



Total Exploration and Production Liban Sal

# Block 4 (Lebanon) offshore exploration drilling

Environmental impact assessment – Volume 1

80754

February 2020

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## RSK GENERAL NOTES

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**Project No.:** 80754

**Title:** Block 4 (Lebanon) offshore exploration drilling environmental and social management plans

**Client:** Total Exploration and Production Liban Sal

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# BLOCK 4 EXPLORATION DRILLING EIA – EXECUTIVE SUMMARY

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## Introduction

Total Exploration & Production Liban Sal (TEP Liban) intends to carry out exploration drilling activities in Block 4 of the Levant sedimentary basin in offshore Lebanese waters. The proposed drilling activities comprise one exploration well, a possible second exploration well and, potentially, one appraisal well, depending on the results of the previous exploration wells. Therefore, a maximum of three wells may be drilled during the exploration phase. Block 4 and the priority area, in which all three wells would be drilled, are shown in Figure ES1.

This document summarises the results of the environmental impact assessment (EIA) of the project (a maximum of three wells in total). It has been produced by a team consisting of personnel from in-country accredited consultancy Dar Al-Handasah (Dar) and international consultancy RSK Environment Ltd (RSK), on behalf of TEP Liban. Impacts to the social components are also included within the EIA process.

If a hydrocarbon discovery is made that can be commercially exploited, and the project goes to the next phase of development, a further EIA will be conducted to assess the impacts of the production phase.

Screening is the first stage in the EIA process. It determines whether an EIA is required for a project. TEP Liban submitted on 16 July 2018 a screening application for Block 4 to the Ministry of Environment, through the Lebanese Petroleum Administration (LPA) and the Ministry of Energy and Water (MoEW). On 29 August 2018 the LPA informed TEP Liban that according to the Ministry of Environment, an EIA would be required for the proposed Block 4 exploration drilling project.

A scoping report was submitted in May 2019 as part of the scoping stage of the EIA process. Scoping is a high-level assessment of anticipated interactions between project activities and environmental, socio-economic and cultural heritage receptors. The scoping report was opened for disclosure and revised after the consultation period to include: (1) updates from the stakeholder engagement (including public meetings), and (2) a scope of work for the EIA. Such scoping report was submitted to the MoE through the LPA on 28 June 2019. The MoE approved the scoping report provided that the EIA gives responses to the comments that were raised.

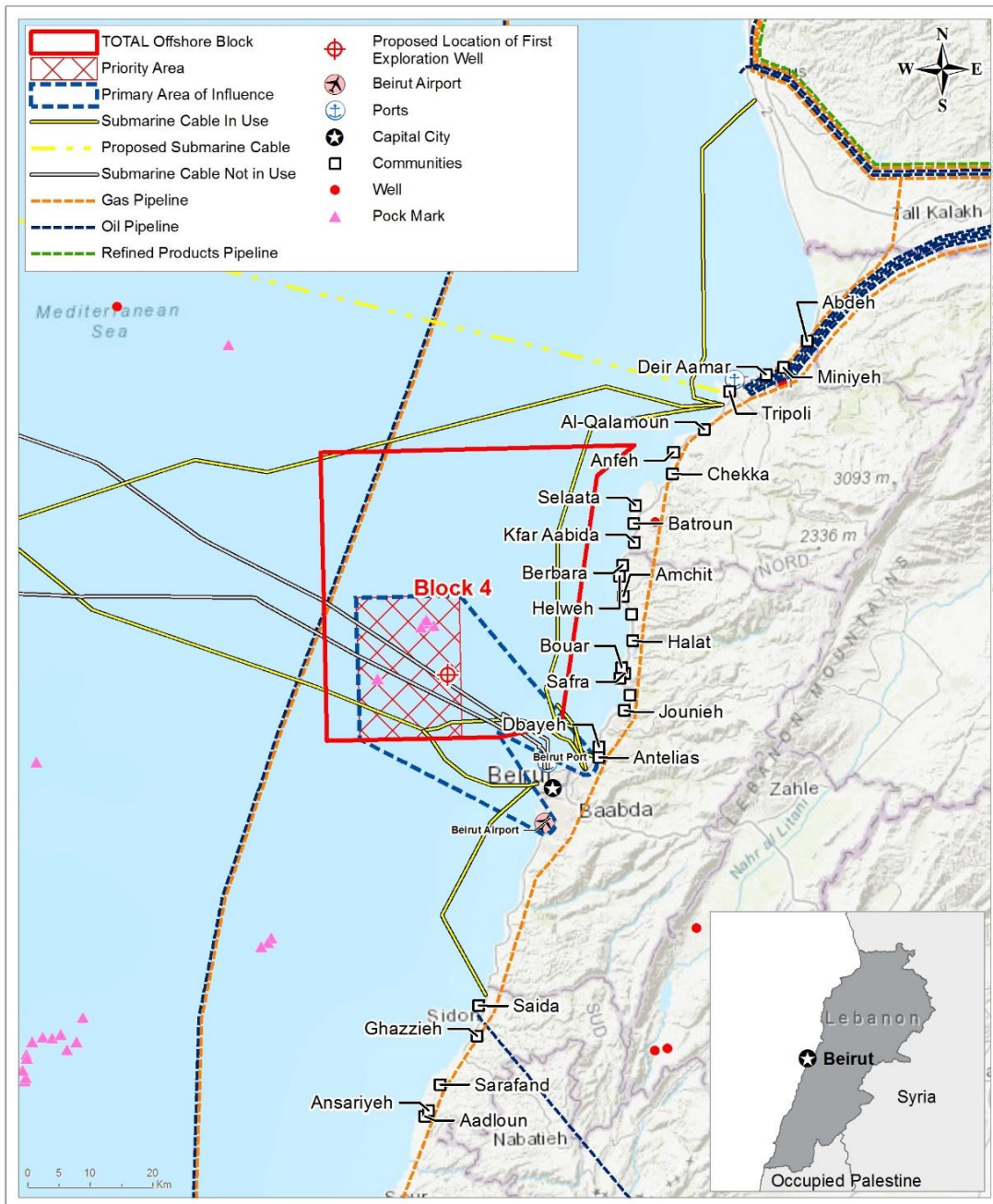
An EIA report document (Rev 0 of this document) was first produced in line with the MoE's scoping report comments, as far as available information allowed. At this stage, the EIA was published via a website for consultation purposes (from 4 September to 4 October 2019) and the results of the EIA process were presented at two public meetings in September 2019. The EIA was then updated, where necessary, in response to comments received during that process. Revision 1 of the EIA was submitted to the MoE on 31 October 2019. After submission, a number of comments on the EIA were received from the MoE. Responses and clarifications were provided to these comments, and where necessary, modifications were made to the EIA. Consequently, the EIA report was approved by the MoE on the 18 February 2020 provided that the comments listed in the Technical Committee Report 18/2/2020 are complied with. In addition, it was requested that a compiled and comprehensive version of the EIA report be submitted, reflecting the comments

received from the MoE. This document (Revision 2) has been compiled in response to this request, so that it constitutes the final compiled version of the EIA as approved by the MoE.

## Overview of the exploration drilling campaign

TEP Liban plans to start drilling the first exploration well in Block 4 in February 2020.

A mobile offshore drilling unit (MODU) will be mobilised to Block 4 and the first exploration well (B4-1) will be drilled pseudo-vertically (deviating slightly from truly vertical) at the proposed location shown in Figure ES1, about 20 km from shore, in 1520 m of water. The target reservoir (gas) is around 4400 m below mean sea level.



**Figure ES1: Location of Block 4 offshore Lebanon, including the priority area and first exploration well site for drilling operations**

The drilling programme for the first exploration well is planned to last around 60 days. The drilling operations for any subsequent wells are anticipated to be of similar duration, though may extend up to three months. Impacts from all three wells are included within this EIA.

Drilling operations will be supported from a logistics base that will be within the existing commercial Port of Beirut. Facilities at the logistics base will include:

- a pipe yard
- warehousing
- a linear jetty with laydown area and mobile cranes for vessels operations
- a drilling-fluids mixing plant and cement bulk plant
- areas for offices, canteen, vehicles, marshalling areas, cargo containers, waste transfer and temporary storage (no waste treatment).

A contractor will build and operate the logistics base. The duration of the logistics base will be dependent on the success of the of the B4-1 well and any subsequent wells.

Two to three project vessels will be used during the exploration drilling work: one vessel will be permanently at the drill site providing safety and security surveillance, the other vessel(s) will transfer supplies, materials, equipment and waste between the MODU and the logistics base (estimated 8–10 return trips in total per week) during the drilling period. Helicopter transfers of personnel will take place from Beirut Rafic Hariri International Airport to the MODU (estimated 10 return trips per week). Two helicopters will support the operation, each with a capacity of 8 to 12 passengers.

Figure ES2 provides a guide to the duration of each of the activities associated with the drilling programme and the location at which they will take place. The drilling duration shown as 2–3 months is intended to cover the duration for any of the wells, while it is anticipated that the first well will involve only around 60 days of drilling.

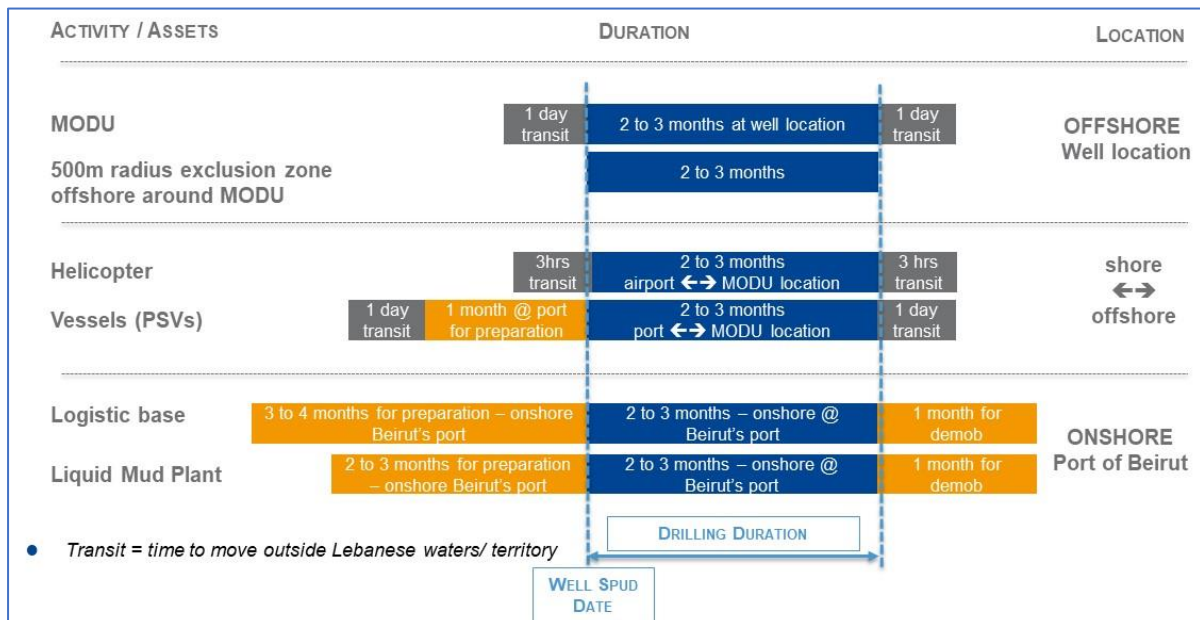


Figure ES2: Duration and location of each project activity

## Objectives of the EIA

The objectives of the EIA process are to

- identify the legal and regulatory requirements and other standards relevant to the project (national legislation and regulations, international agreements and TOTAL's corporate requirements)
- identify sensitive environmental, socio-economic and cultural heritage receptors in the project's area of influence
- inform stakeholders and obtain their views and opinions (potentially affected communities/people and other interested parties)
- determine project aspects and activities that could result in environmental, socio-economic or cultural heritage impacts, along with scoring of impact significance
- develop mitigation measures to reduce potential negative impacts to acceptable levels and enhance any beneficial environmental, socio-economic and cultural heritage impacts arising from the project
- determine residual project impacts, along with scoring of residual impact significance
- ensure that mitigation measures are incorporated into management plans that will be implemented by the project sponsor and its contractors and subcontractors during the exploration drilling programme.

## Study area

The area of influence (AOI) for each environmental and social receptor has been identified based on requirements in the MoE and LPA's draft 'Sector-specific EIA Guidelines for Oil and Gas Reconnaissance and Exploration Drilling Activities in Lebanon'. The extent of the AOI differs depending upon the type of impact being considered and the attributes of the potentially affected receptors.

Baseline data has been collected with a focus on these AOIs, though information has been collected from a broader study area to aid in providing context. Where different areas are used, this is discussed in the respective section of the EIA report.

## Legal and administrative framework

The Block 4 exploration drilling activities will be carried out in accordance with the environmental and social requirements of

- national legislation and regulations
- applicable international conventions and agreements to which Lebanon is a party
- TOTAL's corporate commitments
- international best practice.

Key legislation and guidance for this project includes

- Environmental Impact Assessment Decree 8633/2012
- draft 'Sector-specific EIA Guidelines for Oil and Gas Reconnaissance and Exploration Drilling Activities in Lebanon' (MoE and LPA, 2019)
- Strategic Environmental Assessment (SEA) for Exploration and Production Activities Offshore Lebanon (MoEW, 2019).



Other relevant legislation includes the Offshore Petroleum Resources Law (Law 132/2010); the Petroleum Activities Regulations (Decree 10289/2013); the Exploration and Production Agreement Decree (Decree 43, Annex 2, 2017); the Environment Protection Law (Law 444/2002); the Procedure for Reviewing of Scoping and EIA Reports (Decision 261/1 of 2015); the Law on Strengthening Transparency in the Petroleum Sector (Law 84/2018); and the Right of Access to Information (Law 28/2017).

## Public participation

The EIA process includes public participation, the main goal of which is to identify the views and opinions of potentially affected people and other interested parties. Stakeholder feedback is used to focus the impact assessment and, where appropriate, influence project design and execution. Stakeholder engagement for this project has been undertaken in accordance with the requirements of Lebanese legislation, TOTAL policies for stakeholder engagement and international best practice. A project-specific stakeholder engagement plan (SEP) for Block 4 was developed to support meaningful and effective engagement throughout the EIA process.

Public participation and stakeholder engagement meetings were undertaken during the scoping phase and the baseline data collection phase. Whereas public participation targets the general public, stakeholder engagement targets specific groups and individuals who may be impacted by the project, have influence over it or have an interest in it, including authorities, international and national agencies, civil society and non-governmental organisations (NGOs), academia, businesses and potentially affected groups.

Stakeholder questions, concerns and comments were similar across the two phases and from the different stakeholder groups (national level, regional level and local level). However, local level stakeholders identified issues around social topics such as employment and livelihoods whereas national and regional level stakeholders raised more questions and concerns relating to environmental topics. The stakeholder issues and comments received to date are addressed in this EIA.

The report-back phase stakeholder engagement on the EIA report began in early September 2019. The aim of the engagement was to ensure that stakeholders were informed about and comprehend the outcome of the EIA, particularly the identified impacts and mitigation measures. Comments provided by stakeholders during this phase have been responded to within this EIA. Stakeholder engagement will continue after final EIA submission.

## Summary of surrounding environment

To identify potential impacts of the project on receptors, an understanding of the existing (baseline) pre-project conditions is required.

The following studies/surveys have been carried out for the Block 4 exploration drilling campaign and used to inform the EIA:

- social baseline study – bibliographic review and primary data collection
- offshore environmental baseline study – bibliographic review
- offshore environmental baseline survey – water and sediment sampling and chemical, physical and biological analysis; seabed video surveillance (marine fauna and archaeological observation); onboard watch for marine fauna (marine mammals, seabirds and reptiles) and other sea users.

Environmental receptors that could be affected by the project include

- air quality – the Eastern Mediterranean is affected by various sources of air pollution, including long-range airborne pollutants and particles from dust storms
- seawater quality – offshore seawater has low turbidity, is oligotrophic in terms of nutrients and uncontaminated and is considered representative of conditions typical for offshore locations for the Eastern Mediterranean, while coastal seawater is highly contaminated with anthropogenic pollution in certain places
- sediment quality – the offshore sediments comprise brownish mud dominated by fine particles and are considered to be typical of the deep sea sediments in the Eastern Mediterranean with low contamination except for certain heavy metals, coastal sediments have higher concentrations of heavy metals, hydrocarbons and nutrients
- coastal habitats – seagrass beds and vermetid<sup>1</sup> reefs are features of Lebanon's coastal waters and contribute to criteria for coastal proposed marine protected areas
- deep-water benthic communities – dominated by fauna associated with deep-water sediments of the Eastern Mediterranean, the assemblage is considered relatively impoverished in terms of species abundance and diversity, reflecting the low levels of organic matter and nutrient enrichment
- plankton communities – primary phytoplankton productivity offshore is low due to the oligotrophic water column and stratification, zooplankton abundances are low but with moderate to high diversity
- fish – Lebanon's waters contain more than 100 fish species of commercial importance, a number of threatened fish, shark and ray species are also present
- marine mammals – several species are reported from the Eastern Mediterranean region and include species of whale and dolphin and the Mediterranean monk seal (critically endangered in the Mediterranean). Overall, marine mammal abundances are low in Lebanon's waters, with the bottlenose dolphin being the most commonly sighted species.
- turtles – green turtle, leatherback turtle and loggerhead turtle are present in Lebanese waters, with foraging areas and migration routes along the coast. Nesting sites for green and loggerhead turtles are found on sandy shorelines in south Lebanon.
- birds – gulls were the most commonly sighted bird species during the offshore environmental baseline survey in Block 4, shearwaters, skuas, duck and herons were also sighted
- protected areas – the closest nationally designated site to the Block 4 priority area is Palm Islands Nature Reserve to the north. The closest sites of conservation interest to the Block 4 priority area are Beirut Port Outer Platform proposed marine protected area and three sites identified by OCEANA as deep-sea sites for conservation (Jouneih Canyon, Saint Georges Canyon and Beirut Escarpment).

Socio-economic receptors that could be affected by the project include

- social conditions (safety and security) in local communities – coastal communities adjacent to Block 4, communities in the vicinity of the logistics base in the Port of Beirut, communities along the helicopter transfer route and in the vicinity of Beirut Rafic Hariri International Airport, and communities along project vehicle transport routes
- fisheries – the fishing industry in Lebanon is artisanal, relying on a traditional, small-scale fleet of motorised wooden vessels. Legislation restricts fishing grounds to within six nautical miles of the shore. Fishing vessels do not use the Port of Beirut. Those engaged in fishing generally do so on a full-time basis with no alternative livelihood activities or social security arrangements.

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<sup>1</sup> Vermetid reefs are formed by worm snails. The shells of Vermetid snails are extremely irregular, and do not resemble the average snail shell. They usually grow cemented onto a hard surface or cemented together in colonies.

- tourism – within the coastal zone tourism represents a major contributor to the local economy. Beirut hosts the majority of tourists, although beach resorts, beaches, bathing sites, recreational sailing marinas and scuba-diving sites are present along the coast. One particular recreational activity that takes place along the entire coast of Lebanon is sea angling, which occurs throughout all seasons but is most common during the summer.
- shipping – the Port of Beirut is one of the largest ports in the Eastern Mediterranean and is an important international trading station with the surrounding Arab countries. There are a significant number of shipping routes along the southern boundary of Block 4 and up through the western section of the block.
- archaeological and cultural resources – archaeological review of seabed video surveillance during the offshore environmental baseline survey did not identify any archaeological features in the Block 4 priority area. Several cultural heritage sites with significant historical importance were identified in the coastal zone, including antiquities, such as underwater cities, ancient breakwaters and Phoenician walls. The antiquities at Aamchit are the closest offshore site to the Block 4 priority area.
- infrastructure – Lebanon has a relatively extensive network of physical infrastructure comprising roads, ports, electricity supply, water supply and telecommunications. A growing population and the influx of displaced persons have placed pressure on already-stressed and ageing infrastructure.
- public health – Lebanon like many countries in the Middle East, is undergoing an epidemiological transition marked by an increasingly ageing population suffering from chronic and non-communicable diseases. The Syrian crisis and resulting influx of displaced persons has increased the demand for health care services and significantly increased government's costs in order to meet the increased demand.
- general economy – Lebanon's macro-economic structure is heavily dependent on the services sector, with real estate constituting the largest services sector. Economic growth has slowed since 2011 and the start of the Syrian crisis.
- education and training – high levels of education were reported in all the sample communities, educational levels amongst some groups such as fishermen (particularly elderly) were reported to be lower than amongst the population at large.

## Potential impacts of the project

Potential impacts were identified using the preliminary impact identification matrix outlined in the 'Update on the Strategic Environmental Assessment (SEA) for Exploration and Production Activities Offshore Lebanon (MoEW, 2019)' as guidance.

Table ES1 summarises the key potential impacts resulting from the Block 4 exploration drilling campaign. A comprehensive, systematic review and scoring of all potential impacts from the drilling campaign is provided in Chapter 6 of the EIA. By complying with international best practice on impact avoidance or mitigation and Lebanese legislative requirements, the residual impacts from routine activities are expected to have minor or negligible levels of significance. The exception is from the discharge of water-based cuttings and drilling fluids at the seabed during drilling of the Block 4 upper well sections which has been categorised as moderate residual impact significance<sup>2</sup>. Cuttings and fluids cannot be returned to the rig during this part of the work as these well sections are drilled without a marine riser in place. Impacts on the water column are associated with discharge of the inert, insoluble drilling products barite and bentonite and turbidity effects on marine fauna.

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<sup>2</sup> There is also an option for future wells in Block 4 to use high-performance water based drilling fluids (HPWBDF) in the lower well sections. In this case there will be discharge of water-based cuttings and drilling fluids from the riserless well sections, plus discharge of HPWBDF cuttings from lower well sections. This option has also been assigned a moderate residual impact significance.

**Table ES1: Potential impacts from the Block 4 exploration drilling campaign**

	Air quality	Climate change	Sediment quality/ composition	Water quality	Benthos	Fish	Plankton	Seabirds	Cetaceans, turtles and seals	Sensitive marine habitats	Coastal habitats	Terrestrial ecology	Archaeological and cultural resources	Infrastructure	Social conditions (security/safety)	Education and training	General economy	Fisheries	Shipping	Tourism	Public health
<b>Routine activities</b>																					
MODU mobilisation, installation, plug and abandonment and demobilisation	X	X	X	X	X	X	X		X	X			X					X	X		
Cuttings discharge during drilling Option 1 – use of NADF in lower hole sections Discharge of drill cuttings and WBDFs from riserless top hole sections only (option selected for well B4-1 and option for possible future exploration / appraisal wells in Block 4)			X	X	X	X				X			X	X				X	X	X	
Cuttings discharge during drilling Option 2 – use of a HPWBDF in lower hole sections Discharge of drill cuttings and WBDFs from riserless top hole sections and discharge of HPWBDF cuttings from lower well sections (option for possible future exploration / appraisal wells in Block 4)			X	X	X	X	X		X	X								X	X	X	
Ship to shore of NADF cuttings and fluids (only applicable to Option 1 above)	X	X												X				X	X	X	
Cementing discharges during drilling			X		X																
Pipe dope discharges during drilling				X		X	X											X			
BOP testing discharges during drilling				X		X	X											X			
Discharge of sanitary waste from MODU and support/supply vessels				X		X	X											X			

	Air quality	Climate change	Sediment quality/ composition	Water quality	Benthos	Fish	Plankton	Seabirds	Cetaceans, turtles and seals	Sensitive marine habitats	Coastal habitats	Terrestrial ecology	Archaeological and cultural resources	Infrastructure	Social conditions (security/safety)	Education and training	General economy	Fisheries	Shipping	Tourism	Public health
Discharge of food waste from MODU and support/supply vessels (no discharge permitted for B4-1 well as < 12 nm from land. Discharge permitted for possible future exploration / appraisal wells if > 12 nm from land.)				X		X	X											X			
Desalination unit discharges from MODU				X		X	X											X			
Discharge of drainage water (deck drainage, fire water, bilge water and slop water) from MODU and support/supply vessels				X		X	X											X			
Uplift and discharge of cooling water from MODU				X		X	X											X			
Discharge of ballast from MODU and support/supply vessels				X		X	X											X			
Generation of solid waste on MODU and support/ /supply vessels	None providing waste managed properly																				
Operation of incinerator onboard MODU (not applicable to well B4-1 as no incinerator on MODU, may be applicable to possible future exploration / appraisal wells depending on MODU selection)	X	X																			
MODU and support/supply vessel power generation resulting in air emissions	X	X																			
Well test of possible future appraisal well (not applicable to well B4-1)	X	X																			
Underwater noise from vertical seismic profile (VSP) activities						X			X									X			
Underwater noise from MODU and support/supply vessel operations						X			X									X			
Support activities (movement of support vessels)														X				X	X	X	

	Air quality	Climate change	Sediment quality/ composition	Water quality	Benthos	Fish	Plankton	Seabirds	Cetaceans, turtles and seals	Sensitive marine habitats	Coastal habitats	Terrestrial ecology	Archaeological and cultural resources	Infrastructure	Social conditions (security/safety)	Education and training	General economy	Fisheries	Shipping	Tourism	Public health		
Light spill from MODU						X		X	X											X			
Chemicals transfer and storage	None providing chemicals managed properly																						
Logging using radioactive sealed sources (also applicable to onshore storage and transport of radioactive sealed sources)	None under normal operations																						
Logistics base operation														X	X	X	X			X	X		
Logistics base operation – emissions to air	X	X																			X		
Logistics base operation – discharge of drainage water				X																			
Logistics base operation – noise generation												X								X	X		
Logistics base operation – waste management	None providing waste managed properly														X	X							X
Logistics base operation – chemicals management	None providing chemicals managed properly																						
Helicopter transfers to Beirut International Airport							X				X	X		X						X	X		
<b>Potential accidental event scenarios</b>																							
Dropped object from MODU (lifting)			X		X																		
Loss of chemical containment onboard MODU			X	X	X	X	X											X					
Radioactive source lost in hole			X																				
Riser rupture, release of drilling fluid to sea			X	X	X	X	X											X					
Shallow gas blowout, release of gas into water column	X		X	X	X	X	X											X	X				
Blowout – release of condensate and gas	X			X		X	X	X	X		X		X	X	X		X	X	X	X	X		
Collision of third-party ship with MODU – release of third-party fuel inventory, possible damage to MODU and riser				X		X	X	X	X	X								X	X				

	Air quality	Climate change	Sediment quality/ composition	Water quality	Benthos	Fish	Plankton	Seabirds	Cetaceans, turtles and seals	Sensitive marine habitats	Coastal habitats	Terrestrial ecology	Archaeological and cultural resources	Infrastructure	Social conditions (security/safety)	Education and training	General economy	Fisheries	Shipping	Tourism	Public health	
Helicopter crash on MODU deck – release of aviation fuel to sea				X			X															
Loss of containment during offshore materials transfer to MODU – release of drilling fluids or marine diesel to sea			X	X	X	X	X											X				
Loss of rig stability (rig capsizes) due to severe metocean conditions with release of fuel inventory				X		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X
Earthquake resulting in loss of well integrity and release of hydrocarbons to sea				X		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X
Loss of containment during materials transfer to supply vessels at logistics base quay side – release of drilling fluids/diesel to sea				X																X		

The impacts presented in the EIA can be grouped as follows.

### **Mobilisation, installation and demobilisation**

Impacts from mobilisation, installation and demobilisation of the MODU are largely associated with rig operational activities and the associated emissions (engine exhausts), noise (from engines and dynamic positioning) and wastewater discharges (sanitary wastewater, macerated food waste, desalination unit discharges, drainage, cooling water and ballast water). There is also potential for impacts on shipping and fisheries from the physical presence of the MODU and its safety zone<sup>3</sup>.

A drillship has been selected for the B4-1 drilling programme. If a semi-submersible rig is used for future exploration / appraisal wells, there is the potential for anchoring impacts on seabed sediments and benthic communities, and any unknown archaeological features on the seabed.

### **Drilling operations**

The drilling operations will result in discharges to the marine environment, i.e. cuttings and drilling fluids and small volumes of cement, pipe dope and blowout preventer test fluids.

The Block 4 wells will be drilled in five sections which become progressively narrower in diameter with depth drilled.

The first two hole sections will be drilled “riserless” (there is no potential for the recovery of the cuttings generated during the drilling of these sections) and the cuttings and drilling fluids will be deposited on the seabed directly around the well site. These hole sections will be drilled using seawater and water-based drilling fluids.

For the remaining three hole sections, a marine riser will be in place and cuttings and drilling fluids will be brought back up to the MODU. There are two options with respect to drilling fluid use in these lower hole sections:

- Option 1: Use of a non-aqueous drilling fluid (NADF) to ensure compatibility with the geological formations encountered. In this case cuttings and drilling fluids will not be discharged. They will be shipped to shore for treatment and disposal.
- Option 2: Use of a high-performance water-based drilling fluid (HPWBDF). In this case cuttings will be discharged to sea from the rig. The drilling fluids would be separated from the cuttings on the rig and re-used in subsequent well sections.

Option 1 has been selected for the first B4-1 exploration well as the geological formations downhole are currently not well known and NADF provides enhanced borehole stability. Any subsequent wells in Block 4 will utilise either Option 1 or 2 depending on the findings from the first well.

Disposal of cuttings and water-based drilling fluids at sea will potentially impact seawater and sediment quality, benthic communities, water column communities (fish and plankton) and sensitive marine habitats, as well as fisheries and infrastructure (submarine cables). The land-based disposal of cuttings will have air emission impacts associated with vessel transportation and potential impacts on land-based receptors. It should be noted that for the first well in the Block 4 drilling programme NADF cuttings will be exported to Cyprus for treatment and disposal at the

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<sup>3</sup> 500 m safety zone will be in place around the MODU.



Innovating Environmental Solutions Center (IESC) treatment facility. This facility is permitted separately by the authorities in Cyprus and this disposal route is outside the scope of this EIA.

If vertical seismic profile<sup>4</sup> of the Block 4 wells is carried out, it will introduce impulsive underwater noise to the area for a very short period of time that may affect marine fauna, particularly whales, dolphins and turtles. Drilling activities on the MODU will also be a source of continuous lower levels of underwater noise.

Well testing of the Block 4 first exploration well will not be carried out. If well testing of a future well takes place, this will have associated emissions from flaring of test fluids with potential effects on air quality.

MODU operations can affect archaeological and cultural resources (during well spud and from semi-submersible drilling rig anchors) and the physical presence of the MODU and its safety zone can interfere with shipping, fisheries and potentially tourism (from changes to sea views from the shore).

### **Support activities**

The onshore logistics base has the potential for air and noise-related impacts from operation of the drilling fluids mixing plant / bulk facility and any associated generator(s) and from loading/unloading operations, as well as possible impacts on the Port of Beirut infrastructure. In terms of positive impacts, operation of the logistics base has the potential to result in local employment and training opportunities (although they are limited at this exploration phase).

The movement of supply vessels between the MODU and the logistics base has the potential for impacts on marine fauna (underwater noise impacts), water quality (from vessel operational wastewater discharges), shore-based infrastructure (Port of Beirut), shipping, fisheries and tourism (recreational activities).

Helicopter crew transfers could have potential noise impacts on sensitive coastal habitats, local communities and tourism.

### **Accidental events and transboundary impacts**

Unplanned or accidental events are considered separately from planned routine activities, as they only arise as a result of a technical failure, human error or natural phenomena such as a seismic event.

Representative scenarios of accidental events that may occur during the Block 4 exploration drilling campaign are shown in Table ES1 and presented in more detail in Chapter 6 of the EIA. Spill drift modelling of two large-scale hydrocarbon releases (well blowout with release of condensate and an instantaneous release of a large volume of marine diesel fuel in Block 4) has been conducted as part of the EIA study. The results indicate that the northern coast of Lebanon and Syria could be reached by some residual oil.

Controls and actions to reduce the likelihood of a spill/release incident are a key part of the mitigation and are described in Chapter 6. TEP Liban has developed an oil spill contingency plan

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<sup>4</sup> VSP relates to measurements made using geophones inside the wellbore and a source (airgun array), at the surface near the well. This methodology generally obtains higher-resolution geological information than a surface-towed seismic survey.

that focuses on optimising response at sea in order to minimise coastal and transboundary impacts.

### **Cumulative impacts**

Cumulative impacts consider the additive impact of the primary activity (i.e., the current project) with any local third-party activities.

TEP Liban's drilling programme in Block 4 will be the first offshore exploration drilling activity in Lebanon. The only other offshore block in Lebanese waters that has currently been awarded is Block 9, also to TEP Liban. Block 4 and Block 9 are approximately 45 km apart, cumulative impacts from any future simultaneous activities in these blocks are therefore not anticipated.

No other future projects are known to be taking place in the Block 4 area.

### **Management and implementation of mitigations**

Processes are required to ensure that both TEP Liban and relevant contractors implement commitments derived from the EIA during the exploration drilling campaign.

A commitments register has been compiled that lists all the mitigation measures identified in the EIA. These commitments have been tracked through to Environmental and Social Management Plans (ESMPs) developed for the drilling campaign. The ESMPs form part of TEP Liban's Health, Safety and Environment Management System (HSE MS).

The ESMPs form the basis for subsequent detailed management plans prepared and implemented by the MODU, drilling fluids and cementing contractors; the logistics base contractor; and support/supply vessel contractor who will be requested to comply with the relevant environmental and social requirements set out in TEP Liban's ESMPs.

Contractors will also be required to have their own HSE management systems in place.

### **Conclusion**

This EIA report has provided an assessment of environmental and social impacts associated with TEP Liban's offshore exploration drilling activities in Block 4.

Alternatives to proposed project activities have been considered; the proposed location of the B4-1 exploration well has been selected based on the most direct drilling route to promising hydrocarbon reserves; the drilling rig will be designed specifically to operate in the deep-water environment of Lebanon Block 4 and will include features for high-efficiency operation; and discharges from the drilling activities will be MARPOL 73/78 compliant.

The location of the onshore project logistics base has been selected based on the principle of minimal disruption to existing infrastructure, with the Port of Beirut being the closest and most suitable choice offering the required capacities without further extending its footprint.

During the EIA, all applicable environmental and socio-economic receptors were identified, their sensitivity towards proposed project activities assessed and mitigation measures considered, where impact avoidance was not feasible. In summary, all identified impacts in this EIA are expected to be manageable with acceptable residual effects after mitigation.



The proposed offshore exploration drilling project proposed by TEP Liban is the first project of this type submitted for approval in Lebanon and therefore if exploration is successful it may have potential beneficial impacts on the national economy of Lebanon.