11 Human Environment

11.1 Commercial Fisheries

11.1.1 Summary of Effects and Mitigation

11.1.1.1 For the purposes of this assessment, salmon and sea trout fisheries in the Moray Firth are separately addressed to other commercial fisheries, as a result of their being located largely in-river (with the exception of some coastal netting) and being different in nature to the majority of marine commercial fishing activities.

11.1.1.2 This chapter presents an assessment of the likely significant effects of the construction, operation and decommissioning of the offshore transmission infrastructure (OfTI) on commercial fisheries.

11.1.1.3 Information supporting this assessment has been collected from a data review and consultation as explained in Chapter 5.1 (Commercial Fisheries).

Summary of Effects

Commercial Fisheries

11.1.1.4 Commercial fishing is defined as any legal fishing activity undertaken for declared taxable profit. This chapter summarises the assessment of the potential impacts on commercial fishing from the construction, operation and decommissioning of the OfTI.

11.1.1.5 It should be noted that consultation with commercial fishing interests assisted in defining the offshore export cable route, with the aim of limiting where possible the sensitivity of its location upon the principal fisheries in the area.

11.1.1.6 The assessment of effects has identified significant effects during the construction phase, principally arising from the temporary loss or restricted access to fishing grounds during the construction phase, and the associated displacement of vessels during this time. The implementation of the construction management programme would reduce the potential for conflict between static gear fishing vessels and construction vessels, and the residual impact during the construction phase as a result would be negative and **minor**.

11.1.1.7 The impact of the loss or restricted access to fishing grounds in the operational phase will be reduced to negative and **minor**, as a result of the post construction and installation surveys and, if necessary, seabed rectification measures to ensure that fishing activities can safely resume.

11.1.1.8 It should be noted that the purpose of the construction management programme is also to ensure that the impacts described are kept within the significance levels ascribed throughout both the construction and operational phases of the development.

11.1.1.9 MORL is committed to continuing the exploration and development of mitigation options in consultation with the fishing industry. At the current time, MORL is proposing to undertake fishing trials using modified scallop dredge gear with a view to identifying enhancements to traditional scallop fishing practices that may be of benefit to both the developer and the scallop fleet.

11.1.1.10 MORL will continue to facilitate ongoing dialogue throughout the pre-construction, construction and operational phases of the development, which will continue to discuss the mitigation options under investigation, as well as defining the protocol for engagement during the construction and operation phases.

11.1.1.11 A summary of commercial fisheries effects pre and post mitigation is shown in Table 11.1-1 below. In the instances where the effect is upon fish and shellfish species, the summary table provided in Chapter 10.2 (Fish and Shellfish Ecology) should be referred to (Table 10.2-1).

Table 11.1-1 Commercial Fisheries Effect Summary

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Installation / Decommissioning			
Adverse Effects to commercial Fish and Shellfish Populations (indirect effect upon commercial fishing activities)	Minor-all target species	None proposed	Minor-all target species
Adverse Effects on Recreational Fish Populations	Minor	None proposed	Minor
Complete Loss or Restricted Access to Traditional Fishing Grounds	Minor for scallop, squid and whitefish fisheries Moderate-nephrops and crab and lobster fisheries	None proposed	Minor for scallop, squid and whitefish fisheries Moderate-nephrops and crab and lobster fisheries
Safety Issues for Fishing Vessels	Application of safety zones for unfinished and completed OSPs to ensure risks are within acceptable limits Outside of acceptable limits for inter platform and export cables	Apply for appropriate safety zones Application for operational safety zones & ongoing consultation to reduce risks to acceptable limits	Within acceptable limits Within acceptable limits
Increased Steaming Time to Fishing Grounds	Minor-all fisheries	None proposed	Minor-all fisheries
Displacement of Fishing Activity into Other Fishing Areas	Minor for scallop, squid and whitefish fisheries Moderate-nephrops and crab and lobster fisheries	None proposed	Minor for scallop, squid and whitefish fisheries Moderate-nephrops and crab and lobster fisheries
Interference with Fisheries Activities	Minor-all fisheries	Construction management plan	Minor-all fisheries
Operation			
Adverse Effects to Commercial Fish and Shellfish Populations (indirect effect upon commercial fishing activities)	Minor-all target species	None proposed	Minor-all target species

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Adverse Effects on Recreational Fish Populations (indirect effect upon commercial fishing activities)	Minor	None proposed	Minor
Complete Loss or Restricted Access to Traditional Fishing Grounds	Minor-all fisheries	None proposed	Minor-all fisheries
Safety Issue for Fishing Vessels	Application of safety zones for completed OSPs to ensure risks are within acceptable limits Acceptable for installed inter-platform and export cables	Apply for operational safety zones Cable burial and protection and post-construction surveys	Within acceptable limits Within acceptable limits
Increased Steaming Time to Fishing Grounds	Minor-all fisheries	None proposed	Minor-all fisheries
Obstacles on the Seabed Post-Installation	Within acceptable limits	None above standard industry practice. Cable burial and protection and post-construction surveys	Within acceptable limits
Displacement of Fishing Activity into Other Fishing Areas	Minor-all fisheries	None proposed	Minor-all fisheries
Interference with Fisheries Activities	Minor-all fisheries	Extension of installation management programme to include operations	Minor-all fisheries

Salmon and Sea Trout Fisheries

11.1.1.12 As a result of salmon and sea trout fisheries in the Moray Firth being either in-river or, to a lesser extent, coastal, any likely effects arising from the construction / decommissioning and operation of the OfTI upon the fisheries would broadly be likely to occur as a result of changes to the behaviour of the species in the offshore marine environment. This is described in Chapter 10.2 (Fish and Shellfish Ecology).

11.1.1.13 Given the small footprint of the OfTI, likely effects derived from loss of habitat and introduction of new habitat have been excluded from the assessment of effects on fish and shellfish species (see Chapter 10.2: Fish and Shellfish Ecology).

11.1.1.14 Due to the limited current knowledge in relation to their migration routes in Scottish coastal waters and the use that they may make of the development area, an assessment of effects on salmon and sea trout is based on the conservative assumption that all fish originating from all rivers flowing into the Moray Firth will use the development area during their life stages in the marine environment.

11.1.1.15 Overall, the effects of the construction, operation and decommissioning phases of the OfTI on fish and shellfish ecology, including salmon and sea trout, have been assessed to be negative and of **minor significance**.

11.1.1.16 In general terms, the likely effects of the construction phase on fish and shellfish species have been assessed to be of minor significance. An exception to this is

construction noise, which has been identified as having potential to result in significant effects (above minor) namely cod, herring, salmon and sea trout.

11.1.1.17 The impact assessment (Chapter 7.2: Fish and Shellfish Ecology) on these species has taken a precautionary approach, where conservative assumptions have had to be applied as a result of the uncertainty surrounding currently available information on the use that these species may make of the area of the three proposed wind farms during the construction phase.

11.1.1.18 In order to mitigate this uncertainty, MORL is committed, in consultation with Marine Scotland and the relevant fisheries stakeholders, to undertake additional survey work and monitoring with the objective of increasing the confidence in this impact assessment and identifying whether mitigation is required and, if so, to define feasible measures in order to reduce the significance of the likely effects.

11.1.1.19 Some surveys, such as the sandeel (a key prey species for other fish species) survey were undertaken in consultation with Marine Scotland pre-application during their optimal survey periods the results of which are included in Chapter 7.2 (Fish and Shellfish Ecology). Due to the seasonal nature of these surveys, MORL expects that specific surveys and monitoring will be defined and implemented at the appropriate time of year in consultation with Marine Scotland and other stakeholders.

11.1.1.20 In addition to the monitoring / mitigation above, soft start piling will be used during construction with the aim that mobile species are not exposed to the highest noise levels.

11.1.1.21 A Summary of the Salmon and Sea Trout effects pre and post mitigation is given in Table 11.1-2 below.

Table 11.1-2 Salmon and Sea Trout Effect Summary

Effect	Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Temporary Disturbance to Seabed	Salmon and sea trout	Negative Minor Probable	None proposed	Negative Minor Probable
Noise	Salmon and sea trout	Negative Minor Unlikely	Monitoring / survey work to increase assessment confidence and / or mitigation measures where required.	Negative Minor Unlikely
EMFs	Salmon and Sea trout	Negative Minor Probable	Cable burial / protection	Negative Minor Probable

11.1.2 Introduction

11.1.2.1 Commercial fishing is defined as any legal fishing activity undertaken for declared taxable profit. This chapter summarises the assessment of the likely significant effects on commercial fishing from the construction, operation and decommissioning of the offshore transmission infrastructure (OfTI).

11.1.2.2 For the purposes of this assessment and in the absence of detailed information on decommissioning schedules and methodologies, it is assumed that any effects derived from the decommissioning phase will, at worst, be of no greater significance than those derived from the construction phase and are likely to be significantly less (e.g. there will be no piling works during decommissioning.

11.1.2.3 An assessment of the likely significant effects of the three proposed wind farm sites is provided in Chapter 8.1 (Commercial Fisheries).

11.1.2.4 An assessment of the cumulative effects arising from developments in addition to the three proposed wind farm sites is given in Chapter 15.1 (Commercial Fisheries).

11.1.2.5 The following Chapters and Appendices support this assessment, and can be found as:

- Chapter 5.1 and Technical Appendix 5.1 A (Commercial Fisheries);
- Chapter 4.3 and Technical Appendix 4.3 A (Fish and Shellfish Ecology);
- Technical Appendix 4.3 B (Salmon and Sea Trout Ecology and Fisheries); and
- Chapter 5.2 and Technical Appendix 5.2 D and 5.2 E (Shipping and Navigation).

11.1.3 Rochdale Envelope Parameters Considered in the Assessment

11.1.3.1 A worst case scenario for the effects of the installation / decommissioning and operation of the OfTI upon commercial fishing activities has identified the design parameters which will realistically have the greatest effect upon the fishing activities described in the baseline (see Chapter 2.2: Project Description).

11.1.3.2 The principal factor in determining the design parameters that will constitute a worst case is the consideration of how the fishing activities described in the baseline will be most affected. This could occur in two ways: the first is the potential for the OfTI to cause adverse effects to fish and shellfish populations of commercial importance and hence result in reduced fishing productivity. Whilst this type of effect is briefly discussed within this section, it is more fully assessed in Chapter 10.2 (Fish and Shellfish Ecology). Second, there is the potential for the OfTI to constitute a physical obstacle or risk to the continuation of normal fishing activities as described in the baseline. Accepting that the Fish and Shellfish Ecology assessment will identify the worst case parameters for the first issue, it is the second which determines the parameters of a worst case for commercial fishing activities, and which may result in the identification of design parameters different to those identified as the worst case for incurring effects to species.

11.1.3.3 The parameters provided in Table 11.1-3 constitute the worst case for the OfTI:

Table 11.1-3 Summary of Worst Case Parameters for Commercial Fishing

Potential Effect	Rochdale Envelope Scenario Assessed
Construction & Decommissioning	
Adverse Effects on Commercially Exploited and Recreational Fish and Shellfish Populations (indirect effect upon commercial fishing activities)	See Chapter 10.2.
Temporary Loss or Restricted Access to Fishing Grounds	Maximum loss of fishing grounds as a result of: • Maximum number of OSPs, i.e. Eight (Two AC / DC OSPs, six AC OSPs); • Gravity base foundations (65 m by 65 m); • Total inter-platform cable length to connect the six AC OSPs to the two AC / DC OSPs (i.e. 90 km); • Total offshore export cable length from wind farm to shore: 105 km; • Maximum number of cable trenches: two bundles of two DC cables, each bundle in individual trenches. Each trench width will be a maximum of 3 m; and • Maximum indicative duration of construction period: the OSPs will be installed at points during the construction period of the wind farm (estimated to be five years maximum). The installation of each OSP is estimated to take approximately 90 days. The export cables will be installed in two periods of approximately 200 days per trench up to one year apart.
Safety Issues for Fishing Vessels	See Chapter 11.2. In addition, the realistic worst case scenario should also recognise the safety risks posed by the worst case infrastructure listed in Temporary Loss or Restricted Access to Fishing Grounds.
Increased Steaming Times	Maximum number of safety / exclusion zones in the sites, resulting in increased steaming times as a result.
Displacement of Fishing Activity	See Temporary Loss or Restricted Access to Fishing Grounds.
Interference with Fishing Vessels	Location of port of construction and maximum number of construction works vessels.
Operation	
Adverse Effects on Commercially Exploited and Recreational Fish and Shellfish Populations (indirect effect upon commercial fishing activities)	See Chapter 10.2.
Complete Loss or Restricted Access to Fishing Grounds	Maximum number of gravity base OSPs: i.e. eight.

Potential Effect	Rochdale Envelope Scenario Assessed
Safety Issues for Fishing Vessels	• Maximum number of OSPs (i.e. eight); and • Post installation status of the export and inter array cables.
Increased Steaming Times	None foreseen
Obstacles on the Seabed Post-Construction	Any construction related obstacles and changes to seabed conditions, including cable burial and protection.
Displacement of fishing Activity	See Complete Loss or Restricted Access to Fishing Grounds
Interference with Fishing Vessels	None foreseen in addition to potential operational effects above

11.1.3.4 The offshore export cables will be buried to a target depth of 1 m, based on site-specific seabed conditions. Where adequate burial cannot be achieved alternative protection such as mattresses or rock placement will be used. The appropriate post installation surveys and, if necessary, seabed rectification procedures will be undertaken to ensure that fishing vessels are able to safely resume activities in the vicinity of construction operations.

11.1.3.5 Guidance published by the United Kingdom Cable Protection Committee (UKCPC), now known as Subsea Cables UK, recommends that cable trenches should be separated by a distance based upon water depth. Following this guidance, the maximum total separation distance between the DC cable trenches will be 800 m.

11.1.3.6 The precise location of the OSPs has not yet been defined. It is however anticipated that all AC OSPs will be located within or at the boundaries of the three proposed wind farm sites. The two AC / DC converter OSPs will either be located within the wind farm site boundaries or the surveyed cable route boundary, as close as practicable to the wind farm boundary. Some degree of overlap between the impact assessment undertaken for the three proposed wind farm sites (Chapter 8.1: Commercial Fisheries) and the OfTI should therefore be expected.

11.1.3.7 Consultation with fishing interests identified that a more concentrated, shorter installation period was generally preferred to a longer term installation and installation schedule (this assumes fishing activities can be resumed to some degree within the operational wind farm sites where the OSPs may be located). Furthermore, it is considered that the risks of negative interactions between fishing vessels and installation activities are increased over a longer installation period.

11.1.3.8 The impact assessment methodology used for the evaluation of effects on fish and shellfish species is described below. The significance criteria used are based on the magnitude of the effects and on the sensitivity of the receptors. The parameters used to define these take account of the IEEM (2010) impact assessment guidelines.

11.1.4 EIA Methodology

Commercial Fisheries

11.1.4.1 The following section describes the impact assessment methodology, which has

been applied to the baseline provided in Chapter 5.1 (Commercial Fisheries). In the absence of published guidelines by Marine Scotland regarding the assessment of effects of wind farm development and electrical cable installation upon commercial fishing activities, where appropriate the following aspects as specified in the CEFAS / MCEU (2004) guidelines have been considered:

- Implications for fisheries during the installation phase;
- Implications for the fisheries when the development is completed;
- Adverse effects on commercially exploited fish and shellfish populations;
- Adverse effects on recreational fish populations;
- Complete loss or restricted access to traditional fishing grounds;
- Safety issues for fishing vessels;
- Increased steaming time to fishing grounds;
- Obstacles on the seabed post-installation;
- Interference with fisheries activities; and
- Any other concerns raised by local fishermen and fishing organisations.

11.1.4.2 In addition to the above, the following type of effect has been included subsequent to consultation with fishing interests:

- Displacement of fishing activity into other fishing areas.

11.1.4.3 An assessment of the above effects will be separately applied to the construction / decommissioning phases and the operational phase of the OfTI. In the absence of detailed information on the decommissioning schedules and methodologies, it is considered that the likely effects associated with the decommissioning phase will be of no greater significance, and are likely to be considerably less (e.g. there will be no piling activity), than those of the construction phase.

11.1.4.4 Cumulative effects arising from other marine developments are separately discussed in Chapter 15.1 (Commercial Fisheries).

Salmon and Sea Trout Fisheries

11.1.4.5 As a result of salmon and sea trout fisheries in the Moray Firth being either in-river or, to a lesser extent, coastal, any likely effects arising from the construction / decommissioning and operation of the OfTI upon the fisheries would broadly be likely to occur as a result of changes to the behaviour of the species in the offshore marine environment. However, changes to the behaviour of the species in the offshore marine environment could affect coastal and in-river salmon and sea trout fisheries.

11.1.4.6 A full assessment of the likely effects upon the species is therefore described in Chapter 10.2 (Fish and Shellfish Ecology), and summarised in this chapter.

Assessment Limitations

Commercial Fisheries

11.1.4.7 The principal limitation of an assessment of effects upon commercial fishing activities is the potential for the established baseline to change over time. This may be for a number of reasons: fluctuations in landings, changes in legislation and management policies, economic constraints such as fuel costs and crew

availability, environmental restrictions such as weather etc. As a result, the scope of the impact assessment is limited by the baseline identified.

11.1.4.8 The king scallop fishery is largely nomadic, variously targeting grounds around the UK (with the exception of several smaller category vessels). Although it is recognised that individual vessels may spend greater periods of time targeting specific grounds in the Moray Firth, it is not possible within the scope of this assessment to consider the extent of an effect on a vessel by vessel basis. Instead, scallop grounds affected by the offshore transmission infrastructure have been considered within the context of their relative importance to the Moray Firth, as well as to scallop grounds around the UK.

11.1.4.9 Changes to the behaviour of species of commercial importance in the offshore marine environment, arising from the construction / decommissioning and operation of the three proposed wind farm sites, may indirectly affect commercial fishing activities (including in-river fisheries). An assessment of the likely significant effects upon fish and shellfish species is provided in Chapter 10.2 (Fish and Shellfish Ecology) and the findings summarised in the relevant sections. It should be noted that the methodology used to assess effects on fish and shellfish species (including significance criteria) differs from the one used to assess commercial fisheries, being largely based on the IEEM (2010) guidelines for ecological impact assessment.

11.1.4.10 The impact assessment on salmon and sea trout fisheries is subject to a number of limitations as a result of the lack of current knowledge on the sensitivity of the species to certain effects. In addition, as a result of uncertainties in relation to the distribution of these species and the use that they may make of the area of the OfTI, a number of conservative assumptions have been made.

Significance Criteria

11.1.4.11 The significance criteria as defined in Table 11.1-4 below have been used for this assessment. It should however be noted that the effects of the installation / decommissioning and operation of OfTI upon commercial fishing activities cannot be easily categorised, and the application of the significance criteria is largely qualitative and based upon professional judgement.

11.1.4.12 In the instances where there is potential for an effect of the OfTI to pose a risk to the health and safety of a fishing vessel and crew, the significance criteria used for this assessment is not applied. Instead, the risk is assessed to be within or outside acceptable limits (a risk is considered outside of acceptable limits if they are greater than those incurred during the course of normal fishing operations). For further details see Chapter 11.2 (Shipping and Navigation).

11.1.4.13 In instances where findings from Chapter 10.2 (Fish and Shellfish Ecology) have been summarised, the significance criteria used in that chapter apply.

11.1.4.14 The receptors have been defined by fishery:

- The scallop fishery;
- The *Nephrops* fishery;
- The whitefish fishery;
- The squid fishery;
- The crab and lobster fishery;

- The handline mackerel fishery; and
- The salmon and sea trout fishery.

11.1.4.15 Sensitivities have been defined on this basis. In each instance, the following characteristics are taken into account:

- Adaptability: the ability of the fishery (i.e. vessels) to avoid or adapt to the effect;
- Tolerance: the ability of the fishery (i.e. vessels) to withstand temporarily or permanent effects;
- Recoverability: how well the fisheries recover following exposure to effect; and
- Value: the scale of importance, rarity and relative worth of the fisheries affected.

11.1.4.16 The sensitivity of each fishery has been assessed as low, medium and high, using the following criteria:

- Low sensitivity: no significant change to current fishing practices;
- Medium sensitivity: discernible changes to current fishing practices; and
- High sensitivity: fishing activities are significantly and permanently affected.

11.1.4.17 The general sensitivity of the receptors (fisheries) has been defined using the criteria above and are summarised below. It should be noted that the sensitivity of the fishery may vary with each type of effect, as well as between the construction and decommissioning and operational phases, and as a result sensitivity conclusions are also separately described in each instance.

- The sensitivity of the scallop fishery to the development of the OfTI is low on a regional national level, due to the discrete area the offshore export cable route covers and the availability of scallop grounds;
- The sensitivity of the *Nephrops fishery* to the development of the offshore transmission infrastructure is medium, due to the importance of Nephrops grounds to the Moray Firth and the limited operational range of locally based, under 15 m, Nephrops trawlers;
- The sensitivity of the whitefish fishery to the development of the offshore transmission infrastructure is considered to be low, due to the discrete area of the export cable route and the availability of whitefish grounds;
- The sensitivity of the squid fishery to the development of the offshore transmission infrastructure is considered to be low, due to the discrete area of the export cable route and the availability of squid grounds in the Moray Firth, taking into account the seasonality of the fishery and its importance on a regional and wider scale;
- Due to the majority of creel grounds being located in areas outside of the export cable route, the sensitivity of the crab and lobster fishery on a regional level is considered to be low. In the case of creel activity in the inshore area of the export cable route, however, predominantly targeted by vessels from the Fraserburgh area with limited operational range, the sensitivity of the fishery is considered to be medium; and
- The sensitivity of the handline mackerel fishery is low, taking into account it being limited to inshore areas and the mobile and pelagic nature of the fishery.

11.1.4.18 The magnitude of an effect is considered for each type of effect on a fishery by fishery basis. In each instance, the following characteristics are taken into account:

- Spatial extent: the area within which fishing vessels (by fishery) are unable to undertake normal fishing activities as a result of the construction / decommissioning and operation of the wind farm and export cables, relative to available fishing grounds;
- Duration: the temporal extent that fishing vessels (by fishery) are unable to resume normal fishing activities as a result of the construction / decommissioning and operation of the wind farm and export cables;
- Frequency: the number of time the effect occurs; and
- Severity: the degree of change.

11.1.4.19 The magnitude of an effect has been assessed as negligible, low medium or high, using the following criteria:

- Negligible: there is no discernible effect upon current fishing practices;
- Low: there is no significant effect upon current fishing practices;
- Medium: discernible effect upon current fishing practices; and
- High: fishing activities are significantly and permanently affected.

11.1.4.20 The significance of an effect is assigned using an assessment of the magnitude of effect and sensitivity of the receptor criteria, and is given in Table 11.1-4 below.

Table 11.1-4 Significance Criteria

		Sensitivity of Receptor		
		Low	**Medium**	**High**
Magnitude	**Negligible**	Not significant	Minor significance	Minor significance
	Low	Minor significance	Minor significance	Moderate significance
	Medium	Minor significance	Moderate significance	Major significance
	High	Moderate significance	Major significance	Major significance

11.1.5 Impact Assessment

Construction / Decommissioning – Commercial Fisheries

Adverse Effects on Commercially Exploited Fish and Shellfish Populations

11.1.5.1 The principal commercial species targeted by gear type within the proposed OSP locations are:

- King scallops by boat dredge;
- Squid by modified *Nephrops* trawls and whitefish gear; and
- Haddock by whitefish gear (seine nets and demersal trawls).

11.1.5.2 The principal commercial species targeted by gear type within the export cable route are:

- *Nephrops* by bottom otter trawl;
- King scallop by boat dredge;
- Haddock by whitefish gear;
- Lobster and crab by creels; and
- Handlining for mackerel.

11.1.5.3 There is the potential for the OfTI to cause adverse effects to fish and shellfish populations of commercial importance, and hence result in changes to behaviour or a decline in species abundance, which may indirectly affect the productivity of the fishery. This is an indirect effect and whilst this type of effect is briefly discussed within this section, it is fully assessed in Chapter 10.2 (Fish and Shellfish Ecology), and summarised in Table 11.1-5 below.

Table 11.1-5 Summary of Impact Assessment on Principal Commercial Species

Effect	Receptor	Sensitivity	Magnitude	Probability	Significance of effect
Construction / Decommissioning					
Temporary Disturbance to Seabed	All target species except squid	Low	Low	Unlikely	Negative Minor
	Squid	Medium	Low	Unlikely	Negative Minor
Noise	Haddock	Low	Low	-	Negative Minor
	Mackerel	Low / medium	Low	-	Negative Minor
	King scallops / squid	Low	Negligible	Unlikely	Negative Not significant

11.1.5.4 Taking into account the findings of Chapter 10.2 (Fish and Shellfish Ecology), and accepting that there may be short term species displacement effects which may have a limited indirect effect upon catch rates, it is reasonable to assume that the indirect effects upon commercial fishing will not be greater than those identified in the table above.

Adverse Effects on Recreational Fish Populations

11.1.5.5 There is not a directed recreational fishing activity occurring in the proposed OSP locations and along the offshore export cable route, although it is recognised that there may be likely significant effects upon migratory fish species such as salmon and sea trout, which have significant socio-economic importance as recreational fish species. As previously stated, salmon and sea trout fisheries are

separately assessed later in this chapter.

Complete Loss or Restricted Access to Traditional Fishing Grounds

11.1.5.6 The three proposed wind farm sites, within which the OSPs may be located, include:

- King scallop grounds throughout the site;
- Squid grounds in the south west of the development; and
- Haddock grounds, to a lesser extent, to the north west of the sites.

11.1.5.7 The offshore export cable route transects:

- *Nephrops* grounds along the mid and southern sections of the route;
- Scallops grounds along the northern section of the route and in areas adjacent to the landfall sites;
- Haddock grounds in the south eastern section of the route;
- Crab and lobster grounds are located in inshore areas adjacent to the landfall sites; and
- Seasonal handlining for mackerel in the inshore area of the export cable route.

11.1.5.8 The seasonality of the fisheries in the Moray Firth should be considered relevant to the proposed installation schedule of the OfTI: scallops landings are recorded at their highest levels between May and October, although activity occurs year round. Squid is a highly seasonal fishery, with peak landings recorded in August and September, although the fishing season is reported to be lengthening. Haddock is targeted year round, although landings are lowest during the summer months. *Nephrops* are targeted throughout the year, with the highest landings recorded during the summer months. Creel fishing for crab and lobster peaks in the summer months, between June and September, although activity occurs year round.

11.1.5.9 The principal effects of construction / decommissioning that will potentially result in restricted access to the fishing grounds described above are:

- Exclusion zones around construction / decommissioning activities; and
- Installed offshore infrastructure (including cables and OSPs) in addition to temporary exclusion zones (for maintenance works).

11.1.5.10 Safety zones of 500 m will likely be imposed around OfTI construction / decommissioning works from which all non-works vessels would be excluded. The installation of each individual OSP is expected to be in the order of 90 days and will occur within the installation schedule identified for the Wind Farm. The export cable installation vessel(s) will have a transitory 500 m exclusion zone for the duration of installation, which will last for a period of 200 days for each trench (two trenches in total). The offshore export cables will be buried where possible (target depth of 1 m), and where adequate burial cannot be achieved alternative protection will be used. Two cables and two trenches will be required for the DC cabling, with a maximum separation width of 800 m. Post installation surveys will be undertaken to ensure that fishing activities can be safely resumed in the operational phase.

11.1.5.11 The seasonality of fishing activity will render these exclusion zones more sensitive depending upon the time of year, with the summer months recording the highest

levels of activity overall.

11.1.5.12 In addition to ongoing construction works, OSPs already partially or completely installed on the seabed will further restrict access to fishing grounds (up to eight OSPs of 65 m x 65 m each). Infrastructure installed during the construction phase will be marked and it is likely that a safety zone will be applied. The size of the safety zone will be large enough to ensure sufficient coverage of the infrastructure.

11.1.5.13 There is the potential for cable installation works (including export cables and inter-platform cabling) to preclude fishing activities safely resuming as a result of the associated risks with snagging fishing gear, particularly in the case of towed gear fishing activities such as bottom otter trawling for *Nephrops* and squid, boat dredging for scallops and to a lesser extent demersal trawling for whitefish). It is considered that normal fishing practices cannot safely resume in the immediate vicinity of the cables until all the necessary cable protection measures, including rock placement and / or mattressing, if required, have been completed and the area is considered at an acceptable standard for all fishing activities to safely resume. It is therefore considered that access to fishing grounds within the 800 m corridor of the 105 km export cable route, and in the vicinity of the 90 km of inter platform cabling, will not resume until these measures are satisfactorily complete and their 'over-trawlable' status confirmed by post-installation surveys.

11.1.5.14 The sensitivity of the fishery has been assigned, taking account of:

- The discrete location and temporary nature of the OfTI construction works;
- Inputs by commercial fishing inputs into defining the export cable route corridor;
- The operational range of the majority of towed gear vessels operating in the vicinity of OfTW works; and
- The availability of alternative grounds in the Moray Firth and wider area.

11.1.5.15 The sensitivity of the scallop, squid and whitefish fisheries is considered to be low. The sensitivity of the Nephrops fleet, due to the limited operational range of locally based, under 15 m vessels and the importance of the fishery in the Moray Firth, is considered to be medium.

11.1.5.16 In the case of the crab and lobster fishery located in the near-shore section of the export cable, the mobility and operational range of the small, inshore vessels that target this fishery is more limited than with the towed gear fleet. In addition, crab and lobster grounds in the Fraserburgh area are more discrete than those identified for scallops, *Nephrops* and squid). As a result, the sensitivity of the crab and lobster fishery in the near-shore area of the Fraserburgh landfall is considered to be medium.

11.1.5.17 Due to the mobile and inshore nature of handlining for mackerel, the sensitivity of the handline mackerel fishery is considered to be low.

11.1.5.18 The significance of effect resulting in temporary loss or restricted access to fishing grounds during the construction phase of the OfTI also takes into account:

- The temporary nature of construction works;
- The discrete nature of the OSPs, but the loss of fishing area along the entirety of the export cable route and in the vicinity of inter platform cabling; and
- Access to fishing grounds in the area of OfTI works will become progressively

more restricted as the construction schedule advances.

11.1.5.19 The significance of the effect upon each of the receptors identified is provided in Table 11.1-6 below.

Table 11.1-6 Temporary Loss or Restricted Access to Traditional Fishing Grounds

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Temporary Loss or Restricted Access to Fishing Grounds	Scallop Fishery	Low	Negative	Medium	Minor
	Squid fishery	Low	Negative	Medium	Minor
	Nephrops fishery	Medium	Negative	Medium	Moderate
	Whitefish fishery	Low	Negative	Low	Minor
	Crab and lobster fishery	Medium	Negative	Medium	Moderate
	Handline mackerel fishery	Low	Negative	Low	Minor

Safety Issue for Fishing Vessels

11.1.5.20 In line with standard practice, installation safety zones of 500 m are likely to be in place around all offshore installation and installation activities from which all vessels, including fishing vessels, will be excluded. Risks to fishing vessels would only occur if infringements of these safety zones occurred. It should also be recognised that in line with standard maritime practice, the ultimate responsibility with regard to safety lies with the master of a vessel. Compliance with the safety zones during the installation phase would put the safety risk **within acceptable limits**. These issues are considered further within Chapter 11.2 (Shipping and Navigation).

11.1.5.21 There is additionally the potential for OfTI infrastructure outside of the designated safety zones to pose a risk to fishing vessels as a result of potentially hazardous interactions with fishing gear. This includes export cable(s), OSPs and inter-platform cabling. It is likely that safety zones will be applied around OSPs, which are of sufficient size to incorporate the footprint of the infrastructure), see 11.1.6 below (Proposed Monitoring and Mitigation). The OSPs are 100 m by 100 m. Compliance with these zones would put the safety risk from infrastructure installed during the construction phase **within acceptable limits**.

11.1.5.22 A maximum of 90 km of inter-platform cables and 105 km of export cable (2x2 bundles in trenches) will be installed during the construction phase of the OfTI. All cables will be buried where feasible, with sections protected by other means if burial is not possible. It is considered that fishing vessels will not be able to safely fish in the vicinity of these cables until construction measures are complete, as a result of the potential risks to the safety of fishing vessels associated with snagging. In addition, there is the potential for cable trenching activities resulting in spoil berms that pose risks to the safety of fishing vessels and / or cause damage to fishing gear, either through snagging or nets becoming filled with spoil. Fishing activity will not therefore be able to safely resume in the vicinity of these cables until the appropriate post construction surveys, and if necessary seabed rectification measures, confirm the status of the seabed. During the

construction phase, therefore, the risks posed to the safety of fishing vessels are considered to be **outside of acceptable limits**.

Increased Steaming Time to Fishing Grounds

11.1.5.23 The implementation of safety zones during the installation phase could result in some increases in steaming distances and times, and therefore higher operational costs for fishing vessels. The safety zones implemented during the construction phase of the OfTI will however be very discreet: 500 m around construction vessels in the vicinity of the OSPs or in transitory locations along the export cable route.

11.1.5.24 The significance of effect upon each of the receptors identified is provided in Table 11.1-7 below.

Table 11.1-7 Increased Steaming Times to Fishing Grounds

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Increased Steaming Times to Fishing Grounds	Scallop Fishery	Low	Negative	Low	Minor
	Squid fishery	Low	Negative	Low	Minor
	Nephrops fishery	Low	Negative	Low	Minor
	Whitefish fishery	Low	Negative	Low	Minor
	Crab and lobster fishery	Medium	Negative	Low	Minor

Displacement of Fishing Vessels into other Areas

11.1.5.25 Concerns were raised during consultation with fishermen that wind farm related activities, including the installation of the export cable(s), which may limit access to fishing grounds could displace vessels into grounds outwith the area, resulting in increased competition for grounds outwith the site. This might result in either conflict between vessels competing for the same resource, or between different fishing methods (i.e. static and towed gear vessels).

11.1.5.26 The fisheries identified within the offshore export cable route and OSP locations are limited in the grounds they are able to target elsewhere in the regional area, principally by the availability of target species and their habitat requirements, and for which fishing areas in the regional area have been defined (see Chapter 5.1: Commercial Fisheries).

11.1.5.27 The extent of displacement will be a function of the temporary loss or restricted access to traditional fishing grounds during the construction phase, and as a result the significance of effect for this applies, see Table 11.1-8 below.

Table 11.1-8 Displacement of Fishing Activity into Other Areas

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Displacement of	Scallop Fishery	Low	Negative	Medium	Minor

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Fishing Activity into Other Areas	Squid fishery	Low	Negative	Medium	Minor
	Nephrops fishery	Low	Negative	Medium	Minor
	Whitefish fishery	Low	Negative	Low	Minor
	Crab and lobster fishery	Medium	Negative	Medium	Moderate
	Handline mackerel fishery	Low	Negative	Low	Minor

Interference with Fishing Vessels

11.1.5.28 All of the effects included in this assessment could cause interference to fishing activities. An additional effect to be considered is the potential for navigational conflicts arising between fishing vessels and construction vessels transiting to and from site. This could include the fouling of static gear markers buoys and dhans (marker flags) and towed gear vessels being required to alter towing direction. As a result, this interference has the potential to affect fishing vessels operating in the regional area. Due to the mobility of towed gear and the static position of creel gear for periods of several days, the crab and lobster fishery is considered to be of increased sensitivity to this type of effect.

11.1.5.29 The magnitude of effect depends upon the location of the construction port, which at the current time is unknown. As a result, a conservative assumption has been made that transit routes will be in the vicinity of static and towed gear grounds. The limited duration of the construction schedule and the relatively lower level of works vessel transits for OfTI construction activities than for the wind farm sites are however recognised. The significance of the interference to fishing vessels identified is provided in Table 11.1-9 below.

Table 11.1-9 Interference to Fishing Vessels arising from Navigational Conflicts

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Interference to Fishing Vessels arising from Navigational Conflicts	Scallop Fishery	Low	Negative	Low	Minor
	Squid fishery	Low	Negative	Low	Minor
	Whitefish fishery	Low	Negative	Low	Minor
	Nephrops fishery	Low	Negative	Low	Minor
	Crab and lobster fishery	Moderate	Negative	Low	Minor
	Handline mackerel fishery	Low	Negative	Low	Minor

Operation – Commercial Fisheries

11.1.5.30 The effects below have been considered within the context of the current commercial fisheries baseline and the operational life of the OfTI, currently

estimated to be 25 years in design life. However, trends in fishing activities are difficult to establish on a yearly basis, and an assessment of future effects is therefore complicated.

Adverse Effects on Commercially Exploited Fish and Shellfish Populations

11.1.5.31 The principal commercial species targeted by gear type within the OSP locations are:

- King scallops by boat dredge;
- Squid by modified *Nephrops* trawls and whitefish gear; and
- Haddock by whitefish gear (seine nets and demersal trawls), to a lesser extent.

11.1.5.32 The principal commercial species targeted by gear type within the export cable route are:

- *Nephrops* by bottom otter trawl;
- King scallop by boat dredge;
- Lobster and crab by creels; and
- Haddock, to a lesser extent, by whitefish gear.

11.1.5.33 There is the potential for the OfTI to cause adverse effects to fish and shellfish populations of commercial importance, and hence result in changes to behaviour or a decline in species abundance, which may indirectly affect the productivity of the fishery. This is an indirect effect and whilst this type of effect is briefly discussed within this section, it is fully assessed in Chapter 10.2 (Fish and Shellfish Ecology), and summarised in Table 11.1-10 below.

Table 11.1-10 Summary of Impact Assessment on Principal Commercial Species

Effect	Receptor	Sensitivity	Magnitude	Confidence Level	Significance of effect
Operation					
EMFs	Shellfish	Low	Small	Low	Negative Minor
	Other commercial fish species	Low	Small	Low	Negative Minor

11.1.5.34 Taking into account the findings of Chapter 10.2 (Fish and Shellfish Ecology), and accepting that there may be short term species displacement effects which may have a limited indirect effect upon catch rates, it is reasonable to assume that the indirect effects upon commercial fishing will not be greater than those identified in the Table 11.1-10 above.

Adverse Effects on Recreational Fish Populations

11.1.5.35 There is not a directed recreational fishing activity occurring in the three proposed wind farm sites and along the offshore export cable route. However, it is recognised that there may be effects upon migratory fish species such as salmon and sea trout, which have significant socio-economic importance as

recreational fish species. Effects upon salmon and sea trout fisheries are separately assessed below.

Complete Loss or Restricted Access to Traditional Fishing Grounds

11.1.5.36 Once operational, the eight gravity base OSPs (worst case scenario) will result in a total loss of 33,800 m² of seabed within the three proposed wind farm sites and offshore export cable route. It is likely that there will additionally be operational safety zones around the OSPs of sufficient size to incorporate the footprint of the infrastructure (65 m x 65 m).

11.1.5.37 Subject to the successful burial of the inter-platform and export cables, and the appropriate post-installation surveys and if necessary seabed rectification measures, it is considered that fishing will be able to occur in these areas once the cables are operational.

11.1.5.38 In areas where the cable(s) are protected either by rock placement or mattresses, measures will be undertaken, in line with offshore oil and gas practice in the North Sea, to ensure that the cable protection measures are satisfactory to the fishing industry, and are able to facilitate continued fishing activities.

11.1.5.39 As a result, the complete loss of fishing grounds in the operational phase is expected to be limited to the OSPs and associated safety zones, which will be located in or close to the boundary of the three proposed wind farm sites. The significance of effect is given in Table 11.1-11 below.

Table 11.1-11 Complete Loss or Restricted Access to Traditional Fishing Grounds

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Complete Loss or Restricted Access to Fishing Grounds	Scallop Fishery	Low	Negative	Low	Minor
	Squid fishery	Low	Negative	Low	Low
	Nephrops fishery	Low	Negative	Low	Minor
	Whitefish fishery	Low	Negative	Negligible	Not significant
	Crab and lobster fishery	Medium	Negative	Negligible	Not significant
	Handline mackerel fishery	Low	Negative	Low	Minor

Safety Issue for Fishing Vessels

11.1.5.40 Provided that cable protection measures for both export cables and inter-platform cables are satisfactorily completed and post-installation surveys and, if necessary seabed rectification procedures, confirm that fishing vessels can safely resume normal fishing practices, the safety issues for fishing vessels during the operational phase is considered to be **within acceptable limits**.

Increased Steaming Time to Fishing Grounds

11.1.5.41 The operational OfTI is not considered to have a significant effect upon the steaming times of fishing vessels to fishing grounds (See Chapter 11.2: Shipping and Navigation for further details). The significance of effect upon each of the

receptors identified is provided in Table 11.1-12 below.

Table 11.1-12 Increased Steaming Times to Fishing Grounds

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Increased Steaming Times to Fishing Grounds	Scallop Fishery	Low	Negative	Negligible	Not Significant
	Squid fishery	Low	Negative	Negligible	Not Significant
	Nephrops fishery	Low	Negative	Negligible	Not Significant
	Whitefish fishery	Low	Negative	Negligible	Not Significant
	Crab and lobster fishery	Low	Negative	Negligible	Not Significant
	Handline mackerel fishery	Low	Negative	Low	Minor

Obstacles on the Seabed Post-Installation

11.1.5.42 There is the potential for obstacles to be left on the seabed during the installation or decommissioning phases of the export cable(s) which could result in damage to or loss of fishing gears, as well as representing a safety hazard. Additionally, offshore works such as cable trenching can produce seabed obstructions that can cause fastenings for fishing nets and damage to fishing gears.

11.1.5.43 Contractors (those engaged to undertake development works offshore) will be obliged and monitored to ensure compliance with standard offshore policies prohibiting the discarding of objects or waste at sea (IMO, 1996). The reporting and recovery of any accidentally dropped objects is also required.

11.1.5.44 Any seabed obstructions and spoil identified during post-installation surveying and which might represent a hazard to fishing, such as trenching berms, will be identified during post construction surveys and the appropriate measures taken to rectify the state of the seabed to ensure fishing activities can be safely resumed.

11.1.5.45 Provided there is compliance to obligatory standards by contractors and, if necessary, the implementation of seabed rectification measures, the effect is considered to be **within acceptable limits**.

Displacement of Fishing Vessels into Other Areas

11.1.5.46 The extent of displacement will be a function of the temporary loss or restricted access to traditional fishing grounds during the operational phase, and as a result the significance of effect for this applies, as given in Table 11.1-13 below.

Table 11.1-13 Displacement of Vessels into Other Areas

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Displacement of	Scallop Fishery	Low	Negative	Low	Minor

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Vessels into Other Areas	Squid fishery	Low	Negative	Low	Minor
	Nephrops fishery	Low	Negative	Low	Minor
	Whitefish fishery	Low	Negative	Negligible	Not significant
	Crab and lobster fishery	Low	Negative	Negligible	Not significant
	Handline mackerel fishery	Low	Negative	Low	Minor

Interference to Fishing Activities

11.1.5.47 As previously stated, in addition to the likely significant effects included in this assessment, an additional effect to be considered is the potential for navigational conflicts arising between fishing vessels and operations and maintenance vessels transiting to and from site. This could include the fouling of static gear marker buoys and dhans or, to a lesser extent, towed gear vessels being required to alter towing direction. This interference has the potential to affect more fishing vessels than those operating in the immediate vicinity of the site, depending upon the location of the operations and maintenance port.

11.1.5.48 It is however, considered that the effect during the operational phase of the OfTI will be significantly less than that recorded during the construction phase, which is taken into account in assessing the significance. Furthermore it is considered that codes of conduct between works vessels and fishing vessels will be well established by the completion of construction activities, irrespective of port used. The significance of effect is described in Table 11.1-14 below.

Table 11.1-14 Interference to Fishing Activities arising from Navigational Conflicts

Effect	Receptor	Sensitivity of Receptor	Positive / Negative Effect	Magnitude of Effect	Significance of Effect
Interference to Fishing Activities arising from Navigational Conflicts	Scallop Fishery	Low	Negative	Negligible	Not significant
	Squid fishery	Low	Negative	Negligible	Not significant
	Nephrops fishery	Low	Negative	Negligible	Not significant
	Whitefish fishery	Low	Negative	Negligible	Not significant
	Crab and lobster fishery	Low	Negative	Low	Minor
	Handline mackerel fishery	Low	Negative	Low	Minor

Salmon and Sea Trout Fisheries

Likely Significant Effects

11.1.5.49 As a result of salmon and sea trout fisheries being either in-river, or to a lesser extent, coastal, there are not considered to be direct effects arising from the construction / decommissioning and operation of the wind farm developments.

Indirect effects on the fisheries may however occur if the ecology of these species is adversely affected.

11.1.5.50 The effects on fish and shellfish ecology, including salmon and sea trout, are described in Chapter 10.2 (Fish and Shellfish Ecology). The assessment methodology used for fish and shellfish species is based on the IEEM (2010) guidelines for ecological impact assessment, which differs from that used for assessment of impacts on commercial fisheries. This is detailed in Chapter 10.2 (Fish and Shellfish Ecology). Due to the lack of current knowledge in relation to the migratory behaviour and the use that salmon and sea trout make of wind farm developments, a number of conservative assumptions have been made for the undertaking of the impact assessment on these species.

11.1.5.51 A summary of impacts on salmon and sea trout populations derived from the construction / operational and decommissioning phase of the developments is given in Table 11.1-15 below and is based on information provided in Chapter 10.2 (Fish and Shellfish Ecology).

11.1.5.52 Effects on salmon and sea trout are, in general terms, expected to be of **minor** significance.

Table 11.1-15 Summary of Effects on Natural Stocks of Salmon and Sea Trout

Effect	Receptor	Sensitivity	Magnitude	Probability	Significance of effect
Temporary Disturbance to Seabed	Salmon and sea trout	Medium	Low	Probable	Negative Minor
Construction Noise	Salmon and sea trout	Medium	Negligible	Probable	Negative Minor
EMFs	Salmon and Sea trout	Medium	Low	Probable	Negative Minor

Decommissioning

11.1.5.53 As previously mentioned, in the absence of detailed decommissioning schedules and methodologies it is assumed that the likely significant effects during this phase will, at worst, be as those assessed for the construction phase and are likely to be considerably less in reality.

11.1.6 Proposed Monitoring and Mitigation

11.1.6.1 MORL has undertaken a significant programme of early engagement with the fishing industry and is committed to continuing to explore and develop mitigation options in consultation with the industry.

Construction and Decommissioning

11.1.6.2 In line with standard industry practice, dialogue will be ongoing prior to and during the construction phase to ensure that Project information is effectively disseminated to fishermen, as well as allowing for issues to be raised by the fishing community. Working practices will also be agreed to achieve any possible reduction in interference (e.g. standard navigation routes to / from sites).

11.1.6.3 A construction management plan will be defined in consultation with fishing interests, which clearly establishes protocol for engagement between the developer and fishermen throughout the construction period. In order for the various fishing sectors to be appropriately represented, as well as the developer and the regulatory body, a working group will be established that facilitates the following:

- Ongoing dialogue between the fishing community and the developers throughout the pre-construction and construction phase;
- Protocol for the navigation of offshore transmission works construction and works vessels to and from the site (i.e. agreement of transit lanes to, where possible given other receptors, minimise interference to fishing activities);
- Established procedures in the event of interactions between offshore transmission works construction and fishing activities (i.e. claims for lost and / or damaged gear);
- Protocol for removal of seabed obstacles post-construction; and
- Engagement on appropriate phasing of construction safety zones dependent on the construction programme.

11.1.6.4 In order for there to be ongoing dialogue between the developers and the fishing industry throughout the operational phase of the offshore transmission works, the working group will continue to provide a forum for ongoing engagement.

11.1.6.5 All infrastructure installed during the construction phase will be marked and lit, in line with standard industry practice, and as further described in Chapter 8.2 (Shipping and Navigation). The information will be distributed to fishermen through the agreed channels as defined in the construction management programme.

11.1.6.6 The developers may apply for operational safety zones around installed infrastructure to prevent interactions with fishing vessels which could pose a safety risk.

11.1.6.7 Cables will be buried to a target depth of 1 m where it is technically practical to do so. In instances where adequate burial cannot be achieved then the developers will install cable protection.

11.1.6.8 Over trawl surveys will be carried out on cables to ensure that the cable burial and protection scheme has been successful.

11.1.6.9 In addition to the above defined mitigation strategy, MORL would like to investigate a number of other opportunities that may appropriately mitigate effects dependent on the development of both industries. This includes investigations are ongoing within the offshore renewables industry, and in consultation with the fishing industry, to explore potential modifications to bottom towed scallop fishing gear which may reduce the mutual risk posed by fishing activities within and around operational wind farms and transmission infrastructure. These investigations may result in mitigation to certain of the effects described above. Trials are anticipated to be carried out in 2012 and, if successful, discussion will be ongoing on the next stage of development of this activity.

11.1.6.10 In view of the current level of uncertainty, MORL is committed, in consultation with MS and other relevant stakeholders (i.e. DSFBs), to undertake appropriate survey work and monitoring with the objective of increasing confidence in the impact assessment and identifying whether mitigation is required and, if so, to define

feasible measures in order to reduce the significance of the likely effects to levels that are satisfactory to both regulators and stakeholders.

11.1.6.11 The specific requirements of the surveys and monitoring to be undertake and, where necessary, the mitigation measures to be implemented are yet to be defined. Consultation with MS will be ongoing post-application for these to be agreed.

11.1.6.12 In addition to the monitoring / mitigation above, soft start piling will be used during construction with the aim that mobile species are not exposed to the highest noise levels.

11.1.7 Residual Effects

Commercial Fisheries

11.1.7.1 The residual effects after taking into account the mitigation proposed above are not currently different to those described for pre-mitigation effects. It should be noted that a key aim of the installation management programme is also to ensure that the effects described are kept within the significance levels ascribed in this Environmental Statement (ES) throughout both the installation and operational phases of the development.

11.1.7.2 Table 11.1-1 above provides a summary of the key findings and residual effects of the offshore transmission infrastructure upon commercial fisheries.

Salmon and Sea Trout Fisheries

11.1.7.3 The residual effects upon salmon and sea trout fisheries are as described prior to mitigation. A summary of the impact assessment is given in Table 11.1-2 above.

11.1.8 References

IMO (1996) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, and the 1996 Protocol to the Convention. *London Convention*

IEEM (2010) Institute of Ecology and Environmental Management. Guidelines for Ecological Impact Assessment in Britain and Ireland. Marine and Coastal. Final Document

OSPAR (2008) Background Document on Potential Problems associated with Power Cables other than those for Oil and Gas Activities. OSPAR Commission. Biodiversity Series.

11.2 Shipping and Navigation

11.2.1 Summary

11.2.1.1 The Offshore Substation Platforms (OSPs) and offshore export cable route of the transmission infrastructure (OfTI) to the landfall on the north east coast of Scotland will have a direct negative effect of **minor** significance, post-mitigation measures, on the following shipping and navigation receptors:

- Commercial, fishing and recreational ship routing and collision risk during the construction and installation phase;
- Vessel to Structure (OSP) collision risk during operations for commercial, fishing and recreational routing;
- Commercial and small vessel anchoring and snagging risk during the operational phase; and
- The risk of fishing vessel gear interaction and snagging during the operational phase.

11.2.1.2 The effect on shipborne navigational equipment during the operational phase was considered to be **negligible**.

11.2.1.3 There is a relatively low level of commercial shipping activity along the export cable route and in the vicinity of the OSPs, with a denser volume of traffic transiting to the east of the development. However, given the available sea room, vessels should be able to increase passing distance from installation vessels and associated works leading to a direct negative **minor** effect on shipping and navigation.

11.2.1.4 The Moray Firth provides vessels with anchorages that are sheltered from adverse sea / weather conditions. Anchoring within 10 nm of the export cable route was recorded in Aberdour Bay (mostly smaller offshore / cargo vessels) and north of the Southern Trench (crude oil and shuttle tankers).

11.2.1.5 The coastal area of Fraserburgh Beach is considered to be a higher risk to anchoring vessels, as there is a charted anchorage within Fraserburgh Beach. Provided industry standard mitigation (cable burial / protection) and surveys to monitor burial depth are carried out, the direct effect on commercial ship anchoring is considered to be **minor**.

11.2.1.6 Pre-mitigation, i.e. without cable protection, the direct risk of fishing vessels snagging gear north of the Southern Trench was considered to be moderate, given demersal trawling and scallop dredging was recorded in the area. However provided appropriate mitigation is put in place with cable protection / burial and liaison with the fishing industry, the residual negative effect on fishing vessels are considered to be **minor**.

11.2.1.7 Overall, a **minor**, direct negative effect is predicted on recreation vessel routing (assuming works are managed using SMS and industry standard mitigations); given the available the sea room east of the export cable route.

11.2.1.8 Any electromagnetic fields generated from the HVDC export cables will have minimal effect on smaller vessels navigation electronic equipment and is therefore considered to be **negligible**.

11.2.2 Introduction

11.2.2.1 This chapter addresses the likely significant effects on shipping and navigation from the proposed eight Offshore Substation Platforms (OSPs) and the export cable corridor which form the offshore transmission infrastructure (OfTI) to the landfall on the north east coast of Scotland.

11.2.2.2 The scope of this chapter is to assess the effects on shipping and navigation including commercial shipping, recreation, and fishing vessels. The assessment is informed by Chapter 5.2 (Shipping and Navigation), and should be read in conjunction with Chapter 8.2 (Shipping and Navigation) in Section 3. This assessment also informs, and is informed by, the Commercial Fisheries assessments (Chapters 5.1, 8.1, 11.1 and 15.1) and feeds into Chapters 12.1 (Whole Project Assessment) and 15.2 (Shipping and Navigation Cumulative Impact Assessment). This chapter is supported by the following appendices: Technical Appendix 5.2 A (Hazard Log); Technical Appendix 5.2 B (Consequences Assessment); Technical Appendix 5.2 C (MCA MGN 371 Checklist); Technical Appendix 5.2 D (Navigational Risk Assessment (Wind Farm Sites)); and Technical Appendix 5.2 E (Navigational Risk Assessment (OfTI)).

11.2.3 Rochdale Envelope Parameters Considered in the Assessment

11.2.3.1 The 'worst realistic case' Rochdale Envelope in terms of effects on shipping and navigation is considered to be the maximum number of offshore export cables covering the largest surface area. The assessment of the likely significant effects on shipping and navigation is based on the offshore export cable route, including a 10 nm buffer from the cable route to ensure that wider effects on shipping and navigation are identified and assessed.

11.2.3.2 The worst realistic case also includes the eight OSPs, six of which are within the boundary of the three proposed wind farm sites (Chapter 8.2: Shipping and Navigation) and two outside, but within 2 km. It is noted that the effects associated with any OSP on the periphery or external to the array will have a greater effect on shipping and navigation.

11.2.3.3 Although there are three different turbine layouts considered within the Navigational Risk Assessment (NRA) for the three proposed wind farm sites (Technical Appendix 5.2 D), the OSPs in all three scenarios remain in the same positions therefore only one scenario for the transmission works has been considered.

11.2.3.4 Although discussed separately within this chapter, the OSPs, the export cable route and the wind turbines have been considered cumulatively within the NRA (Technical Appendix 5.2 D). This differs from other assessments within this ES due to the cumulative approach to the NRA required for considering likely significant effects on shipping and navigation from both the offshore generating station and the OfTI combined, and how the number and alignment of structures can vary the significance and magnitude of effects.

11.2.3.5 Table 11.2-1 below shows the collision frequencies for the OSPs in isolation based on the models undertaken as part of the NRA (Technical Appendix 5.2 D). These values include the potential for the turbine placement to mitigate the collision risk for the OSPs as the turbines shield them from vessel to structure collision to varying degrees within the different scenarios.

Table 11.2-1 Offshore Substation Platforms Collision Frequency

Collision Type	OSP Collision Frequency
Passing Powered	3.8×10^{-6}
Passing Drifting	5.5×10^{-8}
Fishing	6.5×10^{-3}
Total	**6.5×10^{-3}**

11.2.3.6 Table 11.2-2 below summarises the Rochdale Envelope scenarios considered within the shipping and navigation impact assessment.

Table 11.2-2 Rochdale Envelope Scenario Considered within Assessment of Likely Significant Effects on Shipping and Navigation

Type of Effect	Rochdale Envelope Scenario Assessed
Construction & Decommissioning	
Increased Level of Vessel Activity with the Installation of the Export Cable and the OSPs (irrespective of final routes) Resulting in Increased Collision Risk.	Maximum loss of navigable sea area: • Increase in ship-to-ship encounters due to passing vessels deviating around the installation and cable laying vessels; and • Maximum number of OSPs (8) covering widest area.
Re-Routing of Shipping (commercial vessels, fishing and recreation ships) in the Area Due to Installation and Cable Laying Vessels.	Maximum loss of navigable sea area based on: • Maximum number of export cables covering the largest surface area resulting in passing vessels deviating around the installation and the cable laying vessels; and • Two separate export cable trenches 800 m apart.
Operation	
Effect on Vessel Anchoring (loss of anchorage, anchor dragging or snagging cable) Due to Export Cable(s)	Maximum loss of potential anchoring area based on: • Maximum number of export cables covering the largest surface area (i.e. Four cables in two trenches 800 m apart).
Vessel to Structure Collision Risk During Operations for Commercial, Fishing and Recreational Routing;	Maximum collision risk based on: • Eight Offshore Substation Platforms including shielding by the turbines (WTGs).
Fishing Gear Interacting / Snagging Export Cable(s)and the OSPs	Potential fishing gear interaction based on: • Maximum number of export cables covering the largest surface area; and • Eight OSPs.
Electromagnetic Interference on Shipborne Navigational Equipment (smaller recreation and fishing vessels)	Electromagnetic interference from export cables carrying High Voltage Direct Current (HVDC) on shipborne navigational system, including magnetic compasses: • Maximum number of export cables covering the largest surface area.

11.2.4 EIA Methodology

11.2.4.1 The methodology used to assess the likely significant effects of the proposed OSPs and export cable route of the OfTI principally follows the Marine Coastguard Agency (MCA) Marine Guidance Notice 371 (MGN 371 M+F) (2008) and Department of Energy Climate Change (DECC) Risk Assessment Methodology (2005). Further details on the guidance used in this assessment can be found in Chapter 5.2 (Shipping and Navigation).

11.2.4.2 The baseline study (see Chapter 5.2: Shipping and Navigation) allowed higher risk areas to be identified through the maritime traffic survey, desk-based research and consultation.

11.2.4.3 The effect on shipping and navigation associated with the OfTI works was assessed and a series of mitigation measures and monitoring plans are presented.

11.2.5 Significance Criteria

11.2.5.1 The likely significant effects on shipping and navigation from the offshore export cable cannot be easily categorised, hence the application of significance criteria to an assessment of effects is, as a result, subjective.

11.2.5.2 In terms of the proposed export cable route, the effects on the shipping and navigation receptors for different phases of the Project are assessed using the significance terminology as described below:

- **Not significant.** Effects that are slight and negligible deviations in terms of vessel navigation / routing, anchor / fishing gear interaction risk causing no damage and radar interference on navigational equipment which does not affect a vessel's ability to navigate;
- **Minor** significance. Effects which are generally small in magnitude in terms of vessel navigation (e.g. minor deviation around cable laying vessels for regular routes), anchor / fishing gear interaction risk causing minor damage to vessel / gear and radar interference on navigational equipment restricting a vessel's ability to navigate safely;
- **Moderate** significance. Effects which are moderate in magnitude in terms of vessel navigation (e.g. moderate deviation for regular route around cable laying vessels), anchor / fishing gear interaction risk causing moderate damage to vessel / gear and / or injury to crew and radar interference on navigational equipment reducing a vessel's ability to navigate in proximity to the infrastructure; and
- **Major** significance. Effects which are majorly significant in magnitude, in terms of vessel navigation (e.g. large deviations for dense shipping), anchor / fishing gear interaction risk causing major damage to vessel / gear and major injuries to crew and radar interference on navigational equipment which means a vessel can no longer navigate safely in the vicinity of the infrastructure.

11.2.6 Impact Assessment

11.2.6.1 The Navigational Risk Assessment (Technical Appendices 5.2 D and 5.2 E) required comprehensive shipping data as input for a complete impact assessment. A vessel based shipping survey was carried out at the export cable route of the offshore transmission infrastructure for the MORL Zone to the landfall, during July to

October 2011. A detailed study area of 10 nm either side of the cable corridor was defined in order to assess the wider impacts on users in the area. The maritime survey recorded fluctuations in shipping and vessel activity over seasonal and tidal variations.

11.2.6.2 A range of vessels were recorded on AIS, to ensure the main vessel types including commercial, fishing and recreational vessels were also recorded in the wider area around the proposed export cable route.

11.2.6.3 The review of likely significant effects was carried out by experienced personnel including local mariners through the use of hazard workshops and consultation process. This gives further confidence in the findings of the work. As a result of the approach adopted, the limitations associated with this study are not considered to be significant.

11.2.6.4 The baseline vessel activity and navigational features in the vicinity of the proposed OfTI were detailed in Chapter 5.2 (Shipping and Navigation). The assessment identified the shipping and navigation receptors that may be affected by the proposed OfTI works.

11.2.6.5 The main part of the assessment covers the likely significant effects on shipping and navigation in relation to commercial shipping, recreation vessels, fishing vessels and effects on shipborne navigational equipment. Effects on commercial fishing are also assessed separately in Chapters 5.1, 8.1, 11.1 and 15.1.

Construction

11.2.6.6 In terms of the shipping and navigation receptors, the overall effect associated with the OfTI has been assessed for the construction / installation phase of the Project.

Effect Due to Installation and Cable Laying Vessels

11.2.6.7 The presence of cable laying and installation vessels within the proposed export cable route and the OSPs can pose additional risks to navigation. This is due to increased vessel activity, in particular in the vicinity of the OSPs, and the fact that the installation vessels are restricted in their manoeuvrability. This may lead to an increase in ship-to-ship encounters in the area as passing shipping deviates around cable laying works.

11.2.6.8 There is a relatively low density of commercial vessels transiting the area. The majority of vessels recorded in close proximity to the offshore export cable route were fishing vessels on passage. There is sea room available for passing vessels to re-route around additional marine operations traffic and cable laying vessels operating in this area.

11.2.6.9 Assuming industry standard mitigation (see 11.2.7 below) and safety management systems (SMS), it is expected that cable laying works can be carried out safely, with a **minor**, direct negative effect on shipping and navigation.

Effect on Commercial Ship Routing

11.2.6.10 The main shipping route intersecting the proposed offshore export cable route was traffic headed north and south, 2.5 nm east of Rattray Head (including roll-on / roll-off vessels, cargo ships and ferries headed to the Northern Isles from

Aberdeen) as shown in Technical Appendices 5.2 D and 5.2 E (NRA). Cargo vessels, tankers and fishing vessels also cross the cable route on a well-defined route heading north by north west and south by south east associated with the traffic to / from the Pentland Firth.

11.2.6.11 A less frequently used route recorded north of Fraserburgh, passing east / west into the Moray Firth, (between 3 to 7 nm from Kinnaird Head), mostly comprises shuttle tankers and small to medium sized coastal cargo vessels.

11.2.6.12 For the OSPs the densest route is to the east with one vessel every ten days recorded on a route transiting from Wick to the south.

11.2.6.13 Offshore supply vessels also intersect the offshore export cable route, to the north and east, supporting mobile / temporary drilling operations and fixed offshore platforms in the area, including Ross Field, Captain Field and Beatrice / Jacky Fields.

11.2.6.14 In general, shipping in the area of the offshore export cable route keeps in the order of at least 1 to 2.5 nm north and east of the Aberdeenshire coast, well clear of shallower areas where the possibility exists of a vessel grounding or foundering. A number of coastal vessels were recorded passing closer to shore (dependant on draught and sea conditions). However, in general, most commercial vessels avoid inshore routes.

11.2.6.15 The cable route intersects the Fraserburgh port approaches. However, the vast majority of vessels using this port are fishing vessels and, given the proximity of the cable land fall to the port, any commercial vessels should already be attentive to navigational hazards as they approach or depart the harbour.

11.2.6.16 For the OSPs it is considered that commercial shipping will be able to pre-plan any revised passage in advance of encountering the area of the proposed sites and there will only be a minor increase to voyage distance and time. Given, the low levels of shipping on the affected routes, available sea room to the east and west of the of the offshore export cable route, the low levels of inshore commercial vessels in close proximity to the cable land fall and assuming industry standard mitigation will be in place; a **minor**, direct negative effect on commercial ship routing is predicted.

Effect on Fishing Vessel Routing

11.2.6.17 The shipping survey (July to October 2011), recorded a high density of fishing vessels on passage, approximately 2 nm clear of Rattray Head. A large number of vessels were also recorded on passage to Fraserburgh, intersecting the export cable route.

11.2.6.18 Local fishing vessels will be aware of installation works and cable laying vessels within the export cable route through Notices to Mariners (NtMs) and fisheries liaison. Non-local fishing vessels will become aware of the cable laying activities as they arrive at fishing grounds through day marks and lights used by the cable laying vessels to advise passing vessels of restrictions in manoeuvrability.

11.2.6.19 Given the available sea room to the east and west of the offshore export cable route and the relatively small size and draught of fishing vessels (mean length of 21 m and mean draught 2.4 m), there will be a **minor**, direct negative effect on routing of fishing vessels during the construction / installation phase.

Effect on Recreational Vessel Routing

11.2.6.20 A small number of recreational vessels were recorded on AIS routing along the Aberdeenshire coast (from Peterhead, off Rattray Head and Kinnaird Head). In addition, two medium and two light use Royal Yacht Association (RYA) / Cruising Association (CA) cruising routes intersect the export cable route and development areas.

11.2.6.21 Overall, a **minor**, direct negative effect is predicted on recreational vessel routing distance / voyage time (assuming works are safely managed using SMS and industry standard mitigations); given that there is sea room available for vessels to deviate around installation and cable laying vessels.

Operation

11.2.6.22 The overall effect associated with the OfTI on shipping / navigation and shipborne navigational equipment, has been identified and assessed for the operational phase of the Project.

Effect on Commercial Vessels Anchoring

11.2.6.23 A Navigational Hazard Review Workshop was carried out in July 2011, as part of the Navigational Risk Assessment (NRA) for the offshore wind farm developments within the Moray Firth. The workshop highlighted that the Moray Firth provides vessels with sheltered anchorages, located inshore of adverse sea and weather conditions that can be experienced in the North Sea. Vessels including shuttle tankers, offshore supply ships, survey and cable laying vessels anchor off the Moray Firth coastline during severe weather. The NRA is found in Technical Appendix 5.2 D.

11.2.6.24 Anchoring within 10 nm of the offshore export cable route was recorded in Aberdour Bay (7.3 nm west of the cable route) and north of the Southern Trench (5 to 6 nm west by south west of the cable route). In both of these areas, the sea bed type is sandy gravel where there is good holding ground for anchoring. Smaller vessels were recorded using the inshore anchorage at Aberdour Bay (offshore supply vessels and small to medium sized cargo ships), with large crude oil and shuttle tankers recorded north of the Southern Trench. A large crude oil tanker was also recorded 5 nm west of the route, in sand / muddy sand sea bed type.

11.2.6.25 Sea bed mobility is relatively high within and adjacent to the Southern Trench. Therefore, to minimise the risk of export cables becoming exposed to anchor interaction, alternative forms of protection will be considered where the cable cannot be satisfactorily buried (i.e. mattresses and / or rock placement), as well as regular surveys to monitor cable burial depths.

11.2.6.26 There is also a charted anchorage in Fraserburgh Beach and two vessels were recorded at anchor within the proposed cable route during the shipping survey. Following installation of the export cables and marking on admiralty charts, it is expected that anchoring activity in Fraserburgh Beach is likely to migrate as vessels become aware of the subsea cables. Kinnaird Head is approximately 1 nm west of the Fraserburgh Beach cable route, and there is a sandy gravel sea bed which covers the sea area to Aberdour Bay, which offers vessels shelter and good holding.

11.2.6.27 The risk of anchor interaction for the offshore export cable route is considered to be higher for the coastal areas of the Fraserburgh Beach route. However given the low number of vessels anchoring in close proximity to the offshore cable route, the overall effect on anchoring is considered to be **minor** including industry standard mitigation and cable burial / protection.

Effect on Commercial Shipping Collision Risk

11.2.6.28 In terms of an errant vessel under power deviating from its route to the extent that it comes into proximity with the OSPs, it is not considered to be a probable event. The worst case collision return period with the eight OSPs is estimated to be one every 261,000 years, and is low compared to the historical average of 5.3 x 10^{-4} per installation-year for offshore installations on the United Kingdom Continental Shelf (UKCS) (One in 1,900 years).

11.2.6.29 The drifting collision risk for the eight OSPs has been identified as one every 18,100,000 years. There have been no reported 'passing' drifting ('Not under Command') ship collisions with structures on the UKCS on over 6,000 operational years. Whilst a number of drifting ship incidents are recorded each year in UK waters, most vessels have been recovered in time, (e.g. anchored, restarted engines or taken in tow.)

11.2.6.30 Overall, through the baseline data, consultation and collision risk models, a minor, direct negative effect is predicted on commercial shipping and collision risk given the low levels of traffic / baseline risk and the small change in collision risk due to the physical presence of the OSPs. This effect is considered unlikely to occur.

Effect on Smaller Vessels Anchoring

11.2.6.31 The effect on smaller vessels anchoring, including fishing and recreational vessels is expected to be similar in nature and extent to those discussed for commercial shipping anchoring effects. However, small vessels are likely to anchor in more sheltered and inshore areas, which are shallower and don't restrict small vessels anchor chain lengths.

11.2.6.32 Consultation carried outwith the RYA and CA during the NRA (for wind farm and offshore transmission works) stated that consultees would like the export cables buried, particularly near port approaches (e.g. the Fraserburgh Beach area). However, RYA and CA noted this is not considered an issue for their interests where sea depth is less than 10 m (approximately 900 m north of the Fraserburgh Beach land fall). In addition, the risk to recreational vessel anchoring is considered low as anchors tend run to approximately 20 cm into the sea bed (and the Rochdale Envelope for the export cable has a target burial depth of 1 m).

11.2.6.33 Assuming industry standard mitigation / cable burial and surveys to monitor export cables, a **minor**, direct negative effect is predicted on small vessel anchoring.

Effect on Fishing Vessels

11.2.6.34 The effect on fishing vessel grounds is assessed in Chapter 11.1 (Commercial Fisheries). In terms of fishing gear interaction, areas of demersal trawling and scallop dredging were recorded within and adjacent to the offshore export cable route (8 to 10 nm north of Southern Trench).

11.2.6.35 Scallop dredgers have a chain bag with teeth that dig into the sediments to about 20 cm, which drags along the sea bed collecting the catch. Scallop gear penetration depth varies (based on gear type / weight and sea bed type), but gear can penetrate up to 75 cm, and therefore these vessels are at higher risk of gear interaction with the export cable. This area of the cable route is likely to require burial, trenching or alternative forms of protection (i.e. mattresses and / or rock placement) to reduce the effect on fishing vessels as well as to protect the cable. The target burial depth is 1 m and, where a satisfactory depth that meets the requirements of both the Developer and navigational stakeholders cannot be achieved, the cables will be protected with concrete mattresses and / or rock placement. Following installation, the cables' over-trawlability will also be tested. Overall, the risk to scallop dredgers operating in the vicinity of the export cable route is likely to be moderate.

11.2.6.36 However, within the offshore export cable route, fishing satellite data (2009) indicated that 67 % of fishing vessels were steaming as opposed to engaged in fishing (i.e. gear deployed). In terms of fishing vessel navigation, the effect on vessels steaming by the site to fishing grounds can be considered similar to other passing vessels (i.e. commercial vessels). However, it is noted that there is good prospect for fishing vessels to navigate within / between structures. This decision to do this however lies with the Master of the vessel who will be responsible for assessing the risks associated with navigating in proximity to and through an offshore wind farm.

11.2.6.37 The baseline data for the cable route also showed that there is a large number of fishing vessels steaming over the proposed route, on approach and departure from Fraserburgh port.

11.2.6.38 There is a risk to fishing vessels should they snag their gear on unprotected cables or cables running over spans (8 to 10 nm north of the Southern Trench) or on the OSPs subsurface. However, with identification and mitigation of potential snagging hazards including cable protection / burial as well as survey / monitoring and liaison with the fishing industry, it is considered that the operational phase of the transmission works will have a **minor**, direct residual effect on fishing vessels.

Effect on Shipborne Navigational Equipment

11.2.6.39 An additional navigational effect was identified based on electromagnetic interference on smaller vessels (navigational equipment, (e.g. recreational craft and small fishing boats magnetic compasses and communication equipment).

11.2.6.40 The export cables will be HVDC, given the ability to transmit large amounts of power over long distances with lower costs and reduced power losses compared to Alternating Current (AC). HVDC export cables could potentially cause deflection of a compass needle through electromagnetic interference (Metoc, 2000). In addition, vessels can use an auto-pilot which is dependent on a magnetic sensor and may experience slight steering issues if crossing a high voltage cable. However, it is noted that given burial / protection and water depth along the majority of the export cables, the level of electromagnetic interference is likely to be low which is in line with the experience from offshore wind farm cables to date (QinetiQ, 2004).

11.2.6.41 In addition, based on the findings of the trials at the North Hoyle Offshore Wind Farm (MCA, 2005 and QinetiQ, 2004), the wind farm generators and their cabling, (inter-turbine and onshore) did not cause any compass deviation during the trials. Export cables at North Hoyle were ploughed using a 2 m burial depth capability achieving a target burial depth of 1.5 m, which is similar to the 1 to 2 m burial depth proposed for the MORL export cables. In addition, studies have found that the greater distance the compass is from the cause of interference the less effect will be experienced.

11.2.6.42 It is assumed that all equipment and export cables will be rated and in compliance with design codes. In addition the export cables will be buried (where possible) and any generated electromagnetic fields will be very weak (see Chapter 10.2: Fish and Shellfish Ecology and Appendix 4.3 D for further information) resulting in a **negligible** effect on shipborne navigational equipment.

11.2.6.43 A small number of vessels identified during the baseline assessment, including those on the Wick and offshore routes will be subject to a low level of radar interference; however, based on the revised routing patterns, radar interference is predicted to be minor.

Decommissioning

11.2.6.44 The effects associated with decommissioning the OfTI are anticipated to be similar in nature and extent to those identified during the construction phase.

11.2.6.45 However, the likely significant effects associated with decommissioning the export cables could be dependent upon the method used for decommissioning and whether it is decided that export cables shall remain buried in the seabed.

11.2.6.46 It is anticipated that the effect resulting from the decommissioning of the export cables shall be **minor** in terms of disruption to shipping and navigation receptors. In addition, any possible effects should be assessed as part of the Environmental Impact Assessment (EIA) undertaken to inform the final decommissioning programme.

11.2.7 Proposed Mitigation

11.2.7.1 Mitigation and safety measures will be applied to the offshore export cables works appropriate to the level and type of risk determined during the EIA.

11.2.7.2 The specific measures to be employed will be selected in consultation with the MCA Navigation Safety Branch and other relevant statutory stakeholders.

11.2.7.3 During the construction, operation and decommissioning phases of the offshore transmission works within the Fraserburgh Beach route, a number of industry standard mitigation measures will be in place and these are listed below:

- Any marine Aids to Navigation (AtoNs) required to mark the structures, land falls and / or subsea features will be provided in accordance with the Northern Lighthouse Board (NLB) requirements;
- Marking of structures and subsea cabling on appropriate scale admiralty charts by the United Kingdom Hydrographic Office (UKHO);
- Positions of the OSPs and export cable routes notified to FISHSAFE via Kingfisher Information Services-Cable Awareness (KIS-CA) for inclusion in cable awareness charts and plotters for the fishing industry;

- Promulgation of information and appropriate liaison. This ensures information on the offshore transmission works are circulated in Notices to Mariners, Navigation Information Broadcasts and other appropriate media to allow vessels to effectively and safely pre-plan navigation around any installation / cable laying vessels;
- A Search and Rescue (SAR) Emergency and Response Cooperation Plan (ERCoP) will be developed and put in place for the construction, operation and the decommissioning phases of the entire wind farm Project. The ERCoP should include procedures covering the offshore transmission works including substation and emergency wind farm shut-down in an event of SAR, counter pollution or salvage incident within or adjacent to the wind farm and associated export cabling). During development of the ERCoP there should be coordination between the wind farm operator and the offshore transmission works owner to address any issues in an event of SAR event in the export cable route; and
- An Active Safety Management System (ASMS) will be developed to ensure the effective co-ordination of emergency response at the offshore transmission works. It will be designed to ensure that the risks related to marine operations (construction, operation / maintenance and decommissioning) specific to the Project are managed carefully and over the long term.

Construction

11.2.7.4 One of the construction / installation vessels will be tasked with vessel monitoring and guard duties to monitor passing vessels and warn / contact errant vessels headed towards offshore transmission works or vessels restricted in manoeuvrability associated with the Project.

Operation

11.2.7.5 Periodic and planned surveys of the export cable routes will be carried out to monitor burial depths / protection and sea bed mobility.

11.2.7.6 A Marine Control Centre is being considered as part of three proposed wind farm sites, and monitoring could be extended to cover the export cable route to shore, (i.e. to monitor any vessels anchoring in proximity to the cable route). Further consideration of vessel monitoring in proximity to the cable route will take place during construction / installation planning.

Decommissioning

11.2.7.7 The mitigation measures associated with decommissioning the export cables are anticipated to be similar to those identified for the construction phase; however measures will also be dependent on the method of decommissioning (i.e. complete removal of export cables or leaving the cable(s) buried in the sea bed).

11.2.7.8 A decommissioning programme in line with standard requirements will be developed and this is likely to lead to a revision of the existing ERCoP and associated safety procedures.

11.2.7.9 Promulgation of information and appropriate liaison with marine stakeholders will be carried out prior to decommissioning works.

11.2.8 Residual Effects

11.2.8.1 The effect of the offshore transmission works has been minimised as industry standard risk control measures will be put in place during the development and operation of the offshore wind farms and associated offshore transmission works.

11.2.8.2 The additional mitigation measures (see 11.2.7 above) will further serve to reduce the effect of the export cables on shipping and navigation, and ensure the Project conforms to MGN 371 and industry good practice.

11.2.8.3 A description of residual effect, mitigation and post-mitigation effect is presented in Table 11.2-3 below.

Table 11.2-3 Residual Effects and Mitigation for Shipping and Navigation Receptors

Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Construction			
Commercial Shipping	Minor	Industry standard (including cable burial, ERCoP and information promulgation on construction / installation works). Other mitigation strategies include guard vessels for cable laying / installation vessels.	Minor
Fishing Vessels	Minor	Industry standard (including cable burial, ERCoP and information promulgation / fishing industry liaison). Other mitigation strategies include guard vessels for cable laying / installation vessels.	Minor
Recreation Vessels	Minor	Industry standard (including cable burial, ERCoP and information promulgation on construction / installation works). Other mitigation strategies include guard vessels for cable laying / installation vessels.	Minor
Operation			
Commercial Vessel Anchoring	Minor	Industry standard (including cable burial / protection, ERCoP and marking subsea cables on charts). Other mitigations strategies include surveys of the cables, marine control centre and vessels setting up anchoring alarm zones to warn of dragging anchor near cables.	Minor
Effect on Shipping Collision Risk	Minor	ERCoP, marking wind farm structures on charts and lighting / buoyage in accordance with NLB and IALA O-139). Other mitigations include consideration of operational safety zones and Marine Control Centre.	Minor

Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Small Vessel Anchoring	Minor	Industry standard (including cable burial / protection, ERCoP and marking subsea cables on charts). Other mitigation strategies include surveys of the cables, marine control centre and vessels setting up anchoring alarm zones to warn of dragging anchor near cables.	Minor
Fishing Vessels	Moderate	Industry standard (including cable burial / protection, ERCoP, marking subsea cables on charts and informing FISHSAFE via KIS-CA for cable awareness charts. Other mitigation strategies include surveys of the cables and the establishment of a marine control centre. Depending on the success of the trials and industry interest, modified scallop dredging gear may be implemented as an additional mitigation (but is not assumed here).	Minor
Shipborne Navigational Equipment	Negligible	Industry standard (including cable burial / protection). Other mitigation strategies include surveys of the cables to monitor burial depths.	Negligible
Decommissioning			
Commercial Shipping	Minor	Industry standard (including promulgation on decommissioning works). Other mitigation strategies include guard vessels for decommissioning vessels.	Minor
Fishing Vessels	Minor	Industry standard (including promulgation on decommissioning works and fishing industry liaison). Other mitigation strategies include the employment of guard vessels for decommissioning vessels.	Minor
Recreation Vessels	Minor	Industry standard (including promulgation on decommissioning works). Other mitigation strategies include the employment of guard vessels for decommissioning vessels.	Minor

11.2.9 References

DECC, 2005. Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind farms, Version Date: 7th September 2005.

MCA, 2005. Offshore Wind Farm Helicopter Search and Rescue Trials undertaken at the North Hoyle Wind Farm.

MCA 2008. Marine Guidance Note 371 (M+F), Offshore Renewable Energy Installations (OREI): Guidance on Navigational Practice, Safety Issues and Emergency Response Issues.

Metoc, 2000. An Assessment of the Environmental effects of Offshore Wind Farms. ETSU W / 35 / 00543 / REP.

QinetiQ and MCA, 2004. Results of the EM Investigations and assessments of marine radar, communications and positioning systems undertaken at the North Hoyle Wind Farm.

The Royal Yachting Association, 2008. UK Coastal Atlas of Recreational Boating; Recreational Cruising Routes, Sailing and Racing Areas around the UK Coast. Updated GIS Layers 2010.

11.3 Military and Civil Aviation

11.3.1 Summary of Effects and Mitigation

11.3.1.1 This chapter summarises the likely significant effects of the proposed offshore transmission infrastructure (OfTI) and onshore transmission infrastructure (OnTI) during its construction, operation and decommissioning phases on aviation interests in the region. The likely effects on the interests of National Air Traffic Services En–Route Ltd (NERL), the Ministry of Defence (MoD) and the helicopter support operations to the offshore oil and gas industry were considered. The constituent parts of the OfTI and OnTI infrastructure are as follows:

- OfTI:
  - AC Offshore Substation Platforms (OSPs); and
  - Offshore Export cables.
- OnTI:
  - Onshore Export cables; and
  - Peterhead Substation.

11.3.2 Summary of Effects

11.3.2.1 At a maximum height of 70 m (230 ft) above Lowest Astronomical Tide (LAT), the OSPs will be lower in height than projected turbines for the three proposed wind farms. Additionally, subsea and underground cabling and the onshore substation will not affect aviation operations. In conclusion, it is identified that the proposed infrastructure will not pose a physical obstruction to routine aviation operations in the area and consequently the Transmission Infrastructure (TI) will not pose any negative obstruction effect on aviation activities.

11.3.2.2 However, during the commissioning and decommissioning phases of the development, the developer will notify the location and movement and maximum height of significant physical obstructions to NATS Aeronautical Information Service (AIS).

11.3.2.3 In addition, the static nature of both the OfTI and OnTI will have no effect on the identified Aviation Stakeholders Primary Surveillance Radar (PSR) systems. PSR systems can distinguish between moving and static targets: the echoes received from a moving target change in electrical phase between pulses; the Doppler shift. Signal processing techniques within such systems will differentiate between moving and static targets, with the static targets not shown on Air Navigation Service Provider displays.

Proposed Mitigation Measures and Residual Effects

11.3.2.4 Mitigation and safety measures will be applied to the offshore transmission infrastructure appropriate to the level and type of risk. The specific measures to be employed will be selected in consultation with the relevant statutory stakeholders where required.

11.3.2.5 In addition, during the construction, operation and decommissioning phases of the Project, industry standard mitigation in the form of obstruction lighting will be in accordance with Article 220 of the UK Air Navigation Order (ANO).

11.3.2.6 A military and civil aviation impact summary with regard to the TI, detailing pre-mitigation effects, proposed mitigation and residual effects, is outlined in Table 11.3-1 below.

Table 11.3-1 Impact Assessment Summary

Receptor	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
Construction			
NERL Allanshill PSR	Not Significant	N / A	Not Significant
ASACS Buchan PSR	Not Significant	N / A	Not Significant
RAF Lossiemouth PSR	Not Significant	N / A	Not Significant
HIAL Wick Airport	Not Significant	N / A	Not Significant
HMR X–Ray	Not Significant	N / A	Not Significant
Offshore Installations	Not Significant	N / A	Not Significant
Minimum Safe Altitude	Not Significant	N / A	Not Significant
Operation			
NERL Allanshill PSR	Not Significant	N / A	Not Significant
ASACS Buchan PSR	Not Significant	N / A	Not Significant
RAF Lossiemouth PSR	Not Significant	N / A	Not Significant
HIAL Wick Airport	Not Significant	N / A	Not Significant
HMR X–Ray	Not Significant	N / A	Not Significant
Offshore Installations	Not Significant	N / A	Not Significant
Minimum Safe Altitude	Not Significant	N / A	Not Significant
Decommissioning			
NERL Allanshill PSR	Not Significant	N / A	Not Significant
ASACS Buchan PSR	Not Significant	N / A	Not Significant
RAF Lossiemouth PSR	Not Significant	N / A	Not Significant
HIAL Wick Airport	Not Significant	N / A	Not Significant
HMR X–Ray	Not Significant	N / A	Not Significant
Offshore Installations	Not Significant	N / A	Not Significant
Minimum Safe Altitude	Not Significant	N / A	Not Significant

11.3.3 Introduction

11.3.3.1 The TI was assessed for likely significant effects on identified aviation stakeholders. This chapter summarises the potential effects on identified stakeholders. The chapter also outlines potential mitigation options, where available, to overcome identified issues.

11.3.3.2 A desk based study identified the potential for an effect on the following aviation receptors:

- NERL – Allanshill Primary Surveillance Radar in support of Civil Air Traffic Control (ATC) and En–route operations;
- MoD Airspace Surveillance and Control Systems (ASACS) Air Defence Radar (ADR) operations and training;
- MoD RAF Lossiemouth PSR, Military ATC Radar;
- HIAL Wick Airport operations;
- Helicopter Main Route (HMR) X-Ray operations;
- Helicopter transits and procedures to offshore oil and gas installations; and
- The Minimum Safe Altitude for offshore flight.

11.3.3.3 This chapter contains relevant information on the OnTI to allow Scottish Ministers and Marine Scotland to make decisions on the applications for Section 36 consents and Marine Licences for the three proposed wind farm sites and the OfTI. Discussions are ongoing with landowners to determine the exact location and layout of the substation(s) on their land within the preferred onshore substation area. This will be finalised following production of a masterplan by the owner / operator of the Peterhead Power Station compound which forms part of the preferred area. Once the precise location and layout for the onshore substation(s) and export cable location has been confirmed, an application for planning permission for the OnTI will be submitted to Aberdeenshire Council and will be supported by this ES and such further information as is required to support the planning application.

11.3.4 Rochdale Envelope Parameters Considered in the Assessment

11.3.4.1 For the assessments of likely significant effects in this chapter, it is presumed that up to eight OSP placements up to a maximum height of 70 m (230 ft) above LAT are required, and that they would be located either within the development boundary of the three proposed wind farms or would be positioned as close to the boundary as possible or adjacent to the planned cable route within 2 km of the MORL Zone boundary. Also required are both offshore and onshore export cabling (Figure 1.1-4, Volume 6 a) and an onshore substation located near Peterhead (Figure 1.1-5, Volume 6 a).

11.3.5 EIA Methodology

11.3.5.1 A list of potential aviation stakeholders were identified in accordance with Civil Aviation Authority CAA publication CAP 764 and considers the en-route and other radar systems and aerodromes within operational range of the TI. The identification stage also considered military areas of operation including, tactical training and danger areas. For each identified stakeholder, the physical obstruction of the TI was considered. The operational effect pays heed to, but is

not limited to, consideration of: the orientation of approach and departure flight paths, physical safeguarding of flight, types of aircraft flying into the aerodrome, airspace characteristics and flight procedures (as published in the UK Integrated Aeronautical Information Package (IAIP) and Military Aeronautical Information Package (Mil AIP).

11.3.5.2 Effects have been informed by the results of a desktop assessment and consultation with reference to the existing evidence base regarding effects of offshore wind farm development.

11.3.5.3 The magnitude criterion of the likely effects on aviation and radar receptors is assessed using the following method and terminology:

- Negligible – No effect on this receptor;
- Low – Receptor able to continue operations with standard mitigation in place;
- Medium – Receptor able to continue safe operations but with some restrictions or non-standard mitigation measures in place; and
- High – Receptor unable to continue safe operations or safe provision of air navigation services (radar) in the presence of the wind turbines. Technical and / or operational mitigation of the effect is required.

11.3.5.4 For an aviation assessment, each of the following receptors has a high sensitivity to effect, given their safety critical function:

- NERL Allanshill PSR;
- ASACS Buchan ADR;
- RAF Lossiemouth PSR;
- HIAL Wick Airport;
- HMR X-Ray;
- Offshore Installations; and
- Minimum Safe Altitude.

11.3.5.5 Any predicted effect upon aviation stakeholders which results in restricted activities is regarded as unacceptable and therefore significant. The following approach identified in Table 11.3-2 below is used and summarises the assessment of significance.

Table 11.3-2 Significance Assessment Matrix

		Sensitivity of Receptor		
		Low	**Moderate**	**High**
Magnitude of effect	**Negligible**	Not significant	Not significant	Not significant
	Low	Significant	Significant	Significant
	Medium	Significant	Significant	Significant
	High	Significant	Significant	Significant

11.3.6 Impact Assessment

11.3.6.1 The static nature of the TI will have no effect on the identified Aviation Stakeholders Primary Surveillance Radar (PSR) and Air Defence Radar (ADR) systems. These radar systems can distinguish between moving and static targets: the echoes received from a moving target change in electrical phase between pulses; the Doppler shift. Signal processing techniques within such systems will differentiate between moving and static targets, with the static targets not shown on Air Navigation Service Provider displays. As a result the effect of the TI on radar systems (NERL Allanshill PSR, ASACS Buchan ADR and RAF Lossiemouth PSR) has been scoped out of this assessment.

11.3.6.2 The physical obstruction aspect of the TI in support of the three wind farm areas has the potential to affect a number of aviation stakeholders:

- Concerns may be raised by HIAL Ltd in respect of the potential effect of the TI upon the operations at Wick Airport due to the proximity of tall structures to the safeguarded surfaces of the Airport;
- The potential exists that the TI will present a physical obstruction to helicopters operating to and from Oil and Gas platforms in the region; and
- The potential exists that the TI will present a physical obstruction to aviation operations in the area with regard to the minimum safe altitude which is set in areas to ensure separation between aircraft and known obstacles.

HIAL Wick Airport

Construction

11.3.6.3 The maximum height of any constituent part of the TI will be 70 m (230 ft). The TI at the closest point will be located 24.8 km from Wick Airport, which is beyond the protected surfaces of the Airport. Therefore, the TI and their construction processes will have no significant effect on the operations at Wick Airport.

11.3.6.4 The magnitude of effect is categorised as negligible. The sensitivity of this receptor to this effect is considered to be high and therefore the effect is assessed as **not significant**.

Operation

11.3.6.5 For the same reasons as for Construction, the TI operation will have no significant effect on the operations at Wick Airport. The magnitude of effect is categorised as negligible. The sensitivity of this receptor to this effect is considered to be high and therefore the effect is assessed as **not significant**.

Decommissioning

11.3.6.6 For the same reasons as for Construction, the TI decommissioning processes will have no significant effect on the operations at Wick Airport. The magnitude of effect is categorised as negligible. The sensitivity of this receptor to this effect is considered to be high and therefore the effect is assessed as **not significant**.

HMR X-Ray

Construction

11.3.6.7 HMRs are established to facilitate safe helicopter flights in Instrument Flight Rules (IFR) conditions (i.e. when flight cannot be completed in visual conditions). HMRs have no defined lateral dimensions, although 2 nm either side of the route centreline should ideally be kept obstacle free. The maximum height of any constituent part of the TI will be 70 m (230 ft). Therefore, aircraft operating on the section of HMR X-RAY between Aberdeen and Wick Airports do not have the potential to conflict with TI placed within the lateral confines of the three proposed wind farms. Consultation with helicopter operators in the Moray Firth confirmed that aircraft routinely operate along HMR X-Ray between 2,000 ft (610 m) and 3,000 ft (914 m), depending on prevailing meteorological conditions. However, this altitude band is sufficient to prevent any helicopters operating on the HMR from coming into direct physical conflict with TI under normal operating conditions.

11.3.6.8 The TI and its construction infrastructure do not have the potential to conflict with the section of HMR X-Ray between Aberdeen and Wick Airports. The magnitude of effect is categorised negligible. The sensitivity of this receptor is high. The above effect is therefore assessed as **not significant**.

Operation

11.3.6.9 For the same reasons as for Construction, TI operation will have no significant effect on aircraft operating on HMR X-Ray. The magnitude of effect is categorised negligible. The sensitivity of this receptor is high. The above effect is therefore assessed as **not significant**.

Decommissioning

11.3.6.10 For the same reasons as for Construction, TI decommissioning processes will have no significant effect on aircraft operating on HMR X-Ray. The magnitude of effect is categorised negligible. The sensitivity of this receptor is high. The above effect is therefore assessed as **not significant**.

Offshore Installations

Construction

11.3.6.11 The TI and its construction infrastructure will not be considered as physical obstructions and will not infringe the existing minimum obstacle clearance criteria of 1,000 ft (305 m). The minimum obstacle clearance dictates the height at which helicopters can transit in the region of the three proposed wind farms and the height that instrument approaches to offshore platforms commence. Currently, due to existing obstructions in the area, helicopters operating under IFR would routinely fly at 1,500 ft (457 m) or above. This is sufficient to prevent any helicopter operating in the area from coming into direct physical conflict with TI under normal operating conditions.

11.3.6.12 The magnitude of effect is therefore considered negligible. The sensitivity of this receptor to is high. The above effect is assessed to be **not significant**.

Operation

11.3.6.13 For the same reasons as for Construction, TI operation will have no significant effect on helicopters operating at offshore installations. The magnitude of effect is therefore considered negligible. The sensitivity of this receptor to is high. The above effect is assessed to be **not significant**.

Decommissioning

11.3.6.14 For the same reasons as for Construction, TI decommissioning processes will have no significant effect on helicopters operating at offshore installations. The magnitude of effect is therefore considered negligible. The sensitivity of this receptor to is high. The above effect is assessed to be **not significant**.

Minimum Safe Altitude

Construction

11.3.6.15 The minimum safe altitude (MSA) for aircraft operations in Instrument Meteorological Conditions (IMC), essentially poor weather, in the Moray Firth region is 1,500 ft (457 m). This allows for a minimum of 1,000 ft (305 m) clearance between aircraft and known en-route obstacles (the highest point of the Beatrice platform complex). The MSA dictates the height at which instrument approaches to offshore platforms commences and is therefore relevant to the Helicopter Main Route assessment and Helicopter Approaches Procedures to Offshore Platforms. The maximum height of the TI will be 70 m (230 ft). Therefore, the existing MSA in the area of the developments will be sufficient, ensuring that a minimum of 1,000 ft vertical separation between the anticipated TI maximum height and aircraft is maintained.

11.3.6.16 The magnitude of effect is therefore considered negligible. The sensitivity of this receptor to is high. The above effect is assessed to be **not significant**.

Operation

11.3.6.17 For the same reasons as for Construction, TI operation will have no significant effect on the existing MSA. The magnitude of effect is therefore considered negligible. The sensitivity of this receptor to is high. The above effect is assessed to be **not significant**.

Decommissioning

11.3.6.18 For the same reasons as for Construction, TI decommissioning processes will have no significant effect on the existing MSA. The magnitude of effect is therefore considered negligible. The sensitivity of this receptor to is high. The above effect is assessed to be **not significant**.

11.3.7 References

11.3.7.1 A variety of aviation publications contain information and guidance relating to the potential effects of an offshore wind development on aviation stakeholders. The following documents were consulted during the assessment process:

- Civil Aviation Publication (CAP) 168: Licensing of Aerodromes;
- CAP 393 Air Navigation: The Order and the Regulations;
- CAP 670 ATS Safety Requirements; and,
- CAP 764 CAA Policy and Guidelines on Wind Turbines.

11.4 Seascape, Landscape and Visual Receptors

11.4.1 Summary of Impacts and Mitigation

11.4.1.1 The effect on the Seascape, Landscape and Visual receptors from the offshore transmission infrastructure (OfTI) has been assessed as being not significant. During construction and decommissioning the effects will be temporary and arise from the cable laying vessels and construction equipment. During operation, the effects will be from the offshore substation platforms, viewed at long distances offshore in the context of the proposed three offshore wind farm sites.

11.4.1.2 The majority of the study area for the OnTI will be affected only temporarily by the changes arising during construction of the onshore export cable, however, there may also be limited long term effects that arise as a result of the operation of the landfall, the substation(s)and where losses of vegetation such as trees and hedgerows cannot be mitigated.

11.4.2 Introduction

11.4.2.1 The Seascape, Landscape and Visual Impact Assessment (SLVIA) considers the effect on the seascape and landscape character and the effect on visual amenity (views) of the transmission infrastructure for the Project. The transmission infrastructure consists of offshore transmission infrastructure (OfTI) (offshore substation platforms (OSPs) and offshore export cable route); and Onshore Transmission Infrastructure (OnTI) (onshore export cable route and onshore converter station (substation(s) and associated switching infrastructure to connect the 400 kV substation).

11.4.2.2 The effect of the OfTI (i.e. the OSPs) in the context of the three proposed wind farm sites is assessed in Chapter 8.4 (Seascape, Landscape and Visual Receptors Offshore Generating Station Impact Assessment).

11.4.2.3 This chapter contains relevant information on the OnTI to allow Scottish Ministers and Marine Scotland to make decisions on the applications for Section 36 consents and marine licences for the three wind farm sites and the OfTI. Discussions are ongoing with landowners to determine the exact location and layout of the substation(s) on their land within the preferred onshore substation area. This will be finalised following production of a masterplan by the owner / operator of the Peterhead Power Station compound which forms part of the preferred area. Once the precise location and layout for the onshore substation(s) and export cable location has been confirmed, an application for planning permission for the OnTI will be submitted to Aberdeenshire Council and will be supported by this ES and such further information as is required to support the planning application.

11.4.3 Offshore Transmission Infrastructure (OfTI) – Rochdale Envelope

Offshore Substation Platforms (OSPs)

11.4.3.1 Indicative locations of the OSPs have been assumed for the SLVIA; the six AC OSPs are planned within the three proposed wind farm site boundaries, with an OSP close to the boundaries nearest Caithness and Moray, with others evenly distributed through the wind farm sites. It is possible that two of the OSPs will be located within a 2 km buffer area from the site boundary within the offshore

export cable route. This buffer area is indicated by the dark green section in Figure 1.1-4, Volume 6 a. The indicative locations of the OSPs assumed for the SLVIA Rochdale Envelope are shown Figure 8.4-2, Volume 7.

11.4.3.2 All OSPs will have a maximum platform length of 100 m, platform width of 100 m and platform height of 70 m. The maximum height of 70 m is the total height of the topside structure (the substation 'box') and visible jacket foundations / air gap, above LAT. Jacket foundations are assumed as the worst case for the SLVIA. The SLVIA assumes that the interface level (the height of visible jacket structures above water) is 20 m above LAT and the height of the topside structure is 50 m. The jacket foundations for the OSPs will have four sides and up to 6 legged jacket structures (AC OSPs) and 8 legged jacket structures (DC OSPs), supported in a lattice tower arrangement and painted yellow for navigational marking.

Offshore Export Cable Route

11.4.3.3 Two bundles of two HVDC export cables each will be required to connect the converter OSPs to the chosen grid connection point. The Rochdale Envelope for the SLVIA assumes that an offshore export cable will be installed in a trench, or on the sea bed, between the offshore converter OSPs and the cable landfall point at Fraserburgh (approximately 105 km), within the offshore cable export route shown in Figure 5.4-1, Volume 7. The Rochdale Envelope for the SLVIA assumes that the offshore export cable will be laid by a cable laying vessel, as described in Chapter 2.2 (Project Description), operating during the construction period. The assessment also assumes that there will be a maximum of 32 cable laying days over a two year period, resulting in a maximum of 64 cable laying vessel working days over this period. Movements to and from port will be dependent on the port location, which has not yet been selected, but the Rochdale Envelope for the offshore export cable is based on 40 vessel movements to and from the construction port and site.

11.4.4 Onshore Transmission Infrastructure (OnTI) – Rochdale Envelope

Onshore Export Cable Route

11.4.4.1 The Rochdale Envelope for the SLVIA assumes that two bundles of two onshore (DC) export cables will be installed in a trench between the cable landfall point at Fraserburgh beach and the onshore converter station (substation(s)) south of Peterhead (approximately 30 km) within the onshore cable export corridor shown in Figure 5.4-8, Volume 7. Several installation methods may be used for the onshore export cable installation: cable plough, directional drilling (landfall and water crossings) and open trench. A description of these installation methods is provided in Chapter 2.2 (Project Description). It is assumed that onshore export cable will be laid in a 5 m wide trench within the onshore cable export route corridor shown in Figure 5.4-8, Volume 7 and that two 3 m trenches will be laid at the beach landing point, up to a jointing pit. The width of the onshore route, shown in Figure 5.4-8, Volume 7 within which the onshore cables and lay–down areas will be located, is approximately 1.5 km. Within this area an optimised cable route location will be selected prior to the submission of the onshore planning application.

Onshore Converter Station (Substation(s))

11.4.4.2 The Rochdale Envelope for the SLVIA assumes that two 750 MW onshore AC / DC converter units (the onshore substation) will be required to connect to the onshore grid network. These two converter units will be co–located within a single compound onshore in close proximity to Peterhead Power Station and the existing AC collector substation. It is assumed that the compound for the onshore substation will cover an area of approximately 200 x 170 m. A search area for the onshore substation (shown in Figure 11.4-2, Volume 7 has been identified near Peterhead Power Station and the existing AC collection substation. Within this preference area an optimised substation location will be identified prior to the submission of the onshore planning application.

11.4.5 EIA Methodology

11.4.5.1 The SLVIA methodology for the assessment of the transmission infrastructure follows the approach described for the offshore generating stations, as described in Technical Appendix 5.4 A and summarised in Chapter 8.4 (Seascape, Landscape and Visual Receptors).

11.4.6 Impact Assessment: OfTI

Offshore Substation Platforms (OSPs)

11.4.6.1 The SLVIA assesses the effect of the addition of the OSPs to the three proposed wind farm sites and is included in the Offshore Generating Station Impact Assessment (Chapter 8.4: Seascape, Landscape and Visual Receptors,) and summarised in this chapter. It does not assess the effect of adding the OSPs to the existing baseline on their own, without the three proposed wind farm sites, as this would represent an unrealistic scenario. The visual effects resulting from the OSPs, in the context of the three proposed wind farm sites, are assessed in Table 11.4–1. The seascape / landscape effects resulting from the OSPs, in the context of the three proposed wind farm sites, are also assessed in Table 11.4–1 below. The baseline description from each of these viewpoints and assessment of effects of the three proposed wind farm sites are described in Chapter 5.4 (Seascape, Landscape and Visual Receptors).

11.4.6.2 A selection of representative viewpoint locations from the main viewpoint assessment, have been chosen to assess the effect of the OSPs. Photomontages showing the OSPs in the context of the three proposed wind farm sites are illustrated in the figures in Volume 7 for each viewpoint (Figures 8.4-13 to 8.4-36, Volume 7). The effects of the OSPs in the context of the OGS are fully explained in Chapter 8.4 (SLVIA) and the effects are summarised in Table 11.4–1 to Table 11.4–4 below.

Table 11.4–1 Assessment of Visual Effects Resulting from OSPs – Construction and Decommissioning

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
Construction and Decommissioning							
Viewpoints							
2. Keiss Pier (Figure 8.4-14)	Medium–high	Low	Direct	Short term	Temporary	Adverse	Not significant
4. Wick Bay (Figure 8.4-16)	Medium–high	Medium–low	Direct	Short term	Temporary	Adverse	Not significant
5. Sarclet (Sarclet Haven Info Board) (Figure 8.4-17)	Medium	Medium–low	Direct	Short term	Temporary	Adverse	Not significant
7. Lybster (end of Main Street) (Figure 8.4-19)	Medium–high	Medium–low	Direct	Short term	Temporary	Adverse	Not significant
8. Latheron (A9) (Figure 8.4-20)	Medium–high	Medium–low	Direct	Short term	Temporary	Adverse	Not significant
9. Dunbeath (nr Heritage Centre) (Figure 8.4-21)	Medium–high	Medium–low	Direct	Short term	Temporary	Adverse	Not significant
12. Navidale (Figure 8.4-24)	Medium–high	Low	Direct	Short term	Temporary	Adverse	Not significant
13. Catchory (Figure 8.4-25)	Medium	None	Direct	Short term	Temporary	Adverse	Not significant
15. Whaligoe Steps (Figure 8.4-27)	Medium–high	Medium–low	Direct	Short term	Temporary	Adverse	Not significant
17. Buckie, Cliff Terrace (Figure 8.4-29)	Medium–low	Negligible	Direct	Short term	Temporary	Adverse	Not significant

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
18. Portnockie – Bow Fiddle Rock Info Point (Figure 8.4-30)	Medium–high	Negligible	Direct	Short term	Temporary	Adverse	Not significant
Route Corridors							
A882	Low	Negligible	Direct	Short term	Temporary	Adverse	Not significant
A9 (Brora to Latheron)	Medium to medium–high	*Brora to Helmsdale:* Low Helmsdale to Ousdale: Low Ousdale to Berriedale: Negligible Berriedale to Latheron: Medium–low	Direct	Short term	Temporary	Adverse	Not significant
A9 (Latheron to Thurso)	Medium–low	Negligible	Direct	Short term	Temporary	Adverse	Not significant
A99 (Latheron to Wick)	Medium	Thrumster to Wick: Negligible Past Lybster: Negligible Latheron to Thrumster: Medium–low	Direct	Short term	Temporary	Adverse	Not significant
A99 (Wick to John O' Groats)	Medium	Low	Direct	Short term	Temporary	Adverse	Not significant

Table 11.4–2 Assessment of Visual Effects Resulting from OSPs – Operation

Receptor	Sensitivity to Change	Magnitude of Change	Direct / indirect	Duration	Permanence	Nature of Effect	Significance of Effect
Operation							
Viewpoints							
2. Keiss Pier (Figure 8.4-14)	Medium–high	Low	Direct	Long term	Temporary	Adverse	Not significant
4. Wick Bay (Figure 8.4-16)	Medium–high	Medium–low	Direct	Long term	Temporary	Adverse	Not significant
5. Sarclet (Sarclet Haven Info Board) (Figure 8.4-17)	Medium	Medium–low	Direct	Long term	Temporary	Adverse	Not significant
7. Lybster (end of Main Street) (Figure 8.4-19)	Medium–high	Medium–low	Direct	Long term	Temporary	Adverse	Not significant
8. Latheron (A9) (Figure 8.4-20)	Medium–high	Medium–low	Direct	Long term	Temporary	Adverse	Not significant
9. Dunbeath (nr Heritage Centre) (Figure 8.4-21)	Medium–high	Medium–low	Direct	Long term	Temporary	Adverse	Not significant
12. Navidale (Figure 8.4-24)	Medium–high	Low	Direct	Long term	Temporary	Adverse	Not significant
13. Catchory (Figure 8.4-25)	Medium	None	Direct	Long term	Temporary	Adverse	Not significant
15. Whaligoe Steps (Figure 8.4-27)	Medium–high	Medium–low	Direct	Long term	Temporary	Adverse	Not significant
17. Buckie, Cliff Terrace (Figure 8.4-29)	Medium–low	Negligible	Direct	Long term	Temporary	Adverse	Not significant

Receptor	Sensitivity to Change	Magnitude of Change	Direct / indirect	Duration	Permanence	Nature of Effect	Significance of Effect
18. Portnockie – Bow Fiddle Rock Info Point (Figure 8.4-30)	Medium–high	Negligible	Direct	Long term	Temporary	Adverse	Not significant
Route Corridors							
A882	Low	Negligible	Direct	Long term	Temporary	Adverse	Not significant
A9 (Brora to Latheron)	Medium to medium–high	Brora to Helmsdale: Low Helmsdale to Ousdale: Low Ousdale to Berriedale: Negligible Berriedale to Latheron: Medium–low	Direct	Long term	Temporary	Adverse	Not significant
A9 (Latheron to Thurso)	Medium–low	Negligible	Direct	Long term	Temporary	Adverse	Not significant
A99 (Latheron to Wick)	Medium	Thrumster to Wick: Negligible Past Lybster: Negligible Latheron to Thrumster: Medium–low	Direct	Long term	Temporary	Adverse	Not significant
A99 (Wick to John O' Groats)	Medium	Low	Direct	Long term	Temporary	Adverse	Not significant

Table 11.4–3 Assessment of Seascape Effects Resulting from OSPs – Construction and Decommissioning

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
Construction and decommissioning							
Landscape Types							
6. Coastal Island	Medium–high	Negligible	Indirect	Short term	Temporary	Adverse	Not significant
8. Coastal Shelf	Medium–high	Low	Indirect	Short term	Temporary	Adverse	Not significant

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
11. Harbour	Medium	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
12. High Cliffs and Sheltered Bays	High	Duncansby Head: Negligible Berriedale to Helmsdale: Low	Indirect	Short term	Temporary	Adverse	Not significant
16. Long Beaches Dunes and Links	Medium–high	Low	Indirect	Short term	Temporary	Adverse	Not significant
18. Mixed Agriculture and Settlement	Medium	Negligible	Indirect	Short term	Temporary	Adverse	Not significant
19. Moorland Slopes and Hills	Medium–low	Low	Indirect	Short term	Temporary	Adverse	Not significant
20. Open Intensive Farmland	Medium–low	Low	Indirect	Short term	Temporary	Adverse	Not significant
23. Small Farms and Crofts	Medium	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
Coastal Character Areas							
7. Duncansby Head	High	Negligible	Indirect	Short term	Temporary	Adverse	Not significant
8. Freswick Bay and Nybster Coast	Medium	Low	Indirect	Short term	Temporary	Adverse	Not significant
9. Sinclair's Bay	Medium–high	Low	Indirect	Short term	Temporary	Adverse	Not significant
10. Noss Head	Medium–low	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
11. Wick Bay	Medium	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
12. Sarclet Head	Medium	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
13. Lybster Bay	Medium	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
14. Dunbeath Bay	Medium	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
15. Helmsdale to Berriedale Coastal Shelf	Medium–high	Low	Indirect	Short term	Temporary	Adverse	Not significant
16. Brora to Helmsdale Deposition Coast	Medium	Low	Indirect	Short term	Temporary	Adverse	Not significant
Gardens and Designed Landscapes							
Castle of Mey	High	None	Indirect	Short term	Temporary	Adverse	Not significant
Dunbeath Castle	High	Low	Indirect	Short term	Temporary	Adverse	Not significant
Langwell Lodge	High	Low	Indirect	Short term	Temporary	Adverse	Not significant
Cullen House	High	Low–negligible	Indirect	Short term	Temporary	Adverse	Not significant
Gordon Castle	High	Low–negligible	Indirect	Short term	Temporary	Adverse	Not significant
Gordonstoun	High	None	Indirect	Short term	Temporary	Adverse	Not significant
Innes House	High	None	Indirect	Short term	Temporary	Adverse	Not significant
Duff House	High	None	Indirect	Short term	Temporary	Adverse	Not significant
Special Landscape Areas (SLAs)							
Flow Country and Berriedale Coast	High	Medium–low	Indirect	Short term	Temporary	Adverse	Not significant
Duncansby Head	High	Low	Indirect	Short term	Temporary	Adverse	Not significant
Dunnet Head **Loch Fleet, Loch Brora and Glen Loth**	High	None	Indirect	Short term	Temporary	Adverse	Not significant

Table 11.4–4 Assessment of Seascape Effects Resulting from OSPs – Operation

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
Operation							
Landscape Types							
6. Coastal Island	Medium–high	Negligible	Indirect	Long term	Temporary	Adverse	Not significant
8. Coastal Shelf	Medium–high	Low	Indirect	Long term	Temporary	Adverse	Not significant
11. Harbour	Medium	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
12. High Cliffs and Sheltered Bays	High	Duncansby Head: Negligible Berriedale to Helmsdale: Low	Indirect	Long term	Temporary	Adverse	Not significant
16. Long Beaches Dunes and Links	Medium–high	Low	Indirect	Long term	Temporary	Adverse	Not significant
18. Mixed Agriculture and Settlement	Medium	Negligible	Indirect	Long term	Temporary	Adverse	Not significant
19. Moorland Slopes and Hills	Medium–low	Low	Indirect	Long term	Temporary	Adverse	Not significant
20. Open Intensive Farmland	Medium–low	Low	Indirect	Long term	Temporary	Adverse	Not significant
23. Small Farms and Crofts	Medium	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
Coastal Character Areas							
7. Duncansby Head	High	Negligible	Indirect	Long term	Temporary	Adverse	Not significant
8. Freswick Bay and Nybster Coast	Medium	Low	Indirect	Long term	Temporary	Adverse	Not significant
9. Sinclair's Bay	Medium–high	Low	Indirect	Long term	Temporary	Adverse	Not significant

Receptor	Sensitivity to Change	Magnitude of Change	Direct / Indirect	Duration	Permanence	Nature of Effect	Significance of Effect
10. Noss Head	Medium–low	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
11. Wick Bay	Medium	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
12. Sarclet Head	Medium	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
13. Lybster Bay	Medium	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
14. Dunbeath Bay	Medium	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
15. Helmsdale to Berriedale Coastal Shelf	Medium–high	Low	Indirect	Long term	Temporary	Adverse	Not significant
16. Brora to Helmsdale Deposition Coast	Medium	Low	Indirect	Long term	Temporary	Adverse	Not significant
Gardens and Designed Landscapes							
Castle of Mey	High	None	Indirect	Long term	Temporary	Adverse	Not significant
Dunbeath Castle	High	Low	Indirect	Long term	Temporary	Adverse	Not significant
Langwell Lodge	High	Low	Indirect	Long term	Temporary	Adverse	Not significant
Cullen House	High	Low–negligible	Indirect	Long term	Temporary	Adverse	Not significant
Gordon Castle	High	Low–negligible	Indirect	Long term	Temporary	Adverse	Not significant
Gordonstoun	High	None	Indirect	Long term	Temporary	Adverse	Not significant
Innes House	High	None	Indirect	Long term	Temporary	Adverse	Not significant
Duff House	High	None	Indirect	Long term	Temporary	Adverse	Not significant

Special Landscape Areas (SLAs)							
Flow Country and Berriedale Coast	High	Medium–low	Indirect	Long term	Temporary	Adverse	Not significant
Duncansby Head	High	Low	Indirect	Long term	Temporary	Adverse	Not significant
Dunnet Head **Loch Fleet, Loch Brora and Glen Loth**	High	None	Indirect	Long term	Temporary	Adverse	Not significant

Offshore Export Cable Works

11.4.6.3 Marine Scotland's Offshore Transmission Works Scoping Response (Technical Appendix 1.3 B) confirmed (page 34) that 'landscape and visual interests can be scoped out of the EIA for the offshore cable works' – as indicated in Section 5-3-8 (page 135) of the Offshore Transmission Infrastructure Scoping Report (MORL, 2011). A brief summary assessment of the seascape, landscape and visual effects of the offshore cable works is provided in the interests of completeness, as follows.

Offshore Export Cable Route

Construction and Decommissioning

11.4.6.4 The seascape, landscape and visual effect of the offshore export cable installation will be caused by cable laying vessels operating during the construction and decommissioning phases. Cable laying vessels for the offshore export cable will be visible between Fraserburgh Bay and the converter OSPs near the three proposed wind farm sites. The majority of the offshore export cable route is located at considerable distance offshore from the Aberdeenshire and Morayshire coast. Cable laying vessels will be visible within the offshore export route corridor for a maximum of 64 cable laying vessel working days over a two year period. Large sea–faring vessels are a common feature on the skyline in the baseline seascape and visual environment of the Moray Firth. Movements of cable laying vessels in Fraserburgh Bay during installation of the offshore export route cable landfall will be more visible to receptors onshore, but will be viewed for a short duration. The magnitude of change resulting from the construction and decommissioning of the offshore export cable on all seascape, landscape and visual receptors is assessed as low to negligible. The effect resulting from the construction and decommissioning of the offshore export route on all seascape, landscape and visual receptors is assessed as short–term (over a two year period), temporary, adverse and not significant.

Operation

11.4.6.5 The offshore export cable between Fraserburgh Bay and the converter OSPs will be installed in trenches in the sea bed and will not be a visible element of the transmission infrastructure during the operational period. The operational effects of the offshore export cable will be limited to occasional maintenance visits from appropriate sea–faring maintenance vessels, which will be similar to large sea–

faring vessels in the baseline seascape and visual environment. The magnitude of change resulting from offshore export cable on all seascape, landscape and visual receptors is assessed as negligible during the operational period. The effect resulting from the operation of offshore export cable on all seascape, landscape and visual receptors is assessed as long term (during the operational life of the three proposed wind farm sites), temporary, neutral and **not significant**.

11.4.7 Impact Assessment: OnTI

Onshore Export Route

Construction and Decommissioning

11.4.7.1 A description of the installation methods likely to be used for the construction of the cable trench is provided in Chapter 2.2 (Project Description). The construction of the onshore export cable will have direct physical effects on landscape features in the 5 m wide trench route between the landfall point at Fraserburgh Beach and the onshore converter station (substation(s)) in Peterhead. The cable route chosen will take account of landscape features, such as woodlands and hedgerows. The physical effects resulting from the construction of the onshore export cable are assessed as short–term, temporary and adverse.

11.4.7.2 The export cable landfall is located within the National Seascape Character Type 3: Mainland Deposition Coastline with Open Views (as shown in Figure 5.4-11, Volume 7) and at the regional level falls within the Fraserburgh Bay Coastal Character Area. Scottish Natural Heritage Review No 37 (Banff and Buchan) identifies the landfall point as being located in The Coast landscape character area, within the Dunes and Beaches from Fraserburgh to Peterhead landscape unit (Figure 5.4-9, Volume 7). The principal views of the export cable landfall will be from the local area in Fraserburgh Bay, particularly Fraserburgh Beach, Beach esplanade (e.g. Figure 11.4-1, Volume 7) Harbour Road, B9033, Fraserburgh Golf Club and the Formartine and Buchan Way. The installation of the export cable landfall will have a localised, direct effect on the character of these seascape / landscape types and local views during the construction stage, either through the creation of an open trench across Fraserburgh Beach for a temporary period (a matter of weeks) during construction, or through the presence of directional drilling rigs positioned to the onshore side of the sand dunes for directionally drilling underneath Fraserburgh Beach. The effect of the construction of the cable landfall on landscape / seascape character and visual amenity is assessed as short–term, temporary and adverse

11.4.7.3 The remainder of the onshore export cable route is located in The Coastal Farmland landscape character area, within the Eastern Coastal Agricultural Plain landscape unit (Figure 5.4-9, Volume 7). The principal views of the onshore export cable route will be from route corridors such as the Formartine and Buchan Way, A90, A950 and A952; and scattered rural settlements and properties within or near the export cable route corridor, such as Rathen, Lonmay, Hythie and Longside. The construction of the onshore export route will have a localised, direct effect on the character of the Eastern Coastal Agricultural Plan landscape unit and on localised views during the construction stage through the creation of a 5 m wide trench route, the presence of construction machinery and laydown areas between the landfall point at Fraserburgh Beach and the onshore substation(s) in Peterhead. The effect of the construction of the onshore export cable on landscape character and visual amenity is assessed as short–term, temporary and adverse.

Operation

11.4.7.4 The onshore export cable between cable landfall point at Fraserburgh Beach and the onshore converter station (substation(s)) in Peterhead will be installed underground and the land will then be restored. Therefore, the onshore export cable route will not be a visible element of the OnTI during the operational period. The magnitude of change resulting from onshore export cable on all seascape, landscape and visual receptors is assessed as negligible during the operational period. The effect resulting from the operation of onshore export cable on all seascape, landscape and visual receptors is assessed as long–term (during the operational life of the three proposed wind farm sites), permanent, neutral and not significant.

Onshore Converter Stations (Substation(s))

Construction and Decommissioning

11.4.7.5 The effect of the onshore substation(s) during construction and decommissioning on landscape character and visual amenity is assessed as short–term, temporary and adverse.

Operation

11.4.7.6 A search area for the onshore substation(s) (shown in Figure 11.4-2, Volume 7) has been identified near Peterhead Power Station and the existing AC collection substation. Within this area the optimal substation(s) location, to cover an area of approximately 200 x 170 m, will be selected prior to the submission of, and included within, the onshore planning application.

11.4.7.7 As part of the embedded and additional mitigation proposals, as outlined in the scoping report, MORL are aware of on–going master–planning work in relation to the Energetica Corridor (the Eastern Aberdeen City and Shire coastal seaboard) and in particular the Peterhead Southern Gateway. MORL are paying due cognisance to this work as part of consultation with Aberdeenshire Council and recognise the opportunity for the onshore substation(s) to deliver part of the Peterhead Southern Gateway Masterplan (Aberdeenshire Council, 2011). The onshore substation proposal will include a landscape masterplan with appropriate landscape design proposals for the substation site, to build upon the strategic framework of the Peterhead Southern Gateway Masterplan.

11.4.7.8 The onshore substation(s) preference area is located partly within the Coastal Farmland landscape character area, in the Eastern Coastal Agricultural Plain landscape unit and partly within the coast landscape character area, in the dunes and beaches from Fraserburgh to Peterhead landscape unit (Figure 5.4-9, Volume 7). At a local level, the onshore substation(s) preference area is located in the Coastal Farmland with Electrical Infrastructure character unit and the Peterhead Power Station character unit (Figure 5.4-14, Volume 7). Electrical infrastructure, including the existing SSE electrical substation, three overhead power lines, and the large scale and massing of Peterhead Power Station are the prevailing influence in this southern gateway to Peterhead.

11.4.7.9 The principal views of the onshore substation(s) preference area are from the A90 route corridor, Boddam and the Invernettie area on the southern edge of Peterhead, together with views from the minor road network in the agricultural areas to the west. An initial Zone of Theoretical Visibility (ZTV) has been produced

to illustrate the visibility of the preference area for the onshore substation(s) (shown in Figure 11.4-2, Volume 7). Existing views of the onshore substation(s) preference area are illustrated in six viewpoints shown in Figures 11.4-3 to 11.4-8, Volume 7. The operation of the onshore substation(s) will have a localised, direct effect on the character of the landscape of the Southern Peterhead Gateway area and on local views for motorists approaching Peterhead and local residents in Boddam, Invernettie and scattered rural properties to the west. The effect of the onshore substation(s) on landscape character and visual amenity is assessed as long–term and permanent.

11.4.8 References

Marine Scotland, December 2011, Offshore Transmission Works Scoping Response

Moray Offshore Renewables Ltd, 2011, Environmental Impact Assessment Scoping Report (Offshore Transmission Infrastructure)

Peterhead Southern Gateway Environmental Improvement Masterplan (Aberdeenshire Council, April 2011).

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11.5 Archaeology & Visual Receptors

11.5.1 Summary of Effects and Mitigation

11.5.1.1 This chapter describes the likely significant effects of the transmission infrastructure (TI) upon cultural heritage assets and proposes a strategy to mitigate any such effects. The transmission infrastructure may have direct, indirect and secondary effects upon the physical fabric of offshore and onshore assets, and the offshore substation platforms (OSPs) and onshore substation(s) may affect the setting of onshore assets. The baseline description is provided in Chapter 5.5 (Archaeology and Visual Receptors) and Technical Appendix 5.5 A.

Summary of Effects

11.5.1.2 The effects on archaeology that were assessed for the TI include:

- Potential direct and indirect effects on archaeological sites and features (for example: damage to or burial of marine sites and features as a result of the proposed marine works and removal or disturbance to onshore unrecorded archaeological assets); and
- Setting impacts, where the visibility of OSPs and onshore substation(s) either causes loss of cultural significance or affects the degree to which significance may be appreciated.

Proposed Mitigation Measures and Residual Effects

11.5.1.3 Offshore cultural heritage assets that would be affected through construction, operation and decommissioning of the offshore transmission infrastructure (OfTI) will be furnished with a temporary exclusion zone; where the purpose is to preserve, in situ, any features or deposits of known or potential cultural heritage interest. This will reduce the post–mitigation effect to **negligible**. In order to mitigate against the discovery of previously unrecorded cultural heritage assets, a protocol for unexpected archaeological discoveries will be put in place.

11.5.1.4 Without any mitigation measures the construction of the onshore transmission infrastructure (OnTI) is likely to disturb or remove both recorded and previously unrecorded assets, as the onshore export cable route corridor runs through areas that have seen occupation throughout history and in which it is evident that the recorded distribution of assets, particularly prehistoric and Early Historic is incomplete. Depending on the sensitivity of the asset affected, this will result in an adverse impact of minor to major significance in the absence of mitigation. By way of mitigation, it is proposed that a programme of archaeological works be implemented that would allow for the preservation by record of affected assets. This would completely mitigate the potential construction effects, resulting in the residual construction effects being not **significant**.

11.5.1.5 No setting impacts relating to the operation of the substations have been identified and it is considered that there is no potential for decommissioning effects.

11.5.1.6 A summary of the residual effects is provided in Table 11.5–1 below.

Table 11.5–1 Impact Assessment Summary

Receptor	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
Construction			
Recorded Sites such as Known Wrecks	Major	Exclusion Zones	Negligible
Sites of Medium or High Potential Identified in the Geophysical Survey Data	Major / Moderate	Exclusion Zones	Negligible
Unrecorded Offshore Cultural Heritage Assets	Unknown	Implementation of WSI and PAD	Negligible
Sub–Surface Onshore Archaeological Assets	Minor / Major	Preservation by record	Negligible
Sites Affected Through Changes in Sedimentary Regime	Negligible	None	Negligible
Operation			
Designated Onshore Receptors	Negligible	None	Negligible
Site affected Through Changes in Sedimentary Regime	Negligible	None	Negligible
Decommissioning			
Effects arising from the decommissioning of the offshore transmission infrastructure (OfTI) are considered to be analogous to those arising in the construction phase. No predicted decommissioning effects are predicted from the decommissioning of the OnTI.			

11.5.2 Introduction

11.5.2.1 This chapter describes the likely significant effects of the transmission infrastructure (TI) upon cultural heritage assets and proposes a strategy to mitigate any such effects. The proposed development may have both direct and indirect effects upon the physical fabric of offshore and onshore assets, and the AC OSPs, AC / DC converter stations and onshore substation(s) may affect the setting of onshore assets. The offshore and onshore elements have been considered separately within this assessment to make it easier for the reader to follow the structure of the chapter and to find the relevant information.

11.5.2.2 This chapter contains relevant information on the OnTI to allow Scottish Ministers and Marine Scotland to make decisions on the applications for Section 36 consents and Marine Licences for the three proposed wind farm sites and the OfTI. Discussions are ongoing with landowners to determine the exact location and layout of the substation(s) on their land within the preferred onshore substation area. This will be finalised following production of a masterplan by the owner / operator of the Peterhead Power Station compound which forms part of the preferred area. Once the precise location and layout for the onshore substation(s) and export cable location has been confirmed, an application for

planning permission for the OnTI will be submitted to Aberdeenshire Council and will be supported by this ES and such further information as is required to support the planning application.

11.5.2.3 The assessment found that there will be potential direct effects on Sites HA 1004, 1005, 1009 and 1014 (identified wreck sites), HA1098 and 1101 (unidentified seabed obstructions), Sites HA52, 55, 65, 66, HA87, 116, 129, 137, 141, 168, 179, 302, 352, 357, 362 (sidescan sonar targets of high archaeological potential), and Sites HA5, 9, 21, 26, 28, 29, 53, 60, 63, 69, 72, 84, 85, 92, 95, 114, 122, 125, 136, 142, 150, 158, 160, 164, 169, 173, 174, 180, 181, 182, 185, 188, 200, 202, 211, 212, 296, 317, 366, 386 (sidescan sonar targets of medium archaeological potential). In addition to these Sites, HA1099 and 1100 (unidentified seabed obstructions) may be subject to secondary effects. The assessment also identified moderate potential for the discovery of previously unrecorded offshore cultural heritage assets. In the absence of mitigation the magnitude of these effects could be major to moderate.

11.5.2.4 Cultural heritage assets considered in this assessment are listed in a Gazetteer and Concordance. In the interests of clarity, cultural heritage assets are referred to by Headland Archaeology (HA) numbers issued in the course of the assessment (see Technical Appendix 5.5 A).

11.5.2.5 The scope of the assessment has considered the proposed offshore and onshore export cable, offshore OSPs, and onshore converter station for potential effects upon the following:

- Designated cultural heritage assets, comprising designated wrecks, scheduled monuments, listed buildings, conservation areas, inventory gardens, designed landscapes and inventory battlefields;
- Undesignated offshore cultural heritage assets, including maritime losses such as wrecks, aircraft and their associated debris and submerged prehistoric and palaeoenvironmentally significant deposits; and
- Undesignated onshore cultural heritage assets, defined as artefacts, structures and deposits of archaeological and historical interest and palaeoenvironmentally significant deposits.

11.5.3 Rochdale Envelope Parameters Considered in the Offshore Assessment

11.5.3.1 The worst case scenario for cultural heritage has been considered in relation to the size and foundation options for OSPs and for inter–platform and export cable installation parameters and methods.

11.5.3.2 The worst case scenario for the OfTI as a whole follows the parameters highlighted above, the individual elements of which are presented in Table 11-5.2 below.

Table 11.5–2 Rochdale Envelope Parameters for the OfTI

Potential Effect	Rochdale Envelope Scenario Assessed
Construction & Decommissioning	
Offshore / Landfall Cable Installation	• Length of cable "bundles" = 103 km; • Width of trench affected area = 6 m (up to two trenches); • No. of export cable "bundles" = two (in up to two trenches); • Length of inter–platform cabling = 90 km; • Trenching using a plough (route); • Trenching using backhoe dredger (landfall); and • Two jointing pits of several to a few tens of metres in length and breadth.
Net Effect of OSP Foundations on the Seabed	Maximum effect on the seabed based on: • Placement of gravity base foundations of 65 m diameter and excavated diameter of 160 m is based on 4 GBS structures per platform (total dredger affected area of 190 m diameter will be noted however); • Total area of seabed affected per structure (16,900 m^2) when total dredger affected area taken into consideration (36,100 m^2); • Maximum no. AC OSPs = six; and • No. AC / DC converter OSPs = two.
Temporary Seabed Disturbances	Maximum OSP footprint and seabed take based on: • Area affected by anchors = 10,740 m^2 (assumes six x 12 Te anchors each 4.5 m wide x 3.64 m long, penetrating to a depth of one metre deployed in a radial pattern around barge and re–positioned every 500 m and each affecting a nominal area of seabed of 5 m^2); and • Feet of jack–up barges on seabed for six AC OSPs and two AC / DC converter stations.
Re–Distribution of Fine Sediments	• Fine sediment arising from installation of two export cable "bundles" and inter–platform cables (total length 296 km) via ploughing or jetting and transported / dispersed via tidal currents and wave events.
Operation	
Visual Effect on the Setting of Cultural Heritage Assets	• Installation of eight OSPs (Six AC substations and two AC / DC converter stations) with a maximum height of 70 m.

11.5.4 Rochdale Envelope Parameters Considered in the Onshore Assessment

11.5.4.1 The worst case scenario for onshore cultural heritage has been considered in relation to the construction footprint, construction method and size of the substation. The individual elements of which are presented in Table 11.5-3 below.

Table 11.5–3 Rochdale Envelope Parameters for the OnTI

Potential Effect	Rochdale Scenario Assessed
Construction & Decommissioning	
Size of Construction Footprint	• Length of cable route = 30 km. Maximum width of cable construction footprint: • 20 m wide stripped easement (i.e. cable trench working width); • 6 m wide trench based on two separate 3 m trenches where bundles are trenched separately (assumed from beach landing point to jointing pit); or 5 m trench for remainder of onshore cable assuming a single trench with two bundles; and • Two jointing pits of several to a few tens of metres in length and breadth. Maximum dimensions of substation(s) • Area 34,000 m²; and • Height 25 m.
Construction Method	• Topsoil stripped by mechanical excavator; and • Cable installed by plough.

11.5.4.2 The exact location of the onshore export cable within the onshore export cable route and location of the substation is yet to be decided. The assessment is based on the assumption that the final route will avoid direct effects on designated assets completely and previously recorded undesignated assets as far as reasonably practicable, as will the substation.

11.5.5 EIA Methodology

11.5.5.1 The methodology and criteria used to assess the significance of the effects on benthic ecology are presented in Chapter 8.5 (Archaeology and Visual Receptors).

11.5.6 Offshore Impact Assessment

Baseline Review – Inner Study Area

11.5.6.1 The baseline assessment (see Chapter 5.5: Archaeology and Visual Receptors) established that there are no designated wrecks or other cultural heritage assets with legal designations within the OfTI (the Inner Study Area). Eleven recorded wreck sites from the SeaZone dataset were identified in the Inner Study Area. Of these recorded wrecks, four (HA104, 1005, 1009 and 114) are considered to be 'LIVE' and seven considered to be 'DEAD' wrecks (Figure 5.5-2, Volume 6 b). These four 'LIVE' wrecks will be taken forward for assessment.

11.5.6.2 Two obstructions from the SeaZone dataset have also been identified in the Inner Study Area of the offshore export cable route (HA 1098 and 1101) (Figure 5.5-2, Volume 6 b). These sites will be taken forward for assessment.

11.5.6.3 A large number of wrecks from the National Monuments Record of Scotland (NMRS) records were identified in the study area but the location of the majority of these records is described as arbitrary or tentative and an extensive geophysical survey failed to locate any wreck remains in their recorded locations.

A number of NMRS records corresponded with the SeaZone wrecks (HA 1005, 1009, 1014, 1101). These sites will be taken forward for assessment.

11.5.6.4 The assessment of marine geophysical data identified 15 anomalies of high archaeological potential which have been positively identified as wrecks; (HA52, 55, 65, 66, 87, 116, 129, 137, 141, 168, 179, 302, 352, 357 and 362), six of which were previously unrecorded in either SeaZone or NMRS data (HA87, 116, 129, 168, 179 and 302, see Figure 5.5-2, Volume 6 b). Forty anomalies of medium archaeological potential were also identified(HA5, 9, 21, 26, 28, 29, 53, 60, 63, 69, 72, 84, 85, 92, 95, 114, 122, 125, 136, 142, 150, 158, 160, 164, 169, 173, 174, 180, 181, 182, 185, 188, 200, 202, 211, 212, 296, 317, 366 and 386). All of these receptors are located within the proposed export cable route Inner Study Area (Figure 5.5-2, Volume 6 b). These sites will be taken forward for assessment.

Baseline Review – Outer Study Area

11.5.6.5 The baseline assessment (see Chapter 5.5: Archaeology and Visual Receptors) established that there are no designated wrecks or other cultural heritage assets with legal designations within a 1 km buffer zone from the OfTI (Outer Study Area). Three recorded wreck sites from the SeaZone dataset were identified in the Outer Study Area. One of these is a 'Dead' wreck and the remaining two have been 'Lifted'. Therefore these sites will not be taken forward for assessment.

11.5.6.6 Two obstructions from the SeaZone dataset have also been identified in the Outer Study Area of the offshore export cable route (HA 1099 and 1100) (Figure 5.5-2, Volume 6 b). These sites will be taken forward for assessment.

Offshore Construction

Direct Effects

11.5.6.7 Likely significant direct effects on cultural heritage assets considered here include those highlighted in Table 11.5–1 above and the effects noted in the Rochdale Envelope (Table 11.5-2 above). The Rochdale Envelope effects considered include Offshore / Landfall Cable installation; net effect of OSP foundations on the seabed; and temporary seabed disturbances.

11.5.6.8 Sites HA 1004, 1005, 1009 and 1014 ('LIVE' wrecks) are classified as sites of high sensitivity within this assessment. The magnitude of effect in the absence of mitigation could be high if sites are directly damaged or lost. The significance of effect is therefore regarded as **major**. The associated high potential targets (HA52, 55, 65, 66, 137, 141, 352, 357 and 362) are considered in conjunction with these recorded wrecks.

11.5.6.9 Sites HA87, 116, 129, 168, 179 and 302 (sidescan sonar targets of high potential) are classified as sites of high sensitivity within this assessment. The magnitude of effect in the absence of mitigation could be high if sites are directly damaged or lost. The significance of effect is therefore regarded as **major**.

11.5.6.10 Sites HA1098, 1100, 1101 and 1101 (unknown obstructions) are classified as sites of medium sensitivity within this assessment. The potential magnitude of the effects in the absence of mitigation could be high if sites are directly damaged or lost. The significance of the effect is therefore regarded as **major**.

11.5.6.11 Sites HA5, 9, 21, 26, 28, 29, 53, 60, 63, 69, 72, 84, 85, 92, 95, 114, 122, 125, 136, 142, 150, 158, 160, 164, 169, 173, 174, 180, 181, 182, 185, 188, 200, 202, 211, 212, 296, 317, 366 and 386 (sidescan sonar targets of medium potential) are classified as sites of medium sensitivity within this assessment. The potential magnitude of the effects in the absence of mitigation could be high if sites are directly damaged or lost. The significance of the effect is therefore regarded as **major**.

Indirect Effects

11.5.6.12 Indirect physical effects on cultural heritage assets considered here include those highlighted in Table 11.5–1 above and the effects noted in the Rochdale Envelope (Table 11.5-2 above). The Rochdale Envelope effects considered include re–distribution of fine sediments.

11.5.6.13 The possibility of alterations to sediment regimes and scour leading to long–term effects on patterns of sediment transport within the export cable route are assessed and reported in Chapter 9.2 (Sedimentary and Coastal Processes). The effects of the export cable burial is of a magnitude potentially in excess of the natural range of variability. However, the effect will be localised and temporary. The effect is therefore considered to be of **minor significance**.

11.5.6.14 The predicted effect of scour potentially resulting from the exposure of export cables onto the seabed or surface cable protection measures (such as mattressing or rock dumping) are considered to be of a low magnitude relative to the range of naturally occurring variability. Effects on morphology or sediment surface texture will be localised to the cable route. This effect is therefore **not significant**.

11.5.6.15 Effects have all been described as of lesser magnitude and are considered to be of minor significance or not significant. It is therefore considered that there will be no significant effect on cultural heritage assets due to changes to sedimentary regimes or scour as a result of the presence of the export cable or OSPs.

11.5.6.16 The assessment of the potential indirect setting effects of the OSPs on cultural heritage assets is considered to be **not significant,** given the height of the platform above the surface of the sea and, hence, visibility and the potential distances of the facilities from the coast.

Secondary Effects

11.5.6.17 Potential Secondary effects on cultural heritage assets considered here include those highlighted in Table 11.5–1 above and the effects noted in the Rochdale Envelope (Table 11.5-2 above). The Rochdale Envelope effects considered include temporary seabed disturbances.

11.5.6.18 Sites HA 1004, 1005, 1009 and 1014 are classified as sites of high sensitivity within this assessment. The magnitude of effect in the absence of mitigation could be medium if sites are buried or disturbed. The significance of effect is therefore regarded as **major**. The associated high potential targets (HA52, 55, 65, 66, 87, 116, 137, 141 and 168) are considered in conjunction with these recorded wrecks.

11.5.6.19 Sites HA 87, 116, 129, 168, 179 and 302 (sidescan sonar targets of high potential) are classified as sites of high sensitivity within this assessment. The magnitude of effect in the absence of mitigation could be medium if sites are buried or disturbed. The significance of effect is therefore regarded as **major**.

11.5.6.20 Sites HA 5, 9, 21, 26, 28, 29, 53, 60, 63, 69, 72, 84, 85, 92, 95, 114, 122, 125, 136, 142, 150, 158, 160, 164, 169, 173, 174, 180, 181, 182, 185, 188, 200, 202, 211, 212, 296, 317, 366 and 386 (sidescan sonar targets of medium potential) are classified as sites of medium sensitivity within this assessment. The potential magnitude of the effects in the absence of mitigation could be medium if sites are buried or disturbed. The significance of the effect is therefore regarded as moderate.

11.5.6.21 Sites HA 1098, 1099, 1100 and 1101 (unknown obstructions) are classified as sites of medium sensitivity within this assessment. The potential magnitude of the effects in the absence of mitigation could be medium if sites are buried or disturbed. The significance of the effect is therefore regarded as **moderate**.

Offshore Operation

11.5.6.22 Secondary effects on cultural heritage assets considered here include those highlighted in Table 11.5–1 above and the effects noted in the Rochdale Envelope (Table 11.5-2 above). The Rochdale Envelope effects considered include temporary seabed disturbances.

11.5.6.23 The offshore operation phase may result in secondary effects on the sites of cultural heritage interest identified in the secondary construction effects noted above. Potential effects may include the anchoring of maintenance vessels and associated activities. The identified sites are of high to medium sensitivity and in the absence of mitigation the magnitude is considered to be high to medium if sites are buried or disturbed. The significance of the potential effect is therefore regarded as **major to moderate**.

11.5.6.24 The potential for indirect effects of the OfTI on cultural heritage assets through change in hydrodynamics and alterations in sedimentary regimes is considered to be the same during the operational phase as that highlighted above during construction.

Offshore Decommissioning

11.5.6.25 Physical effects arising from the decommissioning of the OSPs and offshore export cable are considered to be analogous to those arising in the construction phase and are not discussed further. The effects of decommissioning on the setting of cultural heritage assets will essentially be reversed and are therefore considered to be negligible and not discussed further.

11.5.7 Onshore Impact Assessment

Baseline Review

11.5.7.1 The baseline assessment (Chapter 5.5: Archaeology and Visual Receptors and Technical Appendix 5.5 A) established that the onshore export cable will run through an area in which a substantial number of cultural heritage assets are present (Figures 5.5-3 and 5.5-4, Volume 6 b). These range from early prehistoric flint scatters to Second World War defences. The assessment also established that

there is high potential for unrecorded assets to be present; many of the subsurface archaeological assets recorded have been identified as a result of cropmarks and the distribution of recorded sites may be heavily influenced by geology and agricultural regime, rather than being a true reflection of the distribution of sub–surface archaeological assets. This is supported by the results of fieldwork undertaken in relation to previous projects in the area.

11.5.7.2 Numerous designated assets are present, but most are listed buildings in the historic core of adjacent settlements and hence are not relevant to the current study.

Onshore Construction

Direct Effects

11.5.7.3 Assuming that known assets are avoided, ground disturbance associated with the construction of the cable route, substation and related works has the potential to remove or disturb previously unrecorded archaeological assets (see Table 11.5-3 above for Rochdale Envelope parameter–size of construction footprint).

11.5.7.4 Assets of prehistoric or Early Historic date are likely to be of local or regional importance and hence of low to medium sensitivity to physical effects. Given the size of the construction footprint and the general small size of such assets, it may be assumed that they will either be removed completely or substantially damaged where they lie within the construction footprint, resulting in an effect of medium or high magnitude. Depending on the sensitivity of the asset affected, this will result in an adverse effect of **minor to major** significance in the absence of mitigation. Assets of later date are likely to be of local or lesser importance and hence of low or negligible sensitivity. A substantial part of any such asset is likely to be removed, resulting in an effect of medium or major magnitude. Should this occur the effect is likely to be of **minor** significance in the absence of mitigation.

Indirect Effects

11.5.7.5 No indirect effects have been identified.

Secondary Effects

11.5.7.6 Assuming that construction best practices are adhered to, e.g. known assets are fenced off during construction, **no secondary effects** are predicted as a result of the onshore construction works.

Onshore Operation

11.5.7.7 Operational effects are restricted to the potential for the substation to have effects upon the setting of assets (see Table 11.5-3 above for Rochdale Envelope parameter–size of construction footprint). Only effects upon designated assets have been considered.

11.5.7.8 The location of the substation has yet to be fixed, but an option area to the west of Boddam is being considered. Designated assets in this area are restricted to the listed buildings in the core of Boddam, which is a conservation area. Modern development lies between these and the option area. This would screen the substation from view from the historic core of Boddam. Consequently, there is **no potential for significant setting effects**.

Onshore Decommissioning

11.5.7.9 It is assumed that decommissioning of the onshore export cable and substation would only involve ground disturbance within areas that had been disturbed previously. There is therefore **no potential for effects** to occur during decommissioning.

11.5.8 Proposed Mitigation

Offshore Construction

11.5.8.1 All sites of cultural heritage interest included in this report will be avoided where possible. At present, the following mitigation is proposed:

- Where cultural heritage assets may potentially be subject to direct or secondary effects, the export cable will be re–routed and temporary exclusion zones will be implemented to prevent invasive activities, such as OSP and cable installation, and vessel anchoring or deployment of jack–up legs. Exclusion zones of at least 100 m will be established around sites identified as being of high sensitivity in this assessment (HA52, 55, 65, 66, HA87, 116, 129, 137, 141, 168, 179, 302, 352, 357, 362 1004, 1005, 1008, 1009 and 1014); while an exclusion zone of a minimum 50 m will be established around those of medium sensitivity (HA5, 9, 21, 26, 28, 29, 53, 60, 63, 69, 72, 84, 85, 92, 95, 114, 122, 125, 136, 142, 150, 158, 160, 164, 169, 173, 174, 180, 181, 182, 185, 188, 200, 202, 211, 212, 296, 317, 366, 386, 1098, 1099, 1100 and 1101); and
- In order to mitigate the risk of damage to any previously unrecorded archaeological remains, a Protocol for Archaeological Discoveries (PAD) will be prepared for the approval of Historic Scotland and Aberdeenshire Council Archaeologist to mitigate construction effects in the event of any unexpected archaeological discoveries during installation.

Offshore Operation

11.5.8.2 Mitigation for the operational phase will include the same measures as those proposed for the construction phase.

Offshore Decommissioning

11.5.8.3 Mitigation for the decommissioning phase will include the same measures as those proposed for the construction phase.

Onshore Construction

11.5.8.4 All recorded cultural heritage assets will be avoided where possible. This may not be possible in the case of all undesignated assets and there is clear potential for previously unrecorded assets to be present within the construction footprint. Effects upon assets affected by construction will be addressed through a programme of archaeological works, comprising:

- Evaluation trenching of previously recorded archaeological assets within the construction footprint in order to establish character, extent and condition. Where deposits of palaeoenvironmental interest are affected, cores will be recovered and examined. Further work will be undertaken as appropriate;
- Archaeological monitoring of topsoil stripping, followed by excavation and recording as appropriate; and
- Reporting, and publication where appropriate, of results.

11.5.8.5 This programme of work will allow the preservation by record of assets affected and there will be no perceptible loss to the historic environment.

Onshore Operation

11.5.8.6 No operation effects have been identified and hence no mitigation is proposed.

Onshore Decommissioning

11.5.8.7 No decommissioning effects have been identified and hence no mitigation is proposed.

11.5.9 Residual Effects

11.5.9.1 Table 11.5–1 at the beginning of this chapter outlines the likely residual effects both pre and post mitigation.

11.5.9.2 The implementation of the programme of works will allow the affected assets to be preserved by record and the results to be disseminated appropriately. As the affected assets have no surface expression and are likely to be undergoing plough truncation, it is considered that this will completely mitigate the potential effects.

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11.6 Socio-Economics, Recreation and Tourism

11.6.1 Summary of Effects and Mitigation

11.6.1.1 This assessment details the evaluation of likely significant effects on Socio-Economics, Recreation and Tourism as a result of the Transmission Infrastructure (TI). The likely significant effects on Socio-Economics, Recreation and Tourism as a result of the three proposed wind farms are considered separately in Chapter 8.6 (Socio-Economics, Recreation and Tourism).

Summary of Effects

11.6.1.2 The socio-economic effect of the TI is limited to the employment and GVA associated with the expenditure on the supply and installation of the AC OSPs, AC / DC converter stations, export cables, and of the onshore substation(s). Because there is considered to be no significant visual effect of the TI in addition to that from the three proposed wind farm sites, any effect on tourism or recreation would come from the closure or diversion of access to tourism assets during construction.

11.6.1.3 For the study area, defined as the Highland, Moray, Aberdeenshire and Aberdeen City Local Authority areas, the total number of jobs supported at its peak is anticipated to be 300 and in Scotland between 495 and 590 during construction. This employment is relatively short term lasting over three years.

11.6.1.4 Despite Base Case and High Case results being shown for employment and GVA, the assessment is undertaken using the Base Case results given the higher degree of certainty than that associated with the High Case.

11.6.1.5 During construction the employment and GVA effects are considered to be major positive, while there is a **minor, negative effect** on recreation, through temporary disruption close to the shore at Fraserburgh and during the installation of the export cables. During operation and decommissioning the effects are considered to be **negligible**.

Proposed Mitigation Measures and Residual Effects

11.6.1.6 As there are no significant negative effects identified in the assessment, there are no mitigation measures and the residual effects are as the assessment conclusions. Table 11.6-1 below summarises the impact assessment.

Table 11.6-1 Impact Assessment Summary

Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Construction			
GVA	Major (+)	None	Major (+)
Employment	Major (+)	None	Major (+)
Leisure Tourism	Negligible	None	Negligible
Business Tourism	Negligible	None	Negligible
Surfing & Sea Kayaking	Minor (-)	None	Minor (-)
Walking	Minor (-)	None	Minor (-)

Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Operations			
GVA	Minor (+)	None	Minor (+)
Employment	Minor (+)	None	Minor (+)
Leisure Tourism	Negligible	None	Negligible
Business Tourism	Negligible	None	Negligible
Surfing & Sea Kayaking	Negligible	None	Negligible
Walking	Negligible	None	Negligible
Decommissioning			
GVA	Minor (+)	None	Minor (+)
Employment	Minor (+)	None	Minor (+)
Leisure Tourism	Negligible	None	Negligible
Business Tourism	Negligible	None	Negligible
Surfing & Sea Kayaking	Minor (-)	None	Minor (-)
Walking	Minor (-)	None	Minor (-)

11.6.2 Introduction

11.6.2.1 This section provides details of the methodology used to estimate the likely significant economic effect that the offshore transmission infrastructure will have on the economies of the study area (Aberdeen, Aberdeenshire, Moray and Highlands) and the rest of Scotland.

11.6.2.2 Given that many important design and procurement decisions have not been made to date, there is a wide range of potential effects. It is not possible or appropriate for this analysis to provide an indication of who the successful contractors might be or where they might be based. The assessment should be considered as indicative of the pattern of expenditure anticipated, but may not reflect the actual procurement decisions when they are made.

11.6.2.3 It represents the "best estimates", at this time, of the ranges of expenditure and employment that could be supported.

11.6.2.4 This chapter is presented in two parts covering:

- The approach to assessing the effect of project expenditure; and
- The approach to assessing the effect on tourism, recreation and other social indicators.

11.6.2.5 The TI elements considered in this assessment are:

- Supply and installation of AC OSPs and AC / DC converter stations;
- Supply and installation of export cables; and

- Supply and construction of an onshore substation(s).

11.6.2.6 We note that this represents a considerable proportion of the Project budget and has a substantial effect on employment and GVA.

11.6.2.7 This chapter contains relevant information on the OnTI to allow Scottish Ministers and Marine Scotland to make decisions on the applications for Section 36 consents and Marine Licences for the three proposed wind farm sites and the OfTI. Discussions are ongoing with landowners to determine the exact location and layout of the substation(s) on their land within the preferred onshore substation area. This will be finalised following production of a masterplan by the owner / operator of the Peterhead Power Station compound which forms part of the preferred area. Once the precise location and layout for the onshore substation(s) and export cable location has been confirmed, an application for planning permission for the OnTI will be submitted to Aberdeenshire Council and will be supported by this ES and such further information as is required to support the planning application.

11.6.2.8 The Socio-Economics, Recreation and Tourism assessment interacts with assessments for the following receptors and where relevant linkages have been made within the assessment:

- Chapters 3.4 and 9.1 (Hydrodynamics: Wave Climate and Tidal Regime);
- Chapters 4.3 and 10.2 (Fish and Shellfish Ecology);
- Chapters 4.4 and 10.3 (Marine Mammals);
- Chapters 5.1 and 11.1 (Commercial Fisheries);
- Chapters 5.2 and 11.2 (Shipping and Navigation); and
- Chapters 5.4 and 8.4 (Seascape, Landscape and Visual Receptors).

11.6.3 Statement of Significance

11.6.3.1 Under the terms of the EIA the number of jobs and level of GVA that would be supported by the anticipated expenditure on the TI, are considered to be significant in both the Study Area and Scotland. The effect on tourism and other recreation, covered in this chapter are assessed as being negligible to minor and therefore not significant under the terms of the EIA.

11.6.4 Rochdale Envelope Parameters Considered in the Assessment

11.6.4.1 Relevant parameters defining the 'Rochdale Envelope' for Socio-Economics, Recreation and Tourism are presented in Table 11-6.2 below. The maximum foreseeable adverse scenario for Socio-Economics relates to the minimum predicted expenditure in transmission infrastructure to export 1.5 GW from the offshore generating station (MORL Zone). Therefore these parameters are based on an indicative layout and outputs from financial models carried out by MORL which are available at the of time witting this assessment

11.6.4.2 For tourism relates to the maximum predicted seascape, landscape and visual effect and for recreation the maximum number of structures / longest export cable option.

Table 11.6-2 Parameters Relevant to the Socio-Economics, Recreation and Tourism Impact Assessment

Potential Effect	Rochdale Envelope Scenario Assessed
Construction, Operation & Decommissioning	
Employment and GVA	Minimum predicted expenditure to deliver 1.5 GW: • Three AC OSPs and two AC / DC converter stations; and • 170 km of inter-platform cables and 226 km of export cables (total indicative length of cable, even if bundled).
Tourism and Recreation	Maximum predicted seascape, landscape and visual effect / maximum number of substructures / longest export cable route option: • Six AC OSPs and two AC / DC converter stations; • Onshore substation(s) covering 170 m x 200 m; • 135 km of export cable route (105 km offshore and 30 km onshore); and • Onshore export cable installation – approximately 300 m / day for open trench technique (slowest installation method when compared with cable plough and directional drilling).

11.6.5 EIA Methodology

11.6.5.1 The methodology adopted is the same as outlined in 8.6.5 of Chapter 8.6 (Socio-Economics, Recreation and Tourism). This includes the description of the scope and limitations of the analysis.

Assessment of Significance Criteria

11.6.5.2 The assessment of significance is undertaken in the same way as for the three proposed wind farms and is described in 8.6.5 of Chapter 8.6 (Socio-Economics, Recreation and Tourism). The assessment combines conclusions on sensitivity and magnitude to produce an overall significance as shown in Table 11.6-3 below.

Table 11.6-3 Matrix of Significance of Effect

	Magnitude			
Sensitivity	Negligible	Low	Medium	High
Low	Negligible	Minor	Minor	Moderate
Medium	Negligible	Minor	Moderate	Major
High	Negligible	Moderate	Major	Major

11.6.6 Impact Assessment

11.6.6.1 Although the majority of the effect occurs during construction, both in relation to expenditure and any potential tourism and recreation effects associated with cable and onshore installation, there will continue to be some ongoing expenditure during the operation phase associated with the maintenance of the TI. While the employment and GVA associated with the expenditure of the offshore OSPs are included here, the visual effects are covered in Chapter 8.6 (Socio-Economics, Recreation and Tourism) in line with Chapter 8.4 (Seascape,

Landscape and Visual Receptors). The offshore OSPs are considered by the Seascape, Landscape and Visual Impact Assessment (SLVIA) to be inseparable from the Offshore Generating Station.

11.6.6.2 Despite Base Case and High Case results being shown for employment and GVA, the assessment is undertaken using Base Case results given the higher degree of uncertainty associated with the High Case.

Construction

Employment Effects during Construction of TI

11.6.6.3 The employment effects relate to the jobs associated with the expenditure on the three elements of the TI described in 11.6.2.5 above. Employment will be supported through the supply and installation of OSPs and converter stations, export cables and onshore substation(s).

11.6.6.4 Table 11.6-4 below summarises the projected employment associated with the TI expenditure. For the study area, under the Base Case, the total number of *job years* is anticipated to be around 600, and 800 under the High Case. For Scotland as a whole this is from 1,000 to 1,500. Under the Base case, while the substation work is expected to come from within Scotland, other installation activities are expected to be sourced from outside the UK, with less in the rest of the UK.

Table 11.6-4 Employment Effects in Job Years for Transmission Infrastructure

	Study Area			Scotland		
	Direct	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
Base Case	400	200	600	600	400	1,000
High Case	500	300	800	900	600	1,500

11.6.6.5 Employment in relation to the supply and installation of the TI lasts only through the Construction period, although it is substantial. Table 11.6-5 below shows the peak employment under each of the scenarios.

11.6.6.6 Including the multiplier (indirect and induced effects), there is estimated to be around 303 jobs supported under the Base Case. With the High Case this increases to 320. In Scotland (including the study area) the Base Case supports around 495 jobs and the High case 590.

Table 11.6-5 Employment Effect Summary during Construction of TI

		Construction Phase (peak employment in 2015)		
		Direct	**Indirect**	**Total**
Study Area	**Base case**	196	107	303
	High case	207	113	320
Scotland (including study area)	**Base case**	300	195	495
	High case	352	237	590

Sensitivity

11.6.6.7 Employment is a core measure of economic activity, reflected in the importance attached to rates of employment and unemployment. Levels of unemployment and the availability of employment opportunities are very important for the economic health of communities, the Study Area and Scotland. Changes in employment are therefore considered to be of high sensitivity.

Magnitude

11.6.6.8 Within the study area the assessment suggests that employment associated with the TI, under the Base Case, is more short term than that supported by the operation of the three proposed wind farms. The employment effects from construction last only until 2018. Even so, there are likely to be a large number of jobs supported.

11.6.6.9 At both the level of the Study Area and in Scotland, these levels of employment in the Base Case are considered to be of high magnitude.

Significance

11.6.6.10 Combining the sensitivity and magnitude assessments, the employment associated with the TI in the Base Case is considered a **major positive** effect and is therefore significant in terms of the EIA.

GVA Effects during Construction of TI

11.6.6.11 Table 11.6-6 below provides a summary of the GVA effects for the Study Area, Scotland and the rest of the UK under the Base and High Cases. For the study area, it is estimated that the TI will generate £43 million in GVA under the Base Case and £47 million under the High Case, including the multiplier effects.

11.6.6.12 In Scotland the TI would generate GVA of between £67 million and £97 million, including the multiplier effects. Most of the work will be carried out by Scottish based firms.

Table 11.6-6 GVA Effects in £ Millions (2011 prices) during Construction of TI

	Study Area			Scotland		
	Direct	**Indirect + Induced**	**Total**	**Direct**	**Indirect + Induced**	**Total**
Base Case	29	14	43	42	25	67
High Case	31	16	47	59	38	97

Sensitivity

11.6.6.13 GVA represents the difference between the value of goods and services produced and the cost of raw materials, from which is paid wages, salaries and profits. It is therefore a core measure of economic wealth. Wages, salaries and income are all important elements in determining quality of life for residents in the study area and in Scotland. Sensitivity to changes in GVA is therefore considered to be high.

Magnitude

11.6.6.14 The magnitude of the GVA generated by the TI in the Base Case, both at the Study Area level and in Scotland, is judged to be high, although for a relatively short time.

Significance

11.6.6.15 Combining the sensitivity and magnitude assessments, the GVA effect associated with the expenditure on the development, construction, operation and decommissioning of the TI in the Base Case is considered to be of **major, positive** significance, and therefore significant in terms of the EIA.

Leisure Tourism during Construction of TI

11.6.6.16 The tourism element of the analysis considers the effect of the TI on the volume and value of tourists visiting the study area and Scotland. The analysis distinguishes between two types of effect:

- **Direct effects** on local tourism 'assets' (e.g. physical changes to public rights of way, paths, scenic areas and so on) which the new development may cause. This could include factors such as closure or diversion of access to tourism assets or the removal of those assets
- **Indirect effects** on local tourism assets. In this case, indirect effects mainly relate to changes in amenity through the permanent or temporary modification of land and seascapes. There could also be effects as a result of any disturbance or injury to terrestrial, coastal or marine wildlife interests (e.g. for wildlife watching) during construction, operation or decommissioning of the TI.

11.6.6.17 There is potential for the export cable laying activity offshore, and onshore, to limit access to the sea and / or areas of land during construction. The extent of this effect will depend on the decision on where the export cable will come onshore and the location of the substation(s).

11.6.6.18 One of the issues that encompass both tourism and recreation is access to Fraserburgh beach, an important surfing location. This is assessed under recreation.

11.6.6.19 The indirect effects, based on the visual effect of the offshore OSPs, are assessed in Chapter 8.6 (Socio-Economics, Recreation and Tourism).

11.6.6.20 A full assessment of the visual effects of the TI on seascape, landscape and visual receptors is provided in Chapter 8.4 (Seascape, Landscape and Visual Receptors). The exact location of the onshore substation(s) has not been defined and therefore it is not possible to assess whether this is likely to impact on tourist visits, although this is unlikely.

11.6.6.21 The marine mammal assessment states that no significant long term effects are predicted on the Moray Firth bottlenose dolphin population from the construction, operation and decommissioning of the TI (Chapter 10.3: Marine Mammals) and therefore no significant effects are predicted on dolphin tourism.

11.6.6.22 For tourists that are staying close to, or visiting assets on the cable route, or very close to the substation(s), sensitivity would be high, but the magnitude of the effect (which takes into account the level of effect, its duration and the number of people that are affected) will be negligible.

11.6.6.23 Overall, the construction work will be mostly offshore, laying the export cables, and tourist sensitivity will be low. The onshore construction will be concentrated in a relatively small area along the cable route and substation(s). However, the proposed route includes approximately 8.4 km (out of 85 km) of the Formartine and Buchan Way and access may be limited for a short period during the cable laying. The baseline report (Chapter 5.6: Socio-Economics, Recreation and Tourism) indicates that these long distance walking routes are mainly used by day visitors rather than tourists and the temporary nature of the work and the relatively small number of tourists likely to use the route means that significance is considered to be **negligible**.

Business Tourism during Construction of TI

11.6.6.24 The TI will generate some new trade for tourism related businesses locally. This would include accommodation, bar and restaurant services. The level of business tourism activity locally will be sensitive to the business that this would create, although the magnitude of the effect is considered to be **negligible**.

11.6.6.25 A summary of the effects on tourism during construction of the TI is shown in Table 11.6-7 below.

Table 11.6-7 Tourism Effect Significance during Construction of TI

	Sensitivity	Magnitude	Significance
Leisure Tourism	Medium	Negligible	Negligible
Business Tourism	Medium	Negligible	Negligible

Recreation during Construction of TI

Surfing & Sea Kayaking

11.6.6.26 Recreational activities covered in the following paragraphs are surfing and sea kayaking. Effects would occur if the TI directly affected access to the sites required for recreation, or changed the nature of these sites.

11.6.6.27 For surfers, the surfing wave quality is critical to the attraction of a location. The landfall point near a surf spot could interfere with the waves and installation of the cables could restrict access.

11.6.6.28 For the Moray Firth, Stormrider Surf Guide (online) considers

"*Fraserburgh is the hub of the local scene, home to the Broch Surf Club and a brace of classy reefs*". In the Marine Scotland report "Economic Assessment of the Short Term Options for Offshore Wind Energy in Scottish territorial Waters: Costs and Benefits to Other Marine Users" (Marine Scotland, 2011)

Surfers Against Sewage, state that

"*Fraserburgh beach, which contains beachbreak waves along the length of the beach and a high-quality pointbreak to the northwest extreme, is one of the most popular surf spots in Scotland and is the home of the Broch Surf Club, one of the longest-established surf clubs in Scotland*".

11.6.6.29 The cable route proposed would come ashore near this beach, although the duration of the impact would be temporary. The magnitude of the effect will

depend on how quickly the work can be completed, the time of year and how much access to the beach is restricted.

11.6.6.30 Sea kayaking, like surfing, also requires access and appropriate sea conditions which could be disrupted temporarily.

11.6.6.31 Sensitivity to the TI construction will depend on the effect that it has on surfing conditions. Given that it is possible that the work could, for a short period limit access to a part of the beach sensitivity is considered to be medium.

11.6.6.32 The magnitude of the effect relates to its scale, its duration and the number of people affected. In this case although the beach is well used, the impacts will be for a short time rather than permanent. For both surfing and sea-kayaking, this temporary nature of the work and the small proportion of the population in the study area that would be affected indicate that the magnitude would be low.

11.6.6.33 There is no evidence of the level of sea kayaking on this part of the coast, but any effect would be for a short time during installation and decommissioning.

11.6.6.34 Combining the sensitivity and magnitude assessments, the recreation effect associated with the TI is considered to be **minor, negative**, but not significant in terms of the EIA.

Walking

11.6.6.35 A direct effect on walking would occur where the TI would limit access or use of paths. The proposed onshore cable route includes approximately 8.4 km of the Formantine and Buchan Way as described in Chapter 5.6 (Socio-Economics, Recreation and Tourism). The installation work would directly prevent users (walkers, cyclists and horseriders) from accessing parts of the route temporarily and require diversions. If the entire length of export cable along the Formantine and Buchan Way is buried using an open trench technique it is estimated that would take around 28 days to lay cables (assuming 300 m / day and not taking into account potential delays from engineering / environmental constraints). For users or potential users of the route, sensitivity to the construction work required would be medium. The magnitude of the effect would be low, requiring temporary diversions for users. Taken together this indicates a **minor** significance.

Recreational Sailing

11.6.6.36 The assessment of likely effects on recreational sailing is provided in Chapter 11.2 (Shipping and Navigation).

Fishing

11.6.6.37 There is not considered to be significant recreational fishing activity occurring along the export cable survey corridor, although it is recognised that there may be minor negative effects upon migratory fish species such as salmon and sea trout. This is assessed in Chapters 10.2 (Fish and Shellfish Ecology) and 11.1 (Commercial Fisheries).

11.6.6.38 A summary of the recreation effects during construction of TI are shown in Table 11.6-8 below.

Table 11.6-8 Recreation Effect Summary during Construction of TI

	Sensitivity	Magnitude	Significance
Surfing, Sea Kayaking	Medium	Low	Minor (-)
Walking	Medium	Low	Minor (-)

Operation

Employment Effects during TI Operation

11.6.6.39 The employment effects relate to the jobs associated with the operations and maintenance of the TI, and the operation of the security of the onshore substation. It is difficult to separate the jobs associated with maintaining the three proposed wind farms and the transmission infrastructure and therefore the estimate for operations and maintenance employment and GVA for the TI is included in Chapter 8.6 (Socio-Economics, Recreation and Tourism). However, it should be noted that although these are not quantified there is considered to be **minor, positive** significance for both employment and GVA under the Base Case.

Tourism Effects during TI Operation

11.6.6.40 The tourism element of the analysis considers the effect of the TI on the volume and value of tourists visiting the study area and Scotland.

11.6.6.41 The main elements of the TI that could have an effect on tourism will be the onshore cabling and substation(s). Plans for the onshore substation(s) are not complete, but their location is not likely to be in an area that attracts significant numbers of tourists and therefore is not considered to have any effect on the number of tourists in the study area. During operation the cables would be buried and therefore have no effect on leisure tourism. The effect is assessed as being of **negligible** significance.

Business Tourism effects during TI Operation

11.6.6.42 During operation any related business tourism associated with the TI would be expected to be very limited. The significance of the effect during operation would be **negligible**.

11.6.6.43 A summary of the tourism effects during operation are shown in Table 11.6-9 below.

Table 11.6-9 Tourism Effect Significance during TI Operation

	Sensitivity	Magnitude	Significance
Leisure Tourism	Low	Negligible	Negligible
Business Tourism	Low	Negligible	Negligible

Recreation during TI Operation

Surfing & Sea Kayaking

11.6.6.44 During operation, the cables would be buried and would have no significant effect on waves (see Chapter 9.1: Hydrodynamics – Wave Climate and Tidal Regime) and surfing activity. The effect is considered to be **negligible.**

Walking

11.6.6.45 A direct effect on walking would occur where the TI would limit access or use of paths. During operation, the cables would be buried and have no effect on access to walking routes. The onshore substation is also unlikely to be located where it directly impacted on recreational walking routes. This indicates a **negligible** significance.

Sailing

11.6.6.46 The assessment of likely effects on recreational sailing is provided in Chapter 11.2 (Shipping and Navigation).

Fishing

11.6.6.47 Once operating, the OSPs and converter stations offshore would not have a significant effect on the levels of recreational fishing. This is assessed in Chapters 10.2 (Fish and Shellfish Ecology) and 11.1 (Commercial Fisheries).

11.6.6.48 A summary of the recreation effects is shown in Table 11.6-10 below.

Table 11.6-10 Recreation Effect Summary during Operation of TI

	Sensitivity	Magnitude	Significance
Surfing, Sea Kayaking	Negligible	Negligible	Negligible
Walking	Negligible	Negligible	Negligible

Decommissioning

Employment Effects during TI Decommissioning

11.6.6.49 The employment effects relate to the jobs associated with the decommissioning of the TI. There are no separate estimates of the employment of this part of the decommissioning work which would take place alongside the decommissioning of the three proposed wind farms. The estimate for the full decommissioning is included in the wind farms impact assessment (Chapter 8.6: Socio-Economics, Recreation and Tourism). However, it should be noted that, although not quantified, a small proportion of those jobs could be attributed to the TI, and therefore this is considered to be of **minor, positive** significance for both employment and GVA under the Base case.

Tourism Effects during TI Decommissioning

11.6.6.50 As was covered in the construction phase, the tourism element of the analysis considers the effect of the TI decommissioning on the level of tourists visiting the Study area and Scotland. As was identified in the construction phase there is the

potential for the removal of the onshore cables and substation(s) to limit access to the areas of land (and sea shore). The extent of this effect will depend on the cable route and the location of the substation.

11.6.6.51 The onshore decommissioning will be concentrated in a relatively small area along the cable route and substation(s). The proposed route is close to the Formantine and Buchan Way and there will be temporary diversions during decommissioning. This would represent a short part of the route. For users and potential users, sensitivity is considered to be medium.

11.6.6.52 The temporary nature of the work and the fact that the long distance walking routes are mainly used by local people and day visitors, rather than tourists, means that the magnitude is considered to be negligible. Combined, significance is considered to be **negligible**.

Business Tourism during TI Decommissioning

11.6.6.53 During decommissioning any related business tourism associated with the TI would be expected to be very limited. The significance of the effect during decommissioning would be **negligible**.

11.6.6.54 A summary of the tourism effects during operation are shown in Table 11.6-11 below.

Table 11.6-11 Tourism Effect Significance during TI Decommissioning

	Sensitivity	Magnitude	Significance
Leisure Tourism	Medium	Negligible	Negligible
Business Tourism	Medium	Negligible	Negligible

Recreation during TI Decommissioning

Surfing & Sea Kayaking

11.6.6.55 The cable route proposed would come ashore near the beach at Fraserburgh and decommissioning, although temporary would impact on access for a short time. The magnitude of the effect will depend on how quickly the work can be completed, the time of year and how much access to the beach is restricted.

11.6.6.56 Sea kayaking, like surfing, also requires access and appropriate sea conditions which could be disrupted temporarily.

11.6.6.57 Sensitivity to the TI construction will depend on the effect that decommissioning has on surfing conditions. Given that it is possible that the work could limit access to a part of the beach, sensitivity is considered to be medium.

11.6.6.58 The magnitude of the effect relates to its scale, its duration and the number of people affected. In this case although the beach is well used, the impacts will be for a short time. For both surfing and sea-kayaking, the temporary nature of the work and the small proportion of the population in the study area that would be affected indicate that the magnitude would be low.

11.6.6.59 Combining the sensitivity and magnitude assessments, the recreation effect associated with the TI is considered to be **minor, negative**, but not significant in terms of the EIA.

Walking

11.6.6.60 A direct effect on walking would occur where the decommissioning of the TI would limit access or use of paths. As described for the construction phase, the proposed cable route includes part of the Formantine and Buchan Way and the decommissioning work could directly prevent users from accessing parts of the route temporarily. For users, or potential users of the walk, sensitivity to this work would be medium (it is part of a much longer route and would impact on a small section at a time). The effect would be temporary and require some diversions for users. The magnitude of the effect would therefore be low. Taken together this indicates a **minor, negative** significance.

Sailing

11.6.6.61 The assessment of likely effects on recreational sailing is provided in Chapter 11.2 (Shipping and Navigation).

Fishing

11.6.6.62 There is not considered to be recreational fishing activity occurring along the export cable survey corridor, so decommissioning should not have any direct effect. This is assessed in Chapters 10.2 (Fish and Shellfish Ecology) and 11.1 (Commercial Fisheries).

11.6.6.63 A summary of the recreation effects during decommissioning of the TI are shown in Table 11.6-12 below.

Table 11.6-12 Recreation Effect Summary during TI Decommissioning

	Sensitivity	Magnitude	Significance
Surfing, sea kayaking	Medium	Low	Minor (-)
Walking	Medium	Low	Minor (-)

11.6.7 Proposed Monitoring and Mitigation

11.6.7.1 Only negative effects of moderate significance or above are deemed significant under the terms of the EIA. From the assessment above there are no negative effects of moderate or greater significance and therefore no mitigation is required.

11.6.8 References

Marine Scotland. (2011). Economic Assessment of the Short Term Options for Offshore Wind Energy in Scottish territorial Waters: Costs and Benefits to Other Marine Users and Interests.

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11.7 Traffic and Transport

11.7.1 Summary of Effects and Mitigation

11.7.1.1 This chapter considers the likely significant effects on the road network and road users, the local settlements through which the road passes and the road structure / fabric due to traffic associated with the onshore transmission infrastructure (OnTI).

11.7.1.2 Information supporting this assessment has been collected from a detailed desktop study and related surveys as explained in Chapter 5.7 (Traffic and Transport).

11.7.1.3 The assessment undertook a review of the available information and assumed traffic numbers for a series of construction activities associated with the installation of the onshore export cable and construction of the substation(s). By quantifying the traffic associated with the construction activities, the significance of the likely effects could be realised by determining the increase in traffic.

11.7.1.4 The additional traffic due to the OnTI construction activities will result in increases of traffic flows on the local roads leading to the mobile cable installation site and the substation site. When considering actual volumes of traffic however, the predicted flows are well within the practical operating capacity of these roads and the environmental effect is, therefore, considered negligible; assuming appropriate mitigation measures, such as a robust Traffic Management Plan, are implemented.

11.7.1.5 The development will have a negligible environmental effect on the trunk road network in terms of percentage increases or actual vehicle flows.

11.7.1.6 The levels of traffic anticipated during the operation phase of the wind farm negligible.

11.7.1.7 The principal effects on traffic are associated with the construction of the substation(s) and the installation of the cables. These effects are of a temporary nature and are negligible.

Summary of Effects

11.7.1.8 The effects on traffic and transport that were assessed for the OnTI were:

- Increase in HGV movements;
- Impact on road safety;
- Vehicle delays due to increase in traffic;
- Pedestrian severance, delay and intimidation; and
- Degradation of highway structure.

Proposed Mitigation Measures and Residual Effects

11.7.1.9 The A90, A950, A952 and the local B & C Roads were considered to have negligible residual effects due to the predicted increase in traffic, as long as the recommended mitigation is undertaken. This includes, amongst other mitigation

(see Paragraph 11.7.14.1 below), the traffic utilising approved access routes, a traffic management plan being prepared for the development and a condition survey of the access routes being undertaken. The effects in Table 11.7-1 below have been derived from the receptor sensitivities (Table 11.7-8 below) and magnitudes (all negligible as per Table 11.7-1 below).

Table 11.7-1 Summary of Residual Effects

Receptor Group	Receptor	Impact	Effect	Mitigation	Residual Effect
Road Network	C–Roads	Increase in HGV movements	Minor	Traffic management plan	Negligible
Local Settlements	St Fergus	Vehicle delays due to increase in traffic	Minor	Traffic using approved access routes	Negligible
		Pedestrian severance, delay and intimidation	Minor	Temporary signage and / or temporary crossings	Negligible
	Crimond	Vehicle delays due to increase in traffic	Minor	Traffic using approved access routes	Negligible
		Pedestrian severance, delay and intimidation	Minor	Temporary signage and / or temporary crossings	Negligible
	Mintlaw	Vehicle delays due to increase in traffic	Minor	Traffic using approved access routes	Negligible
		Pedestrian severance, delay and intimidation	Minor	Temporary signage and / or temporary crossings	Negligible
	Longside	Vehicle delays due to increase in traffic	Minor	Traffic using approved access routes	Negligible
		Pedestrian severance, delay and intimidation	Minor	Temporary signage and / or temporary crossings	Negligible
Road Structure	C–Roads	Degradation of highway structure	Minor	Condition surveys and repairs	Negligible

11.7.2 Introduction

11.7.2.1 This chapter contains relevant information on the OnTI to allow Scottish Ministers and Marine Scotland to make decisions on the applications for Section 36 consents and Marine Licences for the three proposed wind farm sites and the OfTI. Discussions are ongoing with landowners to determine the exact location and layout of the substation(s) on their land within the preferred onshore substation area. This will be finalised following production of a masterplan by the owner / operator of the Peterhead Power Station compound which forms part of the preferred area. Once the precise location and layout for the onshore

substation(s) and export cable location has been confirmed, an application for planning permission for the OnTI will be submitted to Aberdeenshire Council and will be supported by this ES and such further information as is required to support the planning application.

11.7.2.2 This chapter details the assessment of likely significant traffic, access and transportation effects associated with the OnTI. This chapter focuses on the effects of increased traffic on the public road system during construction, operation and decommissioning. Such effects are most pronounced in close proximity to the site and the assessment is therefore restricted to the following major and minor roads:

- A90 trunk;
- A950 non–trunk;
- A952 non–trunk; and
- Several B and C roads.

11.7.2.3 The main A roads are described on Figure 5.7-1, Volume 6 b.

11.7.2.4 Construction of the OnTI is assumed to take six months to complete. Traffic associated with the proposed development would be of the following types:

- Construction traffic (movement and installation of onshore export cables, associated plant and materials for both cables and the substation(s), directional drilling rigs for the cables and abnormal loads deliveries associated with the substation(s) construction);
- Operational traffic (vehicles for maintenance); and
- Decommissioning traffic (for demolition of the substation(s) and removal of the cables).

11.7.2.5 The onshore export cable route is being developed, with engineering studies continuing to establish the preferred location within this route. Several access points to the OnTI, via new, temporary and existing entrances, are being considered. The onshore export cable route is described on Figure 5.7-1, Volume 6 b. No permanent access junctions or tracks are to be constructed for the cabling. However, a permanent access will be constructed for the proposed substation(s).

11.7.3 Scope of the Assessment

11.7.3.1 Consideration has been given to the proposed access routes to the OnTI and the changes to trunk and local / minor road traffic patterns as a result of the additional development traffic on parts of the local road network. The assessment recommends measures to manage the effect of development traffic and to minimise disruption to the surrounding road network within the study area, and the assessment is undertaken on this basis.

11.7.3.2 The assessment process comprised the following principal stages:

- Baseline survey and characterisation of the existing traffic network through desk study, traffic surveys and site inspection (see Chapter 5.7: Traffic and Transport);

- Identification of potential effects of the development;
- Input to the design process to prevent and reduce effects;
- Derivation of mitigation measures, where appropriate, to address any identified effects;
- Description of any residual effects; and
- Liaison with transportation authorities.

11.7.3.3 This chapter seeks to quantify the effects of the development on the existing public road traffic flows, indicate the significance of these effects and propose mitigation to reduce the effects.

Study Characteristics

11.7.3.4 One of the main traffic effects associated with the construction of the OnTI relates to the need to import abnormal loads to the substation(s) site. These loads will comprise the electrical equipment in the substation(s) compound (in particular the grid transformers). For this study, the port at Peterhead has been considered as the port of entry for the delivery of abnormal loads for the substation(s) construction.

11.7.3.5 There will also be a need to bring construction plant and materials (cable drums, concrete, pipes, blockwork, steel, etc.) to both the substation(s) and cable route sites. These will be delivered by standard HGVs.

11.7.3.6 Construction workers and operatives commuting during the construction, commissioning, operation and maintenance and decommissioning periods would also generate light–vehicle traffic, such as cars and Light Goods Vehicles (LGVs).

11.7.3.7 For the purpose of this assessment Figure 5.7-1, Volume 6 b, shows the potential access route for the construction traffic: LGVs, cars, HGV and abnormal loads. The proposed route for abnormal load transportation will be subject to a full assessment in consultation with the relevant road departments in an Abnormal Load Study.

11.7.4 Description of Methodology

11.7.4.1 The methodology employed in this assessment has been developed from guidance given in the Guidelines for the Environmental Assessment of Road Traffic and Guidelines for Traffic Impact Assessment. Methodologies detailed in the IHT guidelines recommend that Environmental Statements should be assessed in accordance with the IEMA guidelines.

11.7.4.2 To assess the effects of the additional traffic generated by the development, particularly during the construction phase, the following sequence of steps has been followed.

11.7.4.3 It is necessary to determine the character and traffic levels on the road network. These criteria are:

- The existing character of the road network;
- The existing traffic levels on the road network;
- The forecast traffic levels; and
- The additional traffic generated by the development.

11.7.4.4 Once the baseline criteria for the road network are established, it is imperative to identify the geographical boundaries of the study area and the year of assessment. This allows for the assessment of the significance and the effects of the additional traffic to be carried out.

11.7.4.5 Information used within the assessment has been derived from the following sources:

- Consultations with the local authority transport departments and Transport Scotland on available traffic data, the extent of the study area and the principal effects to be considered;
- Data on the likely traffic generation for the development, based on information provided by MORL;
- Previous experience in the development and construction of infrastructure projects;
- Site inspections of the existing road networks within the study area, as described in paragraphs 5.7.3.4 and 5.7.3.5 of Chapter 5.7 (Traffic and Transport); and
- Traffic surveys as described in Chapter 5.7 (Traffic and Transport).

11.7.5 Traffic Impact Assessment Methodology

11.7.5.1 The IEMA guidelines provide two general rules for establishing the increase in traffic level that is likely to affect the environmental conditions of the road, and that therefore warrant some consideration, namely:

- Rule 1: include highway links where traffic flows would increase by more than 30 % (or the number of HGVs would increase by more than 30 %); and
- Rule 2: include any other specifically sensitive areas where traffic flows would increase by 10 % or more.

11.7.5.2 Where the predicted increase in traffic flows is lower than the thresholds, the IEMA Guidelines suggest the significance of the effects can be stated to be negligible and further detailed assessments are not required.

11.7.5.3 Further guidance is given for Rule 1 with regard to certain aspects of traffic effects. These indicate that projected changes in traffic of less than 10 % create no discernible environmental effect. This threshold is similar to that given by the IHT for operational aspects.

11.7.5.4 Taking account of this guidance, a "coarse" and "fine" filter approach has been adopted. The coarse filter applied to A–Class roads uses 'Rule 1' above to determine if and where more detailed consideration needs to be given. For all other roads in the study area, the coarse filter applies Rule 2. Sensitive locations within the study area have been identified through consultation with Aberdeenshire Council and also by inspection of the network. These locations are considered to be the 'B–class' and 'C–class' roads and settlements on the A90, A950 and A952 within the traffic study area. In recognition of the requests by Aberdeenshire Council, all minor roads have been considered as potentially affected, and have therefore been passed through to a "fine" filter.

11.7.5.5 The "fine" filter approach is based on standard environmental impact assessment methodology of assessing the sensitivity of the receptor, the magnitude of the effects and then synthesising these two factors to derive the significance of the effect.

11.7.6 Assessment of Sensitivity

11.7.6.1 The sensitivity of roads to environmental effects will be assessed with the IEMA Guidelines. The IEMA Guidelines do not provide specific criteria for evaluating sensitivity, however, for the purposes of assessment, the sensitivity of roads to changes in traffic levels has been evaluated on a scale of "negligible", "minor", "moderate" and "substantial", based on their usage by pedestrians and cyclists (judged by the presence / absence of foot–ways and cycle lanes) and the size of communities through which the road section passes and the existing traffic flows.

11.7.6.2 Receptors for environmental effects from traffic changes due to the Project fall into three categories:

- The road network and road users;
- Local settlements through which the road passes; and
- The road structure / fabric.

11.7.6.3 Some of the potential effects on the surrounding environment (such as effects on ecology and increases in noise) are assessed in other chapters: Chapter 10.6 (Terrestrial Ecology); and Chapter 9.4 (Noise (Onshore)) respectively. In this chapter, effects on the surrounding environment are focussed on the effects on the adjacent communities, in terms of severance, driver delay, pedestrian delay, pedestrian and cyclist amenity, intimidation and safety.

11.7.6.4 The sensitivity of one category of receptors can vary greatly to that of another category. For instance, an increase in traffic volume on the road network that travels through a local settlement may be considered to have a low sensitivity with regards to the effect on the road network. However the effect may be high for the residents of the local settlement that the traffic passes through. Table 11.7-2 below identifies the sensitivity criteria adopted for the different receptors.

Table 11.7-2 Sensitivity Criteria for Varying Receptor Groups

Receptor Group	Negligible	Minor	Moderate	Substantial
1. Road Network and Users	Major Highways with no junctions i.e. motorways	Road networks with a high capacity to absorb an increase in traffic, major highways with few junctions.	Road networks with some capacity to absorb an increase in traffic, highways with junctions.	Road networks with little capacity to absorb an increase in traffic, minor roads with susceptibility to congestion.
2. Local Settlements (Residents etc.)	Adjacent local settlements with no direct foot access to the road.	Local settlements with adequate footway provisions	Local settlements with narrow footway provisions, near to places of worship, public open spaces, tourist attractions.	Local settlements with no footway provisions, near hospitals, doctor's surgeries and retirement homes, schools and colleges, roadside shopping areas.
3. Road Structure	National highways or roads with no obvious physical defects.	Regional highways or roads with some minor physical defects.	Local or regional routes with some physical defects.	Local minor routes rarely maintained with generally occurring physical defects.

11.7.7 Assessment of Magnitude

11.7.7.1 The magnitude of traffic effects is a function of the existing traffic volumes, the percentage increase due to the proposals, the changes in type of traffic and the temporal distribution of traffic (principally in terms of the day of the week). The IEMA Guidelines identify magnitude thresholds based on percentage changes in traffic levels as being applicable to severance and intimidation effects. The magnitude of effects arising from the increase in traffic volumes (taken as being either the traffic flow including all vehicles or the HGV traffic flow, whichever is higher) is outlined in 'Rule 1' and categorised in Table 11.7-3 below.

Table 11.7-3 Magnitude of Effect Criteria

	Negligible	Minor	Moderate	Substantial
Traffic Increase	Under 30 %	Between 30 % & 60 %	Between 60 % & 90 %	Above 90 %

11.7.7.2 The determination of the magnitude of the effects was undertaken by reviewing the proposals for the development, establishing the parameters of the road traffic that might cause an effect, and quantifying these effects.

11.7.7.3 The assessment has considered both the change in magnitude of the effects as well as their absolute levels.

11.7.7.4 Consideration was given to the composition of the traffic on the road network under both existing and predicted conditions. For example: Light Goods Vehicles (LGVs) generally have less effect on traffic and the road system than Heavy Goods Vehicles (HGVs). Similarly, HGVs could have less effect than abnormal load vehicles depending on the timing and frequency of the abnormal loads.

11.7.7.5 The timing and duration of the effects were also assessed. For example: LGVs may be concentrated to particular times of the day and week (start / end of the working day from Monday to Friday) whereas HGVs may be spread over the working day. Without suitable controls on timing of deliveries, abnormal loads may have a considerable effect on the road congestion and delay if they occur during peak periods.

11.7.8 Assessment of Significance

11.7.8.1 The significance of any given effect is taken to be a synthesis of both the sensitivity of the receptor and the magnitude of the effect, as shown in Table 11.7-4 below.

Table 11.7-4 Significance of Effects

	Sensitivity			
Magnitude	**Substantial**	**Moderate**	**Minor**	**Negligible**
Substantial	Substantial	Substantial	Moderate	Minor
Moderate	Substantial	Moderate	Minor	Negligible
Minor	Moderate	Minor	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

11.7.8.2 Effects of 'substantial' or 'moderate' significance are considered to be significant under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011.

11.7.9 Quantification of Development Activities

Predicted Construction Phase Activities

11.7.9.1 An assessment of the expected vehicle movements during construction has been undertaken and is detailed within the following section. Descriptions are provided for the assumptions and build–up of traffic volumes for the construction phase of the development. Table 11.7-5 below summarises this assessment.

11.7.9.2 It is important to note that each vehicle travelling to the sites will generate two vehicle movements, one movement to the site and one movement away from the site.

1 delivery = 2 vehicle movements

11.7.9.3 For the purpose of analysis, traffic numbers have been generated for the onshore export cable route and the substation(s) separately.

Site Access

11.7.9.4 Transportation to and from the onshore export cable installation site would be via the existing trunk and local road networks. To date, no access points on the route have been identified for the traffic relating to the installation of the cable. However, it is anticipated that the construction traffic, including LGVs, HGVs and construction personnel will access the development at several points along the onshore export cable route. This is due to the length of the routes and that they will cross public highways at several locations.

11.7.9.5 The access point to the substation(s) will be either from the A90 or C roads near to the existing Scottish and Southern Energy substation at Boddam, south of Peterhead.

Programme

11.7.9.6 For the purposes of the analysis of traffic effects, the construction activities have been assumed to occur during a five day week and a 4.5 week month over a 50 week working year. The overall construction duration is estimated to be six months for the substation(s) and 120 days for the onshore export cable installation.

Mobilisation

Substation(s) Compound

11.7.9.7 The vehicle movements required for the delivery of the substation(s) site compound facilities at the start of construction needs to be accounted for. Assuming that the site office and equipment can be delivered in 10 trips on low loaders, this would then result in 20 vehicle movements at the start and 20 vehicle movements at the end of construction, totalling 40 total vehicle movements.

Construction Personnel

11.7.9.8 As part of the assessment it has been assumed that the contractor would be required to minimise traffic generated by site personnel by using multiple occupancy in vehicles.

Substation(s) Compound

11.7.9.9 In estimating the vehicle movements for the personnel associated with the construction of the substation(s), It was assumed that an average of 30 persons would be working on site for the duration of the Project. It is expected that these vehicle movements will be in LGVs. A construction period of six months therefore generates 5,400 vehicle movements assuming also that on average 1.5 personnel will arrive and depart per vehicle.

Onshore Export Cable Route

11.7.9.10 For the cable installation it has been assumed that there will be eight personnel working on site for the duration of the cable installation resulting in 300 vehicle movements per month, 1,600 vehicle movements in total.

Onshore Export Cable Installation

Construction Vehicles

11.7.9.11 To install the cables, several different construction vehicles will be required to be delivered to site. Up to four cables will be installed along the route in two separate trenches and these two installation phases could be up to a year apart. For this assessment, it has been conservatively assumed that two trenches will be constructed side by side, simultaneously, and all four cables installed during a single construction phase as this represents the worst case scenario for assessment. An excavator, a dumper and a tractor with a cable drums carriage will be required for cable installation. A total of six pieces of machinery, delivered on low loaders, therefore 24 vehicle movements are required.

Cable

11.7.9.12 The 320 kV cables will be delivered to site on cable drums with an assumed cable capacity of 500 m per drum on low loaders (assumed to be carrying four drums per delivery).

11.7.9.13 The onshore export cable route will be approximately 30 km, therefore 240 drums will be required to lay four cables over 120 km. This results in 60 cable deliveries and therefore 120 vehicle movements.

Cable Duct

11.7.9.14 Ducting will be required for the installation of the onshore export cables in the trenches. Assuming that suitably sized ducts are delivered in coils of approx 50 m length and that 20 coils can be loaded onto a low loader.

11.7.9.15 120 deliveries are required for the onshore export cable installations resulting in 240 vehicle movements for the site.

Trench Bedding Material

11.7.9.16 Cable trenches will generally be 1.0 m deep and 3 m wide. At the base of each trench a 0.5 m deep by 0.5 m wide excavation will be provided for the cables.

This excavation will house the cable ducts in sand bedding. Therefore, 0.25 m^3 (conservatively omit cable duct volume) of trench bedding sand will be required per metre run of cable trench. Conservatively assuming the trench runs the full route from land–fall to the proposed substation(s) location. We have assumed that the trench bedding sand will be delivered in 15 tonne delivery vehicles (7.5 m^3 carrying capacity). Therefore the cable route will require approximately 15,000 m^3 of trench bedding sand resulting in 4,000 vehicle movements.

Trench Spoil Removal

11.7.9.17 The remainder of the trench will be backfilled with some of the excavated material. However the material excavated that is replaced by the bedding material will have to be removed from site as spoil. The spoil (15,000 m^3) will be removed by the same 15 tonne vehicle; however we have assumed a 6 m^3 carrying capacity to accommodate voids / unconsolidated material. Therefore 5,000 vehicle movements for spoil removals would be required.

Jointing Bay Slabs

11.7.9.18 Jointing bays will be required to join cable runs at the end of each drum of cable. It has been assumed that three jointing bay slabs will be delivered per low loader. 238 joint bay slabs will be required resulting in 160 vehicle movements.

Horizontal Directional Drilling

11.7.9.19 Horizontal directional drilling (HDD) is proposed for installing the onshore export cable underneath watercourses and trafficked roads that cannot be closed for trenching works. Delivery of the HDD rigs will occur at a number of locations along the onshore export cable route. The route will require up to eight crossings over watercourses and A & B class roads. Conservatively it is estimated that each of these crossings would require the delivery of the HDD rig on a low–loader and two more HGV deliveries of drilling rods and cutting tools. Therefore each crossing generates six vehicle movements therefore the onshore export cable corridor will generate 48 vehicle movements.

Substation Building(s)

11.7.9.20 While potentially only one building may be constructed, as a worst case scenario in line with the Rochdale Envelope, construction of two buildings is assumed. One 150 m long by 100 m wide by 25 m tall (Building 1) to house the HVDC equipment and another 20 m wide by 20 m long by 10 m tall (Building 2) as office / SCADA housing. The method of construction for this building would be a steel frame with sheet cladding.

Structural Steel

11.7.9.21 Building 1 – A four bay lattice beam design (approximately 25 m wide bays) with each lattice beam split up into two sections (approximately 12.5 m long) with each bay supported by columns (five in total per width of building (100 m)) would provide a frame that would repeat itself every 6 m through the entire length of the building (150 m) i.e. 26 frames, assuming that two lattice beam sections can be delivered per low loader. Assuming also that columns are split into two sections (12.5 m long) and that two sections can be delivered per low loader. Therefore, it will require nine steel deliveries per frame, 234 deliveries for 26 frames.

11.7.9.22 Longitudinal beams will be approx 6 m in length and five of these will be required between frames which can be delivered on one HGV, therefore 25 deliveries for

the whole building. On the gable faces it is assumed that all secondary steel (gable columns, cladding rails etc.) will be delivered on one vehicle per bay face of the structure (i.e. 25 m x 25 m gable bay face). Therefore, eight deliveries for the two gable end faces are required. Longitudinally assuming that all secondary steel will be delivered for the same size of 'bay' (25 m x 25 m) i.e. 12 deliveries for the two longitudinal faces. For the secondary steel associated with the roof (purlins etc.) one load delivery will cover the secondary steel requirement for 50 m x 50 m areas i.e. six deliveries for the secondary roof steel.

11.7.9.23 In total, 285 deliveries for the structural steel has been assumed for Building 1.

11.7.9.24 Building 2 – A two bay lattice beam design (approximately 10 m wide bays) with each bay supported by columns (three in total per width of building (20 m)) would provide a frame that would repeat itself every 5 m through the entire length of the building (20 m) i.e. Four frames, assuming that two lattice beams can be delivered per low loader and that three columns can be delivered per low loader. Therefore it will require three steel deliveries per frame, 12 deliveries for four frames.

11.7.9.25 Longitudinal beams will be approx 5 m in length and three of these will be required between frames which can be delivered on one HGV, therefore 4 deliveries will be required. It is assumed that one delivery will be required for all the secondary steel associated with the walls and another for the secondary steel associated with the roof.

11.7.9.26 Eighteen deliveries for the structural steel have been assumed for Building 2. Therefore 303 structural steel deliveries will be required in total for Building 1 and 2 resulting in 606 vehicle movements.

Reinforced Concrete Pad Foundations

11.7.9.27 For Building 1, the pad foundations underneath the steel columns will typically 3 m x 3 m x 1 m deep. For 100 columns, this would require 900 m^3 of (reinforced) concrete to be constructed including approximately 180 m^3 of steel reinforcement equating to 1,432 tonnes. A concrete mixer can carry 6 m^3 per delivery and a HGV can carry 10 tonnes of steel reinforcement therefore 294 material deliveries would be required to construct the pad foundations within Building 1.

11.7.9.28 In addition, Building 2 would typically require pad foundations 2.5 m x 2.5 m x 0.75 m deep. Twelve columns are required in Building 2, therefore 57 m^3 of (reinforced) concrete and 89 tonnes of steel reinforcement will be required resulting in 68 material deliveries. In total the reinforced concrete pad foundations will require 362 material deliveries for Buildings 1 and 2, resulting in 724 vehicle movements.

Reinforced Concrete Ground Floor Slab

11.7.9.29 An average ground floor slab thickness of 250 mm to cover the entire footprint of both buildings would require 3,850 m^3 of reinforced concrete. This would result in 770 m^3 (6,122 tonnes) of steel reinforcement. This would therefore require 642 concrete deliveries and 613 steel deliveries, totalling 2,570 vehicle movements.

Steel Sheet Cladding

11.7.9.30 Both buildings will be clad in steel sheeting. This would require approx 28,700 m^2 of sheet cladding. Typically 1,000 m^2 would require 11,548 kg of cladding materials (including fixings and spacers). Therefore 332 tonnes of material required to be delivered on HGVs (using previously stated ten tonnes capacity) therefore 68 vehicle movements have been assumed.

Internal Block Walls

11.7.9.31 From previous substation designs, typically there will be 150 m run of internal block walling per 500 m^2 of substation. It has been assumed that one quarter of the footprint of Building 1 and the whole footprint of Building 2 will have internal walling. Therefore, for a footprint of 4,150 m^2, 1,245 m of internal block walling is expected. Assuming that the average wall height will be 8 m (to accommodate for some full height walls) then 9,960 m^2 of wall could be constructed. Assuming 140 mm (20 kN / m^3) wide blocks are used therefore 9,960 x 2.8 kN / m^2 = 27,888 kN (approximately 2,843 tonnes), ten tonnes per delivery therefore 568 vehicle movements required.

Internal Ancillaries

11.7.9.32 For the internal ancillary deliveries (doors, timber fittings, wiring, plumbing etc.), it is assumed that 500 vehicle movements will be required.

Electrical Equipment

11.7.9.33 Substation electrical equipment configurations have not been confirmed at this point, therefore it has been assumed that there will be 200 vehicle movements associated with the delivery of electrical equipment.

Transformers

11.7.9.34 Two transformers are to be delivered to site as abnormal loads each requiring two police escort vehicles per delivery. Two transformer deliveries will therefore require six vehicle movements each, 12 vehicle movements in total.

Screening Bund

11.7.9.35 Screening is to be provided around the perimeter of the substation(s) to decrease visual effect of the structure. Assuming an earth bund 3 m high by 3 m wide with 1 in 1 sloped batters on both sides (18 m^3 / m) will run for 500 m around the perimeter of the structures. Conservatively assuming that 9,000 m^3 of material will need to be delivered to construct the screening bund therefore 2,400 vehicle movements will be required (assuming a 7.5 m^3 vehicle carrying capacity).

Temporary Hardstand

11.7.9.36 A 100 m x 100 m temporary hardstand area is to be provided. Assuming a hardstand depth of 0.35 m therefore 3,500 m^3 of material is to be delivered. This would result 934 vehicle movements.

Other

Site Visits

11.7.9.37 For the duration of the substation(s) construction 28 visits (56 vehicle movements) would be generated from the office based staff such as the Project manager, engineer or sub–contractors, SEPA, local authorities etc.

11.7.9.38 It is estimated that 26 visits (52 vehicle movements) will be required during the installation of the cable.

General Deliveries

11.7.9.39 General deliveries of fuel etc. are assumed to be one every other week. For the six month construction period of the substation(s), 14 deliveries (28 vehicle movements) would be made. Twelve deliveries (24 vehicle movements) would be made for the cable installation site.

11.7.10 Summary of Predicted Traffic Volumes during Construction

11.7.10.1 Table 11.7-5 below summarises the total predicted traffic generated during construction.

Table 11.7-5 Summary of Predicted Traffic Volumes during Construction

Item	Type of Vehicle	Total Vehicle Movements	Period	Vehicle Movement / Month
Mobilisation				
Substation(s) Compound	Low Loader	80	Start & End	40
Construction Staff				
Site Personnel – Substation(s)	LGV	5,400	Months 1 to 6	900
Site Personnel – Cable Route	LGV	1,600	120 days (Months 1 to 6)	300
Cable Installation				
Construction Vehicles	Low Loader	24	Start & End	12
Cable	Low Loader	120	120 days (Months 1 to 6)	23
Cable Duct	Low Loader	240	120 days (Months 1 to 6)	45
Trench Bedding Material	HGV	4,000	120 days (Months 1 to 6)	750
Trench Spoil Removal	HGV	5,000	120 days (Months 1 to 6)	938
Jointing Bay Materials	HGV	160	120 days (Months 1 to 6)	30
Horizontal Direction Drilling Vehicles	Low Loader & HGV	48	120 days (Months 1 to 6)	9
Substation(s) Construction				
Structural Steel	Low Loader & HGV	606	Months 2 to 4	202

Item	Type of Vehicle	Total Vehicle Movements	Period	Vehicle Movement / Month
Reinforced Concrete Pad Foundations	Low Loader & HGV	724	Months 1 & 2	362
Reinforced Concrete Ground Floor Slab	Low Loader & HGV	2,510	Months 3 and 4	1,255
Sheet Cladding	HGV	68	Month 4	68
Internal block walls	HGV	568	Months 4 & 5	284
Internal ancillaries	HGV	500	Months 4 to 6	167
Switchgear	HGV	200	Month 5	200
Transformers	Abnormal	4	Month 5	4
Escort Vehicles	LGV	8	Month 5	8
Screening Bund	HGV	2,400	Months 4 to 6	800
Temporary Hardstand	HGV	934	Months 5 & 6	467
Other				
Miscellaneous – Site Visits – Substation(s)	LGV	108	Months 1 to 6	18
Miscellaneous – Site Visits – Cable Route	LGV	48	120 days (Months 1 to 6)	9
Miscellaneous – General Deliveries – Substation(s)	HGV	28	Months 1 to 6	5
Miscellaneous – General Deliveries – Cable Route	HGV	24	120 days (Months 1 to 6)	4
Total Vehicle Movements – Cable Route		**11,264**		
Total Vehicle Movements – Substation(s)		**14,138**		
Total HGV Movements – Cable Route		**9,616**		
Total HGV Movements – Substation(s)		**8,622**		
Total LGV Movements – Cable Route		**1,648**		
Total LGV Movements – Substation(s)		**5,516**		

Predicted Operation Phase Activities

320 kV Cables

11.7.10.2 Maintenance activities would be in accordance with the operator's guidelines. However, we have assumed it would result in 60 visits per year (120 vehicle movements). All of which have been assumed to be light goods vehicles.

Substation(s)

11.7.10.3 For the purpose of this assessment it is anticipated that the substation(s) site would be permanently occupied 24 hours a day, seven days per week. There would be five full–time staff on site during each eight hour shift. Conservatively, it has been assumed that each full–time staff member will be travelling to the substation(s) individually by car. Therefore, 910 vehicle movements will be generated each month of operation through staffing of the substation(s). All of which have been assumed to be light goods vehicles.

11.7.10.4 It is also anticipated that the substation(s) would require some maintenance during its operation phase. This would involve visual inspections on several occasions during the year, with maintenance activities being carried out as required based on these inspections. For the purposes of this assessment, operational traffic generated by these activities is considered to be insignificant and their effects on the local road network negligible.

11.7.10.5 Maintenance crews would be required to deal with unexpected events that may occur during the operational phase of the substation(s). Traffic generated by unplanned events is difficult to predict, however experience at other similar developments indicates that these events could generate 450 additional vehicle movements per annum. These would be LGVs unless electrical components need to be replaced.

11.7.10.6 The effects from the approximate number of vehicles associated with the road network during the operational phase of the substation(s) are **negligible** and do not warrant any further assessment.

Predicted Decommissioning Phase Activities

11.7.10.7 There will not be a requirement for importation of trench bedding sand, so traffic generated during decommissioning is expected to be significantly less than that during construction. There may be traffic movements associated with the removal (and recycling, as appropriate) of material arising from demolition and the import of soil and re–seeding. However, vehicle numbers would be low compared with the level of traffic experienced during the construction phase and would not involve the movement of abnormal loads.

11.7.10.8 The decommissioning activities associated with the installed cable and the substation(s) are considered to be of a lesser magnitude than the construction stage.

11.7.11 Generated Traffic Distribution

Construction Traffic Distribution

11.7.11.1 The traffic generated during the construction phase of the substation(s) and cable installation has been allocated a direction once it leaves the sites. For the purpose of this assessment it has been assumed that the construction traffic will be arriving to the sites from both Peterhead (70 % of the total generated) and another location (30 % of the total generated) south of Ellon Bypass (ATC Site 1) i.e. Aberdeen or further afield. This assumes that a non–local contractor has been awarded the Project with 30 % of the personnel / other traffic travelling to site. The remaining 70 % have been assumed to be either local sub–contractors from Peterhead or non–local personnel residing in Peterhead for the duration of the works.

Operational & Decommissioning Traffic Distribution

Onshore Export Cables

11.7.11.2 As with the installation of the cables, operational traffic distribution associated with the onshore export cable route (such as maintenance) depends heavily on the location of planned and unplanned maintenance. It is expected that operational traffic associated with the cable route will be LGVs only.

Substation(s)

11.7.11.3 For the purpose of this assessment it is anticipated that access to / from the substation(s) site during the operation and decommissioning of the substation(s) would be from the direction of Peterhead.

11.7.12 Assessed Effects

Assessment of Construction Traffic Generation

11.7.12.1 The traffic effects of these movements can be categorised as:

- Additional traffic volumes associated with the development travelling on the existing road network; and
- Delays to non–development related journeys caused by slow–moving vehicles.

11.7.12.2 Table 11.7-6 below outlines the distribution of vehicle movements over the construction phase.

11.7.12.3 Several assumptions have been made in deriving this data with regards to the origins and destinations of traffic recorded at Automatic Traffic Counter site (as per Chapter 5.7: Traffic and Transport), namely:

- **Site 1 – A90(T) at Ellon Bypass** – The contractor for all of the works will be based in Aberdeen (or elsewhere in Scotland / UK south of the development). Thirty percent of the traffic will be travelling from south of site 1, the remaining seventy percent will travel to and from Peterhead. Therefore, there will only be thirty percent of the predicted traffic utilising this section of road for the proposed construction;
- **Site 2 – A90(T) near Cruden Bay** – For the cable installation, it is estimated that traffic will only utilise this section of the A90 during month 5 and 6 with thirty percent and one–hundred percent utilisation per month respectively (i.e. from Aberdeen only in month 5 and both Peterhead and Aberdeen in month 6.) – For the Substation(s), traffic is predicted from Aberdeen only for the entire six month construction period (30 %).
- **Site 3 – A90(T) along Peterhead Peripheral South** – For the cable installation it is estimated that Peterhead traffic (70 %) will utilise this section of the A90 during months 1 to 5. Traffic from Aberdeen is predicted also for month 5 (i.e. 100 % for month 5). – For the Substation(s), traffic is predicted from Peterhead only for the entire six month construction period (70 %);
- **Site 4 – A90(T) near Inverugie** – For the cable installation, it is predicted that only Peterhead traffic will utilise this section of the A90 during months 1 to 4 with an estimated 50 % of the Peterhead traffic utilising it during months 3 and 4 (therefore 70 % for months 1 & 2 and 35 % for months 3 & 4) ;

- **Site 5 – A90(T) South of Fraserburgh** – For the cable installation, it is estimated that Aberdeen & Peterhead traffic (100 %) will only utilise this section of the A90 during the first month of construction;
- **Site 6 – A950 West of Peterhead** – For the cable installation, it is predicted that during month 3 50 % of the Peterhead traffic (35 %) will utilise the A950. Similarly, during month 4 Aberdeen traffic and 50 % of Peterhead traffic (i.e. 65 %) is predicted with Aberdeen and Peterhead traffic (100 %) predicted in month 5;
- **Site 7 – A952 North of Mintlaw** – For the cable installation, it is predicted that Aberdeen traffic (30 %) will utilise this section of the A952 during months 1 to 4 with a further 50 % of the Peterhead traffic predicted during months 3 & 4 (i.e. 65 % during months 3 & 4); and
- **Site 8 – A952 South of Mintlaw** – For the cable installation, it is predicted that Aberdeen traffic (30 %) will utilise this section of the A952 during months 1 to 4.

Table 11.7-6 Distribution of Vehicle Movements during Construction

	Month					
Item	**1**	**2**	**3**	**4**	**5**	**6**
Mobilisation						
Substation(s) Compound	40					40
Construction Staff						
Site Personnel – Substation(s)	900	900	900	900	900	900
Site Personnel – Cable Route	300	300	300	300	300	100
Forestry Clearance						
Tree Felling	5	5	5	5	5	3
Timber Removal	19	19	19	19	19	7
Cable Installation						
Construction Vehicles	12					12
Cable	23	23	23	23	23	5
Cable Duct	45	45	45	45	45	15
Trench Bedding Material	750	750	750	750	750	250
Trench Spoil Removal	938	938	938	938	938	310
Jointing Bays	30	30	30	30	30	10
HDD	9	9	9	9	9	3
Substation(s) Construction						
Structural Steel		202	202	202		

	Month					
Item	**1**	**2**	**3**	**4**	**5**	**6**
R.C Pad Foundations	362	362				
R.C Ground Floor Slab			1,255	1,255		
Steel Sheet Cladding				68		
Internal Block Walls				284	284	
Internal Ancillaries				167	167	166
Switchgear				200		
Transformers					4	
Escort Vehicles					8	
Screening Bund				800	800	800
Temporary Hardstand					467	467
Other Equipment						
Miscellaneous – Substation(s) Site Visits	18	18	18	18	18	18
Miscellaneous – Cable Route Site Visits	9	9	9	9	9	3
Miscellaneous – Substation(s) General Deliveries	5	5	5	5	5	3
Miscellaneous – Cable General Deliveries	4	4	4	4	4	4
Total Monthly Vehicle Movements – Cable Route						
Total Monthly Vehicle Movements	2,144	2,132	2,132	2,132	2,132	722
Number of Days	22.5	22.5	22.5	22.5	22.5	22.5
Total Average Per Day	95.3	94.8	94.8	94.8	94.8	32.1
Total LGVs Per Day	13.7	13.7	13.7	13.7	13.7	4.6
Total HGVs Per Day	81.6	81.0	81.0	81.0	81.0	27.5
Total Monthly Vehicle Movements – Substation(s)						
Total Monthly Vehicle Movements	1,325	1,487	2,380	3,899	2,653	2,394
Number of Days	22.5	22.5	22.5	22.5	22.5	22.5
Total Average Per Day	58.9	66.1	105.8	173.3	117.9	106.4
Total LGVs Per Day	40.8	40.8	40.8	40.8	41.2	40.8
Total HGVs Per Day	18.1	25.3	65.0	132.5	76.8	65.6

		Month					
Item		**1**	**2**	**3**	**4**	**5**	**6**
% Increase in Traffic and HGVs							
Cable Route & Substation(s)	**Five day AADT** / **HGV five day AADT**	**1**	**2**	**3**	**4**	**5**	**6**
Site 1 – A90(T) at Ellon Bypass	14,854	0.3 %	0.3 %	0.4 %	0.5 %	0.4 %	0.3 %
	1,395	2.1 %	2.3 %	3.1 %	4.6 %	3.4 %	2.0 %
Site 2 – A90 (T) near Cruden Bay	8,363	0.7 %	0.8 %	1.3 %	2.1 %	1.7 %	1.7 %
	1,062	1.7 %	2.4 %	6.1 %	12.5 %	9.5 %	8.7 %
Site 3 – A90 (T) along Peterhead Peripheral South	7,025	1.5 %	1.6 %	2.0 %	2.7 %	2.5 %	1.1 %
	1,444	4.8 %	5.1 %	7.0 %	10.3 %	9.3 %	3.2 %
Site 4 – A90 (T) near Inverugie	6,896	1.0 %	1.0 %	0.5 %	0.5 %		
	766	7.4 %	7.3 %	3.7 %	3.7 %		
Site 5 – A90 (T) South of Fraserburgh	8,407	1.1 %					
	730	11.0 %					
Site 6 – A950 West of Peterhead	7,104			0.5 %	0.9 %	1.3 %	
	503			5.6 %	10.3 %	15.9 %	
Site 7 – A952 North of Mintlaw	7,006	0.4 %	0.4 %	0.9 %	0.9 %		
	327	7.4 %	7.3 %	15.9 %	15.9 %		
Site 8 – A952 South of Mintlaw	6,090	0.5 %	0.5 %	0.5 %	0.5 %		
	320	8.8 %	8.8 %	8.8 %	8.8 %		

Effect of General Construction Traffic

11.7.12.4 The estimated traffic generated by the development is shown in Table 11.7-26 above. The upper sections of this table illustrate the traffic generated throughout the construction programme and the assumed distribution of traffic between the site access points. The lower sections of the table indicate the likely increase in traffic flows on the road network as a result of these activities.

11.7.12.5 The predicted maximum increase in traffic due to construction activities at a given period in time during the construction programme is summarised in Table 11.7-7 below.

Table 11.7-7 Maximum Increase in Five Day Average Traffic Flows

Location	Increase in Overall Flow	Increase in HGV Flow
Site 1 – A90(T) at Ellon Bypass	0.5 %	4.6 %
Site 2 – A90 (T) near Cruden Bay	2.1 %	12.5 %
Site 3 – A90 (T) along Peterhead Peripheral South	2.7 %	10.3 %
Site 4 – A90 (T) near Inverugie	1.0 %	7.4 %
Site 5 – A90 (T) South of Fraserburgh	1.1 %	11.0 %
Site 6 – A950 West of Peterhead	1.3 %	15.9 %
Site 7 – A952 North of Mintlaw	0.9 %	15.9 %
Site 8 – A952 South of Mintlaw	0.5 %	8.8 %

11.7.12.6 The following paragraphs discuss the effects on road traffic due to the additional construction traffic.

A90 – Trunk Road

11.7.12.7 The A90 will carry a large proportion of all the traffic associated with the cable installation and substation(s) construction. This includes HGVs, construction staff and deliveries. It will also accommodate the majority of the miscellaneous vehicles, such as visiting project personnel not based on site.

11.7.12.8 For the proposed route, the effect on daily traffic flows equates to a maximum total increase of 2.7 % and an increase in HGVs of 12.5 %. The A90 operates well within the capacity for a road of its class and the increase in flow is unlikely to have any appreciable operational effect on the road network.

11.7.12.9 Due to the low number of residential dwellings close to this road, the sensitivity of this road to severance, pedestrian delay and intimidation effects is considered to be minor, with the exception of the sections through Crimond and St Fergus. These small villages are considered to have a moderate sensitivity to significant change.

11.7.12.10 It is therefore considered that general construction traffic on the A90 would result in an environmental effect of **negligible** significance.

11.7.12.11 Crimond and St Fergus have been considered as sensitive locations and an evaluation of the environmental effects will be carried out in 11.7.13 of this chapter.

A950 Non–Trunk Road

11.7.12.12 It is predicted that the A950 will carry a proportion of traffic associated with the cable routes but none will be associated with the substation(s). It will also accommodate the majority of the miscellaneous vehicles, such as project personnel not based on site, visiting the site.

11.7.12.13 The effect on daily traffic flows equates to a maximum total increase of 1.3 % and an increase in HGVs of 16.1 % for the proposed route. The A950 operates within

the capacity for a road of its class and the increase in flow is unlikely to have any appreciable operational effect on the road or its junctions.

11.7.12.14 The sensitivity Longside and Mintlaw have to severance, pedestrian delay and intimidation effects is considered to have a moderate sensitivity to significant change. Otherwise the rest of the A950 is considered to be minor.

11.7.12.15 It is therefore considered that general construction traffic on the A950 would result in an environmental effect of **negligible** significance.

11.7.12.16 Longside and Mintlaw have been considered as sensitive locations and an evaluation of the environmental effects will be carried out in 11.7.13 of this chapter.

A952 Non–Trunk Road

11.7.12.17 The A952 will carry a proportion of traffic associated with the cable route but none will be associated with the substation(s). It will also accommodate the majority of the miscellaneous vehicles, such as visiting project personnel not based on site.

11.7.12.18 The effect on daily traffic flows equates to a maximum total increase of 0.9 % and an increase in HGVs of 16.1 % for the proposed route. The A952 operates within the capacity for a road of its class and the increase in flow is unlikely to have any appreciable operational effect on the road network.

11.7.12.19 The sensitivity of Mintlaw to significant change to severance, pedestrian delay and intimidation effects is considered to be moderate. Otherwise the rest of the A952 is considered to be minor.

11.7.12.20 It is therefore considered that general construction traffic on the A952 would result in an environmental effect of **negligible** significance.

11.7.12.21 As discussed above, Mintlaw has been considered as a sensitive location and an evaluation of the environmental effects will be carried out in 11.7.13 of this chapter.

B & C Roads

11.7.12.22 It is predicted that the B9033 would be utilised for approximately the first two weeks of the installation of the cable. From Table 11.7-6 above the average daily increase in traffic is predicted to be 150 vehicles per day. All of the initial traffic will be associated with the landfall site. The B9033 is the main access route from between Fraserburgh and satellite towns Inverallochy and St Combs, however there are multiple diversions available via the A90 should there be a need to close the road.

11.7.12.23 As previously discussed in Chapter 5.7 (Traffic and Transport), a number of C–Roads will be utilised in the installation of the cables. The proposed routes across Aberdeenshire from the landfall site to the proposed substation(s) site will cross C–Roads, and therefore potential access points to the cable route, at fairly equidistant intervals. Therefore, it is predicted that each C–Road crossed along the route would carry traffic associated with the cable installation for approximately two to three weeks. It was observed during the site survey that all of the C–Roads which could potentially be utilised were lightly trafficked and for the most part by HGVs (i.e. agricultural vehicles). During the construction period it

is thought that the sensitivity to change due to the increase in HGVs number would be moderate.

11.7.12.24 In Chapter 5.7 (Traffic and Transport), Paragraphs 5.7.3.34 and 5.7.3.35 describe the typical road capacities versus their typical peak flows. As per Table 5.7-13, the C–Roads are described as "*Rural – poor single 5.5 m*" having a capacity of 800 vehicles / hour / direction. From Table 11.7-6 above, the average daily increase in traffic is predicted to be 95 vehicles per day. Assuming a 7 hour day, with the total average number of vehicles utilising any section of the C–Roads per day as 95 vehicles, 14 vehicles would utilise the roads per hour. With a theoretical capacity of 800 vehicle / hour / direction or similarly 1,600 vehicle / hour, 14 vehicles utilising any C–Road in the assessment area would account for 0.9 % of that road's capacity. Based on this, we have determined that the magnitude of the increase in traffic would be negligible.

11.7.12.25 However, as stated in Paragraph 11.7.5.4 above, the B and C roads have been considered as sensitive locations. Due to the lack of readily available traffic flow data for these roads the effect of the percentage increase of traffic on these roads could not be assessed. For this reason, an evaluation of the environmental effects will be carried out in 11.7.13 of this chapter.

Effect of Abnormal Load Transportation

11.7.12.26 The substation(s) transformers would be transported to the substation(s) site as abnormal loads of varying tonnage and length. The number of these vehicles has been included within the assessment of general construction traffic to ensure a robust assessment including all vehicles. It is however important to consider the effect of these particular vehicles in isolation, as the effects are quite different to those attributed to general construction traffic. For the purpose of this assessment, it has been assumed that all substation(s) transformers would arrive as abnormal loads to the site from the port at Peterhead via the A982 and the A90.

11.7.12.27 Generally, abnormal load vehicles can adjust their trailers to standard HGV dimensions once a delivery has been made. However, it is anticipated that the transformers will be delivered on fixed length flat bed trailers and therefore, the effects of abnormal–sized vehicles would occur in both the outbound and inbound directions.

11.7.12.28 Discussions with the relevant police authorities would determine the likely traffic management arrangements for these vehicle movements. These would be incorporated into the construction programme and the Traffic Management Plan to be produced by the contractors prior to commencement of construction. Discussions with the Peterhead Port Authority revealed that they have had previous experience with similar abnormal loads to the ones anticipated for this development. The important details to be established within the Traffic Management Plan would include determining an acceptable time for transporting abnormal loads and the number of loads it may be possible to transport at one time. In the calculations of traffic volumes it has been assumed that each abnormal load would require an escort of two police vehicles.

11.7.12.29 During the period when the loads are being transported there is likely to be some effect on other road users–particularly in terms of journey delays. This effect is increased at junction locations where vehicles in both directions would be required to wait until each load has negotiated the obstacle. However, it is anticipated that there may only be three locations where this possible cause for

journey delay would occur along the route from port to site. These are the roundabouts at the Errol St / South Rd (A892) junction, the A892 / A90 junction and the access junction to the proposed substation(s).

11.7.12.30 By careful management of the timing of the abnormal loads (namely, a traffic management plan) this would minimise any delays at these pinch points, thus producing an environmental effect of **negligible** significance.

Effect of Operational Traffic

11.7.12.31 The predicted level of substation–generated traffic during the day to day operating life of the OnTI has been estimated at approximately 910 light goods vehicle movements per month. It is considered that the increase in traffic levels due to the predicted operational traffic would result in an environmental effect of negligible significance and their effects on the local road network **negligible**.

11.7.12.32 As discussed previously the effect of operational traffic due to cable maintenance is considered to be not significant and their effects on the local road network **negligible**.

Effect of Decommissioning Traffic

11.7.12.33 Current baseline data collected for the purposes of this assessment will not be valid at the year of decommissioning, twenty five years after construction has been completed. As it is unlikely that baseline traffic figures on local roads will reduce appreciably over the next 25 years or so, it is considered that the percentage increase in traffic due to decommissioning would be low, and that overall the effects of decommissioning traffic would be no greater than that of the construction traffic detailed above.

11.7.13 Evaluation of Environmental Effects

11.7.13.1 This section details the resulting effects of the increase in traffic. This involves identifying the receptors and their sensitivity to the increased traffic levels (as set out in Table 11.7-2 above), establishing the criteria upon which effects will be assessed and proposing mitigation where required.

11.7.13.2 As identified in Table 11.7-6 above, it was predicted that the increase in HGV numbers on the A90, A950 and A952 will not exceed the 30 % threshold identified by IEMA. Applying the coarse filter described in Paragraph 11.7.5.4, effects in these particular road links are considered to be of negligible significance with no further assessment required.

11.7.13.3 However, all minor roads (mentioned previously in Chapter 10.7: Traffic and Transport) have been considered as potentially affected, and are therefore evaluated in this section.

11.7.13.4 Other receptors were identified and their sensitivity to environmental effects during the construction phase was evaluated. These receptors are identified in Table 11.7-8 below taking into account their size and function.

Table 11.7-8 Receptor Sensitivity

Location	Receptor Description	Effect	Minor	Moderate
St Fergus	Intermediate rural settlement located between the A90 and C32B junction. One car salesroom to the west of the A90 and a bar and a post office to the east of the A90. There is also a school within St Fergus set back from the A90 and the C32B. 40 mph and 30 mph speed limits exist at St Fergus on the A90 and C32B respectively	Increase in HGV movements	X	
		Impact of road safety	X	
		Vehicle delays due to increase in traffic		X
		Pedestrian severance, delay and intimidation		X
		Degradation of highway structure	X	
Crimond	Rural settlement located north of St Fergus on both sides of the A90. There is a school located to the west of the A90 and there is a speed limit of 40 mph through Crimond.	Increase in HGV movements	X	
		Impact of road safety	X	
		Vehicle delays due to increase in traffic		X
		Pedestrian severance, delay and intimidation		X
		Degradation of highway structure	X	
Mintlaw	Large rural settlement located on the junction of the A950 and A952. There are a number of local shops located on the A950 / A952 roundabout and Mintlaw Primary School on Longside Rd / A950. A 30 mph speed limit is in place throughout Mintlaw with a further 20 mph speed limit on the A950 outside the primary school.	Increase in HGV movements	X	
		Impact of road safety	X	
		Vehicle delays due to increase in traffic		X
		Pedestrian severance, delay and intimidation		X
		Degradation of highway structure	X	
Longside	Intermediate / large rural settlement located on the junction of the A950. A 30 mph speed limit is in place along the A950 through Longside.	Increase in HGV movements	X	
		Impact of road safety	X	
		Vehicle delays due to increase in traffic		X
		Pedestrian severance, delay and intimidation		X
		Degradation of highway structure	X	
Kininmonth Primary School	Small primary school located on the A952 roadside. Access to the school is via the C27B	Pedestrian severance, delay and intimidation	X	
		Degradation of highway structure	X	
Rathen &	Small primary school located in	Increase in HGV movements	X	

Location	Receptor Description	Effect	Minor	Moderate
Rathen Primary School	Rathen, a small rural settlement set back from the A90.	Vehicle delays due to increase in traffic	X	
B9033	Minor rural road (single carriageway typically 7.3 m wide) acting as a link between Fraserburgh and Inverallochy / St Combs. Fraserburgh golf course is located on the north and south sides of the B9033. The C17B and the B9033 south of St Combs offer alternative routes to and from Fraserburgh.	Increase in HGV movements	X	
		Impact of road safety	X	
		Vehicle delays due to increase in traffic	X	
		Pedestrian severance, delay and intimidation	X	
		Degradation of highway structure	X	
C–Roads	Minor rural roads with narrow single carriageways typically 5.5 m wide. Numerous access points to housing and rural settlements. There are several diversion options available for these roads should they be required, except for the C39B where none exist.	Increase in HGV movements		X
		Impact of road safety	X	
		Vehicle delays due to increase in traffic		X
		Pedestrian severance, delay and intimidation	X	
		Degradation of highway structure		X

11.7.13.5 The magnitude of the increase in traffic on the A roads, where the local settlements being assessed are located, is negligible due to the increase in traffic being less than 30 %. As discussed in Paragraph 11.7.1.9, the theoretical magnitude of the increase in traffic is also considered to be negligible.

11.7.13.6 To complete the evaluation of the significance of the environmental effects, the sensitivity of each receptor shown in the above Table 11.7-8 needs to be combined with the magnitude of the effect on that receptor.

11.7.13.7 The significance of the effects on the receptors in Table 11.7-8 above was assessed. As receptors with minor sensitivity and negligible magnitude result in a negligible significance, only the receptors with minor significance are detailed in Table 11.7-1 above.

11.7.14 Mitigation

11.7.14.1 Based on the foregoing analysis the following recommendations for mitigation are made for the unclassified roads:

- That all construction and operational vehicles will be required to only use the approved access route to the site;
- The contractor(s) will be required to prepare a Traffic Management Plan;
- Condition survey to be carried out in conjunction with the local council before and after construction;

- Make provisions for alerting road users of construction activities and delivery routes through signage;
- Provide suitable diversions around works where necessary; and
- Timing of works to avoid peak traffic periods.

11.7.14.2 Continuous monitoring during construction is not necessary, however, the Traffic Management Plan will ensure that frequent inspections are carried out to confirm that agreed mitigation measures as stated above are being implemented.

11.7.15 References

Institute of Environmental Management and Assessment. "Guidelines for the Environmental Assessment of Road Traffic – Guidance Notes No. 1". Institute of Environmental Management and Assessment

Institution of Highways and Transportation (1994). Guidelines for Traffic Impact Assessment. Institution of Highways and Transportation

11.8 Other Human Activities

11.8.1 Summary

11.8.1.1 This chapter presents an assessment of the likely significant effects of the construction, operation and decommissioning of the proposed Moray Offshore Renewables Limited (MORL) offshore transmission infrastructure (OfTI) on other human activities (with marine components) in the Moray Firth, along with proposed mitigation measures, where considered necessary.

11.8.1.2 The assessment of effects has been focused on establishing potential for overlaps and, therefore, conflict between activities and operators in both a geographical and temporal context.

11.8.1.3 The potential for the Project to disrupt activity associated with other proposed offshore wind farms and military practice areas is, based upon the outcomes of studies and consultation to date, not expected to be significant.

11.8.1.4 Whilst there is no existing oil infrastructure within the proposed offshore transmission infrastructure footprint, several operators hold licences to explore the potential of licence blocks which overlap with the location in which offshore substation platforms (OSPs) may be located. At present, exploration plans are not known. Taking a precautionary approach, the impact assessment assumes that licence holders may wish to explore the licence areas (e.g. undertake seismic survey) during OSP construction, operation and decommissioning. Construction works and OSP infrastructure may exclude exploration activities from particular locations and the effect is judged to be of minor adverse significance. In light of the uncertainty surrounding the plans of licence holders, MORL is committed to ongoing consultation, aiming for co–existence where achievable.

11.8.1.5 MORL's proposed export cable will be required to cross an existing subsea telecommunications cable in order to make landfall at Fraserburgh. Any damage caused to the SHEFA–2 cable during the installation of the MORL cable would be expensive to repair and may disrupt telecommunications. The potential effect upon the SHEFA–2 cable is of moderate adverse significance. Application of cable burial protection measures and adherence to cable crossing / proximity agreements and appropriate guidance will significantly reduce the risk of damage.

11.8.1.6 There is a potential for unexploded ordnance (UXO) to be encountered on the seabed within the footprint of the OfTI. Construction activities have the potential to disturb UXO and any unplanned detonation may impact upon human health and safety, as well as wind farm infrastructure and equipment. Without mitigation, the consequences of such an effect will be of major adverse significance. MORL are committed to a suite of standard industry measures to minimise risk from UXO, including a pre–construction UXO seabed survey, and the residual effect is therefore not significant.

11.8.1.7 A summary of the impact assessment is shown in Table 11.8–1 below.

Table 11.8–1 Impact Assessment Summary

Type of Effect	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
Construction / Decommissioning			
Effects on Other Offshore Wind Farms	Not significant	None	Not significant
Effects on Military Practice and Exercise Areas	Not significant	None	Not significant
Effects on Planned Oil Operations and Structures	Not significant	Ongoing consultation and co–ordination with operators	Not significant
Damage to Subsea Cables	Moderate adverse	Cable burial protection measures Cable crossing / proximity agreements Adherence to appropriate guidance	Not significant
Health and Safety Risk due to Unexploded Ordnance	Major adverse	Pre–construction UXO survey; UXO safety plan	Not significant
Operation			
Effects on Other Offshore Wind Farms	Not significant	None	Not significant
Effects on Military Practice and Exercise Areas	Not significant	None	Not significant
Effects on Planned Oil Operations and Structures	Minor adverse	Ongoing consultation and co–ordination with operators	Minor adverse
Damage to Subsea Cables	Minor adverse	Adherence to appropriate guidance	Not significant
Health and Safety Risk due to Unexploded Ordnance	Not significant	None	Not significant

11.8.2 Introduction

11.8.2.1 The construction, operation and decommissioning phases of the proposed OfTI has the potential to disrupt or disturb other human activities, or damage existing infrastructure within and adjacent to the proposed wind farm sites. This chapter specifically assesses potential effects upon the following:

- Other offshore wind farm projects;
- Military practice and exercise areas (PEXA);
- Oil and gas activity;
- Subsea cables and pipelines; and
- Unexploded ordnance (UXO).

11.8.2.2 It is anticipated that the Project will not result in any significant effects upon marine dredging and disposal activities and sites, or telecommunications systems, and so potential effects upon these receptors are not considered any further in the impact assessment that follows. Justification for not taking these forward is provided in Chapter 8.7 (Other Human Activities). Those projects, activities and infrastructure which are considered in impact assessment are described in Chapter 8.7 (Other Human Activities).

11.8.2.3 Note that likely significant effects upon the receptors listed below are discussed in detail in separate chapters:

- Chapter 11.1 (Commercial Fisheries);
- Chapter 11.2 (Shipping and Navigation) ; and
- Chapter 11.6 (Socio–Economics, Recreation and Tourism).

11.8.3 EIA Methodology

11.8.3.1 The methodology and criteria used to assess the significance of the effects on other human activities are presented in Chapter 8.7 (Other Human Activities).

11.8.3.2 MORL has developed a draft Decommissioning Programme (Technical Appendix 1.3 E) but is yet to finalise its approach to project decommissioning. At the time of ES preparation it is considered likely that decommissioning will involve the removal of structures above the seabed, whilst subsea cabling is likely to be left in situ at the end of the Project's lifetime. Decommissioning activities are likely to have effects on other human activities but for the purposes of this Environmental Impact Assessment (EIA) they are regarded as being comparable to those that occur as a result of construction activities. As a result, the effects of construction and decommissioning activities on other human activities are considered together.

Rochdale Envelope Parameters Considered in the Assessment

11.8.3.3 For the purpose of the other human activities impact assessment, a worst realistic case scenario has been defined and is presented in Table 11.8-2 below. In summary, it assumes a maximum infrastructure footprint (i.e. a maximum number of offshore substation platforms (OSPs), their maximum dimensions, and the maximum number of export cables of maximum length) and a maximum construction window.

11.8.3.4 The scenario defined below is also applied to the assessment of cumulative effects (see Chapter 15.8: Other Human Activities).

Table 11.8–2 Rochdale Envelope Parameters

Potential Effect	Rochdale Envelope Scenario Assessed
Construction & Decommissioning	
Damage / disturbance / disruption of other human activities	**Maximum footprint = 2.07 km² based on;** • Length of cable "bundles" = 103 km; • Width of trench affected area = 6 m; • No. of export cable "bundles" = 2 (in up to 2 trenches); • Length of inter-platform cabling = 90 km; • Area of seabed prepared for each OSP and converter station foundation = 36,100 m²; • No. AC OSPs = six; • No. AC/DC converter OSPs = two; and • Area affected by anchors = 10,740 m2 (assumes six x 12 Te anchors each 4.5 m wide x 3.64 m long, penetrating to a depth of 1 m deployed in a radial pattern around barge and re-positioned every 500 m and each affecting a nominal area of seabed of 5 m²). **Maximum (rolling) safety zone extent of 500 m around active installation works.** **Maximum construction window of up to three years.**
Health and safety risk associated with UXO	**Maximum construction seabed footprint of 1.99 km², as defined above.** **Maximum construction window of up to three years.**
Operation	
Damage / disturbance / disruption of other human activities	**Total footprint = 0.58 km² based on;** • Area per OSP / converter station GBS foundation = 16,900 m²; • Area of scour material per AC OSP / AC / DC converter station GBS foundation = 8,700 m²; • Cable protection per OSP and converter station = 20,000 m²; • No. AC OSPs = six; • No. AC / DC converter OSPs = two; • Area of cable protection material required in shallow inshore rocky seabed areas per cable bundle = 190,00 m²; • No of cable "bundles" = 2; and • Use of rock cutting equipment in water depths < 1 m. **Most frequent maintenance schedule, involving regular visits to site by vessel and / or helicopter over the project lifetime of 25 years.**

11.8.4 Impact Assessment

Construction / Decommissioning

Effects on Other Offshore Wind Farms

11.8.4.1 The proposed offshore transmission infrastructure will not overlap with either the existing Beatrice Demonstrator Project turbines or the proposed Beatrice Offshore Wind Farm site and its proposed transmission infrastructure. Beatrice Offshore Wind Farm Ltd (BOWL) is fully aware of the proposed MORL Project; the BOWL and MORL developers have to date worked cooperatively (e.g. undertaking joint EIA studies) and would intend to continue to do so during wind farm and transmission infrastructure construction, looking for opportunities to work together efficiently. Project programmes indicate that it is possible that the BOWL and MORL projects would be constructed concurrently, though the ongoing sharing of information on planned project activities would limit the potential for interaction between the sites and is considered unlikely that one developer would hinder the other. **No significant effect** is predicted.

11.8.4.2 Effects associated with increased vessel traffic during the construction of the MORL and BOWL transmission infrastructure are addressed in Chapters 11.2 and 15.2 (Shipping and Navigation).

Effects on Military Practice and Exercise Areas

11.8.4.3 Portions of the proposed offshore transmission infrastructure lie within danger area D809 (South), which is used by the RAF for a variety of practice flying and firing exercises. There is the potential that the physical presence of vessels involved in the construction of the infrastructure could lead to temporary disruption or exclusion of military activity within D809. However, during consultation the Ministry of Defence (MoD) has not highlighted any concerns with regard to D809 and therefore both the sensitivity of the receptor and the magnitude of the effect are considered negligible and there will be **no significant effect**.

Effects on Oil Operations and Structures

11.8.4.4 There is no existing oil infrastructure within the proposed offshore transmission infrastructure footprint.

11.8.4.5 The proposed OfTI infrastructure, depending upon its final location, may overlap with oil and gas licence blocks awarded to several operators. Operators are yet to explore the potential of the licence blocks and their exploration plans are currently unknown. Discussion is ongoing with one licence holder, Caithness Petroleum Ltd, and MORL will seek to initiate communications with Suncor and Sendero (licences awarded late in MORL EIA process) in order to understand their exploration plans. It is possible that the licence holders may wish to undertake seismic surveys within their licence blocks; if this is the case, survey activity would be excluded from construction locations (and the associated 500 m rolling safety zone). With a negligible sensitivity and magnitude (i.e. exclusion would be temporary and cover a small portion of the licence blocks, and it is assumed there is a degree of flexibility in terms of when seismic survey is undertaken and a variety of survey techniques that may be employed), there will be **no significant effect** on oil and gas activities. The offshore export cable route does not overlap with any licence blocks.

Damage to Subsea Cables

11.8.4.6 The proposed MORL export cables will need to cross an existing SHEFA–2 telecommunications cable. As part of the cable installation process, the following activities could impact upon the SHEFA cable:

- Cable installation and protection activity (via trenching, jetting, ploughing, etc.);
- Vessel anchoring; and
- Debris clearance operations.

11.8.4.7 Damage to subsea cables is expensive to repair and can cause disruption to international telecommunications. As a result, the sensitivity of the receptor is considered to be high. The magnitude of the effect will be medium given that the SHEFA cable will have to be crossed. The unmitigated effect is therefore considered to be of **moderate adverse significance**.

Health and Safety Risk due to Unexploded Ordnance

11.8.4.8 There is potential for UXO associated with historic and current military activity to be encountered on the seabed in the area of the offshore transmission infrastructure. During construction, activities which will have contact with the seabed, either directly (e.g. jack–up vessel, cable laying) or via the placement of material (e.g. foundations or cable protection), run the risk of disturbing UXO with potentially damaging and dangerous effects to both employees and equipment. As human life is at risk, receptor sensitivity is considered to be high. Effect magnitude is considered to be medium and the effect is of potentially **major adverse significance**.

Operation

Effects on Other Offshore Wind Farms

11.8.4.9 Activity associated with the operation of the offshore transmission infrastructure will be significantly reduced relative to the construction / decommissioning phases. Monitoring and maintenance vessels will require access, with any exceptional maintenance activity likely to have a temporary 500 m exclusion zone imposed around the relevant structure. The potential for two such maintenance events occurring concurrently is considered extremely unlikely and in light of established and ongoing coordination of works by MORL and BOWL, **no significant effect** is predicted.

Effects on Military Practice and Exercise Areas

11.8.4.10 As detailed with the 'construction / decommissioning' effects text, although portions of the proposed offshore transmission infrastructure overlap with a military PEXA, no concerns have been raised by the MoD during consultation with MORL. **No significant effect** is anticipated.

Effects on Oil Operations and Structures

11.8.4.11 As detailed above, the intentions of current oil and gas block licence holders are currently unknown. Should licence holders seek to commence block exploration once the offshore transmission infrastructure is operational, it is expected that activities such as seismic survey will be spatially restricted over a relatively small

area by the presence of OSPs and export cabling. With a low sensitivity and magnitude, the potential effect is deemed to be of **minor adverse significance**.

11.8.4.12 Effects associated with vessel access to existing oil and gas infrastructure are addressed in Chapter 11.2 (Shipping and Navigation) and effects upon helicopter access are detailed in Chapter 11.3 (Military and Civil Aviation).

Damage to Subsea Cables

11.8.4.13 During the operational phase, there is the potential for disturbance to subsea cables from maintenance activities, such as OSP foundation and cable repair work which could entail the use of jack–up vessels and the deployment of anchors. It is expected that any such activity will be subject to the same principles and agreements as established under construction.

11.8.4.14 The likelihood for damage to existing cables during such maintenance work is therefore remote and consequently the magnitude of effect is considered to be low. Damage to submarine cables is expensive to repair and can cause disruption to telecommunications and therefore, the value and sensitivity will be high. As a result the potential effect will be of a **minor adverse significance**.

Health and Safety Risk due to Unexploded Ordnance

11.8.4.15 The natural processes of the sea, including tidal action, seabed conditions, movement of sand waves, wave action and bad weather all contribute to the movement of objects on the seabed. Human activities such as seabed trawling will also contribute to the movement of objects, and as such, there is a risk of UXO moving into the MORL transmission infrastructure locations. This will have implications for maintenance and repair activities of foundations, cables and scour protection but the risk is expected to be limited as UXO will have previously been identified during pre–construction surveys. Therefore, **no significant effect** is predicted.

11.8.5 Proposed Monitoring and Mitigation

Construction and Decommissioning

11.8.5.1 There are a number of mitigation measures that will be implemented to reduce the risk of any effects on other human activities occurring.

Oil Operations and Structures

11.8.5.2 MORL will continue to engage with current oil and gas block licence holders in order first to understand their exploration plans and, secondly, to limit any conflicts of interest and achieve co–existence where possible. MORL is actively engaged in ongoing discussions at industry level with RenewableUK, Oil and Gas UK, and the Department of Energy and Climate Change (DECC), which are aiming to develop a protocol by which any conflicts of interest between the offshore wind, oil and gas industries may be amicably resolved.

Subsea Cables

11.8.5.3 There are a number of mitigation measures that will be implemented as part of standard industry best practice that will serve to lower the risk of any impact on

subsea cables. Where necessary, cable protection will be used to ensure future cable integrity and to separate sections of cable from potential risks (e.g. the risk of anchor penetration in areas where cable burial depth is restricted by geology).

11.8.5.4 Consultation has been undertaken with Faroese Telecom (the operator of the SHEFA–2 cable) and they have not raised an objection to the MORL project. Further discussions will result in cable crossing / proximity agreements being secured post–consent which will include detailed crossing conditions and methodology. Faroese Telecom will also be notified of any MORL works within 1,000 m of the SHEFA–2 cable.

Unexploded Ordnance

11.8.5.5 Although the Health & Safety at Work Act 1974 and the Construction (Design and Management) Regulations 2007 do not specifically require a dedicated UXO assessment, there is an obligation on those responsible for intrusive works to ensure that a comprehensive threat assessment is undertaken and risk mitigation measures are implemented with regard to all hazards on site. MORL will ensure that all practicable mitigation measures to minimise the risk of health and safety incidents associated with UXO are fully developed prior to construction. A UXO site survey will be undertaken prior to construction, where it is considered to be likely that UXO will be encountered, and site safety instructions will be prepared in the event that an item of UXO is located. All contractors' staff will be given munitions awareness briefings prior to and during the construction work. Should suspected items of UXO be discovered, their location will be accurately mapped and recorded for future assessment and possible removal / disposal or remediation in situ by a specialist contractor. The MoD and emergency services will also be consulted as appropriate.

Operation

Oil Operations and Structures

11.8.5.6 As per mitigation during construction and decommissioning phases, MORL will continue to engage with oil and gas operators to achieve co–existence where possible.

Subsea cables

11.8.5.7 The future arrangements made in the cable crossing agreement with Faroese Telecom and any other operators will serve to reduce the likelihood for impact.

11.8.6 Residual Effects

11.8.6.1 A summary of the impact assessment is shown in Table 11.8–1 above.