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Hejre to South Arne Development Project
SELECT Phase

Document Title:
Hejre tie-back to South Arne – ESPOO non-technical summary

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1 Non-technical summary

This report comprises the Espoo documentation of Denmark elaborated under the Hejre to South Arne Development Project. It contains a description of the project-related transboundary environmental impacts, which are caused by project impacts generated in Denmark and potentially affecting the marine territories (EEZ and/or territorial waters) of neighbouring countries.

The report contains a description of potential transboundary impacts from the project and an environmental risk assessment of these impacts. The report also contains assessments made on Natura 2000 areas and annex IV-species.

The Espoo report and procedure are an integrated part of the EIA procedures and approval processes.

1.1 The project

INEOS E&P A/S is investigating the possibility to re-develop and subsequently operate the Hejre field in the Danish Sector of the North Sea. The Hejre field was previously operated by DONG E&P A/S. The intended re-development entails a development solution with a Hejre tie-back to South Arne using the existing Hejre facilities.

The partners in the Hejre licence (5/98) are:

- INEOS E&P A/S (operator) 60 %
- INEOS E&P (Norge) Petroleum DK AS 25 %
- INEOS E&P (Petroleum Denmark) ApS 15 %

The Hejre field is located within licenses 5/98 and 1/06 on the Danish continental shelf approximately 300 km west of the Danish west coast.

The Hejre tie-back to South Arne project includes:

- Construction and installation
 - Construction and installation of a new unmanned topsides at Hejre
 - New fortified riser will be installed at Hejre
 - Perforation, clean-up and well test of 3 existing Hejre wells. Barrier repair of well HA-5
 - Drilling of a new well; Lunde (optional)
 - Modifications at Hejre jacket to remove the temporary items left over from the original installation in 2014.
 - Hook-up between the Hejre pre-drilling wellhead module installed in 2014 and the new topside.
 - Modification at the South Arne WHPE – a new tie-in module with a slug catcher, multiphase pig receiver, NGL pumps and new caisson with riser and power cable to be installed
 - Tie-in scope at South Arne Main – removal of obsolete degasser unit and new NGL injection booster pumps to be installed
- Laying and commissioning of pipeline and power cable
 - 30 km 10" or 12" multiphase pipeline from Hejre to South Arne
 - Installation of power cable with fibre optic from South Arne to Hejre with power and control from host
- Production

- Processing of Hejre and Lunde well fluids at South Arne for 20 years
- Operation and maintenance of multiphase pipeline and power cable
- Operation and maintenance of Hejre platform and wells
- Decommissioning
 - Close-in, plug and abandonment of Hejre and Lunde wells
 - Flushing and dismantling of platform and subsea structures

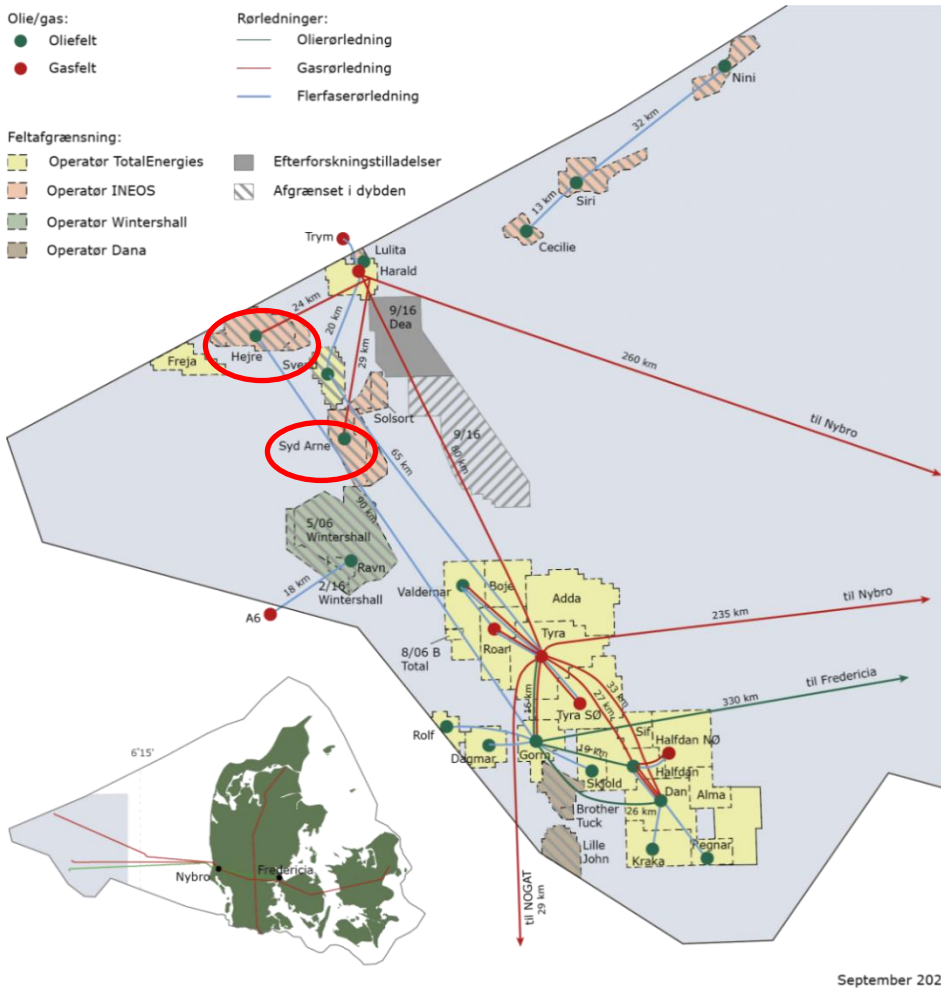


Figure 1-1 Location of the Hejre Field, the Syd (South) Arne platform and other oil and gas installations in the Danish sector of the North Sea.

1.2 Potential transboundary impacts

The following impacts have been identified as potential transboundary impacts:

Potential transboundary impact	Receptor
Impacts of planned discharges to the sea during drilling and completion of wells and pressure testing of pipelines i.e., during construction phase.	Fish eggs and larva, fish, plankton (pelagic organisms)
Impacts of planned discharges to the sea (produced water, production chemicals).	Fish, plankton (pelagic organisms)
Impacts of accidental spills and blowout events.	Fish, marine mammals, birds, ecosystems, tourism
Impact of air emissions during construction, production and decommissioning phases.	Air quality and climate

A screening of potential transboundary impacts has been carried out and the detailed assessments made in the EIA report.

Based on the results of the detailed assessment, the Espoo report presents a screening of the same impacts in relation to their potential transboundary effects. Because of the low range for most of the project impacts, significant transboundary impacts can be ruled out with certainty in many cases. Subsequently, these impacts are not further elaborated on in this chapter, and focus is given to those impacts for which significant transboundary impact cannot be excluded in the first round.

Table 1-1 shows the result of the screening and points out the potential transboundary impacts that are assessed in detail further below in this chapter.

Table 1-1 Screening of potential transboundary impacts

Activity	Potential impact	Transboundary evaluation
Environmental impacts of activities during the construction phase		
Presence of rig	› Impacts on fisheries and shipping due to exclusion zones around rigs	› Local impact only.
Well completion	› Discharges of completion fluids and drilling chemicals can impact water quality and marine fauna. Green and yellow chemicals are discharged.	› Possible local impact
Testing of pipelines	› Impacts of planned discharges to the sea from pressure testing of pipelines.	› Possible local impact
Construction operations causing emissions to the air.	› Release of particles (PM ₁₀) and gaseous emissions (SO _x , NO _x , CO ₂) from vessels with potential effects on air quality	› Regional and international short term minor impacts

Activity	Potential impact	Transboundary evaluation
Release of particles from pipelaying vessels		
Accidental spills and blow-out	<ul style="list-style-type: none"> › Mainly birds, marine mammals, fish, coastal ecosystems may be affected. Blow-outs are extremely rare events 	<ul style="list-style-type: none"> › Potential transboundary impacts may occur
Laying of pipelines/umbilical and installation of structures	<ul style="list-style-type: none"> › Physical impact on the seabed and benthic fauna through placement and presence of pipelines or subsea structures › Noise disturbance to marine mammals resulting in behavioural avoidance 	<ul style="list-style-type: none"> › Local impact only
Artificial light during the construction phase	<ul style="list-style-type: none"> › Artificial light at sea may attract and trap certain species of birds especially during bad weather and overcast nights. 	<ul style="list-style-type: none"> › Local impact only
Environmental impacts of planned activities during the production phase		
<p>Presence of structures</p> <p>Rig, platform and pipeline including 500 m exclusion zone</p>	<ul style="list-style-type: none"> › Reef effect of platforms (Positive effect on epifauna and fish) › Potential disturbance to migrating birds from artificial lightning on platforms › Interference with shipping due to exclusion zone › Loss of access to fishing grounds due to exclusion zone 	<ul style="list-style-type: none"> › Local impact only › Local impact only › Local impact only › Local impact only
<p>Discharge to sea</p> <p>Impacts of planned discharges to the sea (produced water, production chemicals, discharge of facility and well service chemicals).</p>	<ul style="list-style-type: none"> › The discharge may affect marine organisms, particularly pelagic organisms such as plankton including fish eggs and larvae 	<ul style="list-style-type: none"> › Model calculations show local impacts only with a maximum distance of 5.000 m from platform
<p>Emissions</p> <p>Emissions to air</p>	<ul style="list-style-type: none"> › Release of particulates and gaseous compounds (SO_x, NO_x, CO₂) from generators, compressors and other machinery on the production platform and due to flaring operations and transport operations 	<ul style="list-style-type: none"> › Calculations of the magnitude of emission of SO_x and NO_x and of CO₂-eq are considered regional but are short term and with a minor impact and are considered negligible
<p>Accidental spills</p> <p>Blow-out</p> <p>Accidental spills from pipeline rupture</p>	<ul style="list-style-type: none"> › Extremely rare events. Experience from previous blow outs and oil spills at sea have shown that it is mainly birds, marine mammals, fish, coastal ecosystems that may be affected › Mainly birds, plankton, fish eggs and larvae may be affected. 	<ul style="list-style-type: none"> › Potential transboundary impacts may occur. › Potential transboundary impacts may occur

Activity	Potential impact	Transboundary evaluation
Environmental impacts from decommissioning		
Removal of installations	<ul style="list-style-type: none"> › Impacts of underwater noise arising during the cutting of the legs of the platforms. › Removal of artificial reef 	<ul style="list-style-type: none"> › Local impact only › Local impacts only
Discharge from P&A of wells	<ul style="list-style-type: none"> › The discharge may affect marine organisms 	<ul style="list-style-type: none"> › Model calculations show local impacts only with a maximum distance of 5.000 m from platform
Emissions to air	<ul style="list-style-type: none"> › Release of particles (PM₁₀) and gaseous emissions (SO_x, NO_x, CO₂) from vessels with potential effects on air quality 	<ul style="list-style-type: none"> › Regional and international short term minor impacts

1.3 Environmental assessment of accidental oil spills

Accidental spills may cause transboundary impacts. The original oil spill modelling from Hejre Legacy was updated in 2020 as the Hejre has been developed and data on reservoir pressure, flow rates from wells etc. is available.

Accidental spills may include:

- › Spill of oil and emission of gas during an accidental blow-out at Hejre. This may occur during both the construction and operation phase
- › Accidental spill due to rupture of pipelines

Blow out and rupture of pipelines causing discharge and dispersal of oil are extremely rare events. However, in case of blow-out and rupture the environmental impacts may be severe. Experience from previous blow-outs and oil spills at sea have shown that it is mainly birds, marine mammals, fish and coastal ecosystems that may be affected by large oil spills.

2 Conclusion

It is concluded that the Hejre tie-back to South Arne development will not negatively affect the conservation status of habitats and species, for which potentially affected Natura 2000- sites have been designated as well as species listed on Annex IV of the EU Habitats directive (Directive 98/43/EEC of 21 May 1992). Nor will the re-development affect the integrity of the areas negatively.

The conclusion is based on following arguments:

- › The risk that a blowout occur is extremely low since all safety systems and measures are in place on the platform.
- › The oil slick is transported in a relatively narrow band in the direction of the surface currents.

The INEOS Energy Denmark's oil spill contingency plan (INEOS Oil and Gas, 2022) will be activated, and oil spill combat will be carried out, which will reduce the spreading of oil and mitigate impacts of any spill.

2.1 Environmental impacts of gas released during a blowout

In the unlikely event of a blowout at Hejre, gas may also escape from the formation.

In general, the extent of environmental impacts of escaped gas is not comparable to the impact of oil blowouts. The bulk of the gas, bubbles to the surface and escape to the atmosphere within a relatively small area around the platform and does not disperse in the water to the same extent as oil. On the other hand, field and laboratory investigations have demonstrated that severe environmental impacts may be observed in the immediate vicinity of the platform. The investigations clearly proved that severe damages and mass mortality on zooplankton, benthic fauna and fish might occur within the small gas affected area.

Although gas blowout has smaller environmental impacts than oil blowouts, the gas may pose a severe safety risk for personnel on rig, platform and vessels. If the gas ignites and causes fires or explosions, installations and equipment will be damaged and in case personnel is not evacuated in due time, injuries or loss of life of personnel may occur. However, the risk of this is minor due to technical safety features on the platform that prevent blowout from happening. During an unlikely situation, the existing contingency arrangements involving evacuations of personnel from platforms will minimise the risk even further.

2.2 Environmental impacts of pipeline rupture

Rupture of pipelines may occur as a result of corrosion or damage caused by trawlers. However, the risk of spills of larger amounts of oil or gas in case of rupture is minor.

Pipeline pressure is continuously monitored from the production platform. In case of pressure drop, the system closes. In addition, any spills are dealt with in accordance with the oil spill contingency plan for INEOS Energy Denmark's offshore operations.

The oil spill modelling of a pipeline rupture shows it is very unlikely that Natura 2000 areas will be hit by oil. The hit probability within the German SAC DE 1003301 Doggerbank is thus < 1 %. DE 1003301 is designated to protect sandbanks, reefs and different species of fish and marine mammals. SACs in the Netherlands and UK show no hit probability. Based on the low hit probabilities in neighbouring SACs it is assessed that that pipeline rupture will not significantly impact the basis of the designation of these areas.

2.3 Marine Strategy Framework Directive (MSFD)

The impacts identified to have potential transboundary impacts may potentially affect the Marine Strategy Framework Directive's (MSFD) 11 descriptors of Good Environmental Status (GES).

The most important parameters from the project is planned and unplanned discharge of chemicals and oil to the sea.

A summary of the potential impacts from the potential transboundary impacts of the 11 descriptor is provided in Table 2-1.

Table 2-1 Potential impacts on the 11 descriptors given by the Marine Strategy Framework Directive is summarised below. The environmental risk is assessed. NOTE: The impact identified to have potential transboundary impacts is highlighted with italic style.

Descriptor	Potential impact	Environmental risk
D1 Biodiversity (birds)	The project area is not an important area for birds listed on the Birds Habitat directive. Possible impacts include: <u>Noise and light:</u> Impacts from ship noise, noise from rig and installation of topside and pipelaying are considered to be low and temporary.	Negligible
	<u>Accidental spill and blow-out events:</u> <i>very unlikely events. In case a large blow-out event occurs, it will have major impact on sea birds.</i>	<i>Low</i>
	Biodiversity (mammals) The project will not prevent harbour porpoise, harbour seal and grey seals of obtaining good environmental status. Possible impacts include: <u>Accidental spill and blow-out events</u> <i>Large blow-outs events are very unlikely but will affect marine mammals if they occur.</i>	<i>Low</i>
	<u>Underwater noise:</u> See descriptor 11	Negligible
Biodiversity (pelagic habitats)	<u>Planned discharge of chemicals</u> used for pipeline testing and discharge of treated sewage. <u>Unplanned discharge to the sea including accidental spills and blow out events (unlikely).</u>	Negligible <i>Low</i>
D2 Non-indigenous species	The project will not have impact on D2	None

Descriptor	Potential impact	Environmental risk
<p>D3 Commercially exploited fish stocks</p>	<p>The spawning biomass of commercially exploited fish stocks can be affected due to disturbance of seabed and sediment dispersal during the construction phase. This is particularly relevant for sand eel that is buried in the sediment.</p> <p><u>Disturbance of seabed and spreading of sediment.</u> Sandeel is particularly vulnerable to physical disturbance close to the trench since they live buried in the sediment. The impact is temporary and local. Sandeels in the trenched area will make up a minor fraction of sandeel populations in the North Sea.</p> <p><u>Planned discharge of chemicals and treated sewage.</u> The impact is marginal and not measurable on spawning stocks.</p> <p><u>Unplanned discharge to the sea (blow out and pipeline rupture):</u> A blow-out event is very unlikely but may have major impact on spawning stocks.</p>	<p>Negligible</p> <p>Negligible</p> <p>Negligible</p>
<p>D4 Marine food webs</p>	<p>Focus in the marine strategy II is phytoplankton- and zooplankton, since they form the base of the marine food web. Zooplankton will be affected by:</p> <p><u>Sediment disposal:</u> temporary and local</p> <p><u>Planned discharges to the sea:</u> The fitness (survival and fecundity) of zooplankton will decrease in the vicinity of the platform. The area is not important production front and the impact is considered to be negligible.</p> <p><u>Unplanned discharge to the sea (blow-out):</u> blow-out events have potential significant negative impact on all elements of the marine food web. Blow-out events are very unlikely.</p>	<p>Negligible</p> <p>Negligible</p> <p>Low</p>
<p>D5 Eutrophication</p>	<p><u>Release of treated sewage:</u> There is obtained good environmental status for D5 in the North Sea. Release of treated sewage will be marginal and local.</p>	<p>Negligible</p>

Descriptor	Potential impact	Environmental risk
D6 Sea floor integrity	<u>Physical damage and loss of seabed:</u> Establishment of new pipelines will cause physical damage and loss of seabed. Loss and damage of seabed will affect offshore circalittoral mud and sand, which makes up 24.4 % (18170 km ²) and 27.3% (20322 km ²) of the seabed sediment in Denmark respectively.	Negligible
D7 Alteration of hydrographical conditions	The project will not alter hydrographical conditions.	None
D8 Contaminants (concentrations and species health)	<u>Planned discharges to the sea:</u> Discharge of produced water, production chemicals and pigging operations will not exceed threshold values set in the Marine Strategy II.	Negligible
D8 Contaminants (acute pollution events)	<i>Accidental spill and blow-out events are extremely rare events. The risk of accidental spill and blow-out is prevented through a number of mitigating measures.</i>	Low
D9 Contaminants in fish and other seafood for human consumption	<u>Planned discharges to the sea:</u> Discharge of produced water, production chemicals and pigging operations may increase the level of contaminants in fish and other seafood. Measurable contaminants in fish and other seafood only occur as a result of major oil spill.	Negligible
D10 Marine litter	<u>Impact of marine litter:</u> there is an increased risk of contributing to marine litter in the area of the platform due to human activities. Littering will be prohibited on the platform and all waste are collected, sorted and send to shore. Observation of any marine litter on the seabed will be included in the decommissioning pre-survey and collected if present.	Negligible
D11 Underwater noise	<u>Impact of underwater noise on marine mammals:</u> during construction marine mammals will be disturbed due to ship noise, noise from rig, installation of topside and pipelaying. Noise levels are below thresholds for temporary and permanent underwater noise levels for marine mammals.	Negligible

2.4 Risk assessment of Accidental spills

It is assessed that the environmental risks related to accidental spills during construction and operation of Hejre to South Arne Development Project is **Low to Negligible** (Table 2-2).

Table 2-2 Environmental risk of accidental spills during operation of Hejre.

Impact	Extension of impact	Duration of impact	Magnitude of impact	Severity of impact	Likelihood of impact	Environmental Risk
Impacts of oil release during blowout	International	Medium term	Large	Major impact	Very low	Low risk
Impacts of gas release during blowout	Local	Short term	Large	Moderate impact	Very low	Negligible risk
Impacts of rupture of pipeline	Local	Short term	Moderate	Minor impact	Low	Negligible risk

Most of the environmental impacts from the Hejre to South Arne Development Project are local or are confined to Danish waters. These impacts have been assessed in the EIA report to have an insignificant or minor impact on the environment. Underwater noise is assessed to have a moderate but short-term impact and it is confined to Danish waters.

The environmental impact of accidental oil spills and especially an uncontrolled blow out during drilling of a well or during normal production may, however, have transboundary impacts. The main conclusions are that impacts are low to negligible as summarized in Table 2-2. In case of an uncontrolled blowout or other types of spill INEOS's oil spill contingency plan will be activated to handle the spill.