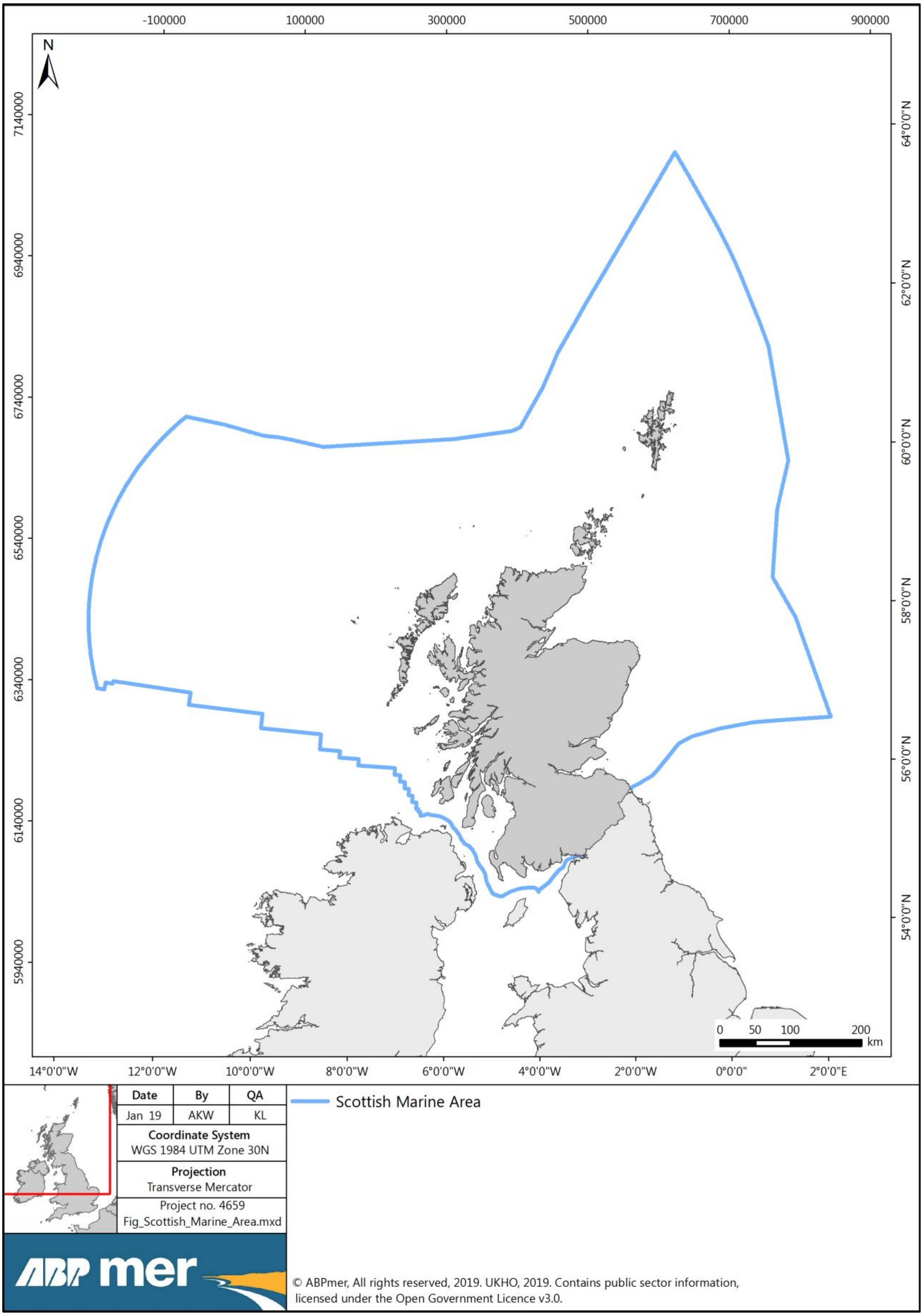

Figure 1 Map of Scottish Marine Area

1.2 Plan Development Process

1.2.1 The plan is being developed in accordance with Marine Scotland's sectoral marine planning process (Figure 2). Once adopted, it is intended that the plan will be reflected in subsequent updates to Scotland's National Marine Plan and in the preparation or revision of relevant Regional Marine Plans.

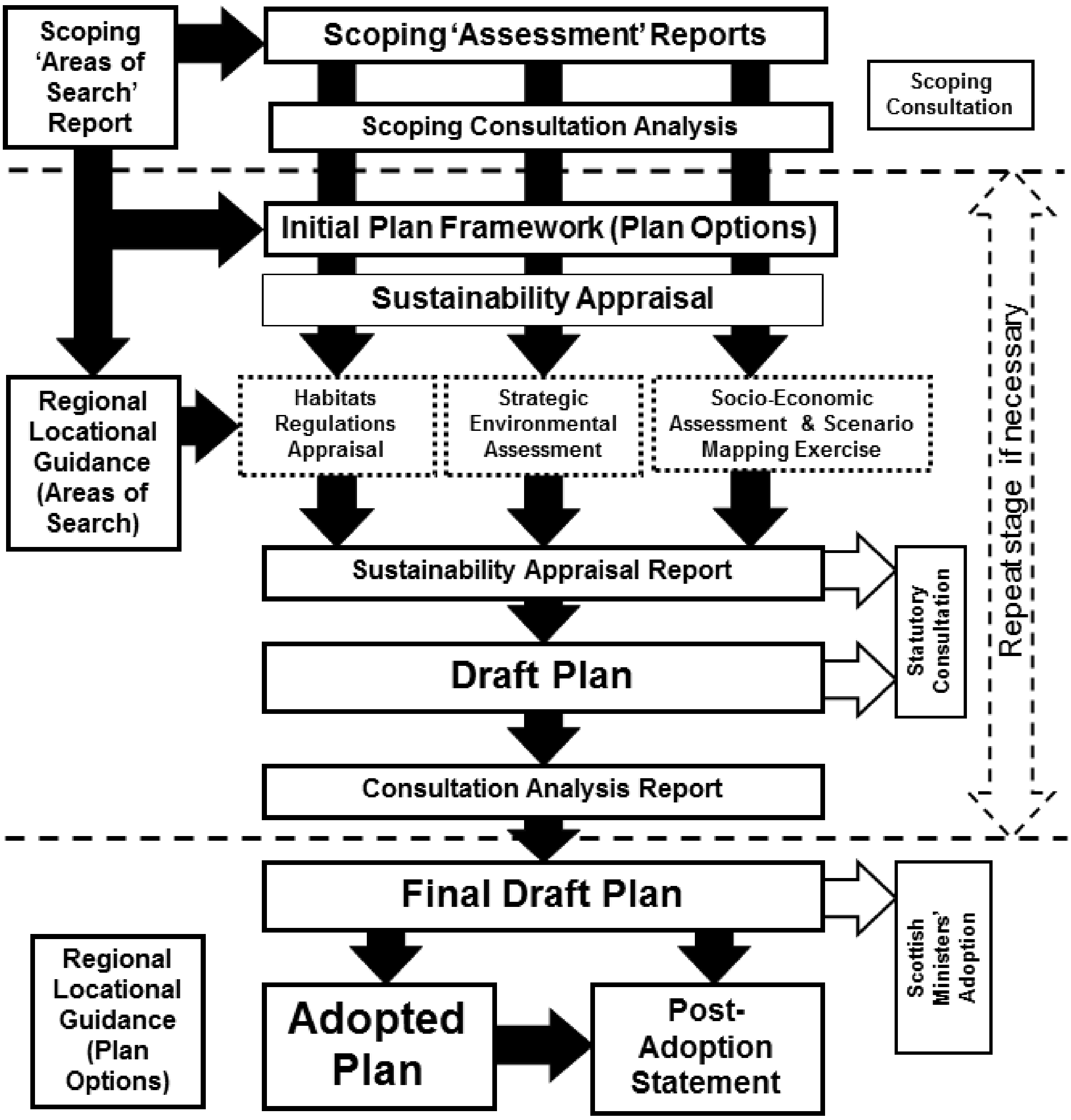

Figure 2 **Marine Scotland's Sectoral Marine Planning Process**

1.2.2 An informal public consultation on the initial stages of development of the draft Plan was held in June 2018. This included consultation on the following scoping documents:

- Context report[3];
- Social and Economic Impact Assessment[4];
- Habitats Regulations Appraisal[5];
- Strategic Environmental Assessment[6];
- Areas of Search Scoping report[7].

1.2.3 Currently the majority of offshore wind farms have been built using conventional fixed bottom substructure technology. The maximum depth considered economically and technically feasible for these to be installed is approximately up to 60 m of depth[8], although technological development may increase this. This depth requirement significantly limits the amount of seabed space that can be exploited. New technology like floating wind turbines attached to the seabed by chains and anchors can potentially open up new areas of sea as they are theoretically not limited by depth. The maximum depth considered for offshore deployment is considered to be around 800 m. Construction and deployment prices of floating foundations may eventually compete with those of fixed bottom technologies, if floating wind sees a similarly rapid cost reduction to that which has taken place in the fixed foundation wind industry.

1.2.4 In order to provide space for the potential development of conventional and deep water offshore wind options, the Areas of Search Scoping study considered the full range of water depths down to 800 m. Full details on the criteria applied in the development of the Areas of Search are provided in the Scoping report.

1.2.5 The Scoping report identified an initial 24 Areas of Search (AoS) (Figure 3) that could provide suitable locations for conventional and deep water wind options. These 24 AoS were subsequently reviewed and updated, resulting in the identification of 17 Draft Plan Options (DPOs) taken forward for further assessment (Figure 3 and reproduced to provide increased detail in a larger image in Figure 4). A full description of the process undertaken to identify the 17 DPOs is included in Section 1.3 below.

---

[3] Scottish Government, 2018a. Sectoral marine plan for offshore wind energy: context report. Available at: https://beta.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep water-plan/

[4] Scottish Government, 2018b. Sectoral marine plan for offshore wind energy: social and economic impact assessment scoping report. Available at: https://beta.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep waterplan-options/

[5] Scottish Government, 2018c. Sectoral marine plan for offshore wind energy: strategic habitat regulations appraisal pre-screening report. Available at: https://beta.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep water-plan-9781788519632/

[6] Scottish Government, 2018d. Sectoral marine plan for offshore wind energy: strategic environmental assessment screening and scoping report. Available at: https://beta.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep water-options/

[7] Scottish Government, 2018e. Search areas for offshore wind energy: scoping study. Available at: https://beta.gov.scot/publications/scoping-areas-search-study-offshore-wind-energy-scottish-waters-2018/

[8] The Carbon Trust (2015). Floating Offshore Wind: Market and Technology Review. Available at: http://www.carbontrust.com/media/670664/floating-offshore-wind-markettechnology-review.pdf

1.2.6 As part of the plan development process, draft Regional Locational Guidance (RLG) has been prepared[9] to provide a baseline for environmental, technical, socio-economic and planning issues in relation to the DPOs. The draft RLG grouped the DPOs into five broad geographic regions (South West, West, North, North East and East) (Figure 4).

9 In draft.

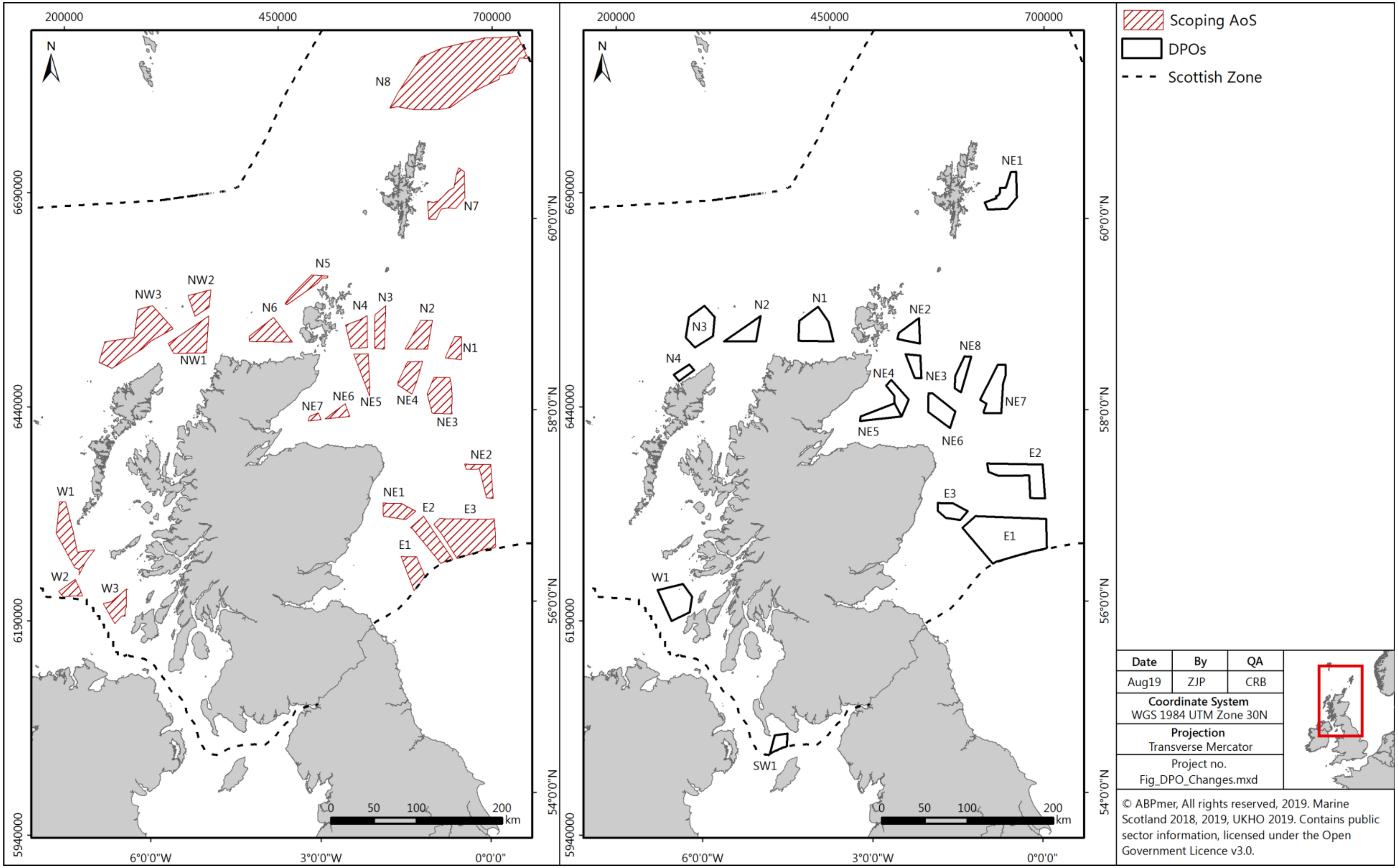

Figure 3 **AoS identified in the Scoping Report (left), and DPOs assessed in this report (right)**

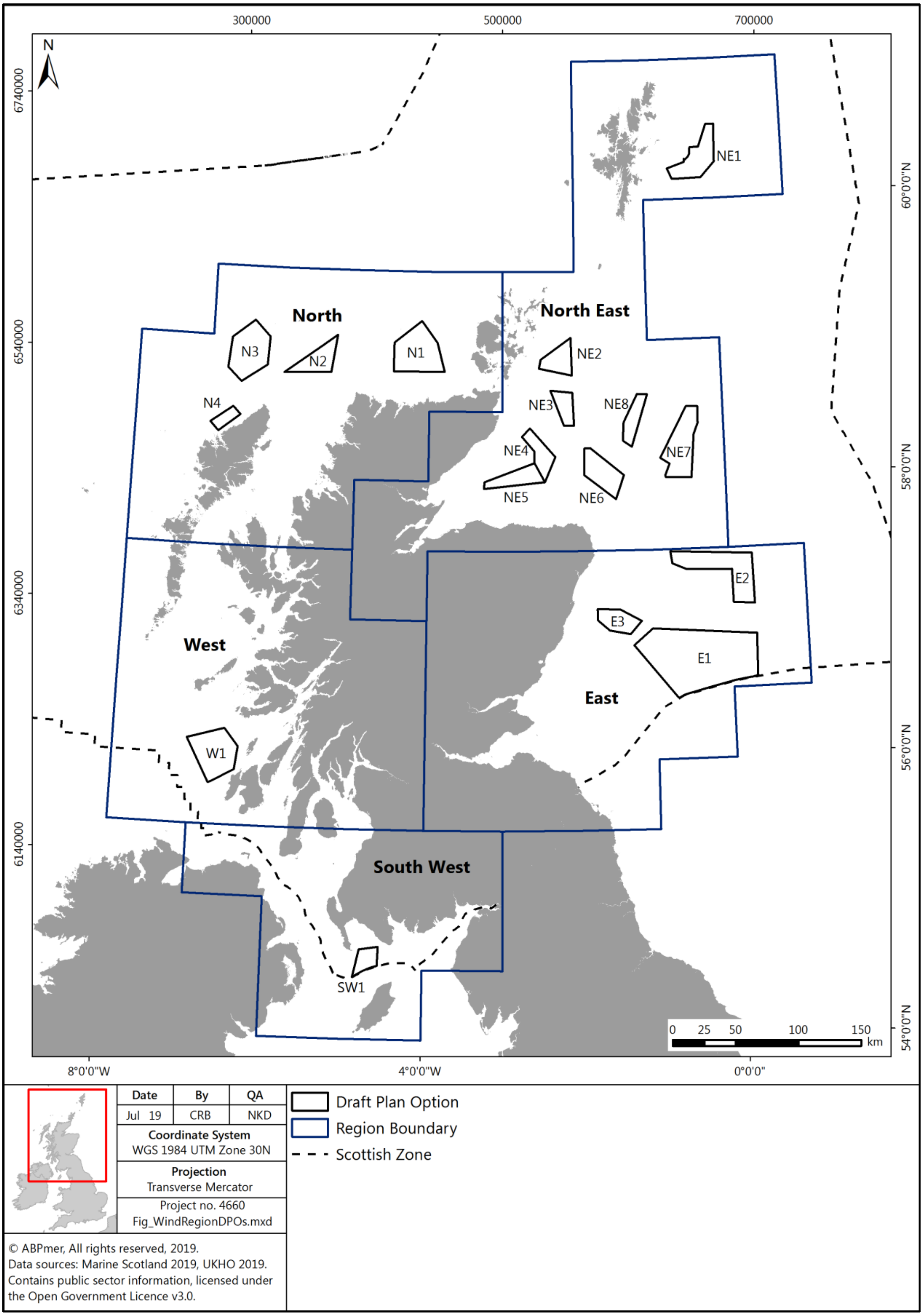

Figure 4 **Map of Offshore Wind Draft Plan Options and Regions**

Table 1 Offshore Wind Draft Plan Options

Region	DPO	Area (km²)
East	E1	3,816
	E2	1,287
	E3	474
North East	NE1	776
	NE2	464
	NE3	339
	NE4	440
	NE5	496
	NE6	699
	NE7	1,027
	NE8	401
North	N1	1,163
	N2	560
	N3	1,106
	N4	200
West	W1	1,107
South West	SW1	292

1.3 Identification of Draft Plan Options

1.3.1 The sectoral marine planning process (as shown in Figure 2) is an iterative process, informed through stakeholder engagement and evidence from the related social, economic and environmental assessments. All of the information and consultation feedback gathered supports the Scottish Ministers in identifying DPOs to progress to the next phase of the plan process.

1.3.2 The DPOs have emerged through an examination of spatial data considerations in addition to advice and other related information provided by members of the Steering Groups and stakeholders.

1.3.3 The key stages of the planning process in relation to the identification of the DPOs, described in greater detail below, are:

- Opportunity and Constraint (O&C) Analysis – Iteration 1;
- Opportunity and Constraint (O&C) Analysis – Iteration 2 – Single Issue Constraint Analysis;
- Scoping Consultation;
- Opportunity and Constraint (O&C) Analysis – Iteration 3;

- Identification of Draft Plan Options;
- Next Steps.

Opportunity and Constraint (O&C) Analysis – Iteration 1

1.3.4 The identification of initial Areas of Search (AoS) was carried out through the use of an O&C analysis. It built upon previous work carried out by Marine Scotland Science in 2011 and the production of draft regional locational guidance for potential deep water floating offshore wind test sites in 2014. The analysis was iterative, so updates could be incorporated as required in order to reflect stakeholder feedback.

1.3.5 Full details of the O&C analysis can be found in the AoS scoping report published for consultation in 2018. The O&C analysis sought to identify areas of opportunity for the future development of offshore wind, whilst also identifying areas that minimised potential negative impacts to the environment, other sectors and users of the sea. This analysis was completed through the use of GIS and numerous spatial data resources.

Opportunity and Constraint (O&C) Analysis – Iteration 2

1.3.6 Sectoral engagement workshops were held in spring 2018. The AoS were then refined with consideration to specific spatial issues and feedback from the workshops.

1.3.7 This refinement process identified a range of distinct AoS (Figure 3). As the draft Plan is technology neutral, no commercial or technology-specific information was used in this refinement process.

Scoping Consultation – Screening and Scoping Reports

1.3.8 Scottish Ministers then consulted on the screening and scoping stages of the Plan process during June and July 2018. Screening and scoping reports were prepared and published online for the SEA, HRA and SEIA alongside the AoS scoping study.

Opportunity and Constraint (O&C) Analysis – Iteration 3

1.3.9 Iteration 3 of the O&C analysis was undertaken, which considered the responses received during the Scoping Consultation. For more details see the Consultation Analysis.

1.3.10 The AoS were refined with consideration to the outputs of the Iteration 3 O&C Analysis. As a result, certain AoS were either removed or refined to avoid/incorporate certain areas of Scottish Waters.

1.3.11 This stage also considered the areas of seabed proposed by stakeholders via the scoping consultation. A number of the areas proposed overlapped with existing AoS, while others overlapped with areas with higher levels of constraint or entirely new areas. This information was provided to Scottish Ministers to inform their decision on the selection of DPOs.

1.3.12 Upon review of the above information, Scottish Ministers identified areas to move forward in the plan process. It should be noted that some additional areas were included at this stage, where there was significant stakeholder interest, but also increased constraint. The Sustainability Appraisal stage will assess these areas in greater detail.

Identification and Assessment of Draft Plan Options

1.3.13 The 22 revised AoS were made available to the Sectoral Marine Plan Project Board and two Project Steering Groups for consideration and comment.

1.3.14 Responses from both the Board and Steering Groups, together with the outputs of the initial assessments, were presented to Scottish Ministers to inform their decision on which AoS should progress to the Sustainability Appraisal for more detailed assessment.

1.3.15 Seventeen revised AoS were selected as DPOs within the draft plan to be taken forward for more detailed assessment within the overall Sustainability Appraisal (Figure 4).

Next Steps

1.3.16 Following statutory consultation on the Draft Plan and accompanying Sustainability Appraisal, the responses received will be subject to consultation analysis. This analysis will be considered by Scottish Ministers' and inform their decision on which Options to take forward in the Final Plan.

1.3.17 It should be noted that if significant changes are required as a result of the consultation feedback, further assessment and consultation may be required prior to adoption and publication of the Final Plan. The Post Adoption Statement (to be published with the Final Plan) will detail any changes made to the Plan as a result of consultation feedback.

1.4 Social and Economic Impact Assessment

1.4.1 The purpose of the social and economic impact assessment (SEIA), as part of the overall Sustainability Appraisal, is to identify and assess the potential economic and social effects of the draft plan on the lives and circumstances of people, their families and their communities. It considers the potential economic impacts (positive and negative), and their distribution among different groups, to inform the assessment of potential impacts on individuals, communities and society. Its scope addresses the impact of the plan as an additional impact to other existing or consented offshore wind development.

1.4.2 The assessment considers the impact of potential development under the draft plan within individual DPOs, as well as the potential cumulative positive and negative economic impacts, and associated potential social impacts, across the suite of DPOs and in combination with other planned projects.

1.5 Report Structure

1.5.1 This SEIA Report sets out the methodology used for the assessment of economic and social impacts and the key findings from the assessment.

1.5.2 The remainder of this report is structured as follows:

- Section 2: Approach to the Assessment;
- Section 3: Impacts on Activities;
- Section 4: Social Impacts on Individuals, Communities and Society;
- Section 5: Potential Positive Impacts; and
- Section 6: Combined Impacts.

1.5.3 The Non-Technical Summary precedes Section 1. Further detailed information is provided in Appendices as follows:

- Appendix A: Project Board and Steering Group;
- Appendix B: Scenarios;
- Appendix C: Detailed approach to supply-side impacts;
- Appendix D: Scoping;
- Appendix E: Detailed assessment methods for each sector;
- Appendix F: DPO Assessment Tables (providing detailed assessments for each DPO, by sector);
- Appendix G: Detailed socio-economic impact assessment; and
- Appendix H: Abbreviations.

2 Approach to the Assessment

2.1 Introduction

2.1.1 The methodology for the assessment of social and economic impacts has built on similar previous studies[10,11,12] and previous EIAs for offshore developments. It follows wider guidance on impact assessment including Scottish Government guidance on Business and Regulatory Impact Assessment[13] and the Green Book methodology[14].

2.1.2 The methodology described below covers:

- Scenarios relating to future offshore wind development;
- Defining relevant marine activities for inclusion in the assessment;
- Establishing a baseline;
- Outcome of scoping;
- Assessment methodology;
- Assessing negative economic impacts to marine activities;
- Assessing positive economic impacts to marine activities;
- Assessing social impacts on individuals, communities and society;
- Assessing combined impacts.

2.1.3 The work has been taken forward working closely with the Project Board and SEIA Steering Group. Organisations represented on the Project Board and Steering Group are listed in Appendix A.

2.2 Scenarios Relating to Future Offshore Wind Development

2.2.1 The DPOs for offshore wind identify potential broad locations within which future arrays might be located. However, in order to provide a sufficient basis to carry out a quantitative socio-economic impact assessment, it is necessary to make assumptions about the potential scale (potential installed capacity), nature (the types of technologies) and timing of possible development within these DPOs. Possible socio-economic impacts associated with array export cables, also need to be taken into account where practicable.

2.2.2 Given the inherent uncertainty in seeking to predict the scale and timing of development, a number of scenarios were developed, primarily relating to

[10] ABPmer, SQW and RPA, 2011. Economic Assessment of Short-term Options for Offshore Wind in Scottish Territorial Waters.

[11] ABPmer & RPA, 2012. Socio-economic Baseline Reviews for Offshore Renewables in Scottish Waters. ABP Marine Environmental Research Ltd, Report No. R.1905 to Marine Scotland.

[12] ABPmer & RPA, 2013. Draft Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters: Socio - Economic Assessment. Report No. R.2045 to Marine Scotland.

[13] https://beta.gov.scot/publications/bria-guidance/

[14] HM Treasury, 2013. The Green Book.

different possible scales of development within the DPOs, so that these uncertainties could be explored. The impacts of these scenarios were then compared against the 'do nothing' option in seeking to estimate the potential positive and negative impacts associated with offshore wind development within the DPOs.

Developing Scenarios relating to the Potential Scale of Future Development

2.2.3 At a UK level, at the start of 2019, there were 7.9 gigawatts (GW) installed offshore wind capacity and around 23.9 GW of additional offshore wind with formal rights (at various stages of planning, consenting or construction).

2.2.4 Scotland currently has six operational offshore wind sites with a total capacity of over 900 MW: the Beatrice demonstrator project (two 5 MW turbines), the Beatrice offshore wind farm (588MW) (from mid-2019) the Hywind Scotland Pilot Park project (30 MW capacity), Robin Rigg (180 MW capacity), Levenmouth Demonstration Turbine (one 7 MW turbine), Kincardine floating turbine (2MW) and the European Offshore Wind Deployment Centre deployed 11 turbines, with a total capacity of 93 MW.

2.2.5 Within Scottish Territorial Waters there are currently plans to install up to a further 1.3 GW capacity of offshore wind in two further short-term option sites Inch Cape and Neart na Gaoithe), together with up to 4.15 GW capacity within two Round 3 sites in offshore waters — Moray Firth (1.7 GW) and Firth of Forth (2.45 GW). Currently Neart na Gaoithe, Moray East (Moray Firth) and Seagreen Phase 1 (Firth of Forth) have all obtained Contracts for Difference.

2.2.6 There are currently few long-term projections for potential future offshore wind development for the period covered by the draft Plan (up to 2050).

2.2.7 Key indications of potential future UK offshore wind capacity requirements include:

- Offshore Wind Industry Council Sector Deal[15]: aiming for 30 GW UK installed capacity by 2030.
- Committee on Climate Change 2018 Progress Report to Parliament[16]: considered scenarios of 28-34 GW UK offshore wind installed capacity by 2030.
- National Grid Future Energy Scenarios[17]: estimated between 26–53 GW UK offshore wind installed capacity by 2050 in four different energy scenarios. These scenarios seek to take account of factors such as the electrification

[15] Department for Business, Energy and Industrial Strategy, Policy Paper, Offshore wind sector deal, Published 7 March 2019 https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal

[16] Committee on Climate Change, 2018. Reducing UK Emissions. 2018 Progress Report to Parliament. June 2018. https://www.theccc.org.uk/publication/reducing-uk-emissions-2018-progress-report-to-parliament/

[17] National Grid, 2019. Future Energy Scenarios. July 2019. http://fes.nationalgrid.com/media/1409/fes-2019.pdf

of transport and the potential role of interconnectors and electricity storage capacity.

- The UK passed legislation in June 2019 committing it to net zero greenhouse gas emissions by 2050[18], and the Scottish Parliament passed the Climate Change Bill on 26 September 2019, committing Scotland to becoming a net-zero society by 2045;
- In August 2019, The Crown Estate announced further leasing for 2017 project extension applications totalling 2.85 GW[19].
- In October 2019, The Crown Estate initiated Round 4 leasing with a proposed installed capacity of at least 7 GW in English and Welsh waters20.
- European Wind Energy Association[21]: indicated that UK installed capacity could be as high as 55 GW by 2030 under a high scenario, assuming 98 GW of offshore wind in the North Sea. Discussions in the North Sea Energy Forum have also indicated interest in exploring options for up to 200 GW installed capacity in the North Sea by 2050, although this would be dependent on the establishment of a North Sea grid.

2.2.8 By 2035, National Grid scenarios suggest a total Scottish generating capacity of between 13 and 25 GW, primarily from renewables. This potentially leads to increasingly dynamic Scottish network behaviour depending on factors such as weather condition and price of electricity. With demand in Scotland not expected to exceed 5.7 GW by 2040, which is much less than the Scottish generation capacity, Scotland will be expected to export power into England. At times of low renewable output, however, Scotland may need to import power from England[22].

2.2.9 The future requirement for and contribution of offshore wind to UK supply will depend *inter alia* on cost competitiveness of offshore wind, UK Government policy in relation to other forms of electricity generation such as nuclear new build and community renewables, the development and cost-effectiveness of electricity storage capacity for intermittent sources of generation and the pace of electrification of transport.

2.2.10 In terms of progress towards national targets, The Committee on Climate Change[23] noted that Scotland is performing well in reducing greenhouse gas

---

[18] https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

[19] https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2019-28-gw-of-offshore-wind-extension-projects-to-progress-following-completion-of-plan-level-habitats-regulations-assessment/

[20] https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/offshore-wind-leasing-round-4/

[21] European Wind Energy Association, 2015. Wind Energy Scenarios for 2030. August 2015.

https://www.ewea.org/fileadmin/files/library/publications/reports/EWEA-Wind-energy-scenarios-2030.pdf

[22] National Grid, 2017. Electricity Ten Year Statement 2017
https://www.nationalgrideso.com/sites/eso/files/documents/14843_NG_ETYS_2017_AllChapters_A01_INT.pdf

[23] Committee on Climate Change, 2018. Reducing emissions in Scotland. 2018 Progress Report to Parliament. September 2018.

https://www.theccc.org.uk/publication/reducing-emissions-in-scotland-2018-progress-report-to-parliament/

emissions compared to the rest of the UK, and met its annual legislated target for 2016. Overall, Scottish emissions are now 49% below 1990 levels, and Scotland is on course to outperform the interim emissions reduction target for at least a 56% reduction in actual emissions by 2020. The Scottish Government introduced the Climate Change (Emissions Reduction Targets) (Scotland) Bill to the Scottish Parliament in May 2018 following advice from the Committee on the definition and levels of the new targets. The amendments lodged to the Climate Change Bill raised the ambition of the 2030 and 2040 targets for emissions reductions to 70% and 90% respectively. The newly passed Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 implements some of the most stringent statutory targets in the world, with the aim of ending our contribution to climate change, definitively, within a generation.

2.2.11 In view of the significant planned expansion of renewables and the scope to further develop renewables opportunities, which would make Scotland a significant net exporter of renewable energy, the Committee on Climate Change[24] notes that the main challenges to Scotland achieving its long-term emission reduction targets relate to tackling emissions from agriculture and transport.

2.2.12 Investment in electricity infrastructure is crucial to realising Scotland's renewable energy potential, allowing power to flow from remote areas of high resource, where grid connections are often weak, to major centres of demand. This is particularly the case for the Highlands and Islands, where connection to the mainland grid network can be challenging.

2.2.13 Overall, the above evidence could indicate a clear potential requirement for new leasing of OWF at UK level of between 10-20 GW installed capacity by 2050 with a possibility of greater demand depending on progress with a North Sea grid. Some of this requirement will be met from further leasing offered by The Crown Estate for England, Wales and Northern Ireland waters, but there is also an opportunity for Scotland to contribute to meeting this demand.

2.2.14 Based on the above, three scenarios (termed 'Low Case', 'Medium Case' and 'High Case') have been developed for the purposes of this study relating to different scales of possible future offshore development within the DPOs at national level in the period 2020 to 2050 as follows (in terms of additional capacity beyond existing lease agreements):

- Low Case: 3 GW installed capacity;
- Medium Case: 5 GW installed capacity;
- High Case: 10 GW installed capacity;

2.2.15 A recent review of the density of offshore wind turbine layouts for recent European offshore wind projects[25] indicated that densities were largely within

[24] Committee on Climate Change, 2018. ibid.

[25] Deutsche Windguard, 2018. Capacity Densities of European Offshore Wind Farms. https://vasab.org/wp-content/uploads/2018/06/BalticLINes_CapacityDensityStudy_June2018-1.pdf

the range 4.3–6.5 MW per km². This density is governed by the need to maximise harnessing of the wind resource without affecting the performance of adjacent turbines within an array. Constraints within individual DPOs could result in lower levels of deployment but it may also be possible to achieve higher levels of deployment at other locations. Assuming an average density of 5 MW per km² for future projects under the Plan and based on the combined area of the DPOs, the DPOs have a combined potential to accommodate over 70 GW installed capacity. This capacity is an order of magnitude greater than the likely demand under the Plan.

2.2.16 In order to carry out a realistic assessment of the potential social and economic impact of possible development under the Plan, consideration has been given both to possible scales of development within each DPO and possible scales of development at regional and national levels. These assumptions are set out in Table 2.

2.2.17 The assessment of the potential negative impacts of development within individual DPOs has assumed that development occurs at a 'maximum realistic level' (column 5 of Table 2) having regard to the overall capacity of the DPO and the anticipated overall scale of likely development under the Plan at regional and national levels.

2.2.18 At regional scale, it is unlikely that development will occur in every DPO in a region and some locations will be taken forward in preference to others. Table 2 therefore also includes assumed realistic regional scales of development under the scenarios. To quantify impacts at regional level, the sum of the DPO-level impacts has been scaled back *pro rata* to the regional scenario totals. To quantify impacts at national level, further scaling back of the regional totals has been undertaken in line with the overall scale of likely development under the Plan at national level under each scenario.

2.2.19 For individual DPOs, in line with the broad parameters for the Plan, it has been assumed that the minimum scale of development within any DPO is 100 MW.

Table 2 Indicative Capacity and Occupancy of Draft Option Plan Areas

Region	DPO	Area (km²)	Potential installed capacity (GW)	Realistic maximum development scenario for DPO (GW)	Regional Low Scenario (GW)	Regional Medium Scenario (GW)	Regional High Scenario (GW)
East	E1	3816	19.1	3			
	E2	1287	6.4	2			
	E3	474	2.4	1			
	Sub-total	5577	27.9	6	1	2	3
North East	NE1	776	3.9	2			
	NE2	464	2.3	1			
	NE3	339	1.7	1			
	NE4	440	2.2	1			
	NE5	496	2.5	1			
	NE6	699	3.5	2			
	NE7	1027	5.1	3			
	NE8	401	2.0	1			
	Sub-total	4641	23.2	12	1.5	3	4.5
North	N1	1163	5.8	2			
	N2	560	2.8	2			
	N3	1106	5.5	2			
	N4	200	1.0	1			
	Sub-total	3030	15.1	7	1	2	3
West	W1	1107	5.5	2			
	Sub-total	1107	5.5	2	0.5	1	2
South West	SW1	292	1.5	1			
	Sub-total	292	1.5	1	0.3	0.6	1
Total		**14646**	**73.2**	**28**	**4.3**	**8.6**	**13.5**
Scaled back in national scenario to:					**3**	**5**	**10**

Consideration of Possible Future Technologies

2.2.20 There is currently uncertainty concerning the nature of possible future offshore wind technologies that will be deployed. The DPOs provide space both for conventional fixed bottom installations in shallower water (less than 60 m depth) and for deeper water (floating) technologies. It is currently unclear how quickly and to what extent deep water technologies might become cost competitive and thus what the balance between technologies might be.

2.2.21 There is also uncertainty concerning construction methods, particularly for deep water technologies, where a variety of options for foundation substructures might be considered.

2.2.22 The precise nature of the technologies to be deployed and their construction methods has the potential to affect the nature and scale of impacts, including socio-economic impacts. However, it is not appropriate to make detailed assumptions about project-level technologies and construction methods in this plan-level assessment. Many socio-economic impacts associated with offshore wind farms do not vary as a function of technology choice, although it is noted that tethering arrangements for floating offshore wind could affect the area of seabed that would be sterilised for commercial fishing activity. This uncertainty has been captured in the methodology for the commercial fisheries assessment.

2.2.23 In addition, while some socio-economic impacts may arise as a consequence of environmental impacts (which may vary to an extent depending on the technology) it will be a general requirement of the EIA and HRA processes to minimise such impacts to acceptable levels (where necessary underpinned by licence conditions). On this basis, residual environmental impacts should not be of sufficient magnitude to give rise to significant socio-economic impacts.

Developing an Indicative Programme

2.2.24 The timing of possible development within individual DPOs is particularly uncertain. The assumption has been that the draft Plan will look to enable development within the period 2030 to 2050. Assuming Plan adoption in 2020, it is possible that consenting could be completed in some DPOs within 4 years with construction in these areas starting as early as the late 2020s, and for those schemes to become operational by the early 2030s. Whilst it is not possible to predict precisely when and where development may come forward, for the purposes of this assessment differing assumptions have been made at individual DPO, regional and national levels.

2.2.25 For the purposes of assessing the individual DPOs it has been assumed (as a worst-case cost assumption, and to allow different DPOs to be compared on the same terms) that construction will begin in 2028 with construction completing and operation starting in 2030.

2.2.26 The assumptions on the temporal sequencing of development at regional and national scales are summarised in Table 3 and Table 4. The year that each development enters operation is shown, with construction taking place during the two preceding years. In these scenarios, the latest developments enter operation in 2042 in order that some element of operational cost is included in the assessment. The proposed mitigation measures for some DPOs has not been incorporated into the temporal assumptions as this would have the effect of reducing the apparent negative economic impacts of those DPOs/regions over the assessment period. These mitigation measures may move the impacts for some DPOs slightly later, but there is uncertainty around how long the mitigation will be in place.

Table 3 Temporal assumptions used in regional assessments

Region	Scenario	Total development in region (GW)	Development Size (GW)	Year entering operation
East	Low	1	1	2030
	Medium	2	1 1	2030 2035
	High	3	1 1 1	2030 2035 2040
North East	Low	1.5	1 0.5	2030 2035
	Medium	3	1 1 1	2030 2035 2040
	High	4.5	1.5 1.5 1.5	2030 2035 2040
North	Low	1	0.5 0.5	2030 2035
	Medium	2	1 1	2030 2035
	High	3	1 1 1	2030 2035 2040
West	Low	0.5	0.5	2030
	Medium	1	1	2030
	High	2	1 1	2030 2035
South West	Low	0.3	0.3	2030
	Medium	0.6	0.3 0.3	2030 2035
	High	1	0.5 0.5	2030 2035

Table 4 Temporal assumptions used in national assessments

Region	Scenario	Total development in region (GW)	Development Size (GW)	Year entering operation
National	Low	3	1 1 1	2030 2035 2040
	Medium	5	1 1 1 1 1	2030 2033 2036 2039 2042
	High	10	2 2 2 2 2	2030 2033 2036 2039 2042

Taking Account of Cable Routes

2.2.27 There is currently a high level of uncertainty concerning the possible location and number of export cables associated with potential development within the proposed DPOs. These requirements will depend on the scale and location of development within the DPOs and the future development of grid connection points (both onshore and offshore). Some information is available from National Grid[26] on potential and planned grid reinforcement which indicates locations where capacity may be available in the future, but this only extends to the medium term and does not take into account potential further offshore wind development in Scottish waters. It remains challenging to predict the precise routes for export cable corridors. Given these uncertainties, a qualitative assessment of the impact of export cables is carried out where feasible, taking into account potential constraints inshore of the DPOs.

Supply Chain Development

2.2.28 The scenarios drive the assessment of positive economic and social impacts, with a series of assumptions required on how, where and why the supply chain could grow and/or change in response to the levels of spending. Quantitative assumptions on the potential scale of future developments, the possible future

[26] National Grid, 2018. Network Options Assessment 2017/18. https://www.nationalgrideso.com/sites/eso/files/documents/Network-Options-Assessment-2017-18.pdf

technologies, the indicative programme of spending and where that spending will be targeted provide the basic scenario assumptions. These have been developed into scenario storylines to explain how the level of spending could result in changes to the supply chain in the associated Nomenclature of Territorial Units for Statistics (NUTS) level 2 areas.

2.2.29 The method used is based on six key steps:

- Step 1: estimate level of spending per GW per year per activity, with five different activities identified reflecting the different stages of projects:
- Development and project management;
- Wind turbine supply;
- Balance of plant;
- Installation and commissioning;
- Operation, maintenance and service.
- Step 2: identify percentage of spend that retained per region per GW per year to account for leakage where spend occurs outside of Scotland. This is based on the current status of the supply chain and its capacity to provide the services required and the extent to which the supply chain is expected to grow. National retention is based on the 'typical' retention across all of the regions given the need to factor back total spending at the national scale, which means this total will be less than the sum across all regions.
- Step 3: allocate total spend to a spending profile to reflect the projected timing of the different activities in each region and nationally.
- Step 4: apply the GVA effects relevant to the different activities to estimate GVA impacts based on level of spend that is retained and total amount of GW expected to be installed.
- Step 5: apply the employment effect relevant to the different activities to estimate number of full-time equivalents (FTEs) that could be generated from the investment.
- Step 6: divide jobs into those that would be for local people and those where people would relocate.

2.2.30 The outcomes of each step are provided in Section 4 with a summary of the results. The detailed methodology and key input data and information used in each step are provided in Appendix C.

2.3 Defining Relevant Marine Activities for Inclusion in the Assessment

2.3.1 A wide range of human activities occur in or are dependent on the marine environment which could potentially be affected by aspects of offshore wind development. For consistency with previous assessments, the following categories of activity (sectors) are considered within the study:

- Aquaculture (finfish and shellfish);

- Carbon Capture and Storage;
- Coast Protection and Flood Defence;
- Commercial Fisheries (including salmon and sea trout);
- Energy Generation;
- Military Activities;
- Oil and Gas (including exploration, production, interconnectors, gas storage);
- Ports and Harbours;
- Power Interconnectors;
- Recreational Boating;
- Shipping (Commercial);
- Telecom Cables;
- Tourism (including heritage assets);
- Waste Disposal (dredge material); and
- Water Sports.

2.4 Establishing a Baseline

2.4.1 To assess the potential social and economic impacts of potential offshore wind development on relevant marine activities, it is necessary to establish a baseline (counterfactual) for each sector affected, against which the potential impacts of the Plan can be assessed.

2.4.2 Baseline information is therefore required for each relevant marine activity including:

- The current location, intensity and economic value of activity; and
- How the location, intensity and economic value might change over time in the absence of the Plan.

2.4.3 The 'Sectoral Marine Plan for Offshore Wind Energy (Regional Locational Guidance (RLG))[27], provides a national baseline for each relevant marine sector included in the assessment in Section 2 of that report with Region specific information in Sections 3 to 7.

2.5 Outcome of Scoping

2.5.1 The potential for offshore wind development (including associated export cables) to give rise to social and economic impacts on other activities depends on the nature and scale of interactions between them. The scoping assessment

[27] Scottish Government (2019) Draft Regional Locational Guidance – Offshore Wind in Scottish Waters, currently in draft.

defines the potential interactions and identifies those with the potential to give rise to significant social and economic impacts.

2.5.2 A scoping assessment[28] was undertaken based on the AoS. This drew on relevant previous studies and took account of specific factors relevant to each area. The scoping assessment was subsequently updated to take account of the selected DPOs. The identification of potentially significant interactions drew on previous social and economic assessments (e.g. ABPmer *et al*., 2011[29] and ABPmer & RPA, 2013[30]) and wider sources on interactions such as MMO (2014)[31].

2.5.3 To identify the potential for significant socio-economic impacts to occur, the scoping process took account of:

- Whether the activity spatially overlaps with one or more AoS/DPO;
- For tourism, where more than 10% of an AoS/DPO is within 15 km of a seascape unit with a low 'Capacity Index', based on Scott *et al*. 2005[32];
- The extent to which the spatial overlap is judged likely to give rise to a significant interaction; and
- The likely scope to avoid a significant interaction through spatial planning of the location of arrays within an AOS/DPO.

2.5.4 Where one or more potentially significant interactions was identified, further consideration has been given to the potential impact pathways by which social and economic impacts may arise and the extent to which any or all of the relevant pathways require assessment. Where potential for significant social and economic impacts was identified, these interactions have been subject to more detailed assessment.

2.5.5 Where potential impacts will need to be mitigated up-front by the developer as a condition of consent, it is assumed that the residual impacts will not give rise to significant social and economic impacts. The mitigation costs to be met by the developer are not included in the costs presented in the assessments described within this study, as there is uncertainty around the nature and scale of any mitigation required. For example, in the case of potential impacts to aviation radar, it has been assumed that these will need to be mitigated by the developer, particularly in the short and medium term, and therefore significant

[28] Marine Scotland, 2018. Sectoral Marine Plan for Offshore Wind Energy (encompassing Deep Water Plan Options), Social and Economic Impact Assessment, Scoping Report. June 2018. Available online at https://www.gov.scot/Resource/0053/00536625.pdf. Accessed 4 October 2018.

[29] ABPmer, SQW and RPA, 2011. Economic Assessment of Short-term Options for Offshore Wind in Scottish Territorial Waters.

[30] ABPmer & RPA, 2013. Draft Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters: Socio - Economic Assessment. Report No. R.2045 to Marine Scotland.

[31] MMO, 2014. Social impacts and interactions between marine sectors (MMO 1060), August, 2014. Marine Management Organisation.

[32] Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06).

impacts to the aviation sector will be avoided and so are not quantified within this assessment.

2.5.6 Similarly, where potential social and economic impacts arise from potential environmental impacts, it has been assumed that mitigation will be required for such (environmental) impacts as a condition of consent, and the residual environmental impacts will not give rise to significant social and economic impacts.

2.5.7 A summary of the outcome of scoping is provided in Table 5 and further detail in Appendix D.

Table 5 Summary of outcome of scoping

Sector	Scoping – Need for Detailed Assessment
Aquaculture	No detailed assessment required.*
Aviation	Detailed assessment required for: ▪ Height obstruction of commercial helicopter navigation routes (arrays).
Carbon Capture and Storage	Detailed assessment required for*: ▪ Competition for space (sterilisation of seabed potential storage areas/obstruction of potential pipeline routes) (arrays).
Coast Protection and Flood Defence	No detailed assessment required.
Energy Generation	Detailed assessment required for*: ▪ Competition for space (offshore) within DPO areas (arrays).
Fisheries	Detailed assessment required for*: ▪ Complete loss or restricted access to traditional fishing grounds (arrays and cables); ▪ Changes in fishing patterns, including gears used and species targeted (arising from displacement of fishing vessels as a result of loss of traditional fishing grounds) (arrays); ▪ Obstruction of fishing vessel navigation routes (arrays); ▪ Fouling of fishing gear on cables or seabed infrastructure; ▪ Consequential impacts to seafood processors and other food, beverage and services including accommodation and water transport.
Military Activities	Detailed assessment required for*: ▪ Competition for space (arrays); ▪ Interference with underwater communications (arrays).
Oil and Gas	Detailed assessment required for*:

Sector	Scoping – Need for Detailed Assessment
	▪ Competition for marine space - restricted access to seafloor (arrays); ▪ Competition for marine space - restriction on exploration activities (arrays); ▪ Competition for marine space - obstruction of pipeline routes (arrays).
Ports and Harbours	No detailed assessment required.*
Power Interconnectors	Detailed assessment required for*: ▪ Competition for space with potential future interconnectors (DPO areas intersect proposed interconnector routes) (arrays).
Recreational Boating	Detailed assessment required for*: ▪ Alterations to informal cruising routes (arrays); ▪ Deterrent to investment in marinas/supply chain (arrays); ▪ Increase marine risk (arrays).
Shipping	Detailed assessment required for*: ▪ Obstruction of transiting vessel and/or ferry routes; increased steaming distances and time (arrays).
Telecom Cables	Detailed assessment required for*: ▪ Competition for space with potential future telecom cables (arrays).
Tourism	Detailed assessment required for*: ▪ Impacts to landscape or seascape – long term (arrays).
Waste Disposal	No detailed assessment required.*
Water Sports	Detailed assessment required for*: ▪ Displacement due to spatial overlap between array and recreational sea angling activity (arrays).
* Cable route implications have been considered to the extent possible where there is clarity on their potential location.	

2.6 Assessment Methodology

2.6.1 The assessment of economic impacts and the consequent social impacts on individuals, communities and society has been undertaken for scoped-in activities and interactions.

2.6.2 The sections that follow provide a high-level overview of the methods applied for:

- Assessing negative economic impacts to marine activities;

- Assessing positive economic impacts to marine activities;
- Assessing social impacts on individuals, communities and society (positive and negative); and
- Assessing combined impacts.

2.7 Assessing Negative Economic Impacts to Marine Activities

2.7.1 The assessment of negative economic impacts has been conducted for individual DPOs and at regional and national levels. Detailed methods for each sector are provided in Appendix E.

2.7.2 Analysis of interactions between offshore wind development and other marine activities is generally based on spatial analysis using geographical information system (GIS) tools to provide a quantitative estimate of the interaction.

2.7.3 Estimates of economic impacts are then made following different approaches, all based on the likely effect of key economic indicators of performance:

- Where an interaction would result in a material reduction in the level of output from an activity, the economic impact is assessed in terms of a reduction in Gross Value Added (GVA) and employment;
- Where an interaction would result in an increase in that activity's operating costs but would not result in a reduction in economic output from that activity, the impacts are expressed in terms of monetary costs; and
- Where an interaction might create investment uncertainty for an activity, such uncertainties are noted in the analysis but not quantified.

2.7.4 Where an interaction has the potential to affect economic output, resulting in impacts to GVA and employment, in line with Scottish Business and Regulatory Impact Assessment (BRIA) guidance[33], a distributional analysis of the economic impact has also been carried out. The outputs from this distributional analysis have been used to inform the assessment of social impacts. Further details on the methods used to assess impacts to GVA and employment and for the distributional analysis are provided in Appendix E and section 2.9.

2.7.5 The economic assessment has been undertaken for a time period of 40 years, starting in 2020 and finishing in 2059 to capture the main period of potential impacts and excluding repowering and decommissioning which could start to occur in the very final years. This ensures that the assessment covers the likely period of construction of deep water wind projects (expected from the late 2020s), with operation assumed in the scenarios to commence in the period 2030 to 2042).

2.7.6 In line with latest HM Treasury guidance, the standard 3.5% declining discount rate has been used for positive and negative impacts over the 40-year time period. The impacts of the offshore wind plan could extend to cover long-term,

[33] https://beta.gov.scot/publications/bria-guidance/

intergenerational effects so the reduced discount rate was applied as a sensitivity (this excludes the pure social time preference). The reduced rate starts at 3% for years 0–30, compared with 3.5% for the standard discount rate. This then declines to 2.57% for years 31–75, compared with 3.0% for the standard discount rate.

2.8 Assessing Positive Economic Impacts to Marine Activities

2.8.1 Positive impacts for the Scottish economy are calculated at both national and local authority level. The percentage local retention rates included in the scenarios are used as the basis for identifying what level of spend is retained in Scotland and what level would lead to impacts being felt elsewhere (outside Scotland). Since these percentages are reported on a regional scale, multipliers are applied to enable knock-on jobs and GVA to be estimated.

2.8.2 In addition, leakage from one region to another is an important consideration in the regional assessment, as well as leakage outside of Scotland for the national assessment. A sensitivity test has been undertaken to assess what the additional impacts might be if there is leakage from the West region to the North and North East regions, rather than if all leaked spend is invested outside of Scotland (e.g. England or Ireland). Consideration is also given to the impacts of substitution effects, where growth in the supply chain in response to investment in offshore wind could substitute for activity in other industry sectors due to capacity limitations (displacement from other sectors would count as a negative impact for the affected sector). This is reported based on the capacity of the supply chain to deliver the expected level of spend in each region individually and across Scotland as a whole.

2.8.3 BVG Associates (2019)[34] gives a breakdown of undiscounted capital and operational costs for a typical offshore wind farm, based on a 1 GW wind farm using 100 10 MW turbines located 60 km from shore in 20 m water depth. Development and project management is assumed to begin in 2022. This is used as the basis for estimating total spent along the supply chain. The total spend per activity are applied with the percentages assumed for local retention as the basis for estimating the GVA and jobs that could be generated associated with the scale and programme of future development. The levels of spend retained locally are combined with multipliers to give an estimate of the positive impacts in terms of GVA and jobs that could result from the level of spend (where this is assumed to give a measure of the change in output). However, the impacts will be derived for the Scottish economy as a whole on the basis of national multipliers.

2.8.4 National multipliers are available for Scotland. National multipliers detail the relationship between producers and consumers and the interdependencies of

[34] BVG Associates (2019): Guide to an offshore wind farm, updated and extended, January 2019.

industries for a given year. They offer a picture of the flows of goods and services (products) in Scotland but they are only available for the onshore economy[35]. Multipliers are assigned to the most relevant SIC codes for each of the activities given in the BVG (2019) report:

- Development and project management: multipliers used for 71 (architectural services, etc.: includes other engineering activities such as 'design activities for the construction of civil engineering works');
- Wind turbine supply: multipliers used for 28 (machinery and equipment);
- Balance of plant: multipliers used for 41-43 (construction);
- Installation and commissioning: multipliers used for 41-43 (construction);
- Operation, maintenance and service: multipliers used for 33 (repair and maintenance).

2.8.5 There are two types of multipliers available depending on the level and round of effects being calculated. Direct and indirect impacts are captured by Type I multipliers. Direct impacts relate to the specific sector, whereas indirect impacts relate to the businesses that supply that sector. Type II multipliers also include induced effects (the effect attributable to the ensuing change in compensation of employees which may cause further spending and hence further changes in final demand).

2.8.6 Multipliers are available for GVA and employment effects from the Scottish Government[36]. Multipliers for GVA effect reflect the direct and indirect (and induced if Type II multipliers are used) GVA changes to the direct output change, due to a unit increase in final use. Employment effect multipliers apply to changes in output, or GVA. Applying the GVA effect to the change in output (estimated as locally-retained spend) for each activity (development and project management, wind turbine supply, balance of plant, installation and commissioning, and operation, maintenance and service) is used to calculate the change in GVA for the economy as a whole. Similarly, applying the employment effect to the change in output (as £ million) enables an estimate to be made of the number of jobs affected (as full-time equivalents). The multipliers used in this study are given in Table 62 and Table 63 in Appendix C.

2.8.7 Further details of the methodology for assessing supply chain impacts are provided in Appendix C.

---

[35] Note that offshore multipliers have provisionally been produced but only for oil and gas.

[36] These are available at https://www2.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads/IO1998-2016All [accessed on 17/07/2018].

2.9 Assessing Social Impacts on Individuals, Communities and Society (Positive and Negative)

2.9.1 The assessment of social impacts is based on social clusters[37]. Impacts on each of these clusters are considered in the context of 'change' and linked to national indicators and sustainable development goals from the National Performance Framework[38]. Table 6 links the value clusters to the national indicators and sustainable development goals from the National Performance Framework[39].

2.9.2 The table shows where the clusters may be potentially affected by positive or negative impacts from offshore wind development and the national indicators and sustainable development goals that could be used to describe and measure those changes.

2.9.3 Some screening has been applied to identify those impacts that are most likely to directly and indirectly result in effects linked to the sustainable development goals. For example, the cluster of family, family life and inter-generational issues could be positively affected from increased numbers of jobs and skills in local areas. At the same time, an increase in population could result in house price increases with young people having to move further away. Better-paid jobs could help to reduce inequalities, including to children's material deprivation. Increased development could have indirect effects such as increased demand for services and loss of access to recreational/open space. This could in turn affect health and well-being.

2.9.4 Because there is considerable overlap between the indicators and goals, and indeed across the clusters, there is a risk of double counting. Thus, the approach provides a framework for a narrative of impacts by cluster such that specific issues or concerns can be highlighted and the pathways for impacts be explored (e.g. increased demand for services, reduced pay gap). The magnitude of impacts at the cluster scale is recorded using a rating system, as set out in Table 7. The ratings are linked back, where possible, to current statistics so the projected changes can be viewed in context (i.e. against the current baseline).

[37] Collingwood Environmental Planning Ltd *et al*. 2016. A two way conversation with the people of Scotland on the social impact of offshore renewables, Final Dialogue Report; as reported by Marine Scotland (2018): Sectoral Marine Plan for Offshore Wind Energy (encompassing Deep Water Plan Options) Social and Economic Impact Assessment Scoping Report.

[38] Scottish Government, 2018. National Performance Framework. Available online at: http://nationalperformance.gov.scot/. Accessed 10 October 2018.

[39] This table has been generated by considering which of the national indicators and sustainable goals are likely to be relevant to the offshore wind farm in terms of potentially delivering positive benefits or resulting in negative impacts. Each national indicator and goals has then been linked to the relevant cluster(s).

Table 6 Linking the clusters to the relevant national indicators and sustainable development goals

Cluster		National Indicators		Sustainable Development Goals	
		Relevant to potential positive impacts	Relevant to potential negative impacts	Relevant to potential positive impacts	Relevant to potential negative impacts
Individual	Family, family life, inter-generation issues	▪ Scotland's population ▪ Children's material deprivation	▪ Scotland's population	▪ Reduced inequalities ▪ Affordable and clean energy ▪ Good health and wellbeing	▪ Reduced inequalities ▪ Good health and wellbeing
	Jobs, career, employment	▪ Economic growth ▪ Spend on research and development ▪ Entrepreneurial activity ▪ Economic participation ▪ Employees on the living wage ▪ Contractually secure work	▪ None	▪ Decent work and economic growth ▪ Reduced inequalities ▪ Affordable and clean energy ▪ Industry, innovation and infrastructure	▪ None
	Money, cost of living	▪ Income equalities ▪ Relative poverty after housing costs ▪ Wealth inequalities ▪ Cost of living ▪ Pay gap	▪ Cost of living	▪ Affordable and clean energy ▪ No poverty	▪ None

Cluster		National Indicators		Sustainable Development Goals	
		Relevant to potential positive impacts	**Relevant to potential negative impacts**	**Relevant to potential positive impacts**	**Relevant to potential negative impacts**
Community	Local jobs, local industry, community sustainability	▪ Productivity ▪ International exporting ▪ Economic growth ▪ Spend on research and development ▪ Entrepreneurial activity ▪ Workplace learning ▪ Skill profile of the population ▪ Skills under-utilisation ▪ Number of businesses ▪ High growth businesses ▪ Economic participation ▪ Contractually secure work	▪ None	▪ Affordable and clean energy ▪ Decent work and economic growth ▪ Industry, innovation and infrastructure ▪ Sustainable cities and communities ▪ Reduced inequalities	▪ None
	Transport connections, technology connections	▪ Quality of public services	▪ Quality of public services	▪ Industry, innovation and infrastructure ▪ Sustainable cities and communities	▪ None

Cluster		National Indicators		Sustainable Development Goals	
		Relevant to potential positive impacts	**Relevant to potential negative impacts**	**Relevant to potential positive impacts**	**Relevant to potential negative impacts**
	Education	▪ Quality of children's services ▪ Workplace learning ▪ Quality of public services	▪ Quality of children's services ▪ Quality of public services	▪ Sustainable cities and communities ▪ Good health and wellbeing ▪ Reduced inequalities	▪ Good health and wellbeing ▪ Reduced inequalities
	Shops, housing	▪ Satisfaction with housing ▪ Quality of public services	▪ Satisfaction with housing ▪ Quality of public services	▪ Sustainable cities and communities ▪ Good health and wellbeing	▪ Good health and wellbeing
	Socialising, recreation, parks, leisure	▪ A positive experience for people coming to Scotland	▪ A positive experience for people coming to Scotland ▪ Places to interact	▪ Good health and wellbeing ▪ Reduced inequalities	▪ Good health and wellbeing ▪ Reduced inequalities ▪ Life on land
	Friends, being involved, supporting others	▪ Social capital	▪ Social capital	▪ Reduced inequalities ▪ Good health and wellbeing	▪ Reduced inequalities ▪ Good health and wellbeing
	Local identity, cultural heritage, Gaelic	▪ A positive experience for people coming to Scotland ▪ Scotland's reputation	▪ A positive experience for people coming to Scotland	▪ Good health and wellbeing ▪ Affordable and clean energy	▪ Good health and wellbeing

Cluster		National Indicators		Sustainable Development Goals	
		Relevant to potential positive impacts	**Relevant to potential negative impacts**	**Relevant to potential positive impacts**	**Relevant to potential negative impacts**
		▪ Perceptions of local area	▪ Scotland's reputation ▪ Perceptions of local area ▪ Community land ownership		
	Healthcare	▪ Quality of public services	▪ Quality of care experience ▪ Quality of public services	▪ Sustainable cities and communities ▪ Good health and wellbeing	▪ Sustainable cities and communities ▪ Good health and wellbeing
	Connection to nature, landscape	▪ Access to green and blue space	▪ Natural capital ▪ Community land ownership ▪ Access to green and blue space ▪ Condition of protected nature sites	▪ Reduced inequalities ▪ Good health and wellbeing ▪ Affordable and clean energy	▪ Reduced inequalities ▪ Good health and wellbeing ▪ Life below water ▪ Life on land
	Local political and decision-making systems	▪ Trust in public organisations ▪ Energy from renewable sources ▪ Influence over local decisions	▪ Trust in public organisations ▪ Influence over local decisions	▪ Affordable and clean energy	▪ None

Cluster		National Indicators		Sustainable Development Goals	
		Relevant to potential positive impacts	**Relevant to potential negative impacts**	**Relevant to potential positive impacts**	**Relevant to potential negative impacts**
Wider political and environmental context	Landscape, seascape, wildlife, environmental change	▪ Access to green and blue space	▪ Natural capital ▪ Access to green and blue space ▪ Condition of protected nature sites ▪ Sustainability of fish stocks ▪ Biodiversity ▪ Marine environment	▪ Affordable and clean energy	▪ Life below water ▪ Life on land
	National and EU level political and decision-making systems	▪ International exporting ▪ Carbon footprint ▪ Greenhouse gas emissions ▪ Trust in public organisations ▪ International networks ▪ Contribution to development support to other nations ▪ Energy from renewable sources	▪ Trust in public organisations	▪ Reduced inequalities ▪ Affordable and clean energy ▪ Climate action	▪ Reduced inequalities

Table 7 Ratings for use in the socio-economic impact assessment

Negative impacts (-)	Positive impacts (+)
Major (- - - -): sufficient negative impacts predicted to have a noticeable effect that is sufficient to cause complaints and/or protests from the community	Major (+ + + +): sufficient positive impacts predicted to have a noticeable effect that is sufficient to enable new services or activities within the community
Moderate (- - -): sufficient negative impacts predicted that result in concerns being raised by the community	Moderate (+ + +): sufficient positive impacts predicted that result in increased levels or expansion of existing activities or services
Minor (- -): negative impacts predicted that may be noticed but which are accepted by the majority of the community	Minor (+ +): positive impacts predicted that may be noticed but which support existing services or activities but not the extent that they can expand
Negligible (-): small negative impacts that are unlikely to be noticed by the majority of the community	Negligible (+): small positive impacts that are unlikely to be noticed by the majority of the community
Neutral/no overall impact: 0	
Notes: Based on work undertaken by RPA with ABPmer for a series of socio-economic impact assessments undertaken for Scottish Government and Marine Scotland.	

2.9.5 The assessment also considers who is affected, including any individual group within the community. The analysis looks regionally first, but it is then reduced to a smaller scale to differentiate between which parts of the community are expected to be affected. This could be geographical, i.e. a specific town or village, or demographical, i.e. a specific age group, gender or minority group. Local priorities are also observed, based on information identified by Collingwood[40], to assess whether there are any positive or negative impacts that may be relatively more significant.

2.9.6 Application of the above framework draws on the qualitative assessment of impacts on each sector and trade-offs: negative effects will draw on the assessment of negative impacts to marine activities and negative economic impacts; positive effects will draw on the assessment of positive economic impacts. These are then considered in terms of their knock-on social impacts.

2.9.7 The scale of impacts is important. A dual approach is applied — both bottom-up and top-down — to ensure that all impacts can be captured, and also for validation purposes. The negative economic impacts on marine activities are bottom-up and so highlight specific, local effects. The positive economic impacts are top-down so represent regional impacts. The social impact

[40] Collingwood Environmental Planning Ltd *et al*., 2016. A two way conversation with the people of Scotland on the social impact of offshore renewables, Final Dialogue Report; as reported by Marine Scotland (2018): Sectoral Marine Plan for Offshore Wind Energy (encompassing Deep Water Plan Options) Social and Economic Impact Assessment Scoping Report.

assessment combines all of these assessments, enabling local impacts on specific localities or groups within society to be reflected. In this way, the scale of the assessment can be kept high-level to ensure it can be completed within the available timescale and budget, but so that important local impacts can be highlighted where these are expected to be significant.

2.9.8 Further details are provided in Appendix G.

2.10 Assessing Combined Impacts

2.10.1 For the purpose of this study, the assessment considers the combined effect at both regional and national scales, using the regions shown in Figure 4. These regions have been developed to group together the DPOs that occur in proximity to each other.

2.10.2 In general, at low levels of offshore wind development, the socio-economic impacts of additional levels of development are likely to be additive. In contrast, above a certain level of development and threshold of impact, it may no longer be economic to continue with an activity and the whole of the activity may be lost. However, there is limited evidence that indicates what the relevant thresholds might be, above which impacts may become synergistic.

2.10.3 Given these constraints, the study generally adopts an additive approach to assessing the cumulative economic impact associated with multiple offshore renewables development locations and multiple offshore renewables technologies. The impact of individual DPOs is assessed and summed on a regional level and then scaled back to the anticipated level of development (within each region and at national level in line with the Plan; see section 2.1.3). If the impacts are predicted to be particularly concentrated and intense at a local or regional level, specific consultation should be undertaken with the relevant sectoral interests to seek to evaluate the combined effect using expert judgement.

2.10.4 The approach to estimating the combined social effects and distributional impacts is based on assigning a significance rating to impacts on different groups in each key area. The following ratings are applied:

- Very significant: almost all people in this location/group are likely to be affected;
- Significant: the most vulnerable people are likely to be affected;
- Slightly significant: some people or those who are more vulnerable are likely to be affected; and
- Not very significant: few people or those who are least vulnerable are likely to be affected.

3 Potential Negative Economic Impacts on Activities

3.1 Introduction

3.1.1 This section summarises the estimated potential negative economic impacts on other marine sectors and activities associated with the development of Offshore Wind within Scottish seas. Quantified cost estimates are presented in tables for each sector. Where potential impacts are expected to affect a sector's output, the impact on GVA and employment is also provided. Potential impacts for which cost estimates were not possible, are described qualitatively.

3.1.2 Potential negative economic impacts are presented initially for the potential development within any one individual DPO under a realistic maximum development scenario. The assessment subsequently factors back these potential impacts to regional and national scale to account for the reality that only a fraction of the area identified in the DPOs will ultimately be developed.

3.2 Aviation

3.2.1 There are no quantified potential negative impacts associated with the aviation sector that can be presented within this report. However, there are potential impacts to helicopter main routes and aviation radar associated with the locations of the DPOs.

3.2.2 Specifically, NE1, NE6, NE7, NE8 and E2 are all intersected by helicopter main routes (HMRs). Current Civil Aviation Authority (CAA) advice (CAP764) indicates that development may be restricted within 2 km of a HMR, which if applied has the potential to significantly reduce the available area within these DPOs.

3.2.3 Any potential cost attributed to the mitigation of impacts on aviation radar has been assumed to be met by the developer, where required, therefore there is no cost to the aviation sector.

3.3 Carbon Capture and Storage

3.3.1 There are no quantified potential negative impacts associated with the CCS sector that can be presented within this report. There is one proposed CCS project which has been reviewed in this assessment (ACT Acorn). This project proposes to use existing infrastructure, which will not be impacted by the development of offshore wind, and there is therefore no additional cost to the sector.

3.3.2 Should further CCS projects come forwards during the lifetime of the plan, there is the potential for opportunity costs, if areas of seabed are sterilised by offshore wind development, and potential costs for pipeline diversions or cable crossings if new pipelines are to be installed which could interact with offshore wind export cables.

3.4 Commercial Fisheries

3.4.1 Potential quantified impacts to direct GVA of the commercial fisheries sector are summarised in Table 8 at a DPO level under the maximum development scenario and Table 9 scaled at regional and national levels. The value of landings affected in any one year for commercial fisheries (on which the direct GVA impact is based) is summarised in Table 10, and the direct GVA impact on an annual average basis is provided in Table 11. These potential negative impacts are based on the worst-case scenario that all fishing activity ceases within arrays.

3.4.2 All DPOs have the potential to give rise to impacts on commercial fisheries. The magnitude of impact will depend on the level of development in individual DPOs, and the direct GVA impacts calculated are scaled according to assumptions of the maximum development scenario in each DPO.

Table 8 Potential direct GVA impacts to commercial fisheries (present value of direct GVA over assessment period 2020-2059, £000s, 2019 prices)

DPO	Maximum Development Scenario (GW)	Direct GVA impact	Direct GVA impact per GW installed
SW1	1	432	432
W1	2	1,482	741
N1	2	1,392	696
N2	2	823	411
N3	2	1,991	995
N4	1	675	675
NE1	2	1,378	689
NE2	1	399	399
NE3	1	600	600
NE4	1	808	808
NE5	1	803	803
NE6	2	345	173
NE7	2	2,967	1,483
NE8	1	1,786	1,786
E1	3	326	109
E2	2	659	330
E3	1	74	74

Table 9 Potential direct GVA impacts for commercial fisheries at regional and national levels (present value over assessment period 2020-2059, £000s, 2019 prices)

Region	Lower Scenario (GW)	Lower Scenario	Medium Scenario (GW)	Medium Scenario	Upper Scenario (GW)	Upper Scenario
South West	0.3	130	0.6	228	1.0	380
West	0.5	371	1	741	2	1,304
North	1	614	2	1,227	3	1,617
North East	1	1,000	3	1,756	4.5	2,634
East	1	177	2	311	3	409
National	**3**	**1,353**	**5**	**2,125**	**10**	**4,284**

Table 10 Potential annual average value of landings affected for commercial fisheries (annual average value, £000s)

DPO	Maximum Development Scenario (GW)	Annual average value of landings	Annual average landings value impact per GW installed
SW1	1	61	61
W1	2	203	102
N1	2	212	106
N2	2	129	65
N3	2	278	139
N4	1	91	91
NE1	2	227	113
NE2	1	66	66
NE3	1	87	87
NE4	1	131	131
NE5	1	132	132
NE6	2	55	28
NE7	2	395	198
NE8	1	211	211
E1	3	57	19
E2	2	115	57
E3	1	12	12

Table 11 Potential annual average direct GVA affected for commercial fisheries (£000s)

DPO	Maximum Development Scenario (GW)	Annual average GVA	Annual average GVA impact per GW installed
SW1	1	31	31
W1	2	107	54
N1	2	101	50
N2	2	59	28
N3	2	144	72
N4	1	49	49
NE1	2	100	50
NE2	1	29	29
NE3	1	43	43
NE4	1	58	58
NE5	1	58	58
NE6	2	25	12
NE7	2	214	107
NE8	1	129	129
E1	3	24	8
E2	2	48	24
E3	1	5	5

3.4.3 DPOs with the highest potential impacts under the maximum development scenario are NE7 (mainly on over-12m pelagic and demersal trawlers), N3 (mainly on over-12m pelagic and demersal trawlers, and potters) and NE8 (mainly on over-12m pelagic trawlers). The DPOs with the greatest potential impact per GW installed are the same as the DPOs with the highest impact under the maximum development scenario.

3.4.4 Under the medium scenario, the North East region has the greatest potential impact on commercial fisheries. This is a result of it being the region with the highest number of DPOs, and containing DPOs with some of the greatest impacts per GW installed (see previous paragraphs). The region with the lowest potential impact under all scenarios is the South West region (Table 9).

3.4.5 At a national level, the potential impact on direct GVA of the commercial fisheries sector ranges from £1.4 million (present value over assessment period, lower scenario) to £4.3 million (present value over assessment period, upper scenario) (Table 9). This equates to annual impacts on GVA of £127,000 to £425,000. These impacts are relatively small in the context of landings of the

Scottish catching sector in 2017 of £560 million, generating a GVA of £296 million. However, if several DPOs are developed in close proximity to each other and in the vicinity of important fishing grounds, they have the potential to have a more significant impact on particular segments of the fleet. This is particularly the case for the over-12m demersal trawl and seine segments of the fleet in the North East region.

3.4.6 The relative impact on each fleet segment is shown in context in Table 12. This shows the potential impact on GVA per fleet segment per region, compared to the total GVA of each fleet segment derived from each region. Note that this will over-estimate the proportional impact where a fleet segment derives landings from beyond the region (from other regions, or from further offshore), as the total GVA is calculated for each fleet segment based on its landings deriving only from the region. On the contrary, it will under-estimate the relative impact, where individual vessels' activity is concentrated in only part of a region. This is particularly the case for the North East region, which covers a large area, and fleets (particularly smaller vessels) will not necessarily fish across the whole region.

3.4.7 The potential impact on GVA of all fleet segments under all regional scenarios is less than 1% of the regional direct GVA of each fleet segment, with the exception of over-12m creelers in the West region, for which 1.9% of regional direct GVA is affected under the high scenario, and 0.9% under the medium scenario. Fleet segments with over 0.5% of regional direct GVA impacted are under-12m dredgers in the West region (high scenario) and over-12m creelers in the South West region (high scenario).

3.4.8 There are also potential impacts on non-UK fishing vessels that are fishing within UK waters. These have not been quantified, but the nationalities potentially affected are noted in the tables for each DPO in Appendix F.

3.4.9 It is possible that the worst-case impact on the fisheries sector can be mitigated to some extent for some gear types by planning to ensure that, where possible, fishing activity can continue within the arrays, and siting of arrays within DPOs seeks to avoid key fishing grounds. If vessels switch gear types to enable them to continue fishing within arrays, there are costs associated with changing gears. As the assessment has assumed that all fishing activity ceases within arrays, such costs have not been quantified.

3.4.10 The knock-on effects of changes in landings and change in direct Gross Value Added (GVA) are estimated using the GVA multiplier (applied to change in present value GVA). Table 13 presents the impacts on GVA per region by scenario for both the Type I (direct and indirect) and Type II (direct, indirect and induced effects). The GVA multipliers used are for fishing (SIC 03.1) and are 0.6 for the Type I effects and 0.7 for the Type II effects.

3.4.11 Table 13 shows that the impacts are greatest in the North East, where they range from £1.6 million (low scenario, Type I) to £4.7 million (high scenario, Type II). The smallest impacts are in the South West, where these range from

£207,000 (low scenario, Type I) to £685,000 (high scenario, Type II). These are discounted present values across the whole assessment timeframe (40 years).

Table 12 Direct GVA affected per fleet segment, per region, compared to regional GVA (annual average, 2019 prices)

Region and fleet segment*	Regional Direct GVA (£)	Direct GVA affected (£, annual average)			Direct GVA affected as % of regional GVA		
		Low	Medium	High	Low	Medium	High
East							
Over 12m							
Demersal trawls	12,803,750	9,037	18,074	27,111	0.1%	0.1%	0.2%
Demersal seines & pelagic trawls	4,475,438	1,589	3,177	4,766	0.0%	0.1%	0.1%
Dredges	8,838,393	1,939	3,877	5,816	0.0%	0.0%	0.1%
Under 12m							
Demersal trawls	4,863,330	2	4	6	0.0%	0.0%	0.0%
Lines	223,493	3	7	10	0.0%	0.0%	0.0%
Creels	22,701,453	68	135	203	0.0%	0.0%	0.0%

North East							
Over 12m							
Demersal trawls	80,276,710	23,317	46,635	69,952	0.0%	0.1%	0.1%
Demersal seines	17,856,592	11,075	22,150	33,225	0.1%	0.1%	0.2%
Dredges	11,225,932	9,749	19,499	29,248	0.1%	0.2%	0.3%
Pelagic trawls	204,984,517	36,107	72,214	108,320	0.0%	0.0%	0.1%
Creels, lines	2,972,704	124	249	373	0.0%	0.0%	0.0%
Under 12m							
Demersal trawls	2,005,040	320	639	959	0.0%	0.0%	0.0%
Dredges	2,639,221	573	1,146	1,719	0.0%	0.0%	0.1%
Lines	935,660	56	112	168	0.0%	0.0%	0.0%
Creels	15,057,483	782	1,565	2,347	0.0%	0.0%	0.0%
Misc, nets, pelagic trawls	1,177,650	0	1	1	0.0%	0.0%	0.0%

North							
Over 12m							
Demersal trawls and seines	38,839,058	19,611	39,222	58,833	0.1%	0.1%	0.2%
Dredges	3,661,332	1,547	3,094	4,641	0.0%	0.1%	0.1%
Pelagic trawls	118,739,754	12,323	24,646	36,970	0.0%	0.0%	0.0%
Creels, lines and misc	16,256,873	13,503	27,006	40,509	0.1%	0.2%	0.2%
Under 12m							
Demersal trawls	1,405,828	12	23	35	0.0%	0.0%	0.0%
Dredges	169,240	106	212	318	0.1%	0.1%	0.2%
Creels	22,609,163	3,056	6,112	9,168	0.0%	0.0%	0.0%
Nets, lines	180,729	2	4	7	0.0%	0.0%	0.0%
Miscellaneous	922,516	172	343	515	0.0%	0.0%	0.1%

West							
Over 12m							
Demersal trawls	26,098,498	5	10	20	0.0%	0.0%	0.0%
Demersal seines	34,206	3	6	13	0.0%	0.0%	0.0%
Dredges	9,751,348	126	252	503	0.0%	0.0%	0.0%
Creels	3,490,573	16,507	33,015	66,030	0.5%	0.9%	1.9%
Under 12m							
Demersal trawls	6,648,328	181	362	724	0.0%	0.0%	0.0%
Dredges	1,362,007	2,004	4,009	8,018	0.1%	0.3%	0.6%
Creels	33,432,187	7,594	15,188	30,376	0.0%	0.0%	0.1%
Lines and Miscellaneous	2,644,476	366	731	1,462	0.0%	0.0%	0.1%
South West							
Over 12m							
Demersal trawls	31,286,616	25	50	84	0.0%	0.0%	0.0%
Dredges	19,462,608	2,207	4,415	7,358	0.0%	0.0%	0.0%
Pelagic trawls	5,894,831	767	1,534	2,556	0.0%	0.0%	0.0%
Creels	3,587,373	5,130	10,259	17,099	0.1%	0.3%	0.5%
Under 12m							
Demersal trawls	2,573,824	4	8	13	0.0%	0.0%	0.0%
Lines	220,139	0	0	0	0.0%	0.0%	0.0%
Dredges	3,624,221	28	56	93	0.0%	0.0%	0.0%
Miscellaneous	2,268,313	558	1,117	1,862	0.0%	0.0%	0.1%
Creels	12,003,953	647	1,294	2,157	0.0%	0.0%	0.0%
Nets	35,267	7	14	24	0.0%	0.0%	0.1%
* In some cases, the impacts on some fleet segments have to be presented together, combined, to avoid disclosure of information that relates to fewer than five vessels.							

Table 13 Present value GVA impacts from changes in landings (£000s, 2019 prices)

Scenario impacts	East	North East	North	West	South West	National
Low, Type I (direct + indirect)	£282	£1,599	£982	£593	£207	£2,166
Low, Type II (direct, indirect + induced)	£318	£1,799	£1,105	£667	£233	£2,436
Medium, Type I (direct + indirect)	£497	£2,809	£1,964	£1,186	£365	£3,400
Medium, Type II (direct, indirect + induced)	£559	£3,160	£2,210	£1,334	£411	£3,825
High, Type I (direct + indirect)	£655	£4,214	£2,587	£2,087	£609	£6,854
High, Type II (direct, indirect + induced)	£737	£4,741	£2,911	£2,348	£685	£7,711

3.4.12 The potential employment impacts are assessed using the employment effect applied to the change in the value of landings, which is assumed to be equal to a change in output from the fisheries sector. The employment effects used are for fishing (SIC 03.1) and are 9.7 for the Type I employment effect and 10.9 for the Type II employment effect. The potential impacts on jobs (as full-time equivalents, FTEs) from the annual impacts on fishing are shown in Table 14.

3.4.13 The largest impacts are in the North East region, with potential loss of 2 jobs (low scenario, Type I effects) to 5 jobs (high scenario, Type II effects). The difference between the Type I and Type II effects is generally small, up to a maximum of one FTE job in the North East. This suggests that the main impacts will be direct (i.e. on fishermen) or indirect (i.e. on processing, ports, etc.), rather than induced from loss of spending from those directly or indirectly affected.

Table 14 Employment effects (FTEs lost) as a result of changes in landings

Scenario impacts	East	North East	North	West	South West	National
Low, Type I	0.3	1.6	1.0	0.5	0.2	2.5
Low, Type II	0.3	1.8	1.1	0.6	0.2	2.8
Medium, Type I	0.6	3.2	2.0	1.0	0.4	4.1
Medium, Type II	0.7	3.6	2.2	1.1	0.4	4.6
High, Type I	0.9	4.7	2.9	2.0	0.6	8.3
High, Type II	1.0	5.3	3.3	2.2	0.7	9.3

3.4.14 The employment effects can also be explored in terms of the impacts on under-12m and over-12m vessels. Most of the impacts in terms of jobs are expected on the over-12m vessels, as shown in Table 15. Impacts on under-12m vessels in the West are proportionally much higher than on under-12m vessels in other regions (due to the importance of the W1 DPO area for creeling by under-12m vessels), with up to 37% of the jobs that are affected being on under-12m vessels. This compares with up to 10% of jobs affected being associated with under-12m vessels across the other regions or nationally.

Table 15 Employment effects (FTEs lost) as a result of changes in landings divided into impacts on under-12m and over-12m vessels

Scenario impacts	East		North East		North	
	Under-12	Over-12	Under-12	Over-12	Under-12	Over-12
Low, Type I	0.001	0.3	0.03	1.5	0.06	0.9
Low, Type II	0.002	0.3	0.04	1.7	0.07	1.0
Medium, Type I	0.003	0.6	0.07	3.1	0.12	1.8
Medium, Type II	0.003	0.7	0.08	3.5	0.13	2.1
High, Type I	0.004	0.9	0.10	4.6	0.17	2.8
High, Type II	0.005	1.0	0.12	5.2	0.20	3.1
Scenario impacts	**West**		**South West**		**National**	
	Under-12	**Over-12**	**Under-12**	**Over-12**	**Under-12**	**Over-12**
Low, Type I	0.18	0.3	0.02	0.2	0.21	2.3
Low, Type II	0.21	0.3	0.03	0.2	0.24	2.5
Medium, Type I	0.37	0.6	0.05	0.3	0.35	3.8
Medium, Type II	0.41	0.7	0.05	0.3	0.39	4.2
High, Type I	0.73	1.2	0.08	0.5	0.81	7.4
High, Type II	0.82	1.4	0.09	0.6	0.91	8.4

3.4.15 The impacts can also be considered in terms of gear type affected, with potential impacts in the West on under-12m vessels being largely associated with pots and traps. This accounts for 70% of the potential job losses under the low, medium and high scenarios. However, the overall impacts on pots and traps on under-12m vessels in the West region is still less than 1 FTE per year.

3.4.16 The largest potential impacts in North East region are for over-12m vessels with the greatest percentage of impacts associated with midwater trawls (33%) and demersal trawls (36%) under the low, medium and high scenarios. This indicates that between 0.5 and 1.7 FTE jobs could be lost on over-12m vessels involved with midwater trawls and between 0.6 and 1.9 FTEs on over-12m vessels involved with demersal trawls (Type I impacts only). Over-12m midwater trawls are also identified as suffering in the North (20%) and over-12m demersal trawls in the East (77%). Impacts in the South West affect over-12m dredges (28%) and over-12m creelers (61%), although in all cases these specific impacts result in the loss of less than 1 FTE, with the exception of midwater trawls in the North under the high scenario where impacts could result in reduction of 0.5 (low) to 1.6 (high) FTEs (Type I only).

3.4.17 The effect of changing GVA and jobs on local areas within each of the regions is based on the home port of the vessels affected (fishermen, local supply chain such as boat maintenance). The effect of a reduction in landings on the processing sector is assessed through the landings port of the vessels affected (impact on processing, ports). These aspects are discussed further in the social impact assessment (Section 5).

3.5 Energy Generation

3.5.1 There are no quantified potential negative economic impacts to the energy generation sector that can be presented within this report. There are areas where development of offshore wind within a DPO has the potential to introduce competition either for sea area (for example, SW1 overlaps with tidal stream energy DPOs, and W1 and N4 overlap with wave energy DPOs) or competition for transmission capacity, particularly with other marine renewable (tidal stream or wave energy) or island wind developments. This competition has the potential to introduce an opportunity cost to the sector, however this cannot be quantified.

3.6 Military Activities

3.6.1 There are no quantified negative economic impacts to the military sector that can be presented within this report. DPOs, specifically W1, NE2, NE3, NE4 and NE5, overlap with or are entirely within a number of exercise and danger areas identified by the UK Ministry of Defence (MOD) as being used for a variety of purposes, including live firing, naval exercises and RAF fast jet exercises. The development of these areas has the potential to displace MOD activity. However, this is unlikely to constitute a significant cost to the sector as the area involved is a very small proportion of the overall area available, and should the activity be considered important within this region, it may present a constraint on development in these regions.

3.7 Oil and Gas

3.7.1 There are no quantified potential negative economic impacts to the oil and gas sector that can be presented within this report. There is some overlap between the DPOs and oil and gas activities, specifically 30th and 31st round awards, licence blocks and small areas of hydrocarbon fields. Additionally, the 32nd round blocks on offer (announced 10 July 2019) overlap parts of the East and North East regions, however there is uncertainty over which blocks may be taken forward in the future.

3.7.2 Development of offshore wind overlapping these areas in NE3, NE4, NE5, NE6, NE7, NE8, E1 and E2, should opportunities for hydrocarbon extraction be subsequently identified, could be considered an opportunity cost for the oil and gas sector. It is not, however, possible to quantify this potential cost.

3.7.3 In addition, there is potential for oil and gas development in the future, and the installation of new pipelines to be required to divert around offshore wind arrays or to install cable crossings. Both of these would potentially incur an additional, currently unquantifiable, potential cost to the oil and gas industry. However, the oil and gas industry in the North Sea is well developed, and therefore future development is likely to tie into existing pipeline infrastructure, reducing the likelihood of additional costs.

3.8 Power Interconnectors and Transmission Lines

3.8.1 Potential quantified negative economic impacts to power interconnector and transmission line developers are summarised in Table 16 at a DPO level under the maximum development scenario and in Table 17 scaled to regional and national levels. These impacts are associated with a potential requirement to divert planned cable routes around the DPOs in NE2 (Shetland interconnector), E1 and E3 (Eastern HVDC).

Table 16 Potential negative economic impacts to power interconnector and transmission line developers (present value of total costs over assessment period 2020-2059, £000s)

DPO	Maximum Development Scenario (GW)	Cost (£000s)	Cost per GW installed (£000s)
NE2	1	5,386	5,386
E1	3	401	134
E3	1	2,327	2,327

Table 17 Potential negative economic impacts to power interconnector and transmission line developers (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Lower Scenario (GW)	Lower Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	Upper Scenario (GW)	Upper Scenario (£000s)
South West	0.3	0	0.6	0	1	0
West	0.5	0	1	0	2	0
North	1	0	2	0	3	0
North East	1.5	673	3	1,346	4.5	2,020
East	1	455	2	909	3	1,364
National	**3**	**787**	**5**	**1,311**	**10**	**2,506**

3.8.2 The potential impacts to the sector are high, particularly when considered per cable installation with a potential cost in NE2 of £5.4m for the diversion of a single cable, the Shetland interconnector. However, it is recognised that these are worst-case impacts which do not take account for the potential for consultation with the sector and appropriate spatial planning within DPOs to mitigate these potential impacts, by reducing or removing the requirement for cable diversions.

3.8.3 Where there are existing operational cables within the DPOs (NE4 and NE5), it has been assumed that this will incur a constraint on offshore wind development without cost to the sector.

3.9 Recreational Boating

3.9.1 Potential quantified negative economic impacts to the recreational boating sector are summarised in Table 18 at a DPO level under the maximum development scenario and Table 19 scaled at regional and national levels. These potential impacts are associated with the diversion of recreational boating vessels using RYA informal offshore cruising routes around the DPOs.

3.9.2 Should recreational boating activities be displaced from a region due to the development of offshore wind it is also recognised that there could be a secondary impact on the earnings of marinas, and therefore on future investment in marina facilities. These impacts cannot, however, be quantified.

Table 18 Potential negative economic impacts to recreational boating (present value of total costs over assessment period 2020-2059, £000s)

DPO	Maximum Development Scenario (GW)	Cost (£000s)	Cost per GW installed (£000s)
SW1	1	11.5	11.5
W1	2	5.3	2.6
N1	2	7.3	3.7
NE1	2	15.9	8.0
NE2	1	0.9	0.9
NE3	1	0.1	0.1
NE5	1	3.1	3.1
NE6	2	6.4	3.2
E3	1	0.3	0.3

Table 19 Potential negative economic impacts to recreational boating (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Lower Scenario (GW)	Lower Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	Upper Scenario (GW)	Upper Scenario (£000s)
South West	0.3	3.4	0.6	6.1	1	10.1
West	0.5	1.3	1	2.6	2	4.6
North	1	0.9	2	1.8	3	2.4
North East	1.5	3.0	3	5.1	4.5	7.7
East	1	0.1	2	0.1	3	0.1
National	**3**	**4.9**	**5**	**7.8**	**10**	**16.1**

3.9.3 Whilst there are impacts associated with a number of DPOs, the impacts themselves are low (maximum per DPO of £15.9k present value over the full assessment period), with the highest values in NE1 and SW1 both of which are shallower water sites closer to shore, intersected by multiple offshore cruising routes. It is, however, recognised that current evidence suggests that the majority of recreational vessels can transit safely through fixed-bottom wind farm arrays (which are likely to be located closer inshore), and hence the diversion costs presented above may be overestimates.

3.9.4 The limited scale of impact on recreational boating cruising routes suggests that secondary impacts on marinas will also be very minor.

3.10 Commercial Shipping

3.10.1 Potential quantified negative economic impacts to the commercial shipping sector are summarised in Table 20 at a DPO level under the maximum development scenario and

3.10.2 Table 21 scaled to regional and national levels. These potential impacts are associated with additional fuel costs based on requirements for commercial ships to divert around the DPOs.

3.10.3 The potential negative economic impacts to commercial shipping are significant and have the potential to cause difficulties in managing and consenting offshore wind developments within certain sites, particularly SW1 and NE6 where potential impacts are potentially greater than £10 million (present value over the assessment period). This is in context of the contribution that shipping made to the Scottish economy in 2015, or £3,600 million GVA[41].

3.10.4 In the case of SW1, this is due to significant diversion of a high intensity route, which could be avoided through appropriate spatial planning of the site, using guidance in MGN 543 (MCA guidance on the Safety of Navigation: Offshore Renewable installations) to create safe shipping lanes through arrays.

[41] Cebr, 2017. The economic contribution of the UK Maritime Sector, A report for Maritime UK. Available at https://www.maritimeuk.org/value/maritime-sector-all/.

Table 20 Potential negative economic impacts to commercial shipping (present value of total costs over assessment period 2020-2059, £000s)

DPO	Maximum Development Scenario (GW)	Cost (£000s)	Cost per GW installed (£000s)
SW1	1	12,319	12,319
W1	2	1,587	793
N1	2	8,889	4,444
N2	2	418	209
N3	2	318	159
N4	1	359	359
NE1	2	2,257	1,129
NE2	1	3,867	3,867
NE3	1	2,048	2,048
NE4	1	2,639	2,639
NE5	1	6,432	6,432
NE6	2	19,706	9,853
NE7	2	3,082	1,541
NE8	1	777	777
E1	3	1,516	505
E2	2	786	393
E3	1	3,128	3,128

Table 21 Potential negative economic impacts to commercial shipping (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Lower Scenario (GW)	Lower Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	Upper Scenario (GW)	Upper Scenario (£000s)
South West	0.3	3,696	0.6	6,506	1	10,844
West	0.5	397	1	793	2	1,397
North	1	1,255	2	2,511	3	3,307
North East	1.5	4,694	3	7,886	4.5	11,830
East	1	905	2	1,593	3	2,098
National	**3**	**6,215**	**5**	**9,758**	**10**	**19,526**

3.10.5 In the case of NE6, however, the potential for spatial planning is limited, and therefore impacts within this DPO may not be avoidable. In addition, although the overall potential cost is lower due to the smaller diversion, there is potentially a significant impact on commercial shipping from development within NE4, due to the overlap encompassing the main shipping route around Scotland, which again is unlikely to be mitigated by spatial planning within the DPO.

3.10.6 Any significant impacts on particular shipping routes have the potential to alter the economic case for trade into or out of certain ports. The impact of this has not been quantified as uncertainties are high, as no analysis of the source or destination of shipping transiting the DPO has been undertaken, and the potential for appropriate spatial planning within the DPOs could reduce impacts significantly.

3.11 Telecommunication Cables

3.11.1 There are no quantified potential negative economic impacts to the telecommunications sector that can be presented within this report. There is some overlap between NE4 and NE5 and a telecom cable, however it is assumed that this will constrain development to avoid interaction with the cable and leave an appropriate corridor such that no diversions are required when the cable is replaced.

3.11.2 There is significant uncertainty regarding the future development and routes of cables, therefore no assessment can be made regarding impacts on potential future telecommunication cable routes.

3.12 Tourism

3.12.1 Potential quantified negative economic impacts to the tourism sector are summarised in Table 22 at a DPO level under the maximum development scenario and Table 23 scaled to regional and national levels. These potential impacts are associated with the potential reduction in tourism expenditure due to tourists being deterred by the visual impacts of offshore wind turbines.

Table 22 Potential negative economic impacts to tourism (present value of total costs over assessment period 2020-2059, £000s)

DPO	Maximum Development Scenario (GW	Cost (£000s)	Cost per GW installed (£000s)
SW1	1	124.0	124.0
W1	2	292.4	146.2
N4	1	1,891.0	1,891.0
NE2	1	15.7	15.7

Table 23 Potential negative economic impacts to tourism (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Lower Scenario (GW)	Lower Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	Upper Scenario (GW)	Upper Scenario (£000s)
South West	0.3	39	0.6	65	1	109
West	0.5	100	1	190	2	334
North	1	238	2	475	3	626
North East	1.5	2	3	3	4.5	5
East	1	0	2	0	3	0
National	**3**	**218**	**5**	**342**	**10**	**711**

3.12.2 Due to the nature of the impact due to the visibility of the turbines from areas of land, the assessment has considered that impacts will only occur on land areas within 18 km of DPOs. The most significant potential effects are from N4 with an impact of reduced spend of £1.9 million (present value over the assessment period), due to the close proximity of the DPO to land, and the importance of tourism to the Outer Hebrides. This is a minor reduction in the total value of tourism in the Outer Hebrides (annual turnover). At a national scale, the impact in the high scenario of £711,000 over the assessment period is not considered to be significant to the tourism industry when considered in the context of the annual marine tourism turnover of £1,031 million (2016) in Scotland.

3.13 Water Sports

3.13.1 Potential quantified negative economic impacts to the watersports sector are summarised in Table 24 at a DPO level under the maximum development scenario and in Table 25 scaled to regional and national levels. These potential impacts are associated with the loss of sea area for recreational angling and relate to total spend by recreational anglers.

Table 24 Potential negative economic impacts to watersports (present value of total costs over assessment period 2020-2059, £000s)

DPO	Maximum Development Scenario (GW	Cost (£000s)	Cost per GW installed (£000s)
SW1	1	5,187	5,187
W1	2	3,159	1,579
N4	1	1,908	1,908

Table 25 Potential negative economic impacts to watersports (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Lower Scenario (GW)	Lower Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	Upper Scenario (GW)	Upper Scenario (£000s)
South West	0.3	1,556	0.6	2,740	1	4,566
West	0.5	790	1	1,580	2	2,781
North	1	240	2	480	3	632
North East	1.5	0	3	0	4.5	0
East	1	0	2	0	3	0
National	**3**	**1,412**	**5**	**2,217**	**10**	**4,943**

3.13.2 The majority of recreational angling is undertaken within 6 NM of land, therefore significant impacts are only assessed where a DPO is within this distance. Any potential impacts are therefore only likely to be seen at SW1, W1 and N4. The most significant impacts are estimated to be in SW1 with a potential cost of £5.2 million (present value over the assessment period), driven by the large area within 6 NM combined with high spend in the South West region on recreational boat angling.

3.13.3 In a worst-case scenario that 100% of the area within 6 NM in SW1 is developed, the impact of £547k per annum is approximately 1.7% of the total annual value of recreational angling in the region. Similarly, in W1 2.2% of the value of angling in the region could be impacted. It is unlikely that all of this would be lost, as some is likely to be displaced, or in reality may continue to occur within the DPO as the sea area is unlikely to be sterilised for sea angling by the development of an offshore wind array. Assuming recreational angling can continue within arrays once construction is completed, the impact is considered unlikely to be significant to the recreational angling sector in the region.

3.13.4 When considered nationally the significance is further reduced, as there are large areas within Scotland which would remain accessible for recreational sea angling. Therefore, even if displacement from a region is considered, this may not be lost to the national sector as a whole.

3.13.5 The potential impact on other watersports cannot be quantified, as there is little information available to determine the value of these watersports or the potential impact of offshore wind development. It is, however, recognised that areas inshore of the DPOs are known to be used for a variety of recreational activities including surfing, kitesurfing, windsurfing, stand up paddleboarding, kayaking and canoeing. These activities have the potential to be affected by development within the DPOs either directly through displacement from areas or through changes to wind or wave regimes inshore of the DPOs, as well as by changes to the environment during or following the construction of cable routes and landfalls. However, none of these impacts are likely to be economically significant either locally, regionally or nationally.

4 Potential Positive Economic Impacts

4.1 Introduction

4.1.1 The methodology for assessing the positive economic impacts derived from level of spend in wind farms is described in Section 2 above. This section provides the results from application of this method at the regional and national scales. The discussion follows the six steps of the assessment approach with full details of the calculations undertaken in each step set out in Appendix C.

4.2 Step 1: Spend per GW per year per activity

4.2.1 Each activity is likely to have a duration that exceeds one year, therefore, spend needs to be divided across the number of years that the activity is expected to take before it is completed. This is a simplification that assumes activity is equally spread across the durations given below:

- Development and project management: activity duration of 10 years giving spend of £12 million per GW per year;
- Wind turbine supply: activity duration of two years giving spend of £500 million per GW per year;
- Balance of plant: activity duration of four years giving spend of £150 million per GW per year;
- Installation and commissioning: activity duration of four years giving spend of £162.5 million per GW per year;
- Operation, maintenance and service: £75 million per GW per year, with this being an annual level of spend assumed for 30 years (or until 2059 which is the end of the appraisal period).

4.3 Step 2: Spend retained per region

4.3.1 The retention rates for each region and nationally for now, 2030 and 2050 are summarised in Table 26.

Table 26 Retention rate assumptions per region and nationally across the study time period

Region	Time	East	North East	North	West	South West	National
Development and project management	Now	20%	0.1%	0.1%	1%	0.1%	1%
	2030	40%	3%	3%	20%	3%	20%
	2050	70%	5%	5%	40%	5%	40%
Wind turbine supply	Now	3%	2%	2%	2%	3%	1%
	2030	14%	12%	12%	12%	14%	20%
	2050	25%	22%	22%	22%	25%	40%
Balance of plant	Now	4%	50%	4%	3%	3%	4%
	2030	23%	60%	23%	9%	9%	23%
	2050	42%	70%	42%	15%	15%	42%
Installation and commissioning	Now	2%	40%	2%	1%	1%	2%
	2030	7%	60%	7%	6%	6%	7%
	2050	12%	80%	12%	11%	11%	12%
Operation, maintenance and service	Now	30%	14%	10%	10%	10%	14%
	2030	50%	16%	11%	11%	11%	16%
	2050	70%	18%	12%	12%	12%	18%

4.4 Step 3: Allocate spend over the appraisal time period

4.4.1 Total levels of spend have been assigned to the regional scenarios. The investments per scenario are set out in Table 27.

Table 27 Regional scenarios used as the basis for level of spend

Region	Regional Low Scenario (GW)	Regional Medium Scenario (GW)	Regional High Scenario (GW)
East	1	2	3
North East	1.5	3	4.5
North	1	2	3
West	0.5	1	2
South West	0.3	0.6	1
Total (regional)	4.3	9.6	13.5
National (factored back)	3	5	10

4.4.2 As discussed in Section 2.1.3, it is assumed that spend is phased over the time period for the appraisal such that smaller levels of spending are made over a number of years. As such, total spend is built up from packages of 0.3 GW, 0.5 GW, 1 GW and 1.5 GW (2 GW at the national level) depending on the total level of spend that is projected to occur in a region. Spend is phased to occur in a reasonably regular pattern and in sensible sized packages. For example, 1 GW is assigned as two 0.5 GW packages in 2030 and 2035 for the North region, low scenario and South West region, medium scenario.

4.5 Step 4: GVA per Region

4.5.1 The GVA effects used are shown in Table 28. This is applied to the projected level of spend retained in each region to enable an estimate to be made of direct and indirect GVA impacts (Type I) and direct, indirect and induced GVA impacts (Type II). The Type I and Type II GVA effects have been applied to the change in output to calculate the change in GVA for the economy as a whole[42]. Direct GVA impacts per region are estimated by taking the output (from level of spend) and multiplying it by the GVA:output ratio (calculated by dividing GVA by total output from each sector). The values used are taken from the combined use table of the Scottish input-output multipliers[43].

Table 28 GVA effect used to estimate GVA impacts per activity

Region	SIC code	GVA effect	
		Type I	Type II
Development and project management	71	0.7	0.9
Wind turbine supply	28	0.5	0.6
Balance of plant	41-43	0.7	0.8
Installation and commissioning	41-44	0.7	0.8
Operation, maintenance and service	33	0.7	0.9

Source: Scottish input output multipliers, see: https://www2.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Mulitipliers

4.5.2 The GVA impacts on Scotland from projected spend in present value (PV) terms from 2020 to 2059 are estimated as shown in Table 29. Direct GVA PV impacts range from £18 million in the South West (low) to £1,277 million (high) in the North East. Nationally, direct GVA PV impacts rage from £328 million (low) to £1,120 million (high). When the GVA effect is applied (which enables indirect, Type I, and induced, Type II, GVA impacts to be included), the largest regional impacts are seen in the North East, with a range from £645 million (low

[42] Following the guidelines on application of the Scottish Government Input-Output Multipliers, see: https://www2.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Mulitipliers

[43] Scottish input-output multipliers: Use table, see: https://www2.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Demand

scenario of 1.5 GW) to £1,921 million (high scenario of 4.5 GW) for Type I and from £760 million (low scenario) to £2,259 million (high scenario) for Type II. The smallest impacts are seen in the West and South West. The South West has the smallest GVA impacts both under the low scenario (£30 million to £38 million, Type I) and under the high scenario (£121 million to £149 million, Type II). This is a function of both the assumed scale of development and retention rates.

4.5.3 The annual maximum GVA (undiscounted) in each region and nationally are presented in Table 30 for each region and scenario and for direct, Type I and Type II GVA impacts. The figures reflect the maximum GVA in any one year and so show the peak impacts, rather than total impacts as in Table 29. In some cases, e.g. South West the peak impacts are much closer in terms of range between low scenario and high scenario (£1.6 millin direct GVA impacts, £2.6 million under the Type I, low scenario, to £21 million under the Type II, high scenario) than for the range of total GVA across all years. In other regions, e.g. West, the range is much higher (£2.2 million direct GVA impacts, £3.4 million under the Type I, low scenario, to £40 million under the Type II, high scenario). This is a reflection of the spend profile and how many of the activities are undertaken in any one year. In the North East, all five activities are being undertaken simultaneously for at least one year in the appraisal timeframe under the low, medium and high scenarios. For the West region, the low scenario has a maximum of four activities being undertaken simultaneously under the low scenario but all five under the high scenario.

Table 29 GVA impacts in Present Value (discounted) terms by region and nationally (Direct, Type I (direct, indirect) and Type II (direct, indirect, induced)) (£ millions)

Scenario	East	North -east	North	West	South- west	National
Low, Direct	£235	£429	£88	£30	£18	£328
Low, Type I	£389	£645	£139	£49	£30	£515
Low, Type II	£497	£760	£170	£61	£38	£631
Medium, Direct	£486	£852	£177	£60	£45	£560
Medium, Type I	£790	£1,280	£278	£98	£72	£874
Medium, Type II	£997	£1,506	£339	£123	£89	£1,069
High, Direct	£683	£1,277	£269	£149	£74	£1,120
High, Type I	£1,103	£1,921	£420	£239	£121	£1,748
High, Type II	£1,386	£2,259	£497	£288	£149	£2,137

Table 30 Maximum GVA impacts in any one year in Present Value (discounted) terms by region and nationally (Type I and Type II) (£ millions)

Scenario	East	North East	North	West	South-west	National
Low, Direct	£12	£54	£14	£2.2	£1.6	£30
Low, Type I	£20	£77	£21	£3.4	£2.6	£46
Low, Type II	£26	£88	£25	£4.0	£3.1	£54
Medium, Direct	£38	£73	£27	£4.5	£7	£46
Medium, Type I	£60	£109	£42	£6.9	£11	£69
Medium, Type II	£72	£126	£50	£8.1	£13	£81
High, Direct	£40	£109	£27	£21	£11	£93
High, Type I	£64	£163	£42	£33	£18	£138
High, Type II	£78	£189	£50	£40	£21	£162

4.5.4 The estimated GVA impacts can be compared with the GVA identified for energy (including renewables) for growth sectors based on data from Scotland's Economic Strategy to put the additional GVA projected to be generated from 2020 to 2059 into context. The GVA for 2016 for the energy (including renewables) sector was:

- East: £9,736 million, with maximum GVA impacts in any one year between 2020 and 2059 accounting for less than 1% even on the high scenario Type II;
- North East: £347 million, with maximum GVA impacts in any one year between 2020 and 2059 under the high scenario Type II equivalent to 54% of GVA in 2016;
- North: £96 million, with maximum GVA impacts in any one year between 2020 and 2059 under the high scenario Type II equivalent to 52% of GVA in 2016;
- West: £1,112 million, with maximum GVA impacts in any one year between 2020 and 2059 accounting for less than 4% even on the high scenario Type II;
- South West: £170 million, with maximum GVA impacts in any one year between 2020 and 2059 under the high scenario Type II equivalent to 12% of GVA in 2016;

- Scotland: £12,948 million[44], with maximum GVA impacts in any one year between 2020 and 2059 under the high scenario Type II equivalent to 1% of GVA in 2016.

4.5.5 Figure 5 shows how the Type II, GVA impacts vary over time. The Type II GVA impacts shown here are undiscounted to show the trend, in nominal value terms, and avoid the effect of discounting on future impacts. The figure shows the high Type II GVA impacts in the North East, which relate to the higher retention factors identified for this region for balance of plant and installation and commissioning. The national values are lower than the sum of the regional values due to factoring back at the national level to a lower level of spend (3 GW, 5 GW and 10 GW across the three scenarios) compared with the sum of spend at regional levels (4.3 GW, 8.6 GW and 13.5 GW). The results for the South West and West regions are very similar, with the South West masked by the West in Figure 5.

4.5.6 Figure 6 presents the national impacts for the low, medium and high scenario for the direct, Type I and Type II GVA impacts. The figure shows how the peaks under the high and medium scenarios are much higher than under the low scenario. This reflects the timing of spend. A smoother spend profile could help encourage growth of the supply chain and hence retention of more positive impacts in Scotland. The GVA impacts under the medium scenario are lower than those seen in the low scenario in years 2033 and 2039. This is due to a change in the timing of spending between the low and medium scenarios.

[44] The total for Scotland is greater than the totals for each region due to some Local Authority areas not having individually presented GVA figures for energy including renewables from the original data source.

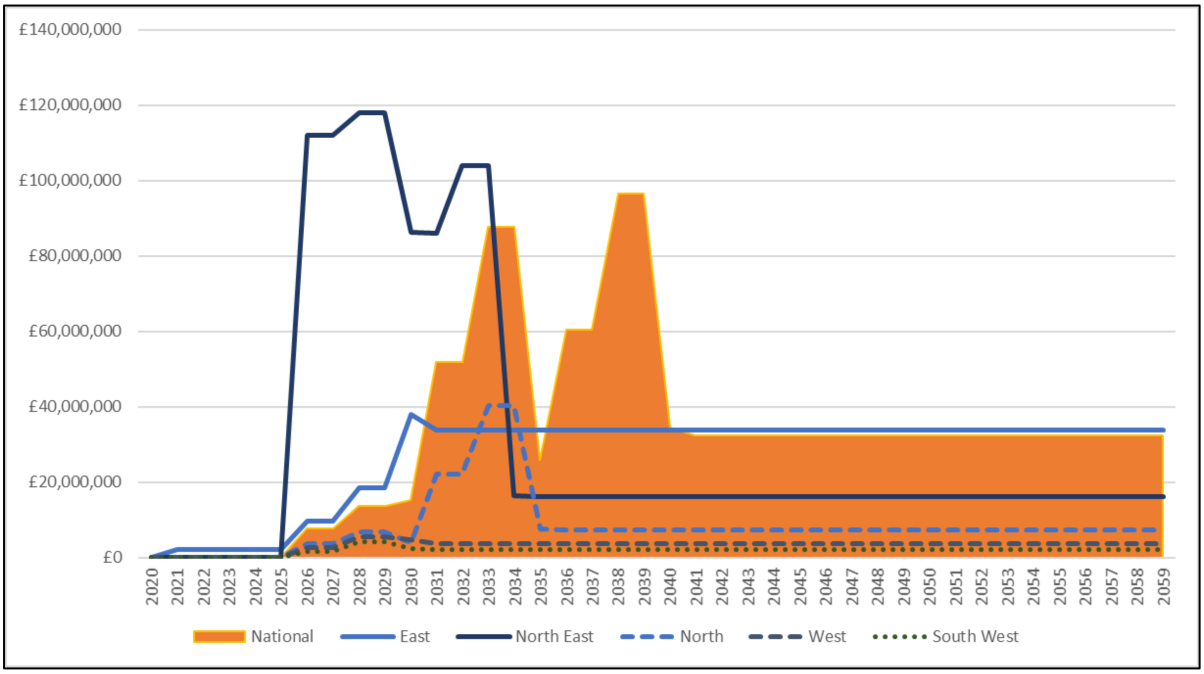

Figure 5 Timing and pattern of Type II, GVA impacts for the Low scenario (National impacts are shown in block colour with regional impacts super-imposed. West and South West show very similar timing and magnitude of impacts)

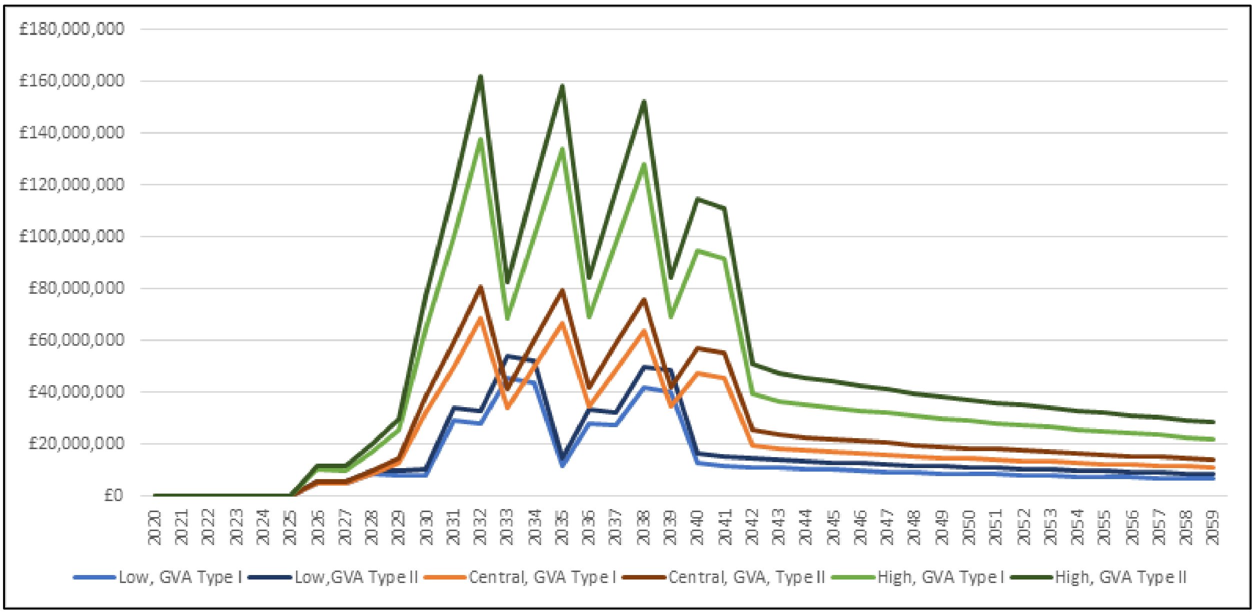

Figure 6 Timing and pattern of GVA impacts for all three scenarios at the national level

4.6 Step 5: Employment per Region

4.6.1 The employment effect multipliers are used to estimate positive employment impacts. The employment effects set out in Table 31 are used with the estimated change in output to provide an indication of the full-time equivalent (FTE) impacts that would be generated within each region and nationally. As with GVA, the direct, direct and indirect (Type I) and direct, indirect and induced (Type II) impacts are estimated. Direct jobs are estimated by dividing the Type II (direct, indirect and induced jobs) by the employment multiplier from the Scottish Input-Output multipliers (with this varying from 1.7 to 1.8 across the five activity types).

Table 31 Employment effect used to estimate employment impacts per activity

Activity	SIC code	Employment effect		Employment multiplier	
		Type I	Type II	Type I	Type II
Development and project management	71	12.2	14.5	1.5	1.8
Wind turbine supply	28	9.8	11.8	1.4	1.7
Balance of plant	41-43	12.3	14.4	1.6	1.8
Installation and commissioning	41-44	12.3	14.4	1.6	1.8
Operation, maintenance and service	33	9.2	11.3	1.4	1.8

Source: Scottish input output multipliers, see: https://www2.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Mulitipliers

4.6.2 Employment impacts are estimated based on undiscounted spend that is retained in each region or nationally (with the use of the same retention rates used to calculate the GVA impacts for the sake of consistency). Table 32 presents the maximum number of jobs in any one year for each region and scenario and for both Type I and Type II employment impacts.

Table 32 Maximum employment impacts in any one year by region and nationally (Type I and Type II) (FTEs)

Scenario	East	North East	North	West	South West	National
Low, Direct	247	938	296	41	31	696
Low, Type I	282	1,255	373	51	38	864
Low, Type II	444	1,684	521	71	53	1,229
Medium, Direct	832	1,588	593	82	147	1,075
Medium, Type I	1,020	2,066	745	103	180	1,357
Medium, Type II	1,468	2,834	1,042	143	256	1,911
High, Direct	1,044	2,382	639	463	245	2,151
High, Type I	1,262	3,099	798	568	300	2,714
High, Type II	1,849	4,250	1,126	808	426	3,821

4.6.3 This can be compared with statistics on the number of unemployed people within each region (statistics used from 2018 Q4):

- East: 42,650 unemployed, or potential jobs for up to 4.3% of those currently unemployed (based on high scenario, Type II);
- North East: 6,000 unemployed, or potential jobs for 28% to 71% of those currently unemployed (based on low scenario, Type II to high scenario, Type II);
- North: 8,000 unemployed, or potential jobs for 7% to 14% of those currently unemployed (based on low scenario, Type II to high scenario, Type II);
- West: 38,150 unemployed, or potential jobs for up to 2.1% of those currently unemployed (based on high scenario, Type II);
- South West: 19,600 unemployed, or potential for up to 2.2% of those currently unemployed (based on high scenario, Type II);
- National: 114,400 unemployed, or potential for around 3% of those currently unemployed (based on high scenario, Type II).

4.6.4 It is important to consider the types of jobs being created and the skill levels required. Jobs related to development and project management are more likely to be highly skilled covering activities such as wind farm design, surveys and related projects. Some of the construction activities may be lower skilled, although many will also involve highly skilled activities or application of what may be perceived to be lower skilled operations in offshore locations. Operation, maintenance and service is also likely to require skilled operation.

Energy & Utility Skills (2018)[45] identifies skills crucial to offshore wind development and deployment as:

- Asset management;
- Project management;
- Leadership;
- Engineering and technical skills (mechanical, electrical, control & instrumentation, blade and turbine technicians);
- Scientists (including marine biology, geophysics, hydrography, oceanography);
- Advanced first aid and rescue;
- Offshore-specific skills (including confined spaces, working at heights, team working, team living).

4.6.5 The types of skills identified above would be the main ones required and so will need a minimum level of pre-existing skills or training should local people without those specific skills be employed. Further discussion on the implications in terms of jobs is considered in Step 6, where the potential for local and relocated jobs is estimated.

4.6.6 The pattern and timing of estimated employment impacts are shown in Figure 7. This shows that employment impacts are larger in the North East region. The East and North regions show similar levels and timing of employment impacts which may have implications in terms of the ability of businesses to attract workers to relocate, unless these workers come from other regions or even from outside of Scotland.

4.6.7 Figure 8 presents a detailed breakdown of the Type I and Type II employment impacts for the North East region. The Figure shows that there is very little difference in employment impacts between 2026 and 2029 under the low and medium scenarios, with this reflecting differences in timing of spend. The Type II impacts under the medium scenario are also very similar to the Type I impacts under the high scenario.

[45] Energy & Utility Skills (2018): Skills and labour requirements of the UK offshore wind industry 2018 to 2032, October 2018, available at: https://aurawindenergy.com/uploads/publications/Aura-EU-Skills-UK-Offshore-Wind-Skills-Study-Full-Report-October-2018.pdf on 19 February 2019.

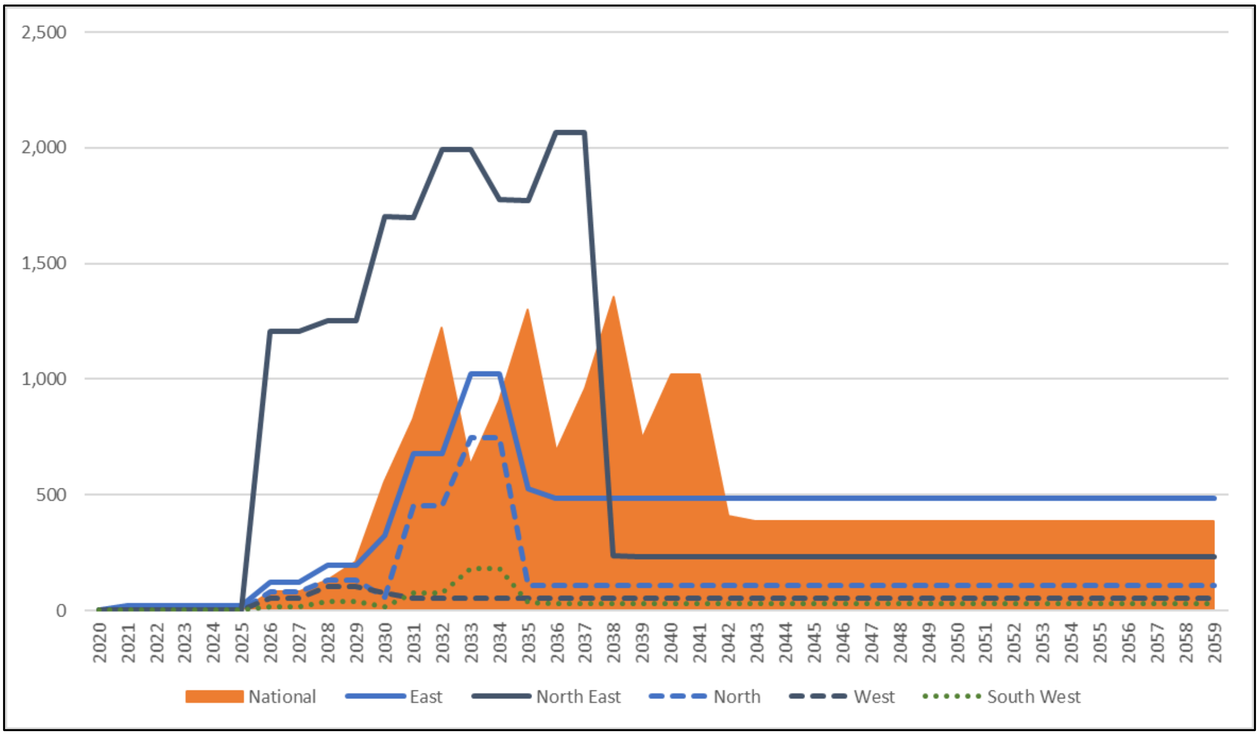

Figure 7 Timing and pattern of Type I employment impacts for the Medium scenario (National impacts are shown in block colour with regional impacts super-imposed)

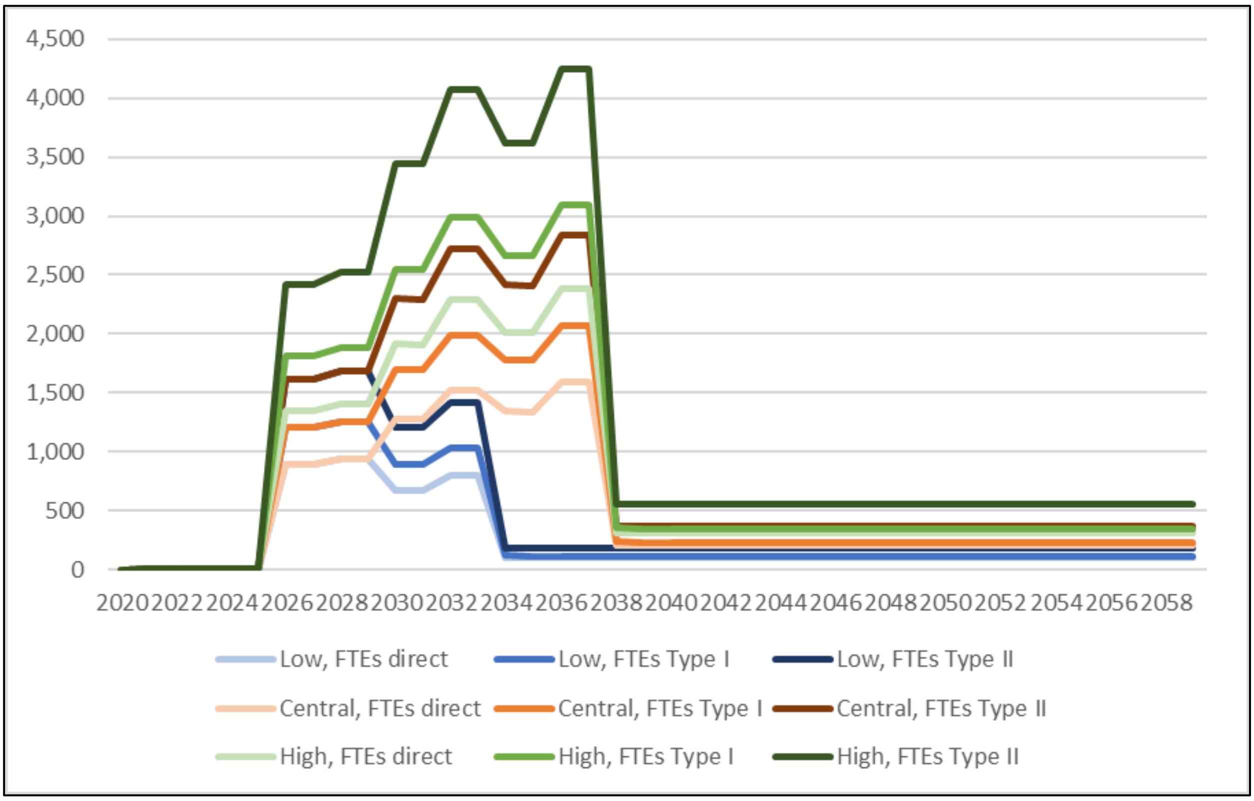

Figure 8 Timing and pattern of Direct, Type I and Type II employment impacts for the North East region, all scenarios

4.7 Step 6: Local jobs and displacement

4.7.1 The division of jobs into jobs for local people, and jobs for people relocating, is important as an input to the social and distributional impacts assessment. Table 33 presents the maximum number of local and relocated jobs per region by scenario. Table 34 then considers the percentage of the local jobs that could be provided to those who are currently unemployed in each region (note this does not reflect the likely skill level required to fill each job and covers unemployment in the region as a whole, when the jobs themselves may be more likely to be located in coastal areas). Table 34 shows that in most regions the additional jobs should be filled through those currently unemployed, although there may be some displacement from other sectors, especially in the North East and North regions.

4.7.2 In many regions, the maximum number of jobs supported or created in any one year is related to construction, although if total jobs is measured in job-years[46] rather than maximum number of jobs in any year, then the majority of jobs are related to operational activities. North East region has the highest proportion of construction jobs with these outweighing the number of job-years supported during operational activities. For all other regions, the majority of job-years are associated with operations. This is usually because operational jobs last for a number of years, while construction jobs are more short-lived. North East has construction over the 12 years in total, with this continuing from 2028 for 12 years out of the total timeframe of 40 years. For the other regions, construction generally occurs for a maximum of 8 years (and in some cases, especially the low scenarios, for just 4 years).

4.7.3 Displacement is an important effect that needs to be considered for estimating the net effects on employment. For local jobs, this could be displacement due to local people changing jobs to work in the wind farm industry, with these jobs then replacing the job that they previously held. For those moving into a region to take up a job, displacement could be from another job in another region in Scotland or from a region outside Scotland. In areas where the oil and gas industry has been an important employer, any decline in oil and gas activity could mean that individuals with the necessary skills become available without causing displacement. There could be competition for skills with any increase in decommissioning activities associated with oil and gas installations. Oil and gas workers also tend to be very mobile so could take up employment in wind farm related jobs in any of the regions.

[46] This is calculated by summing jobs over the time period as a whole. This is different to number of jobs since one job may be supported for a number of years.

Table 33 Maximum local and relocated employment impacts in any one year by region and nationally (Type I and Type II) (FTEs)

Scenario	East		North East		North	
	Local	Relocated	Local	Relocated	Local	Relocated
Low, Direct	62	185	234	703	74	222
Low, Type I	71	212	314	941	93	279
Low, Type II	111	333	421	1,063	130	391
Medium, Direct	208	624	397	1,191	148	445
Medium, Type I	255	765	517	1,550	186	559
Medium, Type II	367	1,101	708	2,125	260	781
High, Direct	261	783	596	1,787	160	479
High, Type I	315	946	775	2,324	200	599
High, Type II	462	1,387	1,063	3,188	281	844
Scenario	**West**		**South West**		**National**	
	Local	**Relocated**	**Local**	**Relocated**	**Local**	**Relocated**
Low, Direct	10	31	8	23	174	522
Low, Type I	13	39	9	28	216	648
Low, Type II	18	54	13	40	307	922
Medium, Direct	20	61	37	110	269	806
Medium, Type I	26	77	45	135	339	1,018
Medium, Type II	36	107	64	192	478	1,433
High, Direct	116	347	61	184	538	1,613
High, Type I	142	426	75	225	678	2,035
High, Type II	202	606	107	320	955	2,866

Table 34 Potential for additional local FTEs to be filled by those currently unemployed (based on numbers unemployed only)

Scenario	East	North East	North	West	South West	National
Low, Direct	0.1%	3.9%	0.9%	0.03%	0.02%	0.2%
Low, Type I	0.2%	5.2%	1.2%	0.03%	0.02%	0.2%
Low, Type II	0.3%	7.0%	1.6%	0.04%	0.1%	0.3%
Medium, Direct	0.5%	6.6%	1.9%	0.1%	0.2%	0.2%
Medium, Type I	0.6%	8.6%	2.3%	0.1%	0.2%	0.3%
Medium, Type II	0.9%	11.8%	3.3%	0.1%	0.3%	0.4%
High, Direct	0.6%	9.9%	2.0%	0.3%	0.3%	0.5%
High, Type I	0.7%	12.9%	2.5%	0.4%	0.4%	0.6%
High, Type II	1.1%	17.7%	3.5%	0.5%	0.5%	0.8%

4.8 Sensitivity analysis: leakage

4.8.1 No account is taken of the potential for leakage from one region to another in the main assessment. For example, it might be expected that spend would be retained in the North and North East regions as a result of spend in the West and South West. Equally, spend in the West and South West could also leak to England or Ireland. The sensitivity test assesses how spend associated with West region might increase if some retention is also assumed in North East and North regions. Retention rates in the West region are assumed to remain the same as in the main appraisal. Additional retention is assumed in North and North East region at 50% of the original retention rates where these have been identified as mid or upper in the main appraisal. These are summarised in Table 35. Total retention assumed across all regions is then:

- Development and project management: 1% now increasing to 20% in 2030 based on retention in West only due to low capacity in North East and North regions;
- Wind turbine supply: 2% now increasing to 12% in 2030 based on retention in West only due to low capacity in North East and North regions;
- Balance of plant: 3% in West region plus 25% in North East region and 2% in North region giving a total of 30% now. This increases to 9% in West region plus 30% in North East region and 11.5% in North region giving a total of 50.5% in 2030;
- Installation and commissioning: 1% in West region plus 20% in North East region and 1% in North region giving a total of 22% now. This increases to 6% in West region plus 30% in North East region and 3.5% in North region giving a total of 39.5% in 2030;

- Operation, maintenance and service: 10% in West region plus 7% in North East region giving a total of 17% now. This increases to 11% in West region plus 8% in North East region giving a total of 19% in 2030.

4.8.2 The impacts on GVA are summarised in Table 36 and show the total GVA that would be generated in each region due to spend in the West region generating supply side impacts in the North East and North regions, rather than the assumption used in the main appraisal that all spend not retained in the West leaks outside of Scotland. Assuming 50% of leakage to other regions in Scotland may be high but is used here to give an indication of the potential additional GVA that could be generated due to the more developed supply chains in the North East and North regions. The sensitivity shows that significant additional GVA is generated in North East and North regions.

Table 35 Retention factors used to capture potential leakage effects on other regions of Scotland from spend in the West

Region	Time	East	North East	North	West	South West
Development and project management	Now	-	-	-	1%	-
	2030	-	-	-	20%	-
	2050	-	-	-	40%	-
Wind turbine supply	Now	-	-	-	2%	-
	2030	-	-	-	12%	-
	2050	-	-	-	22%	-
Balance of plant	Now	-	25%	2%	3%	-
	2030	-	30%	11.5%	9%	-
	2050	-	35%	21%	15%	-
Installation and commissioning	Now	-	20%	1%	1%	-
	2030	-	30%	3.5%	6%	-
	2050	-	40%	6%	11%	-
Operation, maintenance and service	Now	-	7%	-	10%	-
	2030	-	8%	-	11%	-
	2050	-	9%	-	12%	-

Table 36 GVA impacts in present value (discounted) terms by region based on leakage of spend in West region into North East and North regions rather than outside of Scotland (Direct, Type I and Type II) (£ millions)

Scenario	East	North East	North	West	South West
Low, Direct	£0	£206	£18	£30	£0
Low, Type I	£0	£309	£25	£49	£0
Low, Type II	£0	£364	£29	£61	£0
Medium, Direct	£0	£402	£36	£60	£0
Medium, Type I	£0	£600	£50	£98	£0
Medium, Type II	£0	£705	£57	£123	£0
High, Direct	£0	£603	£60	£149	£0
High, Type I	£0	£900	£84	£239	£0
High, Type II	£0	£1,057	£96	£288	£0

4.8.3 Employment impacts are estimated based on the employment effect multiplier as for the main appraisal. The results, in terms of maximum number of jobs generated in each region over the appraisal timeframe are shown in Table 37. The number of jobs shown as being created may over-estimate total job gains as there may be some efficiencies within companies in the North East and North regions such that actual increases in job numbers are not the sum of the jobs created from direct spend into North East and North plus leaked spend from the West region. There may also be capacity issues in the North East in terms of the extent to which the supply chain is able to deliver additional spend leaking from the West region. As a result, the impacts may be smaller than those suggested in Table 37 with leakage outside North East region due to capacity constraints.

Table 37 Maximum employment impacts in any one year by region based on leakage of spend in West region into North East and North regions rather than outside of Scotland (Type I and Type II) (FTEs)

Scenario	East	North East	North	West	South West
Low, Direct	0	448	73	41	0
Low, Type I	0	603	99	51	0
Low, Type II	0	806	132	42	0
Medium, Direct	0	668	147	82	0
Medium, Type I	0	884	197	103	0
Medium, Type II	0	1,202	264	84	0
High, Direct	0	1,002	147	463	0
High, Type I	0	1,327	197	568	0
High, Type II	0	1,803	264	352	0

4.9 Sensitivity analysis: reducing costs of technology over time

4.9.1 The costs per activity are based on BVG (2019) but do not take account of potential efficiencies that could occur as development proceeds. This could result in the costs per GW decreasing over time. The impacts of reducing costs per activity are tested by assuming that the costs per GW decline by 2% per year from 2021. This means that the costs decline as follows for each activity:

- Development and project management: £120 million per GW in 2020 declining to £100 million per GW in 2030;
- Wind turbine supply: £1,000 million per GW in 2020 declining to £833 million per GW in 2030;
- Balance of plant: £600 million per GW in 2020 declining to £500 million per GW in 2030;

- Installation and commissioning: £650 million per GW in 2020 declining to £540 million per GW in 2030;
- Operation, maintenance and service: £75 million per GW per year in 2020 declining to £63 million per GW in 2030.

4.9.2 The impact of assuming efficiencies and cost reductions as investment continues in Scotland and elsewhere means that total GVA and employment impacts reduce over time. Table 38 presents the discounted (Present Value) total GVA impacts over the appraisal timeframe (2020-2059) for each region and nationally. Table 38 also shows the reduction in GVA from the main appraisal. The percentage change in total GVA impacts ranges from –19% (low, Direct, North East and low, Type I, North East) to -33% (High, Type II, East).

Table 38 GVA impacts in Present Value (discounted) terms by region and nationally (Type I and Type II) based on costs reducing by 2% per year from 2021 onwards due to efficiencies and cost savings (£ millions)

Scenario	East	North East	North	West	South West	National
Low, Direct	£165	£348	£65	£21	£13	£233
	-30%	-19%	-26%	-28%	-28%	-29%
Low, Type I	£271	£519	£102	£35	£21	£362
	-30%	-19%	-27%	-28%	-28%	-30%
Low, Type II	£345	£609	£123	£44	£27	£442
	-31%	-20%	-27%	-29%	-28%	-30%
Medium, Direct	£338	£662	£130	£43	£32	£396
	-30%	-22%	-26%	-28%	-28%	-29%
Medium, Type I	£546	£990	£203	£70	£52	£613
	-31%	-23%	-27%	-28%	-28%	-30%
Medium, Type II	£687	£1,160	£247	£88	£64	£747
	-31%	-23%	-27%	-29%	-28%	-30%
High, Direct	£466	£994	£193	£108	£54	£792
	-32%	-22%	-28%	-28%	-28%	-29%
High, Type I	£746	£1,486	£299	£172	£87	£1,227
	-32%	-23%	-29%	-28%	-28%	-30%
High, Type II	£935	£1,740	£355	£208	£107	£1,493
	-33%	-23%	-29%	-28%	-28%	-30%

4.9.3 Since the total costs reduce over time, the employment impacts in terms of gain in number of jobs will consequently reduce. Table 39 presents the maximum number of jobs created in any one year, with the change from the main appraisal. The largest decrease is seen in the East (29% for the high scenario, Direct, Type I and Type II) mirroring that this region also saw the largest decrease in total GVA impacts. The smallest reductions (-13%) are seen in the North East (low, Direct and Type I) West (low and medium, Direct, Type I and Type II) and South West regions (low, Direct and Type I). This reflects the North East showing the smallest reduction in GVA (low, Direct and Type I) and timing of activities associated with the largest number of jobs created per £1 million (balance of plant and installation and commissioning) for which both West and South West have lower retention rates, while the other regions have mid or upper retention rates for these two activities.

Table 39 Maximum employment impacts in any one year by region and nationally (Type I and Type II) (FTEs)

Scenario	East	North East	North	West	South West	National
Low, Direct	206	814	233	35	27	507
	-17%	-13%	-22%	-13%	-13%	-27%
Low, Type I	236	1,090	292	45	33	633
	-17%	-13%	-22%	-13%	-13%	-27%
Low, Type II	370	1,462	409	62	46	893
	-22%	-23%	-22%	-13%	-22%	-28%
Medium, Direct	653	1,219	465	71	115	772
	-22%	-23%	-22%	-13%	-22%	-28%
Medium, Type I	801	1,595	585	89	141	980
	-22%	-23%	-22%	-13%	-22%	-28%
Medium, Type II	1,152	2,175	818	124	201	1,371
	-22%	-23%	-22%	-13%	-22%	-28%
High, Direct	740	1,829	467	363	192	1,545
	-29%	-23%	-27%	-22%	-22%	-28%
High, Type I	895	2,392	587	446	235	1,959
	-29%	-23%	-26%	-22%	-22%	-28%
High, Type II	1,312	3,262	821	634	334	2,743
	-29%	-23%	-27%	-22%	-22%	-28%

5 Social Impacts on Individuals, Communities and Society

5.1 Approach to assessing social impacts

5.1.1 The framework used for the social impact assessment is described in Section 2.9. This section sets out the results from application of the framework. The detailed analysis is provided in Appendix G.

5.1.2 Impacts, both negative and positive, are considered cluster-by-cluster. Key impacts and available statistics are identified to enable a qualitative assessment of the likely impacts, noting that these could be negative as well as positive. The use of statistics provides the baseline against which changes can be considered with these then used to determine which rating of impact to apply. Where possible and appropriate, the statistics are based on those reported through the National Performance Framework dashboard, including the 81 national indicators[47]. This then allows the extent to which the sectoral marine plan could help deliver an improvement or risk a reduction in the indicators to be assessed. This assessment is undertaken at the regional and national level. Where necessary to provide additional coverage or further information, other statistics have also been reviewed, e.g. from the Scottish Household Survey.

5.1.3 Consideration is also given to impacts at the more local level, where specific impacts may affect either a particular location or a specific group of people. These effects are discussed as part of the distributional analysis within each cluster assessment.

5.1.4 Positive individual impacts range from minor (+ +) to moderate (+ + +). Impacts on individuals are expected to be greatest in the East and North East, and lowest in the North, West and South West. National impacts fall in between minor and moderate with maximum estimated 864 (low scenario, Type I) to 3,821 (high scenario, Type II) FTE jobs in any one year. Based on the definition of the ratings, individual impacts are projected to be sufficient to result in noticeable impacts for individuals living and working in the East and North East. Positive effects in other regions and nationally may be noticeable but they will be less significant.

[47] Equality Evidence Finder, accessed at: https://scotland.shinyapps.io/sg-equality-evidence-finder/#equality-npf-top on 28th February 2019.

5.2 Summary of impacts by cluster

5.2.1 The social impacts are presented against the following clusters:

- Individual:
  - family, family life and inter-generation issues;
  - jobs, career, employment;
  - money, cost of living;
- Community:
  - local jobs, local industry, community sustainability;
  - transport connections, technology connections;
  - education;
  - shops, housing;
  - socialising, recreation, parks, leisure;
  - friends, being involved, supporting others;
  - local identity, cultural heritage, Gaelic;
  - healthcare;
  - connection to nature, landscape;
  - local political and decision-making systems;
- Wider political and environmental context:
  - landscape, seascape, wildlife, environmental change; and
  - national and EU level political and decision-making systems.

5.2.2 The impacts described are based on the changes that could occur due to economic impacts from the supply chain (positive in terms of jobs but also negative in terms of increased demand on services and changes to communities), and from negative economic impacts on other marine sectors. Impacts on the fishing industry in particular are identified since these have been estimated to potentially result in negative effects on GVA and jobs. Impacts on other sectors are also captured where these are reported in Section 3 (and Appendix D) even if these do not result in quantifiable economic impacts.

5.2.3 The main social impacts for the Individuals, presented in Table 40, are as follows:

- increased employment (864 to 3,821 new jobs under different scenarios with upper bound including induced effects)
- with potential for knock-on positive impacts for family life and disposable income, with potential positive effects for child wellbeing;

- Increase in potential for people to develop careers locally in skilled occupations (e.g. in engineering and construction sectors) and in a range of locations

The majority of impacts will be more greatly felt in the East and North East, with rural and coastal areas likely to see positive impacts due to the location of offshore wind developments. Against this, losses could be expected in the fishing community and support industries, currently concentrated in the North East. It is important to consider the risk of losing the critical mass needed to support the fishing industry, should the reduction in output and demand for services be significant. The figures provided in this report (e.g. impacts on outputs and employment) can assist with this discussion, but this is beyond the scope of this SEIA.

Negative individual impacts range from minor (- -) to moderate (- - -), although almost all impacts across all regions are rated minor. Only the North East sees moderate negative impacts with these associated with impacts on fishing communities specifically. These impacts are likely to be sufficient for concerns to be raised by members of the fishing community, but most other groups within the community will not see any significant noticeable individual impacts. Nationally, the impacts are expected to be minor (- -). Overall the impacts are expected to be slightly significant due to effects on fishing communities.

5.2.4 Greater income for individuals leads to more spend in communities with knock-on impacts in terms of income from those working in supply chain and services. The main social impacts for the community, presented in Table 41, are:

- Potential for business growth from spend with Present Value GVA impacts over the appraisal timeframe of £515 million (low, Type I) to £2,137 (high, Type II);
- Positive effects from spend in renewable energy, high growth and clean growth businesses; and
- Opportunities to diversify into new business areas could help innovative businesses to grow and develop.

5.2.5 Minor impacts are expected in connections and education. However, impacts are likely to be greater where there is a concentration of jobs which could result in hubs providing high skilled jobs. These are likely to be around the ports that can offer the facilities needed by wind farm developments, in the East and the North East.

5.2.6 Social impacts for the wider political and environmental context are summarised in Table 42. The main impacts at national level are related to Scotland’s reputation as a leader in renewable energy. This could in turn bring future spending linked to growth of the supply chain and the increasing supply chain capacity. The impacts will vary across regions however in terms of impacts on landscape, seascape and environmental impacts. The largest impacts are expected in the East, the North East and the North regions although mitigation measures are expected to mitigate such impacts.

Table 40 Impacts on individuals

	Family, family life and inter-generation issues	Jobs, career, employment issues'	Money, costs of living
National positive impacts	Minor (+ +)	Moderate (+ + +)	Minor (+ +)
	Potential for increased employment and potential reduction in child material deprivation. More disposable income and family time for those able to be employed locally helping to improve child wellbeing and happiness.	Potential for significant additional employment nationally with annual maximum of 864 (low, Type 1) to 3,821 (high, Type II) jobs. Increase in paid employment from increase in jobs. Increase in potential for people to develop careers locally in skilled occupations (e.g. in engineering and construction sectors). Opportunities for people to take up skilled positions in a range of locations opening up options in terms of where they live. This may require access to training where community skill levels are lower. Support to supply chain and other services, e.g. shops which could lead to positive effects on small businesses.	Potential reduction in net income spent on housing, fuel and food, and likely relative poverty after housing costs. Additional jobs in skilled positions could help reduce debt and should reduce percentage of workers earning less than the living wage (although the skilled occupations may mean those taking up the jobs may already have been earning above the living wage). Should maintain or increase proportion of households that are managing well through increased jobs and employment. Greater income leads to more spend in communities with knock-on positive impacts in terms of income from those working in supply chain and services.
Key distributional effects	Rural and coastal areas likely to see positive impacts due to location of wind farm developments. Impacts greater in East than for national with higher retention or equal rates over all five activities.	Impacts likely to be greater where there is a concentration of jobs and may positively affect specific groups with the required skills. Skills gaps are greater in the East and the West than in other regions, for skilled trade occupations, but for labour intensive (i.e. Machine operatives, Elementary staff) the region with the greatest skill	Potential to reduce wealth inequality by providing skilled jobs in rural areas. Impacts likely to be greater where there is a concentration of jobs and may positively affect specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal

	Family, family life and inter-generation issues	Jobs, career, employment issues'	Money, costs of living
	Impacts may be greater in North East towards end of construction phase due to greater retention of spend in balance of plant and installation and commissioning, with positive effects for families associated with those jobs, but North East has the largest number of jobs potentially created of any one region (low 1,255 to high 4,250).	gap is the North East (2017 data based on % of workforce with skills gaps by occupation). This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe and could be accomplished by upgrading skills through structured training. Impacts may be thus greater in North East towards end of construction phase due to greater retention of spend in balance of plant and installation and commissioning, with positive impacts in terms of 1,255 to 4,250 jobs. The mix of short/long-term and skilled/unskilled positions will also affect how much of the positive economic impacts are felt in local communities. Impacts in East greater than for national with higher retention or equal rates over all five activities resulting in potentially significant numbers of jobs (282 to 1,849).	timeframe, although the similar skills and earnings may then mean that the impacts in terms of income are reduced. Positive impacts in rural areas and around ports that can provide the required facilities could affect coastal communities.
National negative impacts	Minor (- -)	Minor (- -)	Minor (- -)
	Less family time where workers move to new regions to take up jobs over week could affect child wellbeing and happiness.	Losses of around 2.5 FTEs (low scenario, Type I) to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small.	Loss of income to fishers and potential loss of jobs Potential increase in cost of living due to increased demand, e.g. on housing or for services due to relocation of

	Family, family life and inter-generation issues	Jobs, career, employment issues'	Money, costs of living
	Loss of income from reduced fishing activity and/or job losses and supply chains supporting fishing, plus knock-on effects from reduced spend in other services from reduction in income from fishing all potentially impacting on child material deprivation.	Knock-on impacts in processing industries, income to ports and business for supply chain supporting fishing industry.	people to fill new jobs resulting from spend on wind farms. Positive impacts may be clustered into hubs, and may not spill far outside those hubs, which could increase wealth inequality.
Key distributional effects	May be larger impacts on fisher families where there are job losses, although losses of up to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small	Direct impacts in terms of increased unemployment in the fishing community and support industries. A maximum of 4.7 FTEs (high, Type I) are estimated to be lost in the North East as a whole such that unemployment impacts are small in the context of the region but may be greater at the port level. Other industry sectors may be affected where employees chose to take jobs in the wind farm industry, with potential knock-on negative effects on those sectors that lose employees.	May be larger impacts on fisher families where there are job losses, although losses of around 2.5 FTEs (low scenario, Type I) to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small. Fishers may also be able to supplement their income from offering services to the wind farm where impacts occur in the same or nearby locations. A maximum of 4.7 FTEs (high, Type I) are estimated to be lost across the North East so while impacts may be larger locally, they are expected to be concentrated into small areas.

Table 41 Impacts on the Community

	Local jobs, local industry, community sustainability	Transport connections, technology connections	Education	Shops and Housing
National positive impacts	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Significant potential for business growth from spend with Present Value GVA impacts over the appraisal timeframe of £515 million (low, Type I) to £2,137 (high, Type II). Positive impacts from spend on renewable energy, high growth and clean growth businesses. Greater income for individuals leads to more spend in communities with knock-on effects in terms of income from those working in supply chain and services. Opportunities to diversify into new business areas could help innovative businesses to grow and develop.	Investment in, e.g., ports could have positive impacts in terms of boat transport (ferries, also potential for cruise ships and recreation). More demand for transport services (e.g. from larger population) could help support better quality or more frequent public transport services. Demand for high-speed broadband from high growth businesses may help drive roll-out for households as knock-on positive impacts; growth of communities due to relocation to fill jobs may also help improve the case for roll-out of high speed broadband to more rural areas.	30+ year investment profiles can help drive local careers for local people, with opportunities to develop and use skills in a growing field. Relocation of workers and their families could help support demand for services and could help secure the future of rural schools. Significant potential for increased employment in skilled positions through creation of up to 864 (low, Type 1) to 3,821 (high, Type II) jobs. Relocation of families could result in more than 1,322 (low, Type I) to 5,846 (high, Type II) people (based on 2.04 people per household) increasing demand for schools for those families with children that relocate.	Greater demand for housing may lead to development of new, high quality, efficient new housing More people moving into an area or more secure income could help increase spend in local shops and on local services (e.g. restaurants, bars) with knock-on positive effects on level and quality of services provided. Growth in spend from increased income may not be sufficient to see significant expansion of shops or other services, but could help support existing services (these impacts are captured though the Type II multiplier effects).

	Local jobs, local industry, community sustainability	**Transport connections, technology connections**	**Education**	**Shops and Housing**
Key distributional effects	Positive impacts may be clustered into hubs, and may not spill far outside those hubs, such that effects may be concentrated in localised communities. This could assist high growth and innovative businesses who will be able to build networks and share ideas better in hubs. Impacts are generally smaller in North, West and South West than at the national level but should still be sufficient to enable expansion of local supply chains such that local incomes could increase.	Impacts likely to be greater where there is a concentration of jobs within each region since this will attract more people to move into the area and drive demand for transport and broadband services.	Impacts likely to be greater where there is a concentration of job, this could result in hubs providing high skilled jobs in concentrated locations. These are likely to be around the ports that can offer the facilities needed by wind farm developments. Impacts greater in East than for national with higher retention or equal rates over all five activities with potential for greater opportunities in terms of skilled employment across all five activities. Impacts in North East greater than for national for work on balance of plant and installation and commissioning. These activities last for around four years (for each package) so may be more likely to result in temporary positive effects on skills	Impacts likely to be greater where there is a concentration of jobs and may positively affect specific groups with the required skills. This could result in more demand in some areas than others, with greater impacts from spend of larger disposable incomes than in other areas. Impacts in North East greater than for national with higher retention for balance of plant and installation and commissioning with potentially 1,938 (low, Type I) to 6,567 (high Type I) people moving into the region at peak employment times.

	Local jobs, local industry, community sustainability	Transport connections, technology connections	Education	Shops and Housing
			and increased workforce mobility.	
National negative impacts	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)
	May be larger impacts on fishing families where there are job losses, although losses of around 2.5 FTEs (low scenario, Type I) to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small. Loss of income may be more significant in terms of ability for fishing business owners to invest in their businesses. Sustainability of some ports may also be affected by impacts on commercial shipping, while marinas may be affected by displacement of recreational boating and angling. May be some small effects at the local scale due to	Greater demand on transport services through increased traffic (directly associated with developments or indirectly due to more people moving to areas) could lead to greater congestion. There may also be increased demand for ferry services. Impacts likely to be noticed by local community and could be significant enough to cause complaints, but there is time for spend within local areas to help encourage investment locally and reduce the risk of impacts. Possible impacts on ferries, and hence quality of ferry services due to impacts on commercial shipping but these can be minimised through spatial planning to create safe shipping lanes.	More families relocating could increase demand on schools, resulting in greater class sizes and perceived reduction in quality of education that is being offered.	Greater demand for housing may increase the cost of housing. Impacts may be significant at times of peak employment levels, but may not be sufficient to raise issues or concerns with the community over the longer term. Housing may continue to be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed. Loss of income for fishers could reduce demand for specialist services supporting the fishing industry with potential loss of income.

	Local jobs, local industry, community sustainability	Transport connections, technology connections	Education	Shops and Housing
	increases in costs associated with commercial shipping that could affect local ports.			
Key distributional effects	Impacts on fishing could affect specific elements of the community so be concentrated on family groups or locations within a town/village. A maximum of 4.7 FTEs are estimated to be lost in the North East so while impacts may be larger locally, they are expected to be concentrated into small areas. Spatial planning should reduce impacts on ports from any increased costs to shipping or displacement of recreational activities. Transitions between construction and operational phases could result in negative impacts where there is a sudden decline in worker	Impacts may be greater in terms of congestion where there are jobs in areas where the transport infrastructure is under-developed, but there is time for improvements to infrastructure before the maximum number of jobs are created. Population increases of 1,938 (low, Type I) to 6,567 (high, Type I) in North East may have impacts on local transport services resulting in congestion, which could cause complaints but there is time for investment before the maximum number of jobs are created (2033).	May be larger impacts in areas where jobs are concentrated since this may be where most people relocate to, but could be wider impacts where families relocate to surrounding towns and villages. The maximum number of people projected to move into the North East region is 938 (low, Type I) to 6,657 (high, Type I). This is a potentially significant increase in demand on services such as schools that could result in concerns being raised by local communities while the relatively short-term nature of work with the key activities could mean there is less opportunity for sustained demand that	Impacts will be concentrated in those areas where there are the greatest increases in jobs and hence largest potential for relocation into areas. Most areas affected will be ports and small coastal communities so they may have limited capacity to cope with increased populations. The large number of people potentially moving into the North East region at peak employment time may cause concerns within the existing communities. Impacts from influx of construction workers (especially in the North East) may lead to greater housing demands over a reasonably concentrated period (of around 12 years

	Local jobs, local industry, community sustainability	Transport connections, technology connections	Education	Shops and Housing
	numbers, with knock-on effects on community sustainability		could enable expansion of schools.	in the North East, 4-8 years in East, 8-12 years in North, 4-8 years in West and 4-8 years in South West).

Table 41 (continues) Community

	Socialising, recreation, parks, leisure	Friends, being involved, supporting others	Local identity, cultural heritage, Gaelic	Healthcare
National positive impacts	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)
	Increase in local jobs could reduce commuting time so provide more free time for socialising and recreation. Investment in ports could provide better facilities for recreational boating. People moving into the area to take up new jobs could offer new opportunities through more support and involvement in recreational activities or facilities.	More local jobs could help result in better local networks, retention of friends, etc. by helping to keep people in their communities through ability to develop their career locally. Projection of 216 (low) to 955 (high) local jobs across nation as a whole may be unlikely to be noticed by the majority of the population at national level however, with impacts more noticeable at local level.	More local jobs enable people to stay in the area and build a career, maintaining the local community and enhancing a sense of belonging. People relocating to an area could provide more support for cultural activities and create more interest in local history and culture. Potential knock-on positive impacts on creative industries from the level of spend in the area. Impacts on creative industries in terms of knock-on effects are small, estimated at 4% of GVA impacts for creative industries and 6% for cultural industries[48] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of	Reduction in mental health conditions linked to increased job security, increase in income and reduction in money concerns. Possible reduction in health risk behaviours due to correlation between increased income/reduced poverty and healthier living.

[48] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

	Socialising, recreation, parks, leisure	Friends, being involved, supporting others	Local identity, cultural heritage, Gaelic	Healthcare
			£515 million (low, Type II) to £2,137 million (high, Type II), this gives positive impacts of £21 million to £85.5 million for creative industries and £31 million to £128 million for cultural industries. Over the country as a whole, this is unlikely to be noticeable.	
Key distributional effects	Impacts may be greater in more rural areas, especially if there is increased access to greenspace.	Impacts likely to be greater where there is a concentration of local jobs and may positively impact specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe by avoiding them having to move out of the area to find jobs elsewhere with impacts on social networks Projection of 314 (low) to 1,111 (high) local jobs across the North East region may be sufficient to have some noticeable impacts.	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on creative and cultural activities.	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater impacts where there are concentrations of jobs. Potential for increased employment with potential for knock-on impacts for mental wellbeing associated with improved income from 864 (low, Type I) to 3,821 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health.

	Socialising, recreation, parks, leisure	Friends, being involved, supporting others	Local identity, cultural heritage, Gaelic	Healthcare
National negative impacts	Negligible (-)	Negligible (-)	Negligible (-)	Negligible (-)
	Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. Relocation of workers on a temporary basis may mean they spend more time commuting to/from their family home potentially reducing free time. Shift work could also affect free time. Potential impacts on recreational boating although these are expected to be small and recreational boats should be able to transit safely through wind farm arrays. Maybe some impacts for less experienced sailors or those looking for a remote coast experience.	Large numbers of new people relocating to an area could be perceived as being a threat to existing communities particularly in the short term. Loss of fishing jobs or income could impact on networks for family businesses and the fishing community. Projection of loss of 2.5 (low, Type I) to 8.3 (high, Type I) fishing jobs across the country is unlikely to be noticeable at the national level. Relocation of 648 (low) to 2,866 (high) jobs could have some community impacts but again these are unlikely to be noticeable across the country as a whole.	People relocating to an area could be perceived as changing the nature of the community and its culture and traditions and may reduce sense of identity. This may be greatest where there is an influx of construction workers (especially in the North East) during peak construction periods. Impacts on fishers could impact on tradition of fishing and culture of fishing in community with spend on wind farms potentially changing areas from fishing towns to wind farm towns. Relocation of between a maximum in any one year of 648 (low) to 2,866 (high) jobs and loss of 2.5 (low, Type I) to 8.3 (high, Type I) FTEs from reduction in income to fishers from impacts on landings, but at a national level these changes are unlikely to be sufficient to be	Increased demand from larger populations from those relocating to take up jobs could put healthcare services under additional stress, resulting in longer waiting times to see a GP, etc. Relocation of 648 (low) to 2,866 (high) jobs with potential for increase in people moving to take up jobs of 1,322 (low) to 5,846 (high) (based on 2.04 people per household) unlikely to be noticeable at the national scale.

	Socialising, recreation, parks, leisure	Friends, being involved, supporting others	Local identity, cultural heritage, Gaelic	Healthcare
			noticeable for the majority of communities. Influxes of non-Gaelic speaking people could also affect continued use of the language. Impacts on landscapes and seascapes could be viewed by receptors as changing the identity of areas due to development, but the impacts are expected to be small.	
Key distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. Impacts on recreational boating likely to be small and may be limited to perception of wind farms within the marine environment. Impacts unlikely to be sufficient to have a noticeable effect, but may be some perception impacts on the unspoilt nature of the coast	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. where there is an identifiable fishing community. Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected. Seascape changes may be greatest in North, West and South West, but are not expected to be significant in terms of cultural or local identity for the majority of the population, but may be	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised.

	Socialising, recreation, parks, leisure	Friends, being involved, supporting others	Local identity, cultural heritage, Gaelic	Healthcare
	around the Outer Hebrides (North).	same area that they grew up	noticed and commented on by some.	

Table 41 (continues) Impacts on the Community

	Connection to nature, landscape	Local political and decision-making systems
National positive impacts	Negligible (+)	Negligible (+)
	Local jobs in skilled areas may mean less commuting time that could provide more time for visits to the outdoors Physical activity is also associated with area based deprivation, with activity levels increasing when deprivation decreases. Spend on renewables and wind farms may help encourage connection with sea through career, education, etc. and could be used as catalyst to increase connection with nature and the landscape.	Larger populations may be perceived as giving neighbourhoods a louder voice but unlikely to be significant impact for most of the community, with impacts relying on other factors to deliver a positive outcome such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making. Good quality project management and engagement and consultation can help empower a community with potential spillover effects for wider engagement with local decision-making,
Key distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are reduced. Families relocating may see greater impacts than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift).	Impacts may be greatest in areas with the largest increases in populations, but the original communities may find themselves faced with more decisions (e.g. planning for new housing) and may not necessarily feel more involved, although they may feel that they need to get more involved.

National negative impacts	Minor (- -)	Negligible (-)
	May be concerns over changes to landscape/seascape from wind farm development, from turbines once installed but also from changes to coastal landscapes if they become more commercial, less fishing oriented. Mitigation measures should ensure that any potential negative impacts are minimised as far as possible but some communities and/or individuals may perceive an impact.	People relocating may result in larger communities with perception that individuals have less influence, or where more decisions need to be made due to increasing demands on services, it may feel that local communities have less influence. For most communities, there may be no change in involvement in local decision making due to spend on wind farms. Poor project management and engagement could disempower and disengage communities.
Key distributional effects	Impacts may be greater where wind farms are located nearer to shore, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports, some of which already consist of industrial areas such that impacts may be minimised. Impacts on landscape may be associated with perception of changes to the landscape in North, West and South West. Impacts on local people may see a change in their perception of the landscapes and seascapes but the impacts are not expected to be significant for the majority of the population.	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence. Influx of construction workers (especially in the North East during peak construction periods) may have an impact on local decision-making, especially if these are seen as transient communities that have no long-term positive impact due to their temporary nature.

Table 42 Wider political and environmental context

	Landscape, seascape, wildlife, environmental change'	National and EU level political and decision-making systems
National positive impacts	Moderate (+ + +)	Moderate (+ + +)
	Spend on renewable energy helps to reduce greenhouse gas emissions and lead to cleaner economy. Potential investment in new housing could lead to more efficient housing. Plan projects renewable energy generation of 3 GW (low), 5 GW (medium) to 10 GW (high) at the national level (scaled back). This is associated with sufficient levels of spending to enable expansion of wind farm development supply chains in Scotland.	Scotland's reputation as a leader in renewable energy would be supported and could bring future spending linked to growth of the supply chain and the increasing supply chain capacity. This could result in positive effects on exports through an increase in skills and innovation in business; governance through renewable energy development and contribution to reducing GHG emissions delivering positive environmental impacts; people through improving employability and development of skills; and investment and immigration through the perception of growth following development and the creation of 648 (low) to 2,866 (high) jobs available for those wishing to relocate. Potential development and impacts that could be delivered could improve Scotland's score through positively affecting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence.
Key distributional effects	Impacts vary across regions, with highest level of projected development in North East region (low of 1.5 GW, medium of 3 GW and high of 4.5 GW). East and North regions both have projected development of 1 GW, 2 GW and 3 GW across the three scenarios with West at 0.5 GW, 1 GW and 2 GW and South West at 0.3 GW, 0.6 GW and 1 GW. Proposed development of 1.5 GW (low scenario) to 4.5 GW (high scenario) in the North East is	Impacts likely to be greater where development is greater across the regions since this will deliver more positive impacts against the 81 national indicators and across the six dimensions of national competence. Scale of development in East and North regions (1 GW, low to 3 GW, high). West (0.5 GW, low to 2 GW, high) and South West (0.3 GW, low to 1 GW, high) means that the influence from the East region may not be sufficient alone to significantly affect Scotland's scores.

	Landscape, seascape, wildlife, environmental change’	National and EU level political and decision-making systems
	50% higher than the next highest region with job opportunities. Proposed development of 0.5 GW (low scenario) to 2 GW (high scenario) in West is lower than in most other regions (except South West) expected to be much larger than in other regions due to the supply chain that already exists. Proposed development in South West of 0.3 GW (low scenario) to 1 GW (high scenario) is lower than all other regions.	
National negative impacts	No impacts (neutral)	Minor (- -)
	No impacts expected due to mitigation measures that will be required for all developments. Assumes all mitigation measures are put in place and are sufficient to avoid environmental impacts. May be some perception of development of the coastline that could be considered to impact on landscapes but these are expected to be insignificant at the national level, with impacts on landscape more locally considered under the community clusters.	Potential impacts on affected sectors such as fishing with estimated reduction of 2.5 (low, Type I) to 8.3 (high, Type I) FTEs as well as wider impacts from reduction of income from effects on landings. Scale of impact is unlikely to affect Scotland’s international reputation for seafood. Only likely to be noticeable in the fishing sector with knock-on impacts being small in most cases.
Key distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence.	Impacts vary by port, with some ports being more affected than others such that impacts could be greater where landings are more affected. In the North East region, a maximum of 4.7 FTEs (high, Type I) are estimated to be lost, as a result more significant impacts may be seen at the more local level.

Table 43 Summary of the results of the social impact assessment at national and regional level

Cluster	National impacts	Regional impacts				
		East	North East	North	West	South West
Individual: family, family life and inter-generation issues	Minor (+ +)	Moderate (+ + +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)
Individual: jobs, career, employment	Moderate (+ + +)	Moderate (+ + +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Moderate (- - -)	Minor (- -)	Minor (- -)	Minor (- -)
Individual: money, cost of living	Minor (+ +)	Minor (+ +)	Minor (+ +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Moderate (- - -)	Minor (- -)	Minor (- -)	Minor (- -)
Community: local jobs, local industry, community sustainability	Moderate (+ + +)	Moderate (+ + +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)
Community: transport connections, technology connections	Minor (+ +)	Minor (+ +)	Minor (+ +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Moderate (- - -)	Minor (- -)	Minor (- -)	Minor (- -)
Community: education	Minor (+ +)	Moderate (+ + +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Moderate (- - -)	Minor (- -)	Minor (- -)	Minor (- -)
Community: shops, housing	Minor (+ +)	Minor (+ +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Moderate (- - -)	Minor (- -)	Minor (- -)	Minor (- -)

Cluster	National impacts	Regional impacts				
		East	North East	North	West	South West
Community: socialising, recreation, parks, leisure	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)
	Negligible (-)	Negligible (-)	Negligible (-)	Minor (- -)	Negligible (-)	Negligible (-)
Community: friends, being involved, supporting others	Negligible (+)	Negligible (+)	Minor (+ +)	Negligible (+)	Negligible (+)	Negligible (+)
	Negligible (-)	Negligible (-)	Negligible (-)	Minor (- -)	Negligible (-)	Negligible (-)
Community: local identity, cultural heritage, Gaelic	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)
	Negligible (-)	Negligible (-)	Negligible (-)	Minor (- -)	Minor (- -)	Minor (- -)
Community: healthcare	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)
	Negligible (-)	Negligible (-)	Negligible (-)	Minor (- -)	Negligible (-)	Negligible (-)
Community: connection to nature, landscape	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)
	Minor (- -)	Negligible (-)	Negligible (-)	Minor (- -)	Minor (- -)	Minor (- -)
Community: local political and decision-making systems	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)	Negligible (+)
	Negligible (-)	Negligible (-)	Negligible (-)	Minor (- -)	Negligible (-)	Negligible (-)
	Moderate (+ + +)	Moderate (+ + +)	Major (+ + + +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)

Cluster	National impacts	Regional impacts				
		East	North East	North	West	South West
Wider political and environmental context: landscape, seascape, wildlife, environmental change	No impacts	No impacts	No impacts	No impacts	No impacts	No impacts
Wider political and environmental context: national and EU level political and decision-making systems	Moderate (+ + +)	Minor (+ +)	Moderate (+ + +)	Minor (+ +)	Minor (+ +)	Minor (+ +)
	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)	Minor (- -)

6 Potential Combined Impacts

6.1 Potential Negative Economic Impacts on Marine Activities

Potential Combined Impacts by DPO

6.1.1 Within the plan there is a variation in impacts between different DPOs and regions, with some DPOs having significantly higher potential negative economic impacts, and therefore likely constraints on development. Table 44 summarises the present value of potential impacts across all sectors in terms of costs and direct GVA impacts (for commercial fisheries) for each DPO, broken down by sector in Figure 9 as present value potential impacts for the maximum development scenarios and Figure 10 as a present value potential cost per GW of installed capacity.

Table 44 Potential negative economic impacts across all sectors per DPO (present value of total costs and direct GVA over assessment period 2020-2059, £000s, 2019 prices)

DPO	Maximum Development Scenario (GW)	Cost (£000s)	Cost per GW installed (£000s)	Direct GVA cost (£000s)	Direct GVA cost per GW installed (£000s)
SW1	1	17,642	17,642	432	432
W1	2	5,131	2,565	1,482	741
N1	2	8,896	4,448	1,392	696
N2	2	418	209	823	411
N3	2	318	159	1,991	995
N4	1	4,159	4,159	675	675
NE1	3	2,273	1,137	1,378	689
NE2	1	9,269	9,269	399	399
NE3	1	2,048	2,048	600	600
NE4	1	2,639	2,639	808	808
NE5	1	6,435	6,435	803	803
NE6	2	19,712	9,856	345	173
NE7	2	3,082	1,541	2,967	1,483
NE8	1	777	777	1,786	1,786
E1	3	1,916	639	326	109
E2	2	786	393	659	330
E3	1	5,456	5,456	74	74

6.1.2 The highest quantified potential negative economic impacts under the maximum development scenario are in NE6 at £19.7 million, whilst per GW SW1 is highest at £17.6 million.

6.1.3 As can be seen from Figure 9 and Figure 10, impacts on commercial shipping make up the vast majority of the total potential impacts at all DPOs with smaller impacts from watersports, tourism and power interconnectors within certain regions.

6.1.4 Impacts on commercial fisheries show relatively high impacts on direct GVA (Figure 11) (over £1 million present value over the assessment period) for a number of DPOs under the maximum development scenario (W1, N1, N3, NE1, NE7 and NE8). When considered in relation to the impact per GW installed (Figure 12), NE4, NE5 and N4 also have a relatively high impact per GW. These DPOs affect a range of different fleet segments (demersal trawl/seine, pelagic trawl, mechanical dredge, pots) mostly for over-12m vessels but some also for under-12m vessels (N4, NE4, NE5). The potential for a combined impact on individual fleet segments within a region is limited by the distribution of the DPOs, which tend to affect different fleet segments. The exceptions are NE4 and NE5, which are in close proximity and both affect over-12 mechanical dredgers, and N2 and N3 which both affect over-12m demersal trawlers and pelagic trawlers.

6.1.5 Whilst the quantified potential negative economic impact in certain DPOs is low this may, but does not necessarily, indicate a region of lower constraint, as unquantified impacts, such as the requirement to divert helicopter routes, may have the potential to be of significant constraint.

6.1.6 In addition, spatial planning within DPOs has the potential to avoid areas of larger impacts, and hence reduce overall potential costs to sectors. i.e. through the application of MGN 543 to design safe shipping lanes through offshore wind arrays and therefore reduce potential impacts on commercial shipping. The impact of such spatial planning cannot be assessed within this document, so a worst-case scenario has been used for the purposes of the calculations but has the potential to be defined at plan level as a requirement on project development.

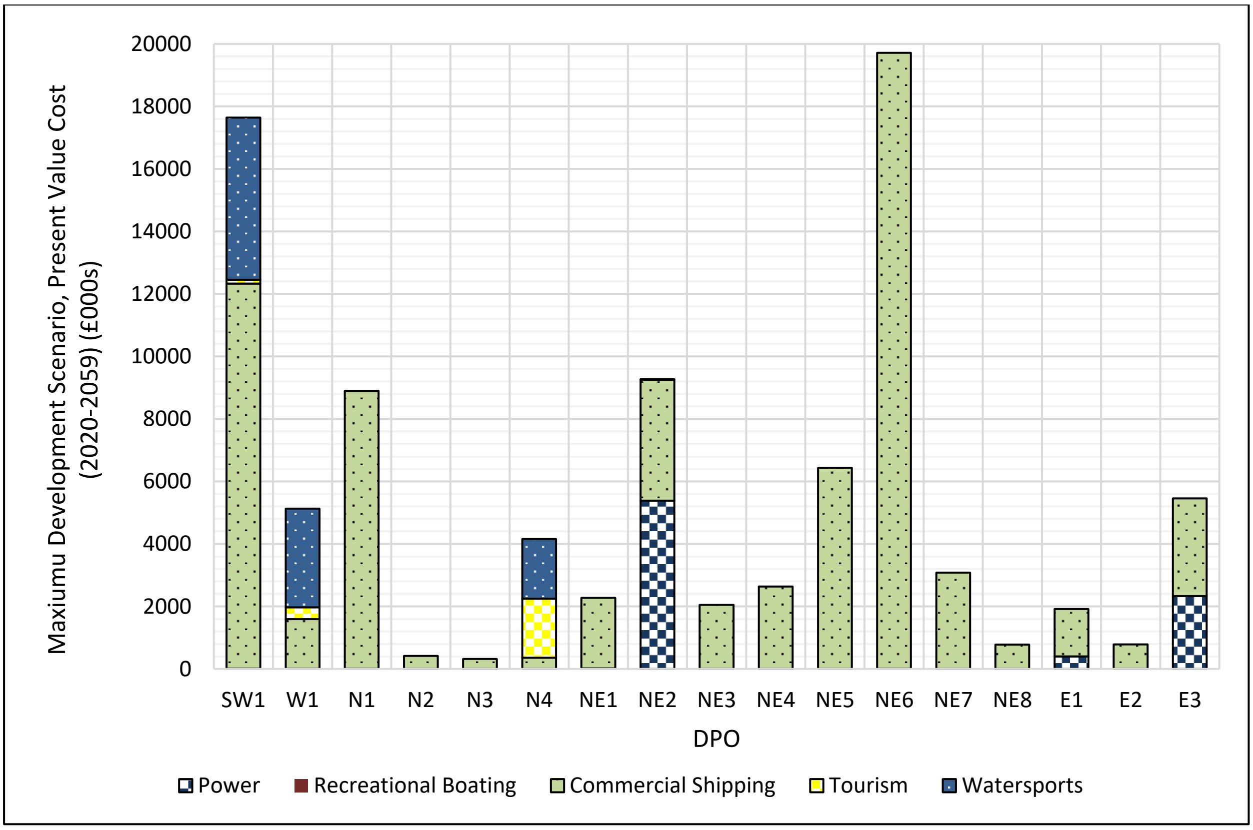

Figure 9 Present value of quantified potential negative economic impacts per DPO under Maximum Development Scenario (cost impact, £000s, over 2020-2059)

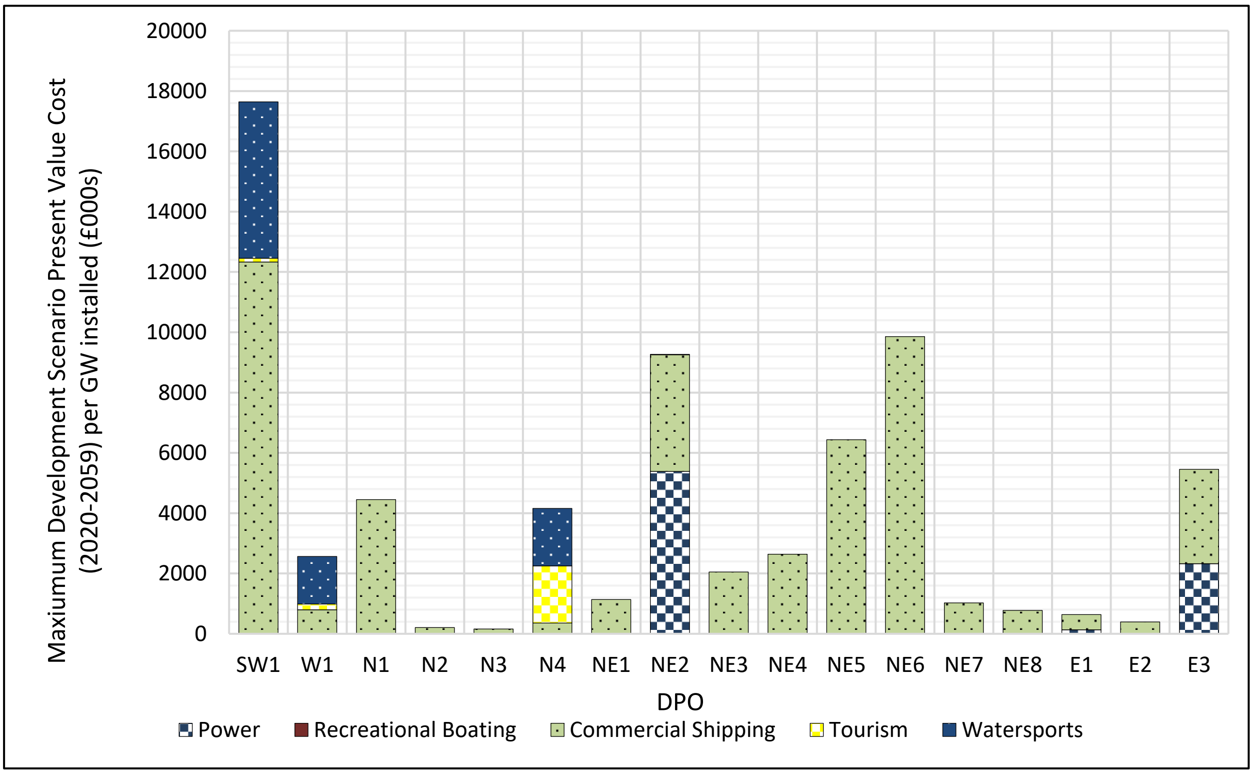

Figure 10 Present value of quantified potential negative economic impacts normalised per GW of capacity installed (cost impact, £000s, over 2020-2059)

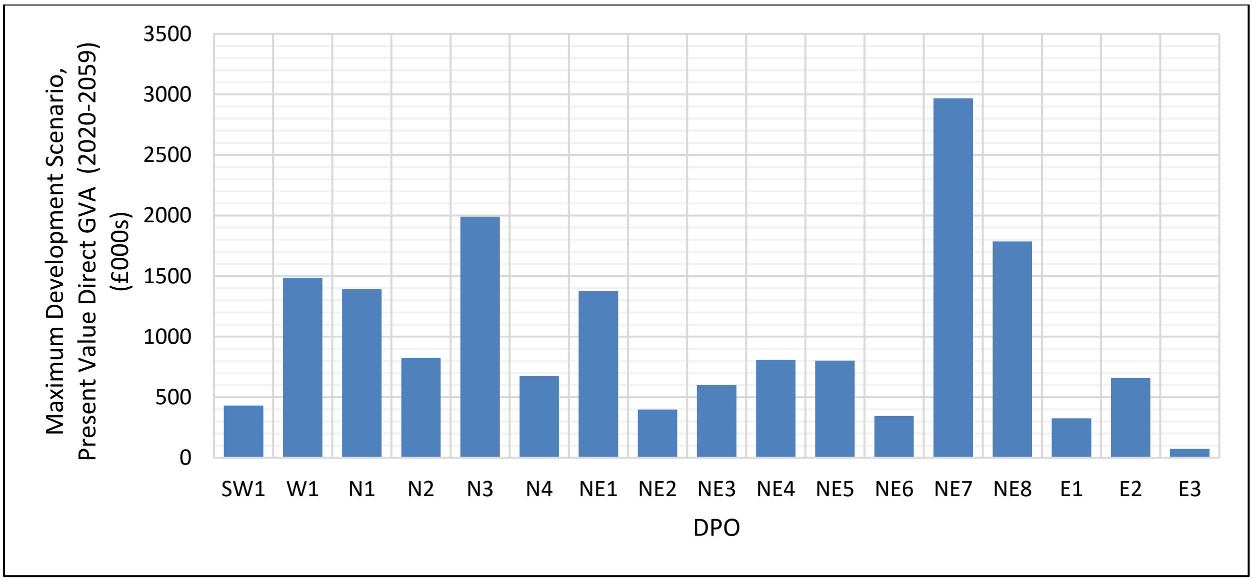

Figure 11 Present value of quantified potential direct GVA impacts (commercial fisheries) per DPO under Maximum Development Scenario (£000s)

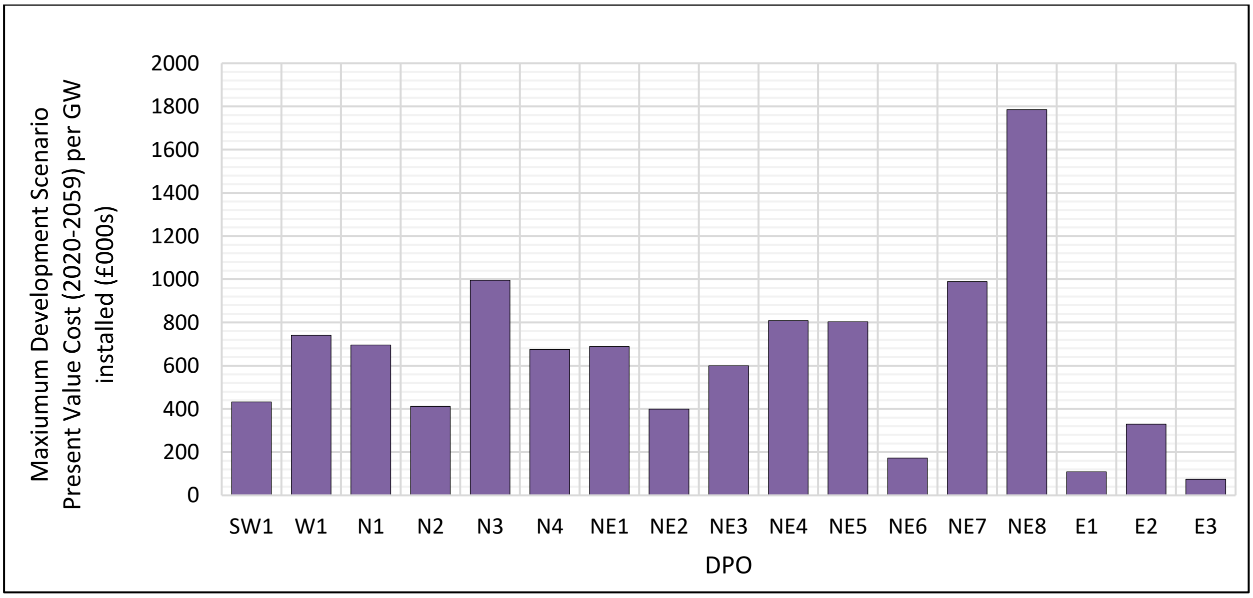

Figure 12 Present value of quantified potential direct GVA impacts normalised per GW of capacity installed (£000s)

Combined potential negative economic impacts, regional and national scaling

6.1.7 At regional and national scales it is recognised that not all DPOs will be developed, and not all to their maximum development scenario. Therefore, it is appropriate to scale the potential impacts identified above against individual DPOs when combining them at a regional and national scale. Table 45 summarises the total present value potential costs for all sectors assessed in section 3 (excluding commercial fishing which is included within Table 46 as direct GVA impacts) combined and scaled as per the regional and national scenarios discussed in Section 2.1.3.

6.1.8 Figure 13 subsequently breaks these down into potential impact per sector against the regions, whilst Figure 14 presents the national breakdowns. Figure 15 and Figure 16 separately present the direct GVA impacts, which in this assessment covers only commercial fisheries.

Table 45 Potential negative economic impacts to all sectors (excluding fisheries) (present value of total costs over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Low Scenario (GW)	Low Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	High Scenario (GW)	High Scenario (£000s)
South West	0.3	5,295	0.6	9,317	1	15,529
West	0.5	1,288	1	2,565	2	4,516
North	1	1,734	2	3,468	3	4,569
North East	1.5	5,372	3	9,241	4.5	13,861
East	1	1,360	2	2,502	3	3,463
National	**3**	**8,638**	**5**	**13,636**	**10**	**27,704**

Table 46 Potential direct GVA impacts (commercial fisheries) (GVA impacts over assessment period 2020-2059, £000s, scaled to regional and national scenarios)

Region	Low Scenario (GW)	Low Scenario (£000s)	Medium Scenario (GW)	Medium Scenario (£000s)	High Scenario (GW)	High Scenario (£000s)
South West	0.3	130	0.6	228	1	380
West	0.5	371	1	741	2	1,304
North	1	614	2	1,227	3	1,617
North East	1.5	1,000	3	1,756	4.5	2,634
East	1	177	2	311	3	409
National	3	**1,353**	5	**2,125**	10	**4,284**

6.1.9 The highest negative economic impacts are in the South West and North East regions (Table 45). As per the individual DPO analysis the majority of quantified potential impacts are driven by commercial shipping both at regional and national scales, whilst watersports (recreational boat angling), power interconnectors and tourism have a smaller contribution to overall potential impacts.

6.1.10 For direct GVA, the North East region has the highest quantified impacts (Table 46). This is a result of the high number of DPOs in the region, and therefore the higher presumed level of development in GW in that region under the scenarios assessed.

6.1.11 Whilst the North East region has high overall potential quantified impacts, this is based on a higher presumed level of development (4.5 GW under the upper scenario) than the other regions. In contrast, the relatively high level of cost impact in South West is driven by a much lower level of presumed development, and therefore the impacts per GW are highest in the South West, predominantly due to impacts on shipping.

6.1.12 For direct GVA impacts for commercial fishing, the North East region has the highest quantified potential impacts per GW developed, with the South West, West and North regions relatively similar to each other, and the lowest impacts per GW in the East region.

6.1.13 It is recognised that both regionally and nationally the high commercial shipping potential impacts tend to be driven by development in a small number of DPOs, and therefore at a regional and national scale the potential impacts may vary significantly depending on which DPOs become the focus for development.

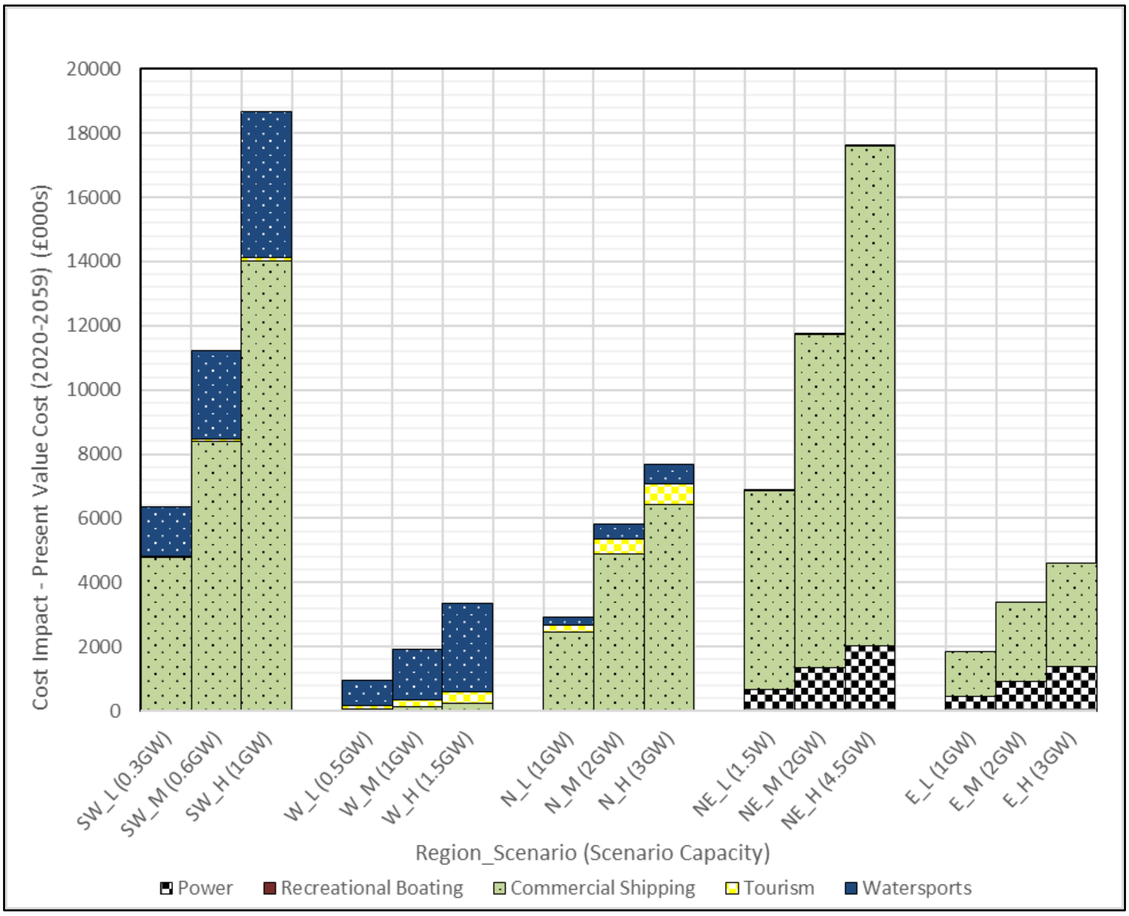

Figure 13 Regionally-scaled sector potential negative economic impacts (present value of costs over assessment period (£000s)

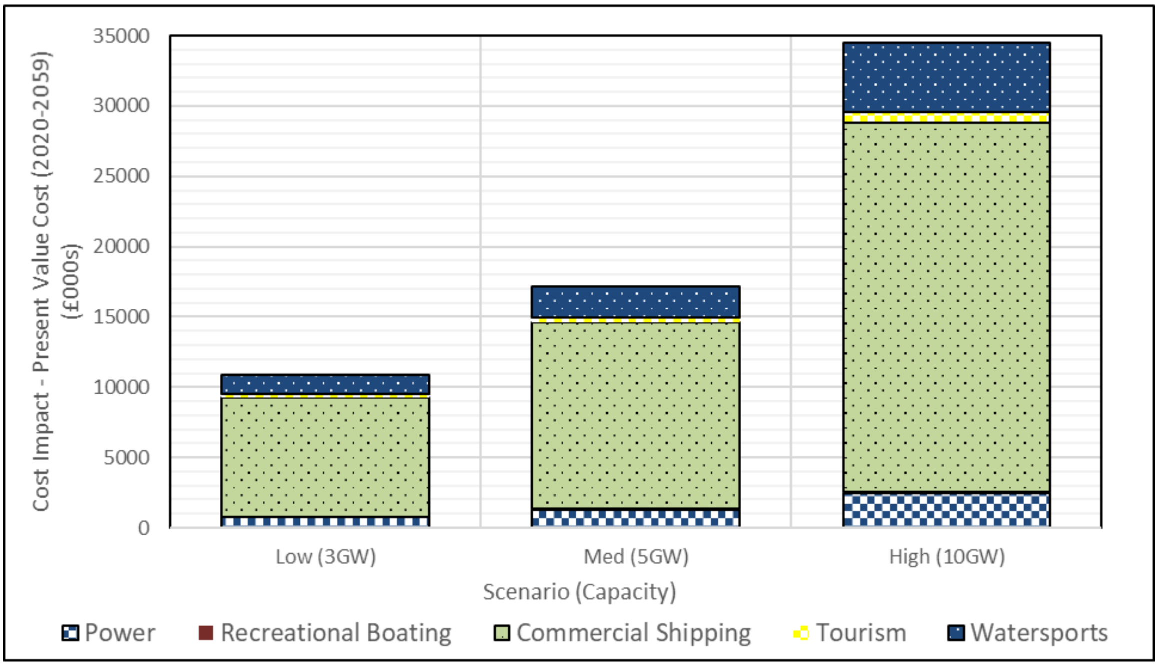

Figure 14 Nationally scaled sector potential negative economic impacts (present value of costs over assessment period (£000s)

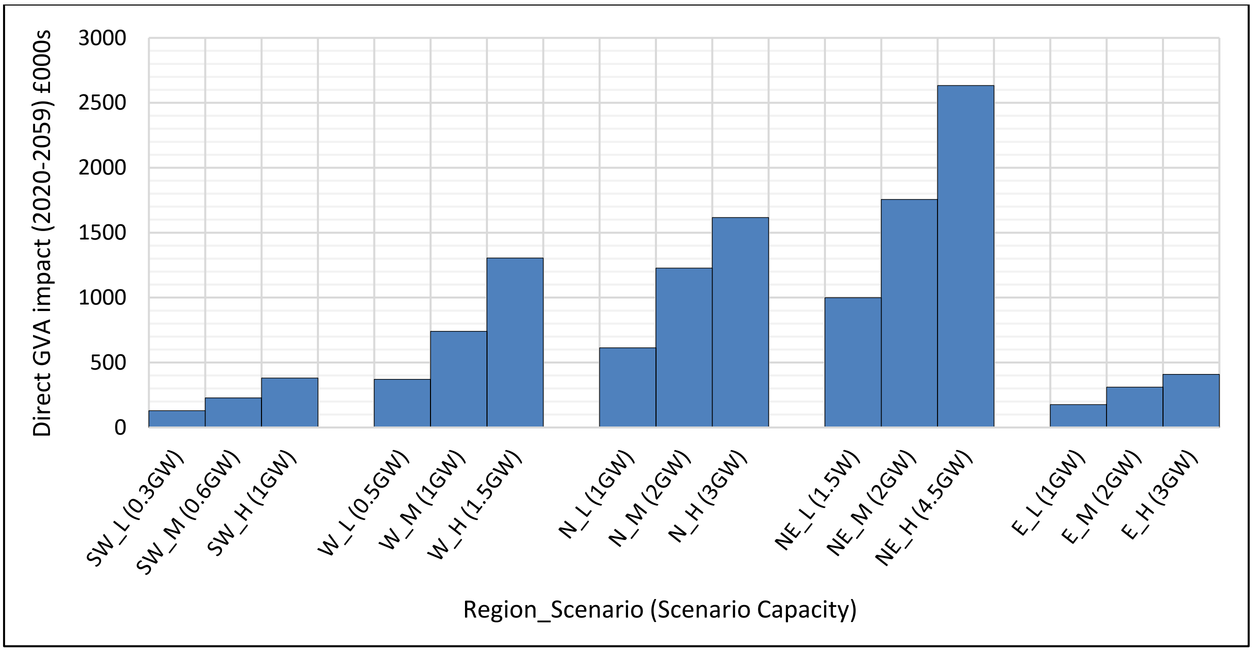

Figure 15 Regionally-scaled direct GVA impacts on commercial fisheries (GVA impact over assessment period (£000s)

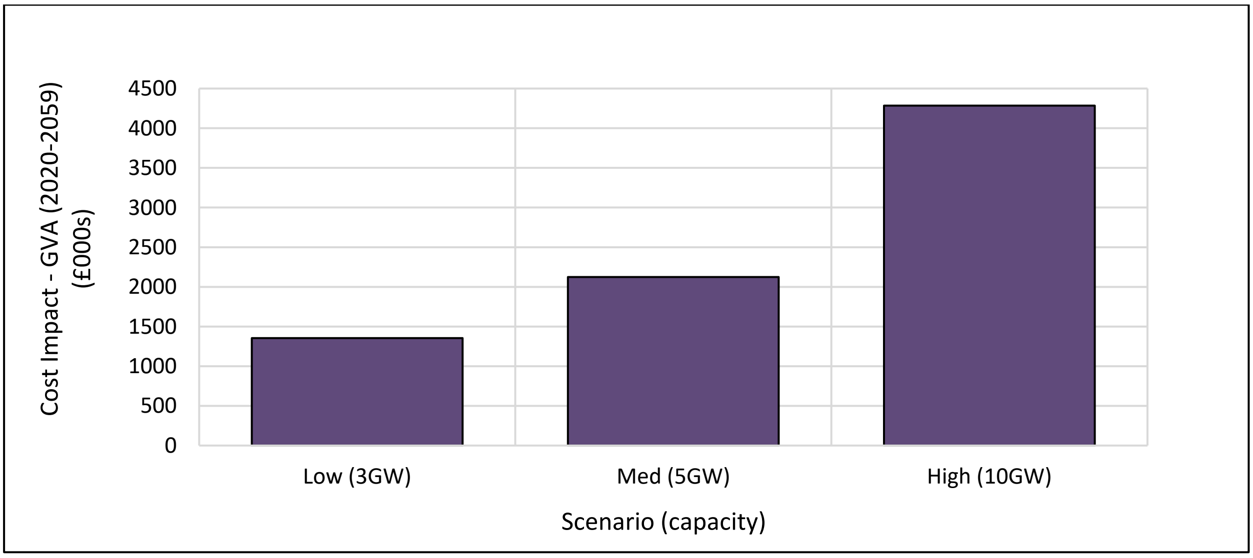

Figure 16 Nationally-scaled direct GVA impacts on commercial fisheries (GVA impact over assessment period (£000s)

Review of potential combined impacts

6.1.14 There is potential for combined socio-economic impacts to occur should multiple DPOs within a similar geographic region be developed.

6.1.15 Within the East region, the development of both E1 and E3 has the potential for additive in-combination effects requiring multiple diversions of the Eastern HVDC. Similarly, the development of multiple DPOs in the North East region (particularly NE6, NE8 and NE4) has the potential to require commercial shipping to undertake a much larger diversion around multiple arrays than currently assessed within an individual site assessment.

6.1.16 Development of DPOs across different regions is not expected to result in cumulative impacts on commercial shipping, as the DPOs in different regions tend to affect different shipping routes.

6.1.17 Development of multiple DPOs in any region has the potential to have cumulative impacts on commercial fisheries, particularly in the North East and North regions.

6.1.18 There are also a number of factors external to the plan that could also have in-combination impacts. For example fisheries restrictions around designated sites or currently consented renewables developments, particularly in the North East region around the Moray Firth, have the potential to displace fishing activities in combination with developments within the DPOs. This could lead to a greater combined impact on commercial fisheries landings and the associated economic impacts on Scottish communities.

6.2 Positive Economic Impacts

6.2.1 The positive economic impacts resulting from the level of spend retained in the Scottish supply chain are estimated based on three scenarios involving different level of development. The total GVA impacts (in Present Value for 2020-2059) are presented in Table 47 covering total spend at the regional level, and then re-scaled at the national level. The Table shows that the biggest GVA impacts are seen in the North East region, followed by East, then North with West and South West having similar level of impacts. The difference between the Type I (direct and indirect impacts) and Type II (direct, indirect and induced impacts) gives an indication of the level of GVA impacts that are derived from the amount of increased income that is re-spent on final goods and services.

Table 47 GVA impacts in Present Value (discounted) terms by region and nationally (Type I and Type II) (£ millions)

Scenario	East	North East	North	West	South West	National
Low, Type I	£389	£645	£139	£49	£30	£515
Low, Type II	£497	£760	£170	£61	£38	£631
Medium, Type I	£790	£1,280	£278	£98	£72	£874
Medium, Type II	£997	£1,506	£339	£123	£89	£1,069
High, Type I	£1,103	£1,921	£420	£239	£121	£1,748
High, Type II	£1,386	£2,259	£497	£288	£149	£2,137

6.2.2 Employment impacts associated with the retained GVA are presented as maxima in any one year. It is not appropriate to sum the number of jobs over the appraisal timeframe as many jobs will last for more than one year so the same job would be counted numerous times. Table 48 presents the maximum number of jobs in any one year for each region, and then re-scaled at the national level. The table shows that the North East would see creation of the largest number of jobs, with this ranging from 1,255 (low scenario, Type I) to 4,250 (high scenario, Type II). Many of these jobs are associated with construction so may be more temporary in nature than operational jobs (although construction in the North East is projected to last for 12 years). This is the maximum number of jobs that would be created in any one year. Overall economic impacts will depend on access to jobs, through training for example, and whether the jobs are short or long-term and are skilled or unskilled. These could affect who is impacted (local versus relocated) as well as the duration of the positive economic effects. There may also be some negative impacts on other industries, if employees leave those sectors to take up employment in the wind industry.

Table 48 Maximum employment impacts in any one year by region and nationally (Type I and Type II) (FTEs)

Scenario impacts	East	North East	North	West	South West	National
Low, Direct	247	938	296	41	31	696
Low, Type I	282	1,255	373	51	38	864
Low, Type II	444	1,684	521	71	53	1,229
Medium, Direct	832	1,588	593	82	147	1,075
Medium, Type I	1,020	2,066	745	103	180	1,357
Medium, Type II	1,468	2,834	1,042	143	256	1,911
High, Direct	1,044	2,382	639	463	245	2,151
High, Type I	1,262	3,099	798	568	300	2,714
High, Type II	1,849	4,250	1,126	808	426	3,821

6.2.3 The pattern of job creation is generally a small number of jobs from 2020 to 2025 when development and project management activities dominate. The number of jobs increase as construction work begins in 2027 (balance of plant, and installation and commissioning), the increases again when wind turbine supply begins (2028). Depending on the scenario and the number of activities that are running concurrently, the maximum number of jobs typically occurs in 2033 and 2034 when all five activities may be running concurrently, i.e. when construction works are on-going in some DPOs while others have moved to operation, maintenance and service. Thus the maximum job estimates relate to the following years for each region:

- East: 2033 and 2034 (also 2038 and 2039 for high scenario)
- North East: 2032 and 2033 (also 2036 and 2037 for mid and high scenarios)
- North: 2033 and 2034 (also 2038 and 2039 for high scenario)
- West: 2033 and 2034 (high scenario only)
- South West: 2033 and 2034 (for mid and high scenarios only)
- National: 2033 and 2034 and 2038 and 2039 (or 2031 and 2032 , 2034 and 2035, 2037 and 2038 and 2040 and 2041 for mid and high scenarios)

6.3 Social Impacts on Individuals, Communities and Society

6.3.1 The social impact assessment identifies the positive and negative impacts across 15 different clusters. The combined impacts are assessed by considering what the overall impacts might be across all clusters. In undertaking this combined impact assessment, there is an implied equal weighting of all clusters. Clusters are aggregated for the individual, community and wider political and environmental context impacts.

6.3.2 Overall the combined social impacts are expected to be slightly significant nationally and in the East and North East, and not very significant for the North, West and South West.

6.3.3 Positive community impacts range from negligible (+) to moderate (+ + +). Again, there is a regional split with communities in the North, West and South West generally seeing negligible to minor positive effects. The largest positive impacts are seen in the East and North East in terms of local industries, community sustainability and education. An influx of new people to take up jobs in the North East could also help support services such as shops, again helping to improve community sustainability. Overall, impacts in the North East and to some extent the East and nationally will see expansion of some services helping to positively affect local communities. Overall, the impacts are expected to be not very significant in the North, West and South West and slightly significant in the East and North East. The impacts may be affected by the transition from construction to operational phase if there is a significant reduction in number of workers.

6.3.4 Negative community impacts range from negligible (-) to moderate (- - -). Moderate negative impacts occur in the North East due to potential impacts on ferry services and possible congestion due to large numbers of people moving into the area to take up jobs. The peak number of jobs are associated with construction so these may be more temporary in nature (than operational jobs) and so may result in additional social problems through increases in demands for housing and services. Expansion of such services may positively impact on the community where jobs have a reasonable duration. Although most negative impacts in the North, West and South West are minor (i.e. noticed by the community but accepted by the majority), there may be some local unease over changes to landscapes and seascapes, and perceived impacts on recreational opportunities that may have some distributional effects on specific groups within local communities. Nationally, the overall negative impacts are expected to be negligible (-) to minor (- -). Overall, the impacts are expected to be slightly significant in the North East and not very significant in the East, North, West, South West and nationally. Some groups within the North, West and South West who are particularly sensitive to changes in seascapes or who are involved in recreational boating that may be displaced may see slightly significant impacts.

6.3.5 Taking the wider political and environmental context, there is significant potential for positive impacts associated with uptake of renewable energy and concerns about climate change and the environment on a more national and international scale. The impacts are projected to be minor (+ +) to major (+ + + +), with overall impacts nationally rated as moderate (+ + +). Impacts vary across the regions depending on the scale of development, from minor in West and South West, to major in the North East. Other factors may also affect the actual social impacts, including cross-regional concerns that may enable those in regions other than North East to also be impacted positively to a greater extent due to the knowledge that Scotland is taking a leading role in renewable energy. Overall impacts for those with a specific interest or concern for the environment, such as members of environmental organisations, may be significant. For the majority of the population the impacts may be slightly significant. Impacts on local decision-making may depend on how the projects are managed, including the extent to which engagement and consultation help to empower local communities. This could, if managed well, lead to knock-on impacts for wider engagement with local politics.

6.3.6 Negative impacts in the wider political and environmental context range from no impacts to minor (- -). Impacts at the landscape scale are considered in detail at the community cluster level, with no significant effects expected at the wider scale due to the actual area of sea that would be developed as a proportion of total sea area. In addition, mitigation measures will be required to minimise impacts on wildlife. Impacts on political decision-making may be linked to the extent to which concerns about proposed developments are seen to influence which areas are taken forwards, especially in relation to impacts on commercial fishing which are expected to be the most significant. Overall impacts are expected to be not very significant, nationally and regionally.

6.3.7 Consideration has also been given to specific groups, communities and locations that may be affected from supply chain development and that may incur impacts due to effects on other sectors and social impacts. Ports seeing potential positive impacts from development in each region have been identified, as have ports, harbours and marinas that may be negatively impacted by changes to fish landings, commercial shipping routes, tourism, recreational boating, sea angling and water sports. It is important to assess the impacts against the critical mass for service provision. Similarly, the impacts on smaller and micro-enterprises may be larger in specific sectors, such as fishing and small tourism services providers, with impacts on specific groups and communities at specific location. These are described in turn.

6.3.8 In the East, positive economic impacts are expected to be concentrated in ports such as Aberdeen, Dundee, Eyemouth, Grangemouth, Leith, Methil, Montrose and Rosyth[49]. Negative impacts on fishing[50] are expected to be concentrated in Aberdeen and Eyemouth, although neither is affected by more than 1% of total impacts. Therefore, although there may be loss of jobs associated with the fishing industry these could be replaced by wind farm jobs, e.g. in Aberdeen. The communities positively affected by economic impacts may also see some

[49] Ports identified as seeing positive impacts are those for where the Ports Handbook includes details of renewable activities that are currently or could be supported, or similar activities such as support vessels for oils and gas, as reported in the Ports of Scotland Yearbook: Maritime Publications Scotland Limited (2019): Ports of Scotland Yearbook 2019, 38th edition.

[50] Based on the registered home ports of fishing vessels affected, as a proxy for where employment impacts may be felt.

negative impacts from increased demand for services as people move into the area to take up new jobs. However, most of these locations are already reasonably sized and may be better able to cope with additional people than in other regions. As a result, overall positive impacts on these ports may be slightly significant and negative impacts are likely to be not very significant.

6.3.9 In the North East, positive economic impacts are expected to be concentrated in ports such as Buckie, Cromarty Firth, Fraserburgh, Inverness, Kirkwall and Hatston, Macduff, Nigg and Wick. Negative impacts on fishing are expected to be concentrated in Buckie, Fraserburgh, Kirkwall, Lerwick, and Peterhead. However, those ports that may see a small loss of fishing jobs are also most likely to see additional wind farm jobs. The North East also sees the largest number of jobs likely to be taken up by people relocating to the region (permanently or temporarily) which may result in increased pressure on housing, education services, and healthcare services. Overall positive impacts are expected to be slightly significant while overall negative impacts are expected to be significant in those locations since pressures on housing and services may disproportionately affect more vulnerable groups.

6.3.10 In the North, positive economic impacts are expected to be concentrated in ports such as Kishorn, Lerwick, Lyness, Scrabster, Stornoway and Sullom Voe. Impacts on fishing in the North in terms of home ports may be seen at Kinlochbervie, Scrabster, Stornoway and Ullapool; impacts on landings also affect these ports plus Stromness. Some of these ports may be positively affected by wind farm jobs, but not all. The number of people moving into the North region to take up wind farm jobs is not expected to be significantly high (up to 1,739 people under the high scenario) such that social impacts on services and housing may be limited. As a result, overall positive impacts for these ports may be slightly significant and negative impacts are likely to be slightly significant since any effects on housing or services are likely to disproportionately affect vulnerable groups within what are reasonably small communities.

6.3.11 In the West, positive economic impacts are expected to be concentrated in ports such as Ardrishaig, Ardrossan, Campbeltown, Corpach, Fairlie, Greenock, Hunterston and Oban. Impacts on fish landings are small at home ports except in Oban, but reductions in landings at ports such as Islay, Fionnphort and Port Ellen could be noticeable. These ports are also less likely to be positively affected bywind farm development. Communities on Islay and Jura may be the most likely to be affected by impacts on seascapes but they may not be positively impacted from people moving into the area to bring additional support to services, or conversely, to put additional demand onto services. Ports like Oban may see the largest increase in population (permanently or temporarily) and may also be impacted by changes in recreational boating demand if these activities are displaced. As a result, overall positive impacts are expected to be slightly significant with overall negative impacts being slightly significant, which specific effects on some local communities.

6.3.12 In the South West, positive economic impacts are expected to be concentrated in Ayr. Impacts on fish landings are also expected to be greatest at Ayr, although the overall effects in terms of loss of jobs is low (0.5 FTE low scenario, Type I to 2.2 FTE high scenario, Type II). People moving into the area to take up jobs are also likely to migrate in and around Ayr with potential impacts due to increased demand for housing and other services, but also potential positive effects from the increased population helping to support local shops. Negative impacts from changes to seascapes or displacement of tourism and recreational activities may be seen along the southern coast of Dumfries and Galloway, so these communities may feel that they incur many of the negative impacts without experiencing any direct economic positive effects from the level of spend. Overall positive impacts are expected to the slightly significant while overall negative impacts are expected to be slightly significant. Some specific groups associated with recreational boating or having specific concerns about seascapes may be significantly affected, but these groups should be reasonably small in number.

Appendices

A Project Board and Steering Group

A.1 Project Board

To oversee the full Sectoral Marine Plan development. Responsibilities include: provide guidance and direction; review stages and approve progress to next; and approve substantive changes.

A.1.1 Project Board Membership

Marine Scotland

- Deputy Director, Marine Planning and Policy
- Head of Marine Renewables and Offshore Wind
- Head of Planning and Strategy
- Head of Marine Analytical Unit
- Deputy Director for ACRE, Aquaculture, Crown Estate, Recreational Fisheries, EMFF and Europe

Directorate for Energy and Climate Change

- Head of Energy Industries, Deputy Director
- Head of Utilities, Markets & Networks Policy Unit
- Head of Large Scale Renewables

A.2 Steering Group

Two Project Steering Groups are in the process of being established. They will provide information and advice, provide input into the methods used and technical content, and review documents. Membership will include Scottish Government officials, external organisations and stakeholders.

A.2.1 Steering Group: Regional Locational Guidance (Environmental Baseline), Plan, Strategic Environmental Assessment and Habitats Regulations Appraisal

Scottish Government

- Marine Scotland - Chair) Head of Marine and Offshore Renewable Energy
- Marine Scotland - Senior Policy Officer and technical adviser
- Marine Scotland - Policy Adviser, MORE Team
- Marine Scotland - Senior Policy Officer, MORE Team
- Marine Scotland Science - Renewable Energy Environmental Adviser
- Marine Scotland - Head of Marine Analytical Unit
- Marine Scotland - Head of Domestic Fisheries Management

- Scottish Government Energy Directorate - Policy Executive, Offshore Wind
- Scottish Government Planning and Architecture Division - Senior SEA Specialist/Planner

Organisations/Stakeholders

- Scottish Natural Heritage –Policy and Advice Manager
- Historic Environment Scotland –Senior Casework Officer
- Scottish Environment Protection Agency – Marine Ecology Unit Manager
- Scottish Renewables
- Crown Estate Scotland (Interim Management) - Policy and Planning Manager
- WWF
- RSPB
- Joint Nature Conservation Committee
- Scottish Fishermen's Federation
- Regional Inshore Fisheries - West Coast Regional IFG Chair

A.2.2 Steering Group: Regional Locational Guidance (Socio-Economic Baseline), Socio-Economic Impact Assessment and Scenario Mapping

Scottish Government

- Marine Scotland - Head of Marine and Offshore Renewable Energy
- Marine Scotland - Senior Policy Officer and technical adviser
- Marine Scotland - Policy Adviser, MORE team
- Marine Scotland - Senior Policy Officer, MORE Team
- Marine Scotland - Head of Marine Analytical Unit
- Marine Scotland - Head of Domestic Fisheries Management
- Scottish Government Energy Directorate - Policy Executive, Offshore Wind
- Scottish Government Planning and Architecture Division - Senior SEA Specialist/Planner

Organisations/Stakeholders

- Scottish Renewables -
- Scottish Fishermen's Federation -
- Scottish Fishermen's Federation -
- UK Chamber of Shipping - Policy Advisor
- Regional Inshore Fisheries - NE Coast Regional IFG Chair
- Regional Inshore Fisheries - West Coast Regional IFG Chair

- Crown Estate Scotland (Interim Management) - Policy and Planning Manager
- Highlands and Islands Enterprise - Senior Development Manager – Large Scale Renewables
- Scottish Enterprise – Senior Manager, Energy Supply Chain Team

B Scenarios

B.1 Storylines

Table 49 Storylines

Activity	Storyline
Region: East	
Development and project management	Much of project management is done outside the region, although there is some retention related to survey work and local planning. 20% of development and project management spend is retained locally at the start of the appraisal period. The potential for a pipeline of development suggests that the supply chain may increase over time such that local retention increases to 70% by the end of the timeframe for the assessment.
Wind turbine supply	The majority of turbine manufacture is undertaken outside of the region (in Humberside). Some assembly work is undertaken, building on the supply chain development associated with development in the Forth & Tay (e.g. Seagreen) enabling 3% of spend to be retained locally. Over time, it is expected that there would be an increase in the amount spend that is retained locally, with this increasing to 25% by the end of the timeframe for assessment.
Balance of plant	Around 4% of spend is retained locally, building on the growing supply chain associated with development in the Forth & Tay. This is expected to grow to 42% by the end of the assessment timeframe as supply chain capacity increases.
Installation and commissioning	Installation activities may be higher than suggested by the LQs due to recent development in the Forth & Tay so retention is increased to 2% (rather than 1%). Growth across the assessment timeframe is expected to result in retention of 12% by the end of the timeframe for the assessment.
Operation, maintenance and service	Most of the minor service work can be undertaken using local supplied resulting in 30% retention of spend. There may be some growth over time, increasing retention to 70% by the end of the assessment timeframe.
Region: North East	
Development and project management	Retention of spend at the outset of the appraisal timeframe is low at just 0.1. The potential for a pipeline of development suggests that the supply chain may increase over time such that local retention increases to 5% by the end of the timeframe for the assessment.
Wind turbine supply	Wind turbine manufacture is undertaken outside of the region, assembly activities and some component manufacture is local

Activity	Storyline
	resulting in retention of just 2% of spend. The amount retained locally is expected to increase over time reaching 22% by 2050.
Balance of plant	Cables, foundations and substation work can draw on the local supply chain with growth of the supply chain due to recent development giving a retention rate of 50%. This is expected to grow slightly into the future up to 70% by the end of the assessment timescale.
Installation and commissioning	Installation and commissioning activities enable good use of the local supply chain with 40% of spend being retained. Growth is expected to result in retention reaching 80% by the end of the appraisal timeframe.
Operation, maintenance and service	Growth of the supply chain due to developments, e.g. Beatrice, means there is increasing supply chain capacity to undertake both minor and major servicing and maintenance. As a result, retention of spend is assumed to be 14% increasing to 18% by the end of the assessment timescale.
Region: North	
Development and project management	Local retention is assumed at 0.1% for spend in the North region. The potential for a pipeline of development suggests that the supply chain may increase over time such that local retention increases to 5% by the end of the timeframe for the assessment.
Wind turbine supply	Manufacturing is limited with 2% retention of spend in the North. The amount retained locally is expected to increase slightly over time to 22% by the end of the appraisal timeframe.
Balance of plant	Investment in cables, substations and foundations results in 4% retention in the North. This is expected to increase to 42% as the supply chain develops due to local spend.
Installation and commissioning	Retention of 2% of spend due to development in the North. Supply chain growth results in this increasing over time to 12% by the end of the assessment timeframe.
Operation, maintenance and service	Retention of 10% of spend in operation, maintenance and service in the North. This is expected to grow to 12% by the end of the assessment timeframe.
Region: West	
Development and project management	Retention in the West for development and project management is assumed to be 1% in the short-term. The potential for a pipeline of development suggests that the supply chain may increase over time such that local retention increases to 40% by the end of the timeframe for the assessment.

Activity	Storyline
Wind turbine supply	Wind turbine manufacture is undertaken outside of the region, but some assembly activities and component manufacture is local resulting in retention of 2% of spend. The amount retained locally is expected to increase over time up to 22% by the end of the appraisal timeframe.
Balance of plant	Spend on cables, substations and foundations is expected to result in a 3% local retention rate. Some growth may occur over time but this is expected to be limited to 15%.
Installation and commissioning	Installation activities are likely to be sourced locally with a high level of 1% retention of spend. It is expected that retention rates would grow over the assessment timeframe to 11%.
Operation, maintenance and service	Retention of 10% of spend in operation, maintenance and service in the West region. This is expected to grow to 12% by the end of the assessment timeframe.
Region: South West	
Development and project management	Retention of spend in the South West is expected to be limited due to supply chain capacity. Overall, is it expected that 0.1% of spend is retained in the South West, increasing to 5% by the end of the assessment timeframe.
Wind turbine supply	It is expected that 3% of spend will be retained in the South West, due to current limitations in the supply chain. The amount retained locally is expected to increase over time to 25% by the end of the appraisal timeframe.
Balance of plant	Capacity issues in the South West are expected to limit the amount of spend that is retained to 3%, potentially increasing to 15% by the end of the assessment timeframe.
Installation and commissioning	The supply chain in the South West is again assumed to be limited in its current capacity such that 1% of spend is retained. Some growth is expected over time, with retention increasing to 11% by the end of the assessment timeframe.
Operation, maintenance and service	Retention of spend in the South West is assumed to be 10%. Some growth is expected in the supply chain in the South West such that retention increases to 12% by the end of the assessment timeframe.

B.2 Review of references informing assessment of supply chain impacts

B.2.1 CH2M (2016): The Economic Benefits of Offshore Wind Energy in the east and North East regions of Scotland, Final Report for Marine Scotland, East Coast Renewables and The Crown Estate, April 2016.

Individual project characteristics of five offshore wind projects, based on each project's Environment Statement are provided in Table 50.

Table 50 Percentage of local content for different stages for five offshore wind projects

Offshore wind project	Percentage local content		
	Development	Construction	Operation
Neart Na Gaoithe	70	6–73	61–92
Seagreen Alpha & Bravo	20–50	8–33	33–45
Inch Cape	n/a	10–32	35–65
Moray: Telford, Stevenson & Macoll	40	10–30	30–60
Beatrice	30–50	20–30	30–60

Factors experienced in relation to the supply chain include:

- Sourcing difficulties;
- A gap between the infrastructure available and that required by industry;
- Finding appropriate port-side locations for construction and installation that are generally suitable in most weather conditions;
- Making O&M activities more efficient by having on-site or near-site teams, as well as increased preventative and predictive maintenance;
- Continued dependency on a limited number of manufacturers, which may have sufficient capacity but could lead to less competitive conditions and bottlenecks;
- Increase in turbine sizes increasing pressure on infrastructure capability and capacity;
- Increased levels of onshore assembly of wind turbines components to virtually complete units leading to more challenging transhipment to offshore sites; and
- Shortages in export cable manufacturing;
- Limited availability of installation vessels (to 2018).

It is highly unlikely that manufacturers will express interest developing turbine manufacturing and/or assembly plant or related facilities in Scotland or elsewhere in the UK (beyond the Humberside plant).

Requirements for piling strategies for deep water projects will rely on suppliers of jacket structures with pin piles. Scottish suppliers include BiFab at Methil, Burnitsland and Arnish; Global Energy Group at Nigg, and FoundOcean in Livingston.

Highland and North East based ports and supply chain businesses could be well-placed to provide the necessary capability and capacity to serve construction and deployment for test and demonstration projects.

Offshore Wind Vision identified UK content levels to be about 43% in 2014 and expected to reach a target of 50% local content by 2030.

Scottish Enterprise and Highlands and Islands Enterprise Offshore Wind Energy Supply Chain Database contain information on 500 companies that have offices or facilities located in Scotland.

The analysis of the supply chain current state and opportunities (from C2HM, 2016) is reproduced in Table 51.

Table 51 Analysis of supply chain current state and opportunities

Component	Current state	Opportunities
Turbines **(No/Minor existing presence)**	No WTG manufacturing presence Presence in turbine components: Artemis Intelligent Power (part of Mitsubishi–Vestas) Moventas (David Brown Gears)	Interest from OEMs – Areva / Gamesa (now rebranded as Adwen), Mitsubishi-Vestas Components such as gearbox transmission systems including valves, electronics and control software
Blades **(No/Minor existing presence)**	No existing presence	Interest from OEMs – Areva / Gamesa (now rebranded as Adwen), Vestas to construct in Isle of Wight, Siemens constructing in Humberside.
Towers **(Limited existing presence)**	Presence in onshore wind tower fabrications: Wind Towers Ltd (now acquired by CS Wind)	Diversification and transferable skills from current steel fabrication experience Potential re-location/new facilities required on East coast Inward investment now secured by the £14 million acquisition of Wind Towers Ltd by South Korean CS Wind who intend to expand into the offshore wind turbine towers market increasing employee numbers by 50%.
Foundations **(Existing presence)**	Presence in jacket substructures: BiFab	Global Energy Group (future potential fabrication & as-assembly) Steel Engineering (Samsung test turbine supplier) Concrete Gravity Bases: BAM Nuttall, Aggregate Industries
Substation **(Limited existing presence)**	Presence in onshore and offshore substation fabrication: Babcock International BiFab	Range of supply chain with growth or diversification potential Substation fabrication and related services: Global Energy Group, Petrofac

Other balance of plant (Limited existing presence)	Limited presence	Diversification and transferable skills Requires inward investment
Vessels (No/Minor existing presence)	Installation - no existing presence Inspection, O&M – limited presence ROV systems/expertise – strong presence	Diversification and transferable skills from parallel experience Inspection / O&M services – strong oil & gas transferrable expertise
Operation & Maintenance (O&M) (Existing presence)	Presence in oil & gas sector O&M activity Range of companies engaged in offshore wind O&M: MCS Clyde Ltd – crew transfer Briggs Marine – repair and maintenance Buckie Shipyard - Aluminium twin hulled workboats	O&M host ports - potential at various locations (see Section 5) Existing vessel & heli-services Diversification of oil & gas services Training and Safety Innovation – monitoring and predictive maintenance

The report also includes an analysis of regional baseline linked to ability to meet project demand from the current market and in the context of a rapidly evolving market. Moray Firth cluster site assessment (from C2HM, 2016) is shown in Table 52.

Table 52 Moray Firth cluster site assessment

Cluster role	Site	Traffic light assessment
Integrated hub	Nigg	High ability
Integrated hub	Ardesier	Medium ability
Distributed manufacturing and O&M	Buckie	High ability
O&M	Invergordon	High ability
O&M	Wick	High ability
O&M	Fraserburgh	Medium ability
O&M	MacDuff	Medium ability

Labour market assessment shows this to be above average in Aberdeenshire and Aberdeen City, and average in Moray and Highland.

Forth & Tay cluster site assessment (from C2HM, 2016) is shown in Table 53.

Table 53 Firth & Tay cluster site assessment

Cluster role	Site	Traffic light assessment
Integrated hub (partial)	Dundee	High ability
Distributed manufacturing	Leith	High ability
Distributed manufacturing	EPF Methil	High ability
Distributed manufacturing	Rosyth	High ability
Support – O&M	Montrose	Medium ability
O&M	Eyemouth	Medium ability
O&M	Dunbar	Medium ability

Labour market shown as below average in Midlothian, East Lothian, Clackmannanshire and Angus, average in City of Edinburgh, West Lothian and Falkirk, and above average in Dundee City and Fife.

Scottish retention rates from the five offshore wind projects (either stated explicitly or calculated from the Environmental Statements) are shown in Table 54. The high rates are considered to be optimistic.

Only Inch Cape provided labour retention rates during manufacturing and construction phases with a low case of 10% and high case of 33%. In the O&M phase, Scottish retention rates gave an average of 60% for the low case and 100% for the high case.

Table 54 Scottish retention rates from offshore wind projects

Offshore wind project	By case		By phase		
	Low/ base	High	Manufacturing	O&M	Construction
Neart Na Gaoithe	31	82	3–84	64–97	22
Seagreen	15	40		Not available	
Inch Cape	21	47		90	
Moray	15	40		60–100	
Beatrice	30	50	15	58–100	20–60

Spend is generally based on £3 million per MW multiplier (from BVG Associates for Renewables in 2011). Further breakdown is available as follows:

- Develop and consent: 4%
- Project management: 6%
- WTG: 35%:
- Blades: 7%
- Rotor subassembly: 4%
- Nacelle: 18%
- Tower: 6%
- Foundations: 20%
- Electrical and BoP: 15%
- Cables: 5%
- Substation: 7%
- BoP: 3%
- Installation: 20%:
- Turbine install: 6%
- Foundation install: 10%
- Cable install: 4%

The Oxford multipliers (developed by Oxford Economics) are used to estimate direct O&M labour requirements and indirect economic impacts. These estimate that 19 full-time equivalents (FTEs) will be required to operate and maintain 1 GW of offshore wind. Inch Cape estimated labour force using a bottom-up analysis with 11 FTEs per GW of deployment.

B.2.2 Scottish Government (2017): Scottish Energy Strategy: The Future of Energy in Scotland, December 2017.

Target to reach 50% of energy to be provided by renewable sources by 2030.

B.2.3 National Grid (2017): Future Energy Scenarios, July 2017.

Electricity demand by 2050 expected to be between 321 TWh (Steady State) and 383 TWh (Consumer Power).

B.2.4 National Grid (2017): Electricity Ten Year Statement 2017, UK electricity transmission, November 2017.

By 2035, scenarios suggest a total Scottish generating capacity of between 13 and 25 GW.

B.2.5 Marine Scotland (2011): Blue Seas – Green Energy: A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters, Part A, The Plan.

Ports and harbours present viable locations to service the associated construction and maintenance activities. Scotland well placed to capture on-third of the total UK Supply chain market, potentially securing £100 billion of investment.

B.2.6 Smart G & Noonan M (2018): Tidal Stream and Wave Energy Cost Reduction and Industrial Benefit: Summary Analysis

Tidal stream industry could generate net cumulative benefit to UK of £1,400 million by 2030, consisting of £1,600 million from GVA from the domestic market and £1,100 million GVA from exports, offset by £1,300 of revenue support. This would support a total of almost 4,000 jobs by 2030 and 14,500 by 2050.

Assuming a 10 year lag behind tidal stream, wave energy could add a net cumulative positive impact to the UK of £4,000 million by 2040, consisting of £1,500 million GVA from the domestic market and £3,700 million GVA from exports, offset by £1,200 million of revenue support. This could support 8,100 jobs by 2040.

50-60% of the economic impacts in terms of GVA and jobs are expected to be generated in coastal areas.

The UK marine energy supply chain is world-leading. Many companies offer site development services, offshore operations services and bespoke engineering. Some companies have diversified or reverted to other sectors but capability remains strong in several sectors.

The Marine Energy Supply Chain Gateway (MESCG)[51] lists more than 850 companies, spread across the UK, currently active or able to participate in the sector. However, other countries have identified wave and tidal stream energy as a major opportunity for energy supply and economic growth.

A 2016 analysis by economic development agencies in the South West, Wales and Scotland estimated that around 1,700 people currently work in the UK wave and tidal sectors with roughly £445 million spent to date in the UK supply chain.

The UK has existing skills in:

- Subsea engineering
- Offshore foundation design
- Manufacture and marine operations

There are also crossover skills in electrical grid connections.

[51] https://www.mescg.co.uk/

UK companies are expected to retain a majority of the domestic supply chain activity. There is export potential in some segments of the supply chain:

- Small, high-value easily transportable electrical components
- Wave and tidal device design
- Expertise in installation techniques
- O&M strategies
- Environmental surveying
- Project development and management

New jobs will be supported and will continue to be concentrated in distinct regions and will grow primarily from existing UK industries where there is strong absorptive capacity, especially offshore wind, oil & gas, steel and maritime, through companies diversifying into marine energy.

Supply chain clusters are forming in the UK, primarily in areas local to deployment. These include Shetland, Orkney, and North-West Scotland (also South West England, Solent/Isle of Wight, Wales and Northern Ireland).

Percentage of UK content by type of project for tidal stream are:

- Tidal platform: 65%
- Foundations/moorings: 80%
- Electrical: 70%
- Installation: 60%
- Other capex: 72%
- O&M: 75%
- Development: 75%
- Total: 70%

Percentage of UK content by type of project for wave energy are:

- Wave energy converter: 65%
- Foundations/moorings: 80%
- Electrical: 70%
- Installation: 60%
- Other capex: 72%
- O&M: 75%
- Development: 75%
- Total: 70%

Tidal industry participants need visibility of a steady project pipeline of an estimated 100 MW per year from 2022 up to at least 2 GW to mobilise the supply chain investment required.

B.2.7 Ironside Farrar (2018): Tiree Onshore Scenario Mapping, Executive Summary and Ironside Farrar (2018): Tiree Onshore Scenario Mapping, Final Report

Four potential O&M scenarios relating to operations and maintenance activity:

1. Onshore O&M base: an onshore base on the island with up to five workboats and one helicopter accessing the array. Requires a harbour or breakwater;
2. Offshore O&M base (platform): an offshore platform located within the array with workboats and one helicopter stationed on the platform;
3. Offshore O&M base (mothership operating from mainland port): two motherships, stationed within the array, with daughter workboats and one helicopter stationed on the mothership working from a mainland port;
4. Onshore O&M base/mothership (operating from Tiree): a combination of scenarios 1 and 3 with an arrangement based on motherships/daughter workboats working within the array, with the motherships and helicopter working from a Tiree base. Requires a harbour or breakwater.

Scenario 1: direct employment 150 array jobs (50% increase in current jobs base of island) and 50 net additional jobs from indirect employment. Estimated population increase of c 140 with 26 to 33 new homes and other refurbished. 7 to 12 return flights per day from the helipad. Additional 9 primary and 7 secondary school pupils. Around 30-50 existing jobs would need to be back-filled as a result of residents choosing to work on the proposed array. Of the 150 FTE jobs, 38 would be available to local people with 112 for people relocating to the island.

Scenario 2: direct employment 5 array jobs (2% increase in current jobs base of Tiree), very limited additional jobs from indirect employment. Population increase of c5, with 2-3 new homes. Helipad for emergency use although may be opportunity for fortnightly flights for Tiree based employees. No requirements for additional school places; school leaver/adult skills will be advanced. No substitution issues over existing jobs with none of the jobs being based on Tiree.

Scenario 3: direct employment of 25 array jobs (8% increase in current jobs base of island), 5 net additional jobs from indirect employment on Tiree. Estimated population increase of c24 with 4-6 new homes. Helipad limited to emergency use although may be opportunity for fortnightly flights for Tiree based employees. Helipad 1-5 flights per days. Additional 2 primary and 1 secondary pupils. 5-10 existing jobs would have to be back-filled. Around 25 FTE jobs would be generated on Tiree with 6 for local people and 19 for those relocating to the island.

Scenario 4: direct employment of 59 array jobs (19% increase in current jobs base of island) and 30 net additional jobs from indirect employment. Estimated population increase of c56 with 10-13 new homes and others refurbished. Helipad 1-5 flights per day and additional 4 primary and 3 secondary school pupils.

A critical requirement in delivering positive impacts to the Argyll & Bute economy and to local communities is the development of community capacity and advance programmes associated with skills development and training. 10-15 jobs would have to be back-filled with 59 FTE jobs generated, of which 15 would be available to local people and 44 for people relocating to the island.

B.2.8 BVG Associates (2014): UK Offshore Wind Supply Chain: Capabilities and Opportunities, report prepared by BVG Associates for the Department for Business, Innovation and Skills, January 2014.

Breakdown of undiscounted capital and operational costs of a typical offshore wind farm (based on a 500 MW farm using 6 MW wind turbines and jacket foundations using a combination of real project and modelled data).

- Development and project management: 2%
- Wind farm design: 1%
- Surveys: 0.3%
- Project other: 1.6%
- Wind turbine supply: 26%
- Turbine assembly: 1%
- Blades: 7%
- Castings and forgings: 2%
- Drive train: 8%
- Tower: 4%
- Turbine other: 4%
- Balance of plant: 19%
- Subsea export cables: 2%
- Subsea array cables: 1%
- Substations: 7%
- Foundations: 8%
- Balance of plant other: 1%
- Installation and commissioning: 14%
- Installation ports: 0.5%
- Turbine installation: 2%
- Foundation installation: 4.5%

- Subsea cable installation: 4%
- Installation other: 3%
- Operation, maintenance and service: 39%
- Operation, maintenance and minor service: 20%
- Major service: 7%
- OMS other: 12%

B.2.9 Highlands and Islands Enterprise (2017): Offshore Wind, www.hi-energy.org.uk, May 2017.

Region supports and strong and expanding supply chain.

B.2.10 Highlands and Islands Enterprise (2017): Infrastructure, www.hi-energy.org.uk, May 2017.

£163 million in investments made in infrastructure sites across Highlands and Islands since 2010. Ports and harbours in the Highlands and Islands have been resilient in adapting their offering to cover growing demand for inspection, repair and maintenance of offshore assets.

B.2.11 Wind Europe (2018): Financing and investment trends, The European Wind Industry in 2017, April 2018.

Germany and UK accounted for half of new Final Investment Decisions (FIDs) announced in 2017. This amounted to €5 billion in the UK (22% of the total). Offshore wind has seen an uptake in corporate finance transactions over the past two years, but offshore wind project finance has declined for new FIDs.

B.2.12 Wind Europe (2017): Wind Energy in Europe: Scenarios for 2030, September 2017.

Medium scenario: EU achieves a 27% renewable energy target.

Low scenario: failure to deliver the 27% target. Offshore wind energy pipeline is below 4 GW/year.

High scenario: EU-wide renewable energy target is increased to 35%. Deployment rate of 7 GW/year

In the UK, offshore wind power cumulative capacity is 22.5 GW (medium) with a range of 18 (low) to 30 GW (high).

B.2.13 Wind Europe (2018): Offshore Wind in Europe, Key Trends and Statistics 2017, February 2018.

The UK's annual offshore wind capacity installations were 1,679 MW across 10 windfarms with 281 turbines connected (compared with Germany at 1,247 MW, Belgium at 165 MW, Finland at 60 MW and France at 2 MW).

Total installed capacity in the UK is 6,835 MW across 31 farms with 1,753 connected turbines. This is equivalent to 43% of all installations in Europe.

B.2.14 BVG Associates (2018): Scottish Offshore Wind Supply Chain, Gap Analysis Refresh, Update Report for Scottish Enterprise, September 2018.

Expenditure broken down into the following categories with figures for a nominal 500MW wind farm using 7MW turbines and jacket foundations (average installed turbine size has increased from 3.5MW in 2010-14 to 5.8MW in 2014-18). Project capex costs have been squeezed since previous study creating an increase in percentage of spending on opex from 38% to 42.6%. Total undiscounted cost of a 500MW wind farm is around £3 billion:

- Development and project management (6.2% or £185 million):
  - Wind farm design: 0.3% total expenditure, with potential opportunity for Scotland also of <1%
  - Surveys: 0.4%, opportunity of <1%
  - Project other, 5.5% (no data on opportunity)

- Turbine supply (16.3% or £490 million):
  - Turbine assembly: 0.7%, opportunity of <1%
  - Blades: 4.6% and opportunity of 3%
  - Casting and forgings: 1.1%, opportunity of <1%
  - Drive train (gearbox, generator and converters: 5%, opportunity of 3%
  - Towers: 2.2%, opportunity of 2%
  - Turbine other: 2.7% (no data on opportunity)

- Balance of plant (16% or £480 million):
  - Subsea export cables: 1.6%, opportunity of <1%
  - Subsea array cables: 0.8%, opportunity of <1%
  - HVAC/HVDC substations: 5.7%, opportunity of 4%
  - Foundations: 7.2%, opportunity of 4% (monopile), opportunity of 7% (non-monopile steel foundations) and opportunity of 7% (concrete foundations)
  - Balance of plant other: 0.7% (no data on opportunity)

- Installation and commissioning (15.6% or £470 million):
    - Installation ports: 0.5%, opportunity of <1%
    - Turbine installation: 2.2%, opportunity of 1%
    - Foundation installation: 4.5%, opportunity of 2%
    - Subsea cable installation: 4.2%, opportunity of 2%
    - Installation other: 3% (no data on opportunity)

- Operation, maintenance and service (42.6% or £1.3 billion):
    - Operation, maintenance and minor service: 20%, opportunity of 19%
    - Major service: 7%, opportunity of 5%
    - OMS other: 12.7% (no data on opportunity)

- Decommissioning (3.3%)

The report assesses the proportion of total available expenditure that could be potentially spent in Scotland and then the realistic amount of expenditure that could be expected to be retained in Scotland for a selection of the above activities:

- Development and project management:
    - Wind farm design and surveys: Scottish supply chain has an opportunity to capture around 20% of the UK expenditure. The size of the Scottish opportunity is limited due to the low spend on project development in comparison with other supply chain areas.

- Turbine supply:
    - Turbine nacelle assembly: negligible opportunity for the Scottish supply chain with no current of likely perspective supply chain capability. Turbine manufacturers have invested in Germany, Denmark and France.
    - Blades: Scottish supply chain has an opportunity to capture around 20% of the UK expenditure. Currently there is no Scottish blade manufacturing. Potential to establish a supply chain will be highly sensitive to the volume of installed UK offshore wind capacity.
    - Castings and forgings: not expected that Scotland will supply casting and forgings for future UK projects.
    - Gearbox, generator and converters: not expected that Scotland will supply drive trains for future UK projects. Turbine manufacturers are likely to use a single supplier who will be closely involved in design.
    - Towers: Scottish supply chain has an opportunity to capture around 40% of the UK expenditure. Scotland has capability to supply tower components but will face competition from non-Scottish steel production companies. There is also strong competition from cheaper and more established non-UK suppliers.

- Balance of plant supply:
  - Subsea array cables: not expected that Scotland will supply subsea array cables for future UK projects. Continued transition to larger turbines means reduced array cable lengths are required so there is no case for investment in UK supply. The opportunity remains for supply of lower tier cable components but there is strong competition from the existing UK supply chain.
  - Subsea export cables: Scottish supply chain has an opportunity to capture around 20% of the UK expenditure. Move to further offshore and a step change to higher export voltages means there is upward pressure on demand. There is currently no UK-based export cable manufacturing facility so any new infrastructure could be based in Scotland (potential investment from Asia).
  - HVAC substations: Scottish supply chain has an opportunity to capture around 20% of the UK expenditure. Very large and complex projects with supply very similar to offshore oil and gas platforms with demand expected to remain steady.
  - HVDC substations: Scottish supply chain has an opportunity to capture around 25% of the UK expenditure. Current demand is low but future offshore wind projects will be larger and located further offshore so will create a growing market. Up to four HVDC stations could be installed in the UK up to 2030. HVDC substations can be up to 5 times the mass of HVAC sub-stations.
  - Monopile steel foundations: not expected that Scotland will supply steel monopile foundations for future UK projects. Non-UK competition is well-established.
  - Non-monopile steel foundations: Scottish supply chain has an opportunity to capture around 30% of the UK expenditure. There is the potential to make use of existing Scottish supply chain associated with jacket foundations. Strong competition from other UK fabrication yards as well as from elsewhere in Europe.
  - Concrete foundations: not expected that Scotland will supply concrete foundations for future UK projects. The UK has moved away from use of concrete foundations and the market is not expected to materialise with negligible potential for the supply chain.
- Installation and commissioning:
  - Installation ports: Scottish supply chain has an opportunity to capture around 20% of the UK expenditure. Scotland has several port locations suitable for support installation but some components may be installed directly from manufacturing facilities outside Scotland.
  - Foundation installation: Scottish supply chain has an opportunity to capture around 5% of the UK expenditure. There remains little economic capacity for large vessel construction in Western Europe and none in the UK.
  - Subsea cable installation: Scottish supply chain has an opportunity to capture around 8% of the UK expenditure. No change in outlook with Scottish expertise maintained from historical strengths in offshore telecoms and oil and gas industries.

    - Turbine installation: Scottish supply chain has an opportunity to capture around 10% of the UK expenditure. Oil and gas industries are origin of UK expertise and there is no change in outlook.

- Operation, maintenance and service:
    - Operation, maintenance and minor service: Scottish supply chain has an opportunity to capture around 20% of the UK expenditure. Opportunities exist for monitoring the performance of the wind farm, planning maintenance schedules, responding to liability issues, spare part supply, project management and various maintenance tasks. Strong supply chain synergies with oil and gas sector. Increased use of autonomous vehicles, remote operation, drone inspection and enhanced condition monitoring technologies are being used to improve safety and reduce operational costs.
    - Major service: Scottish supply chain has an opportunity to capture around 10% of the UK expenditure with no change in outlook. Major repairs are likely to be carried out the many of the same companies in the installation supply chain as well as the larger companies also providing minor service supply. Subsea cable and blade repairs are potential areas where Scottish companies may secure increased market share due to logistical advantage of a local supply. There may also be some opportunities for ports providing services to larger vessels and in the longer term for refurbishment and vessel conversion services.

C Detailed Approach to Supply-Side Positive Economic Impacts

C.1 Introduction

This Appendix provides the detailed assumptions and calculations from the estimation of supply side impacts. The approach is supported by a spreadsheet thus some of the numbers presented below may not sum due to rounding.

C.2 Step 1: Spend per GW per year

Levels of spend per GW are based on BVG (2019)[52]:

- Development and project management: £120 million per GW;
- Wind turbine supply: £1,000 million per GW (based on £10 million per 10 MW turbine and 100 turbines);
- Balance of plant: £600 million per GW;
- Installation and commissioning: £650 million per GW;
- Operation, maintenance and service: £75 million per GW per year.

These are the initial costs and it could be assumed that some reduction in costs would occur over time as technology develops and efficiencies occur. The impact of reducing costs is considered in the sensitivity analysis. For the purposes of the assessment, it has been assumed that the costs of floating technologies are similar to fixed bottom technologies at the point that they become commercially viable.

Table 55 sets out total spend across each activity by region based on projected development levels. This is total spend that is divided into per GW per year to account for the duration of each activity. The per GW per year spend totals are then allocated to specific years in line with the projected investment profile.

[52] BVG (2019): Guide to an offshore wind farm, updated and extended, published on behalf of the Crown Estate and the Offshore Renewable Energy Catapult, January 2019.

Table 55 Spend per GW per year by activity

Activity	Total spend		
	Total spend per GW	**Duration of activity**	**Spend per GW per year**
Development and project management	£120,000,000	10 years	£12,000,000
Wind turbine supply	£1,000,000,000	2 years	£500,000,000
Balance of plant	£600,000,000	4 years	£150,000,000
Installation and commissioning	£650,000,000	4 years	£162,500,000
Operation, maintenance and service (per year)	£75,000,000	Annual	£75,000,000

Durations per activity used to divide total spend to annual spend are:

- Development and project management: 10 years;
- Wind turbine supply: 2 years;
- Balance of plant: 4 years;
- Installation and commissioning: 4 years;
- Operation, maintenance and service: 1 year (annual expenditure is provided in BVG, 2019).

Table 56 presents the projected spend in each region for each scenario.

Table 56 Regional scenarios used as the basis for level of spend

Region	Regional Low Scenario (GW)	Regional Medium Scenario (GW)	Regional High Scenario (GW)
East	1	2	3
North East	1.5	3	4.5
North	1	2	3
West	0.5	1	2
South West	0.3	0.6	1
Total (regional)	5	10	15.5
National (factored back)	**3**	**5**	**10**

C.3 Step 2: Spend retained in Scotland

Assumptions are required on the industry supply chain needs associated with the scale of future developments and the proposed technologies. This ensures that leakage outside of Scotland is excluded from the positive economic impacts. The total of spend retained within the Scottish regions varies according to the year in which spending is projected to occur. The capacity of the supply chain in Scotland to deliver these needs depends upon the programme of spending and where spend will be targeted. A review of available literature (Appendix B) provides an indication of the current capacity of the supply chain.

Assumptions have been made about the percentage of spend that is retained in Scotland. The potential retention rates draw on a number of studies, in particular BVG (2018)[53] which provides an update on supply chain capability, building on an earlier BVG report from 2014. Retention rates for Smith & Noonan[54] are used as upper estimates, given that these relate to wave and tidal energy, rather than wind energy. These studies are used to provide estimates in Scotland by activity to inform the potential retention rates for lower, mid and upper levels of local retention (Table 57). The table includes percentage retention figures for 2050. These reflect potential growth of the supply chain towards the end of the appraisal period and as such are assumed to only be applicable beyond the life of the plan that is assessed here. The proposed percentages are based on:

- Lower estimates: BVG (2018) without adjustment to account for those elements excluded, i.e. assuming that excluded elements would be developed outside Scotland. Since BVG (2018) only includes opportunity for now and in 2030, it is assumed that growth to 2050 is linear and occurs at the same rate as between now and 2030;
- Mid estimates: BVG (2018) with adjustment to account for elements excluded, i.e. expenditure on any activities not allocated an opportunity estimate in BVG (2018) is ignored in the calculations with retention rates based just on those activities for which an opportunity estimate is given;
- Upper estimates: Smith & Noonan (2018) with the low values used for 2020, increasing to medium in 2030 and to high in 2050.

[53] BVG (2018): Scottish Offshore Wind Supply Chain Gap Analysis Research, Update Report for Scottish Enterprise, September 2018.

[54] Smart, G. & Noonan, M., 2018. Tidal Stream and Wave Energy Cost Reduction and Industrial Benefit: Summary Analysis.

Table 57 Potential percentages for local retention related to supply chain capacity, by project activity

Activity	Revised percentages for retention in Scotland								
	Lower			Mid			Upper		
	Now	2030	2050	Now	2030	2050	Now	2030	2050
Development and project management	0.1%	3%	5%	1%	20%	40%	20%	40%	70%
Wind turbine supply	2%	12%	22%	3%	14%	25%	10%	20%	30%
Balance of plant	3%	9%	15%	4%	23%	42%	50%	60%	70%
Installation and commissioning	1%	6%	11%	2%	7%	12%	40%	60%	80%
Operation, maintenance and service	10%	11%	12%	14%	16%	18%	30%	50%	70%
Overall	**5%**	**11%**	**17%**	**7%**	**15%**	**22%**	**30%**	**46%**	**63%**

These percentages can be applied regionally using Location Quotients (LQs). LQs show how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. They reveal what makes a particular region 'unique' in comparison to the national average[55]. LQs are produced by the Office for National Statistics (ONS) and area available at NUTS2 for Scotland[56]. The LQs are averaged across the relevant NUTS2 areas and assigned to one of the Draft Plan Option regions (East, North East, North, West, South West).

The relevant industry sectors are then aligned with the five main activities:

- Development and project management: M – professional, scientific and technical services;
- Wind turbine supply: C – manufacturing;
- Balance of plant: F – construction;
- Installation and commissioning: F – construction and H – transportation and storage; and
- Operation, maintenance and service: D – electricity, gas, steam and air conditioning supply.

Whereas multipliers are available for Scotland, multipliers are not produced at a smaller scale, i.e. regional level. D'Hernoncourt, Cordier and Hadley (2011) note that in order to disaggregate the multipliers to enable a refined local-based analysis, the national or regional multipliers often need to be re-scaled to the local level. The approach has

[55] https://www.economicmodeling.com/2011/10/14/understanding-location-quotient-2/ [accessed 16/10/2018].

[56] ONS (2017): Location quotient data and industrial specialisation for local authorities available at https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/locationquotientdataandindustrialspecialisationforlocalauthorities [accessed 2/10/2018].

included the development and use of Location Quotients. A Location Quotient (LQ) quantifies the concentration of an industry in a region compared with the nation.

This is calculated as follows:

$$LQ_{ir} = \frac{E_{ir}/E_r}{E_{in}/E_n},$$

where E_{ir} = employment in industry i and region r, E_r = total employment in the region, E_{in} = employment in industry i for the nation , E_n = total employment for the nation

LQs can then been applied to national output multipliers for the specific type of industry and expenditure to derive regional multipliers for the expenditure at destination level. The results show the impacts (or contribution) to the regional economy (in terms of GVA) and employment (in terms of FTE) as a result of spend in each particular region.

The lower, mid and upper percentages for retention are assigned according to the mean LQ for each region. The retention rates are based on upper being greater than the 75% quartile and lower being less than the 50% quartile (with mid falling in between). The results are shown in Table 58 below. This provides the starting percentage (now) for each region, with increases occurring from that starting point to reflect the current status of the supply chain and the extent to which it may grow through the pipeline of development.

Table 58 Retention rate assumptions per region based on LQs

Region	Development and project management (M)	Wind turbine supply (C)	Balance of plant (F)	Installation and commissioning (mean of F and H)	Operation, maintenance and service (D)
East	Upper	Mid	Mid	Mid	Upper
North East	Lower	Lower	Upper	Upper	Mid
North	Lower	Lower	Mid	Mid	Lower
West	Mid	Lower	Lower	Lower	Lower
South West	Lower	Mid	Lower	Lower	Lower
National	Mid	Lower	Mid	Mid	Mid

The percentages shown in Table 58 are used as the basis for development of the scenario storylines for each region. The scenario storyline for each region is summarised in Appendix B. The amount of spend (and hence jobs and GVA) is based on local spend initially before being scaled back at the national level on a pro-rata basis.

Start and end retention rates vary over the timeframe as the supply chain develops to meet demand. Table 59 presents the start and end retention rates for each activity, based on growth of the supply chain due to a pipeline of projects across the regions. Note that the 2050 retention rates are not used in the estimation of supply side impacts; these are assumed to be potentially attained by the end of the appraisal timeframe and could form the basis of future positive effects beyond the timeframe of the Plan.

Table 59 Percentage retention rates at the start and end of the project timescale

Activity	Revised percentages for retention in Scotland								
	Lower			Mid			Upper		
	Now	2030	2050	Now	2030	2050	Now	2030	2050
Development and project management	0.1%	3%	5%	1%	20%	40%	20%	40%	70%
Wind turbine supply	2%	12%	22%	3%	14%	25%	10%	20%	30%
Balance of plant	3%	9%	15%	4%	23%	42%	50%	60%	70%
Installation and commissioning	1%	6%	11%	2%	7%	12%	40%	60%	80%
Operation, maintenance and service	10%	11%	12%	14%	16%	18%	30%	50%	70%
Overall	**5%**	**11%**	**17%**	**7%**	**15%**	**22%**	**30%**	**46%**	**63%**

C.4 Step 3: Allocation of spend to the scenario timelines

It is unlikely that all spending would be undertaken at once, indeed, this would be undesirable from an economic perspective as it would give no time or opportunity for growth in supply chains. Assumptions are made, therefore, on the timing of spend for each scenario, each region and nationally based on the assumptions concerning overall project time lines.

Given the nature of project development, construction and then operation, the different stages are phased across the 40 year time period used for the assessment as follows:

- Development and project management: occurs over a ten year period for each GW between 2021 and 2031 (years 1 to 10), to ensure that the wind farms are operational in line with the spend profile
- Wind turbine supply: occurs over a two year period towards the end of development and project management, i.e. in years 8 and 9 of development and project management
- Balance of plant: occurs over a four year period towards the end of development and project management, i.e. years 7 to 10 of development and project management
- Installation and commissioning: occurs over a four year period towards the end of development and project management, i.e. years 7 to 10 of development and project management
- Operation, maintenance and service: occurs annually once installation and commissioning has been completed for 30 years or until the end of the appraisal time period is reached (i.e. 2059).

Table 60 provides the total spend for each region taking into account total spend, i.e. total number of GW that are projected to be installed in each region over the total appraisal period (2020-2059).

The timing of spend varies by region and scenario to ensure that there is a reasonable spread of development across the appraisal period. Table 61 sets out the projected spend profile for each region and nationally for each scenario showing which activities are projected to occur and when.

Table 60 Projected total spend levels per region

Region and Stage	Regional Low Scenario (£ millions)	Regional Medium Scenario (£ millions)	Regional High Scenario (£ millions)
East			
Development and project management	£12	£24	£36
Wind turbine supply	£500	£1,000	£1,500
Balance of plant	£150	£300	£450

Region and Stage	Regional Low Scenario (£ millions)	Regional Medium Scenario (£ millions)	Regional High Scenario (£ millions)
Installation and commissioning	£163	£326	£489
Operation, maintenance and service (per year)	£75	£150	£225
North East			
Development and project management	£18	£36	£54
Wind turbine supply	£750	£1,500	£2,250
Balance of plant	£225	£450	£675
Installation and commissioning	£245	£489	£734
Operation, maintenance and service (per year)	£113	£225	£338
North			
Development and project management	£12	£24	£36
Wind turbine supply	£500	£1,000	£1,500
Balance of plant	£150	£300	£450
Installation and commissioning	£163	£326	£489
Operation, maintenance and service (per year)	£75	£150	£225
West			
Development and project management	£6	£12	£24
Wind turbine supply	£250	£500	£1,000
Balance of plant	£75	£150	£300
Installation and commissioning	£82	£163	£326
Operation, maintenance and service (per year)	£38	£75	£150
South West			
Development and project management	£4	£7	£12

Region and Stage	Regional Low Scenario (£ millions)	Regional Medium Scenario (£ millions)	Regional High Scenario (£ millions)
Wind turbine supply	£150	£300	£500
Balance of plant	£45	£90	£150
Installation and commissioning	£49	£98	£163
Operation, maintenance and service (per year)	£23	£45	£75

Table 61 Spend profile by activity and region

	GW	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059
EAST																																									
Low	1											1																													
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
Medium	2											1					1																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
High	3											1					1					1																			
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									

NORTH EAST																																									
Low	1.5											1					0.5																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
Medium	3											1				1				1																					
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
High	4.5											1.5				1.5				1.5																					
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									

NORTH																																									
Low	1											0.5					0.5																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
Medium	2											1					1																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
High	3											1					1					1																			
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									

WEST																																									
Low	0.5											0.5																													
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
Medium	1											1																													
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
High	2											1					1																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									

SOUTH WEST																																									
Low	0.3											0.3																													
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
Medium	0.6											0.3					0.3																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
High	1											0.5					0.5																								
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									

National																																									
Low	3											1					1					1																			
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
Medium	5											1			1			1			1			1																	
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									
High	10											2			2			2			2			2																	
Development and project management																																									
Wind turbine supply																																									
Balance of plant																																									
Installation & commissioning																																									
Operation, maintenance and service																																									

C.5 Step 4: GVA per region

The impacts are based on change in spend, or output, for each activity. Therefore, the GVA effect is used (rather than the GVA multiplier) for GVA impacts. Spend can be converted to GVA per region by using the GVA effect. Both the Type I (direct and indirect effects) and Type II (direct, indirect and induced effects) are applied[57]. The multipliers used are set out in Table 62 with the results for each region and activity for each of the three scenarios in Table 63 for GVA Type I and Type II. The values set out in Table 63 are undiscounted and provide the total GVA across three ten year periods (2020-2029, 2030-2039, 2040-2049 and 2050-2059).

Table 62 GVA effect multipliers used in the analysis (based on Scottish Government, 2018 with data being for 2015)

Activity	GVA effect		
	SIC code	Type I	Type II
Development and project management	71	0.7	0.9
Wind turbine supply	28	0.5	0.6
Balance of plant	41-43	0.7	0.8
Installation and commissioning	41-43	0.7	0.8
Operation, maintenance and service (per year)	33	0.7	0.9

Table 63 GVA impacts based on Type I and Type II GVA effect

Scenario and region	GVA impacts (undiscounted)			
Low, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	£56,020,000	£265,860,000	£262,500,000	£262,500,000
North East	£402,096,600	£402,582,000	£126,000,000	£126,000,000
North	£18,004,600	£138,419,500	£57,750,000	£57,750,000
West	£13,953,000	£29,715,000	£28,875,000	£28,875,000
South West	£9,667,680	£17,400,600	£17,325,000	£17,325,000
National	£36,992,000	£529,780,000	£253,680,000	£252,000,000
Low, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	£67,040,000	£341,820,000	£337,500,000	£337,500,000
North East	£460,124,200	£477,534,000	£162,000,000	£162,000,000
North	£20,870,200	£166,221,500	£74,250,000	£74,250,000
West	£16,286,000	£38,205,000	£37,125,000	£37,125,000

[57] Type II multipliers capture a further round of impacts in the economy. This is the effect attributable to the ensuing change in compensation of employees and other incomes.

Scenario and region	GVA impacts (undiscounted)			
South West	£11,309,160	£22,372,200	£22,275,000	£22,275,000
National	£43,004,000	£634,160,000	£326,160,000	£324,000,000
Medium, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	£62,740,000	£615,720,000	£525,000,000	£525,000,000
North East	£402,126,000	£1,324,980,000	£252,000,000	£252,000,000
North	£36,009,200	£276,839,000	£115,500,000	£115,500,000
West	£27,906,000	£59,430,000	£57,750,000	£57,750,000
South West	£9,677,760	£67,046,700	£34,650,000	£34,650,000
National	£43,887,000	£830,982,500	£532,465,000	£420,000,000
Medium, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	£75,680,000	£767,290,000	£675,000,000	£675,000,000
North East	£460,162,000	£1,543,260,000	£324,000,000	£324,000,000
North	£41,740,400	£332,443,000	£148,500,000	£148,500,000
West	£32,572,000	£76,410,000	£74,250,000	£74,250,000
South West	£11,322,120	£81,612,900	£44,550,000	£44,550,000
National	£50,944,000	£993,340,000	£670,280,000	£540,000,000
High, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	£62,740,000	£844,410,000	£790,860,000	£787,500,000
North East	£603,189,000	£1,987,470,000	£378,000,000	£378,000,000
North	£36,009,200	£467,557,000	£173,502,000	£173,250,000
West	£28,242,000	£223,485,000	£115,500,000	£115,500,000
South West	£16,129,600	£111,744,500	£57,750,000	£57,750,000
National	£87,774,000	£1,661,965,000	£1,064,930,000	£840,000,000
High, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	£75,680,000	£1,036,970,000	£1,016,820,000	£1,012,500,000
North East	£690,243,000	£2,314,890,000	£486,000,000	£486,000,000
North	£41,740,400	£554,159,000	£223,074,000	£222,750,000
West	£33,004,000	£272,895,000	£148,500,000	£148,500,000
South West	£18,870,200	£136,021,500	£74,250,000	£74,250,000
National	£101,888,000	£1,986,680,000	£1,340,560,000	£1,080,000,000

C.6 Step 5: Employment per region

The impacts of increased GVA per region can be expressed in terms of number of Full-Time Equivalent (FTEs) jobs created and supported. The job numbers are estimated by applying the employment effect multiplier to the GVA retained in each region (in £ millions). As with GVA both the Type I (direct and indirect effects) and Type II (direct, indirect and induced effects) are applied. The multipliers used are presented in Table 64.

Table 64 Employment effect Type I and Type II multipliers used in the analysis (based on Scottish Government, 2018 with data being for 2015)

Activity	Employment effect		
	SIC code	Type I	Type II
Development and project management	71	12.2	14.5
Wind turbine supply	28	9.8	11.8
Balance of plant	41-43	12.3	14.4
Installation and commissioning	41-43	12.3	14.4
Operation, maintenance and service (per year)	33	9.2	11.3

The number of FTEs supported and created by the level of spend is estimated by applying the employment effect to the retained spend (in £ millions). The results in terms of number of FTEs are shown in Table 65 as a maximum number of jobs within each of the ten-year periods. The maximum number of jobs is provided, rather than the sum, since many of the activities last more than one year, hence, the same job may be created and then supported over the duration of the activity.

Table 65 Regional employment impacts based on Type I and Type II employment effect

Scenario and region	Employment (maximum number of FTEs)			
Low, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	174	282	242	242
North East	1,255	1,033	116	116
North	64	373	53	53
West	51	37	27	27
South West	38	17	16	16
National	131	864	252	232
Low, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	244	444	381	381

Scenario and region	Employment (maximum number of FTEs)			
North East	1,684	1,417	183	183
North	89	521	84	84
West	71	58	42	42
South West	53	27	25	25
National	180	1,229	397	366
Medium, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	194	1,020	483	483
North East	1,255	2,066	232	232
North	129	745	106	106
West	103	74	53	53
South West	38	180	32	32
National	211	1,357	1,019	386
Medium, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	275	1,468	763	763
North East	1,684	2,834	366	366
North	178	1,042	168	168
West	143	115	84	84
South West	53	256	50	50
National	289	1,911	1,473	610
High, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	194	1,262	765	725
North East	1,882	3,099	348	348
North	129	798	162	159
West	71	568	106	106
South West	63	300	53	53
National	423	2,714	2,037	773

High, Type II	2020-2029	2030-2039	2040-2049	2050-2059
East	275	1,849	1,207	1,144
North East	2,526	4,250	549	549
North	178	1,126	256	252
West	144	808	168	168
South West	89	426	84	84
National	577	3,821	2,946	1,220

C.7 Step 6: Local versus relocated jobs

Ironside Farrar (2018)[58] gives a breakdown of jobs available to local people and those for people relocating. Typically in Tiree, around 25% of jobs are for local people and 75% for those relocating.

Assumptions also need to be made on the proportion of jobs that will be available to local people, versus those moving into the area to take up new jobs. In estimating the net impact on jobs for Scotland, relocation will have to be considered. Ironside Farrar (2018) identifies that 25% of jobs created are typically taken by local people while 75% are taken by those relocating to the area. The total number of local and relocated jobs are shown in Table 66 for both Type I and Type II jobs over three ten year periods As shown in the tables, the largest number of jobs is expected during 2030–2039, which mostly coincides with the construction period. These employment impacts will cease however being transitional in nature (and likely to be filled in by people being relocated to the areas). This is important information for the social impact assessment. In terms of supply chain impacts, some of those relocating may come from other regions in Scotland, rather than outside Scotland.

Table 66 Local and relocated jobs

Scenario and region	Employment (maximum number of FTEs)							
	2020-2029		2030-2039		2040-2049		2050-2059	
Low, Direct	**Local**	**Relocated**	**Local**	**Relocated**	**Local**	**Relocated**	**Local**	**Relocated**
East	35	104	62	185	53	159	53	159
North East	234	703	199	596	25	76	25	76
North	13	38	74	222	12	35	12	35
West	10	31	8	24	6	17	6	17
South West	8	23	4	11	3	10	3	10
National	26	77	174	522	55	166	51	153
Low, Type I	**Local**	**Relocated**	**Local**	**Relocated**	**Local**	**Relocated**	**Local**	**Relocated**
East	43	130	71	212	60	181	60	181
North East	314	941	258	775	29	87	29	87
North	16	48	93	279	13	40	13	40
West	13	39	9	28	7	20	7	20
South West	9	28	4	13	4	12	4	12
National	33	98	216	648	63	189	58	174
Low, Type II	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	61	183	111	333	95	286	95	286
North East	421	1,263	354	1,063	46	137	46	137
North	22	67	130	391	21	63	21	63

[58] Ironside Farrar, 2018. Tiree Onshore Scenario Mapping, Final Report.

Scenario and region	Employment (maximum number of FTEs)							
	2020-2029		2030-2039		2040-2049		2050-2059	
West	18	54	14	43	10	31	10	31
South West	13	40	7	20	6	19	6	19
National	45	135	307	922	99	298	92	275
Medium, Direct	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	39	117	208	624	106	318	106	318
North East	234	703	397	1,191	51	153	51	153
North	25	76	148	445	23	70	23	70
West	20	61	16	48	12	35	12	35
South West	8	23	37	110	7	21	7	21
National	41	122	269	806	208	624	85	254
Medium, Type I	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	49	146	255	765	121	362	121	362
North East	314	941	517	1,550	58	174	58	174
North	32	97	186	559	27	80	27	80
West	26	77	18	55	13	40	13	40
South West	9	28	45	135	8	24	8	24
National	53	159	339	1,018	255	764	97	290
Medium, Type II	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	69	207	367	1,101	191	572	191	572
North East	421	1,263	708	2,125	92	275	92	275
North	44	133	260	781	42	126	42	126
West	36	107	29	86	21	63	21	63
South West	13	40	64	192	13	38	13	38
National	72	216	478	1,433	368	1,105	153	458
High, Direct	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	39	117	261	783	168	503	159	477
North East	352	1,055	596	1,787	76	229	76	229
North	25	76	160	479	36	107	35	105
West	21	62	116	347	23	70	23	70
South West	13	38	61	184	12	35	12	35
National	81	244	538	1,613	416	1,248	170	509
High, Type I	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	49	146	315	946	191	574	181	543
North East	471	1,412	775	2,324	87	261	87	261
North	32	97	200	599	41	122	40	120
West	26	78	142	426	27	80	27	80

Scenario and region	Employment (maximum number of FTEs)							
	2020-2029		2030-2039		2040-2049		2050-2059	
South West	16	47	75	225	13	40	13	40
National	106	317	678	2,035	509	1,528	193	580
High, Type II	**2020-2029**		**2030-2039**		**2040-2049**		**2050-2059**	
East	69	207	462	1,387	302	905	286	858
North East	632	1,895	1,063	3,188	137	412	137	412
North	44	133	281	844	64	192	63	189
West	36	108	202	606	42	126	42	126
South West	22	66	107	320	21	63	21	63
National	144	433	955	2,866	736	2,209	305	915

The potential impacts in terms of displacement draw on unemployment statistics. The statistics used are those for people without a job who have been actively seeking work within the past four weeks and who are available to begin work within two weeks; the assumption being that the jobs will be filled in by this group. This is different from the proportion of the total population that is unemployed[59] but is appropriate for use here as the aim is to identify the extent to which the local job markets may be able to supply the required workforce with an immediate effect. Note this figure does not take account of skill level.

Table 67 identifies the number of unemployed people within each region (based on statistics for 2018 Q4) in Scotland. Where a local authority area is captured in more than one region, it is assumed that the number of unemployed people is equally distributed across all of the relevant regions.

Table 67 Number of unemployed people per region

Local authorities by region		
Region	**Local authorities included within that region**	**Total number of unemployed people**
East	Aberdeen City Aberdeenshire Angus Clackmannanshire Dundee City East Lothian Edinburgh, City of Falkirk Fife Midlothian	42,650

[59] The statistics for unemployment are based on the International Labour Organisation definition and include those of a working age who were (a) without work during the reference period (b) currently available for work during the reference period and (c) seeking work. Future starters (persons who did not look for work but have a future labour market stake) and participants in skills or retraining schemes within employment promotion schemes are also counted as unemployed (based on definition of unemployment rate from: https://www.ilo.org/ilostat-files/Documents/description_UR_EN.pdf, accessed on 7 March 2019.

	Moray (also North East) North Lanarkshire (also West) Perth & Kinross (also West) Scottish Borders (also South West) South Lanarkshire West Lothian	
North East	Highland (also West and North) Orkney Islands (also North) Shetland Islands	6,000
North	Eilean Siar Highland (also West and North East)	8,000
West	Argyll & Bute East Dunbartonshire East Renfrewshire Glasgow City Inverclyde North Ayrshire Renfrewshire Stirling West Dunbartonshire Highland (also North East and North)	38,150
South West	Dumfries & Galloway East Ayrshire (also West) South Ayrshire	19,600
Notes: Number of unemployed people based on unemployment model based estimates from https://statistics.gov.scot		

Table 68 provides the proportion of total unemployed represented by the number of jobs projected to be created under each scenario. Jobs are grouped over three periods over which they may be created.

Table 68 shows that, for most regions, the number of jobs created is a relatively small proportion in terms of total numbers of unemployed people with the exception being the North East. The maximum percentage is in the North East, where the proportion reaches 19% under the high scenario (Type II). For most regions, therefore, it could be expected that displacement will not have a significant effect since there is sufficient capacity within the current levels of unemployment to fill the wind farm jobs or for those choosing to move from another job into wind farm work. There may be issue with the appropriate level of skills being available, although reductions in jobs associated with other skilled areas, such as oil and gas, could help reduce any potential skill shortages.

Table 68 Proportion of unemployed represented by the projected number of jobs created per region (local jobs only)

Scenario and region	Employment (maximum number of FTEs)			
	2020-2029	2030-2039	2040-2049	2050-2059
Low, Type I	**Local**	**Local**	**Local**	**Local**
East	0.1%	0.2%	0.1%	0.1%
North East	5.2%	4.3%	0.5%	0.5%
North	0.2%	1.2%	0.2%	0.2%
West	0.03%	0.02%	0.02%	0.0%
South West	0.05%	0.02%	0.02%	0.02%
National	0.03%	0.2%	0.1%	0.1%
Low, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	0.1%	0.3%	0.2%	0.2%
North East	7.4%	6.2%	0.8%	0.8%
North	0.4%	1.8%	0.3%	0.3%
West	0.1%	0.05%	0.03%	0.0%
South West	0.1%	0.1%	0.03%	0.03%
National	0.04%	0.3%	0.1%	0.1%
Medium, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	0.1%	0.6%	0.3%	0.3%
North East	5.2%	8.6%	1.0%	1.0%
North	0.4%	2.3%	0.3%	0.3%
West	0.1%	0.05%	0.03%	0.0%
South West	0.05%	0.2%	0.04%	0.04%
National	0.05%	0.3%	0.2%	0.1%
Medium, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	0.2%	0.9%	0.4%	0.4%
North East	7.6%	12.3%	1.5%	1.5%
North	0.9%	3.7%	0.5%	0.5%
West	0.1%	0.1%	0.1%	0.1%
South West	0.1%	0.3%	0.1%	0.1%
National	0.1%	0.4%	0.3%	0.1%
High, Type I	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	0.1%	0.7%	0.4%	0.4%
North East	7.8%	12.9%	1.4%	1.4%
North	0.4%	2.5%	0.5%	0.5%
West	0.1%	0.4%	0.1%	0.1%
South West	0.1%	0.4%	0.1%	0.1%
National	0.1%	0.6%	0.4%	0.2%
High, Type II	**2020-2029**	**2030-2039**	**2040-2049**	**2050-2059**
East	0.2%	1.1%	0.7%	0.7%
North East	11.3%	18.5%	2.3%	2.3%
North	0.9%	3.9%	1.0%	0.8%
West	0.2%	0.6%	0.1%	0.1%
South West	0.2%	0.6%	0.1%	0.1%
National	0.1%	0.8%	0.6%	0.3%

D Scoping

D.1 Outcome of Scoping

The outcome of the scoping for the potential for offshore wind development (including associated export cables) to give rise to significant social and economic impacts on other activities, based on the potential interactions that may occur, is provided in Table 69. Interactions that have been scoped in are highlighted in orange, those scoped out are highlighted in dark green, and interactions related to export cable routes that are scoped in but for which a quantitative assessment is not possible at this stage are highlighted in light green.

Where the initial scoping assessment[60] indicated 'no further assessment required' (i.e. scoped out), further detail on the reasoning for this can be found in Marine Scotland (2018)[61].

[60] Marine Scotland, 2018. Sectoral Marine Plan for Offshore Wind Energy (encompassing Deep Water Plan Options), Social and Economic Impact Assessment, Scoping Report. June 2018. Available online at https://www.gov.scot/Resource/0053/00536625.pdf. Accessed 4 October 2018.

[61] Ibid.

Table 69 Detailed outcome of scoping assessment

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Aquaculture	Exclusion from sea areas (i.e. constraints on the development of future aquaculture sites where conditions may be suitable)	Arrays (construction and operation)	Reduction in income for aquaculture producers	**Scoped out - No detailed assessment required.**
		Export cables (construction and operation)	Reduction in income for aquaculture producers	Export cable routes are uncertain. Constraints inshore of DPOs will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Disturbance or injury to finfish aquaculture species (underwater noise)	Arrays (construction)	Reduction in income for aquaculture producers through stress/injury or loss of stock	**Scoped out - No detailed assessment required.**
	Facilitation of the spread of non-native species	Arrays (construction and maintenance)	Reduction in income and employment for aquaculture producers through introduction (via vessel movement/ballast water exchange) or facilitation of the spread of non-native species detrimental to the cultivated species or their habitat	**Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Resuspension of sediments and/or release of contaminants associated with disturbance of sediments	Arrays (construction)	Reduced business profitability and income through reduction in water quality, subsequent deterioration of growing conditions (especially shellfish) and/or contaminant uptake by shellfish species	**Scoped out - No detailed assessment required.**
		Export cables (construction)	Reduced business profitability and income through reduction in water quality, subsequent deterioration of growing conditions (especially shellfish) and/or contaminant uptake by shellfish species	**Scoped out - No detailed assessment required.**
Aviation	Height obstruction of commercial helicopter navigation routes	Arrays (construction and operation)	Additional track miles for helicopters owing to height obstruction in inclement weather, resulting in additional costs	HMRs intersect with DPO areas on the east coast (E2, NE7, NE8, NE6) and east of Shetland (NE1). **Scoped in - Detailed assessment required.**
	Height obstruction of commercial aircraft navigation routes	Arrays (construction and operation)	Loss of trade at airports	**Scoped out - No detailed assessment required.**
	Interference with radar systems	Arrays(operation)	The need to provide radar mitigation for strategic en-route and low level radar interference.	**Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Carbon capture and storage	Competition for space (sterilisation of seabed potential storage areas/obstruction of potential pipeline routes)	Arrays (construction and operation)	Development constrained through increased costs and a deterrent to investment. Reduction in future employment opportunities	Mains and Captain saline aquifers are located in the region of DPO (NE7, NE8, NE4, NE5, NE6). Further consideration is required to determine whether development of the DPO would compromise use of the aquifers. DPO lie inshore of saline aquifers, therefore detailed assessment should consider whether there may be significant impacts on pipeline routes. **Scoped in - Detailed assessment required.**
		Export cables (operation)	Increased costs associated with any required 'crossing' of CCS pipeline/infrastructure with any export cables linking the DPO areas to land	Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Coastal Protection and Flood Defence	Potential for increased erosion, depending on location and design of array	Array (construction and operation)	Damage to property, infrastructure or economically important land	The cumulative impact of offshore wind development, including floating wind arrays, on coastal processes at the coast is a current knowledge gap. Applying broad assumptions and criteria at a Sectoral level is likely to provide inaccurate results. Instead it is recommended that the economic consequences are discussed at project-level. This should be based on the output of wave modelling studies and in consultation with relevant stakeholders as part of the EIA scoping and consultation process. **Scoped out - No detailed assessment required**.
	Overlap between export cable landfall and coast protection and flood defence infrastructure	Export cables (construction)	Damage to property, infrastructure or economically important land due to reduced protection/defence of the coastline from erosion and flooding	**Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Energy generation	Competition for space (offshore) within DPO areas	All arrays	Reduced renewable energy capacity	Three DPO (W1, N3, N4) overlap with existing wave Draft Plan Option (DPO) areas and one DPO (SW2) overlaps with an existing tidal DPO. **Scoped in - Detailed assessment required**.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Competition for transmission capacity	All arrays, export cables	Increased economic, social and environmental costs associated with less optimal landfalls and onshore grid connections	Potential significant interactions may occur where there is competition for export cable corridors from arrays for suitable landing locations that meet all the technical and environmental criteria for connection to a substation with available capacity. A shortage of suitable locations could lead to cables being brought onshore away from preferred landfalls and connection points, thus significantly increasing the scope, costs and consenting risks of the onshore transmission works being developed. However, at this point in the development of the Plan it is generally not possible to identify where landfalls or grid connections might be as it is likely that grid reinforcement and extension will occur to meet future connection requirements. **Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Increased difficulty of access at cable crossing points with existing/planned export cables	Export cables	Increased maintenance costs for cable owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Cable crossings with potential future export cables	Export cables	Increased maintenance costs for cable owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Fisheries (Commercial)	Complete loss or restricted access to traditional fishing grounds	Arrays (construction and operation)	Reduction in landings and income, possible impact on viability of fishing businesses. Could impact on GVA of sector and employment.	Any significant impacts would be expected where DPO areas overlap with commercial fishing grounds. Given the widespread nature of important fishing grounds in Scottish waters (for both demersal and pelagic fishing gears) and the socio-economic importance of the commercial fishing sector in Scotland, it has been assumed that avoidance of significant fishing areas may not be achieved through spatial planning alone and that the impact of this interaction will need to be assessed. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (operation)	Reduction in landings and income, increase in fishing costs (if vessels need to haul and reset gear to avoid cables), possible impact on viability of fishing businesses. Could impact on GVA of sector and employment.	Export cable routes are uncertain. Any significant impacts would be expected where export cable corridors intersect with important commercial fishing grounds for fisheries which use mobile demersal gear. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Changes in fishing patterns, including gears used and species targeted (arising from displacement of fishing vessels as a result of loss of traditional fishing	Arrays (operation)	Change in costs and earnings profile of vessels. May lead to increased conflict over diminishing fishing grounds, and additional environmental impacts if fishing is displaced to different areas.	Any significant impacts would be an indirect effect arising from complete loss of or restricted access to traditional fishing grounds. This impact will be assessed based on the level of impact from complete loss or restricted access to traditional fishing grounds.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	grounds; see above interaction)	Export cables (operation)	Change in costs and earnings profile of vessels. May lead to increased conflict over diminishing fishing grounds, and additional environmental impacts if fishing is displaced to different areas.	Export cable routes are uncertain. Any significant impacts would be an indirect effect arising from displacement of vessels from traditional fishing grounds. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Obstruction of fishing vessel navigation routes	Arrays (construction and operation)	Increased steaming times for vessels, increased fuel cost and reduced time available for fishing for vessels with limited at-sea time (e.g. day boats).	Fishing vessels are not included in the shipping assessment. Visual inspection of the location of DPO overlain on fishing vessels' 'steaming' pings from vessel monitoring system (VMS) data (speed over 6 knots) indicates that potential impacts on navigation routes should be assessed. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (construction)	Increased steaming times for vessels, increased fuel cost and reduced time available for fishing for vessels with limited at-sea time (e.g. day boats).	Export cable routes are uncertain. However, it can be noted that any potential impact will only occur during the construction phase (export cable laying) and hence will be temporary (see loss or restricted access to fishing grounds interaction above for impacts during operation). Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Disruption to/obstruction of fishing activity	Export cables (construction)	Change in costs and earnings profile of vessels.	Export cable routes are uncertain. However, it can be noted that any potential impact will only occur during the construction phase (export cable laying) and hence will be temporary. Cable route implications to be considered to the extent possible where there is clarity on their potential location.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Fouling of fishing gear on cables or seabed infrastructure	Export cables (operation) (assumes no fishing within operational arrays)	Loss of fishing gear, increase in gear costs, loss of fishing time and revenue. Safety issues for fishing vessels.	Export cable routes are uncertain. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Disturbance of commercially-exploited fish and shellfish populations including disruption or damage to habitats, nursery and spawning grounds	Arrays (construction)	Reduction in Catch per Unit Effort (CPUE), landings and income.	**Scoped out - No detailed assessment required.**
		Export cables (construction)	Reduction in Catch per Unit Effort (CPUE), landings and income.	**Scoped out - No detailed assessment required.**
		Array cables and export cables (operation)	Electromagnetic effects on fish and shellfish populations resulting in changes to CPUE, landings and income	**Scoped out - No detailed assessment required.**
	Consequential impacts to seafood processors	Arrays (construction and operation) Export cables (construction and operation)	Loss of profit for fish processors.	Impacts will be a function of the loss of landings supplying the processing sector, and therefore will be a function of the impact 'complete loss or restricted access to traditional fishing grounds', taking into account any displacement effects. **Scoped in - Detailed assessment required at regional level.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Disruption to salmon and sea trout fisheries	Arrays (construction and operation)	Loss of landings.	**Scoped out - No detailed assessment required.**
		Export cables (construction)	Loss of landings.	Export cable routes are uncertain. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
Military activities	Competition for space	Array (construction and operation)	Displacement/exclusion of activity leading to increased costs to sector	DPO overlap with various PEXA, including danger areas (N1, N3, NE2, NE3, NE4, NE5) and exercise areas (W1). **Scoped in - Detailed assessment required.**
		Export cable corridors (construction and operation)		Any potential significant impacts would only be expected where export cable corridors intersected with PEXA or military installations on the coast (i.e. at landfall sites). Export cable routes are uncertain. Constraints inshore of AoS will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Interference with radar systems	Array (operation)	Displacement of activity leading to increased costs	**Scoped out - No detailed assessment required.**
	Interference with underwater communications	Array – construction and operation	Displacement of activity leading to increased costs	Any potential significant impacts would only be expected where the location of DPO areas were located close enough to PEXA to interfere with underwater communications. W1 overlaps with the West of Hebrides naval exercise area. **Scoped in - Detailed assessment required.**
Oil and gas	Competition for marine space - restricted access to seafloor	Arrays (construction and operation)	Increased cost as a result of restrictions on platform construction leading to a decrease in profitability and a lack of investment in sector	DPO areas overlap with, or lie inshore of, areas where oil discovered but awaiting development. **Scoped in - Detailed assessment required.**
	Competition for marine space- restriction on exploration activities	Arrays (construction and operation)	Decrease in new oil and gas discoveries	DPO areas overlap with, or lie inshore of, areas where oil can be expected to be found but has not yet been explored. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Competition for marine space - obstruction of pipeline routes	Array and export cables (construction and operation)	Increased cost associated with new development activities as a result of re-routing pipelines or cable/pipeline crossings leading to a decrease in profitability and/or investment	DPO areas overlap with, or lie inshore of, existing hydrocarbon fields. **Scoped in - Detailed assessment required.**
	Competition for marine space - increased difficulty of access at crossing points	Export cables (construction and operation)	Increased maintenance costs for pipeline owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	**Scoped out - No detailed assessment required.**
Ports and harbours	Obstruction of maintained navigation channel(s) (interference with vessel routes to port)	Arrays (construction and operation)	Increase in route steaming times for vessels, increased fuel cost. Potential loss of customers and revenue; increased costs associated with maintaining alternative routes.	**Scoped out - No detailed assessment required.**
		Export cables (construction only)	Temporary increase in route steaming times for vessels, increased fuel cost. Potential loss of port customers and revenue (short term and/or seasonal trade). Could impact on GVA of sector and employment. Loss of customers and revenue; increased costs associated with maintaining alternative routes.	Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Power interconnectors	Competition for space with potential future interconnectors (DPO areas intersect proposed interconnector routes)	Arrays (operation)	Increased costs associated with new cable laying operations and cable crossings	Any potential significant impacts would only be expected to occur where AoS areas overlap/intersect with future planned or proposed power interconnector routes that are likely to be constructed after agreements to lease have been issued in relation to DPO areas. There is potential for interaction with future interconnectors in the North East and East regions. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (operation)	Increased costs associated with new cable laying operations	Any potential significant impacts would only be expected to occur where export cables intersect with future planned or proposed power interconnector routes that are likely to be constructed after licence applications for array export cable routes have been submitted. Export cable routes are uncertain. Constraints inshore of AoS will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Cable crossings with existing interconnectors	Export cables (construction)	Additional costs to construct cable crossings.	**Scoped out - No detailed assessment required.**
	Increased difficulty of access at cable crossing points with existing/planned interconnectors	Export cables (operation)	Increased maintenance costs for interconnector owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	**Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Recreational boating	Alterations to informal cruising routes	Arrays (construction and operation)	Increased fuel costs for motorised vessels; possible relocation of vessels leading to loss of revenues for supply chain	Any potential significant impacts would only be expected where DPO areas overlap with areas of medium to high intensity recreational boating use, sailing or racing areas. Recreational boating occurs extensively around the coast of Scotland. DPO areas overlap with specific cruising routes in numerous locations, including SW1, W1, N1, N3, N4, NE4, NE5. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Deterrent to investment in marinas/supply chain	Arrays – construction and operation	Reduced investment in marina development, for example, where altered cruising routes affect the use of a marina or where the location of arrays may be perceived as increasing difficulty of access to marinas/anchorages and hence its usage.	Any potential significant impacts are likely to relate to the proximity of the array to existing marinas, and disruption of cruising routes related to the marinas. The DPO areas are located offshore, and are unlikely to have a direct impact on marine investment. The assessment should consider the potential for a direct deterrent to investment from DPO areas and the potential for alterations to informal cruising routes to act as a deterrent to investment. **Scoped in - Detailed assessment required.**
	Increase marine risk	Arrays (radar interference during operation) and export cables (increased vessel traffic during construction only)	Increased collision risk	Any potential significant impacts would only be expected where DPO areas or export cable corridors overlap with areas of medium to high intensity recreational boating use. DPO areas overlap with specific cruising routes in numerous locations, including SW1, W1, N1, N3, N4, NE4, NE5. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Shipping (Commercial)	Obstruction of transiting vessel and/or ferry routes; increased steaming distances and time	Arrays (construction and operation)	Increased costs, effect on regular route (ferry) competitiveness, potential for increased insurance costs.	Any significant impacts would be expected where DPO areas overlap with commercial shipping or ferry routes. The location of the DPOS overlap with numerous significant shipping routes, particularly in SW1, W1, N1, N3, NE4, NE6. Given the critical importance of commercial shipping and ferry routes, avoidance of significant impacts may not be achieved through spatial planning alone and that the impact of this interaction will need to be assessed. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (construction only)	Increased costs	Any significant impacts would be expected where export cable corridors intersect commercial shipping or ferry routes. Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. However, it can be noted that any potential impact will only occur during the construction phase (export cable laying) and hence will be temporary. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Displacement of formal (commercial) anchorage areas	Arrays (construction and operation)	Increased costs through increased steaming distance from the port to the relocated anchorage, plus the associated cost with lifting and laying ship mooring buoys (should these be part of the displaced anchorage).	**Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (construction and operation)	Increased costs through increased steaming distance from the port to the relocated anchorage, plus the associated cost with lifting and laying ship mooring buoys (should these be part of the displaced anchorage).	Any significant impacts would be expected where export cables corridors intersect with formal (commercial) anchorages. Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Increased marine risk	Arrays (construction and operation)	Increased marine risk (e.g. risk of collision between vessels or vessels and infrastructure) relating to radar interference from offshore wind installations, with implications for costs to sector	**Scoped out - No detailed assessment required.**
		Export cables (construction)	Temporary increased marine risk (e.g. risk of collision between vessels) along cable corridors whilst cabling is being laid, with implications for costs to sector	**Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
Telecom cables	Competition for space with potential future telecom cables (AoS areas intersect proposed subsea telecommunication routes)	Arrays (operation)	Increased costs associated with new cable laying operations and cable crossings	Any potential significant impacts would only be expected to occur where DPO overlap/intersect with future planned or proposed telecom cables (including replacement of existing telecom cables) that are likely to be constructed after agreements to lease have been issued in relation to DPO areas. NE4 and NE5 overlap with existing telecom cables. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (operation)	Increased costs associated with new cable laying operations	Any potential significant impacts would only be expected to occur where export cables intersect with future planned or proposed telecom cables routes that are likely to be constructed after licence applications for array export cable routes have been submitted. Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Cable crossings with existing interconnectors	Export cables (construction)	Additional costs to construct cable crossings.	**Scoped out - No detailed assessment required.**
	Increased difficulty of access at cable crossing points with existing/planned telecom cables	Export cables (operation)	Increased maintenance costs for telecom cable owners/operators; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	**Scoped out - No detailed assessment required.**

Tourism	Impacts to landscape or seascape – long term	Arrays (construction and operation)	Reduction in tourism income and investment (through visitors being deterred by the physical presence of an OWF)	There is the potential for significant impacts to landscapes, seascapes and viewpoints where offshore wind turbines are visible to receptors (i.e. people) and hence the potential for subsequent indirect impacts on tourism if this leads to avoidance of the area (i.e. arising from the perception that the recreational or visual amenity of an area is reduced). The significance of any landscape and visual impacts of arrays will be assessed as part of the EIA process and will relate to numerous factors including the location of turbines, their visibility from shore and the sensitivity of the landscape and seascape to change. Any potentially significant impacts would be expected to be minimised through the application of mitigation measures as part of the licensing process (e.g. minimising impacts to sensitive areas of coastline, use of marine spatial planning within DPO areas etc.). Although various studies have indicated that some people may

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
				avoid visiting an area where land-based or offshore arrays are visible, there is a lack of evidence that existing offshore windfarms (in the UK or globally), have had a negative impact on tourism numbers or expenditure through deterring visitors. Hence, it is considered unlikely that there will be any significant impact on tourism arising indirectly from any landscape and visual impacts associated with the offshore arrays. However, as landscape and visual issues are often the most prominent reason for public objection to both land-based (DTI, 2005) and offshore wind farms, detailed assessment should be undertaken. **Scoped in - Detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Impacts to landscape or seascape – temporary	Export cables (construction in the intertidal/inshore area)	Perceived reduction on amenity value, temporary reduction in tourism income	Any potential significant impacts would only be expected in inshore areas/intertidal areas adjacent to where the export cables make landfall. Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. However, it can be noted that any potential impact will only occur during the construction phase (during cable laying) and hence will be temporary. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Disturbance or injury to coastal or marine wildlife	Arrays (construction and operation)	Reduction in income for ecotourism businesses	**Scoped out - No detailed assessment required.**
	Disturbance or damage to heritage assets	Arrays and export cables (construction only)	Reduction in visitor attraction income; reduction in wider tourism income	**Scoped out - No detailed assessment required.**
Waste disposal (dredge material)	Loss or reduced use of dredge material disposal sites	Arrays (construction and operation)	Increased costs of disposal (e.g. through requirement to use alternative disposal site)	AoS areas do not overlap with open disposal sites. **Scoped out - No detailed assessment required.**

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
		Export cables (construction and operation)	Increased costs of disposal	Any potential significant impacts would only be expected where export cable routes overlap with open disposal sites. Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Obstruction of access to dredge material disposal site	Arrays	Increased costs of disposal (through increased vessel steaming times)	**Scoped out - No detailed assessment required.**

Water sports	Displacement due to spatial overlap between array and water sport activity	Array (construction and operation)	Reduction in activity levels leading to loss of revenue for water sport business.	Any potential significant impacts would only be expected where DPO areas overlapped with areas of watersport activity. As AoS areas are located offshore, it is considered unlikely that DPO areas will impact on areas where watersports such as surfing, windsurfing, shore-based angling or kayaking are undertaken at high intensity, which is mainly inshore (although it is acknowledged that experienced kayakers may undertake the activity further offshore e.g. when crossing between a headland and an island). Scuba diving is generally undertaken at discreet diving sites such as wrecks or areas with interesting and rich marine life or seascapes. As such it is considered that any potential interaction with the above watersport activities are unlikely and could be avoided through the use of marine spatial planning. There is the potential for DPO areas to overlap with recreational angling sites (the majority of which occur within 6 NM of the

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
				coast (Radford *et al*, 2009). Several DPO overlap within 6 NM including SW1, W1, N4. . **Scoped in - Detailed assessment required for recreational sea angling activities.**
	Decrease in recreational quality of the environment (e.g. arising indirectly from visual/noise disturbance)	Array (construction and operation),	Reduction in activity levels leading to loss of revenue for water sport business.	**Scoped out - No detailed assessment required.**
		Export cables (construction only, including in area of landfall)	Temporary reduction in activity levels leading to loss of revenue for water sport business.	Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. However, it can be noted that any impact will be temporary. Cable route implications to be considered to the extent possible where there is clarity on their potential location.

Sector	Potential Interaction	Technology Aspect & Phase	Potential Social and economic Consequences	Initial Scoping Assessment
	Displacement due to spatial overlap between cable corridors and water sport activity	Export cables (construction only)	Temporary reduction in activity levels due to displacement during construction leading to loss of revenue for water sport business	Export cable routes are uncertain. Constraints inshore of DPO will be identified in the RLG. However, it can be noted that any impact will be temporary. Cable route implications to be considered to the extent possible where there is clarity on their potential location.
	Impacts to wave quality (surfing)	Array (construction and operation)	Reduction in surfing activity leading to loss of revenue for water sport business	**Scoped out - Detailed assessment not required.**

E Detailed Assessment Methods for each Sector

E.1 Introduction

Detailed methods for assessment of negative economic impacts for each sector, for those interactions that have been scoped in (see Appendix D), are presented in the sections below.

Cable routes are not yet known. A qualitative assessment of the impact of export cables is carried out where feasible, taking into account potential constraints inshore of the DPOs.

E.2 Aviation

The DPO overlap with various Helicopter Main Routes on the east coast, east of Shetland, and with the Aberdeen-Atlantic Rim Helicopter Main Route off the north coast. There is a need for further assessment of:

- Height obstruction to commercial helicopter navigation routes from arrays.

<u>Method for assessment of height obstruction of commercial helicopter navigation routes from arrays (construction and operation)</u>: the potential social and economic impacts will be determined in consultation with helicopter service providers. This will take into account additional track miles for helicopters owing to height obstruction in inclement weather, resulting in additional costs.

Data limitations: Helicopter Main Routes (HMRs) represent the routes typically flown by helicopters operating to and from offshore destinations and are ‘signposts’ to aid flight safety (i.e. signposting concentrations of helicopter traffic to other air space users). Whilst HMRs have no airspace status and assume the background airspace classification within which they lie, they are used by the Air Navigation Service Provider (ANSP) (i.e. NATS Aberdeen) and helicopter operators for flight planning and management purposes. While compliance with the HMR structure is not compulsory, in the interests of flight safety, civil helicopter pilots are strongly encouraged to plan their flights using HMRs wherever possible. The HMRs do not predict the flow of helicopter traffic[62].

E.3 Carbon Capture and Storage

The Mains and Captain saline aquifers overlap with one or more of the DPO. There is a need for further assessment of:

- Competition for space (arrays and cables).

---

[62] ABPmer and RPA, 2013. Developing the socio-economic evidence base for offshore renewable sectoral marine plans in Scottish Waters. Report R.2045, June 2013. Appendix B.

Method for assessment of competition for space (sterilisation of the seabed in relation to potential storage areas, and obstruction of potential pipeline routes): further consideration will be given to the potential socio-economic impacts in consultation with the Carbon Capture & Storage Association (CCSA). For sterilisation of seabed, the development potential of the saline aquifers will be assessed, based on studies such as ACT Acorn (2008)[63], and additional data on the spatial extent of the saline aquifers and planned location of development. In relation to obstruction of potential pipeline routes, the potential for existing pipelines to be used for transport of CO_2, will be assessed, and any potential new pipeline routes will be considered in relation to overlap with DPO areas.

Data limitations: There are no commercial-scale CCS projects in the UK and uncertainty remains regarding the economic viability and the future location and scale of CCS activity in the UK.

E.4 Energy Generation

There are spatial overlaps between the DPOs and wave and tidal draft plan option areas. There is a need for further assessment of:

- Competition for space from arrays.

Method for assessment of competition for space: It is currently unclear whether or when wave technologies might become commercially viable. Wave resources are widely distributed in Scottish waters and the use of some potential wave resource areas for offshore wind development is unlikely to compromise development of a wave energy sector in Scotland. The detailed assessment will take account of the spatial extent of overlap between the offshore wind DPOs and potential wave development areas and consider the potential social and economic impacts in consultation with Scottish Renewables.

Data limitations: Offshore wave energy is not yet a well-established industry and therefore it is difficult to determine the interactions with offshore wind and the degree to which any spatial overlap will affect energy generation. The future of transmission capacity will depend on the location of future energy generation and levels of investment in grid infrastructure.

E.5 Fisheries (Commercial)

There are spatial overlaps between the DPO and existing fishing grounds. Loss of existing fishing grounds can lead to a displacement of fishing activity, with other knock-on consequences, and/or a loss in the value of landings affected should the affected fishing activity cease. This can have further impacts on output and GVA of the sector, and impacts on processors. There is a need for further assessment of:

[63] ACT Acorn, 2018. ACT Acorn Feasibility Study, D05 Site Selection Report, 10196ACTC-Reo-08-01, January 2018.

- Complete loss or restricted access to traditional fishing grounds (arrays and cables);
- Changes in fishing patterns, including gears used and species targeted (arising from displacement of fishing vessels as a result of loss of traditional fishing grounds) (arrays and cables);
- Obstruction of fishing vessel navigation routes (arrays and cables);
- Fouling of fishing gear on cables or seabed infrastructure (cables – operation);
- Consequential impacts to seafood processors.

<u>Method for assessment of complete loss or restricted access to traditional fishing grounds (arrays and cables)</u>: Potential negative impacts on commercial fisheries may occur principally through the loss of (or displacement from) traditional fishing grounds due to the location of arrays. The loss of fishing grounds could lead to a reduction in catches/landings and income for affected vessels. The value of landings affected by the DPOs is assessed for individual fleet sectors (over-12 m and under-12 m and by gear type for gear types that will not be able to operate within the arrays) as follows:

- Average annual value of landings by UK vessels from the DPO area, pro-rated by the proportion of the DPO area that would be occupied by the array under the different development scenarios (based on the 'Realistic maximum development scenario for the DPO' as a proportion of the 'Potential installed capacity' of the DPO, see Table 2). For vessels over 12 m in length, this is assessed using VMS data linked to landings declarations for pelagic, demersal and shellfish species groups (annual average value over 2013-2017). For vessels 12 m and under, Scotmap data (value of all gears layer) is used to calculate the proportion of fishing activity per ICES rectangle that is within each DPO area. These proportions are applied to the value of landings from each ICES rectangle (annual average, 2013-2017, for demersal, pelagic and shellfish species groups). A static baseline is used, assuming the same value of landings in each year of the assessment period.
- The potential impact on non-UK vessels is assessed based on VMS pings (not linked to landings data) to identify the nationalities of vessels that may be affected.

We assume a worst-case scenario that all landings from a DPO area are lost, and displacement of fishing activity to other areas does not occur. In reality, some displacement is likely, which would result in additional landings from other fishing grounds and a lower impact on the commercial fishing sector. However, there would be additional impacts associated with this displacement of activity, including longer steaming times, changes to vessel cost/revenue profiles, changes to catch per unit effort, impacts on habitats and species in the areas to which vessels are displaced to, and potential conflict between gears and different fishing segments in the areas to which fishing is displaced.

Where there is a reduction in landings value, the impact on direct gross value added (GVA) is calculated for UK vessels based on fleet segment-specific GVA as a percentage of fishing turnover from the Seafish fleet economic performance dataset[64] and economic information from the Scientific, Technical and Economic Committee on Fisheries. Direct and indirect GVA and employment impacts are calculated using Type I multipliers from the Scottish Input-Output tables[65].

In relation to the export cables, impacts would be expected where export cable corridors intersect with important commercial fishing grounds for fisheries which use mobile demersal gear. There is uncertainty over the location of cable routes and so they are not assessed currently. Potential cable routes can be considered in future in relation to existing mobile demersal fishing grounds for over-15 m or over-12 m vessels[66], and under-15 m vessels (from Scotmap).

Method for assessment of changes in fishing patterns (arising from displacement) (arrays and cables): Any significant impacts would be an indirect effect arising from complete loss of or restricted access to traditional fishing grounds, and will therefore be a function of the level of impact from complete loss or restricted access to fishing grounds. Given that the assessment assumes that all landings affected are lost and there is no displacement, this is not assessed, but the potential impacts are noted under non-quantified impacts. This includes[67]:

- Change in the costs and earning profile of vessels from additional steaming costs to reach alternative fishing grounds, changes in catch rates and target species;
- Other displacement impacts such as increased conflict between vessels, and different gear types.

Method for assessment of obstruction of fishing vessel navigation routes (arrays; cables): the potential impact of fishing vessels having to deviate around offshore arrays when steaming is assessed based on the estimated potential extra steaming distance and time and average fuel and labour costs for fishing vessels. This is covered in the assessment of impacts to commercial shipping (section E.10).

Method for assessment of fouling of fishing gear on cables or seabed infrastructure (cables – operation): Export cable routes are uncertain and it is therefore not possible to assess this at the present time. Cables are likely to be buried where possible and therefore impacts on commercial fishing should be minimised. An assessment of the potential for fouling of fishing gear should be carried out at project level, considering the seabed type inshore of DPOs (soft sediment in which cables may be buried or hard rock) and potential cable protection measures that might be

[64] http://www.seafish.org/research-economics/industry-economics/seafish-fleet-economic-performance-data.

[65] https://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output.

[66] Depending on whether ping data from 2013-2017 are to be used, or whether a visual inspection of the VMS fishing intensity layers for 2009-2013 available on NMPi is required.

[67] ABPmer, 2017. Displacement of Fishing Effort from Marine Protected Areas, ABPmer Report No. R.2790. Commissioned Reports, Number 241. York. Available online at http://publications.naturalengland.org.uk/file/6490305064337408. Accessed 11 January 2018.

required, and the use of mobile demersal gears, that might snag on cables or seabed infrastructure, and their penetration depths.

Method for assessment of consequential impacts to seafood processors: Any significant impacts on seafood processors would arise from a change in the availability of landings, and therefore is dependent on the outcome of the assessment of the complete loss of or restricted access to traditional fishing grounds. The potential impact on seafood processors is assessed for the combined impact of all DPOs in a region (i.e. not for individual DPOs, and scaled back in accordance with the regional scenarios).

The impact on individual ports is assessed based on the reduction in the value of landings to each Scottish port, in relation to the total value of landings to each port. This enables the analysis to reflect the fact that a reduction in a certain tonnage of landings to a small island port may have a greater impact on any associated processing activities at that port compared to a loss of the same value of landings to a larger port.

Data limitations: The available data under-represents fishing effort by under-12m vessels, which do not have VMS, and under-10 m vessels which do not have to submit logbooks. Under-12m vessels have submitted catch information on the Fish1 forms since 2017, but data are not available for the time period of the assessment (2013-2017). Information is available from Scotmap, however, this data represents information relating to fishing activity for the period 2007 to 2011 (collected by interviewing fishermen with 72% vessel coverage overall), and hence may no longer be representative of current inshore fishing effort. Furthermore, the coverage of Scotmap dataset varies by region. The distribution of landings from Scotmap, within each ICES rectangle, is therefore applied to the value of landings for each ICES rectangle, for the under-12m vessels. A comparison of Fish1 data for under-10m vessels aligns well with the distribution of landings from Scotmap. Additional investigation of plotter data provided by the industry has shown that the main fishing grounds are reflected in the VMS data used for the assessment of impacts on over-12m vessels. It is possible that the data used (2013-2017) do not fully capture existing or previous displacement of fishing activity from current offshore wind installations and those under construction, or management measures in marine protected areas. Comprehensive data on landings by ICES rectangle by non-EU vessels (e.g. Norwegian, Faroese) are not available.

E.6 Military Activities

DPO overlap with military danger areas (SW1, N1, N3, NE6, NE7, NE9, NE9) and exercise areas (W1). There is a need for further assessment of:

- Competition for space (arrays and cables); and
- Interference with underwater communication.

Method for competition for space (arrays and cables): Consultation is undertaken with the wind energy team of Ministry of Defence (MOD) Safeguarding Defence

Infrastructure Organisation[68] to establish whether there are any specific areas of concern, and the magnitude of any such concerns for the military defence sector, in relation to the proposed DPOs and export cables in relation to competition for space. This consultation also sought to establish whether any impacts could be quantitatively assessed.

Method for interference with underwater communications (arrays): Consultation is undertaken with the wind energy team of Ministry of Defence (MOD) Safeguarding Defence Infrastructure Organisation[69] to establish whether there are any specific areas of concern, and the magnitude of any such concerns for the military defence sector, in relation to the proposed DPOs and potential interference with underwater communications. This consultation also sought to establish whether any impacts could be quantitatively assessed.

Data limitations: Identifying defence activities is relatively straightforward from national statistics. However, establishing whether defence activities are connected to marine activities is not possible. Furthermore, owing to the confidential nature of military defence activities it is difficult to assess the extent and frequency of activity and future trends within the marine environment. There are uncertainties concerning the exact location of training activities within designated exercise areas and the frequency of use of those areas given the need for a certain amount of security in the information provided. In some instances, the exact nature of Government spending changes is also uncertain and thus it is difficult to predict the future intensity of military activity within the marine environment.

E.7 Oil and Gas

There are spatial overlaps between existing oil and gas infrastructure and some DPO and also between some areas licensed for oil and gas production and DPO. Some DPO also lie inshore of existing and potential future oil and gas production areas. For spatial overlaps between existing oil and gas infrastructure and DPO it is assumed that:

- Renewables development will not be permitted within a given ‘corridor’ either side of existing infrastructure such as pipelines or platforms to enable existing infrastructure maintenance (or until such infrastructure is decommissioned); and
- The cost of any required cable/pipeline crossings with existing infrastructure will be borne by the renewables developer.

This would avoid any significant additional impacts to oil and gas operators.

There is a need for further assessment of:

---

[68] https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding/wind-farms-mod-safeguarding

[69] https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding/wind-farms-mod-safeguarding

- Competition for space – restricted access to seafloor (arrays);
- Competition for space – restriction on exploration activities (arrays); and
- Competition for space – obstruction of pipeline routes (arrays and export cables).

Method for competition for space – restricted access to seafloor (arrays): There is some minor spatial overlap between areas licensed for oil and gas development and certain AoS. It has been assumed that spatial planning within the DPO will avoid any significant interaction between oil and gas development within licensed blocks and potential offshore wind development. Consultation will be undertaken with Oil and Gas UK to identify any specific interactions of concern between licensed blocks and DPOs. As the areas are already licensed for oil and gas development, it is likely that this activity would be given priority over offshore wind development. This would reduce the area available for offshore wind development within the DPO but not to the extent that it compromised commercial viability.

Method for competition for space – restriction on exploration activities (arrays): There is some overlap between areas awarded under the 29th and 30th oil and gas licensing rounds and certain AoS. While activity under these awards will have completed or lapsed before any offshore wind development activity is initiated in the DPOs, the areas could be of future interest for oil and gas exploration. Offshore wind development in these DPOs could preclude further oil and gas exploration activity in these areas during the lifetime of the wind farm. This would represent a potential opportunity cost to the oil and gas sector, but this is not readily quantified. Only a small proportion of exploration studies lead to test drills and only a small proportion of test drills lead to field development. Such potential constraints are therefore recognised qualitatively in the assessment.

Method for competition for space – obstruction of pipeline routes (arrays and cables): Many of the AoS are located inshore of oil and gas fields. Should further field development occur which required the construction of new pipeline routes to shore, development within the DPOs could constrain these pipeline routes and increase the costs of the route. However, the North Sea oil and gas fields are mature and relatively few new discoveries would be expected in this region. In most cases, new development within existing fields would be likely to tie in to existing pipeline networks. Consultation will be undertaken with Oil and Gas UK to identify any specific issues of concern with the DPOs. Any issues identified will be reflected qualitatively in the assessment.

Data limitations: there is limited information on the potential locations of future oil and gas development and possible new pipeline routes. Information from the 29th and 30th award rounds indicates where current exploration activity is occurring and licensed blocks indicate where future development may possibly occur. Most oil and gas reserves in UK waters have been well studied and the potential for new development is considered to be quite limited, particularly in the North Sea.

E.8 Power Interconnectors

DPO or potential export cable routes overlap with planned future power interconnector routes. There is a need for further assessment of:

- Competition for space with potential future interconnectors (arrays and cables).

Method for competition for space (arrays and cables): For any DPO areas scoped into the assessment, it is assumed that the cost to the sector of having to 'detour' the future interconnector around the DPO is:

$$Length\ of\ deviation\ (km) \times Average\ cost\ cable\ laying\ per\ km\ (£/km)$$

The average cost of cable laying is assumed to be £1.06m per km (2013 prices) (based on Annex H14 of Defra, 2012[70]), which will be uprated to 2020 prices for the assessment. Consultation will be carried out with the relevant owners/promoters of planned interconnectors where required regarding potential routes and timing of development.

Data limitations: There is uncertainty regarding the routes and timing of development of potential future power interconnectors.

E.9 Recreational Boating

There are spatial overlaps between some sailing and cruising routes and certain DPO (SW1, SW2, W1, N1, N3, N5, NE6, NE7, NE9, NE10) Offshore wind development within AoS could affect these routes and act as a deterrent to investment. Development could also affect navigational safety. There is a need for further assessment of:

- Alterations to informal cruising routes (arrays);
- Deterrent to investment in marinas/supply chain (arrays); and
- Increase marine risk (arrays).

Method for alterations to informal cruising routes (arrays): the potential economic cost of recreational boats having to deviate around offshore arrays can be estimated based on the:

- Number of recreational transits across the area (e.g. from the AIS data), extrapolated to calculate annual recreational transits;
- Estimated extra distance for recreational vessel to deviate around an array; and
- Average fuel costs per nautical mile for recreational vessels.

[70] Defra, 2012. Impact Assessment materials in support of the Regional Marine Conservation Zone Projects' Recommendations. Annex H14. Available online at http://publications.naturalengland.org.uk/publication/1940011.

Fuel type used in the assessment assumes red diesel, with an average unit pence per litre (ppl) of 112 ppl. The estimated difference in distance and associated fuel consumptions is costed for propulsion only, with no use for domestic fuel estimation. The mileage per litre for vessels under motor depends on the size and speed of the vessel in question, ranging from about 13-63 litres per hour. For the purposes of this assessment, fuel usage for a 'generic' averaged-sized boat at a consumption rate of 40 litres per hour travelling at a speed of 20 knots is used. In the assessment, all vessels are assumed to be under power (i.e., sailing boats are not assessed whilst 'sailing'). It can be noted that this will likely overestimate of the cost impact on this sector as it assumes that all vessels deviating around an array are in transit under engine whereas some will be under sail.

Method for deterrent to investment in marinas/supply chain (arrays): The presence of arrays in close proximity to important cruising destinations has the potential to deter future investment. Consultation will be undertaken with RYA Scotland to identify any specific locations of concern with potential impacts assessed qualitatively. Where the cost of alterations to cruising routes is substantial, such that the usage of a route might be affected, the potential for marinas/supply chain activities related to that cruising route will be assessed qualitatively.

Method for increased marine risk: Radar interference from offshore wind installations is a known factor with respect to marine safety. This increase in marine risk is assessed qualitatively with comments regarding possible mitigation measures. Mitigation cost would be transferred to the developer and hence no quantitative assessment of this cost is undertaken. RYA Scotland will be consulted to ascertain whether there are any issues of particular concern for specific DPOs.

Data limitations: The recreational boating 'heatmaps' of intensity of use are based on AIS data. However, the proportion of recreational vessels which have AIS is relatively low. Furthermore, AIS data is monitored from terrestrial receiver stations. Reception range is therefore limited to line of sight and dependent on the power of the transmitting vessel (larger vessels with transmitters mounted higher up are more likely to be received than smaller vessels). Therefore, AIS coverage is better defined closer to shore, and AIS underestimates vessel activity outside of the reception range (i.e. further offshore). Additionally AIS reception in Scotland may be poor due to the steep terrain.

E.10 Shipping (Commercial)

The location of the AoS avoid most significant shipping routes, however, some AoS overlap with areas of medium shipping intensity in the West (W1, W3), and East (NE1) regions. There is a need for further assessment of:

- Obstruction of transiting vessel and/or ferry routes; increased steaming distances and time (arrays and cables).

Method for obstruction of transiting vessel and/or ferry routes; increased steaming distances and time (arrays, cables): the cost of displacement of commercial shipping/ferry routes can be assessed based on the number of vessels potentially displaced (based on AIS data), the estimated potential extra steaming distance and time and average fuel and labour costs for commercial vessels. The additional steaming distance is calculated by assuming that vessels will commence their direction change 10 km either side of the array area.

For both the ferry and commercial shipping routes, the fuel consumption rate is assumed to be 2,941 litres per hour at a speed of 20 knots. This is based on an average assumed vessel fuel consumption of 60 metric tonnes (MT) per day, or 2.5 MT per hour, for a large cargo vessel travelling at 20 knots, where 1 tonne (1,000 kilograms) equates to 1176.5 litres based on an average diesel fuel density of 0.820 kg/l. The density of diesel varies according to its grade, within this assessment, an average diesel fuel at 15ºC with a density of 0.820 kg/l is assumed.

For this costing assessment low sulphur fuel is used. The Baltic and North Sea sulphur Emission Control Area (ECA) established under MARPOL Annex VI, regulations 14[1] requires ships to use fuel oil with a sulphur content not in excess of 0.10%. The assessment uses a cost of *circa* $580 M/T[71]. Therefore, the unit pence per litre (ppl) used in this assessment is taken to be 36.62 ppl. In addition, the use of this fuel for propulsion carries with it an additional duty of 10.11 ppl based on HMRC rates from 2019[72]. Using the additional steaming distance and fuel price, the costs associated with the deviation and additional steaming distance is calculated as:

$$Additional\ steaming\ distance\ (in\ nautical\ miles) \\ \times fuel\ costs\ per\ nautical\ mile$$

The calculation uses an assumed average vessel speed to arrive at fuel consumption per vessel movement. To then infer the annual cost, the journey fuel consumption is multiplied by the average vessel transit count within the DPO area in one year, taken from AIS tracks for the first week of each month scaled up to reflect 52 weeks of activity. Prior to scaling, the AIS tracks are filtered, firstly to remove recreational vessels (used for the calculation under recreational boating above) and secondly to remove tracks which are less than 5% of the route length. Tracks which are less than 5% of the route length are assumed to be fragmented tracks, and therefore using these in the calculation may introduce double counting where multiple fragments of a single transit are calculated to each require the full diversion.

Data limitations: AIS A transmission is mandatory for commercial vessels above 300 GT and all passenger ships regardless of size. As a result, some vessel classifications are underrepresented in the AIS data, including: commercial vessels below 300 GT; recreational vessels, fishing vessels and naval vessels on deployment. AIS B is optional and may be carried by smaller vessels including recreational, fishing and smaller commercial craft. AIS data collected by the Maritime and Coastguard Agency is monitored from terrestrial receiver stations. Reception range is therefore limited to line of sight and dependent on the power of the

[71] Prices for Rotterdam bunker, https://shipandbunker.com/prices/emea/nwe/nl-rtm-rotterdam

[72] https://www.gov.uk/guidance/fuel-duty#rates

transmitting vessel (hence, larger vessels with transmitters mounted higher up are more likely to be received than smaller vessels). Therefore, AIS coverage is greater closer to shore, and AIS may underestimate vessel activity outside of the reception range (i.e. further offshore).

A range of variables affect the fuel burned per hour. These include ship type and size, the precise fuel type and grade being used, different engine types, the age and service history of engines, met-ocean effects, the vessel hull hydrodynamic and the wider economic pressures which dictating vessel speed. For example, slow steaming is currently a technique used by Commercial Shipping operators to minimise fuel, as significant cost savings results from sailing at 12 knots instead of 24 knots. This has become a commonly deployed measure for addressing shipping costs in response to recent economic pressures and fluctuating fuel costs.

E.11 Telecom Cables

DPO overlap with existing telecom cables (NE8 and NE9). There is a need for further assessment of:

- Competition for space with potential future telecom cables (arrays and cables).

<u>Method for competition for space (arrays, cables)</u>: Existing telecom cables need to be replaced periodically (approximately every 25 years), and new telecom cables may be required. Further consideration will be given to the potential socio-economic impacts in consultation with the relevant telecom cable owner/promoter, including the replacement of cables in relation to the potential timing of offshore wind development. For any DPO area scoped into the assessment, the cost to the sector of having to ‘detour’ a future telecom cable around a DPO can be assessed as:

$$Length\ of\ deviation\ (km) \times Average\ cost\ cable\ laying\ per\ km\ (£/km)$$

Data limitations: there is little information available on how this sector may change in the future (future telecom cables) and on the timing of replacement of existing cables.

Where existing telecom cables may require replacement, it is assumed that any development within the DPO will be required to leave a cable corridor along the cable route, and that there would be no requirement to divert the cable upon replacement.

E.12 Tourism

There is the potential for significant impacts to landscapes, seascapes and viewpoints where offshore wind turbines are visible to receptors (i.e. people) and hence the potential for subsequent indirect impacts on tourism if this leads to avoidance of the area. As landscape and visual issues are often the most prominent reason for public objection to both land-based[73] and offshore wind farms, there is a need for further assessment of:

- Impacts to landscape or seascape – long term (arrays).

Method for impacts to landscape or seascape – long term (arrays): The methodology below uses regional tourism expenditure values sourced from VisitScotand. These values are adjusted for GDP to provide baseline regional tourism expenditure values for 2020. For the purposes of this assessment, it is assumed that tourism levels will remain constant in real terms over the period assessed (i.e. there will be no growth in tourism volume and value).

The potential impact on tourism expenditure within each region is then calculated based on the following, and applied to the years in the assessment period when arrays would be constructed and operational:

- The total tourism spend (£million) within the most relevant VisitScotland regions(s) are identified for the DPOs scoped into the assessment;
- The Zone of Influence (ZOI; the zone within which landscape and visual impacts arising from the array may result in a reduction in visitor numbers and hence expenditure) is calculated by measuring the land area which fell within the buffer zone around each DPO that is within 15 m of land. The buffer used was 18 km around each DPO.

The proportion of the VisitScotland regional area within the ZOI is calculated as:

$$\frac{Land\ area\ within\ the\ ZOI\ (km^2)}{Total\ land\ area\ within\ the\ VisitScotland\ region\ (km^2)}$$

The value of tourism expenditure within the ZOI is firstly scaled based on the housing density within a parish and subsequently calculated as:

$$Total\ VisitScotland\ regional\ value\ (£millions) \times proportion\ of\ dwellings\ within\ parish \times proportion\ of\ parish\ area\ within\ ZOI$$

From the available evidence base, the reduction in tourism spending due to negative impacts is assumed to be 1.30% (values based on Riddington *et al.*, 2008[74]). As a precautionary approach it is assumed that these reductions are not negated by any positive impacts. The estimated loss of general tourism-related expenditure is then calculated as:

$$Value\ of\ tourism\ expenditure\ within\ the\ ZOI\ \times 0.013$$

Data limitations: there is limited evidence relating to the impact of offshore wind farms on local or regional tourism. The assessment has used information on the

[73] Department of Trade and Industry (DTI), 2005. Guidance on the assessment of the impacts of offshore wind farms: Seascape and visual impact report. Available online: http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/files/file22852.pdf

[74] Riddington, G., Harrison, T., McArthur, D., Gibson, H., Millar, K. 2008. The economic impacts of wind farms on Scottish tourism. A report for the Scottish Government. March 2008.

estimated impact of onshore windfarms on tourism together with evidence-based judgements on the spatial extent of potential impacts from offshore wind farms.

E.13 Water Sports

There is the potential for DPO areas to overlap with recreational angling sites (the majority of which occur within 6 NM of the coast[75]. Several AoS overlap within 6 NM of the coast in the South West, West and North regions (SW1, SW2, W1, N4). Other watersports such as surfing, windsurfing, shore-based angling or kayaking are mainly undertaken inshore, and scuba diving is generally undertaken at discreet diving sites such as wrecks or areas with interesting and rich marine life or seascapes. There is a need for further assessment of:

- Displacement due to spatial overlap between array and recreational angling activity (arrays).

Method for displacement due to spatial overlap between array and recreational angling (arrays): the potential economic cost of the loss of marine space for recreational sea angling can be estimated based on the total reduction in expenditure/loss of income, calculated by multiplying the percentage loss of area (to arrays) within 6 nm, by the estimated value of boat-based sea angling in the relevant region (derived from Radford *et al*., 2009[76]).

Data limitations: In general, data on the distribution and intensity of marine watersport activities is limited. In the Scottish Marine Recreation and Tourism Survey[77], low response rates to the survey for a minority of activities mean that some spatial information is incomplete. Furthermore, the smaller number of responses covering remoter parts of Scotland means that spatial information for areas such as the Western Isles and Shetland is also likely to be partial.

[75] Radford, A., Riddington, G. and Gibson, H., 2009. Economic Impact of Recreational Sea Angling in Scotland. Prepared for the Scottish Government. July 2009. ISBN: 978-0-7559-8130-4.

[76] Radford, A., Riddington, G. and Gibson, H., 2009. Economic Impact of Recreational Sea Angling in Scotland. Prepared for the Scottish Government. July 2009. ISBN: 978-0-7559-8130-4.

[77] Land Use Consultants (LUC), 2016. Scottish marine recreation and tourism survey 2015. Final report prepared by LUC, March 2016.

F DPO Assessment Tables and Figures

Appendix F is provided as a separate download, available at https://www.gov.scot/publications/draft-sectoral-marine-plan-social-econimic-impact-assessment/

Contents

List of Tables

List of Figures

G Detailed Socio-Economic Impact Assessment

G.1 Key sources of positive impacts underlying the social impact assessment

G.1.1 East

Spend on wind farms will result in GVA impacts estimated at £389 million (low scenario, Type I) to £1,386 million (high scenario, Type II) in Present Value terms over the appraisal timeframe. The maximum GVA impacts in any one year are £20 million (low, Type I) to £78 million (high, Type II).

Key ports that could be positively affected by the projected levels of spend are likely to include (based on Maritime Publication Limited, 2019[78]):

- Aberdeen
- Dundee
- Eyemouth
- Grangemouth
- Leith
- Methil
- Montrose
- Peterhead
- Rosyth (including Port Babcock)

Employment impacts are given as full-time equivalents and a maximum over the appraisal timeframe. In the East, the employment impacts are estimated at a total of 282 jobs (low scenario, Type I) to 1,849 jobs (high scenario, Type II). These are divided into direct/indirect (Type I) and direct/indirect/induced jobs (Type II) and local and relocated jobs.

The difference between Type I and Type II jobs gives an indication of the knock-on employment impacts associated with spend from those being directly and indirectly affected. These are estimated at 162 jobs (low scenario) to 587 jobs (high scenario) in the East.

Local direct and indirect jobs (Type I) in the East range from 71 (low scenario) to 315 (high scenario). Relocated jobs (Type I) where people would move into the region to fill the roles range from 212 (low scenario) to 946 (high scenario).

[78] Maritime Publications Scotland Limited (2019): Ports of Scotland Yearbook 2019, 38th edition. Ports identified as seeing positive effects are those for where the Ports Handbook includes details of renewable activities that are currently or could be supported, or similar activities such as support vessels for oils and gas.

G.1.2 North East

Spend on wind farms will result in positive impacts estimated at £645 million (low scenario, Type I) to £2,259 million (high scenario, Type II) in Present Value terms over the appraisal timeframe. The maximum GVA impacts in any one year are £77 million (low, Type I) to £189 million (high, Type II).

Key ports that could see positive impacts from the projected levels of spend are likely to include (based on Maritime Publication Limited, 2019[79]):

- Buckie
- Cromarty Firth
- Fraserburgh
- Inverness
- Kirkwall and Hatston
- Macduff
- Nigg
- Wick

Employment impacts are given as full-time equivalents and a maximum over the appraisal timeframe. In the North East, the employment impacts are estimated at a total of 1,255 jobs (low scenario, Type I) to 4,250 jobs (high scenario, Type II). These are divided into direct/indirect (Type I) and direct/indirect/induced jobs (Type II) and local and relocated jobs.

The difference between Type I and Type II jobs gives an indication of the knock-on employment impacts associated with spend from those being positively affected directly and indirectly. These are estimated at 511 jobs (low scenario) to 1,344 jobs (high scenario) in the North East.

Local direct and indirect jobs (Type I) in the North East range from 314 (low scenario) to 775 (high scenario). Relocated jobs (Type I) where people would move into the region to fill the roles range from 941 (low scenario) to 2,324 (high scenario).

G.1.3 North

Spend on wind farms will result in GVA impacts estimated at £139 million (low scenario, Type I) to £497 million (high scenario, Type II) in Present Value terms over the appraisal timeframe. The maximum GVA impacts in any one year are £21 million (low, Type I) to £50 million (high, Type II).

[79] Maritime Publications Scotland Limited (2019): Ports of Scotland Yearbook 2019, 38th edition. Ports identified as seeing positive effects are those for where the Ports Handbook includes details of renewable activities that are currently or could be supported, or similar activities such as support vessels for oils and gas.

Key ports that could see positive impacts from the projected levels of spend are likely to include (based on Maritime Publication Limited, 2019[80]):

- Kishorn
- Lerwick
- Lyness
- Scrabster
- Stornoway
- Sullom Voe

Employment impacts are given as full-time equivalents and a maximum over the appraisal timeframe. In the North, the employment impacts are estimated at a total of 373 jobs (low scenario, Type I) to 1,126 jobs (high scenario, Type II). These are divided into direct/indirect (Type I) and direct/indirect/induced jobs (Type II) and local and relocated jobs.

The difference between Type I and Type II jobs gives an indication of the knock-on employment impacts associated with spend from those being positively affected directly and indirectly. These are estimated at 212 jobs (low scenario) to 457 jobs (high scenario) in the North.

Local direct and indirect jobs (Type I) in the North range from 93 (low scenario) to 200 (high scenario). Relocated jobs (Type I) where people would move into the region to fill the roles range from 279 (low scenario) to 599 (high scenario).

G.1.4 West

Spend on wind farms will result in GVA impacts estimated at £49 million (low scenario, Type I) to £288 million (high scenario, Type II) in Present Value terms over the appraisal timeframe. The maximum GVA impacts in any one year are £3.4 million (low, Type I) to £40 million (high, Type II).

Key ports that could see positive effects from the projected levels of spend are likely to include (based on Maritime Publication Limited, 2019[81]):

- Ardrishaig
- Ardrossan
- Campbeltown
- Corpach
- Fairlie
- Greenock

[80] Maritime Publications Scotland Limited (2019): Ports of Scotland Yearbook 2019, 38th edition. Ports identified as seeing positive effects are those for where the Ports Handbook includes details of renewable activities that are currently or could be supported, or similar activities such as support vessels for oils and gas.

[81] Maritime Publications Scotland Limited (2019): Ports of Scotland Yearbook 2019, 38th edition. Ports identified as seeing positive effects are those for where the Ports Handbook includes details of renewable activities that are currently or could be supported, or similar activities such as support vessels for oils and gas.

- Hunterston
- Oban (including NLB Base)

Employment impacts are given as full-time equivalents and a maximum over the appraisal timeframe. In the West, the employment impacts are estimated at a total of 51 jobs (low scenario, Type I) to 808 jobs (high scenario, Type II). These are divided into direct/indirect (Type I) and direct/indirect/induced jobs (Type II) and local and relocated jobs.

The difference between Type I and Type II jobs gives an indication of the knock-on employment impacts associated with spend from those being positively affected directly and indirectly. These are estimated at 53 jobs (low scenario) to 342 jobs (high scenario) in the West.

Local direct and indirect jobs (Type I) in the West range from 13 (low scenario) to 142 (high scenario). Relocated jobs (Type I) where people would move into the region to fill the roles range from 39 (low scenario) to 426 (high scenario).

G.1.5 South West

Spend on wind farms will result in GVA impacts estimated at £30 million (low scenario, Type I) to £149 million (high scenario, Type II) in Present Value terms over the appraisal timeframe. The maximum GVA impacts in any one year are £2.6 million (low, Type I) to £21 million (high, Type II).

Key ports that could see positive effects from the projected levels of spend are likely to be (based on Maritime Publication Limited, 2019[82]):

- Ayr

Employment impacts are given as full-time equivalents and a maximum over the appraisal timeframe. In the South West, the employment impacts are estimated at a total of 38 jobs (low scenario, Type I) to 426 jobs (high scenario, Type II). These are divided into direct/indirect (Type I) and direct/indirect/induced jobs (Type II) and local and relocated jobs.

The difference between Type I and Type II jobs gives an indication of the knock-on employment impacts associated with spend from those seeing positive effects directly and indirectly. These are estimated at 25 jobs (low scenario) to 155 jobs (high scenario) in the South West.

Local direct and indirect jobs (Type I) in the South West range from 9 (low scenario) to 75 (high scenario). Relocated jobs (Type I) where people would move into the region to fill the roles range from 28 (low scenario) to 225 (high scenario).

[82] Maritime Publications Scotland Limited (2019): Ports of Scotland Yearbook 2019, 38th edition. Ports identified as being positively affected are those for where the Ports Handbook includes details of renewable activities that are currently or could be supported, or similar activities such as support vessels for oils and gas.

G.2 Key sources of negative impacts underlying the social impact assessment

G.2.1 Negative impacts

Section 3 summarises the negative impacts on activities. Key impacts for the social impact assessment include commercial fisheries, recreational boating, commercial shipping, tourism and water sports. Of these, impacts on commercial fishing are expected to result in impacts that are sufficiently significant to cause a change in output. Specific details of the likely regional effects are described in more detail below. For the other sectors, impacts are expected to be less significant but could cause some changes in costs. These impacts are captured within the social impact assessment with consideration given as to whether these impacts may be more significant at the local scale.

G.2.2 East

Impacts on fishing could result in a loss of income and GVA[83] of around £18,200 per year (low scenario, Type I) to £63,800 per year (high scenario, Type II) in the East. The most impacted ports in the East in terms of reduction in value of landings are expected to be, based on impacts on fishing grounds from all regions that are then landed to ports in the East region[84]:

- Eyemouth (51% of impacts in the East in terms of value of landings)
- Aberdeen (41% of impacts)
- Stonehaven (5% of impacts)

The impacts on employment that result from the reduction in value of landings is estimated at 0.3 FTE (low scenario, Type I) to 1 FTE (high scenario, Type II). The main home ports affected in the East are:

- Eyemouth (59% of impacts in the East on home ports under the low scenario and 54% under the high scenario)
- Pittenweem (35% of impacts (low scenario) to 41% of impacts (high scenario))
- Aberdeen (5% of impacts (low and high scenario))

Total impacts in terms of value of landings per port[85] are used as an indication of the likely significance of any knock-on social impacts resulting from changes in value of landings at home port (e.g. on jobs) or at landing port (e.g. on processing):

[83] Based on change in value landings multiplied by the GVA effect for fishing.

[84] Includes those ports with 5% or greater of the total value of affected landings (not 5% of the total landings to the port).

[85] Based on average of landings from 2013 to 2017. Percentage impacts are based on the high scenario estimate of impacts on landings and relate to the percentage of total landings by vessels registered to the port (home port), or to the percentage of total landings at each port.

- Eyemouth: 0.015% of landings by vessels registered to the home port; 0.02% of landings to the port;
- Aberdeen: 0.003% of landings by vessels registered to the home port; 0.06% of landings to the port
- Stonehaven: no data for landings by vessels registered to the home port; 0.02% of landings to the port
- Pittenweem: 0.0019% of landings by vessels registered to the home port; ~0% of landings to the port

Other negative impacts could be caused by the migration of workers to take up the relocated jobs created by spend on wind farms through effects on housing demand, increased demand on services. With an estimated 212 (low scenario, Type I) to 2,387 (high scenario, Type II) relocated jobs being created (maximum in any one year over the appraisal period), this could result in up to 441 (low) to 4,965 (high) people moving into communities in the East region assuming 2.08 people per household[86] including the person taking up the job. The communities most likely to be impacted are likely to be associated with the ports where the main spend is projected to be retained, i.e.:

- Aberdeen
- Dundee
- Eyemouth
- Grangemouth
- Leith
- Methil
- Montrose
- Peterhead
- Rosyth (including Port Babcock)

G.2.3 North East

Impacts on fishing could result in a loss of income and GVA of around £97,800 per year (low scenario, Type I) to £342,000 per year (high scenario, Type II) in the North East. The most impacted ports in the North East terms of reduction in value of landings are expected to be, based on impacts on fishing grounds from all regions that are then landed to ports in the North East region[87]:

- Peterhead (46% of impacts in the North East in terms of value of landings)
- Fraserburgh (24% of impacts)
- Lerwick (19% of impacts)
- Buckie (6% of impacts)

[86] Based on project household size in 2030 which is the year in which the maximum number of jobs is created in the East. Statistics taken from statistics.gov.scot for household projections of average household size

[87] Includes those ports with 5% or greater of the total value of affected landings (not 5% of the total landings to the port).

- Stonehaven (5% of impacts)

The impacts on employment that result from the reduction in value of landings is estimated at 1.6 FTE (low scenario, Type I) to 5.3 FTEs (high scenario, Type II). The main home ports affected are:

- Fraserburgh (46% of impacts in the North East on home ports)
- Peterhead (20% of impacts)
- Lerwick (19% of impacts)
- Kirkwall (8% of impacts)
- Buckie (7% of impacts)

Total impacts in terms of value of landings per port[88] are used as an indication of the likely significance of any knock-on social impacts resulting from changes in value of landings at home port (e.g. on jobs) or at landing port (e.g. on processing):

- Buckie: 0.27% of landings by vessels registered to the home port; 0.29% of landings to the port
- Fraserburgh: 0.18% of landings by vessels registered to the home port; 0.11% of landings to the port
- Kirkwall: 0.25% of landings by vessels registered to the home port; 0.003% of landings to the port
- Lerwick: 0.10% of landings by vessels registered to the home port; 0.05% of landings to the port
- Peterhead: 0.13% of landings by vessels registered to the home port; 0.05% of landings to the port
- Stonehaven: no data for landings by vessels registered to the home port; 0.02% of landings to the port

Other negative impacts could be caused by the migration of workers to take up the relocated jobs created by spend on wind farms through effects on housing demand, increased demand on services. With an estimated 941 (low scenario, Type I) to 3,188 (high scenario, Type II) relocated jobs being created (maximum in any one year over the appraisal period), this could result in up to 1,938 (low) to 6,567 (high) people moving into communities in the North East region assuming 2.06 people per household[89] including the person taking up the job.

G.2.4 North

Impacts on fishing could result in a loss of income and GVA of around £60,800 per year (low scenario, Type I) to £213,000 per year (high scenario, Type II) in the North. The

[88] Based on average of landings from 2013 to 2017. Percentage impacts are based on the high scenario estimate of impacts on landings and relate to the percentage of total landings by vessels registered to the port (home port), or to the percentage of total landings at each port.

[89] Based on project household size in 2033 which is the year in which the maximum number of jobs is created in the North East. Statistics taken from statistics.gov.scot for household projections of average household size

most impacted ports in the North in terms of reduction in value of landings are expected to be, based on impacts on fishing grounds from all regions that are then landed to ports in the North region[90]:

- Scrabster (47% of impacts in the North in terms of value of landings)
- Kinlochbervie (28% of impacts)
- Ullapool (10% of impacts)
- Stromness (7% of impacts)

The impacts on employment that results from the reduction in value of landings is estimated at 1.0 FTE (low scenario, Type I) to 3.3 FTEs (high scenario, Type II). The main home ports affected are:

- Scrabster (51% of impacts in the North on home ports)
- Ullapool (15% of impacts)
- Stornoway (15% of impacts)
- Kinlochbervie (9% of impacts)

Total impacts in terms of value of landings per port[91] are used as an indication of the likely significance of any knock-on social impacts resulting from changes in value of landings at home port (e.g. on jobs) or at landing port (e.g. on processing):

- Kinlochbervie: 0.22% of landings by vessels registered to the home port; 0.17% of landings to the port
- Scrabster: 0.84% of landings by vessels registered to the home port; 0.12% of landings to the port
- Stornoway: 0.12% of landings by vessels registered to the home port; 0.03% of landings to the port
- Stromness: no data for landings by vessels registered to the home port; 0.19% of landings to the port
- Ullapool: 0.25% of landings by vessels registered to the home port; 0.05% of landings to the port

Other negative impacts could be caused by the migration of workers to take up the relocated jobs created by spend on wind farms through effects on housing demand, increased demand on services. With an estimated 279 (low scenario, Type I) to 844 (high scenario, Type II) relocated jobs being created (maximum in any one year over the appraisal period), this could result in up to 574 (low) to 1,739 (high) people moving into communities in the North region assuming 2.06 people per household[92] including the person taking up the job.

[90] Includes those ports with 5% or greater of the total value of affected landings (not 5% of the total landings to the port).

[91] Based on average of landings from 2013 to 2017. Percentage impacts are based on the high scenario estimate of impacts on landings and relate to the percentage of total landings by vessels registered to the port (home port), or to the percentage of total landings at each port.

[92] Based on project household size in 2033 which is the year in which the maximum number of jobs is created in the North. Statistics taken from statistics.gov.scot for household projections of average household size

G.2.5 West

Impacts on fishing could result in a loss of income and GVA of around £30,500 per year (low scenario, Type I) to £142,000 per year (high scenario, Type II) in the West. The most impacted ports in the West in terms of reduction in value of landings are expected to be (reported for ports that would experience a minimum of 10% of the impacts), based on impacts on fishing grounds from all regions that are then landed to ports in the West region[93]:

- Islay (27% of impacts in the West in terms of value of landings)
- Fionnphort (21% of impacts)
- Port Ellen (19% of impacts)
- Bunessan (5% of impacts)
- Portnhaven (5% of impacts)

The impacts on employment that results from the reduction in value of landings is estimated at 0.5 FTE (low scenario, Type I) to 2.2 FTEs (high scenario, Type II). The main home ports affected are:

- Oban (96% of impacts in the West on home ports)
- Malliag (2% of impacts)
- Portree (2% of impacts)

Total impacts in terms of value of landings per port[94] are used as an indication of the likely significance of any knock-on social impacts resulting from changes in value of landings at home port (e.g. on jobs) or at landing port (e.g. on processing):

- Bunessan: no data for landings by vessels registered to the home port; 0.41% of landings to the port
- Fionnphort: no data for landings by vessels registered to the home port; 0.71% of landings to the port
- Islay: no data for landings by vessels registered to the home port; 0.74% of landings to the port
- Mallaig: 0.02% of landings by vessels registered to the home port; 0.01% of landings to the port
- Oban: 0.39% of landings by vessels registered to the home port; 0.01% of landings to the port
- Port Ellen: no data for landings by vessels registered to the home port; 0.41% of landings to the port
- Portnahaven: no data for landings by vessels registered to the home port; 0.78% of landings to the port

[93] Includes those ports with 5% or greater of the total value of affected landings (not 5% of the total landings to the port).

[94] Based on average of landings from 2013 to 2017. Percentage impacts are based on the high scenario estimate of impacts on landings and relate to the percentage of total landings by vessels registered to the port (home port), or to the percentage of total landings at each port.

- Portree: 0.01% of landings by vessels registered to the home port; ~0% of landings to the port

Other negative impacts could be caused by the migration of workers to take up the relocated jobs created by spend on wind farms through effects on housing demand, increased demand on services. With an estimated 39 (low scenario, Type I) to 606 (high scenario, Type II) relocated jobs being created (maximum in any one year over the appraisal period), this could result in up to 82 (low) to 1,267 (high) people moving into communities in the West region assuming 2.09 people per household[95] including the person taking up the job.

G.2.6 South West

Impacts on fishing could result in a loss of income and GVA of around £11,000 per year (low scenario, Type I) to £43,000 per year (high scenario, Type II) in the South West. The most impacted ports in the South West in terms of reduction in value of landings are expected to be, based on impacts on fishing grounds from all regions that are then landed to ports in the South West region[96]:

- Kirkcudbright (25% of impacts in the South West in terms of value of landings)
- Port William (19% of impacts)
- Drummore (18% of impacts)
- Isle of Whithorn (12%)
- Girvan (9% of impacts)
- Campbeltown (7% of impacts)
- Stranraer (5% of impacts)

The impacts on employment that results from the reduction in value of landings is estimated at 0.2 FTE (low scenario, Type I) to 0.7 FTEs (high scenario, Type II). The main home ports affected are:

- Ayr (63% (low scenario) or 57% impacts (high scenario) in the South West on home ports)
- Campbeltown (37% (low scenario) or 43% impacts (high scenario))

Total impacts in terms of value of landings per port[97] are used as an indication of the likely significance of any knock-on social impacts resulting from changes in value of landings at home port (e.g. on jobs) or at landing port (e.g. on processing):

[95] Based on project household size in 2028 which is the year in which the maximum number of jobs is created in the West. Statistics taken from statistics.gov.scot for household projections of average household size

[96] Includes those ports with 5% or greater of the total value of affected landings (not 5% of the total landings to the port).

[97] Based on average of landings from 2013 to 2017. Percentage impacts are based on the high scenario estimate of impacts on landings and relate to the percentage of total landings by vessels registered to the port (home port), or to the percentage of total landings at each port.

- Ayr: 0.15% of landings by vessels registered to the home port; ~0% of landings to the port
- Campbeltown: 0.28% of landings by vessels registered to the home port; 0.01% of landings to the port
- Drummore: no data for landings by vessels registered to the home port; 0.17% to landings to the port
- Girvan: no data for landings by vessels registered to the home port; 0.05% of landings to the port
- Isle of Whithorn: no data for landings by vessels registered to the home port; 0.10% of landings to the port
- Kirkcudbright: no data for landings by vessels registered to the home port; 0.03% of landings to the port
- Port William: no data for landings by vessels registered to the home port; 0.15% of landings to the port
- Stranraer: no data for landings by vessels registered to the home port; 0.05% of landings to the port

Other negative impacts could be caused by the migration of workers to take up the relocated jobs created by spend on wind farms through effects on housing demand, increased demand on services. With an estimated 28 (low scenario, Type I) to 320 (high scenario, Type II) relocated jobs being created (maximum in any one year over the appraisal period), this could result in up to 59 (low) to 669 (high) people moving into communities in the South West region assuming 2.09 people per household[98] including the person taking up the job.

G.3 Cluster: individual – family, family life, inter-generation issues

Impacts on family, family life and inter-generation issues at the individual levels are linked to extent to which a family can stay connected, can be located near to each other and can obtain support from the family network. Under family, aspects such as children wellbeing and material deprivation are also included (Table 70).

The relevant statistics identified for this category relate mostly to child wellbeing and happiness, child material deprivation, child social and physical development, and positive relationships for children. It is assumed that this is a good indicator of family issues overall as it can be linked to family time and income.

[98] Based on project household size in 2028 which is the year in which the maximum number of jobs is created in the South West. Statistics taken from statistics.gov.scot for household projections of average household size

Table 70 Cluster: individual – family, family life, inter-generation issues

Aspect	Detail
Detailed statistics	14% of children with abnormal score using the Scottish Index of Multiple Deprivation Index (SIMD) as the basis for assessing child wellbeing and happiness (2013-16) 12% of children in combined material deprivation and low income (below 70% of UK median income) in 2014-17 81% of children have positive relationships (2015)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential reduction in proportion of children in material deprivation. More family time for those able to be employed locally helping to improve child wellbeing and happiness
Cause of impacts	Increase in local and relocated jobs potentially increase family income Local jobs reduce need to commute to jobs that are further away increasing family time
Impacts rating and justi-fication	Minor (+ +) Significant potential for increased employment with potential for knock-on impacts for family life from 864 (low, Type I) to 3,821 (high, Type II) jobs and potential reduction in child material deprivation
Distributional effects	Rural and coastal areas likely to see positive effects due to location of wind farm developments
Negative impacts – potential effect on na-tional indicators	Less family time where workers move to new regions to take up jobs over week could affect child wellbeing and happiness Loss of income from loss of fishing jobs (or income from fishing where effects are not sufficient to cause loss of job) and supply chains supporting fishing, plus knock-on effects from reduced spend in other services from reduction in income from fishing all potentially impacting on child material deprivation
Cause of impacts	Relocated jobs may mean some families are split up during the working week if workers move to take up jobs but where family stays in original location, with potential for 648 (low, Type I) to 2,866 (high, Type II) relocated jobs Loss of small number of local jobs or income from fishing, which may result in fishers having to take on other jobs to supplement income with knock-on effects on family time Loss of small number of indirect and induced jobs due to negative impacts on fishing
Impacts rating and justification	Minor (- -) overall Small impacts on communities as a whole
Distributional effects	May be larger impacts on fisher families where there are job losses, although losses of around 2.5 FTEs (low sce-nario, Type I) to 8.3 FTEs (high scenario, Type I) are pro-jected such that impacts should be small

Aspect	Detail
Region	**EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts greater than for national with higher retention or equal rates over all five activities
Distributional effects	Most significant impacts likely to be in larger towns and ports that support wind farm development. Families within these towns and moving to these towns are expected to see the greatest positive effects.
Impacts rating (negative) and justification	Minor (- -) Small impacts on jobs with 0.9 fisher FTEs lost on over-12m vessels under high scenario, Type I
Distributional effects	Fisheries jobs affected most likely to be in Aberdeen and Eyemouth and may affect processing jobs, with impacts on families associated with these industries. However, impacts on total value of landings are low: 0.02% at Eyemouth and 0.06% at Aberdeen
Region	**NORTH EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts may be greater in North East towards end of construction phase due to greater retention of spend in balance of plant and installation and commissioning, with positive impacts for families associated with those jobs, but North East has the largest number of jobs potentially created of any one region (low 1,255 to high 4,250)
Distributional effects	Most significant impacts likely to be associated with ports supporting balance of plant and installation and commissioning activities in particular
Impacts rating (negative) and justification	Minor (- -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 4.7 fisher FTEs (high, Type I) lost across the whole region
Distributional effects	Peterhead and Fraserburgh see most of the impacts in the North East, but these represent just 0.18% of landings to the home port by value (Fraserburgh) and 0.13% for Peterhead. Buckie sees the overall greatest change in value of landings (0.27% where Buckie is the home port and 0.29% where Buckie is the landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. Families in all these ports could be impacted to the extent that concerns are raised in the communities, both in terms of direct impacts on fisher's families and knock-on effects on families of those working at the port, processing or support industries. In total, though a maximum of 4.7 FTEs (high, Type I) are estimated to be lost across the region as

Aspect	Detail
	a whole; there could be impacts on incomes though that may have effects on child material deprivation
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Impacts are generally smaller than at the national level but should still be sufficient to enable expansion of local supply chains
Distributional effects	Key impacts on families in ports where activities are likely to be concentrated, including Kishorn, Lerwick, Lyness, Scrabster, Stornoway and Sullom Voe likely to see most of the positive effects. Families of people taking up jobs in the wind farm industry should see positive impacts
Impacts rating (negative) and justification	Minor (- -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 2.9 fisher FTEs (high, Type I) lost across the whole region
Distributional effects	Scrabster, Kinlochbervie and Ullapool see most of the impacts in the North, but these represent 0.84% of landings to the home port by value (Scrabster), 0.22% for Kinlochbervie and 0.25% for Ullapool. The overall greatest change in value of landings is 0.84% at Scrabster (home port) and 0.19% at Stromness (landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. This could have impacts on families affected by a reduction in income even if the change is not sufficient to result in significant job losses
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts similar to or smaller than at national level in terms of retention rates but still sufficient to enable expansion of supply chains with job impacts that could result in positive impacts on families
Distributional effects	Families in and around ports that provide the facilities needed for wind farm development are likely to see the greatest positive effects. These include Ardrishaig, Ardrossan, Corpach, Fairlie, Greenock, Hunterston, Oban
Impacts rating (negative) and justification	Minor (- -) Impacts may be significant locally but are small overall with up to a maximum of 2.0 fisher FTEs (high, Type I) lost due to impacts on landings
Distributional effects	Oban, Islay, Fionnphort and Port Ellen see most of the impacts in the West. There are no data for most of these West ports for home port landings. The overall greatest change in value of landings is 0.39% at Oban (home port) and 0.78% at Portnhaven (landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply

Aspect	Detail
	chain. Some of these ports are not expected to be greatly impacted by wind farm development so the impacts could be disproportionately greater as fishers would not be able to supplement their income through, e.g. support work using their vessels directly from their home port. This could affect family life by requiring them to travel further and potentially spend more time away from their families.
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts generally smaller in terms of retention rates than national but are still significant to enable growth of supply chains providing income and support to families in the region
Distributional effects	Most significant impacts likely on families in and around those ports with the facilities required or potential to offer wind farm services. These are likely to be based around Ayr and Campbeltown
Impacts rating (negative) and justification	Minor (- -) May be significant impacts on specific families but overall impacts are small with up to a maximum of 0.6 fisher FTEs (high, Type I) lost across the region
Distributional effects	Ayr, Campbeltown, Drummore and Kirkcudbright see most of the impacts in the South West, but these represent a small percentage of total landing value. Maximum impacts on landings ports are seen at Campbeltown (0.28% of landings value) and Drummore (0.17% of landings value). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. Impacts on fisher families in these locations could be greater than suggested by loss of jobs due to loss of income from landings, but some income lost could be supplemented for fishermen out of Ayr and Campbeltown from new activities associated with wind farms to help supplement incomes

G.4 Cluster: individual – jobs, career, employment

Impacts on jobs, career, and employment at the individual level are linked to job opportunities. This includes statistics on economic activities such as entrepreneurial activity, employment rate, gender balance and gender pay gap, and levels of self-employment.

The estimated employment created through supply chain impacts includes an estimate of the number of jobs that would be created and then number of these jobs that would be available to local people, and the number where it is expected that people would migrate to the regions to fill (Table 71).

Table 71 Cluster: Individual – jobs, career, employment

Aspect	Detail
Detailed statistics	6.7% of the adult working age population that is actively trying to start a business or that own/manage a business that is less than 3.5 years old (2017) 6.9% gap between male and female employment rate (2017) 5.7% difference between make and female full-time hourly earnings, expressed as a percentage of male full-time hourly earnings (2017) 322,900 self-employed people in Scotland (2017) 62% of households had at least one adult in paid employment (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Increase in number of households with at least one adult in paid employment, with these being in skilled positions in many cases. Opportunity to increase self-employed people, although many may choose to take jobs within the supply chain which may be in existing businesses
Cause of impacts	Increase in paid employment from increase in jobs Increase in potential for people to develop careers locally in skilled occupations Opportunities for people to take up skilled positions in a range of locations opening up options in terms of where they live Support to supply chain and other services, e.g. shops which could positively affect small businesses
Impacts rating and justification	Moderate (+ + +) Potential for significant additional employment nationally with annual maximum of 864 (low, Type 1) to 3,821 (high, Type II) jobs
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and may positively affect specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe
Negative impacts – potential effect on national indicators	Loss of jobs in fishing industry with increase in unemployment Knock-on impacts in processing industries, income to ports and business for supply chain supporting fishing industry
Cause of impacts	Impact on value of landings resulting in reduced landings and income for fishers, with knock-on reduction in income for ports and support industries. Processing industries will see a reduction in raw materials which may mean they have to import more for other sources, with potential for higher costs or loss of accreditation impacts depending on where alternative materials can be sourced from

Aspect	Detail
Impacts rating and justification	Minor (- -) Losses of around 2.5 FTEs (low scenario, Type I) to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small
Distributional effects	May be larger impacts on fisher families where there are job losses with direct impacts in terms of increased unemployment in the fishing community and support industries
Region	**EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts greater than for national with higher retention or equal rates over all five activities resulting in potentially significant numbers of jobs (282 to 1,849), but likely to result in expansion of existing businesses and services rather than generation of large numbers of new services, especially in the early part of the appraisal timeframe
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Unemployment within these towns likely to be the most significantly reduced, with potential development of renewable energy clusters
Impacts rating (negative) and justification	Minor (- -) Small impacts on jobs with 0.9 FTE lost on over-12m vessels under high scenario, Type I
Distributional effects	Fisheries jobs affected most likely to be in Aberdeen and Eyemouth and may affect processing jobs, although impacts on total value of landings is very small
Region	**NORTH EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts may be greater in North East towards end of construction phase due to greater retention of spend in balance of plant and installation and commissioning, with impacts in terms of 1,255 to 4,250 jobs. Significance of jobs means rating for reduction in unemployment is increased from national
Distributional effects	Most significant impacts likely to be associated with ports supporting balance of plant and installation and commissioning activities in particular
Impacts rating (negative) and justification	Moderate (- - -) Number of jobs lost is small, but larger than in other regions, and than the national overall
Distributional effects	In total, a maximum of 4.7 FTEs (high, Type I) are estimated to be lost across the region as a whole such that unemployment impacts are small in the context of the region but may be greater at the port level. There are small reductions in value of landings (up to 0.29% at Buckie) that are unlikely to result in knock-on local job losses either directly to fisheries or to processing and the supply chain
Region	**NORTH**

Aspect	Detail
Impacts rating (positive) and justification	Minor (+ +) Impacts are generally smaller than at the national level but should still be sufficient to enable expansion of local supply chains
Distributional effects	Key impacts in terms of reduction in unemployment in ports where activities are likely to be concentrated, including Kishorn, Lerwick, Lyness, Scrabster, Stornoway and Sullom Voe likely to see most of the 373 to 1,126 jobs
Impacts rating (negative) and justification	Minor (- -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 2.9 FTEs lost across the whole region
Distributional effects	There are small reductions in value of landings (up to 0.84% at Scrabster) that are unlikely to result in knock-on local job losses either directly to fisheries or to processing and the supply chain. This could have impacts on families affected by a reduction in income even if the change is not sufficient to result in significant job losses.
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts similar to or smaller than at national level in terms of retention rates but still sufficient to enable expansion of supply chains such with up to 51 to 910 jobs
Distributional effects	Families in and around ports that provide the facilities needed for wind farm development are likely to see the largest impacts. These include Ardrishaig, Ardrossan, Corpach, Fairlie, Greenock, Hunterston, Oban
Impacts rating (negative) and justification	Minor (- - -) Impacts may be significant locally but are small overall with up to a maximum of 2.0 FTEs (high, Type I) lost due to impacts on landings
Distributional effects	Oban, Islay, Fionnphort and Port Ellen see most of the impacts in the West. Loss of jobs and, hence, unemployment could be concentrated in these locations, although the impacts on value of landings to any one port are small (maximum is at Portnahaven at 0.78%
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts generally smaller in terms of retention rates than national but are still significant to enable growth of supply chains providing 38 to 426 jobs
Distributional effects	Most significant impacts likely in and around those ports with the facilities required or potential to offer wind farm services. These are likely to be based around Ayr and Campbeltown with most jobs generated in this area
Impacts rating (negative) and justification	Minor (- -)

Aspect	Detail
	May be localised job losses in most affected ports but overall impacts are small with up to a maximum of 0.6 FTEs (high, Type I) lost across the region
Distributional effects	Ayr, Campbeltown, Drummore and Kirkcudbright see most of the impacts in the South West, but these represent a small percentage of total landing value. Maximum impacts on landings ports are seen at Campbeltown (0.28% of landings value) and Drummore (0.17% of landings value). Job losses likely to be concentrated in these activities but those in Ayr and Campbeltown could be replaced by new opportunities associated with wind farm development

G.5 Cluster: individual – money, cost of living

Impact on money and cost of living at the individual level are linked to income and the cost of living, measures of poverty and debt, inequalities in terms of income and wealth (Table 72).

Table 72 Cluster: individual – money, cost of living

Aspect	Detail
Detailed statistics	25% of median net income spent on housing, fuel and food (2014-17) 8% of people in Scotland living in relative poverty after housing costs for three of the last four years (2012-16) 3.3% of households in unmanageable debt (excessive debt repayments/arrears on commitments or high debt levels relative to annual income) 19.4% of workers earning less than the living wage (2018) Income share of the top 10% of the population in Scotland divided by income share of the bottom 40% (Palma ratio) was 124% (2014-17) 61 wealth inequality measured by the Gini coefficient which ranges from 0 (perfect equality) to 100 (maximal inequality) (2014-16) 8% of adults reporting that at some point in the previous 12 months they worried they would run out of food because of a lack of money or other resources (2017) 54% of households earn less than £25,000 per year, while 22% of households earn more than £40,000 per year (2017) 56% of households reported that they were managing well financially with 35% stating that they get by alright (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential reduction in net income spent on housing, fuel and food, and likely relative poverty after housing costs. Additional jobs in skilled positions could help reduce debt and should reduce percentage of workers earning less than

Aspect	Detail
	the living wage (although the skilled occupations may mean those taking up the jobs may already have been earning above the living wage). Should maintain or increase proportion of households that are managing well through increased jobs and employment
Cause of impacts	Increase in skills local and relocated jobs increasing income Reduced poverty and debt from increased income from more skilled jobs Greater income leads to more spend in communities with knock-on impacts in terms of income from those working in supply chain and services Potential to reduce wealth inequality by providing skilled jobs in rural areas
Impacts rating and justification	Minor (+ +) Significant potential for increased income with potential for knock-on impacts from 864 (low, Type 1) to 3,821 (high, Type II) jobs but over country as a whole is unlikely to result in widescale expansion
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and may positively affect specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe, although the similar skills and earnings may then mean that the impacts in terms of income are reduced. Positive impacts in rural areas and around ports that can provide the required facilities could affect coastal communities
Negative impacts – potential effect on national indicators	Combination of negative effects may impact on incomes to fishers at same time as cost of living, e.g. housing costs, are increasing due to more people moving into the area
Cause of impacts	Loss of income to fishers and potential loss of jobs Potential increase in cost of living due to increased demand, e.g. on housing or for services due to relocation of people to fill new jobs resulting from spend on wind farms Positive impacts may be clustered into hubs, and may not spill far outside those hubs, which could increase wealth inequality
Impacts rating and justification	Minor (- -) May be larger impacts on fisher families where there are job losses, although losses of around 2.5 FTEs (low scenario, Type I) to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small
Distributional effects	Fishers may see a reduction in income at the same time as costs of living increases where there are jobs created in ports that result in people moving into the area increasing

Aspect	Detail
	demand on housing. However, fishers may be able to supplement their income from offering services to the wind farm where impacts occur in the same or nearby locations
Region	**EAST**
Impacts rating (positive) and justification	Minor (+ +) Impacts greater than for national with higher retention or equal rates over all five activities but may see movement of people from similar skilled jobs, e.g. from oil and gas industry rather than necessarily significant additional income for local people currently in lower paid jobs
Distributional effects	Most significant positive impacts are likely to be in larger towns and ports that support wind farm development. People taking up jobs in wind farm activities within these towns and moving to these towns are expected to see the greatest impacts in terms of increased income (assuming they would move to a job that is better paid or has other positive effects such as lower cost and/or quality of living, at least initially)
Impacts rating (negative) and justification	Minor (- -) Small impacts on jobs with 0.9 FTE lost on over-12m vessels under high scenario, Type I
Distributional effects	Fisheries jobs affected most likely to be in Aberdeen and Eyemouth and may affect processing jobs, with impacts on income to fishers and those working in sectors associated with fishing. However, impacts on total value of landings are low: 0.02% at Eyemouth and 0.06% at Aberdeen
Region	**NORTH EAST**
Impacts rating (positive) and justification	Minor (+ +) Impacts may be greater in North East towards end of construction phase due to greater retention of spend in balance of plant and installation and commissioning, with impacts in terms of income for those employed in these sectors
Distributional effects	Most significant positive impacts likely to be associated with ports supporting balance of plant and installation and commissioning activities in particular. These activities have a duration of around four years so may be a mobile workforce that moves around the region (or even outside the region) for similar jobs over the appraisal period
Impacts rating (negative) and justification	Moderate (- - -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 4.7 FTEs lost across the whole region
Distributional effects	Peterhead and Fraserburgh see most of the impacts in the North East, but these represent just 0.18% of landings to

Aspect	Detail
	the home port by value (Fraserburgh) and 0.13% for Peterhead. Buckie sees the overall greatest change in value of landings (0.27% where Buckie is the home port and 0.29% where Buckie is the landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. Incomes to fishers and those working in associated industries in all these ports could be impacted to the extent that concerns are raised in the communities, both in terms of direct impacts on fishers and knock-on effects on those working at the port, processing or support industries. In total, though a maximum of 4.7 FTEs are estimated to be lost across the region as a whole so while impacts may be larger locally, they are expected to be concentrated into small areas
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Impacts are generally smaller than at the national level but should still be sufficient to enable expansion of local supply chains such that local incomes could increase
Distributional effects	Key impacts in ports where activities are likely to be concentrated, including Kishorn, Lerwick, Lyness, Scrabster, Stornoway and Sullom Voe likely to see most of the positive effects. People taking up jobs in the wind farm industry should see positive impacts in terms of increased income, although many may move from similar types of jobs in other sectors or other locations
Impacts rating (negative) and justification	Minor (- -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 2.9 FTEs lost across the whole region
Distributional effects	Scrabster, Kinlochbervie and Ullapool see most of the impacts in the North, but these represent 0.84% of landings to the home port by value (Scrabster), 0.22% for Kinclochbervie and 0.25% for Ullapool. The overall greatest change in value of landings is 0.84% at Scrabster (home port) and 0.19% at Stromness (landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. This could have small impacts on fishers and associated industries including processing affected by a reduction in income even if the change is not sufficient to result in significant job losses
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts similar to or smaller than at national level in terms of retention rates but still sufficient to enable expansion of supply chains with positive impacts on jobs that could result in increased incomes

Aspect	Detail
Distributional effects	People living in or moving into the areas in and around ports that provide the facilities needed for wind farm development are likely to most positively affected. These include Ardrishaig, Ardrossan, Corpach, Fairlie, Greenock, Hunterston, Oban
Impacts rating (negative) and justification	Minor (- -) Impacts may be significant locally but are small overall with up to a maximum of 2.0 FTEs lost due to impacts on landings
Distributional effects	Oban, Islay, Fionnphort and Port Ellen see most of the impacts in the West. There are no data for most of these West ports for home port landings. The overall greatest change in value of landings is 0.39% at Oban (home port) and 0.78% at Portnhaven (landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. Some of these ports are not expected to be greatly impacted by wind farm development so the impacts could be disproportionately greater as fishers would not be able to supplement their income through, e.g. support work using their vessels directly from their home port.
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts generally smaller in terms of retention rates than national but are still significant to enable growth of supply chains providing potential to increase income, especially at the local level
Distributional effects	Most significant impacts likely on people taking up jobs in and around those ports with the facilities required or potential to offer wind farm services. These are likely to be based around Ayr and Campbeltown
Impacts rating (negative) and justification	Minor (- -) May be significant impacts on specific families but overall impacts are small with up to a maximum of 0.6 FTEs lost across the region
Distributional effects	Ayr, Campbeltown, Drummore and Kirkcudbright see most of the impacts in the South West, but these represent a small percentage of total landing value. Maximum impacts on landings ports are seen at Campbeltown (0.28% of landings value) and Drummore (0.17% of landings value). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. Impacts on fishers in these locations could be greater than suggested due to loss of income from landings, but some income lost could be supplemented for fishermen out of Ayr and Campbeltown from new activities associated with wind farms to help supplement incomes

G.6 Cluster: community – local jobs, local industry, community sustainability

Impacts on local jobs, local industry and community sustainability at the community level are linked to economic growth, participation, including how changes in participation in recreational activities may affect local industry and community sustainability, innovation, exports and productivity (Table 73).

Table 73 Cluster: community – local jobs, local industry, community sustainability

Aspect	Detail
Detailed statistics	The annual GDP gap of Scotland with the UK was 0.014% (2017) -1.31% Scotland's position on labour market participation as a gap between the best performing of the other three countries in the UK as a percentage (2018) 1.2% of businesses that were high growth enterprises as a share of all registered enterprises 45% of businesses that were innovation active (2017) Value of Scottish exports to the rest of the world (not including the rest of the UK) was £32,400 million (2017) Scotland was ranked 16th for productivity against key trading partners in the OECD (2017) Number of private sector enterprises registered for VAT and/or PAYE) 391 per 10,000 adults (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Increase in proportion of high growth and innovative businesses. Investment should help secure future of PAYE registered businesses in relevant sectors Exports may increase over time as Scottish businesses develop and innovate, with potential to increase export of knowledge and services
Cause of impacts	Positive impacts from spend in renewable energy, high growth and clean growth businesses Opportunities to diversify into new business areas could help innovative businesses to grow and develop
Impacts rating and justification	Moderate (+ + +) Significant potential for business growth from spend with Present Value GVA impacts over the appraisal timeframe of £515 million (low, Type I) to £2,137 (high, Type II)
Distributional effects	Positive effects may be clustered into hubs, and may not spill far outside those hubs, such that the impacts may be concentrated in localised communities. This could assist high growth and innovative businesses who will be able to build networks and share ideas better in hubs
Negative impacts – potential effect on national indicators	Impacts localised to fishing industry and likely to be small. Fishing communities may be affected in terms of reduction in income with local sustainability and fishing traditions potentially affected. Sustainability of some ports may also be affected by impacts on commercial shipping, while marinas may be affected by displacement of recreational boating and angling
Cause of impacts	Loss of local fishing jobs and income with knock-on impacts on traditional jobs and skills, supply chain, etc. May be some small effects at the local scale due to increases in

Aspect	Detail
	costs associated with commercial shipping that could affect local ports
Impacts rating and justification	Minor (- -) May be larger impacts on fisher families where there are job losses, although losses of around 2.5 FTEs (low scenario, Type I) to 8.3 FTEs (high scenario, Type I) are projected such that impacts should be small. Loss of income may be more significant in terms of ability for fishing business owners to invest in their businesses. Impacts on ports and marinas should be small
Distributional effects	Impacts on fishing could affect specific elements of the community so be concentrated on family groups or locations within a town/village. Some ports may see larger impacts due to displacement of recreational boating that may reduce earnings of marinas. Similarly, some ports may be affected by changes to shipping routes that could affect trade in and out of the port, or displacement of sea angling boats
Region	**EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts greater than for national with higher retention or equal rates over all five activities, this could positively affect hubs of businesses over the whole supply chain and appraisal timeframe
Distributional effects	Most significant positive impacts are likely to be in larger towns and ports that support wind farm development. Businesses within these towns are likely to see the greatest effects.
Impacts rating (negative) and justification	Minor (- -) Small impacts on jobs with 0.9 FTE lost on over-12m vessels under high scenario, Type I. Impacts on recreational boating and commercial shipping very small with no expected impacts on tourism or water sports
Distributional effects	Fisheries jobs affected most likely to be in Aberdeen and Eyemouth and may affect processing jobs, with impacts on fishing businesses associated with these industries
Region	**NORTH EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts may be greater in North East towards end of construction phase due to greater retention of spend in balance of plant and installation and commissioning, with positive impacts for businesses associated with those jobs. Timing of effects may be slightly delayed compared with other regions, although greater potential of region for balance of plant and installation and commissioning could enable it to become a hub, exporting ideas and services to other regions and internationally

Aspect	Detail
Distributional effects	Most significant positive impacts are likely to be associated with ports supporting balance of plant and installation and commissioning activities in particular. Hubs of companies providing these services could lead to greater effects for these sectors
Impacts rating (negative) and justification	Minor (- -) Small impacts on fisher jobs with up to 4.7 FTE lost under the high scenario, Type I. Impacts on recreational boating, tourism and water sports are very small. Impacts on commercial shipping could be significant due to overlapping shipping routes around Scotland that could affect trade into and out of specific ports within the region, with the potential for knock-on effects on local industry and sustainability
Distributional effects	Peterhead and Fraserburgh see most of the impacts in the North East, but these represent just 0.18% of landings to the home port by value (Fraserburgh) and 0.13% for Peterhead. Buckie sees the overall greatest change in value of landings (0.27% where Buckie is the home port and 0.29% where Buckie is the landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. Fishers in all these ports could be impacted to the extent that concerns are raised in the communities, both in terms of direct impacts on fishing businesses and knock-on effects on port, processing or support industries. In total, though a maximum of 4.7 FTEs are estimated to be lost across the region as a whole; there could be impacts on incomes though that may have effects on ability of business owners to invest in their businesses such that the future viability and sustainability of the sectors could be affected
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Impacts are generally smaller than at the national level but should still be sufficient to enable expansion of local supply chains by encouraging investment in local businesses
Distributional effects	Key positive impacts on businesses in ports where activities are likely to be concentrated, including Kishorn, Lerwick, Lyness, Scrabster, Stornoway and Sullom Voe likely to see most of the effects. Hubs may develop in these locations that could attract additional investment, especially where businesses are innovative
Impacts rating (negative) and justification	Minor (- -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 2.9 FTEs (high, Type I) lost across the whole region. Spatial planning should reduce impacts on ports from increased costs on commercial shipping

Aspect	Detail
Distributional effects	Scrabster, Kinlochbervie and Ullapool see most of the impacts in the North, but these represent 0.84% of landings to the home port by value (Scrabster), 0.22% for Kinclochbervie and 0.25% for Ullapool. The overall greatest change in value of landings is 0.84% at Scrabster (home port) and 0.19% at Stromness (landing port). This could have impacts on fishing business owners affected by a reduction in income as they may not be able to afford to invest in their business, which could affect long-term viability Tourism and recreational angling impacts could be significant in the Outer Hebrides with impacts potentially on ports such as Miavaig Boat trips out of Miavaig are also important for recreational fishing and wildlife watching with impacts on fuel costs or access to sites potentially impacting on these industries
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts similar to or smaller than at national level in terms of retention rates but still sufficient to enable expansion of supply chains encouraged to invest in growing businesses and diversification
Distributional effects	Businesses in and around ports that provide the facilities needed for wind farm development are likely to see the greatest positive effects. These include Ardrishaig, Ardrossan, Corpach, Fairlie, Greenock, Hunterston, Oban
Impacts rating (negative) and justification	Minor (- -) Impacts may be significant locally but are small overall with up to a maximum of 2.0 FTEs (high, Type I) lost due to impacts on fish landings. Possible impacts on recreational boating, tourism and recreational sea angling could also cause some knock-on effect on local industries and community sustainability
Distributional effects	Oban, Islay, Fionnphort and Port Ellen see most of the impacts in the West. There are no data for most of these West ports for home port landings. The overall greatest change in value of landings is 0.39% at Oban (home port) and 0.78% at Portnhaven (landing port). Other than Oban, these ports are not expected to be greatly impacted by wind farm development so the impacts could be disproportionately greater as fishers would not be able to supplement their income through, e.g. support work using their vessels directly from their home port. This could affect the extent to which fishing business owners are able to invest with potential impacts on future viability Impacts on recreational boating and marinas may be greatest in Oban, which may also incur impacts due to effects on access for cruise ships and the positive effects these

Aspect	Detail
	can bring to the local community (although spatial planning should reduce the potential impacts)
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts generally smaller in terms of retention rates than national but are still significant to enable growth of supply chains providing encouragement for investment in businesses to help improve future sustainability
Distributional effects	Most significant impacts likely on businesses in and around those ports with the facilities required or potential to offer wind farm services. These are likely to be based around Ayr and Campbeltown
Impacts rating (negative) and justification	Minor (- -) May be significant impacts on specific fishing businesses but overall impacts are small with up to a maximum of 0.6 FTEs (high, Type I) lost across the region. Possible impacts on recreational boating, recreational sea angling and water sports could also cause some knock-on effect on local industries and community sustainability
Distributional effects	Ayr, Campbeltown, Drummore and Kirkcudbright see most of the impacts in the South West, but these represent a small percentage of total landing value. Maximum impacts on landings ports are seen at Campbeltown (0.28% of landings value) and Drummore (0.17% of landings value). Impacts on fishing businesses in these locations could be greater than suggested by loss of jobs due to loss of income from landings, but some income lost could be supplemented for fishermen out of Ayr and Campbeltown from new activities associated with wind farms to help supplement incomes and encourage investment. Investment may be more in activities related to wind farms and less related to fishing with potential loss of traditional community activities and possibility of knock-on impacts on the fishing supply chain Impacts on recreational boating, sea angling and tourism are likely to most affect the coast of Dumfries and Galloway, with impacts on local industries and community sustainability potentially greatest in ports such as Kirkcudbright, Garlieston and Port William

G.7 Cluster: community – transport connections, technology connections

Impacts on transport connections and technology connections are linked to any impacts on transport connections (e.g. shipping). These include statistics on active travel, travel methods, satisfaction with public transport and access to superfast broadband (Table 74).

Table 74 Cluster: community – transport connections, technology connections

Aspect	Detail
Detailed statistics	30.1% of adults usually travelling to work by public or active transport (2017) 87% of residential and non-residential addresses where superfast broad band is available (2017) 69% of respondents (to the Scottish Household Survey) who are fairly or very satisfied with the quality of public transport
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential increase in quality or frequency of public transport (although increased incomes may discourage use of public transport) Potential increase in proportion of population with access to superfast broadband
Cause of impacts	Investment in, e.g. ports could have positive effects in terms of boat transport (ferries, also potential for cruise ships and recreation) More demand for transport services (e.g. from larger population) could help support better quality or more frequent public transport services Demand for high-speed broadband from high growth businesses may help drive roll-out for households as knock-on effects; growth of communities due to relocation to fill jobs may also help improve the case for roll-out of high speed broadband to more rural areas
Impacts rating and justification	Minor (+ +) Significant potential for increased public transport and broadband due to increased population from those moving into the country to take up jobs (some may move within Scotland so there may be more of a rearrangement of the population rather than a significant increase)
Distributional effects	Impacts likely to be greater where there is a concentration of jobs since this will attract more people to move into the area and drive demand for transport and broadband services
Negative impacts – potential effect on national indicators	Greater demand on transport services through increased traffic (directly associated with developments or indirectly due to more people moving to areas) could lead to greater congestion. Possible impacts on ferries, and hence quality of ferry services due to impacts on commercial shipping

Aspect	Detail
Cause of impacts	Increased population to take up job opportunities and/or increased number of people commuting for jobs where they do not permanently move for work. Increased commercial shipping costs caused by increased fuel costs to divert around developments
Impacts rating and justification	Minor (- -) Impacts likely to be noticed by local community and could be significant enough to cause complaints, but there is time for the level of spend within local areas to help encourage investment locally and reduce the risk of impacts. Impacts on commercial shipping can be minimised through spatial planning to create safe shipping lanes
Distributional effects	Impacts may be greater in terms of congestion where there are jobs in areas where the transport infrastructure is under-developed, but there is time for improvements to infrastructure before the maximum number of jobs are created
Region	**EAST**
Impacts rating (positive) and justification	Minor (+ +) Impacts greater than for national with higher retention or equal rates over all five activities, with number of people potentially moving into the region of up to 441 (low) to 4,965 (high). Population likely to be spread over ports that could see positive effects such that impacts in any one community may be reduced but may still be sufficient to support investment in transport and broadband
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. People living within these towns are more likely to see positive effects from any investment in transport and broadband
Impacts rating (negative) and justification	Minor (- -) Population increases of 441 (low) to 4,965 (high) may have impacts on local transport services resulting in congestion, which could cause complaints but there is time for the level of spend before the maximum number of jobs are created (2030). Impacts on commercial shipping expected to be small and can be mitigated through spatial planning
Distributional effects	Impacts likely to be greatest in areas where there are already congestion issues, and where these are expected to increase over time
Region	**NORTH EAST**
Impacts rating (positive) and justification	Minor (+ +) Number of people potentially moving into the region of up to 1,938 (low) to 6,657 (high). Population likely to be spread over ports that could be positively affected such that impacts in any one community may be reduced but

Aspect	Detail
	may still be sufficient to support investment in transport and broadband
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. People living within these towns are more likely to see effects from any investment in transport and broadband
Impacts rating (negative) and justification	Moderate (- - -) Population increases of 1,938 (low) to 6,567 (high) may have impacts on local transport services resulting in congestion, which could cause complaints but there is time for the level of spend before the maximum number of jobs are created (2033). Possible impacts on commercial shipping moving through the North Sea
Distributional effects	Impacts likely to be greatest in areas where there are already congestion issues, and where these are expected to increase over time
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Number of people potentially moving into the region of up to 574 (low) to 1,739 (high). Population likely to be spread over ports that could be positively affected such that impacts in any one community may be reduced but may still be sufficient to support investment in transport and broadband
Distributional effects	Most significant positive impacts are likely to be in larger towns and ports that support wind farm development. People living within these towns are more likely to see positive effects from any investment in transport and broadband. Impacts may also occur on specific ferry routes, e.g. Aberdeen to Lerwick ferry
Impacts rating (negative) and justification	Minor (- -) Population increases of 574 (low) to 1,938 (high) may have impacts on local transport services resulting in congestion, which could cause complaints but there is time for the level of spend before the maximum number of jobs are created (2033). Impacts on ferry services likely to be small due to services and routes not being directly affected
Distributional effects	Impacts likely to be greatest in areas where there are already congestion issues, and where these are expected to increase over time. No significant impacts expected on quality or duration of ferry services
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Number of people potentially moving into the region of up to 82 (low) to 1,267 (high). Population likely to be spread over ports that could positively affected such that impacts in any one community may be reduced but may still be sufficient to support investment in transport and broadband

Aspect	Detail
Distributional effects	Most significant positive impacts are likely to be in larger towns and ports that support wind farm development. People living within these towns are more likely to see positive effects from any investment in transport and broadband
Impacts rating (negative) and justification	Minor (- -) Population increases of 82 (low) to 1,267 (high) may have impacts on local transport services resulting in congestion, which could cause complaints but there is time for the level of spend before the maximum number of jobs are created (2028). Impacts on ferry services likely to be small due to services and routes not being directly affected
Distributional effects	Impacts likely to be greatest in areas where there are already congestion issues, and where these are expected to increase over time. No significant impacts expected on quality or duration of ferry services
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Number of people potentially moving into the region of up to 59 (low) to 669 (high). Population likely to be spread over ports that could be positively affected such that impacts in any one community may be reduced but may still be sufficient to support investment in transport and broadband
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. People living within these towns are more likely to see positive effects from any investment in transport and broadband
Impacts rating (negative) and justification	Minor (- -) Population increases of 59 (low) to 669 (high) may have impacts on local transport services resulting in congestion, which could cause complaints but there is time for the level of spend before the maximum number of jobs are created (2028). Impacts on ferry services likely to be small due to location of services and routes
Distributional effects	Impacts likely to be greatest in areas where there are already congestion issues, and where these are expected to increase over time. No significant impacts expected on quality or duration of ferry services

G.8 Cluster: community – education

Impacts on education at the community level are linked to skill levels and training. This includes statistics on skill profile, skill shortages, skill under-utilisation, workplace learning and young people's participation in education, employment of training.

The type of employment related to specific activities associated with wind farm development is related to the types of skills and level of skills required. Studies such as

Energy & Utility Skills (2018)[99] provide an overview of the type of skills required (Table 75).

Table 75 Cluster: community – education

Aspect	Detail
Detailed statistics	10.8% of the population with low or no qualifications at SCQF level 4 or below (2017) 91.1% of Early Learning and Childcare achieving good or better across four quality themes (2017) 6% of employers with skill shortage vacancies (2017) 35% of graduates aged 16-64 years in employment in low and medium-skilled occupations (2017) Gross Expenditure on research and development as a percentage of GDP was 1.54% (2016) 23.2% of employees received on-the-job training in the last three months (2017) 91.8% of young adults (16-19 year olds) participating in education, training or employment 31% of the population had a degree or professional qualification, 12% an HNC/HND or equivalent, 18% higher/ A level or equivalent, 19% O grade/standard grade or equivalent and 16% no qualifications (2017) 70% of respondents (to the Scottish Household Survey) who are fairly or very satisfied with the quality of local schools
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential increase in on-the-job training through additional skilled positions. Opportunities for graduates to take up skills positions reducing percentage in low and medium-skilled occupations Potential increase in research and development from businesses investing innovation
Cause of impacts	30+ year spend profiles can help drive local careers for local people, with opportunities to develop and use skills in a growing field Relocation of workers and their families could help support demand for services and could help secure the future of rural schools
Impacts rating and justification	Minor (+ +) Significant potential for increased employment in skilled positions through creation of up to 864 (low, Type 1) to 3,821 (high, Type II) jobs. Relocation of families could result in

[99] Energy & Utility Skills (2018): Skills and labour requirements of the UK offshore wind industry 2018 to 2032, October 2018, available at: https://aurawindenergy.com/uploads/publications/Aura-EU-Skills-UK-Offshore-Wind-Skills-Study-Full-Report-October-2018.pdf on 19 February 2019.

Aspect	Detail
	more than 1,762 (low, Type I) to 7,795 (high, Type II) people increasing demand for schools for those families with children that relocate
Distributional effects	Impacts likely to be greater where there is a concentration of job, this could result in hubs providing high skilled jobs in concentrated locations. These are likely to be around the ports that can offer the facilities needed by wind farm developments
Negative impacts – potential effect on national indicators	Potential reduction in proportion of the population that are fairly or very satisfied with the quality of local schools
Cause of impacts	More families relocating could increase demand on schools, resulting in greater class sizes and perceived reduction in quality of education that is being offered
Impacts rating and justification	Minor (- -) Any impacts are likely to be small given the number of people likely to relocate, proportion that may have children and the extent to which these families congregate in the same areas
Distributional effects	May be larger impacts in areas where jobs are concentrated since this may be where most people relocate to, but could be wider impacts where families relocate to surrounding towns and villages
Region	**EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Impacts greater than for national with higher retention or equal rates over all five activities with potential for greater opportunities in terms of skilled employment across all five activities
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Here the workforce should become increasingly skilled, especially if hubs of high growth businesses begin to concentrate in the region
Impacts rating (negative) and justification	Minor (- -) Families relocating could affect demand for school places and increase class sizes. The maximum number of people projected to move into the region is 441 (low) to 4,965 (high).
Distributional effects	The most affected areas may be schools in locations where jobs are concentrated, although there may be wider impacts on surrounding towns and villages if people relocate more widely
Region	**NORTH EAST**
Impacts rating (positive) and justification	Moderate (+ +) Impacts greater than for national for work on balance of plant and installation and commissioning. These activities last for around four years (for each package) so may be

Aspect	Detail
	more likely to result in temporary positive impacts on skills with people then moving out to another region to offer the same skills when they are needed elsewhere
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Here the workforce should become increasingly skilled. It may be less likely that hubs will develop under the low scenario, but could be greater impacts under the high scenario where repeated spending may help to encourage hubs of high growth businesses to set up with longer term positive effects for skills
Impacts rating (negative) and justification	Moderate (- - -) Families relocating could affect demand for school places and increase class sizes. The maximum number of people projected to move into the region is 1,938 (low) to 6,567 (high). This is a potentially significant increase in demand on services such as schools that could result in concerns being raised by local communities while the relatively short-term nature of work with the key activities could mean there is less opportunity for sustained demand that could enable expansion of schools
Distributional effects	The most affected areas may be schools in locations where jobs are concentrated, although there may be wider impacts on surrounding towns and villages if people relocate more widely
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Impacts equal to or lower than for national in terms of retention rates of spend. As such, education and skills could increase through provision of skilled employment
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Here the workforce should become increasingly skilled, although some employees may move from similar skilled positions, e.g. from oil and gas industry
Impacts rating (negative) and justification	Minor (- -) Families relocating could affect demand for school places and increase class sizes. The maximum number of people projected to move into the region is 574 (low) to 1,739 (high). This could be a significant increase in demand on services such as schools but across the region as a whole and across all the ports that could potentially be positively affected may not be sufficient to raise concerns within communities
Distributional effects	The most affected areas may be schools in locations where jobs are concentrated, although there may be wider impacts on surrounding towns and villages if people relocate more widely

Aspect	Detail
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts equal to or lower than for national in terms of retention rates of spend. As such, education and skills could increase through provision of skilled employment
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Here the workforce should become increasingly skilled, although some employees may move from similar skilled positions, e.g. from oil and gas industry
Impacts rating (negative) and justification	Minor (- -) Families relocating could affect demand for school places and increase class sizes. The maximum number of people projected to move into the region is 82 (low) to 606 (high). This could result in an increase in demand on services such as schools but across the region as a whole and across all the ports that could potentially be positively affected may not be sufficient to raise concerns within communities
Distributional effects	The most affected areas may be schools in locations where jobs are concentrated, although there may be wider impacts on surrounding towns and villages if people relocate more widely
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts equal to or lower than for national in terms of retention rates of spend. As such, education and skills could increase through provision of skilled employment
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Here the workforce should become increasingly skilled, although some employees may move from similar skilled positions, e.g. from oil and gas industry
Impacts rating (negative) and justification	Minor (- -) Families relocating could affect demand for school places and increase class sizes. The maximum number of people projected to move into the region is 59 (low) to 669 (high). This could result in an increase in demand on services such as schools but across the region as a whole and across all the ports that could potentially be positively affected may not be sufficient to raise concerns within communities

Aspect	Detail
Distributional effects	The most affected areas may be schools in locations where jobs are concentrated, although there may be wider impacts on surrounding towns and villages if people relocate more widely

G.9 Cluster: community – shops, housing

Impacts on shops and housing at the community level are linked to availability and quality of housing. This includes consideration of statistics on relative poverty after taking housing costs into account, satisfaction with housing, and housing tenure (Table 76).

Table 76 Cluster: community – shops, housing

Aspect	Detail
Detailed statistics	18% of individual living in private households with an equivalised incomes of less than 60% of the UK median after housing costs (2014-17) 92% of households who report being fairly or very satisfied with their house or flat (2017) 35% of people in Scotland live alone (2017) 15% of households rent from a private landlord of which 79% lived in urban areas, with 23% of households in social rented sector (2017) 84% of households are located in urban areas including small towns (2017) 35% of adults in private rented properties had been at their address for less than one year, with an average stay of two years (2017) Private rented properties are more likely to be flats (62%) than houses (37%) and tend to be smaller with 23% having one bedroom and 50% having two bedrooms (2017) 130,000 households (5%) were on a housing list with a further 20,000 (1%) of households having applied for social housing using a choice based letting system or similar within the past year (2017) Total number of households has increased by 13% since 1999 to 2.46 million households (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential increase in proportion of population satisfied with their house or flat Potential increase in disposable income after housing costs are taken into account
Cause of impacts	Greater demand for housing may lead to development of new, high quality, efficient new housing

Aspect	Detail
	More people moving into an area or more secure income could help increase spend in local shops and on local services (e.g. restaurants, bars) with knock-on impacts on level and quality of services provided
Impacts rating and justification	Minor (+ +) Potential for expansion of housing sector to support people moving for work but may be limited in scale at national level. Growth in spend from increased income may not be sufficient to see significant expansion of shops or other services, but could help support existing services
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and may provide positive effects for groups with the required skills. This could result in more demand in some areas than others, with greater impacts from spend of larger disposable incomes than in other areas
Negative impacts – potential effect on national indicators	Potential reduction in proportion of population satisfied with their house or flat Potential reduction in level of disposable income if demand for housing means housing costs increase such that they take up more as percentage of income Possible loss of some specialist shops and services, e.g. those associated with fishing industry
Cause of impacts	Greater demand for housing may increase the cost of housing Loss of income for fishers could reduce demand for specialist services supporting the fishing industry with potential loss
Impacts rating and justification	Minor (- -) Impacts may be significant at times of peak employment levels, but may not be sufficient to raise issues or concerns with the community over the longer term. Housing may continue to be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed
Distributional effects	Impacts will be concentrated in those areas where there are the greatest increase in jobs and hence largest potential for relocation into areas. Most areas affected will be ports and coastal communities so they may have limited capacity to cope with increased populations
Region	**EAST**
Impacts rating (positive) and justification	Minor (+ +) Impacts greater than for national with higher retention or equal rates over all five activities but total number of families moving into the region is lower than for some other regions and may be concentrated in larger towns that may have greater housing capacity to cope with increased demand

Aspect	Detail
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Some of these may already be growth areas, e.g., Aberdeen, Dundee
Impacts rating (negative) and justification	Minor (- -) Increased demand for housing may increase house prices and rental charges, which may be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed
Distributional effects	Impacts likely to be focused onto those areas where jobs are created, so increased income from those jobs could help to offset the additional housing costs. Poorer sections of communities may be disproportionately affected as they may not see their income increase and may find their housing costs increasing with potential negative consequences such as having to move to lower quality housing or moving out of the area
Region	**NORTH EAST**
Impacts rating (positive) and justification	Moderate (+ +) Impacts greater than for national with higher retention for balance of plant and installation and commissioning with potentially 1,938 (low, Type I) to 6,567 (high Type I) people moving into the region at peak employment times
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Some of these may already be growth areas, e.g., Inverness
Impacts rating (negative) and justification	Moderate (- - -) Increased demand for housing may increase house prices and rental charges, which may be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed. The large number of people potentially moving into the region at peak employment time may cause concerns within the existing communities
Distributional effects	Impacts likely to be focused onto those areas where jobs are created, so increased income from those jobs could help to offset the additional housing costs. Poorer sections of communities may be disproportionately affected as they may not see their income increase and may find their housing costs increasing with potential negative consequences such as having to move to lower quality housing or moving out of the area
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Impacts equal to or lower than national in terms of retention rates over all five activities so total number of families moving into the region is lower than for some other regions and

Aspect	Detail
	may be concentrated in larger towns that may have greater housing capacity to cope with increased demand
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. This may increase demand for new quality housing in areas such as Lerwick, Stornoway
Impacts rating (negative) and justification	Minor (- -) Increased demand for housing may increase house prices and rental charge, which may be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed. The impacts are likely to be concentrated in areas that may already have some housing issues, such as in Shetland, and where the capacity to support influxes of new employees may be limited
Distributional effects	Impacts likely to be focused onto those areas where jobs are created, so increased income from those jobs could help to offset the additional housing costs. Poorer sections of communities may be disproportionately affected as they may not see their income increase and may find their housing costs increasing with potential negative consequences such as having to move to lower quality housing or moving out of the area. There is pressure on entry-level housing stocks in Shetland based on the housing need and demand assessment.
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts equal to or lower than national in terms of retention rates over all five activities but total number of families moving into the region is lower than for some other regions and may be concentrated in larger towns that may have greater housing capacity to cope with increased demand
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. Some of these may already be growth areas, e.g. Greenock. Others are smaller ports that may already have capacity issues that could be exacerbated by increased demand.
Impacts rating (negative) and justification	Minor (- -) Increased demand for housing may increase house prices and rental charges, which may be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed
Distributional effects	Impacts likely to be focused onto those areas where jobs are created, so increased income from those jobs could help to offset the additional housing costs. Poorer sections of communities may be disproportionately affected as they

Aspect	Detail
	may not see their income increase and may find their housing costs increasing with potential negative consequences such as having to move to lower quality housing or moving out of the area. However, the population moving into the region is smaller than for some other regions
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Impacts equal to or lower than national in terms of retention rates over all five activities but total number of families moving into the region is lower than for some other regions and may be concentrated in larger towns that may have greater housing capacity to cope with increased demand
Distributional effects	Most significant positive impacts likely to be in larger towns and ports that support wind farm development. These impacts are likely to be concentrated in and around Ayr but could help support investment in the Ayrshire Growth Scheme. Towns such as Campbeltown may see positive impacts from investment and migration into the town
Impacts rating (negative) and justification	Minor (- -) Increased demand for housing may increase house prices and rental charges, which may be affordable for those moving to take up skilled positions but may be negative for those already living in the area who may not have the skills needed
Distributional effects	Impacts likely to be focused onto those areas where jobs are created, so increased income from those jobs could help to offset the additional housing costs. Poorer sections of communities may be disproportionately affected as they may not see their income increase and may find their housing costs increasing with potential negative consequences such as having to move to lower quality housing or moving out of the area. However, the population moving into the region is smaller than for some other regions

G.10 Cluster: community – socialising, recreation, parks, leisure

Impacts on socialising, recreation, parks and leisure at the community level are linked to levels of physical activity, and visits to the outdoors (Table 77).

Table 77 Cluster: community – socialising, recreation, parks, leisure

Aspect	Detail
Relevant statistics	Physical activity; visits to the outdoors
Detailed statistics	65% of adults meeting physical activity recommendations while 81% participated in physical activity (2017)

Aspect	Detail
	52% of adults making one or more visits to the outdoors per week (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential for contribution to increase in physical activity including through increasing visits to the outdoors
Cause of impacts	Increase in local jobs could reduce commuting time so provide more free time for socialising and recreation Investment in ports could provide better facilities for recreational boating People moving into the area to take up new jobs could offer new opportunities through more support and involvement in recreational activities or facilities
Impacts rating and justification	Negligible (+) Possible small positive through creation of more local jobs but impact is likely to be small. May also be impacts from those relocating from more urban areas to more rural areas where access to greenspace may improve
Distributional effects	Impacts may be greater in more rural areas, especially if there is increased access to greenspace
Negative impacts – potential effect on national indicators	Potential reduction in time spent undertaking physical activity outside of work or for socialising. Potential impacts on recreational boating although these are expected to be small and recreational boats should be able to transit safely through wind farm arrays. Maybe some impacts for less experienced sailors or those looking for a remote coast experience
Cause of impacts	Relocation of workers on a temporary basis may mean they spend more time commuting to/from their family home potentially reducing free time. Shift work could also affect free time. May be some impacts on enjoyment of recreational boating where there are changes from what was previously perceived as being an unspoilt coastline/sea
Impacts rating and justification	Negligible (-) Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. Impacts on recreational boating likely to be small and may be limited to perception of wind farms within the marine environment. Impacts on sea angling and water sports are less significant across the country as a whole
Distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. Recreational boating impacts may be greater in smaller ports along the West coast where marina income could be affected if activities are displaced. Impacts on sea angling may be greater in the South West and West

Aspect	Detail
	due to the closer location of wind farms to land in these regions. Changing wind or wave climates may also have knock-on effects on water sports activities in these regions
Region	**EAST**
Impacts rating (positive) and justification	Negligible (+) Possible small positive through creation of 71 (low) to 462 (high) local jobs but impact is likely to be small. May also be impacts from those relocating from more urban areas to coastal areas such as Aberdeen
Distributional effects	Impacts may be greater in coastal and more rural areas, especially if there is increased access to greenspace
Impacts rating (negative) and justification	Negligible (-) Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. Impacts on recreational boating are expected to be very small with costs significantly less than £1,000 across the appraisal timeframe. Impacts on sea angling and water sports are not significant
Distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. There may also be more commuters to cities with good transport links such as Aberdeen or Dundee.
Region	**NORTH EAST**
Impacts rating (positive) and justification	Negligible (+) Possible small positive through creation of 314 (low) to 1,111 (high) local jobs but impact is likely to be small. May also be impacts from those relocating from more urban areas to more rural areas in and around Inverness or Wick, for example
Distributional effects	Impacts may be greater in coastal and more rural areas, especially if there is increased access to greenspace. Impacts unlikely to be sufficient to have a noticeable effect on marina income
Impacts rating (negative) and justification	Negligible (-) Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. Impacts on recreational boating are small, with costs of a few thousand over the appraisal timeframe. Impacts on sea angling and water sports are not significant
Distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. There may also be more commuters to cities

Aspect	Detail
	with good transport links such as Inverness and may be less likely for more remote locations
Region	**NORTH**
Impacts rating (positive) and justification	Negligible (+) Possible small positive through creation of 93 (low) to 314 (high) local jobs but impact is likely to be small. May also be impacts from those relocating from more urban areas to more rural areas in and around Kishorn or Lyness, for example
Distributional effects	Impacts may be greater in coastal and more rural areas, especially if there is increased access to greenspace
Impacts rating (negative) and justification	Minor (-) Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. Impacts on recreational boating are very small with no expected impacts on tourism or water sports. Impacts on sea angling and water sports may be larger, although are still likely to be small
Distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. There may also be more commuters to areas with good transport links such as Shetland. Impacts unlikely to be sufficient to have a noticeable effect on marina income, but may be some perception impacts on the unspoilt nature of the coast around the Outer Hebrides in particular. Sea angling and water sports impacts may also be grater in the Outer Hebrides, with potential effects on boat trips out of harbours such as Miavaig or surfing along the Lewis coast
Region	**WEST**
Impacts rating (positive) and justification	Negligible (+) Possible small positive through creation of 13 (low) to 227 (high) local jobs but impact is likely to be small. May also be impacts from those relocating from more urban areas to more rural areas in and around Oban or Fairlie, for example
Distributional effects	Impacts may be greater in coastal and more rural areas, especially if there is increased access to greenspace
Impacts rating (negative) and justification	Negligible (-) Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. May be some small impacts on recreational boating due to a change in perception of the coast becoming more spoilt due to development, which may reduce enjoyment of recreational boaters. Sea angling and water sports impacts are also projected to be very small

Aspect	Detail
Distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. There may also be more commuters to areas with good transport links such as Greenock and may be less likely for more remote locations such as Ardrishaig or Corpach. Impacts on recreational boating may be more significant, especially for those using harbours such as Dunstaffnage, Craobh, and Oban Marinas if there is displacement of activity due to development of the sea or reduction in enjoyment from development of what was previously perceived to be an unspoilt area
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Negligible (+) Possible small positive through creation of 9 (low) to 114 (high) local jobs but impact is likely to be small. May also be impacts from those relocating from more urban areas to more rural areas in and around Ayr
Distributional effects	Impacts may be greater in coastal and more rural areas, especially if there is increased access to greenspace
Impacts rating (negative) and justification	Negligible (-) Possible small negative where workers travel to/from their place of work to home and where the family itself does not commute, but impacts likely to be small. May be some small impacts on recreational boating potential displacement of activities where wind farms are located over offshore cruising routes
Distributional effects	Impacts may be greater where jobs are of short-time duration reducing likelihood that workers and their families would move. There may also be more commuters to areas with good transport links such as Ayr. Impacts on recreational boating may be associated with displacement of activities with potential impacts on marinas at Kirkcudbright and Dalbeattie

G.11 Cluster: community – friends, being involved, supporting others

Impacts on friends, being involved and supporting others at the community levels are linked to feelings of belonging to their community, levels of discrimination and crime and views on the neighbourhood as a place to live (Table 78).

Table 78 Cluster: community – friends, being involved, supporting others

Aspect	Detail
Detailed statistics	57% of adults rate their neighbourhood as a very good place to live and 95% rate it is very or fairly good (2017) 53% of people living in large urban or other urban areas rate it is a very good place to live, 59% of those living in accessible small towns, 65% in remote small towns, 70% in accessible rural and 76% in remote rural areas (2017) Rating of neighbourhood as a very good place to live varies by deprivation with 53% of the 1-10% most deprived rating it as very good compared with 80% of the 10% least derived (2017) 88% feel they fairly or strongly belong to their immediate neighbourhood (2017) 75.5% of respondents (to the Scottish Household Survey) who think crime in their area has stayed the same or reduced in the past two years (2017) 13.4% of people who have been victims of one or more crimes in the past year (2016) 15% of respondents to the Scottish Household Survey thought their neighbourhood had got worse over the past three years with 63% thinking it had stayed the same. 21% of the most deprived 10% thought their area had got worse (2017) 7% of adults reported that they had experienced discrimination and 6% had experienced harassment in the past three years (2017) 88% of respondents to the Scottish Household Survey tended to agree or strongly agreed that they would rely on friends/relatives in the neighbourhood for help (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential to increase proportion of people that feel they fairly or strongly belong to their immediate neighbourhood Potential to increase proportion go people who think their neighbourhood is a good place to live, aligned with increase in income from more skilled jobs Potential to increase proportion of people that could rely on friends/relatives in the neighbourhood for help
Cause of impacts	More local jobs could help result in better local networks, retention of friends, etc. by helping to keep people in their communities through ability to develop their career locally
Impacts rating and justification	Negligible (+) Projection of 216 (low) to 955 (high) local jobs across nation as a whole may be unlikely to be noticed by the majority of the population
Distributional effects	Impacts likely to be greater where there is a concentration of local jobs and may provide positive impacts for specific groups with the required skills. This could include people

Aspect	Detail
	who previously worked in the oil and gas industry, if this declines over the appraisal timeframe by avoiding them having to move out of the area to find jobs elsewhere with impacts on social networks.
Negative impacts – potential effect on national indicators	Potential to reduce proportion of people who feel that they fairly or strongly belong to their immediate neighbourhood Potential to increase proportion go people who think their neighbourhood is a good place to live, aligned with possible change in makeup of community, aligned with increase in housing costs that may make it more difficult for local people to live in the same neighbourhood
Cause of impacts	Lots of new people relocating to an area could be perceived as being less friendly Loss of fishing jobs or income could impact on networks for family businesses and the fishing community
Impacts rating and justification	Negligible (-) Projection of loss of 2.5 (low, Type I) to 8.3 (high, Type I) fishing jobs across the country is unlikely to be noticeable at the national level. Relocation of 648 (low) to 2,866 (high) jobs could have some community impacts but again these are unlikely to be noticeable across the country as a whole
Distributional effects	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. where there is an identifiable fishing community. Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the same area that they grew up
Region	**EAST**
Impacts rating (positive) and justification	Negligible (+) Projection of 71 (low) to 462 (high) local jobs across the region may be unlikely to be noticed by the majority of communities
Distributional effects	Impacts likely to be greater where there is a concentration of local jobs and may result in positive effects on specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe.
Impacts rating (negative) and justification	Negligible (-) Projection of loss of 0.3 (low, Type I) to 0.9 (high, Type I) fishing jobs across the region is unlikely to be noticeable, with impacts very localised. Relocation of 212 (low) to 1,387 (high) jobs could have some community impacts but again these are likely to be noticeable across the region as a whole

Aspect	Detail
Distributional effects	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. Peterhead. Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the same area that they grew up. These may already be larger communities such as Aberdeen and Dundee so impacts may be small.
Region	**NORTH EAST**
Impacts rating (positive) and justification	Minor (+ +) Projection of 314 (low) to 1,111 (high) local jobs across the region may be sufficient to have some noticeable impacts
Distributional effects	Impacts likely to be greater where there is a concentration of local jobs and may result in positive impacts on specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe.
Impacts rating (negative) and justification	Negligible (-) Projection of loss of 1.6 (low, Type I) to 4.7 (high, Type I) fishing jobs across the region is unlikely to be noticeable, with impacts very localised. Relocation of 648 (low) to 2,866 (high) jobs could have some community impacts but again these are likely to be noticeable across the region as a whole
Distributional effects	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. Buckie or Fraserburgh (here impacts may increase to Minor (- -). Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the same area that they grew up. This could affect communities, for example, in Nigg or Wick
Region	**NORTH**
Impacts rating (positive) and justification	Negligible (+) Projection of 93 (low) to 314 (high) local jobs across the region may be sufficient to have some noticeable impacts
Distributional effects	Impacts likely to be greater where there is a concentration of local jobs and may result in positive effects for specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe.
Impacts rating (negative) and justification	Negligible (-) Projection of loss of 1.0 (low, Type I) to 2.9 (high, Type I) fishing jobs across the region is unlikely to be noticeable,

Aspect	Detail
	with impacts very localised. Relocation of 279 (low) to 844 (high) jobs could have some community impacts but again these are likely to be noticeable across the region as a whole
Distributional effects	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. Kinlochbervie or Ullapool. Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the same area that they grew up. This could affect communities, for example, in Lerwick or Scrabster
Region	**WEST**
Impacts rating (positive) and justification	Negligible (+) Projection of 13 (low) to 227 (high) local jobs across the region may be sufficient to have some noticeable impacts
Distributional effects	Impacts likely to be greater where there is a concentration of local jobs and may result in positive impacts on specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe.
Impacts rating (negative) and justification	Negligible (-) Projection of loss of 0.5 (low, Type I) to 2.0 (high, Type I) fishing jobs across the region is unlikely to be noticeable, with impacts very localised. Relocation of 39 (low) to 682 (high) jobs could have some community impacts but again these are likely to be noticeable across the region as a whole
Distributional effects	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. Oban or Fionnphort. Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the same area that they grew up. This could affect communities, for example, in Ardrossan or Hunterston
Region	SOUTH WEST
Impacts rating (positive) and justification	Negligible (+) Projection of 9 (low) to 114 (high) local jobs across the region may be sufficient to have some noticeable impacts
Distributional effects	Impacts likely to be greater where there is a concentration of local jobs and may result in positive effects for specific groups with the required skills. This could include people who previously worked in the oil and gas industry, if this declines over the appraisal timeframe.

Aspect	Detail
Impacts rating (negative) and justification	Negligible (-) Projection of loss of 0.2 (low, Type I) to 0.6 (high, Type I) fishing jobs across the region is unlikely to be noticeable, with impacts very localised. Relocation of 28 (low) to 341 (high) jobs could have some community impacts but again these are likely to be noticeable across the region as a whole
Distributional effects	Impacts may be greater where the negative impacts affect concentrations of people within the local community, e.g. Ayr and Kirkcudbright. Impacts may also be greater on those communities where there is a large influx of people moving for jobs such that housing costs increase affecting extent to which local people who are not able to take up the skilled positions becoming less able to afford to live in the same area that they grew up. This could affect communities, for example, in and around Ayr

G.12 Cluster: community – local identity, cultural heritage, Gaelic

Impacts on local identity, cultural heritage and Gaelic at the community level are linked to the extent to which traditions can be maintained. The statistics captured include attendance at cultural events, people working in arts and culture and the state of historic sites (Table 79).

Table 79 Cluster: community – local identity, cultural heritage, Gaelic

Aspect	Detail
Detailed statistics	93% of adults had attended or visited a cultural event or place in 2017 78.1% of adults who have participated in a cultural activity in the last 12 months Gross Value Added of cultural economy was £4,389 million (2016) 77,000 people worked in creative industries growth centre (culture and arts) (2017) 68% of pre-1919 dwellings (sites) classified as having disrepair to critical elements (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential increase in number of people working in creative industries as knock-on impacts from increased number of jobs Potential increase in percentage of adults attending or visiting a cultural event or place (although this may be more of a reallocation of attendances rather than an increase in attendance)

Aspect	Detail
Cause of impacts	More local jobs enables people to stay in the area and build a career, maintaining the local community and enhancing a sense of belonging People relocating to an area could provide more support for cultural activities and create more interest in local history and culture Potential knock-on positive effects on creative industries from investment into the area Impacts on landscapes and seascapes could be viewed by receptors as changing the identity of areas due to development, but the impacts are expected to be small
Impacts rating and justification	Negligible (+) Impacts on creative industries in terms of knock-on positive impacts are small, estimated at 4% of GVA impacts for creative industries and 6% for cultural industries[100] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of £515 million (low, Type II) to £2,137 million (high, Type II), this gives positive effects of £21 million to £85.5 million for creative industries and £31 million to £128 million for cultural industries. Over the country as a whole, this is unlikely to be noticeable
Distributional effects	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on creative and cultural activities
Negative impacts – potential effect on national indicators	Potential impacts on traditions of local community, but may be more perceptions than actual impacts. More visible may be changes to the fishing communities
Cause of impacts	People relocating to an area could be perceived as changing the nature of the community and its culture and traditions and may reduce sense of identity Impacts on fishers could impact on tradition of fishing and culture of fishing in community with spend on wind farms potentially changing areas from fishing towns to wind farm towns. Influxes of non-Gaelic speaking people could also affect continued use of the language
Impacts rating and justification	Negligible (-) Relocation of between a maximum in any one year of 648 (low) to 2,866 (high) and loss of 2.5 (low, Type I) to 8.3 (high, Type I) FTEs from reduction in income to fishers from impacts on landings, but at an national level these changes are unlikely to be sufficient to be noticeable for the majority of communities

[100] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

Aspect	Detail
Distributional effects	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected
Region	**EAST**
Impacts rating (positive) and justification	Negligible (+) Impacts on creative industries in terms of knock-on positive impacts are small, estimated at 4% of GVA impacts for creative industries and 6% for cultural industries[101] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of £389 million (low, Type II) to £1,386 million (high, Type II), this gives positive effects of £16 million to £55 million for creative industries and £23 million to £83 million for cultural industries. This is unlikely to be noticeable over the whole region
Distributional effects	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on creative and cultural activities. This could be in locations such as Leith and Rosyth
Impacts rating (negative) and justification	Negligible (-) Relocation of between a maximum in any one year of 212 (low) to 1,387 (high) and loss of 0.3 (low, Type I) to 0.9 (high, Type I) FTEs from reduction in income to fishers from impacts on landings. At a regional level these changes are unlikely to be sufficient to be noticeable for the majority of communities or cultural events, and in many cases may be a redistribution of visits from the original location of workers and their families that have relocated for work. No impacts on landscapes or seascapes so no impacts on local and cultural identity associated with changes to these in this region
Distributional effects	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected
Region	**NORTH EAST**
Impacts rating (positive) and justification	Negligible (+)

[101] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

Aspect	Detail
	Impacts on creative industries in terms of knock-on positive impacts are small, estimated at 4% of GVA impacts for creative industries and 6% for cultural industries[102] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of £645 million (low, Type II) to £2,259 million (high, Type II), this gives positive effects of £26 million to £90 million for creative industries and £39 million to £136 million for cultural industries. This is unlikely to be noticeable over the whole region
Distributional effects	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on creative and cultural activities. This could be in locations such as Inverness and Cromarty Firth
Impacts rating (negative) and justification	Negligible (-) Relocation of between a maximum in any one year of 941 (low) to 3,188 (high) and loss of 1.6 (low, Type I) to 4.7 (high, Type I) FTEs from reduction in income to fishers from impacts on landings. At a regional level these changes are unlikely to be sufficient to be noticeable for the majority of communities or cultural events, and in many cases may be a redistribution of visits from the original location of workers and their families that have relocated for work. No impacts on landscapes or seascapes so no impacts on local and cultural identity associated with changes to these in this region
Distributional effects	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected. These impacts may be more significant and noticeable in smaller communities to Minor (- -)
Region	**NORTH**
Impacts rating (positive) and justification	Negligible (+) Impacts on creative industries in terms of knock-on positive impacts are small, estimated at 4% of GVA impacts for creative industries and 6% for cultural industries[103] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of £139 million (low, Type II) to £497 million (high, Type II),

[102] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

[103] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

Aspect	Detail
	this gives positive effects of £6 million to £20 million for creative industries and £8 million to £30 million for cultural industries. This is unlikely to be noticeable over the whole region
Distributional effects	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on creative and cultural activities. This could be in locations such as Lerwick and Stornoway
Impacts rating (negative) and justification	Minor (- -) Relocation of between a maximum in any one year of 279 (low) to 844 (high) and loss of 1.0 (low, Type I) to 2.9 (low, Type I) FTEs from reduction in income to fishers from impacts on landings. At a regional level these changes are unlikely to be sufficient to be noticeable for the majority of communities or cultural events, and in many cases may be a redistribution of visits from the original location of workers and their families that have relocated for work. There may be some impacts on landscapes or seascapes but effects on local and cultural identity associated with such changes are expected to be small for the majority of the population (some people may also like to see the windfarms)
Distributional effects	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected. Seascape changes may be greatest on the Isle of Lewis, but are not expected to be significant in terms of cultural or local identity
Region	**WEST**
Impacts rating (positive) and justification	Negligible (+) Impacts on creative industries in terms of knock-on positive impacts are small, estimated at 4% of GVA benefits for creative industries and 6% for cultural industries[104] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of £49 million (low, Type II) to £288 million (high, Type II), this gives positive effects of £2 million to £12 million for creative industries and £3 million to £17 million for cultural industries. This is unlikely to be noticeable over the whole region
Distributional effects	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on

[104] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

Aspect	Detail
	creative and cultural activities. This could be in locations such as Campbeltown and Ardrossan
Impacts rating (negative) and justification	Minor (- -) Relocation of between a maximum in any one year of 39 (low) to 606 (high) and loss of 0.5 (low, Type I) to 2.0 (high, Type I) FTEs from reduction in income to fishers from impacts on landings. At a regional level these changes are unlikely to be sufficient to be noticeable for the majority of communities or cultural events, and in many cases may be a redistribution of visits from the original location of workers and their families that have relocated for work. There may be some impacts on landscapes or seascapes but effects on local and cultural identity associated with such changes are expected to be small
Distributional effects	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected. Seascape changes may be greatest on the Islay and Jura, but are not expected to be significant in terms of cultural or local identity for the majority of the population
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Negligible (+) Impacts on creative industries in terms of knock-on positive impacts are small, estimated at 4% of GVA impacts for creative industries and 6% for cultural industries[105] such that impacts from increased income and spend will only be small. Over total Present Value GVA impacts (2020-2059) of £30 million (low, Type II) to £149 million (high, Type II), this gives positive effects of £1.2 million to £6 million for creative industries and £1.8 million to £9 million for cultural industries. This is unlikely to be noticeable over the whole region
Distributional effects	Impacts likely to be greater where there is a concentration of jobs (local and relocated) and where disposable income increases such that there is greater potential for spend on creative and cultural activities. This could be in locations such as Ayr
Impacts rating (negative) and justification	Minor (- -) Relocation of between a maximum in any one year of 28 (low) to 341 (high) and loss of 0.2 (low, Type I) to 0.6 (high, Type I) FTEs from reduction in income to fishers from impacts on landings. At a regional level these changes are unlikely to be sufficient to be noticeable for the majority of

[105] Based on final use change by industry group for direct, indirect and induced effect (Type II) taken from the Leontief matrices from the Scottish input-output multipliers for 2015.

Aspect	Detail
	communities or cultural events, and in many cases may be a redistribution of visits from the original location of workers and their families that have relocated for work. There may be some impacts on landscapes or seascapes but effects on local and cultural identity associated with such changes are expected to be small
Distributional effects	Impacts, or perception of impacts, likely to be greater where there is a concentration of relocated jobs and where there are specific impacts on fishing communities that could affect fishing traditions in those locations that are more significantly affected. Seascape changes may be greatest on the coastline from Drummore to Kirkcudbright, but are not expected to be significant in terms of cultural or local identity for the majority of the population

G.13 Cluster: community – healthcare

Impacts on healthcare at the community level are linked to access to healthcare services, such as GP, and satisfaction with health care services. Other statistics of relevance relate to health risk behaviours, healthy weight, mental wellbeing, and long-term physical and mental health condition (Table 80).

Table 80 Cluster: community – healthcare

Aspect	Detail
Detailed statistics	29% of adults with two or more health risk behaviours (current smoker, harmful drinking, low physical activity, obesity) (2017) 33% of adults that are a healthy weight (2017) 61 years estimated average number of years that a new born baby could be expected to live in 'good health' (2015) 49.8 average score of Warwick-Edinburgh Mental Wellbeing Scale (WEMWS) (2017) 425.2 European Age Standardised mortality rate per 100,000 for people under 75 (2017) Perinatal mortality rate of 6 per 1000 births (2016) 90% of people who describe the overall care provided by their GP practice as excellent or good (2017) 82% of respondents (to the Scottish Household Survey) who are fairly or very satisfied with the quality of local health services 28% of adults reported a long-term physical or mental health condition (2017)
Level	**NATIONAL**

Aspect	Detail
Positive impacts – potential contribution to national indicators	Potential reduction in mental health conditions Possible reduction in health risk behaviours with associated increase in average score on wellbeing scale and reduced mortality rate
Cause of impacts	Reduction in mental health conditions linked with increase in income and reduction in money concerns. Possible reduction in health risk behaviours due to correlation between increased income/reduced poverty and healthier living
Impacts rating and justification	Negligible (+) Potential for increased employment with potential for knock-on impacts for mental wellbeing associated with improved income from 864 (low, Type 1) to 3,821 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health
Distributional effects	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater effects where there are concentrations of jobs
Negative impacts – potential effect on national indicators	Potential reduction in proportion of people who describe the care provided by their GP service as excellent or good
Cause of impacts	Increased demand from larger populations from those relocating to take up jobs could put healthcare services under additional stress, resulting in longer waiting times to see a GP, etc.
Impacts rating and justification	Negligible (-) Relocation of 648 (low) to 2,866 (high) jobs with potential for increase in people moving to take up jobs of 1,322 (low) to 5,846 (high) (based on 2.04 people per household) unlikely to be noticeable at the national scale
Distributional effects	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised
Region	**EAST**
Impacts rating (positive) and justification	Negligible (+) Potential for increased employment with potential for knock-on positive impacts for mental wellbeing associated with improved income from 282 (low, Type 1) to 1,849 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health
Distributional effects	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater positive effects where there are concentrations of jobs, such as in Aberdeen or Dundee

Aspect	Detail
Impacts rating (negative) and justification	Negligible (-) Relocation of 212 (low) to 1,387 (high) jobs with potential for increase in people moving to take up jobs of 441 (low) to 4,965 (high) (based on 2.06 people per household) unlikely to be noticeable at the regional scale
Distributional effects	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created, such as Montrose and Methil, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised
Region	**NORTH EAST**
Impacts rating (positive) and justification	Negligible (+) Potential for increased employment with potential for knock-on positive impacts for mental wellbeing associated with improved income from 1,255 (low, Type 1) to 4,250 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health
Distributional effects	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater effects where there are concentrations of jobs, such as in Fraserburgh and Inverness
Impacts rating (negative) and justification	Negligible (-) Relocation of 941 (low) to 3,188 (high) jobs with potential for increase in people moving to take up jobs of 1,938 (low) to 6,567 (high) (based on 2.06 people per household) unlikely to be noticeable at the regional scale
Distributional effects	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created, such as Buckie and Macduff, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised
Region	**NORTH**
Impacts rating (positive) and justification	Negligible (+) Potential for increased employment with potential for knock-on positive impacts for mental wellbeing associated with improved income from 279 (low, Type 1) to 844 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health
Distributional effects	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater effects where there are concentrations of jobs, such as in Lerwick and Lyness
Impacts rating (negative) and justification	Negligible (-)

Aspect	Detail
	Relocation of 279 (low) to 844 (high) jobs with potential for increase in people moving to take up jobs of 574 (low) to 1,739 (high) (based on 2.06 people per household) unlikely to be noticeable at the regional scale
Distributional effects	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created, such as Kishorn and Sullom Voe, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised
Region	**WEST**
Impacts rating (positive) and justification	Negligible (+) Potential for increased employment with potential for knock-on positive impacts for mental wellbeing associated with improved income from 51 (low, Type 1) to 808 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health
Distributional effects	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater effects where there are concentrations of jobs, such as in Ardrishaig and Oban
Impacts rating (negative) and justification	Negligible (-) Relocation of 39 (low) to 606 (high) jobs with potential for increase in people moving to take up jobs of 82 (low) to 1,267 (high) (based on 2.09 people per household) unlikely to be noticeable at the regional scale
Distributional effects	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created, such as Corpach and Fairlie, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Negligible (+) Potential for increased employment with potential for knock-on positive impacts for mental wellbeing associated with improved income from 38 (low, Type 1) to 426 (high, Type II) jobs and potential reduction in deprivation with associated positive effects for health
Distributional effects	Positive impacts for individuals taking up better paid jobs and knock-on impacts in terms of indirect and induced jobs, with potential greater effects where there are concentrations of jobs in and around Ayr

Aspect	Detail
Impacts rating (negative) and justification	Negligible (-) Relocation of 28 (low) to 341 (high) jobs with potential for increase in people moving to take up jobs of 59 (low) to 669 (high) (based on 2.09 people per household) unlikely to be noticeable at the regional scale
Distributional effects	Impacts likely to be greater in those locations where there are larger numbers of jobs that are created in and around Ayr, especially if there are hubs that result in large numbers of people moving into relatively local areas. Impacts could then increase to Minor (- -) or even Moderate (- - -) where the additional population is sufficient to result in concerns being raised

G.14 Cluster: community – connection to nature, landscape

Impacts on connection to nature and landscape at the community level are linked access and use of local green spaces, and personal concern over damage to the natural environment and climate change (Table 81).

Table 81 Cluster: community – connection to nature, landscape

Aspect	Detail
Relevant statistics	Access to green or blue space; natural capital; waste generated
Detailed statistics	64.7% of adults who live within a 5 minute walk of their local green or blue space (2017) while 52% visited the outdoors at least once a week in the past year and 37% visit their nearest area of greenspace at least once per week (2017) In urban areas, 51% of households make at least one visit per week to the outdoors, compared with 61% in rural areas (2017) 74% of adults were very or fairly satisfied with their nearest area of greenspace (2017) Natural Capital Asset Index was 101.5 (2015) as a measure of the quality and quantity of habitats in Scotland according to their potential to deliver different ecosystem services now and into the future 2.5 million tonnes of household waste generated (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential increase in number of visits to outdoors, linked with potential increase in population moving from more urban to more rural areas and increase in proportion of adults living within a 5 minute walk of their local green or blue space
Cause of impacts	Local jobs in skilled areas may mean less commuting time that could provide more time for visits to the outdoors Spend on wind farms may help encourage connection with sea through career, education, etc. and could be used as catalyst to increase connection with nature and the landscape
Impacts rating and justification	Negligible (+) Local jobs estimated at 216 (low) to 955 (high) but impacts will depend on a number of other factors, including if commuting time reduces and if time saved is used for activities in the outdoors. Also assumes people relocating are moving from more urban to more rural areas, but change could be to attract people from surrounding villages into port areas that may be more developed reducing connection with the natural environment
Distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are

Aspect	Detail
	reduced. Families relocating may see greater positive effects than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift)
Negative impacts – potential effect on national indicators	Potential reduction in percentage of adults that are very or fairly satisfied with their nearest area of greenspace
Cause of impacts	May be concerns over changes to landscape/seascape from wind farm developments, from turbines once installed but also from changes to coastal landscapes if they become more commercial, less fishing oriented
Impacts rating and justification	Minor (-) Mitigation measures should ensure that any potential negative impacts are minimised as far as possible, although there may be some small impacts where development is closer to shore for both those living along the coast through their connection to the landscape and for visitors to the coast
Distributional effects	Impacts may be greater where wind farms are located nearer to shore, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports, some of which already consist of industrial areas such that impacts may be minimised. As such, impacts are likely to be greatest in the North, West and South West regions
Region	**EAST**
Impacts rating (positive) and justification	Negligible (+) Local jobs estimated at 71 (low) to 462 (high) but impacts will depend on a number of other factors, including if commuting time reduces and if time saved is used for activities in the outdoors. Also assumes people relocating are moving from more urban to more rural areas, but change could be to attract people from surrounding villages into port areas that may be more developed reducing connection with the natural environment
Distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are reduced. Families relocating may see greater positive effects than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift).
Impacts rating (negative) and justification	Negligible (-) Mitigation methods should ensure that any potential negative impacts are minimised as far as possible. No impacts expected on landscapes hence no effects expected on connection to landscapes for locals or visitors

Aspect	Detail
Distributional effects	Impacts may be greater where wind farms are located nearer to short, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports such as Aberdeen, Dundee or Grangemouth, some of which already consist of industrial areas such that impacts may be minimised
Region	**NORTH EAST**
Impacts rating (positive) and justification	Negligible (+) Local jobs estimated at 314 (low) to 1,111 (high) but impacts will depend on a number of other factors, including if commuting time reduces and if time saved is used for activities in the outdoors. Also assumes people relocating are moving from more urban to more rural areas, but change could be to attract people from surrounding villages into port areas that may be more developed reducing connection with the natural environment
Distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are reduced. Families relocating may see greater positive effects than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift).
Impacts rating (negative) and justification	Negligible (-) Mitigation methods should ensure that any potential negative impacts are minimised as far as possible. No impacts expected on landscapes hence no effects expected on connection to landscapes for locals or visitors
Distributional effects	Impacts may be greater where wind farms are located nearer to short, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports such as Inverness and Nigg, some of which already consist of industrial areas such that impacts may be minimised
Region	**NORTH**
Impacts rating (positive) and justification	Negligible (+) Local jobs estimated at 93 (low) to 314 (high) but impacts will depend on a number of other factors, including if commuting time reduces and if time saved is used for activities in the outdoors. Also assumes people relocating are moving from more urban to more rural areas, but change could be to attract people from surrounding villages into port areas that may be more developed reducing connection with the natural environment
Distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are

Aspect	Detail
	reduced. Families relocating may see greater positive effects than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift).
Impacts rating (negative) and justification	Minor (- -) Mitigation methods should ensure that any potential negative impacts are minimised as far as possible. Impacts may occur on landscapes associated with development of wind farms near to the shore
Distributional effects	Impacts may be greater where wind farms are located nearer to short, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports such as Lerwick and Sullom Voe, some of which already consist of industrial areas such that impacts may be minimised. Impacts on landscapes likely to be focused around the Isle of Lewis. Impacts on local people may see a change in their perception of the landscapes and seascapes but the impacts are not expected to be significant. The impacts are expected to be insignificant in the context of the total value of tourism to the Outer Hebrides. The impacts may be linked to perception of development of an unspoilt coastline, with this used as a selling point for many boat trips and walks that look to sell the landscape and nature as part of a tourism offering
Region	**WEST**
Impacts rating (positive) and justification	Negligible (+) Local jobs estimated at 13 (low) to 227 (high) but impacts will depend on a number of other factors, including if commuting time reduces and if time saved is used for activities in the outdoors. Also assumes people relocating are moving from more urban to more rural areas, but change could be to attract people from surrounding villages into port areas that may be more developed reducing connection with the natural environment
Distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are reduced. Families relocating may see greater positive effects than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift).
Impacts rating (negative) and justification	Minor (- -) Mitigation methods should ensure that any potential negative impacts are minimised as far as possible. Impacts on landscape may be associated with perception of changes to the landscape. Impacts on local people may see a change in their perception of the landscapes and seascapes but the impacts are not expected to be significant.

Aspect	Detail
	The costs of impacts for visitors are insignificant when compared with tourism income
Distributional effects	Impacts may be greater where wind farms are located nearer to short, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports such as Greenock and Hunterston, some of which already consist of industrial areas such that impacts may be minimised. Impacts on landscapes may be concentrated on Islay and Jura with windfarm development potentially affecting the perception of the coastline as undeveloped and unspoilt.
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Negligible (+) Local jobs estimated at 9 (low) to 114 (high) but impacts will depend on a number of other factors, including if commuting time reduces and if time saved is used for activities in the outdoors. Also assumes people relocating are moving from more urban to more rural areas, but change could be to attract people from surrounding villages into port areas that may be more developed reducing connection with the natural environment.
Distributional effects	Impacts likely to be greater where people move from more urban to more rural areas and where commuting times are reduced. Families relocating may see greater positive effects than where the employee relocates for work and then returns home outside of working periods (e.g. weekends or end of shift).
Impacts rating (negative) and justification	Minor (- -) Mitigation methods should ensure that any potential negative impacts are minimised as far as possible. Impacts on landscape may be associated with perception of changes to the landscape. Impacts on local people may see a change in their perception of the landscapes and seascapes but the impacts are not expected to be significant. The costs of impacts for visitors are insignificant when compared with tourism income
Distributional effects	Impacts may be greater where wind farms are located nearer to short, or where there is more significant development of land for commercial/industrial purposes and where this is a change from current and use. This is likely to be associated with key ports such as Ayr, some of which already consist of industrial areas such that impacts may be minimised. Impacts on landscapes may be associated with development of the south coast of Dumfries and Galloway and could be associated with perception of development of the unspoilt coastline

G.15 Cluster: community – local political and decision-making systems

Impacts on local political and decision-making systems at the community level are linked to involvement (perceived or actual) in decision-making, including participation in local decision-making, employee voice and access to justice (Table 82).

Table 82 Cluster: community – local political and decision-making systems

Aspect	Detail
Detailed statistics	75.5% of adults who are confident that the Scottish Criminal Justice System as a whole makes sure everyone has access to the justice system if they need it (2016-17) 22.7% of people who agree with the statement 'I can influence decisions affecting my local area' (2017) 34.8% of employees who agree that agreements between trade union and employer affect pay and conditions (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential increase in proportion of people who feel they can influence decisions affecting their local area
Cause of impacts	Larger populations may be perceived as giving neighbourhoods a louder voice
Impacts rating and justification	Negligible (+) Unlikely to be significant positive impacts for most of the community, with impacts relying on other factors to deliver effects, such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making
Distributional effects	Impacts may be greatest in areas with the largest increases in populations, but the original communities may find themselves faced with more decisions (e.g. planning for new housing) and may not necessarily feel more involved, although they may feel that they need to get more involved
Negative impacts – potential effect on national indicators	Potential decrease in proportion of people who feel that they can influence decisions affecting their local community
Cause of impacts	People relocating may result in larger communities with perception that individuals have less influence, or where more decisions need to be made due to increasing demands on services, it may feel that local communities have less influence
Impacts rating and justification	Negligible (-) For most communities, there may be no change in involvement in local decision making due to spend on wind farms
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence

Aspect	Detail
Region	**EAST**
Impacts rating (positive) and justification	Negligible (+) Unlikely to be significant positive impacts for most of the community, with impacts relying on other factors to deliver effects such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making.
Distributional effects	Relocation of 441 to 4,965 people to the region (based on average household size associated with a relocated job of 2.06) could have a noticeable impact on those communities where jobs are concentrated, but the increased voice of the community may come after many decisions, especially planning decisions, have been made
Impacts rating (negative) and justification	Negligible (-) For most communities, there may be no change in involvement in local decision making due to spend on wind farms
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence. This may be especially true in areas where jobs are concentrated, such as in the ports of Aberdeen, Eyemouth or Leith.
Region	**NORTH EAST**
Impacts rating (positive) and justification	Negligible (+) Unlikely to be significant positive impacts for most of the community, with impacts relying on other factors to deliver effects such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making.
Distributional effects	Relocation of 1,938 to 6,567people to the region (based on average household size associated with a relocated job of 2.06) could have a noticeable impact on those communities where jobs are concentrated, but the increased voice of the community may come after many decisions, especially planning decisions, have been made
Impacts rating (negative) and justification	Negligible (-) For most communities, there may be no change in involvement in local decision making due to spend on wind farms
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence. This may be especially true in areas where jobs are concentrated, such as in ports like Buckie, Macduff or Wick
Region	**NORTH**
Impacts rating (positive) and justification	Negligible (+) Unlikely to be significant positive impacts for most of the community, with impacts relying on other factors to deliver

Aspect	Detail
	effects such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making.
Distributional effects	Relocation of 574 to 1,739 people to the region (based on average household size associated with a relocated job of 2.06) could have a noticeable impact on those communities where jobs are concentrated, but the increased voice of the community may come after many decisions, especially planning decisions, have been made
Impacts rating (negative) and justification	Negligible (-) For most communities, there may be no change in involvement in local decision making due to spend on wind farms
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence. This may be especially true in areas where jobs are concentrated, such as in ports like Kishorn, Lerwick or Stornoway
Region	**WEST**
Impacts rating (positive) and justification	Negligible (+) Unlikely to be significant positive impacts for most of the community, with impacts relying on other factors to deliver effects such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making.
Distributional effects	Relocation of 82 to 1,267 people to the region (based on average household size associated with a relocated job of 2.09) could have a noticeable impact on those communities where jobs are concentrated, but the increased voice of the community may come after many decisions, especially planning decisions, have been made
Impacts rating (negative) and justification	Negligible (-) For most communities, there may be no change in involvement in local decision making due to spend on wind farms
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence. This may be especially true in areas where jobs are concentrated, such as in ports like Ardrossan, Greenock or Hunterston
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Negligible (+) Unlikely to be significant positive impacts for most of the community, with impacts relying on other factors to deliver effects such as location of relocated employees and their families and their willingness and interest to get involved in local decision-making.

Aspect	Detail
Distributional effects	Relocation of 59 to 669 people to the region (based on average household size associated with a relocated job of 2.09) could have a noticeable impact on those communities where jobs are concentrated, but the increased voice of the community may come after many decisions, especially planning decisions, have been made
Impacts rating (negative) and justification	Negligible (-) For most communities, there may be no change in involvement in local decision making due to spend on wind farms
Distributional effects	Impacts likely to be greater where there is a concentration of jobs and where the population is increasing fastest as communities may feel that more decisions are being made than they can adequately influence. This may be especially true in areas where jobs are concentrated, such as in and around Ayr and Campbeltown

G.16 Cluster: wider political and environmental context – landscape, seascape, wildlife, environmental change

Impacts on landscape, seascape, wildlife and environmental change at the wider scale are linked to climate change, greenhouse gas emissions and energy from renewable sources, and condition of protected nature sites (Table 83).

Table 83 Cluster: wider political and environmental context – land-scape, seascape, wildlife, environmental change

Aspect	Detail
Detailed statistics	Index of terrestrial breeding birds 119 (2017) 76.5 million tonnes of CO_2e was produced in Scotland in 2015 80.3% of natural features on protected nature sites found to be in favourable condition (2017) 20% of energy consumption that is renewable energy (2017) 61% thought climate change is an immediate and urgent problem (2017) 67% of respondents to the Scottish Household Survey disagreed or strongly disagreed that 'it's not worth me doing things to help the environment if others don't do the same' and 59% disagreed/strongly disagreed that 'I don't believe my behaviour and everyday lifestyle contribute to climate change' (2017)
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Increase in percentage of energy consumption that is renewable Reduction in tonnes of CO_2e produced in Scotland (of renewable energy sources replace non-renewable sources)

Aspect	Detail
Cause of impacts	Spend on renewable energy helps to reduce greenhouse gas emissions and lead to cleaner economy Potential investment in new housing could lead to more efficient housing
Impacts rating and justification	Moderate (+ + +) Plan projects renewable energy generation of 3 GW (low), 5 GW (medium) to 10 GW (high) at the national level (scaled back). This is associated with sufficient level of spend to enable expansion of wind farm development supply chains in Scotland
Distributional effects	Impacts vary across regions, with highest level of projected development in North East region (low of 1.5 GW, medium of 3 GW and high of 4.5 GW). East and North regions both have projected development of 1 GW, 2 GW and 3 GW across the three scenarios with West at 0.5 GW, 1 GW and 2 GW and South West at 0.3 GW, 0.6 GW and 1 GW
Negative impacts – potential effect on national indicators	No impacts expected due to mitigation measures that will be required for all developments. May be some perception of development of the coastline that could be considered to impact on landscapes but these are expected to be insignificant at the national level, with impacts on landscape more locally considered under the community clusters
Cause of impacts	Assumes all mitigation measures are put in place and are sufficient to avoid environmental impacts
Impacts rating and justification	Neutral Mitigation measures should ensure that any negative environmental impacts are mitigated
Distributional effects	None
Region	**EAST**
Impacts rating (positive) and justification	Moderate (+ + +) Proposed development of 1 GW (low scenario) to 3 GW (high scenario)
Distributional effects	Development likely to be concentrated in those ports which already have facilities to support wind farm activities or where expansion is possible to enable those facilities to be provided. In the East, this is expected to include Aberdeen, Dundee, Eyemouth, Grangemouth, Leith, Methil, Montrose, Peterhead and Rosyth
Impacts rating (negative) and justification	Neutral Mitigation measures should ensure that any negative environmental impacts are mitigated. No impacts on landscape expected
Distributional effects	None
Region	**NORTH EAST**
Impacts rating (positive) and justification	Major (+ + + +) Proposed development of 1.5 GW (low scenario) to 4.5 GW (high scenario) is more than double the next highest

Aspect	Detail
	region with job opportunities expected to be much larger than in other regions due to the supply chain that already exists
Distributional effects	Development likely to be concentrated in those ports which already have facilities to support wind farm activities or where expansion is possible to enable those facilities to be provided. In the North East, this is expected to include Buckie, Cromarty Firth, Fraserburgh, Inverness, Kirkwall and Hatston, Macduff, Nigg and Wick
Impacts rating (negative) and justification	Neutral Mitigation measures should ensure that any negative environmental impacts are mitigated. No impacts on landscape expected
Distributional effects	None
Region	**NORTH**
Impacts rating (positive) and justification	Moderate (+ + +) Proposed development of 1 GW (low scenario) to 3 GW (high scenario)
Distributional effects	Development likely to be concentrated in those ports which already have facilities to support wind farm activities or where expansion is possible to enable those facilities to be provided. In the North, this is expected to include Kishorn, Lerwick, Lyness, Scrabster, Stornoway, and Sullom Voe
Impacts rating (negative) and justification	Neutral Mitigation measures should ensure that any negative environmental impacts are mitigated. Maybe some impacts on landscape at the local level (e.g. Lewis coast) but these are considered in the community clusters
Distributional effects	None
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Proposed development of 0.5 GW (low scenario) to 2 GW (high scenario) is lower than in most other regions (except South West)
Distributional effects	Development likely to be concentrated in those ports which already have facilities to support wind farm activities or where expansion is possible to enable those facilities to be provided. In the West, this is expected to include Ardrishaig, Ardrossan, Corpach, Fairlie, Greenock, Hunterston and Oban
Impacts rating (negative) and justification	Neutral Mitigation measures should ensure that any negative environmental impacts are mitigated. Maybe some impacts on landscape at the local level (e.g. Islay and Jura) but these are considered in the community clusters
Distributional effects	None
Region	**SOUTH WEST**

Aspect	Detail
Impacts rating (positive) and justification	Minor (+ +) Proposed development of 0.3 GW (low scenario) to 1 GW (high scenario) is lower than all other regions
Distributional effects	Development likely to be concentrated in those ports which already have facilities to support wind farm activities or where expansion is possible to enable those facilities to be provided. In the South West, this is expected to include Ayr and Campbeltown
Impacts rating (negative) and justification	Neutral Mitigation measures should ensure that any negative environmental impacts are mitigated. Maybe some impacts on landscape at the local level (e.g. Drummore, Isle of Whithorn) but these are considered in the community clusters
Distributional effects	None

G.17 Cluster: wider political and environmental context – national and EU level political and decision-making systems

Impacts on national and EU level political and decision-making systems at the wider scale are linked to Scotland's reputation and access to justice (Table 84).

Table 84 Cluster: wider political and environmental context – national and EU level political and decision-making systems

Aspect	Detail
Relevant statistics	Access to justice; Scotland's reputation
Detailed statistics	62.7 average score of the six dimension of national competence (out of 100) using the Anholt GfK-Roper Nations Brands Index (2018)[106].
Level	**NATIONAL**
Positive impacts – potential contribution to national indicators	Potential positive impacts on the exports, governance, people and investment and immigration dimensions of the index
Cause of impacts	Scotland's reputation as a leader in renewable energy would be supported and could bring future investment linked to growth of the supply chain and the increasing supply chain capacity. This could result in positive effects exports through an increase in skills and innovation in business; governance through renewable energy development and contribution to reducing GHG emissions delivering en-

[106] This measures and ranks a country's broad reputation across six dimensions of national competence (exports, governance, culture, people, tourism, investment and immigration).

Aspect	Detail
	vironmental impacts; people through improving employability and development of skills; and investment and immigration through the perception of growth following development and the creation of 648 (low) to 2,866 (high) jobs available for those wishing to relocate
Impacts rating and justification	Moderate (+ + +) Potential development and impacts that could be delivered could improve Scotland's score through positively impacting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence
Distributional effects	Impacts likely to be greater where development is greater across the regions since this will deliver more positive effects against the 81 national indicators and across the six dimensions of national competence
Negative impacts – potential effect on national indicators	Potential negative impacts on some of the 81 national indicators that reflect specific issues for the fishing industry, with this also potentially affecting exports (of fish and fish products) and people dimensions
Cause of impacts	Potential impacts on affected sectors such as fishing with estimated reduction of 2.5 (low, Type I) to 8.3 (high, Type I) FTEs as well as wider impacts from reduction of income from effects on landings
Impacts rating and justification	Minor (- -) Only likely to be noticeable in the fishing sector with knock-on impacts being small in most cases
Distributional effects	Impacts vary by port, with some ports being more affected than others such that impacts could be greater where landings are more affected
Region	**EAST**
Impacts rating (positive) and justification	Minor (+ +) Potential development in the East region could provide that could help improve Scotland's score through positively impacting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence. Scale of development (1 GW, low to 3 GW, high) means that the influence from the East region may not be sufficient alone to significantly affect Scotland's scores
Distributional effects	Impacts on relevant indicators of the 81 national indicators will be more significant in and around those ports where development is more likely
Impacts rating (negative) and justification	Minor (- -) Small impacts from reduction in fishing jobs with 0.3 (low, Type I) to 0.9 (high, Type I) FTE lost
Distributional effects	Fisheries jobs affected most likely to be in Aberdeen and Arbroath and may affect processing jobs, with impacts on families associated with these industries
Region	**NORTH EAST**

Aspect	Detail
Impacts rating (positive) and justification	Moderate (+ + +) Potential development in the North East region could provide that could help improve Scotland's score through positively impacting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence. Scale of development (1.5 GW, low to 4.5 GW, high) means that the influence from the North East region may have the greatest potential impact on any change to Scotland's scores
Distributional effects	Impacts on relevant indicators of the 81 national indicators will be more significant in and around those ports where development is more likely
Impacts rating (negative) and justification	Minor (- -) Small impacts from reduction in fishing jobs with 1.6 (low, Type I) to 4.7 (high, Type I) FTEs lost
Distributional effects	Peterhead and Fraserburgh see most of the impacts in the North East, but these represent just 0.18% of landings to the home port by value (Fraserburgh) and 0.13% for Peterhead. Buckie sees the overall greatest change in value of landings (0.27% where Buckie is the home port and 0.29% where Buckie is the landing port). These are small reductions that are unlikely to result in local job losses either directly to fisheries or to processing and the supply chain. In total, though a maximum of 4.7 (high, Type I) FTEs are estimated to be lost across the region as a whole; as a result impacts on national indicators may be limited at the national level; more significant impacts may be seen at the more local level
Region	**NORTH**
Impacts rating (positive) and justification	Minor (+ +) Potential development in the North region could provide that could help improve Scotland's score through positively impacting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence. Scale of development (1 GW, low to 3 GW, high) means that the influence from the North region may not be sufficient alone to significantly affect Scotland's scores
Distributional effects	Impacts on relevant indicators of the 81 national indicators will be more significant in and around those ports where development is more likely
Impacts rating (negative) and justification	Minor (- -) Significant impacts could occur in some ports but overall effect is small with up to a maximum of 2.9 FTEs (high, Type I) lost across the whole region
Distributional effects	Scrabster, Kinlochbervie and Ullapool see most of the impacts in the North, but these represent 0.84% of landings to the home port by value (Scrabster), 0.22% for Kinclochbervie and 0.25% for Ullapool. The overall greatest

Aspect	Detail
	change in value of landings is 0.84% at Scrabster (home port) and 0.19% at Stromness (landing port). However, with only 2.3 (high, Type I) FTEs lost as a maximum, impacts on national indicators may be limited at the national level; more significant impacts may be seen at the more local level.
Region	**WEST**
Impacts rating (positive) and justification	Minor (+ +) Potential development in the West region could provide that could help improve Scotland's score through positively impacting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence. Scale of development (0.5 GW, low to 2 GW, high) means that the influence from the West region may be unlikely to be sufficient to significantly affect Scotland's scores
Distributional effects	Impacts on relevant indicators of the 81 national indicators will be more significant in and around those ports where development is more likely
Impacts rating (negative) and justification	Minor (- -) Impacts may be significant locally but are small overall with up to a maximum of 2.0 FTEs (high, Type I) lost due to impacts on landings
Distributional effects	Oban, Islay, Fionnphort and Port Ellen see most of the impacts in the West. There are no data for most of these West ports for home port landings. The overall greatest change in value of landings is 0.39% at Oban (home port) and 0.78% at Portnhaven (landing port).These ports are not expected to result in large positive impacts from wind farm development so the impacts could be disproportionately greater as fishers would not be able to supplement their income through, e.g. support work using their vessels directly from their home port. However, with only 2.0 (high, Type I) FTEs affected, impacts on national indicators may be limited at the national level; more significant impacts may be seen at the more local level
Region	**SOUTH WEST**
Impacts rating (positive) and justification	Minor (+ +) Potential development in the South West region could provide that could help improve Scotland's score through positively affecting many of the 81 national indicators and, consequently, up to four of the six dimensions of national competence. Scale of development (0.3 GW, low to 1 GW, high) means that the influence from the West region may be unlikely to be sufficient to significantly affect Scotland's scores

Aspect	Detail
Distributional effects	Impacts on relevant indicators of the 81 national indicators will be more significant in and around those ports where development is more likely
Impacts rating (negative) and justification	Minor (- -) May be significant impacts on specific families but overall impacts are small with up to a maximum of 0.6 FTEs (high, Type I) lost across the region
Distributional effects	Ayr, Campbeltown, Drummore and Kirkcudbright see most of the impacts in the South West, but these represent a small percentage of total landing value. Maximum impacts on landings ports are seen at Campbeltown (0.28% of landings value) and Drummore (0.17% of landings value).Impacts on fisher families in these locations could be greater than suggested by loss of jobs due to loss of income from landings, but some income lost could be supplemented for fishermen out of Ayr and Campbeltown from new activities associated with wind farms to help supplement incomes. With up to 0.6 (high, Type I) FTEs lost across the region, impacts on national indicators may be limited at the national level; more significant impacts may be seen at the more local level

H Abbreviations

AGL	Above Ground Level (Height)
AIS	Automatic Identification System
ANSP	Air Navigation Service Provider
AoS	Area of Search
BoP	Balance of Plant
BRIA	Business and Regulatory Impact Assessment
BVG	BVG Associates
CAA	Civil Aviation Authority
CCS	Carbon Capture and Storage
CCSA	Carbon Capture & Storage Association
CO2e	Carbon Dioxide Equivalent
CPUE	Catch per Unit Effort
CR	Creels
D	Dredges
DPO	Draft Plan Option
DS	Demersal Seines
DT	Demersal Trawls
DTI	Department of Trade and Industry
E	East (region)
ECA	Emission Control Area
EIA	Environmental Impact Assessment
EMFF	European Maritime and Fisheries Fund
EPF	Energy Park Fife
EU	European Union
FID	Final Investment Decision
FTE	Full-time equivalent
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographical information system
GP	General Practitioner
GT	Gross Tonnage
GVA	Gross value added

GW	Gigawatt
HM	Her Majesty's
HMR	Helicopter Main Route
HMRC	Her Majesty's Revenue and Customs
HNC	Higher National Certificate
HND	Higher National Diploma
HRA	Habitats Regulations Appraisal
HVAC	Heating, Ventilation, and Air Conditioning
HVDC	High-Voltage Direct Current
ICES	International Council for the Exploration of the Sea
IFG	Inshore Fisheries Group
LN	Lines
LQ	Location Quotient
LUC	Land Use Consultants
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MESCG	Marine Energy Supply Chain Gateway
MGN	Marine Guidance Note
Misc	Miscellaneous
MMO	Marine Management Organisation
MOD	Ministry of Defence
MT	Metric Tonnes
MW	Megawatt
N	North (region)
NATS	National Air Traffic Services
NLB	Northern Lighthouse Board
NM	Nautical Miles
NMPi	National Marine Plan interactive
NUTS2	Nomenclature of Territorial Units for Statistics
NW	North West (region)
O&C	Opportunity and Constraint
O&M	Operation & Maintenance
OECD	Organisation for Economic Co-operation and Development
OMS	Operation, Maintenance and Service
ONS	Office for National Statistics

OWF	Offshore wind farm
PAYE	Pay As You Earn
PEXA	Practice and Exercise Areas
PT	Pelagic trawls
PV	Present Value
Q	Quarter
RAF	Royal Air Force
RLG	Regional Locational Guidance
ROV	Remotely Operated Underwater Vehicle
RPA	Risk & Policy Analysts
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAR	Search and Rescue
SCQF	Scottish Credit and Qualifications Framework
SEA	Strategic Environmental Assessment
SEIA	Social and Economic Impact Assessment
SIC	Standard Industrial Classification
SIMD	Scottish Index of Multiple Deprivation
SQW	SQW Group Ltd.
SW	South West (region)
TWh	Terawatt Hour(s)
UK	United Kingdom
UKHO	UK Hydrographic Office
UTM	Universal Transverse Mercator
VAT	Value-Added Tax
VMS	Vessel monitoring system
W	West (region)
WEMWS	Warwick-Edinburgh Mental Wellbeing Scale
WGS 1984	World Geodetic System (1984)
WTG	Wind Turbine Generator
WWF	World Wide Fund
ZOI	Zone of Influence

This publication is available at **www.gov.scot**

Any enquiries regarding this publication should be sent to us at

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

ISBN: 978-1-83960-379-2

Published by The Scottish Government, December 2019

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS638962 (12/19)