Rialtas na hÉireann
Government of Ireland

DRAFT Plan for assessment of applications for Petroleum Exploration and Production Authorisations in Irish Offshore Waters for the Period to 2030

2022

Prepared by the Department of the Environment, Climate and Communications
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1 Introduction

The "*Plan for assessment of applications for Petroleum Exploration and Production Authorisations in Irish Offshore Waters for the Period to 2030*" sets out the proposed approach to the issuing of petroleum authorisations in Ireland, and the consideration of the possible offshore exploration activities that could take place under such authorisations, to reflect the 2020 Programme for Government commitment to end the issuing of new Petroleum Authorisations for the exploration and extraction of gas on the same basis as the decision taken in 2019 by the previous Government in relation to oil exploration and extraction and the subsequent statutory basis provided for this commitment through the enactment and commencement of the Climate Action and Low Carbon Development (Amendment) Act 2021 on 7 September 2021.

Holders of existing authorisations are not affected by the changes and may apply to progress their authorisations through the licensing stages towards a natural conclusion which may include expiry, relinquishment, production or rejection. Any such applications, or applications to undertake offshore activities under an authorisation, remain subject to consent, and will continue to be required to meet environmental, technical and financial standards as appropriate.

The Plan is being considered in the context of both Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA), with the entire project referred to as Irish Offshore Strategic Environmental Assessment 6 ('IOSEA6') with the following objective:

- To inform the Department of the Environment, Climate and Communications of specific environmental considerations in petroleum activities taking place under both existing petroleum authorisations and any follow-on authorisations that may be granted during the lifetime of the "Plan for assessment of applications for Petroleum Exploration and Production Authorisations in Irish Offshore Waters for the Period to 2030" in line with current policy and legislation.
- To provide petroleum authorisation holders with an operational baseline against which they can conduct activities whilst ensuring the protection of the marine environment, in line with current best practice and lessons learned from previous IOSEAs.

This process will inform the final version of the Plan as well as identify mitigation measures to be taken into account when undertaking offshore exploration and production activities under petroleum authorisations

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This Plan will cover the period from its adoption to 2030, which is a key milestone across several Government policies which are relevant to reducing Ireland's reliance on fossil fuels. This includes the timeframe for significant targets and priorities set out in the Climate Action and Low Carbon Development (Amendment) Act 2021 and Climate Action Plan 2021, including:

- Reducing our greenhouse gas emissions by 51% by 2030 and transitioning to net zero emissions no later than 2050;
- Delivering up to 80% of renewable electricity (both onshore and offshore) by 2030 including a target of up to 5 GW of offshore renewable electricity generation; and
- Investment of up to €8 billion in the retrofitting of 500,000 homes to a Building Energy Rating of B2/cost optimal or carbon equivalent and the installation of 600,000 heat pumps, 400,000 of which will be in existing homes by 2030.

The Climate Action Plan also reflects Ireland's commitment to achieving the 2030 UN Agenda for Sustainable Development.

The National Development 2021-2030 plan sets out a total Exchequer and non-Exchequer investment of €165 billion over the period 2021 to 2030.

Given the above and the policy and legislative background with regard to issuing new petroleum authorisations, it is appropriate that this Plan will remain in place until 2030.

2 Policy and Legislative Background

2.1 Programme for Government commitment to end new licences for exploration

The Programme for Government – Our Shared Future (June 2020) sets a clear pathway towards less reliance on fossil fuels across every sector of our society. It specifically contains a commitment to end the issuing of new licences for the exploration and extraction of gas on the same basis as the decision taken in 2019 by the previous Government in relation to oil exploration and extraction.

This commitment was made effective immediately upon the current Government taking office in June 2020. Since then, DECC has no longer accepted new applications for new petroleum authorisations. In addition, there will be no future licensing rounds. Holders of existing authorisations are not affected by these changes and may apply to progress their

authorisations through the licensing stages towards a natural conclusion which may include expiry, relinquishment, production or rejection.

2.2 Petroleum and Other Minerals Development Act 1960

The Petroleum and Other Minerals Development Act 1960 contains the statutory basis for the issuing of authorisations (in particular, sections 7, 8, 9, 10, 13 and 19), and for environmental impact assessment of plans for the working of petroleum (sections 13A and 13B).

Section 21 of the Climate Action and Low Carbon Development (Amendment) Act 2021 amends the Petroleum and Other Minerals Development Act 1960 to restrict the Minister's power to grant new petroleum authorisations by repealing certain sections of the Act. Saving provisions, however, provide that the Minister may grant successor authorisations to holders of existing authorisations (and further successor authorisations in the future, depending on the stage of the authorisation).

Any such applications remain subject to Ministerial consent and the provisions of the Petroleum and Other Minerals Development Acts 1960-2021 and the relevant Licensing Terms for Offshore Oil and Gas Exploration, Development & Production 2007.

2.3 Policy Statement on for Petroleum Exploration and Production in Ireland

The Department of the Environment, Climate and Communications will publish a revised policy statement on Petroleum Exploration and Production in Ireland in the coming months. This will replace the December 2019 Policy Statement – Petroleum Exploration and Production Activities as part of Ireland's Transition to a Low Carbon Economy. The new policy statement will take into account the policy and legislative changes that have taken place since 2019.

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3 Current Status of Petroleum Exploration in the Irish Offshore

Ireland operates a concession system whereby, petroleum exploration companies are given rights to explore for petroleum within defined acreage offshore, through a licensing system which progresses from a licensing option to exploration licence and lease, in the event of a commercial find. Progression from Licensing Option to Exploration Licence and between the individual phases of an Exploration Licence is dependent upon fulfilment by the authorisation holder of work programme obligations.

Industry carries the financial risk associated with such exploration and fiscal terms have been designed to strike the necessary balance between attracting the high-risk exploration investment necessary to prove the potential of the Irish Offshore and maximising the return to the State from Ireland's natural resources.

Since exploration began in the Irish offshore, four commercial gas discoveries (Kinsale Head, Ballycotton, Seven Heads and Corrib) have been made. The Kinsale, Ballycotton and Seven Heads gas fields off the coast of Cork ceased production on 5 July 2020 and the decommissioning of the gas fields is now underway. The Corrib gas field commenced commercial operation on 30 December 2015; by 2017, it met 63% of Ireland's (ROI) gas demand. However, gas volume plateaued in 2018 and since then it has been in decline. Cessation of production is expected in 2030. Corrib is now meeting circa 25% of Ireland's gas demand. While there have been some discoveries of oil in the Irish offshore, to date none of these have been declared commercial.

The geographic scope of the 6th Irish Offshore Strategic Environmental Assessment (IOSEA6) was based on the blocks from the Offshore Ireland Petroleum Exploration & Development Concession Map issued on 31st December 2021. This map was selected as the Study Area at the time of commencing the IOSEA6 assessments and was used in the geographic mapping of baseline information and summary of the baseline environment.

Existing authorisations shown in the Concession Map (Figure 1) are principally located in the Irish and Celtic Seas within the Slyne Basin in the eastern section of Rockall Basin, Porcupine Basin, North Celtic Sea Basin and Central Irish Sea Basin.

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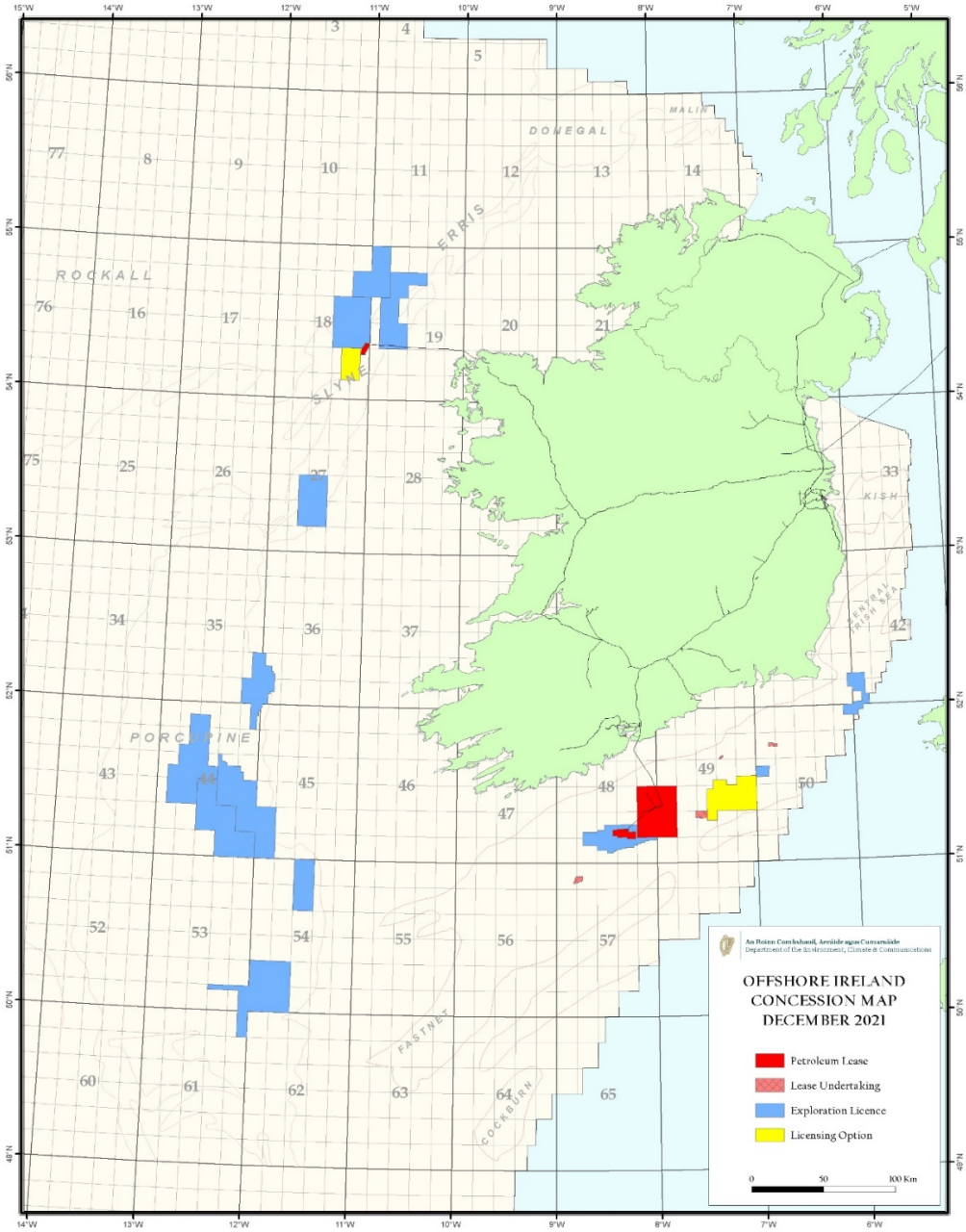

Figure 1: Concession map of Petroleum authorisations under regulation as at 31 December 2021, which was subject of IOSEA6

The effects of the changes in policy in recent years are very apparent. As of December 2021, there were 24 authorisations in force under the Petroleum and Other Minerals Development Act 1960. This represents a net reduction of 31 authorisations since September 2019, at which point there were 55 authorisations in force.

However, it should be noted that since the IOSEA 6 exercise commenced in early 2022, three licences have been relinquished and the areas covered by the Plan are likely be smaller in scale. Figure 2 below shows the decrease in the number of authorisations since 31 December 2021 in further detail.

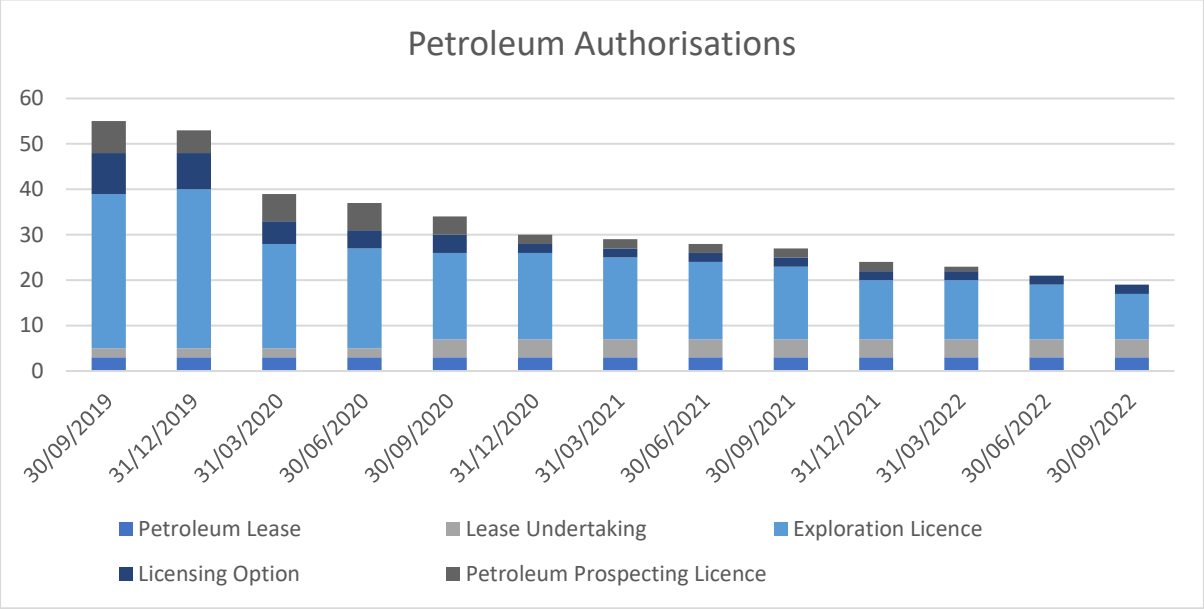

Figure 2: Petroleum authorisations under regulation at the end of each quarter, from September 2019 to latest Acreage Report dated 30th June 2022. Source: Quarterly Acreage Reports on gov.ie

It is expected that the overall number of authorisations will continue to decline as authorisations expire or are relinquished – with no new authorisations for new exploration replacing them. However, as holders of existing authorisations may apply for successor authorisations, it is possible that the number of lease undertakings and leases could increase over time as the amount of exploration licences declines.

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4 Plan for assessment of applications for Petroleum Exploration and Production Authorisations

4.1 Government Policy for issuing of Petroleum Authorisations

As already noted, Section 21 of the Climate Action and Low Carbon Development (Amendment) Act 2021 amends the Petroleum and Other Minerals Development Act 1960 to restrict the Minister's power to grant new petroleum authorisations by repealing certain sections of the Act. However, saving provisions provide that the Minister may grant successor authorisations to the holders of existing authorisations (and further successor authorisations in the future, depending on the stage of the authorisation).

Any such applications remain subject to Ministerial consent and the provisions of the Petroleum and Other Minerals Development Acts 1960-2021 and the relevant Licensing Terms.

Accordingly, there will be no new petroleum exploration or extraction in areas not currently under authorisation. In that regard, as there are no extant onshore authorisations, the onshore area will remain closed for petroleum exploration and production, in accordance with the 2019 Policy Statement – Petroleum Exploration and Production Activities as part of Ireland's Transition to a Low Carbon Economy.

In line with the Petroleum and Other Minerals Development Acts 1960-2021, the Minister will henceforth only consider applications that are already connected to existing authorisations, such as applications for:

- an exploration licence from the holder of a licensing option;
- a lease undertaking from the holder of a licensing option or exploration licence;
- a petroleum lease from the holder of an exploration licence or lease undertaking; or
- a petroleum prospecting licence from the holder of any other authorisation, where this is necessary for the purposes of the other authorisation held.

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4.2 Types of Petroleum Authorisation listed under the Petroleum and Other Minerals Development Act 1960

Petroleum Prospecting Licence

- Issued under Section 9(1) of the 1960 Act, in accordance with Section 21 of the 2021 Act.
- Non-exclusive licence giving the holder the right to search for petroleum in any part of the Irish Offshore which is not subject of a licence or lease granted to another party.
- **Applications for petroleum prospecting licences will only be considered in limited circumstances, namely to ensure that holders of licensing options and lease undetakings can comply with their Licensing Terms, and in situations where it is necessary for the holder of a licence or a lease to acquire data outside the boundary of their authorisation in order to fully inform any work directly relevant within their authorisation.**

Licensing Option

- Formerly issued under Section 7(1) of the 1960 Act.
- Non-exclusive authorisation giving the holder the first right to an Exploration Licence over all or part of the area covered by the authorisation.
- **In line with the Climate Action and Low Carbon Development (Amendment) Act 2021, Licensing Options can no longer be issued.**

Exploration Licence

- Issued under Section 8(1) of the 1960 Act, in accordance with Section 21 of the 2021 Act.
- The Licensing Terms provide for three categories of exploration licence. These are a Standard Exploration Licence (for water depths up to 200m), a Deepwater Exploration Licence (for water depths exceeding 200m) and a Frontier Exploration Licence (for areas specified by the Minister).
- Licence holders are obliged to carry out work programmes during each phase of an exploration licence, which may include deskstop studies or the drilling of wells.

Lease Undertaking

- Issued under Section 10(1) of the 1960 Act, in accordance with Section 21 of the 2021 Act.
- When a discovery is made in a licensed area and the licensee is not in a position to declare the discovery commercial during the period of the licence, but expects to be able to do so in the foreseeable future, the licensee may apply for a Lease Undertaking. This is an undertaking by the Minister, subject to certain conditions, to grant a Petroleum Lease at a stated future date.

Petroleum Lease

- Issued under Section 13(1) of the 1960 Act, in accordance with Section 21 of the 2021 Act.
- When a commercial discovery has been established, the authorisation holder notifies the Minister and applies for a Petroleum Lease with a view to its development.
- Production can occur under a Petroleum Lease, once the relevant approvals have been granted.

Reserved Area Licence

- Issued under Section 19(1) of the 1960 Act.
- A Petroleum Lease holder may apply for a reserved area licence in respect of an area adjacent to or surrounding the leased area and which is not subject of an authorisation other than a Petroleum Prospecting Licence.

Applications for authorisations must be made in accordance with the applicable version of Licensing Terms for Offshore Oil and Gas Exploration, Development & Production (1992 or 2007).

5 Offshore Activities

Offshore exploration and production activities under petroleum authorisations will continue to be considered under the relevant legislation (i.e., the 1960 Act for plans for working of petroleum under a lease). Activities under an exploration licence or petroleum prospecting licence are subject to Environmental Impact Assessment (EIA) and Appropriate Assessment (AA) Screening and assessment procedures provided under Regulations 3 and 4 of the European Union (Environmental Impact Assessment) (Petroleum Exploration) Regulations 2013 (S.I. 134 of 2013), as amended by the European Union (Environmental Impact Assessment) (Petroleum Exploration) (Amendment) Regulations 2019 (S.I. 124 of 2019).

Whilst section 7 of this Plan examines in further detail the impacts of seismic surveys and the drilling of exploration, appraisal and production wells, applications from authorisation holders for other activities such as site surveys will continue to be considered.

Prior to production activities occurring under a petroleum lease, a lessee must submit a plan for the working of petroleum in accordance with the Petroleum and Other Minerals Development Act 1960 for the Minister's approval. Prior to carrying out offshore activities under a petroleum licence, an application for Ministerial consent must be made accordance with S.I. 134 of 2013 and S.I. 124 of 2019.

All applications for offshore activities, or for approval of a plan for the working of petroleum must also be submitted in the form prescribed in the Department's Rules and Procedures Manuals.

6 Activities Subject to EIA/AA screening [& full assessment if required]

European Union (Environmental Impact Assessment) (Petroleum Exploration) Regulations 2013 (as amended) S.I. 134 of 2013 and European Union (Gas Act 1976) Environmental Impact Assessment Regulations 2021 S.I. 174 of 2021 contains the statutory basis for consenting offshore activities (including seismic surveys and drilling of wells) under a petroleum licence and the Environmental Impact Assessment (EIA) of those activities.

S.I. 134 of 2013, as amended by S.I. 2019, and the Petroleum and Other Minerals Development Act 1960 contain Environmental Impact Assessment (EIA) provisions for

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petroleum-related activities. SI 477 of 2011 – European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) also applies in relation to petroleum activities.

All applications for offshore activities under a Petroleum Authorisation will continue to be subject to EIA/AA screening [and full assessment if required in accordance with the requirements set out in Directive 2011/92/EU, as amended by Directive 2014/52/EU (EIA Directive) and Directive 92/43/EEC (Habitats Directive) in respect of applications made to the Minister for permission to undertake activities under an exploration licence or petroleum prospecting licence, or applications made to the Minister for the approval of the working of petroleum under a petroleum lease.

For activities under an exploration licence or petroleum prospecting licence, Regulations 3 and 4 of the European Union (Environmental Impact Assessment) (Petroleum Exploration) Regulations 2013 (S.I. 134 of 2013), as amended by the European Union (Environmental Impact Assessment) (Petroleum Exploration) (Amendment) Regulations 2019 (S.I. 124 of 2019) provide for the EIA screening and assessment procedures.

For applications made to the Minister by holders of a petroleum lease granted under Section 13 of the Petroleum and Other Minerals Development Act 1960 (the 1960 Act) for approval of the 'working of petroleum', Sections 13A and 13B of the Act provide for the EIA screening and assessment procedures.

Appropriate Assessment

The European Communities (Birds and Natural Habitats) Regulations 2011-15, as amended (Birds and Natural Habitats Regulations) give effect to the Habitats Directive as a matter of Irish law and require, inter alia, that a public authority carry out screening for Appropriate Assessment of a plan or project for which an application for consent is received. The Environmental Advisory Unit in the Department is responsible for carrying out AA screening assessments (and any required Stage 2 Appropriate Assessment) in accordance with the Regulations, in respect of applications to the Minister for permission to undertake activities under an exploration licence or petroleum prospecting licence, and in respect of applications made to the Minister for the approval of the working of petroleum under a petroleum lease.

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7 Scenarios and Assumptions for the Plan

The levels of activity identified in sections 7.1.2, 7.1.3 and 7.2.2 represent the maximum levels of seismic acquisition and maximum number of wells that may be drilled per annum for the duration of the Plan and have been developed to inform the environmental assessment of this Plan. It is possible that actual levels of activity will be lower than these values. For comparison, whilst the Plan for assessment of applications for Petroleum Exploration and Production Authorisations in Irish Offshore Waters during the Period 2015 to 2020 (which was the subject of IOSEA5) was undertaken on the basis of assumptions of a maximum of 10 wells per annum, 25,000km of 2D seismic survey per annum and 20,000km^2 of 3D seismic survey per annum, the actual levels of activity fell well below those values. Over the entire duration of the Plan (i.e., in the period 2015-2020), there was a sum total of 3 wells drilled, 15,533.5km 2D seismic survey and 20,695km^2 3D seismic survey.

7.1 Seismic Surveys

A 2D seismic survey is the simplest form of seismic survey and consists of a single acoustic source and a single towed streamer. These streamers are normally between 3 and 8km long but can be up to 12km long. The resulting image of the seabed represents a two-dimensional profile in time beneath the survey line. It is normally the first type of seismic survey undertaken during exploration, with the results analysed and used to inform where a follow-up 3D survey should take place or where a potential drilling target may exist.

A 3D seismic survey is a more complex survey method involving more sophisticated equipment. At a basic level, a 3D seismic survey is a dense grid of 2D seismic lines. These surveys typically use multiple towed streamers enabling the acquisition of many closely spaced 2D lines over a single sail line. The acquired data can then be used to create a 3D image or data volume of the subsurface rock. This provides a much more detailed view of the underlying geology, and it is generally used to cover a specific geological target, as informed by the 2D survey.

Both 2D and 3D seismic surveys are typically conducted by a vessel towing acoustic sound sources (air guns) 5 to 10m below the sea surface along pre-determined survey lines. The air guns emit high intensity and low frequency noise (under 200 Hz frequency band with a broad peak around 20-120 Hz and incidental sounds up to 22 kHz) into the surrounding water by the release of bubbles of compressed air, which produces a primary energy pulse

and an oscillating bubble. The air guns contain different chamber volumes designed to generate an optimal tuned energy output of specific frequencies.

Seismic surveys would also generate noise from the operations of the primary seismic vessel and guard vessel (e.g., machinery, propellers and hull flow noise) and by helicopters (e.g., for crew transport) during survey operations.

Routine vessel discharges are limited to galley waste, which comprises food waste which emanates from the vessel kitchen.

Sea node and sea bottom cable surveys are non-conventional seismic acquisition techniques with Ocean Bottom Cables or Ocean-Bottom Nodes – essentially a seismic source detached from the receivers. Nodes are attached to the seabed, to receive the seismic energy transmitted by vessels. Ocean-bottom cable (OBC) acquisition is deployed on the seafloor and connected by electrical wires. An assembly of geophones and hydrophones are connected by electrical wires deployed on the seafloor to record and relay data to a seismic recording vessel or recording buoy.

Ocean-bottom node (OBN) is also deployed on the seafloor; however, this comprises a set of autonomous seismic receivers/recorders deployed on the sea floor. These are self-contained with a rechargeable battery and generally not connected to other receivers by cable. In addition, it is possible that an electromagnetic (EM) survey may be undertaken – this can either be undertaken using a towed streamer or can use an array of receivers deployed on the seafloor with a towed electric dipole source. The survey system measures subsurface resistivity to assist in identifying hydrocarbon accumulations.

The maximum (also introductory paragraph at section 7) 2D and 3D seismic survey forecast to be acquired both and over the duration of this plan, as well as the maximum in any one given year, is outlined in the table below:

Activity	Maximum over duration of plan	Maximum in any one year
2D seismic survey acquired	8,000km	2,000km
3D seismic survey acquired	4,000km^2	1,000km^2

7.2 Wells (Exploration, Appraisal and Production)

Typically, the first step in the sequence of drilling activities is to drill an exploration well to see if hydrocarbons are present. The location of exploration wells will be guided by the results of the analysis of the seismic surveys, and the design, depth and dimension of the exploration well will be determined by the environmental characteristics of the locations and the location of the target geological horizon(s). This will also determine the type of drilling rig used (e.g., jack up, semi-submersible, or drillship).

The types of drilling rig that are employed under licenses issued in accordance with the Plan would be Mobile Offshore Drilling Units (MODUs) as follows:

- Moored / anchored (e.g., semi-submersible rigs);
- Dynamically Positioned (DP) rigs, including drill ships; and or
- Jack-Up rigs (used in shallower waters).

The associated subsea equipment is likely to comprise the following:

- anchors, chains and wire (for a moored drilling unit only);
- wellhead and blowout preventer stack;
- marine riser;
- any Cuttings Transport System (CTS) or Riserless Mud Recovery (RMR) system, pumps, hoses, dispersion frames and hose skids; and or
- Remotely Operated Vehicle (ROV).

As drill rigs are being brought on-line in preparation for drilling, some discharge of ballast water could occur.

Typically, the first step in the sequence of drilling activities is to drill a top-hole section into the seabed into which the conductor pipe is cemented, following which the well is drilled in successively smaller diameter sections until the hydrocarbon-bearing formation is reached. Once each well section is drilled, steel casing of appropriate diameter is inserted and cemented into place, to provide stability and a barrier between the wellbore and surrounding formations. In addition, the casing provides a firm anchorage for the blow out preventer (BOP) stack and structural integrity for subsequent drilling, testing and possible future production operations. Once the BOP is in place the marine riser, a large diameter pipe that connects the BOP stack to the drilling rig, is installed.

The use of drilling fluid, also known as drilling mud, is intrinsic to all drilling operations. Drilling mud assists in a number of functions such as lubrication and cooling of the drilling bit, suspension and transport of rock cuttings to the surface and, most importantly, the

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provision of hydrostatic pressure to counterbalance formation pressure. Drilling mud consists of a liquid mixture of clay, water or oil, and other chemical additives. The most commonly used drilling fluids contain water as the fluid continuous phase and are known as water-base muds (WBMs). However, certain borehole conditions might require a mud formulation where the continuous phase is oil or a synthetic fluid and these are known as oil-base muds (OBMs) or synthetic base muds (SBMs).

The top-hole section of the well has to be drilled without the conductor and BOP in place, and thus with no riser from the seabed to the drilling platform. This means that all drilling fluids, rock cuttings, and cement returns from the top section are discharged directly from the top of the well onto the seabed. Once the marine riser is in place, the drill fluids and cuttings can be circulated from the well back up to the drilling rig where they will be treated so that the drilling mud can be re-used, and the cuttings disposed of appropriately.

Although some of the WBM is discharged with cuttings it readily disperses and tends not to form cuttings piles. There is, however, the potential for these cuttings to contain oil from the reservoir section of an oil well.

If OBMs or SBMs are used it would be only when a marine riser is in place, with recovery to the drill rig through the marine riser for either skip-and-ship to shore, or part or full processing on the rig. The discharge of OBM or SBM cuttings is not permitted offshore of Ireland; instead, the cuttings must be skipped and shipped for onshore treatment, re-use or disposal.

If hydrocarbons are found, well testing may be required in order to test the productivity of the well and determine parameters such as pressure, flow rates and other reservoir and fluid characteristics and this can involve short duration flaring test.

Borehole seismic surveys, such as a check shot survey or Vertical Seismic Profile (VSP) may be undertaken, which measure the seismic travel time (i.e., the elapsed time for a seismic wave to travel from its source to a given reflector and return to a receiver at the Earth's surface) from the surface to a known depth in the borehole, thereby allowing the well data to be correlated with the seismic data.

The maximum (also introductory paragraph at section 7) number of wells forecast to be drilled under the Plan in terms of over the duration of this plan, as well as the maximum in any one given year, is outlined in the table below:

Activity	Maximum over duration of plan	Maximum in any one year
Wells drilled	15	3

8 Monitoring of the Plan

Under this Plan, applications for approval to conduct activities will continue to be submitted to the Geoscience Regulation Office in the Department of the Environment, Climate and Communication, accompanied by a screening for Environmental Impact Assessment (EIA) and Appropriate Assessment (AA) assessing the potential environmental effects of activities in a specific location.

As part of this process, the operator is also required to provide the Geoscience Regulation Office in DECC the most recent and relevant information of the potential environmental impacts of their proposed activities to ensure that the operations being proposed are not in conflict with the SEA objectives outlined under this plan, while the Geoscience Regulation Office will be responsible for seeking observations from relevant bodies on the details of the application.

The Department is satisfied that under these conditions, alongside the requirement for all applications to comply with international and national conventions, directives and legislation and to apply the best available technologies, best environmental practice, and clean technology, that the monitoring of the activities is accurately captured at the project level of each individual application throughout the life of each such project.

When a project obtains ministerial consent, the operator is required to comply with a list of commitments to ensure environmental protection. The Department will in any event conduct compliance check following conclusion of the project operations. In 2030, should a new plan be initiated, any new SEA process will monitor the effectiveness of the previous SEA.

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9 Mitigation Measures

Mitigation measures will be selected at a project level and through detailed planning and design when the specifics can be optimised in order to limit the potential impacts on sensitive receptors. This section provides initial consideration of potential mitigation measures that could be implemented at Project level. At Project level the residual impacts remaining will be assessed following the implementation of mitigation measures. Residual impacts are not considered in this report. The potential mitigation measures for the significant effects associated with the Plan's activities are presented in the table below.

The timing of individual seismic survey and drilling works should be planned to avoid any potential for negative cumulative impacts or inter-relationships with other schemes, plans or projects. All works and planning of works should be undertaken with respect to all relevant legislation, licencing and consent requirements and recommended best practice.

Operators are expected to use best available technology (BAT), best environmental practice and clean technology as set out in the Rules and Procedures for Offshore Petroleum Exploration and Appraisal Operations (DCENR, 2014), which states that:

"The Operator shall take all possible steps to prevent the introduction of substances or energy into the marine environment that are likely to result, in hazards to human health, harm to living resources and marine ecosystems, damage to amenities or interference with other legitimate users of the sea. To this end the Operator shall apply, where appropriate:

- best available technology.
- best environmental practice; and
- clean technology.

These objectives and principles apply to the Operator and equally to contractors and subcontractors working on their behalf. The operator is responsible for the entire operation. Notwithstanding this the operator is responsible for ensuring that contractors carry out their work in accordance with best industry practice. Operators shall also ensure that their operations are carried out in accordance with National Legislation and the provisions of the Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention).

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Annex I – Recommended Mitigation measures for the significant effects associated with the Plan's activities

Potential Issue/Impact Predicted	Mitigation Measure
Impacts of atmospheric emission from combustion from survey vessels, rigs, helicopters and other vessels.	Under the MARPOL Convention and EU law, as applicable in national law, ships may not cause pollution either by discharge to water or emissions to air, when at sea or when at berth in port.
	Annex VI of MARPOL covers the prevention of air pollution from ships
Impacts of flaring on air quality.	Flaring should only be undertaken when required. Best Available Techniques Guidance on upstream hydrocarbon exploration and production published by the European Commission should be followed.
Underwater noise impacts on marine mammals and fish from seismic survey and drilling.	Application of mitigation measures listed in Section 4.3.4 in relation to seismic survey and 4.3.2 in relation to Drilling of Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (DAHG, 2014).
	Under Annex IV of the EU Habitats Directive 92/43/EEC cetaceans are listed as requiring strict protection. Therefore seismic surveys should screen for potential impact to Annex IV species and where necessary Appropriate Assessment will be undertaken.
	DECC will act as a central coordinator of seismic activity which will also include surveys carried out under Marine Scientific Research (MSR) provisions on the Irish Continental Shelf. The 100 km separation distance is a standard condition of all survey approvals.
Effects of accidental spills on flora and fauna (including birds, fish and marine mammals), habitats and designated sites.	Design / implementation of schemes should minimise disturbance to biodiversity as well as wildlife protection measures.
	Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels. In the event of an accidental fuel release occurring and appropriate standard practice management procedures will be implemented accordingly.
	Surveys could be undertaken to determine European Protected Species (EPS) and basking sharks presence in areas where development is proposed.
	Lighting on-board the vessels will be kept to the minimum level required to ensure safe operations. This will minimise disturbance to seabird species without compromising marine navigation requirements and health and safety of offshore workers.
	Vessels will be travelling at a slow speed during works to minimise impacts of disturbance.

Disturbance of birds due to flaring.	Flaring should be minimised as much as is practically possible in order to reduce the potential for adverse impacts on seabird populations
Collision above and below water with static or moving objects on marine mammals	Vessels will be travelling at a slow speed during works to minimise the risk injury impacts to marine mammals.
Habitats disturbance and impact on benthos due to anchoring or placement of equipment on the seabed and drilling.	Seabed habitat information should be obtained, using surveys if necessary, prior to any deployment in order to assess the potential for damage, and deployment on the most sensitive habitats should be avoided. The European Communities (Birds and Natural Habitats) Regulations provide for the management of Natura 2000 sites and the strict protection of animal species. Any activity carried out under a petroleum authorisation is, therefore, subject to AA Screening/AA as appropriate.
	Deployment of anchor chains will be kept to a minimum.
	The consideration of potential impact to the benthic community is a component requirement of the EIA Directive and in the Habitats Directive assessments, where there is existence of benthos
	Appropriate site assessment and planning, to include determination of the location of any potentially sensitive benthic habitats, along with modelling and assessment of the potential for accumulation and dispersal of cuttings, should be carried out prior to selection of final drilling locations in order to reduce the potential for significant impacts.
Control and management of alien species and invasive species.	Ballast water discharges from vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention).
Impact on species and habitats due to contaminated cuttings discharge and chemical/mud/cement/cuttings discharge.	Discharge of chemicals is controlled through DECC consenting processes for use and discharge of chemicals in connection with O&G activities, in accordance with relevant OSPAR Decisions, Agreements and Recommendations.
Atmospheric emissions of greenhouse gases from combustion from survey vessels, rigs, helicopters and other vessels.	All petroleum activities, under an exploration licence or petroleum prospecting licence, including seismic surveys are subject to the requirements of the European Communities (Environmental Impact Assessment) (Petroleum Exploration) Regulations 2013 as amended with respect of EIA.
Effects on coastal sediments, coastal landscape or population due to accidental spills.	Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels. In the event of an accidental fuel release occurring and appropriate standard practice management procedures will be implemented accordingly.
	Implementation of an Oil Pollution Emergency Plan (OPEP). The OPEP is designed to assist the decision-making process during an oil spill, indicate what

	resources are required to combat the spill, minimise any further discharges and mitigate its effects. An OSCP is required under the Sea Pollution (Amendment) Act 1999, and this requirement is re-stated in the Rules and Procedures Manual (DCENR, 2014). The OSCP is designed to assist the decision-making process during an oil spill, indicate what resources are required to combat the spill, minimise any further discharges and mitigate its effects. The OSCP must be submitted to the Irish Coastguard for approval.
Indirect effects on economy due to accidental spills.	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environmental Protection Committee) act. Production of this plan will help to ensure that the potential for release of pollutants from construction, operation and decommissioning is minimised.
	Notification to the Irish Coast Guard if the activity occurs within or near an International Maritime Organisation (IMO) designated Traffic Separation Scheme. Employ the safety measures detailed in 'traffic routing systems' (IMO) wherever possible to reduce the probability for collisions.
Disturbance effects on fishing industry due to exclusion zones around survey and drilling operations.	A Fisheries Liaison Officer (FLO) will be employed to manage interactions between vessels, personnel, equipment and fishing activity. This will be managed through the Fisheries Liaison Mitigation Action Plan.
	Notification to fishing vessels and the Sea Fisheries Protection Authority and DECC of the location and timing of seismic surveys and drilling operations. The notices include the time and location of any work being carried out, and emergency event procedures.
Effects on other marine users such as shipping industry, offshore renewable energy projects and military e.g. conflicts of space.	Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures.
Impacts on water quality due to routine vessel discharges.	Vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ship standards.
	Compliance with all OSPAR Agreements, Recommendations, Strategies, Decisions and Guidelines and MARPOL legislation relating to protection of the marine environment from the potential effects of discharges.
Impacts on water quality due to release of chemicals/mud/cement and cuttings to the water column.	Use and discharge of least harmful chemicals to the marine environment, including those on the OSPAR list of Substances/Preparations Used and Discharged Offshore which are Considered to Pose Little or No Risk

	to the Environment (PLONOR) in all drilling operations (wherever possible).
	Zero discharge of chemicals on the OSPAR List of Chemicals for Priority Action (LCPA).
	To reduce usage by the best means practicable of chemicals on the OSPAR List of Substance of Possible Concern.
	All drilling operations to ensure compliance with Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).
	Utilisation of OBM or SBM to be kept to a minimum and all OBM or SBM to be collected through closed system and brought ashore for re-use, recycling or disposal.
	Ensure minimal use of chemicals where biodegradation is less than 20% during 28 days, and specify use of substances that meet the Persistent, Bioaccumulative and Toxic (PBT) criteria. Both of these measures are used by OSPAR as criteria to assess improvement in the industry over time.
	Implementation of OSPAR Recommendation 2006/3 to phase out discharge of offshore chemicals that are, or which contain substances identified as candidates for substitution and phasing towards the cessation of these discharges from offshore installations.
	All chemicals used on drilling units must have prior approval according to a system in which chemical formulation is continually reviewed and revised to eliminate or minimise harm to the environment through factors such as toxicity and bioaccumulation.
Effects on water quality through release of diesel and chemicals.	An Emergency Spill Response Plan will help to ensure that the potential for release of pollutants from vessels and rigs is minimised. Production of this plan will help to ensure that the potential for release of pollutants from construction, operation and decommissioning is minimised.
	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environmental Protection Committee) act.
	Any oil spill, however small, must be reported immediately to the Irish Coast Guard. The level and manner of the required oil spill response will be overseen by the Irish Coast Guard, and determined by the volume and type of oil spilled, and the weather and sea conditions at the time.
	Implementation of an Oil Pollution Emergency Plan (OPEP). The OPEP is designed to assist the decision-making process during an oil spill, indicate what

	resources are required to combat the spill, minimise any further discharges and mitigate its effects. An OSCP is required under the Sea Pollution (Amendment) Act 1999, and this requirement is re-stated in the Rules and Procedures Manual (DCENR, 2014). The OSCP is designed to assist the decision-making process during an oil spill, indicate what resources are required to combat the spill, minimise any further discharges and mitigate its effects. The OSCP must be submitted to the Irish Coastguard for approval.
	Potentially hazardous operations should be carried out under appropriate weather/tide conditions
	Management of ship waste (mainly oil, hazardous and polluting substances, sewage, garbage and polluting emissions to air) and of all cargo residues must be ensured as required under international (IMO), EU and national law. Under existing provisions ships are obliged to discharge waste and cargo residues at port and ports are obliged to provide facilities for their reception from ships.
	The crew of the drilling rig/ship should undergo environmental awareness and safety training. All equipment used on the rig/ship should have safety measures built in to minimise the risks of any oil spillage. All operations where appropriate, shall apply best available technologies, best environmental practice and clean technology. This is the aim of the requirement of DECC (2011) for operators to have accredited and verified environmental management systems.
	Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels. In the event of an accidental fuel release occurring and appropriate standard practice management procedures will be implemented accordingly.

Annex II – Recommended Mitigation Measures in relation to conservation of relevant Natura 2000 sites

Generic Mitigation measures are recommended for the identified pressures assessed as being Likely Significant Effects (LSE). Continued and detailed assessment is required at the individual project level to ensure that the Draft Plan will not adversely affect the integrity of any relevant Natura 2000 sites in view of the conservation objectives of these sites.

Certain measures are incorporated as adherence to standard industry best practices or embedded mitigation which is fundamental to how the project will be executed. All embedded mitigation will be included within the Construction Environmental Management Plan (CEMP), which will adopt measures to ensure environmental impacts are minimised, and to reduce the potential for release of pollutants from installation works. Additional mitigation is suggested on a receptor specific basis informed by the impact assessments.

Embedded mitigation and best practice measures relevant to the project level

Measure	Details
Production of a Construction Environmental Management Plan (CEMP)	Measures will be adopted to ensure environmental impacts are minimised, and to reduce the potential for release of pollutants from installation works.
All project personnel will be trained and informed of their responsibility to implement the environmental and ecological mitigation outlined in the CEMP	Toolbox talks, inductions, and awareness notices will be used to disseminate this information among all relevant project personnel.
Environmental planning.	Positioning of boreholes will be optimised as part of the final engineering design to avoid impacts on sensitive environmental features, including Annex I habitats insofar as possible.
Scottish Marine Wildlife Watching Code (SMWWC)	All vessels will adhere to the provisions of the SMWWC during installation works. NatureScot developed the Code as part of its duties under the Nature Conservation (Scotland) Act 2004. The Code was first published in 2006 and was revised in 2017. The code aims to minimise disturbance to marine wildlife.
Adherence to official guidelines "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters"	"Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters" published in 2014 by the Department of Arts, Heritage and the Gaeltacht (now the Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media), was provided as

	official guidelines and codes of practice under Regulation 71 of the European Communities (Birds and Natural Habitats) Regulations 2011.
Lighting on board will be kept to a minimum	Lighting on-board the vessels will be kept to the minimum level required to ensure safe operations. This will minimise disturbance to seabird species.
Deployment of anchor chains will be kept to a minimum.	Reduces the potential for disturbance to benthic habitats and species including those which utilise the seabed.
Vessels will be travelling at a slow speed during works.	The slow speed of installation vessels will minimise the risk of disturbance and injury impacts to seabird and marine mammal receptors.
Production of an Emergency Spill Response Plan	An Emergency Spill Response Plan will help to ensure that the potential for release of pollutants from vessels and rigs is minimised.
Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels. In the event of an accidental fuel release occurring and appropriate standard practice management procedures will be implemented accordingly.	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environmental Protection Committee) act. Production of this plan will help to ensure that the potential for release of pollutants from construction, operation and decommissioning is minimised.
Vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ship standards.	Measures will be adopted to ensure that the potential for release of pollutants from installation vessels is minimised.
Ballast water discharges from vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention).	The BWM Convention, adopted in 2004, aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Measures will be adopted to ensure that the risk of Invasive Non-Native Species (INNS) introduction is minimised.
A Fisheries Liaison Officer (FLO) will be employed to manage interactions between vessels, personnel, equipment and fishing activity. This will be managed through the Fisheries Liaison Mitigation Action Plan.	Employment of a FLO will ensure all commercial fisheries operators in the vicinity will be proactively and appropriately communicated with in terms of proposed Project operations including exclusions, dates and durations.

Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures.	Ensure navigational safety and minimise the risk and equipment snagging.
Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).	IRPCS are the international standards designed to ensure safe navigation of vessels at sea. All installation vessels will adhere to these rules, including displaying appropriate lights and shapes. SOLAS is an international maritime treaty which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards.
As built survey data will be provided to the UKHO and Kingfisher for inclusion on Admiralty Charts and KIS-ORCA Awareness Charts.	Ensure navigational safety and minimise the risk and equipment snagging.

Underwater Noise Changes

Application of mitigation measures listed in Section 4.3.4 in relation to seismic survey and 4.3.2 in relation to Drilling of Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (DAHG, 2014). The key ones are listed out below:

Hydrocarbon & PAH Contamination

Further to the measures outlined in the above sections, he following measures are already in place, either integral with good practice, or with regulatory systems, or both:

- Avoid travelling along inshore routes where the potential for vessel accidents is higher
- Location data for all drilling infrastructure to be added to FishSAFE to reduce the likelihood of fishing vessel collision with installations
- Installation of Automatic Identification System (AIS) or radar systems on platforms to enable early detection of potential collisions. This is recommended by the International Association of Oil and Gas Producers (OGP, 2010).
- To use best practice technologies to reduce the concentrations of chemicals discharged.
- The crew of the drilling rig/ship should undergo environmental awareness and safety training. All equipment used on the rig/ship should have safety measures built in to minimise the risks of any oil spillage. All operations where appropriate, shall apply best

available technologies, best environmental practice and clean technology. This is the aim of the requirement of DECC (DCENR, 2014) for operators to have accredited and verified environmental management systems.

- A two-barrier well control policy should be implemented at all times as a minimum. Primary well control (i.e. mud hydrostatic) and secondary well control (blow-out preventers or BOPs) should be maintained throughout the drilling of a well. A full risk assessment should be performed as part of the planning phase of the well.
- As the highest risk of diesel spillage occurs during re-fuelling (bunkering) operations at sea, all bunkering should take place during suitable weather conditions, preferably in daylight hours, and a continuous watch should be posted during the operations. The bunkering hoses should be segmented and have pressure valves that, in the event of a drop in pressure within the line as a result of loss of diesel, will close, preventing the further release of diesel.
- The potential for shallow gas should be identified and minimised by site assessment prior to drilling.
- The BOP is installed to prevent gas blowout once drilling has progressed beyond the riserless stage.
- Gas detection systems are installed on mud shakers to give early indication of any potential for gas blowout.
- Training in safety awareness and response procedures for drilling crews will ensure that the risk of a blowout will be minimised, and that the appropriate responses will be made should one occur.
- All chemicals used on drilling units must have prior approval according to a system in which chemical formulation is continually reviewed and revised to eliminate or minimise harm to the environment through factors such as toxicity and bioaccumulation.

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