

12 Residual Impacts and Conclusion

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12.1 Introduction

This Chapter of the Environmental and Socio-Economic Impact Assessment (ESIA) summarises the residual impacts and conclusions of the SWAP 3D Seismic Survey ESIA.

12.2 Environmental and Socio-Economic Impacts

Environmental and socio-economic impacts have been assessed for the 3D Seismic Survey activities. The assessments within the ESIA show that impacts are minimised as far as practicable and necessary through the implementation of the existing control measures and no additional mitigation is required.

Tables 12.1 and 12.2 summarises the residual environmental and socio economic impacts associated with the routine and non-routine SWAP 3D Seismic Survey activities.

Table 12.1: Summary of SWAP 2D Seismic Survey Environmental Impacts

Event	Event Magnitude	Receptor Sensitivity	Impact Significance
Underwater sound from energy source	Medium	Low (Fish)	Minor Negative
		Medium (Seals)	Moderate Negative
Offshore Survey Activities	Medium	Overwintering and Migrating Birds (Medium)	Moderate Negative
		Nesting Birds (Medium)	Moderate Negative
		Absheron National Park (Medium)	Moderate Negative
In air sound arising from onshore survey activities, including vehicle movements and operation of the seismic source	Low	Human Receptors (Medium)	Minor Negative
Groundborne vibration due to operation of onshore survey sound source and use of the onshore survey vehicles	Low	Residential/Community Structures (Medium)	Minor Negative
		Human Receptors (Medium)	Minor Negative
Disturbance and physical presence of the survey vehicles	Low	Ecological Receptors (Flora) (Medium)	Minor Negative
		Ecological Receptors (Fauna) (Medium)	Minor Negative
Groundborne vibration due to Onshore Survey Activities	Low	Cultural Heritage Receptors (Medium)	Minor Negative
Physical disturbance due to Onshore Survey Activities	Low		Minor Negative

Table 12.2: Summary of SWAP 2D Seismic Survey Socio-Economic Impacts

Event	Event Magnitude	Receptor Sensitivity	Impact Significance
Physical presence of seismic vehicles, support vehicles, equipment (including nodes) and crew	Low	Medium (Land owners and land users)	Minor Negative
		Medium (Recreational users of the beach and coastal areas, including tourists)	Minor Negative
		Medium (Tourism business owners)	Minor Negative
Physical presence of seismic vessels, support vessels and equipment	Low	Low (International, Local and Regional Shipping)	Negligible

(vessel movement and survey operations in shallow water)	Low	Medium (Small-Scale Coastal Fishing)	Minor Negative
	Low	Medium (Recreational Maritime Users)	Minor Negative
Operation of offshore energy source	Low	Medium (Small-scale coastal fishing)	Minor Negative

Environmental Residual Impacts

During the offshore 3D Seismic Survey, the seismic sources will be moving and the underwater sound will occur repeatedly but intermittently, with the sound energy reducing with distance from the source. There will be up to five vessels operating simultaneously during daylight and only two during the night time. A given sound level will last for a very short period of time in any one location.

Since underwater sound has the potential to impact fish and Caspian seals in the marine environment, an underwater sound study was undertaken to consider the combined effects of multiple vessels on underwater sound for a range of vessel scenarios. Modelling has focused in Priority Areas 2 and 4 based on their sensitivity for Caspian Seals and fish.

The Caspian seal population is highly vulnerable and has an internationally protected status of 'Endangered'. Caspian seals are observed in many regions of the Caspian Sea depending on the season as they undertake annual migrations between breeding locations in the north and feeding locations in the south. Northbound autumn migration starts in October and seals are observed in the waters of Azerbaijan, particularly in the vicinity of the Absheron Peninsula and the adjacent islands to the east, from October to mid-December. Current information available on seal migration routes has been used to identify the most sensitive areas for seals within and adjacent to the 3D Seismic Survey Area.

A number of control measures have been included in the design of the 3D Seismic Survey to reduce potential impacts. The Survey schedule has been designed to take into account the presence and seasonal sensitivity of protected species and protected areas. In water depths greater than 2m, the seismic source soft-start (or ramp up) procedures will be implemented each time activation of the source array recommences after a period of inactivity. Prior to the seismic source being activated using a soft-start procedure, marine mammal monitoring will be conducted for 30 minutes to observe whether there are any seals within a 500m Mitigation Buffer Zone around the sound source. If seals are sighted, the soft-start procedure will be delayed for at least 20 minutes to ensure no seals are within the Mitigation Buffer Zone.

Modelling results show all for fish species, regardless of hearing sensitivity, in all depth zones within Priority Areas 2 and 4, sound levels decrease below thresholds associated with potential mortal injury and recoverable injury at a distance smaller than 60m from the source. As fish are highly mobile and there will be a soft-start prior to operations commencing in water depths greater than 2m it is unlikely that fish will be subject to injurious levels of sound.

For Caspian seals, permanent and temporary injury for single pulses is only likely at very close proximity to vessels (within 32m of the vessel) and within 80m for behavioural disturbance. However, should any seals be present within Priority Area 2 and 4 the modelling for cumulative sound has indicated there is potential for sound exposure levels from multiple vessels to exceed Permanent Threshold Shift (PTS)¹, but only if vessels are close together and seals are present in the later months. With the soft-start procedure² and the careful scheduling of the survey to avoid seals at sensitive times these impacts are highly unlikely to occur.

The Caspian region has a high diversity of bird species, with a large number of endemic species present including overwintering, migrating and nesting birds. There are 3 International Bird Areas (IBAs) located within with Priority Areas 2, 4 and 5 and there are 3 locations noted as being of

¹ A permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level. This is considered to be auditory injury.

² A soft-start procedure is a process whereby airgun operation is slowly ramped up until the full working capacity is reached.

importance to nesting birds, despite not being internationally recognised. To minimise potential impacts to birds from the offshore survey activities, a number of measures have been incorporated into the project design. A key measure has been the planning of the Survey schedule, which has been developed to avoid peak periods of sensitivity for birds at the IBAs and other important locations. In the event that it is not possible to avoid the nesting season (April to July), a local ornithologist will accompany the survey crew to identify any potential nesting birds and will advise if restriction should be in place. Offshore survey personnel will be provided with environmental awareness training that includes measures designed to minimise sound and disturbance generated by offshore survey activities.

The Absheron National Park, which overlaps with the Shahdili Spit IBA, is an internationally designated area. In addition to the importance of the area for birds, the National Park designation also reflects the presence of species of flora, fauna, reptiles and amphibians of conservation importance. No survey activities will be undertaken within the boundary of the Absheron National Park. However, to mitigate against any potential impacts to the Absheron National Park the measures described above are also applicable. Taking these measures into consideration it is expected that sound and disturbance will be barely discernible or indiscernible to fauna (mammals, reptiles and amphibians) within the National Park meaning these species will only be marginally affected or unaffected.

Land across most of the Priority Areas has been disturbed by previous activity; this is especially the case in Priority Area 1 where the Ecology Survey undertaken in November 2015 identified that the majority of the area is very unlikely to support any threatened or nationally important habitats. Priority Area 2 comprises predominantly marshland (within 150m from the coast) and semi-arid habitat including sparse low vegetation crossed with tracks. Most of Priority Area 3 is developed land or has been disturbed, including stripping of the topsoil. For both Priority Areas 2 and 3, with the exception of suspected presence of Spur-thighed Tortoise, no species of conservation importance greater than Least Concern³ were recorded. To minimise potential impacts to ecological receptors, a number of measures will be followed. Survey crew will be trained to identify areas of potential ecological importance; each survey line will be inspected for areas potential ecological importance prior to commencing the 3D Seismic Survey. If an area of potential ecological importance is identified and it is not possible to re-route the survey line around this area an on call ecological watching brief will be established, which involves using suitably qualified national ecologists to confirm and record the presence of any protected species. Where protected species are identified the ecological watching brief ecologist will advise on the controls required to minimise or avoid impacts.

Sound arising from the onshore survey activities, including vehicle movements and operation of the seismic source has the potential to impact local residents. The sound generated from both vehicles movements and the source operation will be very short term and transient. The survey will only be present in each survey location for a few minutes before moving on to the next location. The Survey will be restricted to daylight hours only. As a minimum, the Survey will adhere to a 5m offset distance from all residential properties as set out in guidelines by the International Association of Geophysical Contractors (IAGC). In addition, to ensure local residents are informed of the Survey activities a Communication and Consultation Management Plan will be implemented and maintained as a mechanism of communicating with the communities.

Groundborne vibration will arise from the operation of the seismic source; it has the potential to effect both physical structures and local residents. Residential/community structures are located throughout the 3D Seismic Survey Area and structures range from framed/reinforced commercial and brick built buildings to shacks and shelters constructed from metal and/or wood. Mitigation measures include those listed above for sound. The 5m offset distance will ensure there is no damage to the physical structures and will reduce potential nuisance to local residents.

As part of the ESIA process a Cultural Heritage Walkover Survey was conducted with support from archaeologists from the IoAE to verify known archaeological sites and to assess the potential for unknown archaeological sites. It is recognised that historic buildings are often more fragile and susceptible to damage. The 3D Seismic Survey will avoid known sites and a minimum 30m offset

³ Under the International Union for Conservation of Nature (IUCN) Least Concern is considered as a taxon which has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

distance will be placed around them to prevent any potential impacts from vibration or physical disturbance in line with criteria developed by the British Museum. There is the potential that unknown sites may be identified during the Survey; the likelihood is considered to be moderate to high in Priority Area 3 where there has been little disturbance to the natural environment. To mitigate against potential impact to unknown archaeological sites a number of measures will be followed. Survey crew will be trained to identify sites of archaeological potential. Each survey line will be inspected prior to commencing the 3D Seismic Survey. If a site of archaeological potential is identified and it is not possible to re-route Survey around it then an on call archaeological watching brief will be established. An archaeologist from the IoAE will attend and assess the site and if required the Survey may be suspended while further investigation is undertaken.

Socio-Economic Residual Impacts

The physical presence of 3D Seismic Survey onshore has the potential to impact land owners and land users, recreational users of the beach and tourism and business owners. As the Survey may require access to private land, land owners and land users may be affected by physical disturbance to their land and crops. The Survey will be undertaken along the beach during the peak summer months which will impact both recreational users and tourist businesses operating in the area. To minimise potential impacts to affected receptors, a number of measures will be implemented. All 3D Seismic Survey activities will be notified to land owners in advance in accordance with the Communication and Consultation Management Plan, which will be implemented and maintained as a mechanism of communicating with the communities. A Conditions Walkover Survey will be conducted along the seismic survey line (ahead of the 3D Seismic Survey team) to identify the characteristics and condition of the land, structures and crops. A grievance procedure will provide a mechanism for landowners and land users to raise their concerns and a compensation procedure will ensure the assessment and management of claims, made by the public and stakeholders, for damage specifically caused as a direct result of 3D Seismic Survey activities.

Offshore Survey activities have the potential to affect international, regional and local shipping activities; however these vessels are typically equipped with communication systems, and have the ability to adapt to change. A number of measures will be adopted to reduce the potential impact including, the notification of the Survey schedule to relevant maritime and port authorities in advance, compliance with national and international maritime regulations for avoiding collisions at sea, use of signals and lights and on-going communication throughout the Survey with other vessels, including the provision of advanced positioning.

Small scale coastal fishing is normally undertaken within to 2 to 3 nautical miles from the shore and there are approximately 381 fishermen with a licence to fish within the SWAP Contract Area. The fishermen are vulnerable to change given that fishing is generally the main source of income for their families. While the presence of the Survey is likely to impact fishermen, source vessels will be continuously moving and will not be present in an area for any significant period. It is not planned to remove fixed fishing equipment, which will be identified during the planned Seabed Hazard Survey and avoided. However, if removal is required, suitable monitoring and reporting measures will be implemented. Local fishermen will be engaged both prior to and during the Survey in line with the Communication and Consultation Management Plan and the establishment of the grievance procedure will ensure fishermen have a mechanism should they wish to raise any complaints.

There are a number of beaches and touristic locations within the 3D Seismic Survey Area that are used for recreational activities and water sports (including diving, jet ski-ing, boating, sailing and kite surfing), particularly during the summer months. However, the Absheron Peninsula provides alternative recreational beaches and tourist locations that are available for recreational users to access while the 3D Seismic Survey Activities are in progress. As such, it is considered that the majority of recreational users have the potential to adapt, however for some users such as those who own summer houses in the area, their ability to adapt is less. To minimise impacts, a number of measures will be followed, including implementation of the Communication and Consultation Management Plan as outlined above, which will include engagement with dive companies.

It is anticipated that the indirect effect of the sound source on commercial and small scale fishing would be temporary, and unlikely to result in concerns being raised by stakeholders or governmental bodies.

The assessments within the ESIA show that impacts are minimised as far as practicable and necessary through the implementation of the existing control measures and no additional mitigation is required.

12.3 Cumulative, Transboundary and Accidental Events

Potential cumulative impacts, transboundary impacts and the impacts of accidental events associated with the SWAP 3D Seismic Survey have been assessed.

The potential for cumulative impacts arising from the combined effects of separate project-related residual impacts is insignificant. As no onshore activities other than those associated with the 3D Seismic Survey have been identified cumulative impacts are not expected onshore. A number of other offshore projects were identified and a cumulative impact assessment was undertaken to ascertain the potential impact on the most susceptible receptors: Caspian seals, fish, and small scale coastal fishing. Projects identified as having potential cumulative impacts are: SWAP 2 D Seismic Survey, Shah Deniz (SD) North East 2D Seismic Survey; Azeri Chirag Gunashli (ACG) 3D Seismic Survey and Gum Deniz & Bahar 3D Seismic Survey. Due to the timing of the Gum Deniz & Bahar and ACG seismic surveys cumulative impacts from these surveys on seals are expected to be limited. The SD and SWAP 2D surveys were scheduled for October and November, respectively, which is when seals are expected to migrate through the area on their autumn migration. However, given the geographic and temporal gaps between the past and planned seismic surveys and the use of the soft start procedure there is limited scope for cumulative impacts to seals due to underwater sound.

Taking into consideration the other known offshore activities and projects that have the potential to cause impacts, only the SWAP 2D Seismic Survey was assessed as having the potential to impact small scale coastal fishing. However, the potential cumulative impact is considered to be no more than moderate adverse as there is no temporal or geographic overlap between the SWAP 2D and 3D seismic surveys.

It is estimated that 15 kilotonnes of greenhouse gas (GHG) emissions will be released to the atmosphere as a result of the SWAP 3D Seismic Survey. Total GHG emissions for Azerbaijan in 2015 were forecast to be approximately 49,000 kilo tonnes, of which the SWAP 3D Seismic Survey is expected to contribute approximately 0.0306% of the national total.

Accidental Events are considered separately from routine and non-routine activities as they only arise as a result of a technical failure, human error or as a result of natural phenomena such as a seismic event. Studies have been undertaken to understand the impacts of the following accidental events occurring:

- Offshore:
 - Vessel collision with other marine users, infrastructure and Caspian seals;
 - Release of chemicals/ waste from the 3D survey source, node and support vessels; and
 - Spill of marine diesel from the 3D survey source, node and support vessels, including a worst case scenario of a full fuel inventory loss (maximum 10 m³).
- Onshore:
 - Road accidents; and
 - Leaks and spillages.

The SWAP 3D Seismic Survey activities will take place in waters between 0 and 25m deep, where the density of offshore infrastructure is relatively high. There is therefore potential of a collision between SWAP 3D Seismic Survey vessels and shipping traffic, fishing vessels, or offshore infrastructure. However, with the preventative measures outlined in the ESIA in place the potential impacts on other marine users and infrastructure as a result of collision are unlikely to be significant.

Although highly unlikely to occur (given the existing control measures), collision with source vessels or airgun arrays may cause injury or lethal outcome to individual Caspian seals. Caspian seals are also expected to avoid areas of increased underwater sound and collision risk is likely to be limited and of low significance for the population.

A number of chemicals in small quantities will be stored and used onboard the seismic and survey vessels throughout the survey and waste streams generated during the seismic survey activities will be stored on board in dedicated containers. The likelihood of an accidental release of chemicals or waste to the marine environment is considered to be very low given the control measures set out in the ESIA.

While considered unlikely, it is possible due to mechanical failure, collision, grounding, or fire the diesel inventory of the fuel tanks onboard one or more of the vessels may be released to sea. In reality fuel is typically stored in a series of smaller tanks which are double bottomed and connected by valves and it is unlikely that contents of all the tanks would be lost simultaneously. Furthermore, the hull of some survey vessels is double skinned.

As a realistic worst case, the loss of the entire diesel inventory stored onboard (10m³) the largest survey vessel type has been modelled for a release in Priority Areas 1, 2, 3 and 4. Diesel on the sea surface is not expected to persist in any one location for more than 24 hours, being evaporated, dispersed or stranded under the effect of winds and currents. The extent of the area where diesel in water (dissolved and dispersed) concentration is anticipated to exceed the 58ppb threshold in the water column (5>% probability) is limited to a few kilometres around the release locations for a maximum period of 1-2 days. Generally, there is a low probability of diesel reaching the shoreline; out of the multiple variations of meteorological conditions modelled only up to 5% of real case scenarios may result in shoreline oiling with Priority Areas 2 and 4 predicted to have the greatest extent of shoreline impacted by beached diesel.

The potential impacts of the 10m³ diesel spill on plankton, benthic invertebrates and fish is considered to be insignificant and the impact to the commercial fishing industry is considered to be low, with negligible impacts to stocks or fish quality anticipated given the low probability of a diesel spill reaching important commercial fishing grounds. However, the impact on seals could potentially be significant, since seals are highly sensitive to hydrocarbons. The impact of a diesel release on small scale fishing along the coastline is anticipated to be limited to a small number of fishermen, however the impact could be potentially significant without adequate compensation in place as fishing represents the primary source of household income for the majority of fishermen.

The probability of spilled diesel arriving at a site of conservation and ecological importance following a release of diesel is low (generally less than 5% and up to 10% for parts of the Absheron National Park). However, the impacts from a spill are considered to be potentially significant based on the international conservation status and ecological importance of these areas. Some important bird and biodiversity areas may be exposed to elevated hydrocarbon concentrations following a spill, however the extent of and persistence of such pollution is likely to be spatially and temporally limited. Nevertheless, it is considered that the potential impact on important bird and biodiversity areas (and the birds present there) could have a potentially significant impact due to the seasonal sensitivities of nesting birds in the region.

Technical and operational control measures will be in place to minimise the potential for spills during the SWAP 3D Seismic Survey. In the event of a spill to the sea, existing plans and procedures will be followed which cover the actions to be taken in the event of a spill, including notification, response actions, follow-up actions and reporting.

Through the implementation of technical and operational control measures described in the ESIA the probability of accidents onshore (road accidents and leaks and spillages) and the potential for environmental and socio-economic impacts as a result of an accident is considered to be low.

12.4 Environmental and Socio-Economic Management

Under the SWAP PSA, BP as Operator is responsible for the environmental and socio-economic management of the SWAP activities, to ensure that project commitments are implemented, and conforms to applicable environmental and social legal, regulatory and corporate requirements.

BP will have overall responsibility for managing the SWAP 3D Seismic Survey and for monitoring and auditing of the technical, safety, environmental and socio-economic performance of the SWAP 3D

Seismic Survey Contractor. An Environmental and Social Management Plan will be developed by the Seismic Contractor and incorporated within a Project Management Plan.

The SWAP 3D Seismic Survey Contractor will be responsible for performing the 3D Seismic Survey and will ensure conformance with their Health Safety Security and Environment Management System, as well as any interface documents developed to ensure BP processes, practices and procedure requirements are met.

12.5 Conclusions

It is concluded that with the implementation of design control impacts for all receptors (on and offshore) will not exceed moderate adverse and are minimised as far as practicable. In addition, BP has consulted with marine ecologists, both national and international, to design and set up a fit for purpose survey programme.

The potential for cumulative impacts arising from interactions between separate project-related residual impacts is considered to be insignificant; and the potential for cumulative impacts with other seismic surveys in the region were considered to be limited.

There will be no discernible transboundary environmental impacts from non-GHG atmospheric emissions. For GHG emissions the SWAP 2D Seismic Survey is expected to contribute approximately 0.0306% of the national total forecast for 2015.

Technical and operational control measures will be in place to minimise the potential for accidental events occurring during the 3D Seismic Survey.

The SWAP 3D Seismic Survey Contractor will be responsible for preparing an Environmental and Social Management Plan which aligns with BPs expectations; and for undertaking the 3D Seismic Survey in accordance with the Plan. BP will have overall responsibility for managing the SWAP 3D Seismic Survey; for monitoring and auditing the performance of the Contractor; and for ensuring that project commitments are implemented.