

5. ENVIRONMENTAL IMPACT ASSESSMENT

This chapter describes and assesses the significance of potential impacts of related to the proposed exploration activities in the Licence Block 11B/12B. The potential impacts of the proposed activities are addressed in three categories, namely:

1. Impacts of normal vessel operation;
2. Impacts of the proposed sonar surveys on marine fauna;
3. Impacts of the proposed seabed sediment sampling programme; and
4. Impacts of the proposed exploration activities on other users of the sea.

All impacts are systematically assessed and presented according to predefined rating scales (see Appendix 3). For each potential impact a table is provided that summarises the significance level assessment for that impact. Mitigation or optimisation measures are proposed which could ameliorate the negative impacts or enhance potential benefits, respectively. The status of all impacts should be considered to be negative unless otherwise indicated. The significance of impacts with and without mitigation is also assessed.

Unless otherwise indicated, all potential impacts discussed below would be for the duration of the sonar surveys and seabed sediment sampling campaigns only, i.e. short-term (three to four weeks and three to five weeks, respectively).

5.1 IMPACT OF NORMAL VESSEL OPERATION

5.1.1 EMISSIONS TO THE ATMOSPHERE

Description of impact

Emissions to the atmosphere may include exhaust gases from the use of diesel as fuel for generators and motors, and the incineration (burning) of wastes.

Diesel exhaust comprises mainly carbon dioxide (CO₂) as well as several toxic gases such as nitrogen oxides (NO_x), sulphur oxides (SO_x) and carbon monoxide (CO). In addition, diesel combustion can produce hydrocarbons (total hydrocarbons (THC) and volatile organic carbons (VOC)). Smoke and particulate matter (soot) are also produced during diesel combustion.

Incineration of waste on board would also release soot as well as CO, CO₂ and dioxins (depending on the composition of waste). However, many vessels do not have an incinerator on board. In these circumstances solid waste would be stored separately on board for later onshore disposal.

Impact assessment

The atmospheric emissions from the survey and sampling vessels are expected to be similar to those from similar diesel-powered vessel of comparable tonnage. The volumes of solid waste incinerated on board, and hence also the volumes of atmospheric emissions, would be minimal and incineration would comply with the relevant MARPOL 73/78¹ standards.

The potential impact of emissions to the atmosphere during the proposed sonar surveys and seabed sediment sampling operations would be limited to the survey areas, is of low intensity and is considered

¹ MARPOL 73/78 is an International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto. All vessels operating within the South African EEZ are required to conform to legal requirements for waste management and pollution control, including the Marine Pollution Act (No. 2 of 1986 – which incorporate MARPOL 73/78 standards) and the Dumping at Sea Control Act (No. 73 of 1965). These Acts make provision for the discharge of sewage, plastics, oil, galley wastes, hazardous liquids and packaged hazardous material.

to be of **VERY LOW** significance with or without the implementation of mitigation measures (see Table 5.1).

Mitigation

No mitigation is deemed necessary, but it is recommended that all diesel motors and generators receive adequate maintenance to minimise soot and un-burnt diesel released to the atmosphere.

Table 5-1: Impact of atmospheric emissions from vessel operations.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Definite	Very Low	High
With mitigation	Local	Short-term	Low	Definite	VERY LOW	High

5.1.2 DISCHARGES/DISPOSAL TO THE SEA

Discharges from the survey and sampling vessels to the marine environment include deck drainage, machinery space drainage, sewage, galley wastes and solid wastes and accidental hydrocarbon spills.

5.1.2.1. Deck drainage

Description of impact

Drainage of deck areas may result in small volumes of oils, solvents or cleaners being introduced into the marine environment.

Impact assessment

Oils, solvents and cleaners could be introduced into the marine environment in small volumes through spillage and drainage of deck areas. Due to the small volumes lost overboard, the potential impact of deck drainage on the marine environment would be of low intensity across the survey area over the short-term, and is considered to be of **VERY LOW** significance with or without mitigation (see Table 5-2).

Mitigation

The following measures are recommended for mitigation of deck drainage discharges from the survey and sampling vessels:

- Deck drainage should be collected in oily water catchment systems. Discharged water must meet MARPOL 73/78 standards;
- Low-toxicity biodegradable detergents should be used in cleaning of all deck spillage;
- Training and awareness of crew in spill management could minimise contamination; and
- All hydraulic systems should be adequately maintained and hydraulic hoses should be frequently inspected.

Table 5-2: Impact of deck drainage from the survey and sampling vessels.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Highly Probable	Very Low	High
With mitigation	Local	Short-term	Low	Highly Probable	VERY LOW	High

5.1.2.2. Machinery space drainage

Description of impact

Small volumes of oil such as diesel fuel, lubricants, grease, etc. used within the machinery space of the survey and sampling vessels could enter the marine environment.

Impact assessment

The survey and sampling vessels must comply fully with international agreed standards regulated under MARPOL 73/78. All machinery space drainage would pass through an oil/water filter to reduce the oil in water concentration to 15 mg/l, in accordance with MARPOL 73/78 requirements.

Concentrations of oil reaching the marine environment through drainage of machinery spaces are therefore expected to be low. The potential impact of such low concentrations would be of low intensity and limited to the survey area over the short-term. The potential impact of machinery space drainage on the marine environment is therefore considered to be of **VERY LOW** significance with or without mitigation (see Table 5-3).

Mitigation

The proposed mitigation measures are as per those recommended for deck drainage above.

Table 5-3: Impact of machinery space drainage from the survey and sampling vessels.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Highly Probable	Very Low	High
With mitigation	Local	Short-term	Low	Highly Probable	VERY LOW	High

5.1.2.3. Sewage

Description of impact

Sewage poses an organic and bacterial loading on the natural degradation processes of the sea, resulting in an increased biological oxygen demand (BOD). This could result in anaerobic conditions in the marine environment. Although treated sewage would also increase BOD, it does not pose a bacterial load.

Impact assessment

The proposed exploration activities are expected to take between three to four weeks for the sonar surveys and three to five weeks to complete per sediment sampling campaign, depending on, amongst other things, weather conditions. The volumes of sewage wastes released from the survey and sampling vessels would be small and comparable to volumes produced by vessels of similar crew compliment. All sewage would be treated to the required MARPOL 73/78 standard prior to release into the marine environment, where the high wind and wave energy is expected to result in rapid dispersal.

The potential impact of sewage effluent from the survey and sampling vessels on the marine environment is expected to be limited to the survey area over the short-term, and is therefore considered to be of **VERY LOW** significance with or without mitigation (see Table 5-4).

Mitigation

No mitigation measures are recommended (assuming sewage discharges are in compliance with the MARPOL 73/78 standards).

Table 5-4: Impact of sewage effluent discharge from the survey and sampling vessels.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Highly Probable	Very Low	High
With mitigation	Local	Short-term	Low	Highly Probable	VERY LOW	High

5.1.2.4. Galley wasteDescription of impact

Galley wastes, comprising mostly of biodegradable food waste, would place a small organic and bacterial loading on the marine environment.

Impact assessment

The volume of galley waste from survey and sampling vessels would be small and comparable to wastes from any vessel of a similar crew compliment. Discharges of galley wastes, according to MARPOL 73/78 standards, would be comminuted to particle sizes smaller than 25 mm prior to disposal to the marine environment if less than 12 nautical miles (\pm 22 km) from the coast and no disposal within 3 nautical miles (\pm 5.5 km) of the coast. The potential impact of galley waste disposal on the marine environment would be of low intensity and limited to the survey area over the short-term. The potential impact of galley waste on the marine environment is therefore considered to be of **VERY LOW** significance with or without mitigation (see Table 5-5).

Mitigation

No mitigation measures are deemed necessary (assuming discharge is in compliance with the MARPOL 73/78 standards).

Table 5-5: Impact of galley waste disposal from the survey and sampling vessels.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Highly Probable	Very Low	High
With mitigation	Local	Short-term	Low	Highly Probable	VERY LOW	High

5.1.2.5. Solid wasteDescription of impact

The disposal of solid waste comprising non-biodegradable domestic waste, packaging and operational industrial waste into the sea could pose a hazard to marine fauna, may contain contaminant chemicals and could end up as visual pollution at sea, on the seashore or on the seabed.

Impact assessment

Solid waste would be incinerated on-board or transported ashore for disposal on land, and consequently would have no impact on the marine environment. However, a spill may result in a small amount of waste entering the marine environment (e.g. blown by wind, spill during transfer to support vessel, etc.). Hazardous waste would be disposed of by specialist waste disposal contractors. The potential impact of the disposal of solid waste on the marine environment is therefore considered to be **INSIGNIFICANT** (see Table 5.6).

Mitigation

The following measures are recommended for the mitigation of waste:

- Initiate a waste minimisation system on board all vessels;
- On board solid waste storage is to be secure; and
- Contractors must co-operate with the relevant local authority and dispose of waste (solid and hazardous) in accordance with the appropriate laws and ordinances.

Table 5-6: Impact of solid waste disposal from the survey and sampling vessels.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short- term	Zero	Improbable	Insignificant	Medium
With mitigation	Local	Short- term	Zero	Improbable	INSIGNIFICANT	Medium

5.1.3 NOISE FROM VESSEL OPERATIONS

5.1.3.1. Noise from vessel operations

Impact description

The noise from survey and sampling vessels could result in localised disturbance of marine fauna.

Impact assessment

Noise from survey and sampling vessels is likely to be no higher than that from other small shipping vessels in the region and is deemed a neutral impact. The potential impact of noise from the survey and sampling vessel operations on marine fauna is considered to be localised, of low intensity in the short-term. The significance of this impact is therefore assessed to be **VERY LOW** with and without mitigation (see Table 5-7).

Mitigation measures

No measures are deemed necessary to mitigate noise impacts from vessel operations.

Table 5-7: Impact of noise from survey and sampling vessels.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Probable	Very Low	Medium
With mitigation	Local	Short-term	Low	Probable	VERY LOW	Medium

5.2 IMPACTS OF SONAR SURVEYS ON MARINE FAUNA

Description of impact

Potential impacts of sonar surveys on marine fauna (mainly cetaceans) could include physiological injury and behavioural avoidance of the survey area.

Impact assessment

Section 3.2.1 outlines the various sonar survey techniques considered for the proposed sonar surveys. Active sonar systems operate at frequency ranges greater than 10 kHz, producing levels of sound pressure ranging from about 180 dB re 1µPa to 235 dB re 1µPa. The higher frequency emissions utilised in normal multi-beam and sub-bottom profiling operations tend to be dissipated to safe levels over a relatively short distance.

Research has indicated that baleen whales are most sensitive to sounds from 10's of Hz to around 10 kHz, while toothed whale and dolphin hearing is centred at frequencies of between 10 and 100 kHz. Thus both baleen and toothed whales (collectively known as cetaceans) would thus be expected to hear sonar signals at frequencies within their functional hearing range. However, they would only be affected if they passed through the cone of the sonar beam below the survey vessel.

Similarly, pinnipeds (seals) are also expected to hear sonar signals at frequencies within their functional hearing range if the animals pass through the cone of the sonar beam, and phocids (true seals) and otariids (fur seals) would hear sonars operating at frequencies up to about 75 kHz and 35 kHz, respectively.

Marine turtles appear to have their highest auditory sensitivity at frequencies of 250 to 700 Hz, and thus well below the frequency ranges typically used by oceanographic sonars.

The statistical probability of crossing a cetacean with the narrow multi-beam fan several times, or even once, is very small. It is thus generally understood that in open coastal waters the effects of multi-beam sonars on marine fauna are negligible.

The potential physiological impact on marine fauna (mainly cetaceans) would be of low intensity across the survey area (within the cone of the sonar beam below the survey vessel). The duration of the impact on the population would be limited to the short-term. The impact is therefore considered to be of **VERY LOW** significance with and without mitigation (see Table 5-8).

Mitigation

Despite the very low significance of potential impacts, the following mitigation measures, which are based on the Joint Nature Conservation Committee (JNCC) guidelines, are recommended for the proposed sonar survey:

- Appoint an onboard MMO.
- The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses;
- Pre-survey scans should be limited to a minimum of 15 minutes prior to the start of survey equipment;
- If any marine mammals show affected behaviour within 500 m of the survey vessel or equipment, the survey must be terminated until the mammal has vacated the area; and
- For the months of June and November (period of Southern Right Whale migration to and from the South Coast) ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.

- Ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme that may take place in the Southern Right Whale migration periods (to and from the South Coast) of June and/or November.

Table 5-8: Impact of sonar noise on marine fauna

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Improbable	Very Low	High
With mitigation	Local	Short-term	Low	Improbable	VERY LOW	High

5.3 POTENTIAL IMPACTS OF SEABED SEDIMENT SAMPLING

5.3.1 Potential Impact on Marine Fauna

Description of Impact

During the seabed sediment sampling programme, sediment cores / samples would be removed from the seafloor. As benthic fauna typically inhabit the top 20 to 30 cm of sediment, removal of the sediment samples would result in the disturbance and loss of benthic macrofauna, which would result in a loss of some benthic biodiversity. In addition, the discarding of excess sediment overboard may result in limited smothering effects on the seabed.

Some disturbance or loss of adjacent benthic biota can also be expected as a result of the placement on the seafloor of the trigger weight of the piston corer or the supporting frame of the box corer. Epifauna and infauna beneath the footprint of the weight / frame may be smothered or crushed resulting in a reduction in benthic biodiversity.

Impact assessment

Sediment removal

For each piston core and/or grab sample, it is estimated that an average of 0.02 m³ of sediment would be removed per sample. The volume of material to be removed by the box core sediment samples is estimated to be 0.03 m³ per sample. In total it is expected that less than 5 m³ of sediment would be removed from the seabed during the proposed sampling campaign. Considering the available area of similar habitat off the edge of the continental shelf in the vicinity of the proposed exploration area, this reduction in benthic biodiversity can be considered negligible.

Depending on the texture of the sediments at the target sites, slumping of adjacent unconsolidated sediments into the excavation can be expected over the very short-term. Although this may result in localised disturbance (i.e. confined to the sample footprints) of macrofauna associated with these sediments and alteration of sediment structure, it also serves as a means of natural recovery of the excavations. Studies have shown that some mobile benthic animals are capable of actively migrating vertically through overlying sediment thereby significantly affecting the recolonisation of impacted areas and the subsequent recovery of disturbed areas of seabed.

Natural rehabilitation of the seafloor following sampling or dredging operations, through a process involving influx of sediments and recruitment of invertebrates, has been demonstrated on the southern African continental shelf. Recovery rates of impacted communities are variable and dependent on the

sampling method, sediment influx rates and the influence of natural disturbances on succession communities. Although recovery in the deep offshore habitats is likely to be very slow, this is offset by the insignificant seabed area disturbed by the proposed seabed sampling.

Any change in sediment composition is expected to be minimal and would not affect recovery. Impacts on the offshore benthos as a result of sediment removal are considered to be of very low intensity at an extremely local scale (i.e. confined to the sample footprints). Full recovery is expected to take place within 1 to 5 years (i.e. short-term), as the excavations would be refilled through sediment influx and recolonisation would occur through recruitment and immigration from adjacent areas. Therefore, this impact is rated as being **INSIGNIFICANT** (see Table 5-9).

Crushing

Some disturbance or loss of adjacent benthic biota can also be expected as a result of the placement on the seabed of the trigger weight, and the supporting frame of the box corer. Epifauna and infauna beneath the footprint of the weight/frame may be smothered or crushed resulting in a reduction in benthic biodiversity. Crushing is likely to primarily affect soft-bodied species as some molluscs and crustaceans may be robust enough to survive.

The impacts would be of medium to high intensity, but highly localised, and short-term as recolonisation would occur rapidly from adjacent undisturbed sediments. The potential impact is consequently deemed to **INSIGNIFICANT** (see Table 5-9).

Smothering

Discarding overboard of excess sediment may result in limited smothering effects on the seabed. However, due to the rapid dilution and widespread dispersion of settling particles, any adverse effects in the water column would be ephemeral and highly localised. Any biological effects on nektonic and planktonic communities would thus be negligible. The impact of increased turbidity in the water column would thus be of zero to very low intensity, persist only over the very short-term (days), and would be extremely localised around the survey vessel. Any potential adverse effects on pelagic biota would be negligible. The biochemical impact of reduced water quality through increased turbidity can thus confidently be rated as being **INSIGNIFICANT** (see Table 5-9).

Mitigation

No mitigation measures for potential impacts on marine invertebrates are feasible or deemed necessary.

Table 5-9: Impact of seabed sediment sampling on marine fauna.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Sediment removal						
Without mitigation	Local (highly)	Short-term	Very Low	Definite	Insignificant	High
With mitigation	Local (highly)	Short-term	Very Low	Definite	INSIGNIFICANT	High
Crushing						
Without mitigation	Local (highly)	Short-term	Very Low	Definite	Insignificant	High
With mitigation	Local (highly)	Short-term	Very Low	Definite	INSIGNIFICANT	High
Smothering						
Without mitigation	Local (highly)	Short-term	Very Low	Definite	Insignificant	High

	Extent	Duration	Intensity	Probability	Significance	Confidence
With mitigation	Local (highly)	Short-term	Very Low	Definite	INSIGNIFICANT	High

5.3.2 POTENTIAL IMPACT ON CULTURAL HERITAGE MATERIAL

Description of impact

The proposed seabed sediment sampling activities could disturb cultural heritage material on the seabed, particularly historical shipwrecks.

Impact assessment

The likelihood of disturbing a shipwreck is expected to be very small considering the vast size of the South African offshore area. The majority of known wrecks lost along the South Coast are located in relatively shallow water close inshore (Turner, 1988). There are several known shipwrecks in the vicinity of, and possibly within, Licence Block 11B/12B, however, geographic co-ordinates in this regard are currently not available (Tara van Niekerk, South African Heritage Resources Agency, pers. comm., Feb 2014). The likelihood of impact is reduced by the fact that the sonar surveys would identify potential obstacles on the seafloor at the selected sample sites.

While it is considered improbable, the potential impact on any marine cultural heritage material could be permanent, of regional interest and of medium intensity. The significance of impact is consequently **high** without mitigation. With the implementation of mitigation, the intensity and duration are reduced, therefore the significance is reduced to **LOW** with mitigation (see Table 5-10).

Mitigation

- The final positioning of the sample sites should avoid any cultural heritage material identified during the sonar surveys; and
- If any cultural heritage material is found during sampling activities the South African Heritage Resources Agency (SAHRA) should be notified immediately. If any material older than sixty years is to be disturbed a permit would be required from SAHRA.

Table 5-10: Impacts of seabed sediment sampling on cultural heritage material.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Regional	Permanent	Medium	Improbable	High	High
With mitigation	Local	Permanent	Low	Improbable	LOW	High

5.3.3 POTENTIAL IMPACT ON SEAFLOOR INFRASTRUCTURE

Description of impact

Seafloor telecommunications cables pass through License Block 11B/12B (see Figure 4-37). The proposed seabed sampling activities could disturb or damage seafloor telecommunications cables.

Impact assessment

The location of the proposed seabed sediment sampling would only be identified following the analysis of the sonar survey results. The likelihood of disturbing or damaging existing seafloor infrastructure is expected to be very low as the location of the existing infrastructure is known (see Figure 4-37). The

likelihood of impact is further reduced by the fact that the sonar survey would identify any potential obstacles on the seafloor that can be avoided at the specific sample site.

The potential impact on seafloor infrastructure is considered to be improbable. However, if it did occur it would be of national interest and of high intensity in the short-term. The significance of this potential impact is thus assessed to be **medium** without mitigation (see Table 5.10). There would be **NO IMPACT** with the implementation of the proposed mitigation.

Mitigation

- Sampling sites must avoid existing seafloor telecommunications cables within License Block 11B/12B; and
- No anchoring is permitted within 1 nm of seafloor telecommunication cables.

Table 5-11: Impact on seafloor infrastructure.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	National	Short-term	High	Improbable	Medium	Medium
With mitigation	NO IMPACT					

5.4 IMPACT ON OTHER USERS OF THE SEA

5.4.1 POTENTIAL IMPACT ON FISHING INDUSTRY

Description of impact

The proposed exploration programme could result in impacts on fishing as a result of the 500 m safety zones around the exploration vessels (in terms of the Marine Traffic Act (No. 2 of 1981)).

The impact on the fishing industry includes the likely disruption to fishing operations, loss of access to fishing grounds in the proposed survey area over the survey period, fish avoidance of the survey area and changes in feeding behaviour (with duration of the effect being less than or equal to the duration of the survey). The fishing sectors that could potentially be impacted by the proposed safety zone including demersal and midwater trawl, demersal and pelagic long-line, traditional line-fish, small pelagic purse-seine, South Coast rock lobster and squid jig.

Impact assessment

Demersal trawl sector

The demersal trawl sector (i.e. trawling for fish on the sea floor) on the South Coast focuses on a broad area along the shelf edge in depths up to 1 000 m. Over the period 2000 to 2012, the average effort directed by the demersal trawl sector within Licence Block 11B/12B represents approximately 5.0 % of the total national effort and 8.6 % of the total catch landed by the demersal trawl sector.

The impact on the demersal trawl sector is considered to be localised and of medium intensity in the short-term. The significance of this impact is therefore assessed to be **VERY LOW** with and without mitigation (Table 5-12).

Midwater trawl sector

The midwater trawl sector areas coincides with License Block 11B/12B inshore of areas with depths of 1 000 m. Between 2000 and 2012, an average effort of 350 trawls were conducted within the licence area. This represents 35.8 % of the effort for the midwater trawl sector over this period.

The impact on the midwater trawl sector is considered to be localised and of high intensity in the short-term. The significance of this impact is therefore assessed to be **LOW** with and without mitigation (Table 5-12).

Demersal long-line sector

Demersal hake long-line fishing grounds are situated within the licence area inshore of 500 m depth. Approximately 25.3 % of the total national effort is conducted within the licence area annually and 18.0 % of the total national catch is taken in this area.

The shark-directed long-line fishing effort does not coincide with License Block 11B/12B, with the closest reported fishing activity located approximately 30 km inshore of the licence area. No impact is thus expected.

The impact on the demersal long-line sector is considered to be localised and of high intensity in the short-term. The significance of this impact is therefore assessed to be **LOW** with and without mitigation (Table 5-12).

Large pelagic long-line sector

The pelagic long-line fishery targets swordfish and tuna species along the shelf edge from the Orange River to East London. Pelagic long-line vessels can be expected across License Block 11B/12B and are likely to be especially concentrated where the continental slope is steepest. Over the period 2008 to 2012, approximately 3.7 % of the total national effort and 2.9 % of the total catch landed by this sector occurred within License Block 11B/12B.

The impact on the large pelagic long-line sector is considered to be localised and of medium intensity in the short-term. The significance of this impact is therefore assessed to be **VERY LOW** with and without mitigation (Table 5-12).

Traditional line-fish

Traditional line fishing is predominantly coastal, extending up to areas with depths of 200 m. Over the period 2000 to 2012, 0.05% of the total recorded national landings were taken from License Block 11B/12B. However, no effort has been reported within the licence area since 2008.

The impact on the sector is expected to be localised in extent and of low intensity in the short-term. The significance of this impact is therefore assessed to be **INSIGNIFICANT** with and without mitigation (Table 5-12).

Small pelagic purse-seine

The small pelagic purse-seine sector operates predominantly on the West Coast and to a lesser extent on the South Coast and Eastern Cape Coast up to a maximum distance of 100 km offshore, but usually closer inshore. Minimal catch is expected within the shallower section of License Block 11B/12B. Over the period 2008 to 2012, the average effort directed by the small pelagic purse-seine fishery within the licence area amounted to less than 0.02% of the total national catch and effort.

The impact on the sector is expected to be localised in extent and of very low intensity in the short-term. The significance of this impact is therefore assessed to be **INSIGNIFICANT** with and without mitigation (Table 5-12).

South Coast rock lobster

The south coast rock lobster fishery targets stock on the continental shelf of the South Coast between depths of 50 m and 200 m. Two areas are commercially viable to fish, the first of which is approximately 200 km offshore on the Agulhas Bank and the second is within 50 km of the shoreline between Mossel Bay and East London. The fishery is restricted by the Agulhas Current from operating far offshore, but would be expected to operate within the licence area, inshore of 300 m depth. Within License Block 11B/12B, approximately 17.4 % and 15.7 % of the total effort expended and catch was landed by the sector over the period 2008 to 2012, respectively.

The impact on the South Coast rock lobster sector is considered to be localised and of high intensity in the short-term. The significance of this impact is therefore assessed to be **LOW** with and without mitigation (Table 5-12).

Squid Jig

The jig fishery targeting squid is mostly concentrated in the bay areas around Cape St Francis and Port Elizabeth. Fishing activity takes place in the north-eastern portion of Licence Block 11B/12B. Between 2006 and 2012, effort within the licence area averaged 1.1 % of the total national effort and 1.5 % of the total catch landed by the fishery.

The impact of sonar surveys on the squid jig fishery is considered to be localised and of low intensity in the short-term. The significance of this impact is therefore assessed to be **VERY LOW** with and without mitigation (Table 5-12).

The impact of the seabed sediment sampling programme on the fishing industry would be limited to the safety zone and safe operational limits around the sampling vessel at each sampling site. It is thus expected that potential impacts as a result of the proposed sediment sampling activities on the above-mentioned fishery sectors would be of lower intensity than the impacts associated with the sonar survey vessels, as assessed above. Thus the significance of the impact is considered to be **INSIGNIFICANT**.

Mitigation

The mitigation measures listed below are unlikely to reduce the significance of potential impacts, but they would minimise disruptions to survey and fishing operations.

- Prior to the commencement of each exploration activity the following key stakeholders should be consulted and informed of the proposed activities (including navigational co-ordinates of the survey / sampling areas, timing and duration of proposed activities) and the likely implications thereof:
 - > Fishing industry / associations (these include South African Tuna Association, South African Tuna Long-Line Association, Fresh Tuna Exporters Association, South African Deep-Sea Trawling Industry Association, South African Hake Long-Line Association, South African Fishing Industry Associations, South African Midwater Trawling Association, South Coast Rock Lobster Association, South African Commercial Linefish Association, and South African Squid Management Industrial Association); and
 - > Other: DEA, Department of Agriculture, Forestry and Fisheries (DAFF), Port Captains, South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority.
- The operator must request, in writing, the SAN Hydrographic office to release Radio Navigation Warnings and Notices to Mariners throughout the various sampling / survey periods. The Notice to Mariners should give notice of (1) the co-ordinates of the proposed survey / sampling areas, (2) an indication of the proposed survey / sampling timeframes and day-to-day location of the survey vessel, and (3) an indication of the 500 m safety zones. These Notices to Mariners should be distributed timeously to fishing companies and directly onto vessels where possible;

- Any fishing vessel targets at a radar range of 12 nautical miles from the survey vessel should be called via radio and informed of the navigational safety requirements; and
- Affected parties should be notified through fishing industry bodies when the programme is complete.

Table 5-12: Assessment of the potential impact relating to increased fishing effort and disruption to fishing activities.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Demersal Trawl						
Without mitigation	Local	Short-term	Medium	Probable	Very Low	High
With mitigation	Local	Short-term	Medium	Probable	VERY LOW	High
Midwater trawl						
Without mitigation	Local	Short-term	High	Probable	Low	High
With mitigation	Local	Short-term	High	Probable	LOW	High
Demersal long-line						
Without mitigation	Local	Short-term	High	Probable	Low	High
With mitigation	Local	Short-term	High	Probable	LOW	High
Large pelagic long-line						
Without mitigation	Local	Short-term	Medium	Probable	Very Low	High
With mitigation	Local	Short-term	Medium	Probable	VERY LOW	High
Traditional line-fish						
Without mitigation	Local	Short-term	Very Low	Improbable	Insignificant	High
With mitigation	Local	Short-term	Very Low	Improbable	INSIGNIFICANT	High
Small pelagic purse-seine						
Without mitigation	Local	Short-term	Very Low	Improbable	Insignificant	High
With mitigation	Local	Short-term	Very Low	Improbable	INSIGNIFICANT	High
South Coast rock lobster						
Without mitigation	Local	Short-term	High	Probable	Low	High
With mitigation	Local	Short-term	High	Probable	LOW	High
Squid Jig						
Without mitigation	Local	Short-term	Low	Probable	Very Low	High
With mitigation	Local	Short-term	Low	Probable	VERY LOW	High

5.4.2 POTENTIAL IMPACT ON FISHERIES RESEARCH

Description of impact

Fisheries research on small pelagic and demersal fish resources are undertaken by DAFF off the South African coastline on a bi-annual basis in order to set the annual Total Allowable Catch. The presence of the exploration vessels, and associated 500 m safety zone, could interfere with research.

Impact Assessment

Stratified, bottom trawls are conducted to assess the biomass, abundance and distribution of hake, horse mackerel, squid and other demersal trawl species on the shelf and upper slope of the South African coast. The surveys, usually of one month duration each, take place in January (West Coast survey) and May (South Coast survey). The South Coast demersal survey could potentially coincide with the proposed sonar surveys and seabed sediment sampling programme. Since the position of research trawls is random, the research survey design could avoid areas of survey / sampling activity.

Two further acoustic surveys are undertaken on the small pelagic species in order to assess their biomass during May - June and October - December. During the surveys the vessel travels pre-determined transects (perpendicular to bathycontours) running from the coast out to approximately the 200 m bathycontour. The survey is designed to cover an extensive area from the Orange River on the West Coast to Port Alfred on the East Coast. Similarly, the acoustic survey could potentially coincide with the proposed sonar surveys and seabed sediment sampling programme.

The timings of the demersal and acoustic surveys are not flexible, due to restrictions with availability of the research vessel, as well as scientific requirements. Thus, depending on when the proposed exploration activities are undertaken there is a possibility that it could coincide with these demersal and acoustic surveys resulting in potential impacts to both the research surveys and exploration programme.

The impact of sonar surveys on the fishery research is considered to be local in extent and of low intensity in the short-term. The overall significance of this impact is expected to be **VERY LOW** both with and without mitigation (see Table 5.13).

The impact of the seabed sediment sampling programme on fisheries research would be limited to the safety zone and safe operational limits around the sampling vessel at each sampling site. It is thus expected that the impact on fisheries research, as a result of the proposed sediment sampling activities, would similarly be of **VERY LOW** significance to that of sonar surveys.

Mitigation

The most effective means of mitigation would be to ensure that the proposed sonar surveys and seabed sediment sampling programme do not coincide with the research surveys. It is recommended that prior to the commencement of the proposed activities, TEPSA consult with the managers² of the DAFF research survey programmes to discuss their respective programmes and the possibility of altering the programme in order to minimise or avoid disruptions to both parties.

² Deon Durholtz (DeonD@nda.agric.za) and Janet Coetzee (JanetC@nda.agric.za).

Table 5-13: Assessment of the potential impact on fisheries research.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Local	Short-term	Low	Probable	Very Low	High
With mitigation	Local	Short-term	Low	Probable	VERY LOW	High

5.4.3 POTENTIAL IMPACT ON MARINE PROSPECTING, MINING, EXPLORATION AND PRODUCTION ACTIVITIES

Description of impact

The presence of the sonar survey and sampling vessels with the associated 500 m safety zone and proposed safe operational limits could interfere with other prospecting, mining, exploration and production activities in the area.

Impact assessment

Prospecting and mining

Diamond Fields International Ltd has submitted an application to DMR to prospect for marine phosphates in the Outeniqua West Licence Area. The application for an exploration licence was recently granted by the Minister (approximately January 2014) and is valid for a period of five years. It is noted in Section 4.5.3.2 that the proposed prospecting licence area partially overlaps Licence Block 11B/12B to the north-west.

The potential impact on prospecting and mining would be localised (limited to the area overlapping Licence Block 11B/12B), of low intensity in the short-term. The significance of this potential impact is thus assessed to be **VERY LOW** with and without mitigation (see Table 5-14).

Exploration and production

Exploration for oil and gas is currently undertaken in a number of licence blocks off the southern coast of South Africa (see Figure 4-35). Although the proposed exploration activities would be limited to License Block 11B/12B, the survey vessels may need to exit the licence block for various reasons (e.g. avoid bad weather, etc.), which may have an impact on adjacent operators. Therefore, should TEPSA and adjacent operators undertake any exploration activities at a similar time there could be a localised impact, of medium intensity in the short-term. The significance of this impact is assessed to be **VERY LOW** both with and without mitigation (see Table 5-14).

Mitigation

- TEPSA should engage timeously with prospecting and mining right holders and applicants to discuss the scheduling of proposed survey activities in order to reduce the risk of delay to or interference with the proposed exploration programme; and
- Any dispute arising should be referred to the Department of Mineral Resources and/or PASA for resolution.

Table 5-14: Assessment of impact on marine prospecting, mining and exploration activities.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Prospecting and mining						
Without mitigation	Local	Short-term	Low	Improbable	Very Low	High
With mitigation	Local	Short-term	Low	Improbable	VERY LOW	High
Exploration and production						
Without mitigation	Local	Short-term	Low	Improbable	Very Low	High
With mitigation	Local	Short-term	Low	Improbable	VERY LOW	High

5.4.4 POTENTIAL IMPACT ON MARINE TRANSPORT ROUTES

Description of impact

Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Rule 18), survey vessels engaged in surveying operations are defined as “vessel restricted in its ability to manoeuvre”, which requires that power-driven and sailing vessels give way to a vessel restricted in its ability to manoeuvre. Vessels engaged in fishing shall, so far as possible, keep out of the way of the survey operations. Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a vessel used for the purpose of exploiting the seabed falls under the definition of an “offshore installation” and as such it is protected by a 500 m safety zone. In terms of this definition, the sampling vessels are considered to be an “offshore installation” and a 500 m safety zone around the sampling vessel is applicable.

Impact assessment

The shipping traffic on the South Coast is high, although much of it occurs relatively close to shore (see Figure 4-34). There is likely to be some interaction with shipping traffic in the northern half of Block11B/12B.

Although the safety zone around the survey and sampling vessels would be relatively small all vessels would be prohibited from entering this area. The displacement of shipping would be limited to within the extreme near vicinity of the survey vessels. Although survey and sampling vessels are protected by a 500 m safety zone, there could be some interaction with marine traffic during surveying, resulting in disruptions and/or delays, particularly in the northern half of the licence area. This is normally mitigated by a notice to mariners and regular communication through daily notifications.

The potential impact on shipping traffic in the Exploration Right area is considered to be regional and of medium intensity in the short-term. The significance of this potential impact is therefore assessed to be low without mitigation and **VERY LOW** with mitigation (see Table 5-15).

Mitigation

Recommendations to mitigate the potential impacts on marine transport routes are similar to that recommended for fishing (refer to Section 5.4.1). In addition, the following is recommended:

- The survey and sampling vessels must be certified for seaworthiness through an appropriate internationally recognised marine certification programme (e.g. Lloyds Register, Det Norske

Veritas). The certification, as well as existing safety standards, requires that safety precautions would be taken to minimise the possibility of an offshore accident;

- Collision prevention equipment on the vessels should include radar, multi-frequency radio, foghorns, etc. Additional precautions include: the existence of an internationally agreed safety zone around the survey vessels, cautionary notices to mariners and access to current weather service information. The vessels are required to fly standard flags, lights (three all-round lights in a vertical line, with the highest and lowest lights being red and the middle light being white) or shapes (three shapes in a vertical line, with the highest and lowest lights being balls and the middle light being a diamond) to indicate that the multi-beam bathymetry survey vessel is restricted in manoeuvrability, and must be fully illuminated during twilight and night; and
- Report any emergencies to SAMSA.

Table 5-15: Assessment of interference with marine transport routes.

	Extent	Duration	Intensity	Probability	Significance	Confidence
Without mitigation	Regional	Short-term	Medium	Highly probable	Low	Medium
With mitigation	Regional	Short-term	Low	Highly probable	VERY LOW	Medium

6. CONCLUSIONS AND RECOMMENDATIONS

TEPSA is proposing to undertake further exploration activities in License Block 11B/12B off the South Coast of South Africa. The proposed exploration activities would include various sonar survey techniques and seabed sediment sampling.

TEPSA has appointed CCA to compile this EMPr Addendum to meet the relevant requirements of the MPRDA and the Regulations thereto. Specialists were appointed to address the two key issues, namely the effect on the fishing industry and marine fauna. The findings of the specialist studies and other relevant information have been integrated and synthesised into this EMPr Addendum.

This chapter summarises the key findings of the study and presents mitigation measures that should be implemented if the proposed activities go ahead.

6.1 CONCLUSIONS

A summary of the assessment of potential environmental impacts associated with the proposed exploration activities is provided in Table 6-1.

The majority of the impacts associated with the sonar surveys and seabed sediment sampling would be of short-term duration and limited to the immediate survey and/or sampling areas. As a result, the majority of the impacts associated with the exploration activities are considered to be of **INSIGNIFICANT** to **LOW** significance after mitigation.

Although the impacts on the various fishing sectors active in License Block 11B/12B are assessed to be of **LOW** (midwater trawl, hake-directed long-line and south coast rock lobster), **VERY LOW** (demersal trawl, large pelagic long-line and squid jig) significance or **INSIGNIFICANT** (traditional line-fish and small pelagic purse seine) after mitigation, it is important that the operator engages timeously with the fishing industry prior to and during the proposed exploration activities. Regular communication with fishing vessels in the vicinity during surveying or sampling would minimise the potential disruption to fishing operations and risk of gear entanglements.

Table 6-1: Summary of the significance of the potential impacts of undertaking sonar surveys and seabed sediment sampling in License Block 11B/12B.

Potential impact	Significance	
	Without mitigation	With mitigation
<i>Normal vessel operation:</i>		
Emissions to the atmosphere	VL	VL
Deck drainage into the sea	VL	VL
Machinery space drainage into the sea	VL	VL
Sewage effluent into the sea	VL	VL
Galley waste disposal into the sea	VL	VL
Solid waste disposal into the sea	Insignificant	INSIGNIFICANT
Noise from vessel operations	VL	VL

Potential impact		Significance	
		Without mitigation	With mitigation
Impacts on marine fauna:			
Impacts of sonar survey on marine fauna		VL	VL
Impacts of seabed sediment sampling			
Impacts on marine fauna	Sediment removal	Insignificant	INSIGNIFICANT
	Crushing	Insignificant	INSIGNIFICANT
	Smothering	Insignificant	INSIGNIFICANT
Impacts on cultural heritage material		H	L
Impacts on seafloor infrastructure		M	NO IMPACT
Impact on other users of the sea:			
Fishing industry	Demersal trawl fishery	VL	VL
	Midwater trawl	L	L
	Demersal long-line fishery	L	L
	Large pelagic long-line fishery	VL	VL
	Traditional line-fish	Insignificant	INSIGNIFICANT
	Small pelagic purse-sine	Insignificant	INSIGNIFICANT
	South Coast rock lobster	L	L
	Squid jig	VL	VL
Impacts of sonar surveys on fisheries research		VL	VL
Impacts of sediment sampling on fisheries research			
Impacts on marine prospecting and mining activities		VL	VL
Impacts on marine exploration and production activities		VL	VL
Marine transport routes		L	VL
H=High M=Medium L=Low VL=Very low N/A=Not applicable All impacts are negative			

6.2 RECOMMENDATIONS

The following recommendations and mitigation measures are proposed.

6.2.1 GENERAL

6.2.1.1. Compliance with environmental protection activities and procedures

- All phases of the proposed sonar surveys and seabed sediment sampling programme (including pre-establishment phase, establishment phase, operational phase, and decommissioning and closure phase) must comply with the specific environmental protection activities and procedures presented in Chapter 7.

6.2.1.2. Compliance with MARPOL standards

- All vessels must comply with the MARPOL 73/78 standards.

6.2.1.3. Exemption application

- In terms of the Marine Living Resources Act, 1998 (No. 18 of 1998) it is illegal for any vessel to approach to or remain within 300 m of whales within South African waters without a permit or exemption. Therefore, if necessary, it is recommended that the operator apply to DEA for an exemption from the relevant section of this Act.

6.2.1.4. Vessel safety

- The survey vessels must be certified for seaworthiness through an appropriate internationally recognised marine certification programme (e.g. Lloyds Register, Det Norske Veritas). The certification, as well as existing safety standards, requires that safety precautions would be taken to minimise the possibility of an offshore accident;
- Collision prevention equipment should include radar, multi-frequency radio, foghorns, etc. Additional precautions include:
 - > The existence of an internationally agreed 500 m safety zone around the survey vessels;
 - > Cautionary notices to mariners; and
 - > Access to current weather service information.
- The vessels are required to fly standard flags, lights (three all-round lights in a vertical line, with the highest and lowest lights being red and the middle light being white) or shapes (three shapes in a vertical line, with the highest and lowest lights being balls and the middle light being a diamond) to indicate that the survey vessel is restricted in manoeuvrability, and must be fully illuminated during twilight and night; and
- Report any emergency situation to SAMSA.

6.2.1.5. Emissions, discharges into the sea and solid waste

- Diesel motors and generators are to be adequately maintained to minimise the volume of soot and unburned diesel released to the atmosphere;
- All hydraulic systems are to be adequately maintained and hydraulic hoses frequently inspected;
- Undertake training and awareness of crew members of the need for thorough cleaning up of any spillages immediately after they occur, as this would minimise the volume of contaminants washing off decks;
- Use of low-toxicity, biodegradable detergents during deck cleaning to further minimise the potential impact of deck drainage on the marine environment;
- Collect deck drainage in oily water separator systems. Discharged water must meet MARPOL 73/78 standards;
- Discharge effluent (e.g. sewage and galley waste) as per MARPOL requirements;
- Initiate an on board waste minimisation system;
- On board solid waste storage is to be secure; and
- Contractors must co-operate with the relevant local authority and dispose of waste (solid and hazardous) in accordance with the appropriate laws and ordinances.

6.2.1.6. Communication with key stakeholders

- Prior to the commencement of each exploration activity the following key stakeholders should be consulted and informed of the proposed activities (including navigational co-ordinates of the

survey / sampling areas, timing and duration of proposed activities) and the likely implications thereof:

- > Fishing industry / associations (these include South African Tuna Association, South African Tuna Long-Line Association, Fresh Tuna Exporters Association, South African Deep-Sea Trawling Industry Association, South African Hake Long-Line Association, South African Fishing Industry Associations, South African Midwater Trawling Association, South Coast Rock Lobster Association, South African Commercial Linefish Association, and South African Squid Management Industrial Association); and
- > Other: DEA, Department of Agriculture, Forestry and Fisheries (DAFF), Port Captains, South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority.
- The operator must request, in writing, the SAN Hydrographic office to release Radio Navigation Warnings and Notices to Mariners throughout the various sampling / survey periods. The Notice to Mariners should give notice of (1) the co-ordinates of the proposed survey / sampling areas, (2) an indication of the proposed survey / sampling timeframes and day-to-day location of the survey vessel, and (3) an indication of the 500 m safety zones. These Notices to Mariners should be distributed timeously to fishing companies and directly onto vessels where possible;
- Any fishing vessel targets at a radar range of 12 nautical miles from the survey vessel should be called via radio and informed of the navigational safety requirements; and
- Affected parties should be notified through fishing industry bodies when the programme is complete.

6.2.2 Recommendations specific to the seabed sediment sampling programme

- The final positioning of the sample sites should avoid any cultural heritage material identified during the sonar survey and existing seafloor telecommunications cables;
- If any cultural heritage material is found during sampling activities SAHRA should be notified immediately. If any material older than sixty years is to be disturbed a permit would be required from SAHRA; and
- No anchoring is permitted within 1 nm of seafloor telecommunication cables.

6.2.3 Recommendations specific to the sonar surveys

- Appoint an MMO for the duration of the survey;
- Surveying must only commence once it has been confirmed for a 15-minute period (visually during the day) that there is no large cetacean activity within 500 m of the vessel;
- Terminate the survey if cetaceans show obvious negative behavioural changes within 500 m of the survey vessel or equipment. The survey should be terminated until such time it is confirmed that cetaceans have moved to a point that is more than 500 m from the source or despite continuous observation, 15 minutes has elapsed since the last sighting of the cetaceans within 500 m of the source.
- The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses. The duties of the MMO would be to:
 - > Monitor the survey pre-watch period to confirm that there is no large cetacean activity within 500 m of the vessel for a 15-minute period;
 - > Record sound levels, pre-watch sightings and “soft-start” procedures (if required);
 - > Observe and record responses of marine fauna to the multi-beam bathymetry survey. Data captured should include species identification, position (latitude/longitude), distance

- from the vessel, swimming speed and direction (if applicable) and any obvious changes in behaviour (e.g. startle responses or changes in surfacing/diving frequencies, breathing patterns) as a result of the survey activities; and
- > Request the temporary termination of survey, as appropriate. A log of all termination decisions must be kept for inclusion in both daily and “close-out” reports.
 - If the source level is greater than 210 dB re 1 μ Pa at 1 m the following is recommended:
 - > Where equipment allows, a “soft-start” procedure shall be implemented for a period of 20 minutes. This requires that the sound source be ramped from low to full power rather than initiated at full power, thus allowing a flight response by marine fauna to outside the zone of injury or avoidance. Where this is not possible, the equipment should be turned on and off over a 20 minute period to act as a warning signal and allow cetaceans to move away from the sound source;
 - > “Soft-starts” should, as far as possible, be planned to commence within daylight hours;
 - > “Soft-start” procedures must only commence once it has been confirmed by the MMO (visually during the day) that there is no large cetacean activity within 500 m of the vessel for a 15-minute period. However, if after a period of 15 minutes small cetaceans (particularly dolphins) are still within 500 m of the vessel, the normal “soft-start” procedure should be allowed to commence; and
 - > “Soft-start” procedures must also be implemented after breaks in surveying (for whatever reason) of longer than 20 minutes. Breaks of shorter than 20 minutes should be followed by a “soft-start” of similar duration.
 - For the months of June and November (period of Southern Right Whale migration to and from the South Coast) ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.