



EnQuest Heather Limited
Kraken Field Development
Environmental Statement (ES) Summary

Title:	Kraken Field Development Environmental Statement
Operator:	EnQuest Heather Limited (EnQuest)
Consultants:	RPS Energy
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Reviewer:	Anna Buckingham
Date:	09 September 2013

Project Description

Enquest propose to develop the Kraken Field, located in the northern North Sea in UKCS Block 09/02b, approximately 126 kilometres (km) east of the nearest UK coastline and approximately 46 km west of the UK/Norway median line, in a water depth of between approximately 108 metres (m) and 125 m.

The Kraken Area will be developed as three separate fields, Kraken North, Kraken Central and Kraken South. A total of 14 horizontal production wells and 11 horizontal water injector well will be drilled from a Mobile Drilling Unit (MoDU), and tied back to a Floating Production Storage and Offloading vessel (FPSO). Drilling of the wells is scheduled to commence in Q2 2014 with completion in 2016. Because it is a 'heavy oil' development, all of the production wells will require artificial lift using Hydraulic Submersible Pumps (HSPs), which will be powered from the FPSO.

The production wells will be tied-back to four production manifolds, each connected to two production flowlines, a HSP power fluid flowline and a control umbilical tied-back to the FPSO; and the water injection wells will be tied-back to three water injection manifolds, each connected to a single water injection flowline and a control umbilical tied-back to the FPSO.



Flowline installation is scheduled to take place in Q3 / Q4 2014 with manifold installation and tie-in scheduled to commence in Q4 2014. Installation of the risers, pipework and umbilical to connect to the FPSO is scheduled to take place in Q2 / Q3 2015. The pipelines and umbilicals will be trenched and rock-dumped over their entire length, because the sediments in the area consist of a light sand veneer over stiff or very stiff clay that is not suitable for natural backfill, and protection is required to prevent upheaval buckling. Concrete mattresses will be used for protection and stability in the vicinity of the FPSO and riser bases.

The FPSO will be located in the field in Q2 2015, and first oil is scheduled for 2016. Oil is to be exported via a shuttle tanker on a fortnightly basis. The anticipated field life is 25 years, and the maximum recoverable reserves are estimated to be 185.2 million standard barrels (MMstb) or 24.72 million tonnes of heavy oil. Based on the projected P10 (highest) recovery rate, it is estimated that oil production in the first year will be approximately 11,100 tonnes per day (t/d), increasing in the second year to approximately 11,900 t/d, and then gradually decreasing to approximately 819 t/d by 2039.

The facilities will be gas deficient from start up, and power demand will initially be met using the associated gas and crude oil as fuels. However, assuming that StatOil's Bressay Field development goes ahead, EnQuest propose to import gas via the Bressay / Vesterled pipeline system from 2018. For most of the field life, the FPSO will require approximately 240 t/d of crude oil or 2.8 million to 3.1 million cubic metres (m^3) of imported gas as fuel.

Key Environmental Sensitivities

The environmental impact assessment identified the following environmental sensitivities:

Fish Stocks: The development is in an area where there are fish spawning grounds for cod, haddock, whiting, saithe, Norway Pout and sandeels (January to November); and nursery areas for haddock, whiting, Norway Pout, ling, hake, blue whiting, anglerfish, mackerel, herring and sandeels (January to November), with juveniles likely to be present throughout the year.

Seabirds: Seabird vulnerability in the area is very high in November, high in January, March and July and moderate to low for the rest of the year.



Annex I Habitats: No Annex I habitats have been identified in the immediate vicinity of the proposed development.

Annex II Species: The harbour porpoise white beaked dolphin and minke whale have been recorded in the vicinity of the proposed development.

Protected sites: The nearest protected site is the Pobie Bank Reef Special Area for Conservation (cSAC), located approximately 87 km south of the proposed development.

Other Users of the Sea: The level of fishing activity in the development area is low, and the level of shipping traffic is very low.

Key Potential Environmental Impacts

The environmental impact assessment identified the following potential impacts and related mitigation measures:

Physical interference: Appropriate mitigation measures will be put in place to ensure that other users of the sea are aware of the proposed activities, e.g. 500m exclusion zone around the MoDU and FPSO, the use of standby vessels, and the issue of Kingfisher Bulletins and Notices to Mariners. Due to the low fishing and shipping activity in the area, the potential impact of the proposed development on other users is considered to be insignificant.

Seabed disturbance: The drilling of the wells, installation of the subsea infrastructure and the deposits of mattresses and rock will have a direct impact on the benthic community. An estimated 1.04 million tonnes of rock is required to protect the pipeline and umbilical systems. However, the species composition and habitat is typical of the area, and only a very small proportion of the local habitat will be impacted by the proposed operations. The benthic community and habitat are also expected to recover or be replaced within a fairly short period of time.

Noise: A number of noise sources will be associated with the proposed operations, including noise from drilling, piling operations for the installation of the FPSO anchors, production operations, standby vessels and helicopters. The only significant noise source is anticipated to



be the piling operations, where the sound pressure level (SPL) is calculated to be approximately 203dB at 1m from the source. However, the proposals will only involve the driving of 12 piles, and will be completed in approximately eight days. The JNCC guidelines will be followed, including the implementation of a soft-start procedure to allow any marine mammals to move away from the sound source, and the risk to marine mammals is therefore considered to be low. A more detailed assessment, including sound propagation modeling to confirm that the 500 m mitigation zone is appropriate to avoid the risk of injury to marine mammals, will be undertaken prior to seeking approval for the FPSO locating operations.

Marine discharges: The wells will be drilled using a combination of Water Based Mud (WBM) and Low Toxicity Oil Based Mud (LTOBM), with WBM cuttings discharged to sea and LTOBM cuttings shipped ashore for disposal. All the chemicals used in the course of the drilling and production operations will be selected on the basis of technical compatibility and environmental performance, and all produced water will be re-injected. The marine environment in the development area is sufficiently dynamic to facilitate rapid dispersion and dispersion of the proposed discharges, and potential environmental impacts are considered to be insignificant.

Atmospheric emissions: The main source of atmospheric emissions will be fuel use during the drilling, production and support operations and, in particular, in relation to the use of crude oil as a fuel because the development is gas deficient. Considering the highly dispersive nature of the environment, potential impacts are considered to be insignificant.

Accidental events: Control measures will be in place to minimise the risk of accidental events, and EnQuest will develop an Oil Pollution Emergency Plan (OPEP) and Emergency Procedures Plan (EPP) for the proposed drilling and production activities. Modelling of worst-case blow-out and diesel spill scenarios has been undertaken, and related impact assessments included in the environmental impact assessment.

Cumulative Impacts: The proposed development is in an area where there is a range of oil and gas operations, in addition to the limited commercial fishing and shipping operations. However, it is not anticipated that there will be any significant in-combination effects.

Transboundary Impacts: The proposed drilling and production activities are not anticipated to result in any significant transboundary effects. In the event of an oil spill entering the waters of an



adjacent State, it may be necessary to implement international contingency arrangements, e.g. the NORBRIT Agreement (the Norway-UK Joint Contingency Plan).

Consultation

The Joint Nature Conservation Committee (JNCC), Marine Scotland (MS), the Maritime and Coastguard Agency (MCA), and the Ministry of Defence (MoD) were consulted on the proposals. The Environmental Statement was also subject to Public Notice.

JNCC: JNCC welcomed the commissioning of site-specific geophysical and benthic survey data, providing an up-to-date picture of the environment around the development, and the commitment to undertake sound propagation modelling to confirm that the 500 m mitigation zone is appropriate to avoid the risk of injury to marine mammals during the piling operations.

MS: MS confirmed they had no objections, but deferred a final risk assessment for chemical use and discharge until they were consulted on the relevant chemical permit applications.

MCA: MCA confirmed they had no objections, subject to inclusion of the normal navigational conditions in the relevant Consents to Locate.

MoD: MOD confirmed they had no objections.

Public Consultation: No comments were received in response to the Public Notice.

Further Information

Further information was requested to address issues raised by consultees and identified during the DECC OED review. The response received from EnQuest adequately addressed the issues raised.

Conclusion

Following its review of the Environmental Statement, the comments received from consultees and the additional information provided by EnQuest, DECC OGED is content that the Kraken



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Development is unlikely to have any significant adverse environmental impact, and that it will not have a significant adverse effect on the marine environment in general, any protected sites or species or other users of the sea.

Recommendation

DECC OED has no objection to the Kraken Development being granted consent to proceed, but reserves the right to request supplementary information and review its decision if there are any significant changes to the Field Development Plan that have a material effect on the information provided in the ES.

Approved

Wendy Kennedy.....Date 13/09/2013.....

Wendy Kennedy

Head of Offshore Oil and Gas Environment and Decommissioning