

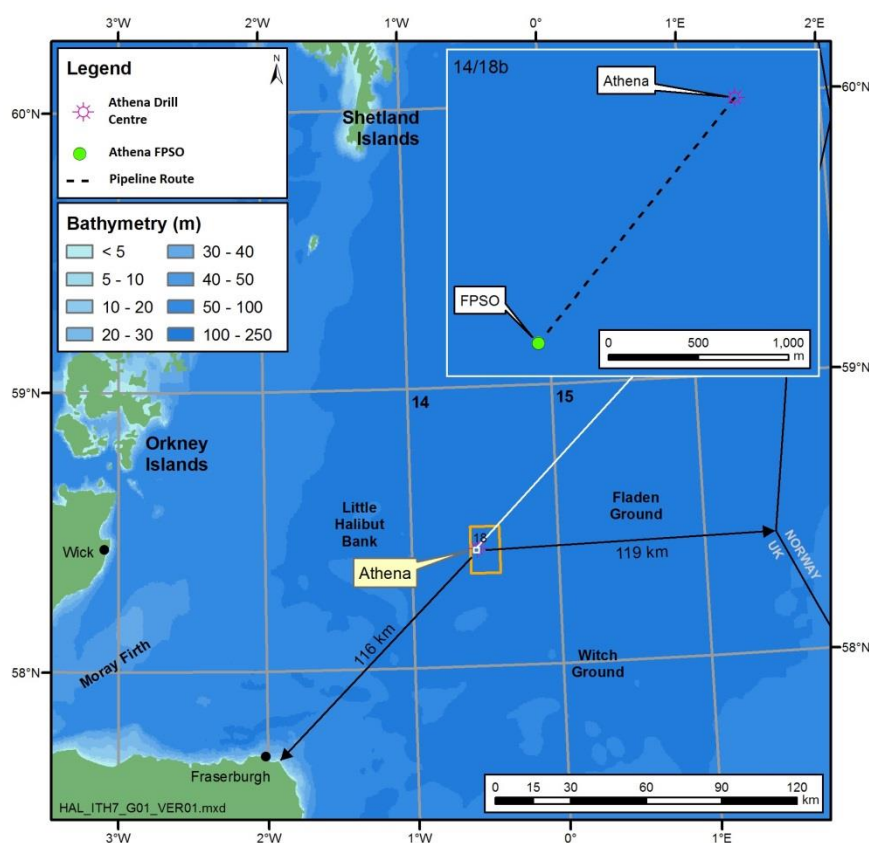
Non-Technical Summary

Introduction

In April 2016, Ithaca Energy (UK) Ltd (Ithaca) submitted an Environmental Statement in support of the Athena oil field decommissioning programmes in Block 14/18b. The Athena field was a subsea tie-back to the BWO Athena FPSO.

BW Athena ceased production in January 2016 and vessel sail away occurred February 2016.

Field location



Scope

Proposed decommissioning programmes and consideration of alternatives

The key elements of the proposed decommissioning programmes are:

- Flush all subsea production pipework with treated seawater prior to vessel disconnection and sail away.
- Disconnect the FPSO from the STP buoy and return vessel to port, STP buoy will remain submerged to -24m and be protected by guard vessel until equipment is removed from the water column.
- A semi-submersible rig will be used to P and A the wells in accordance with Oil and Gas UK Guidelines for Abandonment of Wells. Issue 5, July 2015.
- The production wells completion equipment will be recovered and returned onshore for re-use or recycling.

- The production manifold including the piping and control modules will be recovered and returned onshore for re-use or recycling.
- The tie in spools and umbilicals between the wells and the manifold will be disconnected and may be left in situ or recovered for recycling onshore.
- The 2km flexible flowlines between the manifold and the riser base will be disconnected removed and returned onshore for re-use or recycling.
- The ESP cable and EHC umbilical between the manifold and the riser base will be disconnected removed and returned onshore for re-use or recycling.
- The riser base will be disconnected, removed and recovered onshore for re-use or recycling.
- All stability features, concrete mattresses, grout bags and sand bags will either be recovered onshore for re-use/recycling or left in situ.
- The FPSO has a nine point suction can mooring system, measuring approximately 7.5m in length and 10m diameter. These are connected by mooring chains and wire rope to the STP buoy. The equipment will be removed and recovered onshore for re-use or recycling.
- The risers and mid water arch system including the MWA clump weight structure will be recovered onshore for re-use or recycling.
- A field subsea survey will be conducted on completion of the above works to recover any oil and gas associated debris and to ensure no snag hazards remain.

The Environmental Statement

The environmental impact assessment process, documented in this Environmental Statement, has evaluated various alternatives available for achieving the project objectives. A Comparative Assessment has been conducted which details the options considered and preferred option and is submitted in support of the decommissioning programmes.

This Non-Technical Summary summarises the Athena Field Decommissioning Programmes Environmental Statement (ES), a formal document presenting the findings of the Environmental Impact Assessment (EIA) carried out by Ithaca for the proposed decommissioning programmes. The submission of an ES is mandatory under the *Offshore Petroleum Production and Pipe-lines (Assessment of Environmental Effects) Regulations 1999* (as amended 2007).

The Environmental Impact Assessment provides a systematic assessment of the environmental effects the proposed decommissioning programmes may have on its surrounding environment, including accidents and effects cumulative to those of existing developments and activities. During the assessment process, consultations were conducted with a range of government and other bodies by letter, phone and meetings.

Environmental Background

The water depth at the field location is some 130m. The seabed of the Athena field is relatively flat, becoming slightly shallower to the southwest. Sediments are predominantly sandy mud. Shallow pockmarks are present throughout the proposed field area, although seabed investigations have not found them to contain features of special conservation interest.

The water mass in the area is derived from oceanic waters entering the North Sea from the north to the east of Shetland, and from the northwest through the Fair Isle current. The water column stratifies thermally in summer, and surface currents are dominated by weak tides flowing on a predominantly north-south axis. The climate is generally mild for the latitude, with strongest winds and largest waves occurring during winter months.

The seabed animals present are typical for muddy sediments in the central-northern North Sea, and several species of commercially important fish and shellfish species use the area as spawning and/or nursery grounds. These include whiting, Norway pout, sprat, blue whiting and the prawn *Nephrops*.

Harbour porpoise, white-beaked dolphin and minke whale are the most frequently occurring marine mammals in the wider area, and may occasionally be present in the Athena area. Harbour and grey seals are likely to be present in only limited numbers and for fairly short periods. Vulnerable concentrations of seabirds may be present in the Athena area during July-August as birds disperse into the North Sea from their breeding colonies, particularly aggregations of flightless, moulting adult and juvenile auks.

The Athena field lies on the western edge of a large area with numerous oil and gas fields. The Athena field is on the western edge of the Fladen Ground, an area of importance for commercial fisheries, particularly Scottish demersal trawlers targeting the prawn *Nephrops* and white fish.

The main environmental features of the area and their seasonal variability are shown graphically below.

Summary of Seasonal Environmental Variability in the Vicinity of Block 14/18

Aspect	Months of the Year											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Operations window	P and A of existing wells is expected to be carried out some time during Q4 2019 and Q1 2020. Removal of the subsea equipment is expected during Q1 and Q2 2020. Sai away of the FPSO and recovery of the equipment in the water column is expected during Q1and Q2 2016. The graphic below shows activities for 2010 (top row) and 2011 (bottom).											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Periods of concern	There is a period of concern in Block 14/18 for drilling P&A (July to August), for e.g. because of potential adverse effects on bird migrations or fish spawning.											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Water column	Throughout most of the northern and central North Sea, a thermocline develops during summer. This stratification of the water column generally breaks up with the onset of autumnal gales. Wave heights are smallest in summer and greatest in winter.											
Plankton	A phytoplankton bloom occurs in spring, followed by a smaller peak in the autumn. Zooplankton abundance follows a similar seasonality to phytoplankton, although peak abundances lag slightly behind. The zooplankton is dominated in terms of biomass and productivity by Calanoid copepods, which constitute a major food resource for many commercial fish species.											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Benthos	Sensitivity similar throughout the year.											
Commercial fish and shellfish	The area overlaps with known spawning grounds of <i>Nephrops</i> , whiting, Norway pout and sprat (see below for timing). The area also supports known nursery grounds of <i>Nephrops</i> , blue whiting, Norway pout and sprat											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2	3	3	3	3	3	2	2	2	1	1	1
Key: 1 = 1 species spawning, 2 = 2 species spawning etc												

Aspect	Months of the Year											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Operations window	P and A of existing wells is expected to be carried out some time during Q4 2019 and Q1 2020. Removal of the subsea equipment is expected during Q1 and Q2 2020. Sai away of the FPSO and recovery of the equipment in the water column is expected during Q1and Q2 2016. The graphic below shows activities for 2010 (top row) and 2011 (bottom).											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seabirds and water birds	Key: Most likely timing of P&A of existing wells shown in grey. Decommissioning activities (including flowline recovery, manifold and riser base) shown in blue											
	At an annual scale, the area may be considered to be of moderate importance for seabirds in the context of the North Sea as a whole. Seabird vulnerability to surface pollution in Block 14/18 varies between moderate-low from Dec-Jun and high-very high from Jul-Nov (JNCC 1999). The region is a considerable distance from important coastal water bird sites and seabird breeding colonies. Post breeding dispersal from the colonies sees rafts of adult and juvenile birds, primarily auks, congregate on the sea surface. This, along with birds migrating through the area, accounts for the high vulnerability. The main prey of many bird species is sandeels, which are not present in the fine sediments of the Fladen Ground. Seabird vulnerability to surface pollution for blocks: 14/18 (top) and 14/19 (bottom)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4	2	3	4	3	4	1	1	2	2	2	3
Marine mammals	4	3	4	4	3	4	2	2	3	2	2	3
	Key: 1 = V High 2 = High 3 = Moderate 4= Low											
	The most frequently occurring cetaceans in the general Athena area are harbour porpoise, white-beaked dolphin and minke whale. Atlantic white-sided dolphin may also occur in the area, particularly in summer. Limited sightings of killer whale and bottlenose dolphin have also been recorded in the general area. The Moray Firth and the coast of eastern Scotland is home to the only resident population of bottlenose dolphins in the North Sea; however, these are a primarily coastal species and are unlikely to be frequently present in the Athena area. Harbour and grey seals may occur in the proposed Athena area, but in very limited numbers and for fairly short periods of time as this area is beyond their typical foraging habitat.											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Conservation sites												
	Key: Darker colour reflects months when marine mammals most frequently observed											
	The coasts of north east Scotland, Orkney and Shetland have a variety of important habitats and species protected under international, national and local designations; however, these are all at least 116km from the Athena area. These sites have year round importance. A candidate Special Area of Conservation for pockmark habitat features lies 89km to the east (Scanner pockmark).											
Other users	The Athena field lies within ICES rectangle 45E9; this area receives considerable fishing effort, primarily from demersal trawlers targeting <i>Nephrops</i> and demersal fish. In 2006, UK landings into Scotland from rectangle 45E9 were worth approximately £4.5m. Fishing effort fluctuates considerably between months and years, although effort appears to be greatest from Feb-Apr and Aug-Oct. Twenty-five shipping routes pass within 10nm of the proposed Athena location. There are no Ministry of Defence exercise areas, dredging areas or marine disposal sites in the area. There are 17 wells and two gas pipelines within block 14/18. There are no designated protected wrecks in the area, but several wrecks are known.											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Key: Darker colour reflects months when fishing effort is typically greater											

Natura 2000 sites

There are a number of Special Protection Areas and Special Areas of Conservation (Natura 2000 Sites) on the coasts adjacent (albeit 116km distant) to the Athena field. Similarly, the closest offshore conservation sites to the field are the Scanner pockmark and Braemar pockmarks (candidate Special Areas of Conservation) some 89km to the east and 130km to the northeast respectively. The potential for planned decommissioning activities to affect any of these sites has been considered and in no case were significant effects expected. Of the accidental events assessed, a large spill of crude oil would be expected to beach under some wind and tidal conditions as indicated above such an event is considered very unlikely.

Potential sources of effect

The following potential issues have been identified, associated with the decommissioning programmes:

Atmospheric emissions

The principal routine atmospheric emissions during the proposed Athena field decommissioning programmes would be combustion products from rig for well P and A, vessels associated with subsea equipment removal and helicopters.

Physical presence

The physical presence of a drilling rig and associated support vessels during field decommissioning (with associated safety exclusion zones), has the potential to affect other users of the area. The Athena area is of moderate to high importance for the fishing industry but has a relatively light density of shipping traffic. In the design of the field the wells were clustered around a manifold to reduce the overall footprint both of infrastructure but also rig anchoring spread. The CSV/DSV vessels for recovery of the subsea installations and pipelines will be of short periods. On completion of decommissioning activities, as left surveys will be conducted to ensure that no significant items of debris remain on the seabed

Physical disturbance

Rig anchoring will result in physical disturbance of the seabed and given the muddy nature of the sediment, anchor and other scars may persist for a number of years. Because of this the number of rig anchoring events will be kept to a minimum. The removal of the subsea equipment and pipelines will also result in physical disturbance of the seabed. However, the benthic fauna of the area is expected to be fairly resilient to the effects of sediment mobilisation and recover rapidly from any physical disturbance.

Drilling discharges

Organic kill fluids and cementing chemicals of low toxicity are preferentially being selected for use during the Athena well P and A activity. The cuttings discharged during the initial drilling phase comprised of material from the surface hole sections of the wells which were drilled with seawater (and some low hazard chemicals added to increase the viscosity to help sweep cuttings out of the wellbore) and discharged directly to seabed. This material has formed small piles at each well, above the seabed which have re-mobilised over time by water currents and burrowing fauna activity. No further cuttings will be discharged during the decommissioning programmes however there may be some discharge of cement while abandoning the wells. The predicted environmental effects are localised and of short duration, involving smothering of benthic habitat and communities, with rapid faunal re-colonisation. The cuttings will be left undisturbed.

Cementing operations will also involve the discharge of some chemicals to the environment although in both cases; products of low toxicity and bioaccumulation potential have been selected.

Noise

The main sources of noise from the Athena decommissioning programmes activities will include piling cutting noise during removal of the manifold and riser base associated moorings, Drilling P and A noise (which is generally low frequency) and thrusters on the construction vessels, shuttle tanker, rig, anchor handlers and support vessels.

It is generally considered that the most sensitive receptors of acoustic disturbance in the marine environment are marine mammals, due to their use of echolocation and vocal communication. Most marine mammal species in the vicinity of the Athena location use vocal communications. Toothed whale and dolphin species, and possibly also seals, also use acoustic echolocation as a primary sense.

Pile cutting can generate loud pitched noise but of short duration. However high pressure water cutting is proposed and noise levels from this method are considered to be Safe for divers, significant effects to marine mammals would therefore not be expected.

Underwater noise produced by an CSV/DSV during equipment removal and a semi-submersible rig whilst drilling P and A is comparable to that from a large merchant vessel, mainly low-frequency continuous noise. This is in contrast to some other major sources of anthropogenic noise in the ocean, for example seismic surveys and military sonars which produce high intensity impulse sounds. Given the low density of marine mammals in the area, and the short-term nature of the drilling P and A decommissioning programmes activities, significant effects are assessed to be very unlikely.

Waste to shore

Subsea systems including wellheads, pipelines, manifold, riser base and risers are flushed with treated sea water <10mg/l OIW returned to FPSO cargo tanks post final cargo discharge. Line cleaning and tank washings will be offloaded at a licenced onshore facility for treatment prior to disposal. Pipeline ends will be capped and any residual fluids from within the subsea facilities will be released to the marine environment under permit prior to removal to shore.

Further cleaning and decontamination will take place at a recognised and certified disposal contractor's base. Appropriate licenced sites will be selected. Facility chosen by removal contractor must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver innovative recycling options.

Oil spills

Overall, the oil spill risks associated with the proposed Athena decommissioning programmes are low, in view of the low technical risk involved in the proposed activity and very low probability of vessel collisions. Sources of potential oil spills include vessel collision, and uncontrolled releases of crude oil, diesel fuel, kerosene and lubricating oils from storage or transfer operations both during well P&A and decommissioning operations.

Modelling results indicate that diesel spills will evaporate and disperse rapidly and would not be expected to approach the adjacent coastlines. In contrast, a large spill of crude oil could be expected to beach under some wind and tidal conditions. Such an event is considered very unlikely. The historic frequency of blowouts during North Sea P and A and major spills from decommissioning operations is extremely low.

Offshore, ecological sensitivities to oil spills are associated principally with surface oiling effects on seabird and marine mammal populations. The vulnerability of seabirds to surface oiling is related to individual species' behavioural patterns, distribution and ecological characteristics such as potential rate of population recovery. Considered across all seabird species, vulnerability is very high in the vicinity of the proposed development between July and August with typically low to moderate vulnerability between January and June. In general, marine mammals (which rely on blubber for

insulation) are less vulnerable than seabirds to fouling by oil, but they are at risk from hydrocarbons and other chemicals that may evaporate from the surface of an oil slick at sea. Population recovery rates are likely to be lower than for most bird species.

A comprehensive range of prevention and mitigation measures will be implemented to minimise, so far as practicable, the occurrence and magnitude of oil spills. These include:

- The selected drilling rig will be equipped with bunded fuel and chemical storage, and sealed drainage in the well test area and drill floor.
- Sensitive periods (i.e. July and August) will be avoided during drilling activity schedule planning
- Rig bunkering will be undertaken in good weather and under close supervision, and so far as practicable, during daylight hours.
- Fuel transfer hoses will be colour coded, pressure tested, and fitted with dry breakaway fittings.
- Environmental awareness training will be provided for all rig and vessel crews.
- The Athena field Oil Spill Contingency Plan will remain valid, detailing the risk assessments, resources available and communication routes between the companies.
- The rig in transit, and all support vessels will implement Ship Onboard Pollution Emergency Plans, which outline prevention and contingency measures.
- Spill and emergency response bridging documents will be developed between Ithaca and the drilling and decommissioning contractors.

Cumulative effects

Incremental, cumulative and synergistic effects have been reviewed, with incremental effects possible in the event of a major oil spill from hydrocarbon well P and A decommissioning activities. Potentially significant cumulative risks (i.e. effects acting additively or in combination with those of other human activities) were identified for physical disturbance from fishing, and oil spills from shipping. No significant synergistic effects – where the joint effect of two or more processes is greater than the sum of individual effects – are predicted.

Transboundary effects

The proposed offshore activities have a very limited likelihood of transboundary effects because the proposed decommissioning programmes location is approximately 119km from the UK-Norway median line, the closest international boundary. Noise, atmospheric and aqueous emissions from the field are unlikely to affect Norwegian national waters and air quality. A major oil spill is a potential exception to this but in view of the low reservoir pressure and planned spill prevention measures, the likelihood of such a spill occurring is regarded as extremely remote.

Environmental Management

Ithaca uses the ISO 14001:2004 international standard as the model for its Environmental Management System (EMS) and this system has been externally audited. The Ithaca EMS conforms to the government guidance on OSPAR requirements for EMS. The various mitigation actions identified and commitments made in this ES will be implemented and tracked through the Ithaca EMS.

Conclusions

Through a systematic evaluation of the proposed Athena field decommissioning programmes and their interactions with the environment, a variety of potential sources of effect have been identified. The majorities of these effects were of limited extent and duration and deemed minor. Potentially significant issues were further assessed and there were no potential sources of effect which could not be mitigated to reduce them to meet regulatory requirements and Ithaca company policy. These mitigation measures will be taken forward into detailed engineering and implemented through Ithaca's Environmental Management System. The risks of spills have been assessed in detail and preventative measures and procedures will be put in place to minimise the likelihood of their occurrence.

The overall conclusion of the Environmental Assessment is that the decommissioning programmes will result in minor economic benefits and that the implementation of proposed mitigation and risk reduction measures, the Athena field decommissioning programmes will not result in significant adverse local, cumulative or transboundary effects on the environment.