

Section 9

Cumulative and transboundary impacts from implementing the Draft Plan

9 Cumulative and transboundary impacts from implementing the Draft Plan

9.1 Introduction

Cumulative impacts occur as a result of a number of activities, discharges and emissions combining or overlapping, potentially creating a significant impact. Potential cumulative impacts could arise as a result of impacts resulting from seismic and exploration activities interacting or combining with those from other activities taking place in the IOSEA3 area. These may include, for example, seismic survey and exploratory drilling from the Draft Plan interacting with marine scientific research, commercial fishing, shipping and military activities. Some of the impacts assessed in Sections 7 and 8 have the potential to combine with each other, and should therefore be considered together or cumulatively in this section.

Transboundary impacts are those which could potentially have an impact on the environmental and resources beyond the boundary of UK waters. In 1991, in Espoo in Finland, the Convention on Environmental Impact Assessment in terms of transboundary impacts was established. The Espoo Convention addressed the need to enhance international co-operation in assessing transboundary environmental impacts and highlighted a number of activities that may potentially cause significant adverse transboundary impacts, among them offshore hydrocarbon production. Of the likely impacts arising from seismic survey and drilling activity under the Draft Plan, the only ones potentially capable of extending across national boundaries into the territories of other EU nations are underwater noise from seismic survey, accidental hydrocarbon spills, and atmospheric emissions.

9.2 Noise

This section assesses the cumulative impacts of anthropogenic sound in the IOSEA3 area. Both seismic surveys and offshore drilling operations contribute to manmade sound in the marine environment, although the sound levels generated by former are inherently more significant than the latter. Other sources of sound in the IOSEA3 area include those of military vessels, super tankers and research vessels which, at times, all emit relative high levels of sound into the water column.

9.2.1 Cumulative noise impacts from seismic surveys

Table 4.1 summarises the predicted seismic survey effort in the IOSEA3 area, for the period 2010 to 2016. The table shows that, between 2010 and 2016 levels of seismic survey activity are high, with an estimated total of 413 ship days per year during this period. The practical operational timing of seismic survey is weather dependent and, therefore, can effectively only take place during the summer months when the weather is most likely to be suitable. As a consequence, seismic surveys may overlap, particularly as the predicted survey effort is greater than 3 months per year for each year of the plan. This will add to existing noise levels from other sea users including shipping and the oil and gas industry in this region of the northeast Atlantic.

Large marine mammals are regular visitors of the waters west of Ireland, as a result of upwelling currents bringing plentiful supplies of food. In addition, there is some evidence that the area is used as a migratory pathway by certain baleen whale species. Gordon *et al* (1998) suggests that migratory pathways could be interrupted and feeding grounds disrupted if several seismic surveys occur at the same time. Simultaneously generated (loud) sound sources from different directions, such as those generated by multiple (seismic) vessels, have the potential to reduce the effectiveness of a marine mammal's directional hearing. This effect might be exacerbated by the complex bathymetric environment of the Rockall Basin, which might deflect and refract sound waves in multiple directions. However, studies both in northwestern Australia and along the Californian coast have indicated that baleen whales continue to migrate into areas of consistently high survey activity, and along coastlines subjected to decades of seismic activity (McCauley, 1994).

In the event that there is a requirement for multiple surveys, in the same area and at the same time, it is advised these are combined into consecutive surveys through appropriate planning and co-operation. If surveys must be carried out simultaneously, a minimum separation distance of



100 km should be observed between survey vessels, in order to create a corridor between the two surveys through which marine mammals and fish can avoid, or safely leave, these areas and migration routes are not impeded.

9.2.2 Cumulative noise impacts from drilling operations

Table 9.1 shows the predicted maximum drilling activity in the IOSEA3 area for the period 2010 to 2016, expressed as the amount of exploration, appraisal and development wells to be drilled and associated drilling time (assuming an average drilling time of 50 days per well).

Table 9.1 Maximum estimated drilling effort in the IOSEA3 area

Drilling activity	2010	2011	2012	2013	2014	2015	2016	Total
Number of wells	0	1	2	4	6	6	6	25
Drilling time (days)	0	50	100	200	300	300	300	1,250

The table shows that drilling activity is expected to increase over the years, levelling out at 300 days per year. This indicates that multiple drilling operations may have to take place simultaneously, in order to accommodate the maximum level of drilling activity.

The impact of such noise is difficult to assess due to uncertainties in how noise affects specific marine mammals, and how far the noise will be transmitted in the sea. However, it is estimated that the underwater noise produced could elicit response from individual cetaceans if they pass within 350 m to 3.5 km of a semi-submersible drilling rig or a drill ship respectively. Harbour porpoises might show a slightly increased avoidance distance, as they have shown to be quite sensitive to a wide range of human sounds at relatively low exposures. The limited data available for seals indicate avoidance behaviour to be limited to distances within a few hundred metres of the source at most. At certain times, multiple drilling operations are expected to take place simultaneously within the IOSEA3 area. It is however unlikely that the underwater sound generated by these operations will overlap in such a way as to cause a significant cumulative impact.

9.2.3 Cumulative impacts of seismic and drilling activities with noise from other sea users

Other users of the IOSEA3 area may include merchant shipping, fishing, marine scientific research, naval vessels, and the oil and gas industry in adjacent offshore areas. Table 7.2 in Section 7 shows some indicative sound levels of various users of the sea. This table shows that, in general, sound levels of all these users are attenuated to below levels expected to cause any effects on marine mammal or fish behaviour within a few km from the source (with the exception of seismic surveys).

Due to the transitory and temporary nature of noise inputs to the sea from other sea users (mainly fishing and shipping), the interaction of these with underwater noise from drilling and associated activities is unlikely to cause significant cumulative impacts. Fishing vessel activity in the IOSEA3 area is low and not concentrated in any particular location. Similarly, whilst commercial shipping tends to follow two or three main routes through the IOSEA3 area, traffic levels are very low. Interactions of seismic and drilling activities with these other noise sources are transient, and therefore any significant cumulative impacts with regard to other sea users are therefore unlikely.

9.2.4 Transboundary impacts

The northern edge of the IOSEA3 area is confluent with the Ireland/UK international boundary line, so potential does exist for noise from survey and drilling activities to travel into UK territory. Any transboundary impacts with regard to noise during seismic surveys and drilling activity will be limited in scale and of very short duration. However, in view of the likelihood that seismic surveys can interfere with each other and can give rise to environmental impacts, notification of seismic activity planned within 100 km of the Ireland/UK boundary will be given to the appropriate licensing authorities.

The NIEA expressed concerns as to the potential impacts of the IOSEA3 Draft Plan on the Ellet line, which is a chain of oceanographic monitoring stations extending from Scotland in the UK to Iceland via the Anton Dohrn seamount and the islet of Rockall. The Ellet line passes more than 100 km to the north of the IOSEA3 area at its closest point, and whilst noise from seismic surveys may be measurable at this distance, it will not have any impact on the oceanographic parameters being monitored. Therefore the impact from seismic survey noise in the IOSEA3 area on the Ellet line, and the long-term data that it yields for research into climate change for example, should be negligible.

9.2.5 Conclusion

The long term, synergistic and cumulative impacts of sound sources in water are poorly understood. As a result, the introduction of additional low frequency noise into the marine environment from seismic surveys in the IOSEA3 area should be considered to have the potential to create a cumulative effect. However, the relatively short duration of the individual seismic surveys and the directional character of most of the produced sound, suggests that any potential cumulative and transboundary impacts will be minor provided appropriate mitigation measures are in place.

9.3 Discharge of drill cuttings and disturbance to sea bed

Drilling activity within the Rockall Basin area has been very low historically, with only 3 wells drilled to date. As discussed in Section 8.3.2 the extent of sea bed disturbance impacts potentially arising from the oil and gas industry amount to a very small proportion of the 117,000 km² IOSEA3 area. In addition, the temporary nature of anchoring impacts, and the very localised extent and low toxicity of discharged drilling wastes on the seabed, lead to good recovery potential in the dynamic benthic environment of the IOSEA3 area. However, the significance of any impact depends on the nature of the benthic environment at the sites concerned, and whether or not particularly sensitive or important habitats or species, seabed features or notable archaeological interests are present.

Other activities taking place within the IOSEA3 area which lead to physical disturbance of the sea bed include commercial fishing for demersal or benthic species, and telecommunications cable installation. There is currently no aggregate extraction or aquaculture taking place within the IOSEA3 area, and there is no dredging or spoil dumping within the area either.

With regard to fishing, there are no data quantifying the area of seabed trawled or dredged in the IOSEA3 area. However, due to the localised and discontinuous nature of seabed disturbance associated with drilling activities, the additive effect resulting from the Draft Plan would be relatively small.

Exploration drilling activity will be taking place in an environment that has long been used for a variety of economic activities, some of which disturb the seabed. As the potential impacts from drilling discharges and physical disturbance to the marine environment tend to be localised, of short duration and with generally good recovery potential, the risks of cumulative impacts are considered to be low for this level of exploration and appraisal activity. For these reasons, transboundary impacts from drilling are also likely to be negligible.

9.4 Atmospheric emissions

9.4.1 Cumulative impacts of emissions from seismic surveys

The annual emissions resulting from seismic survey activity in the IOSEA3 area would result in potential emissions of 22,242 tonnes CO₂ equivalent for 413 survey ship effort days per year. Emissions of CO₂, NO_x and SO₂ from shipping in and around Ireland have been estimated in Entec (2005) and are summarised in Table 7.5. These show that the assumed annual seismic survey effort in the IOSEA3 area would make up 0.82%, 0.66% and 0.06% respectively of the total forecast emissions of these substances from shipping for 2010. In this context, the predicted atmospheric emissions from seismic survey activity in the IOSEA3 area between 2010 and 2016 can be considered to be minor, and therefore its resulting impacts are expected to be insignificant.



9.4.2 Cumulative impacts of emissions from drilling activity

The annual emissions resulting from the drilling of potentially up to four wells per year (including two with full well tests) would result in potential emissions of 55,467 tonnes CO₂ equivalent. Against the figure of 69.76 million tonnes CO₂ equivalent for Irish emissions for 2006, the annual emissions from the proposed annual drilling activity in the IOSEA3 area would be just 0.08% of total annual Irish emissions, which is considered to be insignificant.

9.4.3 Cumulative impacts of combined emissions from seismic and drilling activity

The combined emissions on an annual basis from both seismic survey (22,242 tonnes) and drilling (55,467 tonnes) activities in the IOSEA3 area amount to 77,709 tonnes CO₂ equivalent. This equates to 0.11% of the total annual Irish emissions for 2006 (EPA, 2008b).

9.4.4 Transboundary impacts from atmospheric emissions

With prevailing wind directions being from the west and southwest, most of the vessel emissions are likely to be deposited in Irish coastal waters or in Ireland. In terms of possible transboundary impacts, a small proportion of the emissions considered might end up in other European states including the UK. As outlined above in Section 9.4.3, the combined annual emissions anticipated from both seismic survey and drilling amount to 77,709 tonnes CO₂ equivalent. This equates to 0.11% of the total annual Irish emissions of 69.76 million tonnes CO₂ equivalent for 2006 (EPA, 2008b). In this context, the additional incremental transboundary impacts of emissions (including potential impacts on the UK Ellet line of oceanographic monitoring stations) from activities carried out under the IOSEA3 Draft Plan are likely to be negligible.

Shipping emissions in the UK have fluctuated between approximately 1.5 - 2.0 million tonnes carbon dioxide equivalents between 1996 and 2006 (DEFRA, 2006). Set against this, and against the almost 200 million tonnes of carbon dioxide arising from European-flagged ships in 2000, the annual and total emissions estimated to result from the proposed seismic survey are low by comparison. There is also a much higher level of exploration activity generally underway in the UK, and the impact of any emissions crossing over from exploration activity in the IOSEA3 area will be minor compared to these. For comparison, the total GWP of emissions from UK exploration activity in one year amounted to approximately 551,437 tonnes CO₂ equivalent (EEMS, 2004), although it should be noted that the UK Environmental Emissions Monitoring System (EEMS) only covers drilling rig fuel use and well testing, and excludes data on support vessels and helicopters. Within this framework the increases in atmospheric emissions resulting from the proposed seismic and drilling activity can only be viewed as negligible.

9.5 Physical presence

9.5.1 Cumulative effects of physical presence of seismic and drilling activities

In terms of physical exclusion to other sea users, the combination of seismic survey and drilling activity is mutually exclusive; drilling at a location tends to follow on from a seismic survey. However, it may be useful to consider the total area affected by the proposed activities.

With regard to seismic survey, a 500 m exclusion zone applies around the vessel and streamers at any one time whilst on survey. Based on the information in Section 4, and taking the conservative (worst case) view that other sea users might realistically need to avoid not just the survey vessel itself but the whole survey area for the day, this could amount to an exclusion area amounting to 150 km² per day for a 2D survey and 90 km² per day for a 3D survey. Thus, the Draft Plan for the IOSEA3 area would amount to 240 km² per day being excluded to other sea users for 413 days per year over the period 2010 to 2016. This is equivalent to approximately 0.2% of the 117,000 km² offshore area covered by the Draft Plan per day.

In the case of drilling, up to 25 wells over 7 years (up to four per year) from all activities will be drilled, with an exclusion zone of 500 m radius around each. On this basis, the maximum level of drilling expected would cause a total exclusion area of less than 5 km² to be unavailable to other sea users in any one year on a temporary basis. This total is insignificant in relation to the 117,000 km² of offshore area being proposed for the Draft Plan, and is much smaller than the exclusion that may possibly result from seismic survey activity. Together with the 'worst case' rough estimate for seismic survey of 240 km² per day, the total cumulative impact of implementing the Draft Plan along with pre-

existing activities could be to exclude other sea users from up to approximately 245 km², or less than 0.5% of the IOSEA3 area.

Within the IOSEA3 area, the fishing industry may be of closest relevance to the oil and gas industry in comparing levels of exclusion to other sea users (and possibly also disturbance to the sea bed in combination with drilling discharges to the sea bed). However, the impacts of the physical presence on these various users in the IOSEA3 area do not change significantly when considered in combination.

9.5.2 Transboundary impacts

There is little transboundary impact likely to arise from seismic vessel activity within the IOSEA3 area. It is possible that some of the seismic vessel activity in the IOSEA3 area will be based in ports in other European States. In addition, the proposed activity has the potential to interact with shipping travelling through the area to or from other European ports. The anticipated levels of seismic survey vessel activity are very low, and therefore any impact on other shipping will be insignificant. In addition, seismic surveys are subject to regulation and any potential impacts to other shipping would be mitigated through existing control and notification measures.

9.6 Accidental events

9.6.1 Cumulative and transboundary impacts

The total draft plan and existing exploration activities forecast for the IOSEA3 area indicate a maximum of 25 exploration, appraisal and development wells will be drilled between 2010 and 2016. Based on the probabilities outlined for UK and Norwegian production, the incremental risk of a significant hydrocarbon spill is very low.

The cumulative level of hydrocarbons entering the marine environment from spills associated with exploration, appraisal and development drilling is likely to be negligible when considered against other natural and anthropogenic sources. While the impacts from oil spills will differ from those of hydrocarbon inputs from rivers, sewage and shipping for example, even large oil spills associated with tanker accidents do not appear to have had long term chronic impacts on marine ecosystems.

Transboundary impacts on the UK marine environment are considered to be the same or less than for Ireland. The island of Tiree off the coast of Scotland is the closest UK landfall some 130 km to the northeast of the IOSEA3 area, and the UK's Ellet line of oceanographic monitoring stations lies over 100 km to the north of the IOSEA3 area. Any oil spill likely to have impacts in UK waters will be reported by the Irish Coast Guard to the relevant UK authorities. The Irish Coast Guard has a close working relationship with the UK Maritime and Coast Guard Agency (MCA) and the two have a draft Service Level Agreement for co-operation on search and rescue and oil spill response in place. The Irish Coast Guard and the UK MCA also regularly conduct joint search and rescue and oil spill response exercises.

Cumulative and transboundary impacts from a shallow gas blowout would be reservoir specific. Atmospheric emissions could potentially have cumulative effects, although they would be dependent on the type and volume of gas released into the atmosphere. Similarly, transboundary impacts could possibly occur with the UK and other European States.

In conclusion, the degree of activity predicted to take place under the IOSEA3 Draft Plan, particularly when set against the oil and gas activity already taking place in Irish and UK offshore waters, is small. Additionally, there is an existing framework regulating offshore activities and for co-ordination of resources in the event of transboundary incidents. Finally, statistics for accidental events indicate that spills and releases from seismic survey and exploration drilling are minor and have control measures in place for clean-up and limiting impacts. Overall therefore, the risk of significant cumulative or transboundary impacts from accidental events is likely to be negligible.