Appendix C Site Assessment Tables

C.1 North-East Lewis pMPA (NEL)

C.1.1 Site/Feature Summary

Site (marine) Extent (km^2): 907.39
Management Extent (km^2): 907.39

Table 1. Summary of Proposed Protected Features, Data Confidence and Conservation Objectives					**NEL**
Protected features					
North-east Lewis possible MPA encompasses two biodiversity features: Risso's dolphin and sandeels. The protected features also include Quaternary of Scotland interests (represented by glaciated channels/troughs, landscape of areal glacial scour and megascale glacial lineations) and Marine Geomorphology of the Scottish Shelf Seabed interests (represented by the longitudinal bedform field).					
Summary of confidence in presence, extent and condition of protected features and conservation objectives					
Protected Feature	**Estimated Area of Feature (km^2) or Number of Individuals**	**Confidence in Feature Presence**	**Confidence in Feature Extent**	**Confidence in Feature Condition**	**Conservation Objective**
Biodiversity Features					
Risso's dolphin	≥ 117 individuals	High	High	High	Conserve
Sandeels	254.60 km^2	High	High	High	Conserve
Geodiversity Features (for site assessment only)					
Marine geomorphology of the Scottish shelf seabed *(longitudinal bedform field)*	48.38 km^2	High	High	High	Conserve
Quaternary of Scotland *(glaciated channel/troughs, landscape of areal glacial scour, megascale glacial lineations)*	425.13 km^2	High	High	High	Conserve
Key: References: **Brooks, A.J., Kenyon, N.H., Leslie, A., Long, D. and Gordon, J.E. (2013).** Characterising Scotland's marine environment to define search locations for new Marine Protected Areas. Part 2: The identification of key geodiversity areas in Scottish waters (final report). *Scottish Natural Heritage Commissioned Report No. 432.* **Marine Scotland Science. (2012)**. Marine Protected Areas and sandeels (*Ammodytes marinus* & *A. tobianus*). Position paper for 4th MPA Workshop, Heriot-Watt University, 14-15 March 2012. **Weir, C., Hodgins, N., Dolman, S. and Walters, A. (2017).** Risso's dolphin (*Grampus griseus*) in a proposed Marine Protected Area off east Lewis (Scotland, UK), 2010–2017. Journal of the Marine Biological Association of the United Kingdom.					

Area of Features: 907.39 km^2
Confidence in biodiversity feature presence and extent: High
Confidence in biodiversity feature condition: High
Confidence in geodiversity feature presence and extent: High
Confidence in geodiversity feature condition: High

C.1.2 Summary of Costs and Benefits

Table 2. Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive at present values)			**NEL**
Human Activity	**Cost Impact on Activity**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Economic Costs (Discounted)			
Finfish Aquaculture	9	71	107
Shellfish Aquaculture	9	9	9
Coastal Protection	16	16	16
Commercial Fisheries (GVA)	0	Cannot be disclosed	Cannot be disclosed
Ports and Harbours	27	27	27
Power Interconnectors	6	6	478
Telecommunication Cables	4	4	4
Total Quantified Economic Costs	**72**	**134**	**642**
Total Quantified Economic Costs (GVA)	**0**	**Cannot be disclosed**	**Cannot be disclosed**
Non-Quantified Economic Costs			
Finfish Aquaculture	▪ Cost of uncertainty and delays ▪ Potential displacement of new aquaculture sites to areas outwith the pMPA	▪ Cost of uncertainty and delays ▪ Potential displacement of new aquaculture sites to areas outwith the pMPA	▪ Cost of uncertainty and delays ▪ Potential displacement of new aquaculture sites to areas outwith the pMPA
Shellfish Aquaculture	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays
Commercial Fisheries	▪ None	▪ If activity is displaced rather than lost, there is potential for: ▪ Gear conflict. ▪ Additional impacts on species outside of site. ▪ Changes to vessel costs/revenues.	▪ If activity is displaced rather than lost, there is potential for: ▪ Gear conflict. ▪ Additional impacts on species outside of site. ▪ Changes to vessel costs/revenues.
Power Interconnectors	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications
Note: For detailed information on economic cost impacts on activities, see Table 3.			

C.1.3 Human Activity Summaries

Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 3a: Finfish Aquaculture			**NEL**
There are currently no finfish aquaculture sites within the NEL pMPA, with a single finfish aquaculture site located within a 1 km buffer around the pMPA. It is expected that the finfish aquaculture in the NEL pMPA will expand over the assessment period, and an assumption has been used below that there will be 1 application for new or expanding sites every 5 years in NEL. It is assumed that the site in the pMPA currently uses acoustic deterrent devices (ADDs), intended to reduce predation by seals. Aquaculture installations are shown in Figure 1.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ It is assumed there will be 1 application every 10 years in NEL. ▪ Additional assessment to support new applications will cost £5,600 per assessment. ▪ Development of and compliance with vessel management plan will cost £1,000 per new application.	▪ It is assumed there will be 1 application every 10 years in NEL. ▪ Additional assessment to support new applications will cost £5,600 per assessment. ▪ The additional cost of installing 50% cetacean-friendly ADDs is £11,500 per site, every 6 years. ▪ Development of and compliance with vessel management plan will cost £1,000 per new application.	▪ It is assumed there will be 1 application every 10 years in NEL. ▪ Additional assessment to support new applications will cost £5,600 per assessment. ▪ The additional cost of installing antipredator nets is £48,000 per site. ▪ It is assumed that the cost associated with antipredator nets will be phased in associated with the replacement of end-of-life ADDs, and required for all new applications. ▪ Development of and compliance with vessel management plan will cost £1,000 per new application.

Description of quantified one-off impacts - (on-site)		▪ Additional assessment is required to assess the potential impact of new fish farms on MPA features to support planning applications. Total cost = £11k ▪ Development of and compliance with vessel management plan. Total cost = £2k	▪ Additional assessment is required to assess the potential impact of new fish farms on MPA features to support planning applications. Total cost =£11k ▪ Development of and compliance with vessel management plan. Total cost =£2k ▪ Replacement of 50% of end of life ADDs with cetacean appropriate devices. Total cost = £92k	▪ Additional assessment is required to assess the potential impact of new fish farms on MPA features to support planning applications. Total cost =£11k ▪ Development of and compliance with vessel management plan. Total cost = £2k ▪ Replacement of ADDs with antipredator nets. Total cost = £144k
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays
	Off-site	▪ Potential displacement of new aquaculture sites to areas outwith the pMPA	▪ Potential displacement of new aquaculture sites to areas outwith the pMPA	▪ Potential displacement of new aquaculture sites to areas outwith the pMPA
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		13	105	157
Average annual costs		1	5	8
Present value of total costs (2019 to 2038)		9	71	107
Definitions of cost and economic impacts: Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period. Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20). Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.				

Table 3b: Shellfish Aquaculture				**NEL**
There are currently no shellfish aquaculture sites within the NEL pMPA, and no shellfish aquaculture sites within a 1 km buffer around the pMPA. However, there are a number of sites in close proximity (albeit greater than 1 km from the site) and therefore, with the growth of the industry there is potential for shellfish aquaculture in the NEL pMPA to develop over the assessment period, and an assumption has been used below that there will be 1 application for a new site (or expansion of existing site) every 10 years in NEL. Aquaculture installations are shown in Figure 1.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that there will be 1 new application in NEL every 10 years. ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application. ▪ Development of a vessel management plan associated with new applications will cost £1,000 per application.	▪ It has been assumed that there will be 1 new application in NEL every 10 years. ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application. ▪ Development of a vessel management plan associated with new applications will cost £1,000 per application.	▪ It has been assumed that there will be 1 new application in NEL every 10 years. ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application. ▪ Development of a vessel management plan associated with new applications will cost £1,000 per application.
Description of quantified one-off impacts - (on-site)		▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £11,200 ▪ Development of and compliance with vessel management plan. Total cost = £2,000	▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £11,200 ▪ Development of and compliance with vessel management plan. Total cost = £2,000	▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £11,200 ▪ Development of and compliance with vessel management plan. Total cost = £2,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays
	Off-site	▪ N/A	▪ N/A	▪ N/A

Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)			
Cost Impacts (£000s)			
Total costs (2019 to 2038)	13	13	13
Average annual costs	1	1	1
Present value of total costs (2019 to 2038)	9	9	9

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3c Coastal Protection				**NEL**
The data currently available through the Eurosion database currently identifies no coastal protection assets within the pMPAs. However, it is thought that there are some areas of hard defence which are likely to require maintenance, and therefore assumptions made as summarised below.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that there is one application every 5 years in NEL for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.	▪ It has been assumed that there is one application every 5 years in NEL for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.	▪ It has been assumed that there is one application every 5 years in NEL for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.
Description of quantified one-off impacts - (on-site)		▪ Additional assessment is required to assess the potential impact of new coastal protection projects on MPA features to support planning applications. Total cost = £22,400	▪ Additional assessment is required to assess the potential impact of new coastal protection projects on MPA features to support planning applications. Total cost = £22,400	▪ Additional assessment is required to assess the potential impact of new coastal protection projects on MPA features to support planning applications. Total cost = £22,400
Description of quantified recurring impacts – (on-site)*		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		22	22	22
Average annual costs		1	1	1
Present value of total costs (2019–2038)		16	16	16

* Notes
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3d: Commercial fisheries			**[NEL]**
North-east Lewis pMPA lies within ICES rectangles 45E3, 46E3, 45E4 and 46E4 in ICES Division VIa. Approximately 11,697 tonnes of fish and shellfish were landed from these ICES rectangles per annum (2012-2016), predominantly (over 60%) pelagic species by weight and shellfish species (over 50%) by value. The main gear types were midwater and demersal trawls. VMS-based estimates and ICES rectangle landings statistics indicate that demersal trawls and creels (over-12m vessels) and demersal trawls and creels (under-12m vessels) are the main gear types that operate within the North-east Lewis pMPA. The value of landings from the pMPA was £1.7 million (over-12m vessels, from VMS data) and £4.0 million (under-12m vessels, indicated from ICES rectangle landings data) (annual average for 2012–2016, 2019 prices). Vessels fishing in the North-east Lewis pMPA predominantly operate from: Stornoway and Ullapool (over-12m vessels) and Stornoway and Ayr (under-12m vessels). Landings from the over-12m vessels were made predominantly into Stornoway (50 %), Ullapool (28 %) and Kinlochbervie (8 %). Landings from the under-12m vessels were made predominantly into Back (27 %), Bernera (Lewis) (16 %), Stornoway (15 %) and Carloway (14 %). For the over-12m vessels, creels operated in particular in the sandeel grounds in the north of the pMPA while demersal trawls operated mainly in the southern part of the pMPA. For the under-12m vessels, creels operated in particular along the coast of Lewis and the southern part of the pMPA. VMS and Scotmap data for the site are shown in Figure 2 and Figure 3. The value of the loss of fishing income assessed cannot be disclosed in the intermediate and upper scenarios, as it represents the activity of fewer than 5 vessels, the values are minimal (<£100 per year).			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ Reduce risk of entanglement of static gear with Risso's dolphin by following best practice. It is assumed that this does not entail additional costs. ▪ Reduce risk of entanglement of Risso's dolphin with pelagic gear by following best practice. It is assumed that this does not entail additional costs.	▪ Reduce risk of entanglement of static gear with Risso's dolphin by following best practice. It is assumed that this does not entail additional costs. ▪ Reduce risk of entanglement of Risso's dolphin with pelagic gear by following best practice. It is assumed that this does not entail additional costs. ▪ Exclude targeted fishing for sandeels. ▪ Exclusion of hydraulic gear from sandeel habitat. ▪ Exclusion of drift nets and set nets in southern half of site.	▪ Reduce risk of entanglement of static gear with Risso's dolphin by following best practice. It is assumed that this does not entail additional costs. ▪ Reduce risk of entanglement of Risso's dolphin with pelagic gear by following best practice. It is assumed that this does not entail additional costs. ▪ Exclude targeted fishing for sandeels. ▪ Exclusion of hydraulic gear from sandeel habitat. ▪ Exclusion of drift nets and set nets across site between May and

				October.
One-off impacts (on-site)		▪ None	▪ None	▪ None
Recurring impacts – cost impacts per fleet segment (annual values, £000s, 2019 prices) (on-site)*	**Over-12m vessels**	▪ Loss of >12m fishing income:	▪ Loss of >12m fishing income:	▪ Loss of >12m fishing income:
	No gears affected	0.0	0.0	0.0
	Subtotal over-12m	0.0	0.0	0.0
	Under-12m vessels	▪ Loss of <12m fishing income:	▪ Loss of <12m fishing income:	▪ Loss of <12m fishing income:
	Set nets and drift nets	0.0	Cannot be disclosed	Cannot be disclosed
	Subtotal under-12m	0.0	Cannot be disclosed	Cannot be disclosed
	Total all vessels	0.0	Cannot be disclosed	Cannot be disclosed
Description of non-quantified impacts	On-site	▪ None	▪ None	▪ None
	Off-site	▪ None	If activity is displaced rather than lost, there is potential for: ▪ Gear conflict. ▪ Additional impacts on species outside of site. ▪ Changes to vessel costs/revenues.	If activity is displaced rather than lost, there is potential for: ▪ Gear conflict. ▪ Additional impacts on species outside of site. ▪ Changes to vessel costs/revenues.
Quantified Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive) (deriving from on-site impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		0.0	Cannot be disclosed	Cannot be disclosed
Average annual costs		0.0	Cannot be disclosed	Cannot be disclosed
Present value of total costs (2019–2038)		0.0	Cannot be disclosed	Cannot be disclosed
Economic Impacts				
Direct GVA (£000s)				
Total change in GVA (2019–2038)		0.0	Cannot be disclosed	Cannot be disclosed
Average annual change in GVA		0.0	Cannot be disclosed	Cannot be disclosed
Present value of total change in GVA (2019–2038)		0.0	Cannot be disclosed	Cannot be disclosed
Direct + Indirect GVA (£000s)				

Total change in GVA (2019–2038)	0.0	Cannot be disclosed	Cannot be disclosed
Average annual change in GVA	0.0	Cannot be disclosed	Cannot be disclosed
Present value of total change in GVA (2019–2038)	0.0	Cannot be disclosed	Cannot be disclosed
Direct, Indirect + Induced GVA (£000s)			
Total change in GVA (2019–2038)	0.0	Cannot be disclosed	Cannot be disclosed
Average annual change in GVA	0.0	Cannot be disclosed	Cannot be disclosed
Present value of total change in GVA (2019–2038)	0.0	Cannot be disclosed	Cannot be disclosed
Employment (FTEs)			
Direct and indirect reduction in employment	0.0	Cannot be disclosed	Cannot be disclosed
Direct, indirect and induced reduction in employment	0.0	Cannot be disclosed	Cannot be disclosed

* On-site cost impacts may be offset by catches from effort displaced off-site, detailed in the assumptions.
** Where the value of landings affected is less than 10% of the value from the site, less than 10% of the value from each ICES rectangle, or less than 1% of the value from the region, it is likely that this activity can be absorbed by other grounds in the pMPA, ICES rectangles or region as appropriate, and therefore no cost impact is anticipated.
Cannot be disclosed: Where data represent 5 or fewer individuals/vessels/companies, their value cannot be disclosed for data protection reasons.
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.
Total change in GVA (2019–2038) = The change in GVA (direct/indirect/induced as appropriate) for commercial fisheries summed over the 20 year period.
Average annual change to GVA = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries divided by the total number of years under analysis (i.e. 20).
Present value of total change in GVA (2019–2038) = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries discounted to current value, using a discount rate of 3.5%.
Direct, indirect reduction in Employment = The average (mean) reduction in direct employment in the sector in full-time equivalents (FTEs), and indirect reduction in employment on the sector's suppliers.
Direct, indirect and induced reduction in employment = The average (mean) reduction in employment in the sector, the sector's suppliers and across the economy as a whole as a result of reduced expenditure by employees and suppliers.

Table 3e: Ports and Harbours				NEL
There are 5 minor ports and harbours within NEL or within a 1 km buffer of the NEL pMPA (Back, Bayble, Brevig, Garrabost and Ness). Ports and harbours are shown in Figure 1.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs per licence application are estimated to be £7,600 (at 2019 prices); ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs per licence application are estimated to be £7,600 (at 2019 prices); ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs per licence application are estimated to be £7,600 (at 2019 prices); ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.
Description of quantified one-off impacts - (on-site)		▪ Additional assessment cost for development of major ports. Total cost = £0 ▪ Additional assessment cost for development of minor ports. Total cost = £38,000	▪ Additional assessment cost for development of major ports. Total cost = £0 ▪ Additional assessment cost for development of minor ports. Total cost = £38,000	▪ Additional assessment cost for development of major ports. Total cost = £0 ▪ Additional assessment cost for development of minor ports. Total cost = £38,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-	On-site	▪ N/A	▪ N/A	▪ N/A

quantified impacts	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		38	38	38
Average annual costs		2	2	2
Present value of total costs (2019 to 2038)		27	27	27

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3f: Power Interconnectors			**NEL**
There are no power interconnectors currently located within the NEL pMPA. There is one project identified for potential development over the assessment period (Western Isles HVDC, potentially due for construction in 2021) which crosses the pMPA. This project will require additional assessments to support planning applications (including marine licence) and regular survey to support operation and maintenance following construction. The proposed interconnector route is shown in Figure 1.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ It has been assumed that the additional assessment required to include MPA features is £5,600 for each application. ▪ It has been assumed that the Western Isles HVDC connection is the only proposed connection in NEL during the assessment period.	▪ It has been assumed that the additional assessment required to include MPA features is £5,600 for each application. ▪ It has been assumed that the Western Isles HVDC connection is the only proposed connection in NEL during the assessment period.	▪ It has been assumed that the additional assessment required to include MPA features is £5,600 for each application. ▪ It has been assumed that the Western Isles HVDC connection is the only proposed connection in NEL during the assessment period. ▪ It will take 3 days of survey effort to survey a 12 nm section of cable within the MPA ▪ The restriction on survey effort to Nov-April is assumed to double the amount of time required to undertake the survey (3 days of survey effort will take on average 8 days in winter, 4 in summer i.e. an additional 4 days downtime). ▪ The cost of an additional day (generally weather down-time) is assumed to be £10,000. ▪ It is assumed that the Western Isles HVDC will require survey annually following construction in 2021.
Description of quantified one-off impacts - (on-site)	▪ Cost of additional assessment for proposed interconnector projects transecting sites. Total cost = £5,600	▪ Cost of additional assessment for proposed interconnector projects transecting sites. Total cost = £5,600	▪ Cost of additional assessment for proposed interconnector projects transecting sites. Total cost = £5,600

Description of quantified recurring impacts – (on-site)		▪	▪	▪ Cost associated with additional weather downtime associated with seasonal restriction on annual cable survey. Total cost = £680,000
Description of non-quantified impacts	On-site	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		6	6	686
Average annual costs		0	0	34
Present value of total costs (2019 to 2038)		6	6	478

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3g: Telecommunication Cables				**NEL**
There is one telecommunication cable which transits through NEL (BT-HIE Seg1.13) totalling approximately 15 km of length within the pMPA. This links mainland Scotland with the Isle of Lewis. Telecom cables are shown in Figure 1.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices. ▪ It has been assumed that the cable is replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices. ▪ It has been assumed that the cable is replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices. ▪ It has been assumed that the cable is replaced during the assessment period.
Description of quantified one-off impacts - (on-site)		▪ Cost of additional assessment. Total cost = £5,600	▪ Cost of additional assessment. Total cost = £5,600	▪ Cost of additional assessment. Total cost = £5,600
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		6	6	6
Average annual costs		0	0	0
Present value of total costs (2019 to 2038)		4	4	4
Definitions of cost and economic impacts: Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period. Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20). Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.				

Human activities that would benefit from designation and management of the site as an MPA

Table 4. Human Activities that would Benefit from Designation and Management of the Site as an MPA				NEL
Activity	**Description**	**Lower Estimate**	**Intermediate Estimate**	**Upper Estimate**
Marine wildlife tourism	Tourism based around observation of features protected at sites (e.g. cetaceans, basking shark, seabird colonies).	Minimal, management scenarios have little impact.		Low-Moderate, scale and/or quality of activity may increase due to protection of features of site that contribute to tourism and recreation from decline, possibly allowing some recovery.
Marine recreation	Recreation activities using the marine environment, for which wildlife and environmental quality are part of the motivation for the activity (e.g. angling, scuba diving).			

Human activities that would be unaffected by designation and management of the site as an MPA

Table 5. Human Activities that would be Unaffected by Designation and Management of the Site as an MPA	NEL
Activity	**Description**
Carbon Capture and Storage	No CCS sites or potential pipelines near the site
Energy Generation	There are no current proposals for energy generation which would be affected by the MPA, and the uncertainty regarding future development is too high to conclude any impact within the study period.
Oil and Gas	There are no current proposals for the oil and gas industry which would be affected by the MPA, and the uncertainty regarding future development is too high (although considered highly unlikely) to conclude any impact within the study period.
Recreational Boating	The potential management scenarios would have no impact on recreational boating in the region of the MPA.
Shipping	The potential management scenarios would have no impact on commercial shipping in the region of the MPA.

C.1.4 Social and Distributional Analysis of Impacts arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 6a. Social Impacts Associated with Quantified and Non-Quantified Economic Impacts			NEL
Potential Economic Impacts	**Area of Social Impact Affected**	**Mitigation**	**Significance of Social Impact**
Exclusion from traditional from traditional fishing grounds (assuming no displacement)	Reduced income and employment	N/A	0
Impacts: xxx – significant negative effect; xx – possible negative effects; x – minimal negative effect, if any; 0 – no noticeable effect expected.			

Table 6b. Distribution of Social Impacts (Location, Age and Gender)									NEL
Sector/Impact	**Scale of Impact by location**			**Age**			**Gender**		
	Region	**Ports***	**Rural, Urban, Mainland or Island**	**Children**	**Working age**	**Pensionable Age**	**Male**	**Female**	
Unemployment	North Minch	Home: Stornoway 100% (100%) Landing: Barra 100% (100%)	0	0	0	0	0	0	
Lower Income			0	0	0	0	0	0	
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected. * Based on value of landings by home or landing port affected under intermediate estimate (upper estimate in brackets)									

Table 6c. Distribution of Social Impacts (Fishing Groups, Income Groups and Social Groups)									NEL
Sector/Impact	**Fishing Groups**		**Income Groups**			**Vulnerable Social Groups**			
	Vessel Category <12 m >12 m	**Gear Types/Sector**	**10% most deprived**	**Middle 80%**	**10% most affluent**	**Crofters**	**Ethnic minorities**	**With disability or long-term sick**	
Unemployment	<12 m	Drift nets and Set nets	0	0	0	0	0	0	
Lower Income			0	0	0	0	0	0	
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected.									

C.1.5 Public Sector Costs

Table 7. Site/Feature-Specific Public Sector Costs arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 Inclusive)			NEL
Description	**Public Sector Costs (Total cost- not discounted)**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Public Sector Costs (Total, not discounted unless otherwise specified)			
Preparation of Statutory Instruments	0	4.2	4.2
Preparation of a Management Scheme	27.8	27.8	27.8
Promotion of Voluntary Measures	4.2	4.2	4.2
Monitoring of Protected Features	324	324	324
Review of Assessments (PV)	7	7	7
Total Quantified Public Sector Costs	**363**	**367**	**367**
Average annual costs	**18**	**18**	**18**
Present value of total costs (2019 to 2038)	**274**	**278**	**278**

C.1.6 Potential contribution of the site to an ecologically-coherent network

Table 8. Overview of MPA interest features for which designation and management have been proposed and how these contribute to an ecologically coherent network of MPAs					NEL
Feature Name	**Representation**	**Replication**	**Linkages**	**Geographic Range and Variation**	**Resilience**
Risso's dolphin	Provides representation of the highly mobile MPA search feature that would not otherwise be included within the network.	Although Risso's dolphin would only be included once there are no other locations that could constitute essential areas for this species in Scottish waters. Therefore Risso's dolphin would be adequately protected even though replication of this feature has not been achieved within the Scottish MPA network.	MPA proposal was developed on the inclusion of habitats of key prey species and for Risso's dolphin, the inclusion of areas with a high percentage of sightings where calves were present.	The assessment was on the geographic range, because there is no known ecological variation across Scotland's seas.	Resilience considered to be adequate from inclusion in NEL pMPA. Risso's dolphin is not included on the OSPAR Threatened and/or Declining List and therefore it is not considered that a greater proportion needs to be included within the MPA network.
Sandeels	Provides representation of this feature in OSPAR Region III.	Sandeels are replicated within the Scottish MPA network at 3 further sites, NEL provides the only representation in OSPAR Region III	The NEL pMPA provides an export of larvae to north-west Scotland sandeel grounds, contributing to linkages across the continental shelf around Scotland.	NEL provides representation of sandeel in OSPAR Region III.	Sandeels within Scotland's seas have declined and are considered to be vulnerable, so there is justification for greater replication of important areas for sandeels in the network.

References Scottish Natural Heritage. 2014. Further advice to Scottish Government on the selection of Nature Conservation Marine Protected Areas for the development of the Scottish MPA network. *Scottish Natural Heritage Commissioned Report No. 780.*

C.1.7 Anticipated Impacts on Ecosystem Services

Table 9a. Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)									NEL
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
Fish and shellfish for human consumption	Moderate, benthic habitat and sandeels contribute to the food web	On-site and off-site	Stocks not at MSY	Nil		Nil, fisheries effects negligible	Moderate, sandeels are important in food webs for commercial species and priority wildlife species.	Minimal	Moderate
Fish and shellfish for non-human consumption			Stocks reduced from potential maximum						
Climate regulation	Moderate, in coastal areas	On-site	Moderate	Nil – management scenarios will not affect features providing this service			Moderate	Nil	High
Waste breakdown/ detoxification	Minimal	On-site	Low	Nil – management scenarios will not affect features providing this service			Low, water quality in this area not affecting human welfare	Nil	High
Non-use value of natural environment	Moderate, Risso's dolphin and sandeels, and contribution of the site to MPA network, have non-use value	On-site and off-site	Non-use value of the site may decline	Moderate, protection of features of site from potential future decline			Low–Moderate, protection of features is valued by divers & anglers (Kenter *et al*. 2013).	Moderate	Moderate, extent of features, responses to management scenarios, and value to society all uncertain
					Low, recovery of features possible				
Recreation	Moderate, wildlife tourism and recreation at site, including angling (Kenter *et al*. 2013)	On-site	Recreation value of the site may decline	Minimal, protection of features of site	Low, protection of features of site that contribute to recreation, allowing some recovery		Moderate–High, recreation and tourism support jobs, and are valued (Kenter *et al*. 2013)	Low–Moderate	Low–Moderate, extent of change from management scenarios uncertain
Research and Education	Moderate, small number of biological features have research value, but there are	On-site	Value of site may decline		Low, protection of key character-istics of site from decline, improving future research opportunities		Low, for individual features. Moderate for opportunity to	Low	Low–Moderate, extent to which research uses site in future uncertain.

Table 9a. Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)								NEL
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
	substitutes			Designation may play role in communicating management needs.			understand response of range of features to management.		
Total value of changes in ecosystem services			Value of site may decline	Minimal for lower scenario, Low for intermediate and upper scenario, designation has Moderate non-use value to protecting site from future decline (Kenter *et al*. 2013)				Low–Moderate	Moderate
Total value of changes in ecosystem services				**Low–Moderate**					**Moderate**

Table 9b. Summary of Ecosystem Services Costs arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)								NEL
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Costs**	**Confidence**
				Lower	**Intermediate**	**Upper**			
No costs are expected to arise. The scale of fisheries impacts is considered to be too small for displacement of fishing effort or changes in fishing gear to have any noticeable impacts on ecosystem services outside the site.									
Total value of changes in ecosystem services				**Nil**					**High**

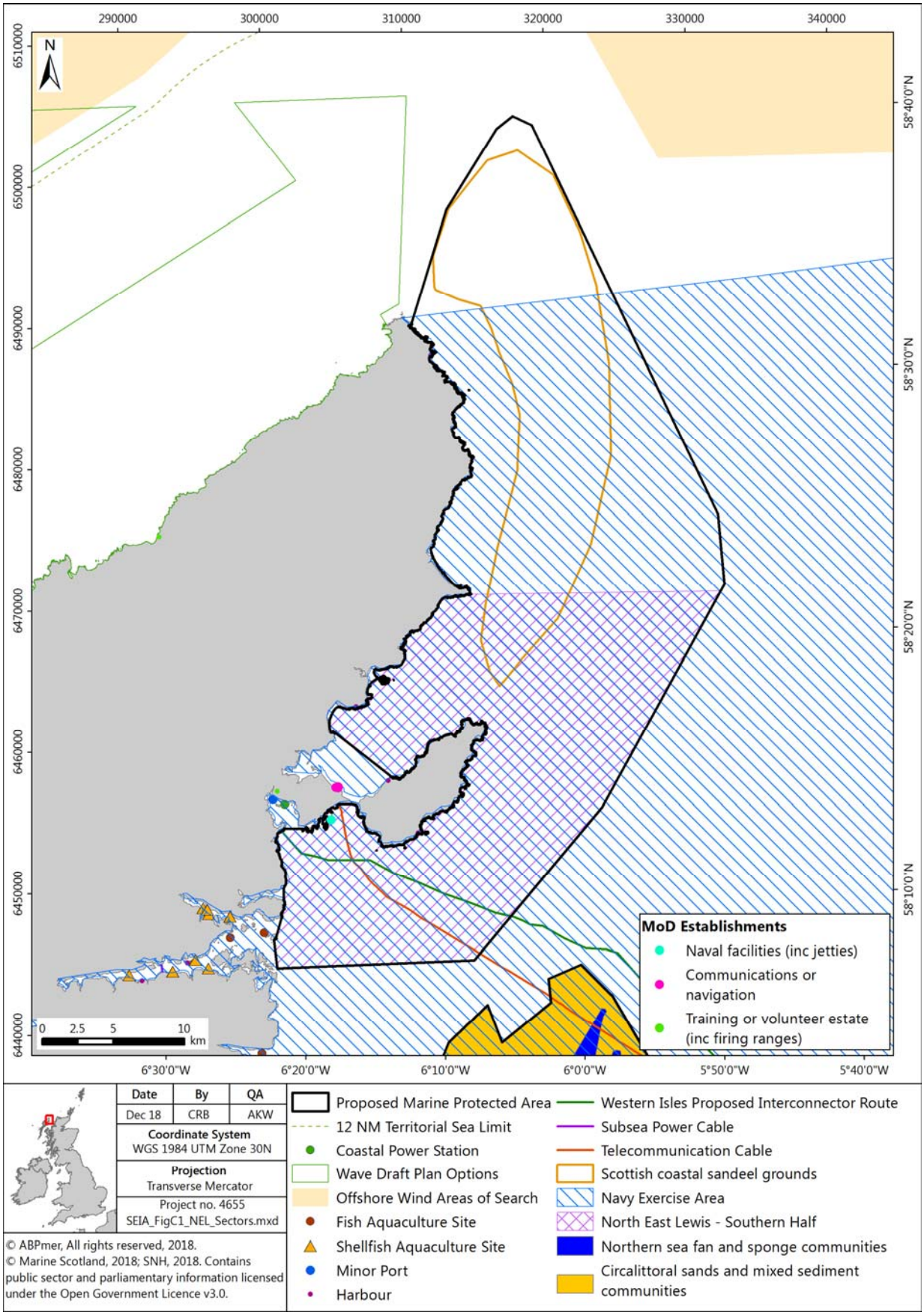

Figure 1 All sector activities in NEL (excluding commercial fisheries)

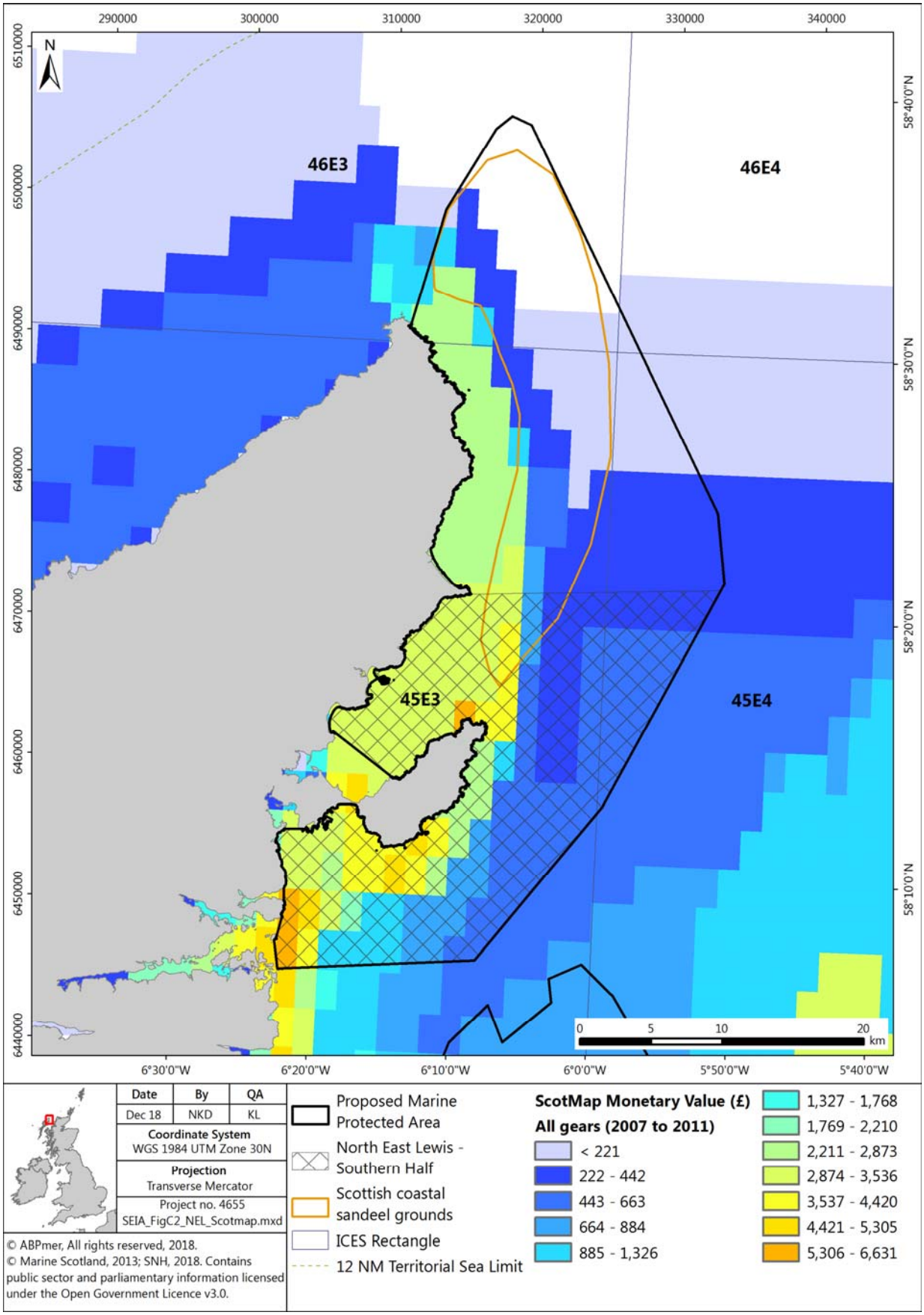

Figure 2 Commercial fisheries ScotMap Data for NEL

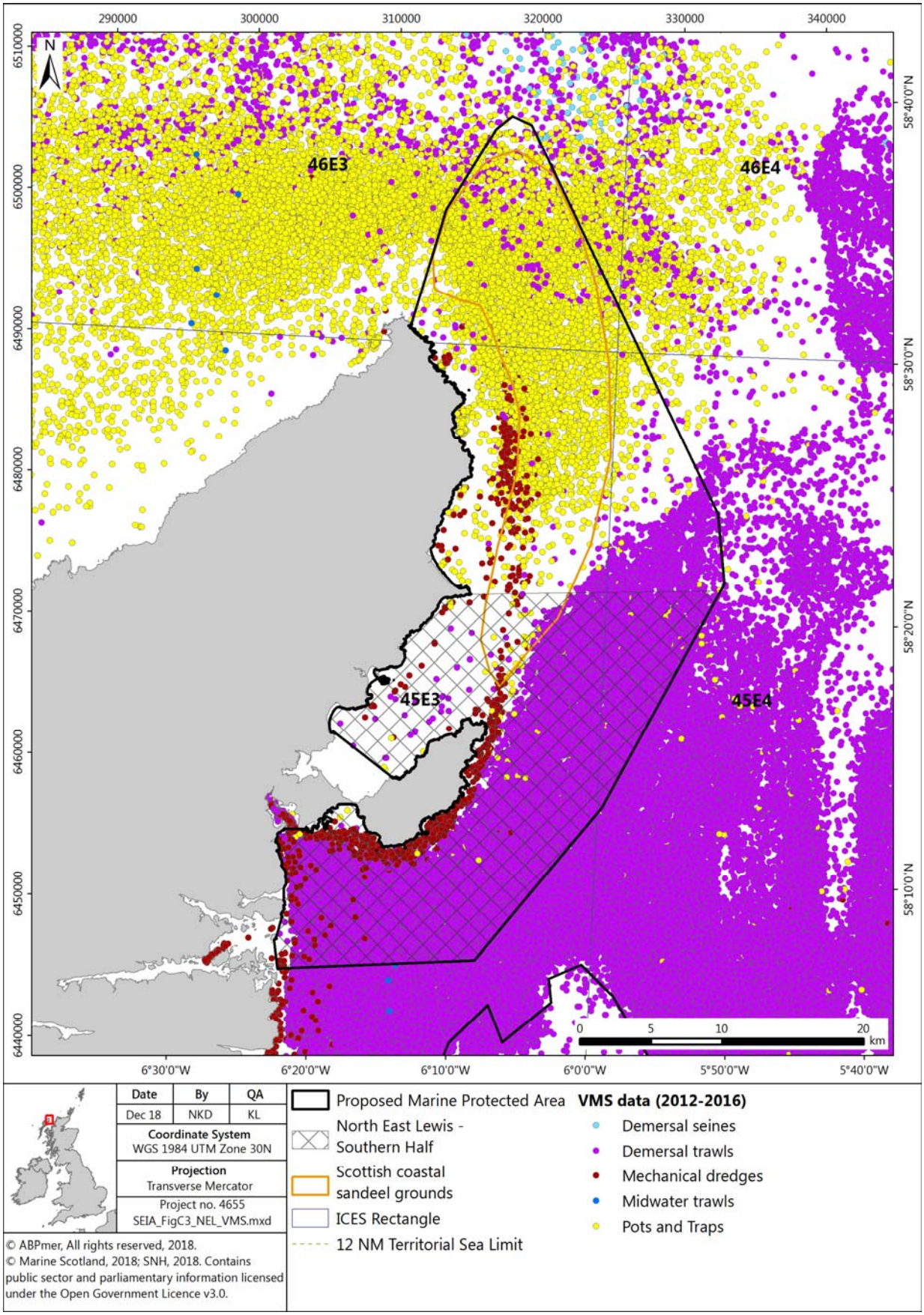

Figure 3 Commercial fisheries VMS data for NEL

C.2 Sea of the Hebrides pMPA (SOH)

C.2.1 Site/Feature Summary

Site Extent (km²): 10,039.10
Management Extent (km²): 10,039.10

Table 1. Summary of Proposed Protected Features, Data Confidence and Conservation Objectives					**SOH**
Protected features					
Sea of the Hebrides possible MPA encompasses three biodiversity features: basking shark, minke whale and fronts. The front feature, which appears during the spring and summer south-west of Tiree, provides an important functional link to both basking shark and minke whale by facilitating favourable feeding conditions. The protected features also include marine geomorphology of the Scottish shelf seabed interests as represented by the Inner Hebrides Carbonate Production Area.					
Summary of confidence in presence, extent and condition of protected features and conservation objectives					
Protected Feature	**Estimated Area of Feature (km²) or Number of Individuals**	**Confidence in Feature Presence**	**Confidence in Feature Extent**	**Confidence in Feature Condition**	**Conservation Objective**
Biodiversity Features					
Basking shark	N/A[a]	High	High	Medium	Conserve
Fronts	N/A[b]	High	High	High	Conserve
Minke whale	N/A[a]	High	High	Medium	Conserve
Geodiversity Features (for site assessment only)					
Marine geomorphology of the Scottish shelf seabed (*Inner Hebrides Carbonate Production Area)*	1,726.23 km²	High	Medium	Medium	Conserve

a. Population estimate relating to the pMPA is not available for mobile species
b. The position and extent of the fronts feature varies spatially and temporally. The pMPA site boundary therefore reflects the persistent position of the front feature averaged across all seasons.

References:

Brooks, A.J. Kenyon, N.H. Leslie, A., Long, D. and Gordon, J.E. (2013). Characterising Scotland's marine environment to define search locations for new Marine Protected Areas. Part 2: The identification of key geodiversity areas in Scottish waters. Scottish Natural Heritage Commissioned Report No. 432.

Miller, P.I., Xu, W. and Lonsdale, P. (2014). Seasonal shelf-sea front mapping using satellite ocean colour to support development of the Scottish MPA network. Scottish Natural Heritage Commissioned Report No. 538.

Paxton, C.G.M., Scott-Hayward, L.A.S. and Rexstad, E. (2014). Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and basking shark. Scottish Natural Heritage Commissioned Report No. 594.

Area of Features: 10,039.10 km²

Confidence in biodiversity feature presence and extent: High. Confidence in biodiversity feature condition: High/Medium. Confidence in geodiversity feature presence and extent: Medium. Confidence in geodiversity feature condition: Medium

C.2.2 Summary of Costs and Benefits

Table 2. Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)			**SOH**
Human Activity	**Cost Impact on Activity**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Economic Costs (Discounted)			
Finfish Aquaculture	29	198	300
Shellfish Aquaculture	66	66	66
Coastal Protection	16	16	16
Commercial Fishing (GVA)	0	16	25
Ports and Harbours	59	59	62
Recreational Boating	0	0	1
Commercial Shipping	0	0	1
Telecommunication Cables	4	4	4
Total Quantified Economic Costs	**175**	**344**	**451**
Total Quantified Economic Costs (GVA)	**0**	**16**	**25**
Non-Quantified Economic Costs			
Finfish Aquaculture	▪ Cost of uncertainty and delays ▪ Potential displacement of new aquaculture sites to areas outwith the pMPA	▪ Cost of uncertainty and delays ▪ Potential displacement of new aquaculture sites to areas outwith the pMPA	▪ Cost of uncertainty and delays ▪ Potential displacement of new aquaculture sites to areas outwith the pMPA
Shellfish Aquaculture	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays
Commercial Fisheries	▪ None	▪ If activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Gear conflict. ▪ Additional impacts on species outside of site. ▪ Changes to vessel costs/revenues.	▪ If activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Gear conflict. ▪ Additional impacts on species outside of site. ▪ Changes to vessel costs/revenues.
Power Interconnectors	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications
Note: For detailed information on economic cost impacts on activities, see Table 3.			

C.2.3 Human Activity Summaries

Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 3a: Finfish Aquaculture			**SOH**
There are currently 4 finfish aquaculture sites within the SOH pMPA, and a further 2 finfish sites in a 1 km buffer around the pMPA. Of these sites, five are within the Inner Hebrides and the Minches SAC. It is expected that finfish aquaculture in the SOH pMPA will expand over the assessment period, and an assumption has been used below that there will be 9 applications for new or expanding sites every 5 years in SOH. Of the sites in the pMPA it is expected assumed that all will currently use acoustic deterrent devices (ADDs) devices, intended to reduce predation of stocks by seals. Aquaculture installations are shown in Figure 4.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ There will be 9 applications every 10 years in SOH (7 of which also overlap Inner Hebrides and the Minches cSAC). ▪ Additional assessment to support new applications will cost £5,600 per assessment; ▪ Development of and compliance with vessel management plan will cost £1,000 per new application.	▪ There will be 9 applications every 10 years in SOH (7 of which also overlap Inner Hebrides and the Minches cSAC). ▪ Additional assessment to support new applications will cost £5,600 per assessment; ▪ The additional cost of installing 50% cetacean friendly ADDs is £11,500 per site ▪ Development of and compliance with vessel management plan will cost £1,000 per new application.	▪ There will be 9 applications every 10 years in SOH (7 of which also overlap Inner Hebrides and the Minches cSAC). ▪ Additional assessment to support new applications will cost £5,600 per assessment; ▪ Development of and compliance with vessel management plan will cost £1,000 per new application. ▪ The additional cost of installing antipredator nets is £48,000 per site. ▪ It is assumed that the cost associated with antipredator nets will be phased in associated with the replacement of end-of life ADDs. ▪ There is no additional cost due to restriction of vessel speeds to <6 knots in shark awareness zones

Description of quantified one-off impacts - (on-site)		▪ Additional assessment is required to assess the potential impact of new fish farms on MPA features to support planning applications. Total cost = £22,400 ▪ Development of and compliance with vessel management plan. Total cost = £18,000	▪ Additional assessment is required to assess the potential impact of new fish farms on MPA features to support planning applications. Total cost = £22,400 ▪ Development of and compliance with vessel management plan. Total cost = £18,000 ▪ Replacement of 50% of end of life ADDs with cetacean / basking shark appropriate devices. Total cost = £250,000	▪ Additional assessment is required to assess the potential impact of new fish farms on MPA features to support planning applications. Total cost = £22,400 ▪ Development of and compliance with vessel management plan. Total cost = £18,000 ▪ Restriction of vessel speeds to <6 knots in shark awareness zones. Total cost = £0 ▪ Replacement of ADDs with antipredator nets. Total cost = £384,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays
	Off-site	▪ Potential displacement of aquaculture sites to areas outwith the pMPA	▪ Potential displacement of aquaculture sites to areas outwith the pMPA	▪ Potential displacement of aquaculture sites to areas outwith the pMPA
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		40	290	424
Average annual costs		2	14	21
Present value of total costs (2019 to 2038)		29	198	300

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3b: Shellfish Aquaculture			**SOH**
There are currently 3 shellfish aquaculture sites within the SOH pMPA, and a further 3 shellfish sites within a 1 km buffer around the pMPA. Of these, three are within the Inner Hebrides and the Minches SAC. It is expected that the shellfish aquaculture in the SOH pMPA will expand over the assessment period, and an assumption has been used below that there will be 7 applications for new or expanding sites every 10 years in SOH. Aquaculture installations are shown in Figure 4.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ It has been assumed that there will be 7 new applications in SOH every 10 years. ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application. ▪ Development of and compliance with a vessel management plan associated with new applications will cost £1,000 per application.	▪ It has been assumed that there will be 7 new applications in SOH every 10 years. ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application. ▪ Development of and compliance with a vessel management plan associated with new applications will cost £1,000 per application.	▪ It has been assumed that there will be 7 new applications in SOH every 10 years. ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application. ▪ Development of and compliance with a vessel management plan associated with new applications will cost £1,000 per application. ▪ It is assumed that the restriction of vessel speeds within the shark awareness zones has no additional associated cost.
Description of quantified one-off impacts - (on-site)	▪ Additional assessment is required to assess the potential impact of new aquaculture sites on MPA features to support planning applications. Total cost = £78,000 ▪ Development of and compliance with vessel management plan. Total cost = £14,000	▪ Additional assessment is required to assess the potential impact of new aquaculture sites on MPA features to support planning applications. Total cost = £78,000 ▪ Development of and compliance with vessel management plan. Total cost = £14,000	▪ Additional assessment is required to assess the potential impact of new aquaculture sites on MPA features to support planning applications. Total cost = £78,000 ▪ Development of and compliance with vessel management plan. Total cost = £14,000
Description of quantified recurring impacts – (on-site)	▪ N/A	▪ N/A	▪ N/A

Description of non-quantified impacts	On-site	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays	▪ Cost of uncertainty and delays
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		92	92	92
Average annual costs		5	5	5
Present value of total costs (2019 to 2038)		66	66	66

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3c Coastal Protection				**SOH**
In order to maintain protection from coastal erosion and flooding events, coastal protection assets require maintenance activities. Maintenance activities introduce the requirement for assessments in order to gain marine licences and planning permissions, which will need to be expanded to include the protected features of the pMPA sites.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that there is one application every 5 years in SOH for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.	▪ It has been assumed that there is one application every 5 years in SOH for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.	▪ It has been assumed that there is one application every 5 years in SOH for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.
Description of quantified one-off impacts - (on-site)		▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £22,400	▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £22,400	▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £22,400
Description of quantified recurring impacts – (on-site)*		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		22	22	22
Average annual costs		1	1	1
Present value of total costs (2019–2038)		16	16	16

* Notes
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3d: Commercial fisheries	SOH

Sea of the Hebrides pMPA lies within nine ICES rectangles covering the Sea of the Hebrides, from the Isle of Mull in the south to Skye in the north and the Outer Hebrides to the west, in ICES Division VIa. Approximately 8,580 tonnes of fish and shellfish were landed from these ICES rectangles per annum (2012-2016), predominantly shellfish species by weight (over 50%) and value (over 75%). The main gear types were demersal trawls and creels.

VMS-based estimates and ICES rectangle landings statistics indicate that demersal trawls and mechanical dredges (over-12m vessels) and demersal trawls and creels (under-12m vessels) are the main gear types that operate within the Sea of the Hebrides pMPA. The value of landings from the pMPA was £9.5 million (over-12m vessels, from VMS data) and £12.9 million (under-12m vessels, indicated from ICES rectangle landings data) (annual average for 2012–2016, 2019 prices).

Vessels fishing in the Sea of the Hebrides pMPA predominantly operate from: Mallaig, Stornoway, Fraserburgh and Oban (over-12m vessels) and Portree, Stornoway and Oban (under-12m vessels).

Landings from the over-12m vessels were made predominantly into Mallaig (57 %), Oban (13 %) and Northbay (9 %). Landings from the under-12m vessels were made predominantly into Strathaird (18 %), Mallaig (11 %) and Dunvegan (10 %).

For the over-12m vessels, demersal trawls operated in particular across the eastern and central parts of the pMPA while creels operated mainly in the north-west and mechanical dredges operated in the south-east part of the pMPA. For the under-12m vessels, demersal trawls operated in particular in the northern part of the pMPA. VMS and Scotmap data for the site are shown in Figure 6 and Figure 7.

Economic Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ Follow best practice for mobile bottom-contacting gear to minimise risk of bycatch of basking shark. ▪ Reduce risk of entanglement of basking shark and minke whale with static gear by following best practice. ▪ Reduce risk of entanglement of minke whale and basking shark with pelagic gear by following best practice. ▪ It is assumed these scenarios entail no extra cost on the industry.	▪ Follow best practice for mobile bottom-contacting gear to minimise risk of bycatch of basking shark. ▪ Reduce risk of entanglement of basking shark and minke whale with static gear by following best practice. ▪ Reduce risk of entanglement of minke whale and basking shark with pelagic gear by following best practice. ▪ Exclusion of hydraulic gear from sandeel habitat. ▪ Exclude targeted fishing for sandeels. ▪ Exclusion of drift nets and set nets between April and October in 'shark awareness zones'.	▪ Follow best practice for mobile bottom-contacting gear to minimise risk of bycatch of basking shark. ▪ Reduce risk of entanglement of basking shark and minke whale with static gear by following best practice. ▪ Reduce risk of entanglement of minke whale and basking shark with pelagic gear by following best practice ▪ Exclusion of hydraulic gear from sandeel habitat. ▪ Exclude targeted fishing for sandeels. ▪ Exclusion of drift nets and set nets between April and October across site. ▪ Limit herring and sprat fishing effort to current levels.
One-off impacts (on-site)		▪ None	▪ None	▪ None
Recurring impacts – cost impacts per fleet segment (annual values, £000s, 2019 prices) (on-site)*	**Under & Over-12m vessels** Suction dredges & set nets	▪ Loss of fishing income: 0.0	▪ Loss of fishing income: 2.4	▪ Loss of fishing income: 3.5
	Total all vessels	**0.0**	**2.4**	**3.5**
Description of non-	On-site	▪ None	▪ None	▪ None

quantified impacts	Off-site	▪ None	If activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Additional impacts on species outside of site ▪ Potential changes to vessel costs/revenues	If activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Additional impacts on species outside of site ▪ Potential changes to vessel costs/revenues
Quantified Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive) (deriving from on-site impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		0.0	47.3	69.3
Average annual costs		0.0	2.4	3.5
Present value of total costs (2019–2038)		0.0	34.8	51.0
Economic Impacts				
Direct GVA (£000s)				
Total change in GVA (2019–2038)		0.0	21.7	33.7
Average annual change in GVA		0.0	1.1	1.7
Present value of total change in GVA (2019–2038)		0.0	15.9	24.8
Direct + Indirect GVA (£000s)				
Total change in GVA (2019–2038)		0.0	31.4	48.9
Average annual change in GVA		0.0	1.6	2.4
Present value of total change in GVA (2019–2038)		0.0	23.1	35.9
Direct, Indirect + Induced GVA (£000s)				
Total change in GVA (2019–2038)		0.0	35.3	54.9
Average annual change in GVA		0.0	1.8	2.7
Present value of total change in GVA (2019–2038)		0.0	25.9	40.4
Employment (FTEs)				
Direct and indirect reduction in employment		0.0	0.0	0.1
Direct, indirect and induced reduction in employment		0.0	0.0	0.1

* On-site cost impacts may be offset by catches from effort displaced off-site, detailed in the assumptions.
** Where the value of landings affected is less than 10% of the value from the site, less than 10% of the value from each ICES rectangle, or less than 1% of the value from the region, it is likely that this activity can be absorbed by other grounds in the pMPA, ICES rectangles or region as appropriate, and therefore no cost impact is anticipated.
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.
Total change in GVA (2019–2038) = The change in GVA (direct/indirect/induced as appropriate) for commercial fisheries summed over the 20 year period.
Average annual change to GVA = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries divided by the total number of years under analysis (i.e. 20).
Present value of total change in GVA (2019–2038) = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries discounted to current value, using a discount rate of 3.5%.
Direct, indirect reduction in Employment = The average (mean) reduction in direct employment in the sector in full-time equivalents (FTEs), and indirect reduction in employment on the sector's suppliers.
Direct, indirect and induced reduction in employment = The average (mean) reduction in employment in the sector, the sector's suppliers and across the economy as a whole as a result of reduced expenditure by employees and suppliers.

Table 3e: Ports and Harbours			**SOH**
There are 11 minor ports and harbours within or within a 1 km buffer of the SOH pMPA (Baile Mor, Canna, Coll, Fionnphort, Galmisdale (Eigg), Hynish (Tiree), Meanish (Loch Pooltiel), Port Mor (Muck), Scarinish (Tiree), Milton (Tiree) and Gott Bay (Tiree)). Of these, six are within the Shark Awareness Zones, but of the six only Canna, Coll and Gott Bay (Tiree) are of sufficient size to issue notices to mariners. Ports and harbours are shown in Figure 5.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs are estimated to be £7,600 (at 2019 prices) per licence application; ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs are estimated to be £7,600 (at 2019 prices) per licence application; ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs are estimated to be £7,600 (at 2019 prices) per licence application; ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029. ▪ The cost to a port or harbour within the shark awareness zones to issue a Notice to Mariners is assumed to be £1,000.
Description of quantified one-off impacts - (on-site)	▪ Additional assessment cost for development of major ports. Total cost = £0 ▪ Additional assessment cost for development of minor ports. Total cost = £84,000	▪ Additional assessment cost for development of major ports. Total cost = £0 ▪ Additional assessment cost for development of minor ports. Total cost = £84,000	▪ Additional assessment cost for development of major ports. Total cost = £0 ▪ Additional assessment cost for development of minor ports. Total cost = £84,000 ▪ Cost to ports or harbours of issuing Notice to Mariners for speed restrictions in shark awareness zones. Total cost =

				£3,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		84	84	87
Average annual costs		4	4	4
Present value of total costs (2019 to 2038)		59	59	62

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3f: Recreational Boating				**SOH**
There is a high density of recreational boating within the SOH pMPA, concentrated near the coastline, with facilities and stopping points for recreational yachts within the pMPA, including RYA clubs and training facilities on Coll and Tiree, within the shark awareness zone.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ No additional costs	▪ No additional costs	▪ It has been assumed that the cost to the RYA for disseminating data regarding shark awareness zones is £1,000.
Description of quantified one-off impacts - (on-site)		▪ N/A	▪ N/A	▪ Cost of disseminating information regarding speed restrictions. Total cost = £1,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		0	0	1
Average annual costs		0	0	0
Present value of total costs (2019 to 2038)		0	0	1
Definitions of cost and economic impacts: Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period. Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20). Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.				

Table 3g: Commercial Shipping				**SOH**
There is some commercial shipping activity throughout the SOH pMPA. This activity includes considerable numbers of lifeline ferry transits connecting mainland Scotland to the Hebrides, alongside ships transiting through the Minches, where an International Maritime Organisation (IMO) traffic separation scheme (TSS) is in place to manage the high density of traffic in the region. Traffic through the area of the shark awareness zone is dominated by ferry routes, which are excluded from management scenarios, with small amounts of additional traffic transiting through the regions.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ No additional cost	▪ No additional cost	▪ It has been assumed that, given the low level of transits, and the exclusion of ferries from the management measure, there is no significant impact on shipping traffic from the <6 knots speed restriction. ▪ It has been assumed that the cost to the UKHO to integrate the speed restrictions onto nautical charts is £1,000.
Description of quantified one-off impacts - (on-site)		▪ N/A	▪ N/A	▪ Cost to UKHO to update nautical charts. Total cost = £1,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		0	0	1
Average annual costs		0	0	0
Present value of total costs (2019 to 2038)		0	0	1

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3h: Telecommunication Cables				**SOH**
There are two telecommunication cables which transit through SOH (BT-HIE Seg1.17 and BT-HIE Seg1.15) totalling approximately 65 km of length within the pMPA. These link mainland Scotland with the Hebridean islands of Tiree and Uist. Telecom cables are shown in Figure 4.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices per application. ▪ It has been assumed that half of the cables are replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices per application. ▪ It has been assumed that half of the cables are replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices per application. ▪ It has been assumed that half of the cables are replaced during the assessment period.
Description of quantified one-off impacts - (on-site)		▪ Cost of additional assessment. Total cost = £5,600	▪ Cost of additional assessment. Total cost = £5,600	▪ Cost of additional assessment. Total cost = £5,600
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		6	6	6
Average annual costs		0	0	0
Present value of total costs (2019 to 2038)		4	4	4
Definitions of cost and economic impacts: Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period. Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20). Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.				

Human activities that would benefit from designation and management of the site as an MPA

Table 4. Human Activities that would Benefit from Designation and Management of the Site as an MPA				SOH
Activity	**Description**	**Lower Estimate**	**Intermediate Estimate**	**Upper Estimate**
Marine wildlife tourism	Tourism based around observation of features protected at sites (e.g. cetaceans, basking shark, seabird colonies).	Minimal, management scenarios have little impact.	Low–Moderate, scale and/or quality of activity may increase due to protection of features of site that contribute to tourism and recreation from decline, possibly allowing some recovery.	
Marine recreation	Recreation activities using the marine environment, for which wildlife and environmental quality are part of the motivation for the activity (e.g. angling, recreational boating).			

Human activities that would be unaffected by designation and management of the site as an MPA

Table 5. Human Activities which would be Unaffected by Designation and Management of the Site as an MPA	SOH
Activity	**Description**
Carbon Capture and Storage	No CCS sites or potential pipelines near the site
Energy Generation	There are no current proposals for energy generation which would be affected by the MPA, and the uncertainty regarding future development is too high to conclude any impact within the study period.
Oil and Gas	There are no current proposals for the oil and gas industry which would be affected by the MPA, and the uncertainty regarding future development is too high (although considered highly unlikely) to conclude any impact within the study period.
Power Interconnectors	There are no current proposals for power interconnectors which would be affected by the MPA, and the uncertainty regarding future development is too high (although considered highly unlikely) to conclude any impact within the study period.

C.2.4 Social and Distributional Analysis of Impacts arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 6a. Social Impacts Associated with Quantified and Non-Quantified Economic Impacts			SOH
Potential Economic Impacts	**Area of Social Impact Affected**	**Mitigation**	**Significance of Social Impact**
Exclusion from traditional from traditional fishing grounds (assuming no displacement)	Reduced income and employment	N/A	0
Impacts: xxx – significant negative effect; xx – possible negative effects; x – minimal negative effect, if any; 0 – no noticeable effect expected.			

Table 6b. Distribution of Social Impacts (Location, Age and Gender)								SOH
Sector/Impact	**Scale of Impact by location**			**Age**			**Gender**	
	Region	**Ports***	**Rural, Urban, Mainland or Island**	**Children**	**Working age**	**Pensionable Age**	**Male**	**Female**
Unemployment	North & South Minch	Home: Cambeltown 98% (67%), Stornoway 2% (33%) Landing: Oban 98% (67%), South Uist and Eriskay 0% (32%)	0	0	0	0	0	0
Lower Income			0	0	0	0	0	0
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected. * Based on value of landings by home or landing port affected under intermediate estimate (upper estimate in brackets)								

Table 6c. Distribution of Social Impacts (Fishing Groups, Income Groups and Social Groups)									SOH
Sector/Impact	**Fishing Groups**		**Income Groups**			**Vulnerable Social Groups**			
	Vessel Category <12 m >12 m	**Gear Types/Sector**	**10% most deprived**	**Middle 80%**	**10% most affluent**	**Crofters**	**Ethnic minorities**	**With disability or long-term sick**	
Unemployment	>12m	Suction dredges	0	0	0	0	0	0	
Lower Income			0	0	0	0	0	0	
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected.									

C.2.5 Public Sector Costs

Table 7. Site/Feature-Specific Public Sector Costs arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 Inclusive)			SOH
Description	**Public Sector Costs**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Public Sector Costs (Total, not discounted unless otherwise specified)			
Preparation of Statutory Instruments	0	4.2	4.2
Preparation of a Management Scheme	27.8	27.8	27.8
Promotion of Voluntary Measures	4.2	4.2	4.2
Monitoring of Protected Features	324	324	324
Review of Assessments (PV)	18	18	18
Total Quantified Public Sector Costs	**374**	**378**	**378**
Average annual costs	**19**	**19**	**19**
Present value of total costs (2019 to 2038)	**285**	**289**	**289**

C.2.6 Potential contribution of the site to an ecologically-coherent network

Table 8. Overview of MPA Interest Features for which Designation and Management have been Proposed and how these Contribute to an Ecologically Coherent Network of MPAs SOH					
Feature Name	**Representation**	**Replication**	**Linkages**	**Geographic Range and Variation**	**Resilience**
Basking shark	The proposal provides representation of the highly mobile MPA search feature that would not otherwise be included within the network.	Only represented once within the MPA network, as there are currently insufficient data to consider any other locations for this species. Therefore, recommended that this species is considered adequate, despite lack of replication.	The results of the tagging work for basking shark have given greater insight into the movements of this species, showing direct links with areas considered to be 'hotspots' for basking sharks off the coast of Northern Ireland and the Isle of Man. Appropriate to consider the assessment of linkages at this wider scale because of the large distances over which these animals have been shown to travel.	Geographic range, not reflected in network, however, the pMPA does reflect areas considered to be essential for this species and therefore this geographic range is considered to be met.	It was not possible to include more than one example of this feature in the network, despite it being one of the 14 features for which a greater proportion of the search feature be included in the network.
Fronts	The proposal provides representation of a front in OSPAR Region III.	Provides one of three functionally significant examples of fronts in the MPA network, together with Clyde Sea Sill (Region III) and Southern Trench (Region II).	No information available.	Different types of shelf fronts in a range of settings are represented, driven by a variety of environmental factors such as topography, tides and salinity. The SOH pMPA is an example of a tidal/topographical driven front, which differs from the topographic and density-driven front of Clyde Sea Sill in the same OSPAR region.	Fronts are not considered to be threatened and/or declining and therefore a greater proportion does not need to be included in the network.
Minke whale	Provides representation of the highly mobile MPA search feature.	The proposal would enable replication of minke whale within the Scottish MPA network (also in Southern Trench).	MPA proposals were developed on the basis of habitats of preferred prey species, consistent seasonal presence of individuals, and relative abundance.	The MPA proposal covers a significant part of the wider area of high abundance and also cover one of the two essential areas for the species in Scottish waters. Ecological variation has not been assessed as this is a wide ranging, large mobile species.	Minke whale is not included on the OSPAR Threatened and/or Declining List and therefore it is not considered that a greater proportion needs to be included within the MPA network.

References Scottish Natural Heritage. 2014. Further advice to Scottish Government on the selection of Nature Conservation Marine Protected Areas for the development of the Scottish MPA network. *Scottish Natural Heritage Commissioned Report No. 780.*

C.2.7 Anticipated Impacts on Ecosystem Services

Table 9a. Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)									SOH
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
Fish and shellfish for human consumption	Moderate, benthic habitat and sandeels contribute to the food web	On-site and off-site	Stocks not at MSY	Nil		Minimal, small recovery of fish stocks possible	Moderate, sandeels are import in food webs for commercial species and priority wildlife species	Minimal	Moderate
Fish and shellfish for non-human consumption			Stocks reduced from potential maximum						
Climate regulation	Moderate, in coastal areas	On-site	Function of carbonate production areas may decline	Minimal		Minimal–Low, from prevention of damage to carbonate production areas	Moderate	Nil	High
Waste breakdown/ detoxification	Moderate, some biogenic benthic features (e.g. sea fans) provide this service	On-site and off-site	Low	Minimal			Low, water quality in this area not affecting human welfare	Nil	High
Non-use value of natural environment	Moderate, Basking shark, Minke whale and sandeels, and contribution of the site to MPA network, have non-use value	On-site	Non-use value of the site may decline	Moderate–Low, protection of features of site from potential future decline, but parts of site already protected			Moderate, protection of features is valued by divers & anglers (Kenter *et al*. 2013).	Moderate	Moderate, extent of features, responses to management scenarios, and value to society all uncertain
					Low, recovery of features possible				
Recreation	Moderate, wildlife tourism and recreation at site, including angling (Kenter *et al*. 2013)	On-site	Recreation value of the site may decline	Minimal, protection of features of site	Low, protection of features of site that contribute to recreation, allowing some recovery		Moderate–High, recreation and tourism support jobs, and are valued (Kenter *et al*. 2013).	Low–Moderate	Low–Moderate, extent of change from management scenarios uncertain.

Table 9a.	**Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)**								**SOH**
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
Research and Education	Moderate, small number of biological features have research value, but there are substitutes	On-site	Value of site may decline	Minimal, protection of features of site	Low, protection of key character-istics of site from decline, improving future research opportunities.		Low, for individual features. Moderate for opportunity to understand response of range of features to management.	Low	Low–Moderate, extent to which research uses site in future uncertain.
				Designation may play role in communicating management needs.					
Total value of changes in ecosystem services			Value of site may decline	Minimal for lower scenario, Low for intermediate and upper scenario, designation has Moderate–Low non-use value to protecting site from future decline (Kenter *et al*. 2013)				Low–Moderate	Moderate
Total value of changes in ecosystem services				**Low–Moderate**					**Moderate**

Table 9b.	**Summary of Ecosystem Services Costs arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)**								**SOH**
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Costs**	**Confidence**
				Lower	**Intermediate**	**Upper**			
No costs are expected to arise. The scale of fisheries impacts is considered to be too small for displacement of fishing effort or changes in fishing gear to have any noticeable impacts on ecosystem services.									

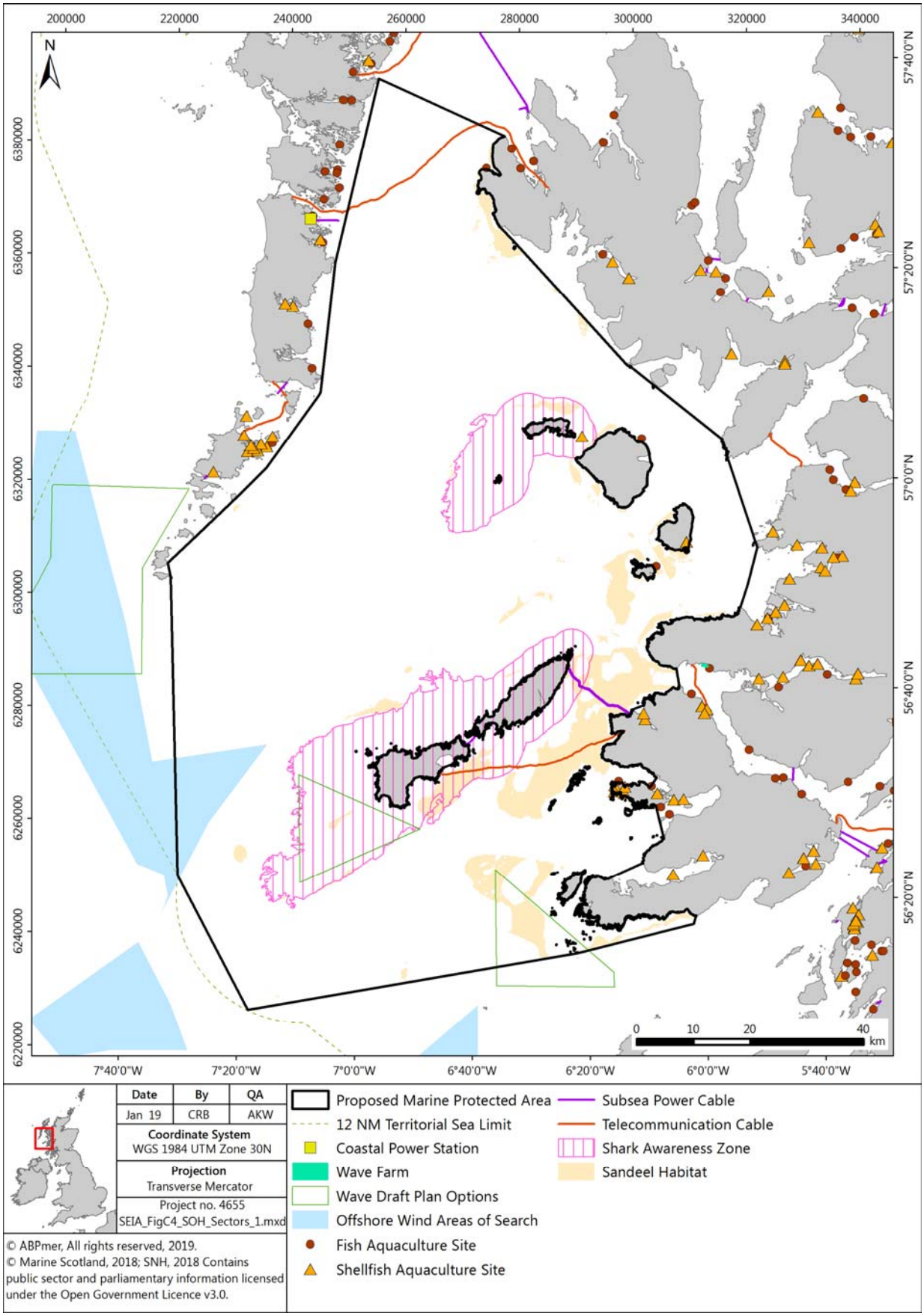

Figure 4 All sector activities in SOH (excluding commercial fisheries, ports and military)

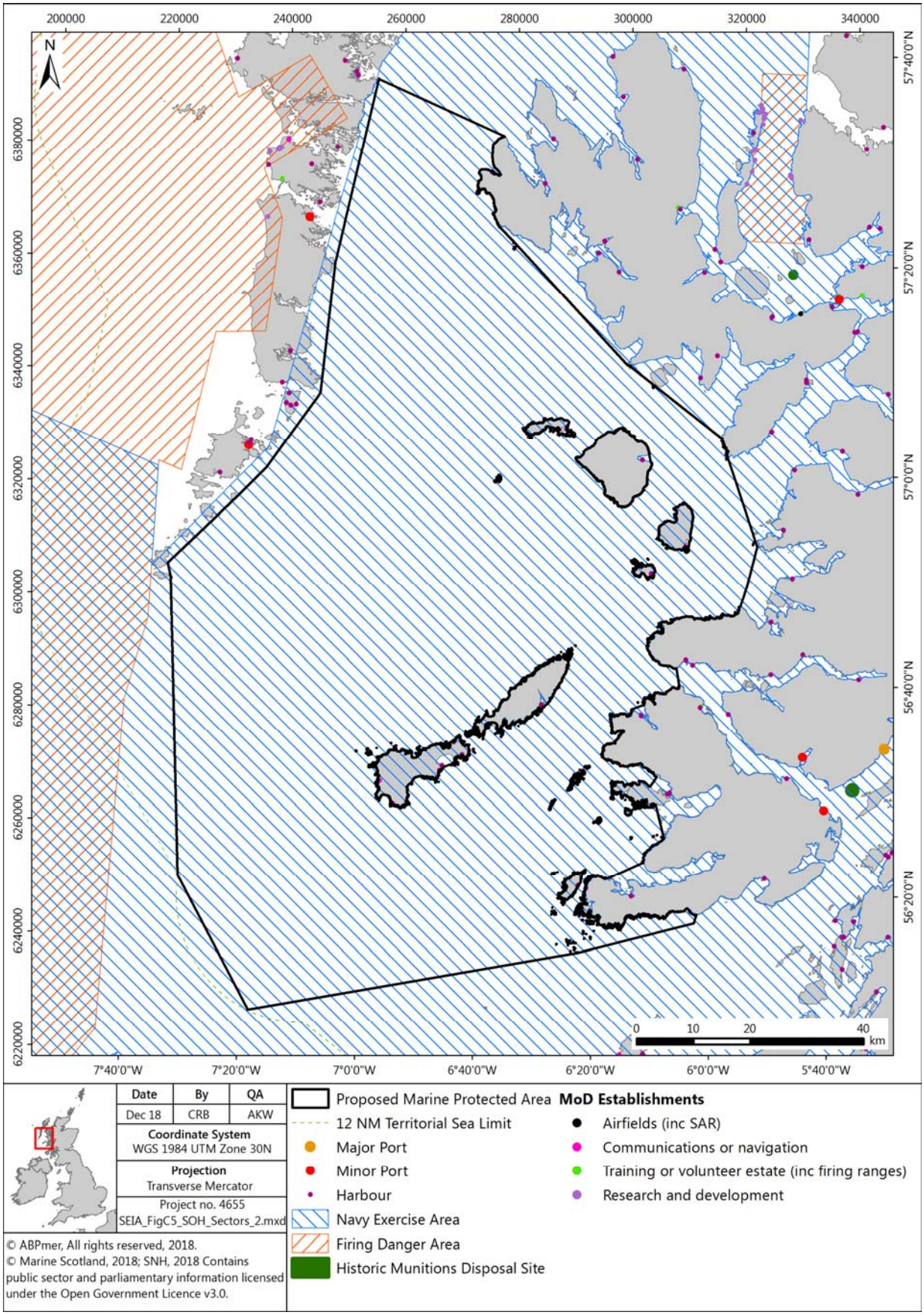

Figure 5 Ports, harbour and military activities in SOH

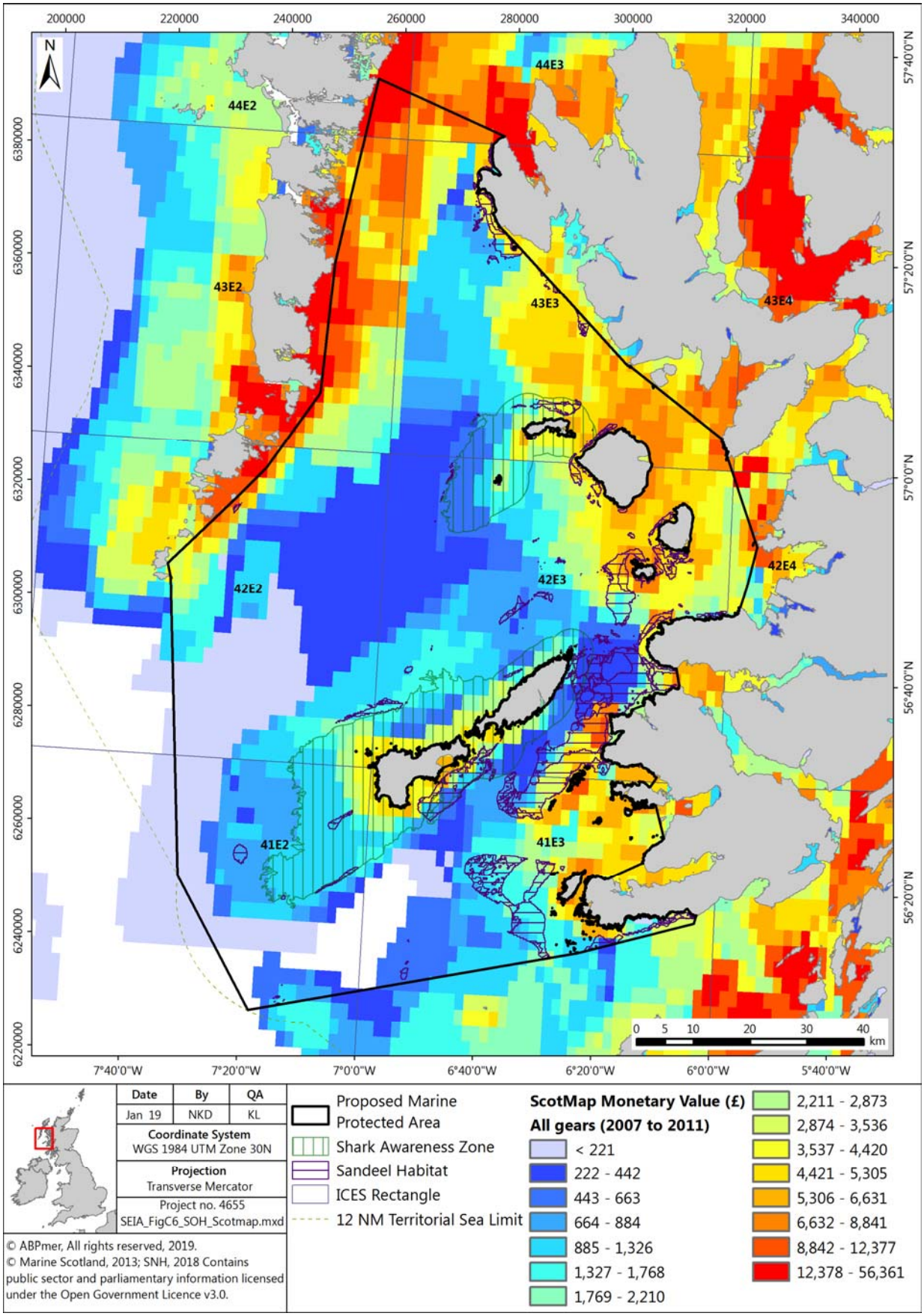

Figure 6 Commercial fisheries ScotMap Data for SOH

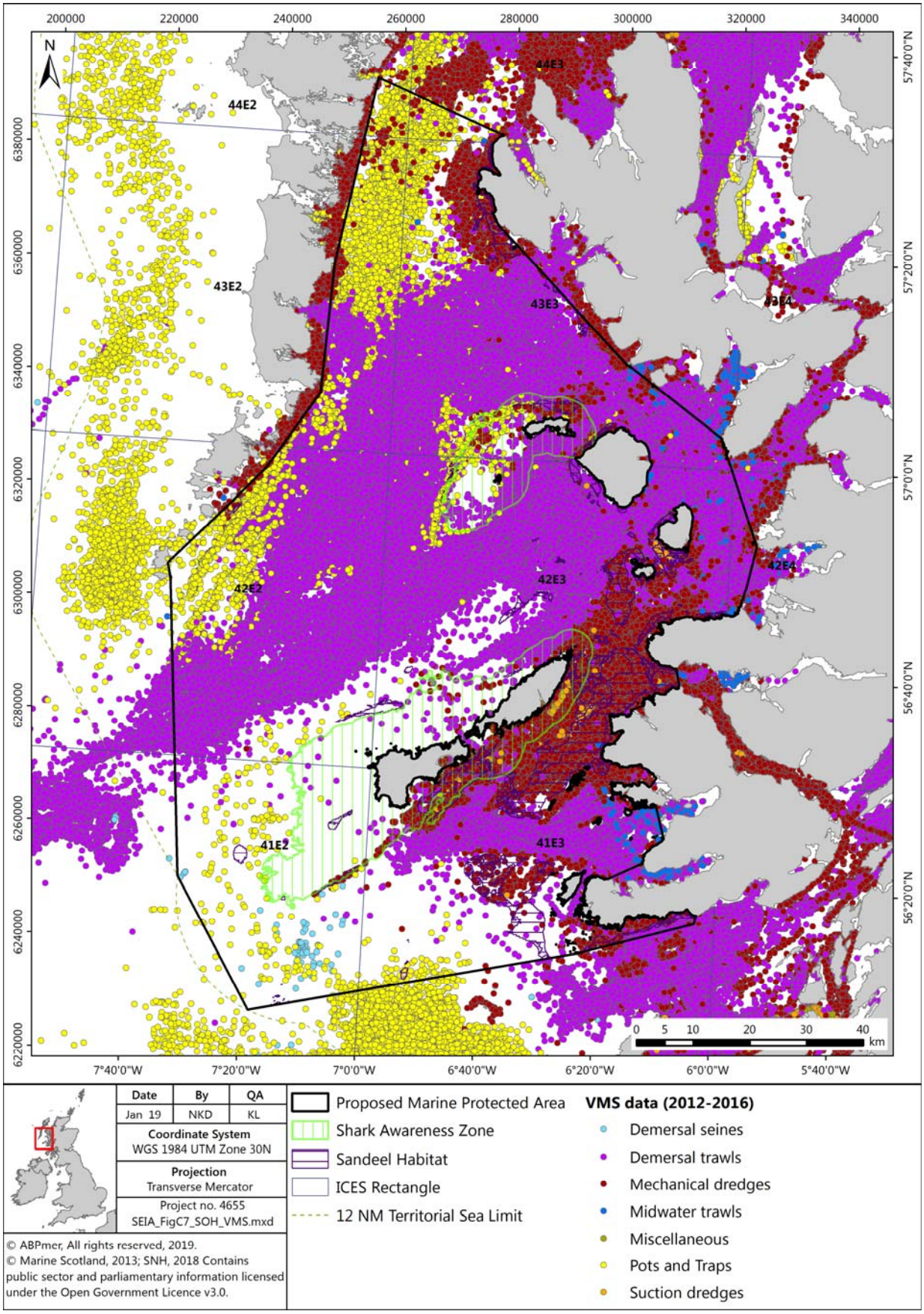

Figure 7 Commercial fisheries VMS data for SOH

C.3 Shiant East Bank pMPA (SEB)

C.3.1 Site/Feature Summary

Site (marine) Extent (km^2): 307.79
Management Extent (km^2): 307.79

Table 1. Summary of Proposed Protected Features, Data Confidence and Conservation Objectives					**SEB**
Protected features					
Shiant East Bank possible MPA encompasses three biodiversity features: Circalittoral sands and mixed sediment communities, Northern sea fan and sponge communities and Shelf banks and mounds. The shelf banks and mounds large-scale MPA search feature is considered to be of functional significance, providing the necessary substrates to support an assemblage of finer resolution habitats and species. The features are associated with an outstanding range of glacial bedforms representing the Quaternary of Scotland geodiversity feature.					
Summary of confidence in presence, extent and condition of protected features and conservation objectives					
Protected Feature	**Estimated Area of Feature (km^2) or Number of Individuals**	**Confidence in Feature Presence**	**Confidence in Feature Extent**	**Confidence in Feature Condition**	**Conservation Objective**
Biodiversity Features					
Circalittoral sand and mixed sediment communities	N/A[a]	High	Medium	High	Conserve
Northern sea fan and sponge communities	N/A[a]	High	Medium	High	Conserve
Shelf banks and mounds	204.93	High	High	High	Conserve
Geodiversity Features (for site assessment only)					
Quaternary of Scotland *(drumlinoid forms, glacial lineations, iceberg ploughmarks, streamlined bedrock)*	N/A[b]	High	High	High	Conserve
Key: a. Biodiversity habitat feature data is from point sources therefore an estimate of the area of features is not available. b. Area estimate not available. References: **Allen, J.H. (2015**). Infaunal and PSA analyses of grab samples collected from the Shiant East Bank and Wester Ross in September 2013. *Scottish Natural Heritage Commissioned Report No. 693*. **Bradwell, T. and Stoker, M. S. (2015).** Submarine sediment and landform record of a palaeo-ice stream within the British-Irish Ice Sheet. Boreas. 10.1111/bor.12111. ISSN 0300-9483 **Paxton, C.G.M., Scott-Hayward, L.A.S. and Rexstad, E. (2014).** Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and basking shark. Scottish Natural Heritage Commissioned Report No. 594. Area of Features: 307.79 km^2 Confidence in biodiversity feature presence and extent: High/Medium. Confidence in biodiversity feature condition: High. Confidence in geodiversity feature presence and extent: High. Confidence in geodiversity feature condition: High.					

C.3.2 Summary of Costs and Benefits

Table 2. Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)			**SEB**
Human Activity	**Cost Impact on Activity**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Economic Costs (Discounted)			
Commercial Fisheries (GVA)	0	177	296
Telecommunication Cables	4	4	319
Total Quantified Economic Costs	**4**	**4**	**319**
Total Quantified Economic Costs (GVA)	**0**	**177**	**296**
Non-Quantified Economic Costs			
Commercial Fisheries	▪ None	▪ If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues	▪ If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues
Note: For detailed information on economic cost impacts on activities, see Table 3.			

C.3.3 Human Activity Summaries

Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 3a: Commercial fisheries				**SEB**
Shiant East Bank pMPA lies within ICES rectangles 44E3, 45E3, 44E4 and 45E4 in ICES Division VIa. Approximately 5,391 tonnes of fish and shellfish were landed from these ICES rectangles per annum (2012-2016), predominantly shellfish species by weight (over 65%) and value (over 85%). The main gear types were demersal trawls and creels. VMS-based estimates and ICES rectangle landings statistics indicate that demersal trawls (over-12m vessels) and demersal trawls and creels (under-12m vessels) are the main gear types that operate within the Shiant East Bank pMPA. The value of landings from the pMPA was £110k (over-12m vessels, from VMS data) and £260k (under-12m vessels, indicated from ICES rectangle landings data) (annual average for 2012–2016, 2019 prices). Vessels fishing in the Shiant East Bank pMPA predominantly operate from: Stornoway and Ullapool (over-12m vessels) and Stornoway, Portree and Ullapool (under-12m vessels). Landings from the over-12m vessels were made predominantly into Stornoway (42 %), Gairloch (17 %) and Ullapool (17 %). Landings from the under-12m vessels were made predominantly into Back (11 %), Portree (8 %), Stornoway (8 %), Lochinver (7 %), Stockinish (7 %) and Bernera (Lewis) (7 %). For the over-12m vessels, demersal trawls operated in particular around the northern, southern and western edges of the pMPA. For the under-12m vessels, demersal trawls operated in particular along the southern and eastern edges of the pMPA. VMS and Scotmap data for the site are shown in Figure 9 and Figure 10.				
Economic Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ None	▪ Exclusion of mobile/active bottom-contacting gear from northern sea fan and sponge communities ▪ Exclude mobile bottom-contacting gear from 20% of circalittoral sand	▪ Exclusion of mobile/active bottom-contacting gear from northern sea fan and sponge communities ▪ Exclude mobile bottom-contacting gear from 40% of circalittoral sand
One-off impacts (on-site)		▪ None	▪ None	▪ None
Recurring impacts – cost	**Over-12m vessels**	▪ Loss of >12m fishing income:	▪ Loss of >12m fishing income:	▪ Loss of >12m fishing income:

impacts per fleet segment (annual values, £000s, 2019 prices) (on-site)*	Demersal trawls & mechanical dredges	0.0	26.6	45.5
	Subtotal over-12m	*0.0*	*26.6*	*45.5*
	Under-12m vessels	▪ Loss of <12m fishing income:	▪ Loss of <12m fishing income:	▪ Loss of <12m fishing income:
	Demersal trawls	0.0	3.1	4.3
	Mechanical dredges	0.0	0.4	0.6
	Subtotal under-12m	*0.0*	*3.5*	*4.9*
	Total all vessels	**0.0**	**30.1**	**50.4**
Description of non-quantified impacts	On-site	▪ None	▪ None	▪ None
	Off-site	▪ None	If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues	If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues

Quantified Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive) (deriving from on-site impacts)			
Cost Impacts (£000s)			
Total costs (2019–2038)	0.0	601.6	1,008.9
Average annual costs	0.0	30.1	50.4
Present value of total costs (2019–2038)	0.0	442.5	742.0
Economic Impacts			
Direct GVA (£000s)			
Total change in GVA (2019–2038)	0.0	241.1	403.1
Average annual change in GVA	0.0	12.1	20.2
Present value of total change in GVA (2019–2038)	0.0	177.3	296.5
Direct + Indirect GVA (£000s)			
Total change in GVA (2019–2038)	0.0	349.0	583.6
Average annual change in GVA	0.0	17.5	29.2
Present value of total change in GVA (2019–2038)	0.0	256.7	429.2

Direct, Indirect + Induced GVA (£000s)			
Total change in GVA (2019–2038)	0.0	392.2	655.8
Average annual change in GVA	0.0	19.6	32.8
Present value of total change in GVA (2019–2038)	0.0	288.5	482.3
Employment (FTEs)			
Direct and indirect reduction in employment	0.0	0.5	0.8
Direct, indirect and induced reduction in employment	0.0	0.5	0.8

* On-site cost impacts may be offset by catches from effort displaced off-site, detailed in the assumptions.
** Where the value of landings affected is less than 10% of the value from the site, less than 10% of the value from each ICES rectangle, or less than 1% of the value from the region, it is likely that this activity can be absorbed by other grounds in the pMPA, ICES rectangles or region as appropriate, and therefore no cost impact is anticipated.
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.
Total change in GVA (2019–2038) = The change in GVA (direct/indirect/induced as appropriate) for commercial fisheries summed over the 20 year period.
Average annual change to GVA = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries divided by the total number of years under analysis (i.e. 20).
Present value of total change in GVA (2019–2038) = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries discounted to current value, using a discount rate of 3.5%.
Direct, indirect reduction in Employment = The average (mean) reduction in direct employment in the sector in full-time equivalents (FTEs), and indirect reduction in employment on the sector's suppliers.
Direct, indirect and induced reduction in employment = The average (mean) reduction in employment in the sector, the sector's suppliers and across the economy as a whole as a result of reduced expenditure by employees and suppliers.

Table 3b: Telecommunication Cables				**SEB**
There is one telecommunication cable which transits through SEB (BT-HIE Seg1.13) totalling approximately 8.5 km of length within the pMPA. This links mainland Scotland with the Isle of Lewis. This cable passes through an area of northern sea fan and sponge communities within SEB, and upon replacement may require re-routing around this habitat. Telecommunication cables are shown in Figure 8.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices per application. ▪ It has been assumed that the cable is replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices per application. ▪ It has been assumed that the cable is replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices per application. ▪ It has been assumed that the cable is replaced during the assessment period. ▪ It has been assumed that re-routing of the cable will cost £1.15m per km. ▪ It has been assumed that the shortest route to avoid sensitive habitat will be taken (0.4 km).
Description of quantified one-off impacts - (on-site)		▪ Cost of additional assessment. Total cost £5,600	▪ Cost of additional assessment. Total cost £5,600	▪ Cost of additional assessment. Total cost = £5,600 ▪ Cost to re-route cable. Total cost = £460,000
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A

Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)			
Cost Impacts (£000s)			
Total costs (2019 to 2038)	6	6	466
Average annual costs	0	0	23
Present value of total costs (2019 to 2038)	4	4	319

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Human activities that would benefit from designation and management of the site as an MPA

Table 4. Human Activities that would Benefit from Designation and Management of the Site as an MPA				SEB
Activity	**Description**	**Lower Estimate**	**Intermediate Estimate**	**Upper Estimate**
There are not considered to be any sectors which would benefit socio-economically from the designation of SEB as an MPA				

Human activities that would be unaffected by designation and management of the site as an MPA

Table 5. Human Activities that would be Unaffected by Designation and Management of the Site as an MPA	SEB
Activity	**Description**
Aquaculture – Finfish	There are currently no finfish aquaculture sites within the pMPA, and no current or expected future proposals that would be impacted by the management scenarios.
Aquaculture – Shellfish	There are currently no shellfish aquaculture sites within the pMPA, and no current or expected future proposals that would be impacted by the management scenarios.
Carbon Capture and Storage	No CCS sites or potential pipelines near the site
Coastal Defence	No coastal defence structures within 1km boundary of the site
Energy Generation	There are no current proposals for energy generation which would be affected by the MPA, and the uncertainty regarding future development is too high to conclude any impact within the study period.
Oil and Gas	There are no current proposals for the oil and gas industry which would be affected by the MPA, and the uncertainty regarding future development is too high (although considered highly unlikely) to conclude any impact within the study period.
Ports and Harbours	There are no ports or harbours in the vicinity of the pMPA that would be impacted by the management scenarios
Power Interconnectors	There are no current proposals for power interconnectors which would be affected by the MPA, and the uncertainty regarding future development is too high (although considered highly unlikely) to conclude any impact within the study period.
Recreational Boating	The potential management scenarios would have no impact on recreational boating in the region of the MPA.
Shipping	The potential management scenarios would have no impact on commercial shipping in the region of the MPA.
Tourism	The potential management scenarios would have no impact on tourism in the region of the MPA.

C.3.4 Social and Distributional Analysis of Impacts arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 6a. Social Impacts Associated with Quantified and Non-Quantified Economic Impacts			SEB
Potential Economic Impacts	**Area of Social Impact Affected**	**Mitigation**	**Significance of Social Impact**
Exclusion from traditional fishing grounds (assuming no displacement)	Reduced income and employment	N/A	0
Impacts: xxx – significant negative effect; xx – possible negative effects; x – minimal negative effect, if any; 0 – no noticeable effect expected.			

Table 6b. Distribution of Social Impacts (Location, Age and Gender)								SEB
Sector/Impact	**Scale of Impact by location**			**Age**			**Gender**	
	Region	**Ports***	**Rural, Urban, Mainland or Island**	**Children**	**Working age**	**Pensionable Age**	**Male**	**Female**
Unemployment	North Minch	Home: Stornoway 34% (38%), Ullapool 20% (20%), Campbeltown 11% (10%) Landing: Stornoway 34% (38%), Gairloch 19% (18%), Ullapool 16% (17%), Lochinver 11% (9%)	0	0	0	0	0	0
Lower Income			0	0	0	0	0	0
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected. * Based on value of landings by home or landing port affected under intermediate estimate (upper estimate in brackets)								

Table 6c. Distribution of Social Impacts (Fishing Groups, Income Groups and Social Groups)									SEB
Sector/Impact	**Fishing Groups**		**Income Groups**			**Vulnerable Social Groups**			
	Vessel Category <12 m >12 m	**Gear Types/Sector**	**10% most deprived**	**Middle 80%**	**10% most affluent**	**Crofters**	**Ethnic minorities**	**With disability or long-term sick**	
Unemployment	>12 m	Demersal trawls	0	0	0	0	0	0	
Lower Income			0	0	0	0	0	0	
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected.									

C.3.5 Public Sector Costs

Table 7. Site/Feature-Specific Public Sector Costs arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 Inclusive)			SEB
Description	**Public Sector Costs**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Public Sector Costs (Total, not discounted)			
Preparation of Statutory Instruments	0	4.2	4.2
Promotion of Voluntary Measures	4.2	4.2	4.2
Monitoring of Protected Features	170	170	170
Total Quantified Public Sector Costs	**174**	**178**	**178**
Average annual costs	**9**	**9**	**9**
Present value of total costs (2019 to 2038)	**145**	**149**	**149**

C.3.6 Potential contribution of the site to an ecologically-coherent network

Table 8. Overview of MPA Interest Features for which Designation and Management have been Proposed and how these Contribute to an Ecologically Coherent Network of MPAs					SEB
Feature Name	**Representation**	**Replication**	**Linkages**	**Geographic Range and Variation**	**Resilience**
Circalittoral sand and mixed sediments communities	Representative of Scotland's marine environment more generally.	No information available.			
Northern sea fan and sponge communities	Feature considered well represented within the existing protected area network (Carruthers et al., 2011).	The additional MPA proposal is not required to achieve adequacy because of the protection already provided by existing measures.	The examples within the Shiant East Bank MPA proposal are being recommended because, they are good quality examples, add to the integrity of these proposals and complement the existing protection in Region III.	Site provides a good quality example of the feature to add to the integrity of the proposals and complement the existing protection in Region III.	Additional representation not required to achieve resilience, however the site complements existing projection of the feature in the region, adding to resilience.
Shelf banks and mounds	MPA proposal would ensure representation of shelf banks and mounds in OSPAR Region II.	Proposal would ensure replication of the shelf banks and mounds feature (with Firth of Forth Banks Complex MPA within OSPAR Region II).	No information available.	Proposal reflects part of the known geographic range of the feature, providing an example from Region III. No known ecological variation.	Shelf banks and mounds are not considered to be threatened and/or declining and therefore a greater proportion does not need to be included within the network.

References Scottish Natural Heritage. 2014. Further advice to Scottish Government on the selection of Nature Conservation Marine Protected Areas for the development of the Scottish MPA network. *Scottish Natural Heritage Commissioned Report No. 780.*

C.3.7 Anticipated Impacts on Ecosystem Services

Table 9a. Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)									SEB
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
Fish and shellfish for human consumption	Moderate, benthic habitat contributes to the food web	On-site and off-site	Stocks not at MSY	Nil	Minimal, small recovery of fish stocks possible		Moderate, sandeels are import in food webs for commercial species and priority wildlife species	Minimal	Moderate
Fish and shellfish for non-human consumption			Stocks reduced from potential maximum						
Climate regulation	Moderate, in coastal areas	On-site	Moderate	Nil, management scenarios will not affect features providing this service			Moderate	Nil	High
Waste breakdown/ detoxification	Minimal	On-site	Low	Nil, management scenarios will not affect features providing this service			Low, water quality in this area not affecting human welfare	Nil	High
Non-use value of natural environment	Moderate, contribution of the site to MPA network has non-use value	On-site and off-site	Non-use value of the site may decline	Moderate, protection of features of site from potential future decline			Low–Moderate, protection of features is valued by divers & anglers (Kenter *et al*. 2013).	Moderate	Moderate, extent of features, responses to management scenarios, and value to society all uncertain
					Low, recovery of features possible				
Recreation	Minimal, features of low relevance to recreation	On-site	Minimal	Minimal, maintain features of site			Minimal	Minimal	High.
Research and Education	Minimal	On-site	Minimal, whether research uses site in future uncertain.	Minimal, maintain features of site			Nil–Low	Minimal	Moderate
				Designation may play role in communicating management needs.					
Total value of changes in ecosystem services			Value of site may decline	Minimal for lower scenario, Low for intermediate and upper scenario, designation has Moderate non-use value to protecting site from future decline (Kenter *et al*. 2013)				Low–Moderate	Moderate
Total value of changes in ecosystem services				**Low–Moderate**					**Moderate**

Table 9b.	Summary of Ecosystem Services Costs arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)								SEB
Services	Relevance to Site	On-site / Off-site	Baseline Level	Estimated Impacts of Management			Value Weighting	Scale of Costs	Confidence
				Lower	Intermediate	Upper			
No costs are expected to arise. The scale of fisheries impacts is considered to be too small for displacement of fishing effort or changes in fishing gear to have any noticeable impacts on ecosystem services.									

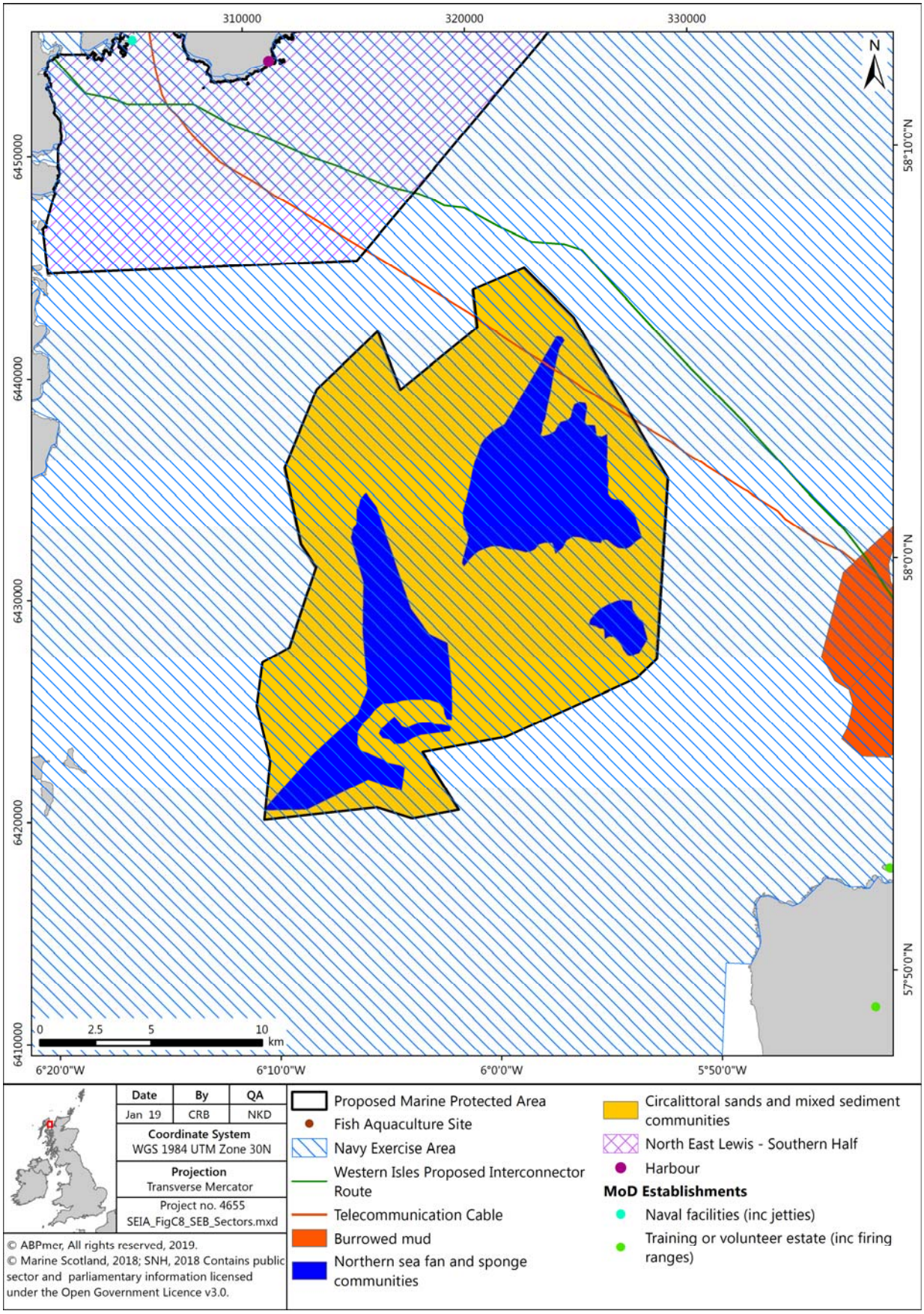

Figure 8 All sector activities in SEB (excluding commercial fisheries)

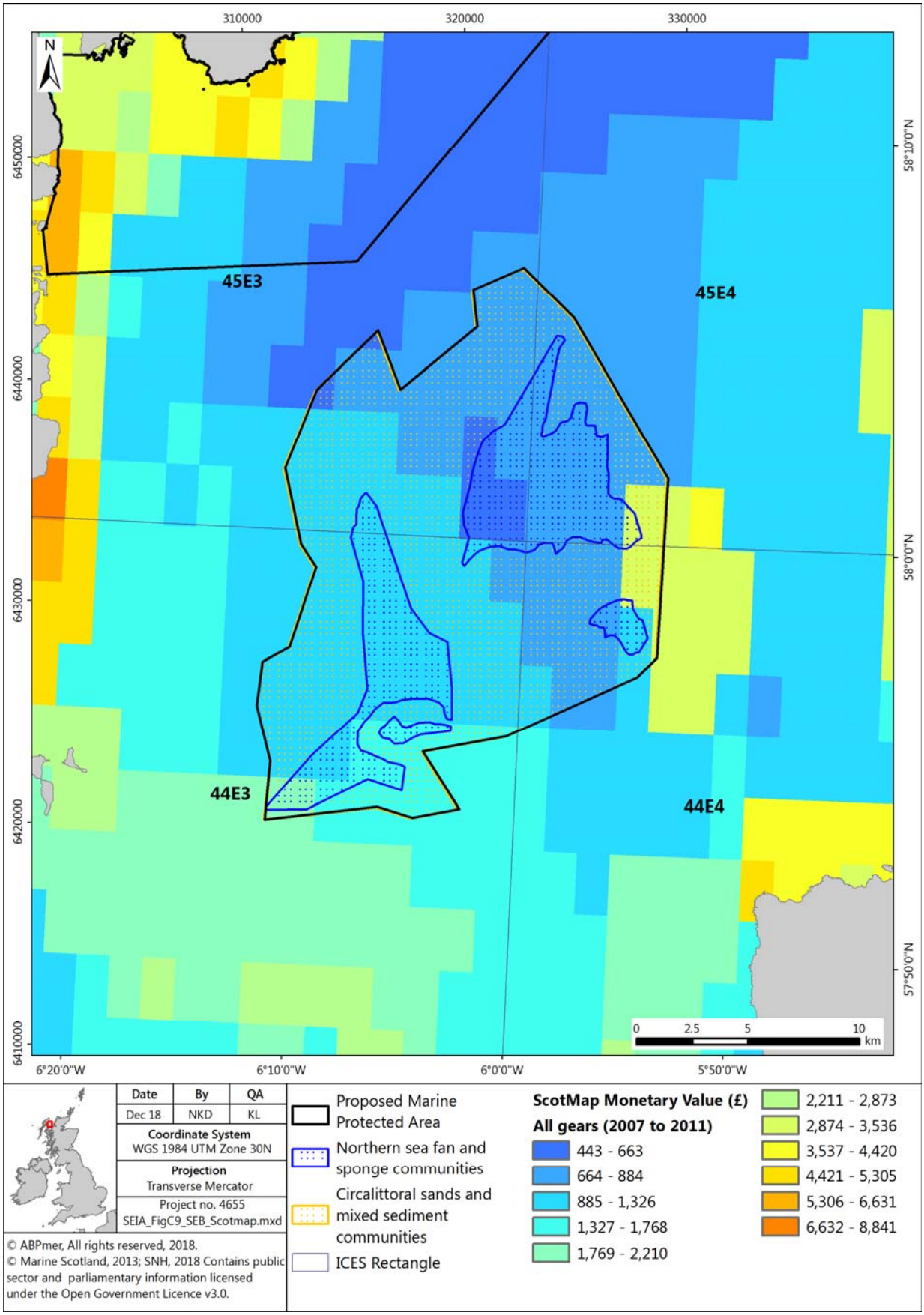

Figure 9 Commercial fisheries ScotMap Data for SEB

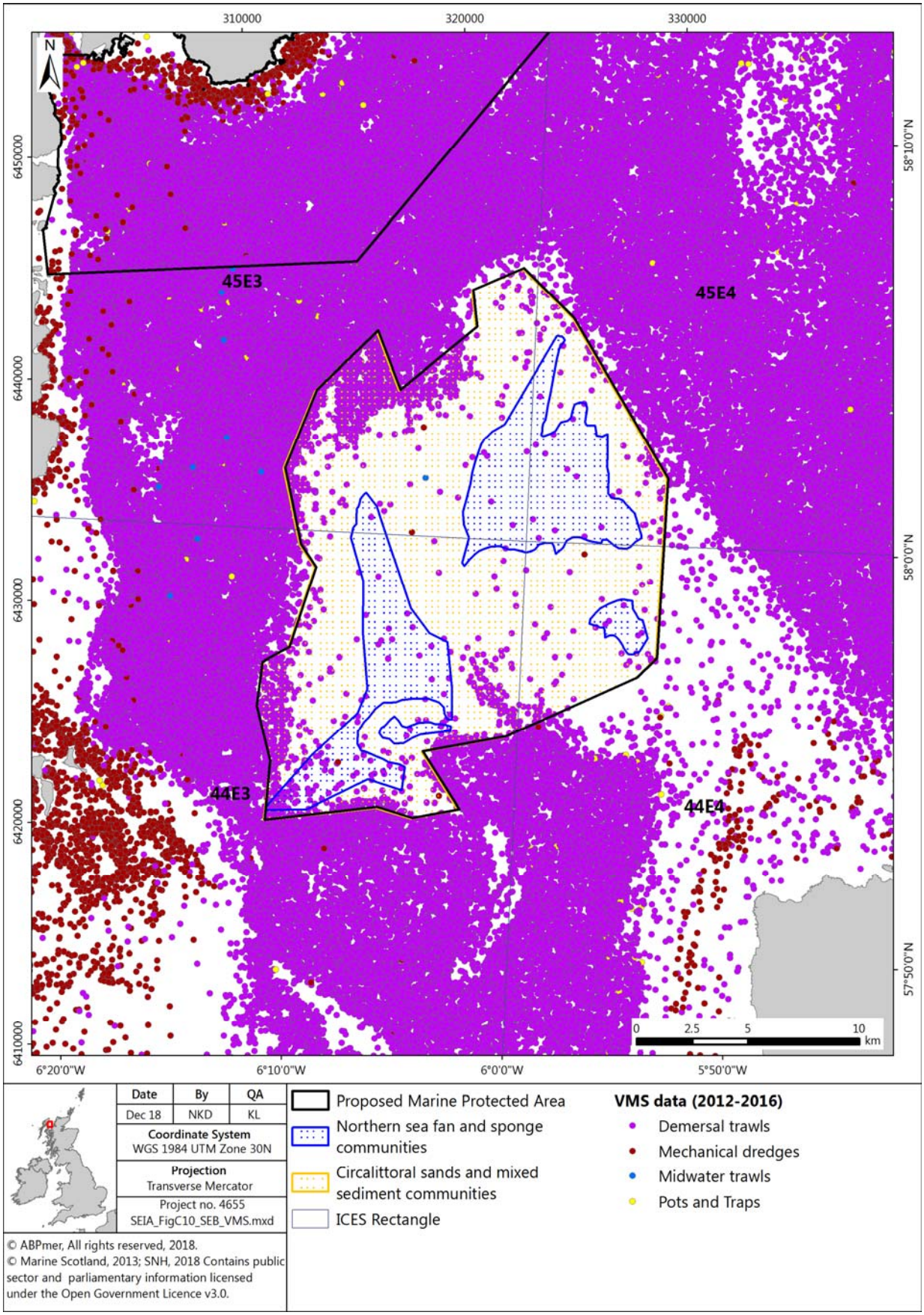

Figure 10 Commercial fisheries VMS data for SEB

C.4 Southern Trench pMPA (STR)

C.4.1 Site/Feature Summary

Site (marine) Extent (km^2): 2,536.35
Management Extent (km^2): 2,536.35

Table 1. Summary of Proposed Protected Features, Data Confidence and Conservation Objectives					**STR**
Protected features					
Southern Trench possible MPA encompasses four biodiversity features: burrowed mud, minke whale, fronts and shelf deeps. The shelf deeps and fronts features are of functional significance, with the former comprising the Southern Trench (after which the site is named) which runs across the possible MPA from the western side to the north-east tip. The proposed protected features also include two geodiversity features: Quaternary of Scotland and Submarine Mass Movement.					
Summary of confidence in presence, extent and condition of protected features and conservation objectives					
Protected Feature	**Estimated Area of Feature (km^2) or Number of Individuals**	**Confidence in Feature Presence**	**Confidence in Feature Extent**	**Confidence in Feature Condition**	**Conservation Objective**
Biodiversity Features					
Burrowed mud	N/A[a]	High	Medium	Medium	Conserve
Fronts	N/A[b]	High	High	High	Conserve
Minke whale	N/A[c]	High	High	Medium	Conserve
Shelf deeps	263.52 km^2	High	High	High	Conserve
Geodiversity Features (for site assessment only)					
Quaternary of Scotland *(subglacial tunnel valleys and moraines)*	614.40 km^2	High	High	High	Conserve
Submarine Mass Movement *(slide scars)*	N/A[d]	High	High	High	Conserve

Key:
a. Biodiversity habitat feature data is from point sources therefore an estimate of the area of features is not available.
b. The position and extent of the fronts feature varies spatially and temporally. The pMPA site boundary therefore reflects the persistent position of the front feature averaged across all seasons.
c. Population estimate relating to the pMPA is not available for mobile species.
d. The Submarine Mass Movement (slide scars) proposed protected feature is under-represented in the mapping of geodiversity interests within the possible MPA and difficult to define in terms of area.

References:

Brooks, A.J. Kenyon, N.H. Leslie, A., Long, D. and Gordon, J.E. (2013). Characterising Scotland's marine environment to define search locations for new Marine Protected Areas. Part 2: The identification of key geodiversity areas in Scottish waters. Scottish Natural Heritage Commissioned Report No. 432.

Hirst, N.E., Clark, L. and Sanderson, W.G. (2012). The distribution of selected MPA search features and Priority Marine Features off the NE coast of Scotland. *Scottish Natural Heritage Commissioned Report No.500*

Miller, P.I., Xu, W. and Lonsdale, P. (2014). Seasonal shelf-sea front mapping using satellite ocean colour to support development of the Scottish MPA network. Scottish Natural Heritage Commissioned Report No. 538.
Area of Features: 2536.35 km^2
Confidence in biodiversity feature presence and extent: High/Medium
Confidence in biodiversity feature condition: High/Medium
Confidence in geodiversity feature presence and extent: High
Confidence in geodiversity feature condition: High

C.4.2 Summary of Costs and Benefits

Table 2. Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)			**STR**
Human Activity	**Cost Impact on Activity**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Economic Costs (Discounted)			
Carbon Capture and Storage	5	5	554
Coastal Protection	16	16	16
Commercial Fisheries (GVA)	0	1,288	2,570
Energy Generation	0	0	548
Oil and Gas	0	0	7,502
Ports and Harbours	92	92	92
Power Interconnectors	0	0	588
Telecommunication Cables	4	4	4
Total Quantified Economic Costs	**118**	**118**	**9,305**
Total Quantified Economic Costs (GVA)	**0**	**1,288**	**2,570**
Non-Quantified Economic Costs			
Commercial Fisheries	▪ None	▪ If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues	▪ If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues
Energy Generation	▪ Impact of delays and / or additional costs in future applications for wind-farm export cables not yet consented.	▪ Impact of delays and / or additional costs in future applications for wind-farm export cables not yet consented.	▪ Impact of delays and / or additional costs in future applications for wind-farm export cables not yet consented.
Oil and Gas	▪ Additional costs associated with development of licence blocks allocated to end of impact period (in areas not currently exploited).	▪ Additional costs associated with development of licence blocks allocated to end of impact period (in areas not currently exploited).	▪ Additional costs associated with development of licence blocks allocated to end of impact period (in areas not currently exploited).
Power Interconnectors	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications
Note: For detailed information on economic cost impacts on activities, see Table 3.			

C.4.3 Human Activity Summaries

Site-Specific Economic Costs on Human Activities arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 3a: CCS			**STR**
There are no current installations for CCS within the STR pMPA. However, there is potential for the development of a single project during the assessment period, associated with the ACT Acorn proposal. This project proposes the re-purposing of an existing oil and gas pipeline (the goldeneye pipeline), which transects the STR pMPA (12 nm of pipeline within the pMPA). This will necessitate a requirement for surveying the pipeline on a regular basis and will require a marine licence prior to commencement of activity, currently programmed for 2023. The potential CCS location is shown in Figure 11.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ The additional cost to incorporate impacts on MPA features from the CCS scheme into assessments for planning applications is assumed to be £5,600.	▪ The additional cost to incorporate impacts on MPA features from the CCS scheme into assessments for planning applications is assumed to be £5,600.	▪ The additional cost to incorporate impacts on MPA features from the CCS scheme into assessments for planning applications is assumed to be £5,600. ▪ It will take 3 days of survey effort to survey a 12 nm section of pipeline within the MPA ▪ The restriction on survey effort to Nov-April is assumed to double the amount of time required to undertake the survey (3 days of survey effort will take on average 8 days in winter, 4 in summer i.e. an additional 4 days downtime). ▪ The cost of an additional day (generally weather down-time) is assumed to be £10,000. ▪ It is assumed that the pipeline for ACT Acorn will require survey annually.
Description of quantified one-off impacts - (on-site)	▪ Additional cost of assessment incorporating MPA features. Total cost = £5,600	▪ Additional cost of assessment incorporating MPA features. Total cost = £5,600	▪ Additional cost of assessment incorporating MPA features.

Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ Cost associated with additional weather downtime associated with seasonal restriction on annual pipeline survey. Total cost = £760,000
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		5.6	5.6	766
Average annual costs		0.3	0.3	38
Present value of total costs (2019 to 2038)		5.4	5.4	554

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3b Coastal Protection				**STR**
In order to maintain protection from coastal erosion and flooding events, coastal protection assets require maintenance activities. Maintenance activities introduce the requirement for assessments in order to gain marine licences and planning permissions, which will need to be expanded to include the protected features of the pMPA sites.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that there is one application every 5 years in STR for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.	▪ It has been assumed that there is one application every 5 years in STR for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.	▪ It has been assumed that there is one application every 5 years in STR for maintenance of a coastal protection asset ▪ Additional assessment of the impact on MPA features from new sites will cost £5,600 per application.
Description of quantified one-off impacts - (on-site)		▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £22,400	▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £22,400	▪ Additional assessment is required to assess the potential impact of new shellfish aquacultures sites on MPA features to support planning applications. Total cost = £22,400
Description of quantified recurring impacts – (on-site)*		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		22	22	22
Average annual costs		1	1	1
Present value of total costs (2019–2038)		16	16	16

* Notes
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3c: Commercial fisheries	**STR**

Southern Trench pMPA lies within ICES rectangles 43E8, 44E6, 44E7 and 44E8 in ICES Division IVa. It lies mostly within 12nm but a small part extends beyond 12nm, which currently would require management measures to be introduced through CFP mechanisms. Approximately 7,677 tonnes of fish and shellfish were landed from these ICES rectangles per annum (2012-2016), predominantly pelagic species by weight (over 30%) and shellfish species by value (over 40%). The main gear types were demersal trawls, mechanical dredges and creels.

VMS-based estimates and ICES rectangle landings statistics indicate that demersal trawls, midwater trawls and mechanical dredges (over-12m vessels) and demersal trawls, mechanical dredges and creels (under-12m vessels) are the main gear types that operate within the Southern Trench pMPA. The value of landings from the pMPA was £4.9 million (over-12m vessels, from VMS data) and £8.7 million (under-12m vessels, indicated from ICES rectangle landings data) (annual average for 2012–2016, 2019 prices).

Vessels fishing in the Southern Trench pMPA predominantly operate from: Fraserburgh (over-12m vessels and under-12m vessels).

Landings from the over-12m vessels were made predominantly into Fraserburgh (43 %), Peterhead (24 %) and Buckie (13 %). Landings from the under-12m vessels were made predominantly into Fraserburgh (60 %), Buckie (13 %) and Peterhead (12 %).

For the over-12m vessels, demersal trawls operated in particular in the west part of the pMPA while mechanical dredges were the main operators in the eastern part of the pMPA. For the under-12m vessels, demersal trawls operated in particular in the western part of the pMPA, creels and mackerel lines operated in particular off the coast in the eastern part of the pMPA. VMS and Scotmap data for the site are shown in Figure 12 and Figure 13. The potential impact on non-UK vessels in the small part of the site that extends beyond 12nm has not been assessed.

Economic Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ Reduce risk of entanglement of minke whale with static gear by following best practice. ▪ Reduce risk of entanglement of minke whale with pelagic gear by following best practice. ▪ It is assumed that implementing these scenarios does not impose a cost on the industry.	▪ Reduce risk of entanglement of static gear minke whale by following best practice. ▪ Reduce risk of entanglement of minke whale with pelagic gear by following best practice. ▪ Exclude targeted fishing for sandeels. ▪ Exclusion of hydraulic gear from sandeel habitat. ▪ Exclude mobile bottom-contacting gear from 20% of burrowed mud.	▪ Reduce risk of entanglement of static gear with minke whale by following best practice. ▪ Reduce risk of entanglement of minke whale with pelagic gear by following best practice. ▪ Exclude targeted fishing for sandeels. ▪ Exclusion of hydraulic gear from sandeel habitat. ▪ Exclude mobile bottom-contacting gear from 40% of burrowed mud. ▪ Exclusion of drift nets and set nets between June and October. ▪ Limit herring and sprat fishing effort to current levels
One-off impacts (on-site)		▪ None	▪ None	▪ None
Recurring impacts – cost impacts per fleet segment (annual values, £000s, 2019 prices) (on-site)*	**Over-12m vessels**	▪ Loss of >12m fishing income:	▪ Loss of >12m fishing income:	▪ Loss of >12m fishing income:
	Demersal seines and demersal trawls	0.0	227.7	455.5
	Mechanical dredges and suction dredges	0.0	1.6	2.4
	Subtotal over-12m	*0.0*	*229.3*	*457.8*
	Under-12m vessels	▪ Loss of <12m fishing income:	▪ Loss of <12m fishing income:	▪ Loss of <12m fishing income:
	Demersal trawls	0.0	4.7	9.3
	Mechanical dredges	0.0	0.0	0.1
	Subtotal under-12m	*0.0*	*4.7*	*9.4*
	Total all vessels	**0.0**	**234.0**	**467.2**
Description of non-quantified impacts	On-site	▪ None	▪ None	▪ None

	Off-site	▪ None	If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues	If mobile bottom-contacting gear activity is displaced rather than lost, there is potential for: ▪ Additional abrasion ▪ Potential for gear conflict ▪ Potential changes to vessel costs/revenues
Quantified Impacts arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive) (deriving from on-site impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		0.0	4,679.7	9,344.4
Average annual costs		0.0	234.0	467.2
Present value of total costs (2019–2038)		0.0	3,441.9	6,872.7
Economic Impacts				
Direct GVA (£000s)				
Total change in GVA (2019–2038)		0.0	1,750.8	3,494.7
Average annual change in GVA		0.0	87.5	174.7
Present value of total change in GVA (2019–2038)		0.0	1,287.7	2,570.3
Direct + Indirect GVA (£000s)				
Total change in GVA (2019–2038)		0.0	2,534.8	5,059.7
Average annual change in GVA		0.0	126.7	253.0
Present value of total change in GVA (2019–2038)		0.0	1,864.3	3,721.4
Direct, Indirect + Induced GVA (£000s)				
Total change in GVA (2019–2038)		0.0	2,848.5	5,685.9
Average annual change in GVA		0.0	142.4	284.3
Present value of total change in GVA (2019–2038)		0.0	2,095.1	4,181.9
Employment (FTEs)				
Direct and indirect reduction in employment		0.0	3.5	7.1
Direct, indirect and induced reduction in employment		0.0	3.8	7.6

* On-site cost impacts may be offset by catches from effort displaced off-site, detailed in the assumptions.
** Where the value of landings affected is less than 10% of the value from the site, less than 10% of the value from each ICES rectangle, or less than 1% of the value from the region, it is likely that this activity can be absorbed by other grounds in the pMPA, ICES rectangles or region as appropriate, and therefore no cost impact is anticipated.
Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.
Total change in GVA (2019–2038) = The change in GVA (direct/indirect/induced as appropriate) for commercial fisheries summed over the 20 year period.
Average annual change to GVA = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries divided by the total number of years under analysis (i.e. 20).
Present value of total change in GVA (2019–2038) = Total change in GVA (direct/indirect/induced as appropriate) for commercial fisheries discounted to current value, using a discount rate of 3.5%.
Direct, indirect reduction in Employment = The average (mean) reduction in direct employment in the sector in full-time equivalents (FTEs), and indirect reduction in employment on the sector's suppliers.
Direct, indirect and induced reduction in employment = The average (mean) reduction in employment in the sector, the sector's suppliers and across the economy as a whole as a result of reduced expenditure by employees and suppliers.

Table 3d: Energy Generation			**STR**
There is no current energy generation activity within or adjacent to the STR pMPA. However, there is a consented route through the pMPA for the export cable for the Moray East offshore wind farm. This is due to be constructed (alongside the associated wind farm in the Moray Firth) and operational by early 2020s, and it is expected that this will introduce the requirement for regular survey of the cable route. There may be future potential for export cables for non-consented wind farms to transect the pMPA, however the scale of any development offshore from the STR pMPA is currently unknown. Energy generation activity is shown in Figure 11.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ No associated costs	▪ No associated costs	▪ It will take 3 days of survey effort to survey a 12 nm section of cable within the MPA ▪ The restriction on survey effort to Nov-April is assumed to double the amount of time required to undertake the survey (3 days of survey effort will take on average 8 days in winter, 4 in summer i.e. an additional 4 days downtime). ▪ The cost of an additional day (generally weather down-time) is assumed to be £10,000. ▪ It is assumed that the export cable for Moray East OWF will require survey annually.
Description of quantified one-off impacts - (on-site)	▪ N/A	▪ N/A	▪ N/A
Description of quantified recurring impacts – (on-site)	▪ N/A	▪ N/A	▪ Cost associated with additional weather downtime associated with seasonal restriction on annual cable survey. Total cost = £760,000

Description of non-quantified impacts	On-site	▪ Impact of delays and / or additional costs in future applications for wind-farm export cables not yet consented.	▪ Impact of delays and / or additional costs in future applications for wind-farm export cables not yet consented.	▪ Impact of delays and / or additional costs in future applications for wind-farm export cables not yet consented.
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		0	0	760
Average annual costs		0	0	38
Present value of total costs (2019–2038)		0	0	548

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3e: Oil and Gas			**STR**
There are no licensed blocks for oil and gas within the STR pMPA. It is noted however, that there are a number of pipelines transecting the STR pMPA, landfalling principally at locations around St Fergus and Peterhead. In total there is 154 nm of pipeline in the STR pMPA. There are large numbers of licensed blocks that are not yet exploited seawards of the pMPA, however the extent of development of these blocks, and the likelihood of future pipelines crossing the pMPAs is currently unknown, but it is unlikely that significant new pipeline development will occur. Rather, any new offshore development is likely to tie in to existing pipeline infrastructure. Oil and gas activity is shown in Figure 11.			
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)			
	Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts	▪ No additional cost	▪ No additional cost	▪ It will take 3 days of survey effort to survey a 12 nm section of pipeline within the MPA ▪ It is assumed that the 154 nm of pipeline currently present is the only pipeline that requires annual survey over assessment period. ▪ The restriction on survey effort to Nov-April is assumed to double the amount of time required to undertake the survey (3 days of survey effort will take on average 8 days in winter, 4 in summer i.e. an additional 4 days downtime). ▪ The cost of an additional day (generally weather down-time) is assumed to be £10,000.
Description of quantified one-off impacts - (on-site)	▪ N/A	▪ N/A	▪ N/A
Description of quantified recurring impacts – (on-site)	▪ N/A	▪ N/A	▪ Cost associated with additional weather downtime associated with seasonal restriction on annual pipeline survey. Total cost = £10,200,000

Description of non-quantified impacts	On-site	▪ Additional costs associated with development of licence blocks allocated to end of impact period (in areas not currently exploited).	▪ Additional costs associated with development of licence blocks allocated to end of impact period (in areas not currently exploited).	▪ Additional costs associated with development of licence blocks allocated to end of impact period (in areas not currently exploited).
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		0	0	10,200
Average annual costs		0	0	510
Present value of total costs (2019 to 2038)		0	0	7,502

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3f: Ports and Harbours				STR
There is one major and 13 minor ports and harbours within or within a buffer (5 km for major ports, 1 km for minor ports) of the STR pMPA (major port: Peterhead; minor ports and harbours: Banff, Buckie, Cairnbulg, Cullen, Fraserburgh, Gardenstown, Macduff, Pennan, Portknockie, Portsoy, Rosehearty, Sandhaven and Whitehills). There are also 4 open disposal sites within the STR pMPA. Ports and harbours are shown in Figure 11.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs per licence application are estimated to be £7,600 (at 2019 prices); ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs per licence application are estimated to be £7,600 (at 2019 prices); ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.	▪ New development proposals affecting MPAs will require additional assessment of impacts to protected features; ▪ Additional assessment costs per licence application are estimated to be £7,600 (at 2019 prices); ▪ Costs are incurred by all major ports within 5km of new MPAs or all non-major ports within 1km of new MPAs; and ▪ All major ports submit development applications every 5 years starting in 2021 and all other ports submit development applications every 20 years starting in 2029.
Description of quantified one-off impacts - (on-site)		▪ Additional assessment cost for development of major ports. Total cost = £30,400 ▪ Additional assessment cost for development of minor ports. Total cost = £98,800	▪ Additional assessment cost for development of major ports. Total cost = £30,400 ▪ Additional assessment cost for development of minor ports. Total cost = £98,800	▪ Additional assessment cost for development of major ports. Total cost = £30,400 ▪ Additional assessment cost for development of minor ports. Total cost = £98,800
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-	On-site	▪ N/A	▪ N/A	▪ N/A

quantified impacts	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		129	129	129
Average annual costs		6	6	6
Present value of total costs (2019 to 2038)		92	92	92

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3g: Power Interconnectors				**STR**
There are no power interconnectors currently located within the STR pMPA. There is one project identified for potential development over the assessment period (Caithness–Moray, currently under construction). This project will require regular survey to support operation and maintenance following completion of construction in 2021. The proposed power interconnector route is shown in Figure 11.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ No additional cost	▪ No additional cost	▪ It will take 3 days of survey effort to survey a 12 nm section of cable within the MPA ▪ The restriction on survey effort to Nov-April is assumed to double the amount of time required to undertake the survey (3 days of survey effort will take on average 8 days in winter, 4 in summer i.e. an additional 4 days downtime). ▪ The cost of an additional day (generally weather down-time) is assumed to be £10,000. ▪ It is assumed that the Caithness-Moray HVDC will require survey annually following construction in 2021.
Description of quantified one-off impacts - (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ Cost associated with additional weather downtime associated with seasonal restriction on annual cable survey. Total cost £800,000
Description of non-quantified impacts	On-site	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications	▪ Cost of uncertainty and delays to licence applications

	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019–2038)		0	0	800
Average annual costs		0	0	40
Present value of total costs (2019–2038)		0	0	588

Definitions of cost and economic impacts:
Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period.
Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20).
Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.

Table 3h: Telecommunication Cables				**STR**
There are two telecommunication cables which transit through STR (SHEFA-2 and CNS FIBRE OPTIC) totalling approximately 30 km of length within the pMPA. These link mainland Scotland with the Orkney Islands and with oil and gas platforms through the hub on the Ula oilfield. Telecommunication cables are shown in Figure 11.				
Economic Impacts Arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive)				
		Lower Estimate	**Intermediate Estimate**	**Upper Estimate**
Assumptions for impacts		▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices. ▪ It has been assumed that half of the cables are replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices. ▪ It has been assumed that half of the cables are replaced during the assessment period.	▪ It has been assumed that the cost associated with additional assessment to support planning applications is £5,600 in 2019 prices. ▪ It has been assumed that half of the cables are replaced during the assessment period.
Description of quantified one-off impacts - (on-site)		▪ Cost of additional assessment. Total cost = £5,600	▪ Cost of additional assessment. Total cost = £5,600	▪ Cost of additional assessment. Total cost = £5,600
Description of quantified recurring impacts – (on-site)		▪ N/A	▪ N/A	▪ N/A
Description of non-quantified impacts	On-site	▪ N/A	▪ N/A	▪ N/A
	Off-site	▪ N/A	▪ N/A	▪ N/A
Quantified Impacts arising from the Designation and Management of the Site (Over 2019 to 2038 Inclusive) (Deriving from on-Site Impacts)				
Cost Impacts (£000s)				
Total costs (2019 to 2038)		6	6	6
Average annual costs		0	0	0
Present value of total costs (2019 to 2038)		4	4	4
Definitions of cost and economic impacts: Total costs = Sum of one-off costs and recurring costs for the site summed over the 20 year period. Average annual costs = Total costs divided by the total number of years under analysis (i.e. 20). Present value of total costs = Total costs discounted to their current value, using a discount rate of 3.5%.				

Human activities that would benefit from designation and management of the site as an MPA

Table 4. Human Activities that would Benefit from Designation and Management of the Site as an MPA				STR
Activity	**Description**	**Lower Estimate**	**Intermediate Estimate**	**Upper Estimate**
Marine wildlife tourism	Tourism based around observation of features protected at sites (e.g. cetaceans, basking shark, seabird colonies)	Minimal, management scenarios have little impact	Low–Moderate, scale and/or quality of activity may increase due to protection of features of site that contribute to tourism and recreation from decline, possibly allowing some recovery.	
Marine recreation	Recreation activities using the marine environment, for which wildlife and environmental quality are part of the motivation for the activity (e.g. angling, recreational boating).			

Human activities that would be unaffected by designation and management of the site as an MPA

Table 5. Human Activities that are Present but which would be Unaffected by Designation and Management of the Site as an MPA	STR
Activity	**Description**
Aquaculture – finfish	There are currently no finfish aquaculture sites within the pMPA, and no current or expected future proposals that would be impacted by the management scenarios.
Aquaculture – shellfish	There are currently no shellfish aquaculture sites within the pMPA, and no current or expected future proposals that would be impacted by the management scenarios.
Shipping	The potential management scenarios would have no impact on commercial shipping in the region of the MPA.

C.4.4 Social and Distributional Analysis of Impacts arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 inclusive)

Table 6a. Social Impacts Associated with Quantified and Non-Quantified Economic Impacts			STR
Potential Economic Impacts	**Area of Social Impact Affected**	**Mitigation**	**Significance of Social Impact**
Reduction in fishing activity and/or profitability	Income and employment Culture and Heritage	None	xx
Reduction in fishing process activity		None	xx
Impacts: xxx – significant negative effect; xx – possible negative effects; x – minimal negative effect, if any; 0 – no noticeable effect expected.			

Table 6b. Distribution of Social Impacts (Location, Age and Gender)									STR
Sector/Impact	**Scale of Impact by location**			**Age**			**Gender**		
	Region	**Ports***	**Rural, Urban, Mainland or Island**	**Children**	**Working age**	**Pensionable Age**	**Male**	**Female**	
Unemployment	Buchan & Moray	Home: Fraserburgh 87% (87%), Buckie, Mallaig & Peterhead 3% (3%) Landing: Fraserburgh 89% (89%), Buckie 4% (4%), Macduff and Peterhead 3% (3%)	Rural & urban, Mainland	x	xx	x	x	x	
Lower Income				x	xx	x	x	x	
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected. * Based on value of landings by home or landing port affected under intermediate scenario (upper scenario in brackets)									

Table 6c. Distribution of Social Impacts (Fishing Groups, Income Groups and Social Groups)									STR
Sector/Impact	**Fishing Groups**		**Income Groups**			**Vulnerable Social Groups**			
	Vessel Category <12 m >12 m	**Gear Types/Sector**	**10% most deprived**	**Middle 80%**	**10% most affluent**	**Crofters**	**Ethnic minorities**	**With disability or long-term sick**	
Unemployment	>12 m, <12m	Demersal trawls	xx	xx	x	0	0	0	
Lower Income			xx	xx	x	0	0	0	
Impacts: xxx/+++ – significant negative/positive effect; xx/++ – possible negative/positive effects; x/+ – minimal negative/positive effect, if any; 0 – no noticeable effect expected.									

C.4.5 Public Sector Costs

Table 7. Site/Feature-Specific Public Sector Costs arising from the Designation and Management of the Site as an MPA (over 2019 to 2038 Inclusive)			STR
Description	**Public Sector Costs**		
	Lower Estimate (£k)	**Intermediate Estimate (£k)**	**Upper Estimate (£k)**
Quantified Public Sector Costs (Total, not discounted unless otherwise specified)			
Preparation of Statutory Instruments	0	4.2	4.2
Preparation of a Management Scheme	27.8	27.8	27.8
Promotion of Voluntary Measures	4.2	4.2	4.2
Monitoring of Protected Features	494	494	494
Review of Assessments (PV)	12	12	12
Total Quantified Public Sector Costs	**538**	**542**	**542**
Average annual costs	**27**	**27**	**27**
Present value of total costs (2019 to 2038)	**421**	**425**	**425**

C.4.6 Potential contribution of the site to an ecologically-coherent network

Table 8. Overview of MPA Interest Features for which Designation and Management have been Proposed and how these Contribute to an Ecologically Coherent Network of MPAs					STR
Feature Name	**Representation**	**Replication**	**Linkages**	**Geographic Range and Variation**	**Resilience**
Burrowed mud	MPAs / MPA proposals have been identified in OSPAR Regions II, III and V and comprise both biotopes and both component species.	Burrowed mud within the MPA proposal would be the only example of this feature in the Scottish network within OSPAR Region II outside the Fladen Grounds (Central Fladen MPA), with which recent research has shown no connectivity (Gallego et al.,2013).	There is currently little evidence on which to base assessments of linkages for seabed habitats and low or limited mobility species in Scotland's seas.	The Central Fladen MPA and Southern Trench MPA proposal reflect the geographic range of seapens and burrowing megafauna in offshore waters and away from the coast, respectively.	One of the examples needed to achieve resilience within the MPA network, given that this feature is on the OSPAR Threatened and/or Declining list and the proportional importance of Scotland's seas for this feature.
Fronts	MPAs/MPA proposals have been included in both OSPAR Regions II and III covering shelf seas.	The designation of STR and SOH would mean that replication would be provided within the network. These are considered to be functionally significant examples.	No information available.	MPAs/MPA proposals have been included in both OSPAR Regions II and III covering shelf seas.	Fronts are not considered to be threatened and/or declining and therefore a greater proportion does not need to be included within the network.
Minke whale	The proposal provides representation of the highly mobile MPA search feature that would not otherwise be included within the network.	The proposal would enable replication of minke whale within the Scottish MPA network (also in Sea of the Hebrides).	MPA proposals were developed on the basis of essential areas for key life cycle stages e.g. for minke whale.	Consideration of geographic range, because there is no known ecological variation across Scotland's seas.	Minke whale is not included on the OSPAR Threatened and/or Declining List and therefore it is not considered that a greater proportion needs to be included within the MPA network.
Shelf deeps	Representation of shelf deeps in OSPAR Region II. Southern Trench is the deepest feature on the Scottish continental shelf.	Proposal would ensure replication of shelf deeps (with Small Isles MPA in OSPAR Region III).	No information available.	Reflects the known geographic range of the feature by providing representation in Region II.	Shelf deeps are not considered to be threatened and/or declining and therefore a greater proportion does not need to be included within the network.

References Scottish Natural Heritage. 2014. Further advice to Scottish Government on the selection of Nature Conservation Marine Protected Areas for the development of the Scottish MPA network. *Scottish Natural Heritage Commissioned Report No. 780.*

C.4.7 Anticipated Impacts on Ecosystem Services

Table 9a.	Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)								STR
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
Fish and shellfish for human consumption	Moderate, burrowed mud contributes to the food web	On-site and off-site	Stocks not at MSY	Low, recovery of fish stocks possible in long term from protection of benthic features		Moderate, recovery of fish stocks possible in medium to long term due to extent of protection of benthic features	Moderate, fish stocks have commercial value	Low–Moderate	Moderate
Fish and shellfish for non-human consumption			Stocks reduced from potential maximum						
Climate regulation	Minimal	On-site	Minimal	Nil			Moderate	Nil	High
Waste breakdown/ detoxification	Minimal	On-site	Minimal	Nil			Low	Nil	High
Non-use value of natural environment	Moderate – High, features such as minke whale, and contribution of the site to MPA network, have non-use value (Kenter *et al*. 2013).	On-site and off-site	Non-use value of the site may decline	Low–Moderate, designation, and protection of features of site from decline and/or allowing some recovery			Moderate, range of features contributes to halting decline of marine biodiversity	Low–Moderate	Moderate, extent of features, responses to management scenarios, and value to society all uncertain
Recreation	Moderate, wildlife tourism and recreation (including angling/ diving, Kenter *et al*. 2013) at site	On-site	Recreation value of the site may decline	Low, protection of features of site that contribute to recreation		Moderate, protection of features of site that contribute to recreation from decline, and/or allowing some recovery	Moderate, recreation and tourism support jobs, and are valued (including angling/ diving, Kenter *et al*. 2013).	Low–Moderate	Low–Moderate, extent of change from management scenarios uncertain.
Research and Education	Moderate, features subject to scientific study (e.g. enclosed (glacial) seabed	On-site	Features may decline	Minimal	Low–Moderate, protection of geological features improve future research opportunities. Designation may play role in communicating management needs.		Low–Moderate for studied features.	Low–Moderate	Low–Moderate, extent to which research uses

Table 9a.	Summary of Ecosystem Services Benefits arising from the Designation and Management of the Site as an MPA (Over 2019 to 2038 Inclusive)								STR
Services	**Relevance to Site**	**On-site / Off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Benefits**	**Confidence**
				Lower	**Intermediate**	**Upper**			
	basin)								site in future uncertain.
Total value of changes in ecosystem services				**Minimal for lower scenario. Low for intermediate scenario, Moderate for upper scenario, mainly based on recreation and non-use value evidence in Kenter *et al*. (2013).**				**Low–Moderate**	**Moderate**

Table 9b. Summary of Ecosystem Services Costs arising from the Management Scenarios for the Site/Feature (over 2019 to 2038 inclusive)										STR
Services	**Relevance to Site**	**On-site / off-site**	**Baseline Level**	**Estimated Impacts of Management**			**Value Weighting**	**Scale of Costs**	**Confidence**
				Lower	**Intermediate**	**Upper**			
Fish and shellfish for human consumption	Moderate, burrowed mud contributes to the food web	On-site and off-site	Stocks not at MSY	Minimal–Low, potential impact from substitute gears on-site		Low, potential impact from substitute gears on-site	Moderate, fish stocks have commercial value	Minimal–Low	Moderate
Fish and shellfish for non-human consumption			Stocks reduced from potential maximum		Low, potential impacts if affected gears displace effort to outside of site				
Climate regulation	Minimal	On-site	Minimal	Minimal	Nil, not impacted by substitute gears on-site		Moderate	Nil–Minimal	High
Waste breakdown/ detoxification	Minimal	On site	Minimal	Minimal	Nil, not impacted by substitute gears on-site		Low	Nil–Minimal	High
Non-use value of natural environment	Moderate–High, features such as minke whale, and contribution of the site to MPA network, have non-use value (Kenter *et al*. 2013).	On-site and off-site	Non-use value of the site may decline	Minimal–Low, effort displaced is low, seabed off-site less valuable for this service	Minimal, potential impact from substitute gears on-site		Moderate, range of features contributes to halting decline of marine biodiversity	Minimal–Low	Low
Recreation	Moderate, wildlife tourism and recreation (including angling/ diving, Kenter *et al*. 2013) at site		Recreation value of the site may decline				Moderate, recreation and tourism support jobs, and are valued (including angling/ diving, Kenter *et al*. 2013).	Minimal–Low	Moderate
Research and Education	Moderate, features subject to scientific study (e.g.	On-site	Features may decline	Minimal, effort displaced is low, seabed off-site less	Minimal, potential impact from substitute gears on-site		Low–Moderate	Minimal	Moderate

	enclosed (glacial) seabed basin)			valuable for this service				
Total value of changes in ecosystem services				**Minimal–Low**		**Minimal–Low**		**Low**

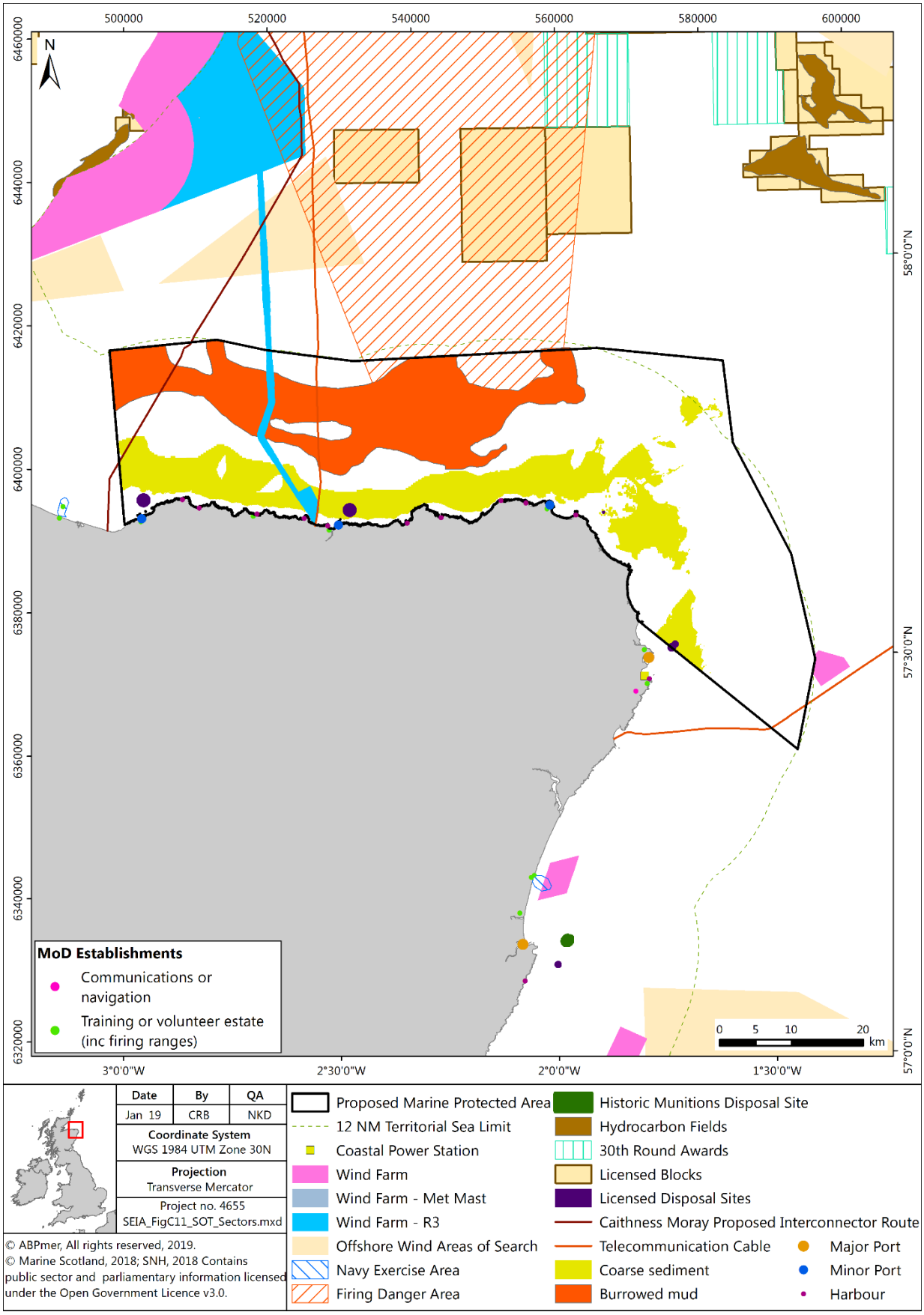

Figure 11 All sector activities in STR (excluding commercial fisheries)

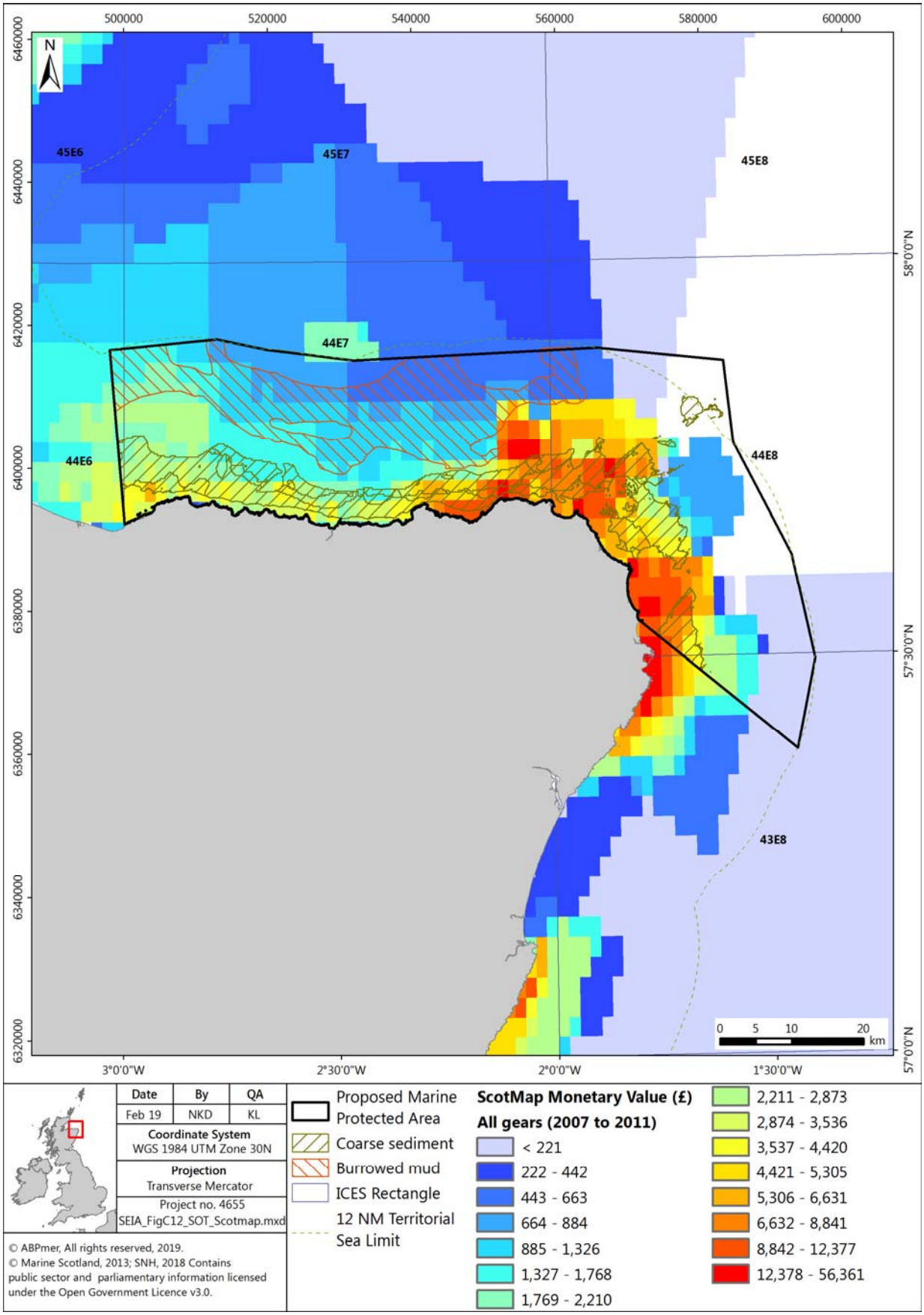

Figure 12 Commercial fisheries ScotMap Data for STR

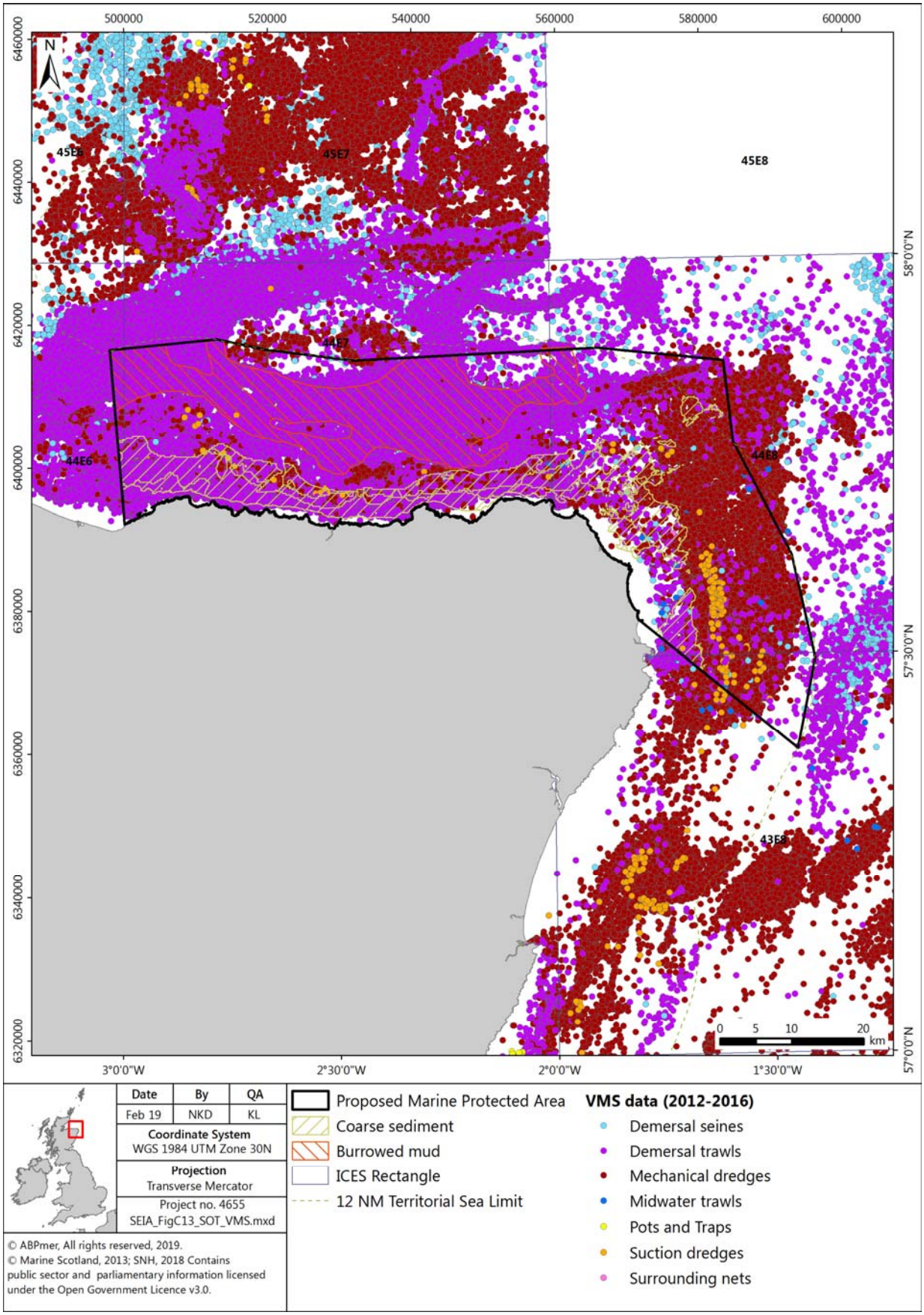

Figure 13 Commercial fisheries VMS data for STR