South Stream
Offshore Pipeline
ENERGISING EUROPE

Chapter 15: Transboundary Impact Assessment

Table of Contents

Tables

Figures

15 Transboundary Impact Assessment

15.1 Introduction

Transboundary impacts may be considered as:

"*…impacts that extend to multiple countries, beyond the host country of the project, but are not global in nature. Examples include air pollution extending to multiple countries, pollution of international waterways, and transboundary epidemic disease transmission*" (Ref. 15.1).

As the South Stream Offshore Pipeline spans multiple countries and is being constructed across a dynamic marine environment, there is the potential for some Project activities to generate transboundary impacts. Such impacts may arise from Project activities which traverse country boundaries, or impacts that originate within one country, but have the ability to extend across national borders.

This chapter considers the potential for transboundary impacts resulting from the Project. Where applicable, the chapter draws upon the impact assessments conducted in each of the technical discipline sections of this Environmental and Social impact Assessment (ESIA) Report (Chapters 7 to 12).

Given that greenhouse gas emissions are a global issue as opposed to a transboundary concern; this chapter does not include a Project-related greenhouse gas assessment. Details regarding greenhouse gas emissions associated with Project activities are provided in **Chapter 5 Project Description** and **Chapter 7 Physical and Geophysical Environment**.

15.2 Frameworks for Considering Transboundary Impacts

The following have informed the assessment of potential transboundary impacts:

- International Finance Corporation (IFC) Performance Standard (PS) 1 Assessment and Management of Environmental and Social Risks and Impacts (Ref. 15.2) recognises the need to consider transboundary impacts. It states that the risks and impacts identification process needs to consider:

  "…potential transboundary effects, such as pollution of air, or use of or pollution of international waterways"; and

- The Espoo Convention specifies the obligations on countries[1] in which a project is proposed where significant adverse environmental impacts might be experienced in another country's territory. Of the three countries in which the South Stream Offshore Pipeline is proposed, only Bulgaria has ratified the Convention (signed by Bulgaria on 25 February 1991, ratified on 16 March 1995 and came into force on 10 October 1997). Turkey and Russia have not

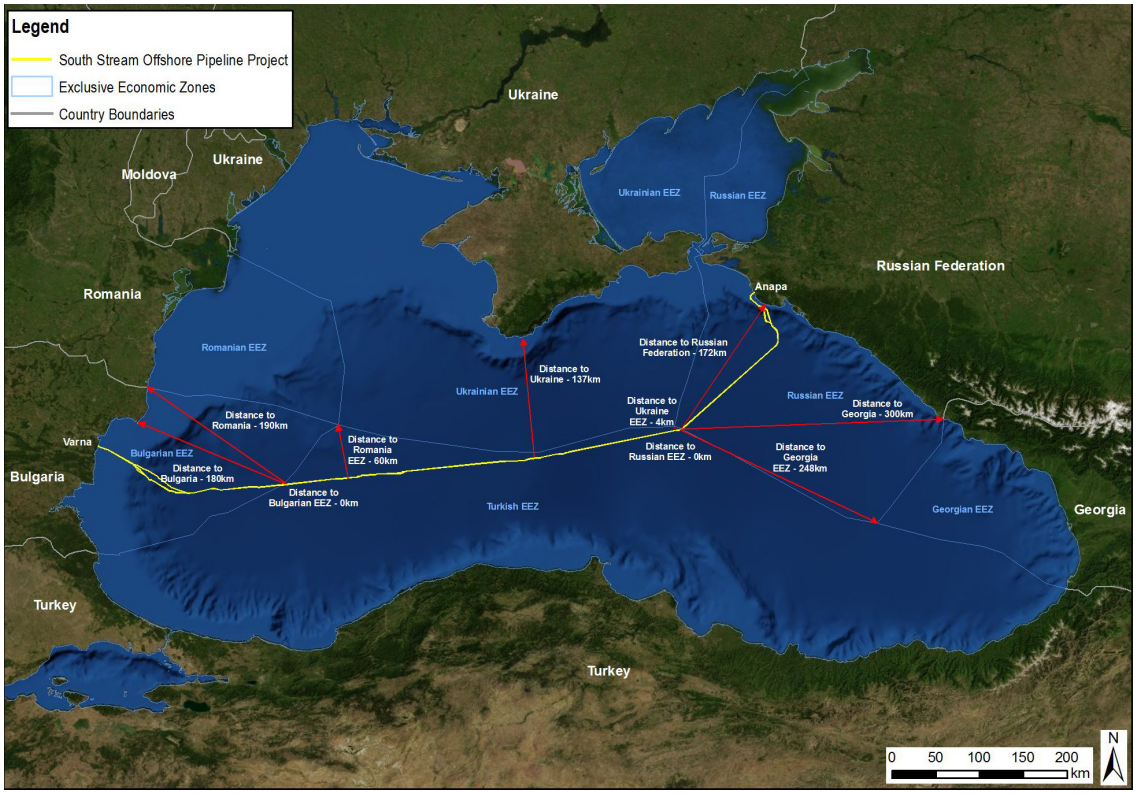
[1] The Convention defines a Party of Origin, being the country in which a project is planned, and Affected Parties, being the States whose territory might be affected. The Convention imposes an obligation on Parties of Origin to notify Affected Parties where a project is likely to have significant adverse environmental transboundary effects.

ratified the Convention. Nevertheless, the principle of the Convention, that the potential exists for significant adverse environmental impacts to be experienced in the territories of Georgia, Ukraine, Russia, Bulgaria and Romania, has informed the assessment as presented herein.

15.3 Potential for Transboundary Impacts

In order to generate a transboundary impact, activities arising from the Project would need to generate an impact that has the potential to cross national jurisdictions which for the purpose of this Chapter are defined by the EEZ boundaries of the Black Sea countries. Figure 15.1 illustrates the closest points of the Project to these EEZ boundaries and to land territory of nearby countries.

Figure 15.1 Distances from the Project to Turkey, Georgia and Ukraine EEZ Boundaries



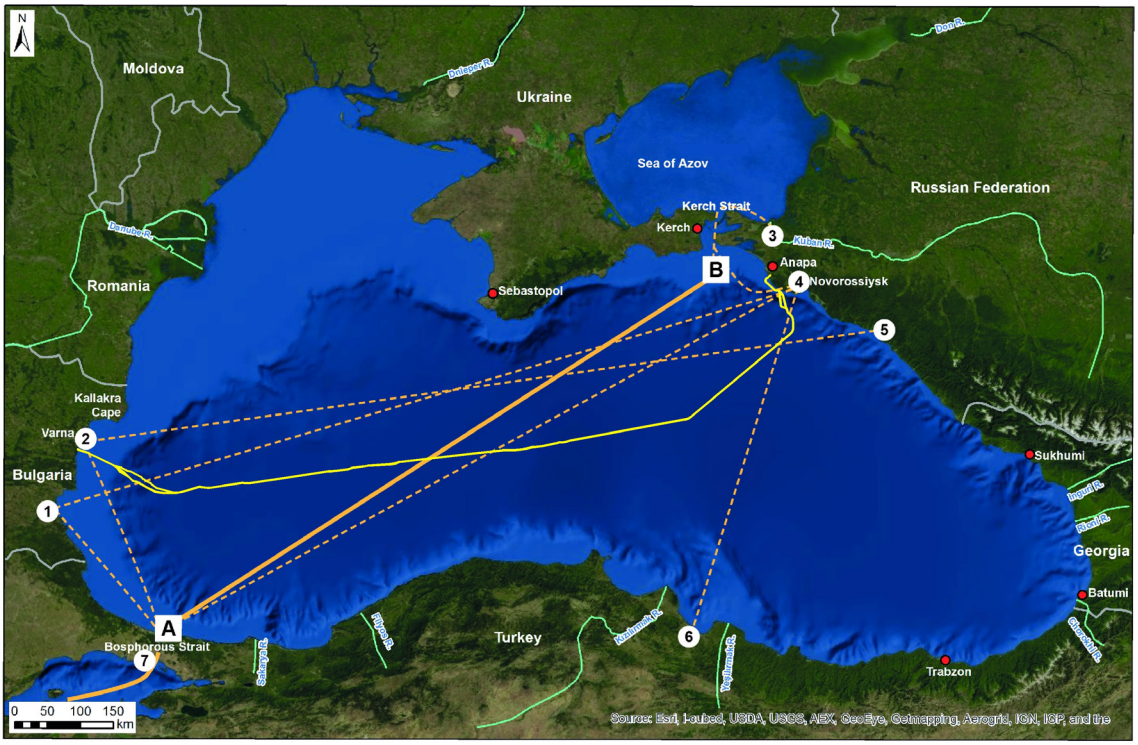
Note: All geographic boundaries depicted in maps in this ESIA Report relate to February 2014.

It is acknowledged that some Project Activities will be located closer to EEZ boundaries and Black Sea country land borders than indicated in Table 15.1. This includes Project-related marine supply vessel movements which are likely to use existing international shipping routes to and from selected ports (as shown in Figure 15.2).

Table 15.1 Closest Points of the Project to Turkey, Georgia and Ukraine EEZ Boundaries and to Land Territories

Country	Closest Distance of Project to Land Territory (kilometres (km))	Closest Distance of Project to EEZ Waters (km)
Georgia	300	248
Ukraine	137	4
Russia	172	Located directly adjacent to the EEZ boundary
Bulgaria	180	Located directly adjacent to the EEZ boundary
Romania	190	60

Figure 15.2 Shipping and Navigational Routes in the Black Sea which Potentially Interact with the Project Pipelines



Key:

A: Bosporus shipping junction (Istanbul)
B: Kerch Strait shipping junction

river
existing shipping route
main shipping route

1: Burgas
2: Varna
3: Temryuk
4: Novorossiysk
5: Tuapse
6: Samsun
7: Istanbul

15.4 Impact Assessment Methodology

The various technical assessments as presented within this ESIA Report (Chapters 7 to 12) have used defined impact assessment methodologies to quantify Project impacts upon defined sensitive receptors. In undertaking this task, these assessments have considered the potential for identified impacts during the various Project Phases (Construction and Pre-Commissioning, Operational and Decommissioning Phases) to traverse EEZ borders. This chapter captures the findings of earlier chapters in so far as they relate to transboundary impacts and considers both planned and unplanned events.

In general, potential impacts generated by planned activities during the Construction and Pre-Commissioning Phase of the Project are typically temporary in nature and localised in extent. Similarly impacts generated from planned activities during the Operational Phase will also be localised. However, during the various Project Phases there is the potential for unplanned events which are those events that are unintended and that may pose risks to environmental and socio-economic receptors (**Chapter 13 Unplanned Events**) that may result in wider transboundary impacts. Unplanned events include the accidental release of hydrocarbons (e.g. spills of fuel from vessels) to the marine environment during the Construction and Pre-Commissioning Phase and the release of natural gas to the atmosphere in the event that the Pipeline is damaged during the Operational Phase. Such events have a low likelihood of occurrence and strict management measures will be put in place to ensure that risks and any resultant impacts are minimised (**Chapter 13 Unplanned Events**).

The sections below consider the potential for marine environment transboundary impacts from both planned and unplanned events during the Construction and Pre-Commissioning Phase and Operational Phases of the Project. The activities to be undertaken during the Decommissioning Phase are uncertain, as decommissioning proposals will be developed during the Operational Phase of the Project. Current Good International Industry Practice (GIIP) is to decommission pipelines in place, with few resultant environmental impacts. However, should a decision be made to remove the pipelines and the associated infrastructure, it is expected that the potential transboundary impacts and mitigation measures will be similar in nature to some of those as described herein for the Construction and Pre-Commissioning Phase of the Project. As such, the Decommissioning Phase is not specifically covered in this chapter.

15.5 Potential Transboundary Impacts

15.5.1 Introduction

The following potential adverse transboundary impacts arising from the Project have been identified and are discussed below:

- Impacts from waste generation;
- Impacts from underwater noise on fish and marine mammals;
- Impacts on birds;
- Impacts on fish migration and fisheries; and

- Impacts from unplanned events, specifically from maritime accidents leading to oil spills, from the introduction of invasive species and from gas releases.

15.5.2 Waste Generation

Waste material will be generated on-board the pipe-laying and other vessels throughout the Construction and Pre-Commissioning Phase (**Chapter 12 Waste Management**). Supply and support vessels will originate from Russia and Bulgaria. Materials will be transported to the pipe-laying vessel by the supply vessel, which will transport waste from the pipe-laying vessel for management and disposal on shore. Support vessels may transport waste from the pipe-laying vessel for management and disposal on shore. In some circumstances waste from the pipe-lay vessel may be temporarily stored on-board pipe-lay vessels, prior to its subsequent transfer to supply vessels.

No Turkish ports will be used for any purpose for the Project. Thus support or supply vessels will come from either Russia or Bulgaria, collect waste material from the pipe-laying vessel within Turkish waters, and then return to its home port. It is normal practice in the shipping industry for port waste reception facilities to receive waste from vessels using that port, where the waste has been generated during the ship's voyage which may have been outside of the waters of the receiving country.

The Project will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) Annexes I, IV and V, each of which includes specific waste management provisions, as well as relevant national requirements of the recipient country. All hazardous waste will be disposed of at licenced facilities.

Adherence to MARPOL requirements will enable significant adverse transboundary impacts associated with Project waste to be avoided.

15.5.3 Underwater Noise Impacts upon Fish and Marine Mammals

The acoustically sensitive receptors in the Black Sea are the fish species categorised as 'hearing specialists' and marine mammals. Some of the sensitive fish species and all marine mammal species, specifically the bottlenose dolphin, common dolphin and harbour porpoise that are found in the Black Sea, are of conservation concern (**Chapter 8 Biological Environment**). The potential for Project construction activities in Turkish waters to impact upon acoustically sensitive ecological receptors located across EEZ boundaries thus needs to be considered. As reported in **Chapter 8 Biological Environment**, some Project Activities such as pipe-laying and vessel movements will increase underwater noise levels. The noise levels associated with such activities are most likely to cause harassment reactions rather than strong behavioural reactions and injury.

For hearing generalist fish, no impacts are anticipated. Hearing specialist fish are generally more sensitive to underwater noise and behavioural effects may be apparent in some species such as sprat or anchovy in some situations. Modelling has suggested that pipe-laying may generate noise impacts at a range of approximately 0.5 km. **Chapter 8 Biological Environment** also reports that underwater noise arising from several vessels simultaneously were insufficient to give rise to lethality in marine mammals. Based on audiogram weighted

criteria, behavioural effect ranges for individual vessel operations are only estimated to be significant for dolphins and porpoises with effect ranges never exceeding approximately 1 km.

Given the above, whilst Project construction activities have the potential to generate underwater noise, and thus impact upon fish and marine mammal behaviour, the limited spatial extent of behavioural reactions is such that no significant adverse transboundary impacts are expected.

15.5.4 Birds

A number of migration routes stretching from the Arctic to South Africa occur around and over the Black Sea for birds that overwinter, nest and roost in coastal locations (**Chapter 8 Biological Environment**). In the Turkish EEZ (outside of territorial waters), there are no nesting sites and so the birds observed in this region are restricted to a small number of species that may be feeding or migrating through the area. The Central Black Sea is outside the main Mediterranean/Black Sea Flyway migration route which connects Europe with Africa. The area is not important for large numbers of migrating birds, although data on the occurrence of birds in the Central Black Sea are scarce.

Vessel movements during construction activities have the potential to temporarily disturb seabirds. However, these are highly mobile animals generally able to avoid areas of disturbance, and the density of seabirds at sea in the Central Black Sea is lower than coastal areas, birds will generally only be present during migration and are unlikely to be present on the sea surface in any significant number.

There will be occasions where night-time works are required necessitating the use of floodlights. Light can affect migrating birds and cause mortality from bird strikes on highly illuminated offshore installations. The source of illumination (e.g. pipe-lay vessel) will be transient at any given location and have limited scope to interact with night-flying birds. Because only a small number of localised individuals could be affected, this is considered a short term impact. Mitigation measures to minimise such impacts include removing unnecessary illumination, reducing light intensity and shielding light sources during the most active bird migration period.

Overall, no significant adverse transboundary impacts to individuals or populations of migratory birds are expected as a result of planned Project Activities.

15.5.5 Fisheries

The European anchovy is the only commercial species in the Black Sea known to migrate across the Project Area. However, as the construction spread will only be moving at around 2.75 km per day it can be considered a stationary object and anchovy will be able to avoid it. Migrating schools of fish are fast moving and their presence at a particular point is temporary. The main migration corridor could extend around 125 km in width through the EEZs of Turkey and Ukraine. Given that the main impact radius associated with construction noise is 0.5 km in

hearing specialist fish, no significant adverse impacts upon anchovy migration and therefore fishing activities across EEZ boundaries are anticipated as a result of planned Project activities[2].

15.5.6 Maritime Accidents Leading to Oil Spills

A maritime risk assessment has considered the probability of unplanned events, such as vessel collisions and sinking during the Construction and Pre-Commissioning Phase and the subsequent probability of an oil spill. Vessel collisions during Operational and Decommissioning Phases have been discounted from this assessment.

The probability of an oil spill arising from an unplanned event been assessed as ranging from unlikely to extremely remote, depending on the event leading to the spill. The adoption by vessels employed by the Project of Oil Spill Prevention and Response Plans, and Shipboard Oil Pollution Emergency Plans, and of crew training programmes will reduce the likelihood of a spill, and minimise the extent and fate of any spill that does occur by the deployment of spill response procedures. Further the fact that wherever practicable, Marine Gas Oil (MGO) or Marine Diesel Oil (MDO) will be used means that spillages would evaporate and disperse as a result of wave action.

Oil spill modelling has been undertaken and is reported in Appendix 13.1: Maritime Risk Assessment and Oil Spill modelling. Four locations for oil spill modelling were selected along the pipeline route within the Turkish EEZ, with modelling undertaken for a spill of 2,000 m^3 of MDO at each release location. Modelling results are discussed below:

- *Modelling Oil Spillage Near the Turkish/Bulgarian EEZ Border:* It is predicted that a localised area of the Black Sea would be affected with a surface slick of thicknesses over 1 micrometre (µm) for up to 128 km from the release location. There is an 11% probability of visible surface hydrocarbons reaching Bulgarian waters. Hydrocarbons may enter the Bulgarian EEZ within 6 hours. Dissolved water column concentrations of greater than 50 parts per billion (ppb) are predicted a maximum of 100 km away from the release site and therefore are not expected to reach the Turkish coast. Concentrations will take up to 1.5 days to fall below this threshold in localised areas (oil is not expected to have acute toxic effects at water column concentrations of less than 50 ppb) (Ref. 15.3).

  For the worst scenarios of oil reaching the shoreline, deterministic modelling was undertaken to predict the mass balance fate of the oil as it disperses over time, typical development and appearance of the surface slick. The modelling has predicted that oil might beach after 5 days across a wide area of coastline but that the oil would arrive in a highly weathered and dispersed state, and would not be visible. This modelling does not take into consideration oil spill response procedures being in place during the spill;

- *Modelling Oil Spillage North West Turkish EEZ:* It is predicted a moderate area of the Black Sea would be affected with a surface slick of thicknesses over 1 µm for up to 128 km from the release location. Dissolved water column concentrations of greater than 50 ppb are predicted a maximum of 105 km away from the release site and therefore are not expected

[2] Transboundary impacts on Turkey are considered in the Appendix 9.1: Fishing Study.

to reach the Turkish coast. Concentrations will take up to 2 days to fall below this threshold in localised areas.

For the worst scenarios of oil reaching the shoreline, deterministic modelling was undertaken to predict the mass balance fate of the oil as it disperses over time, typical development and appearance of the surface slick. The modelling has predicted that oil might beach after 5 days across a wide area of coastline but that the oil would arrive in a highly weathered and dispersed state, and would not be visible. This modelling does not take into consideration oil spill response procedures being in place during the spill;

- *Modelling Oil Spillage North Turkish EEZ Close to the Ukrainian EEZ Border:* It is predicted a moderate area of the Black Sea would be affected with a surface slick of thicknesses over 1 µm for up to 115 km from the release location. There is a 20% probability of visible surface hydrocarbons reaching Ukrainian waters. Hydrocarbons may enter international waters (i.e. cross EEZ borders) within 5 hours. Dissolved water column concentrations of greater than 50 ppb are predicted a maximum of 100 km away from the release site and therefore are not expected to reach the Turkish coast. Concentrations will take up to 1.5 days to fall below this threshold in localised areas.

  For the worst scenarios of oil reaching the shoreline, deterministic modelling was undertaken to predict the mass balance fate of the oil as it disperses over time, typical development and appearance of the surface slick. The modelling has predicted that oil might beach after 5 days across a wide area of coastline but that the oil would arrive in a highly weathered and dispersed state, and would not be visible. This modelling does not take into consideration oil spill response procedures being in place during the spill; and

- *Modelling Oil Spillage North East Turkish EEZ Close to the Ukrainian and Russian EEZ Borders:* It is predicted a moderate area of the Black Sea would be affected with a surface slick of thicknesses over 1 µm for up to 96 km from the release location. There is a 33% probability of visible surface hydrocarbons reaching Russian waters and a 10% chance in Ukrainian waters. Hydrocarbons may enter international waters (i.e. cross EEZ borders) within 1 hour. Dissolved water column concentrations of greater than 50 ppb are predicted a maximum of 68 km away from the release site, and therefore are not expected to reach the Turkish coast. Concentrations will take up to 1.5 days to fall below this threshold in localised areas.

  For the worst scenarios of oil reaching the shoreline, deterministic modelling was undertaken to predict the mass balance fate of the oil as it disperses over time, typical development and appearance of the surface slick. The modelling has predicted that oil might beach after 3 days across a wide area of coastline but that the oil would arrive in a highly weathered and dispersed state, and would not be visible. This modelling does not take into consideration oil spill response procedures being in place during the spill.

Given that unplanned hydrocarbon spillages have the potential to generate a transboundary impact, the Project will implement a range of design controls that aim to reduce the probability of such events occurring which are applicable to all Project phases (refer to **Chapter 13 Unplanned Events**), including the following:

- Where practicable vessels deployed in the Project Area will use MGO or MDO and, therefore, any accidental spill of fuel will have less adverse consequences than a spill that involves heavier fuels;
- All contractors and operators of marine vessels working on behalf of South Stream Transport will be required to develop and implement an Oil Spill Prevention and Response Plans. South Stream Transport will ensure that contractor Oil Spill Prevention and Response Plans are appropriately aligned with the Black Sea Contingency Plan (Ref. 15.4);
- Contractors and operators of vessels working on behalf of South Stream Transport will operate in compliance with MARPOL regulations on oil spill prevention and response and are required to prepare Shipboard Oil Pollution Emergency Plans (SOPEP) and Shipboard Marine Pollution Emergency Plans (SMPEP) as applicable for each vessel. The SOPEPs will specify the control and response measures that have to be available on board every vessel to respond to a spill that does not require external intervention; and
- All marine vessel crews will have the appropriate training, qualification and certification to undertake the tasks required during the construction of the pipelines.

15.5.7 Invasive Species

Some of the vessels used by the Project will originate from locations outside of the Black Sea. Depending on the previous location of marine vessels (including the pipe-lay, support and supply vessels), there is a possibility that some vessels could introduce invasive species to the Black Sea via ballast water or fouling organisms on the vessel hulls. To mitigate against such risks, where practicable, the following measures will be put in place (also refer to **Chapter 13 Unplanned Events**):

- Where relevant and practical these measures will be based on those identified in the IPIECA (Global Oil and Gas Industry Association for Environmental and Social Issues) document Alien Invasive Species and the Oil and Gas Industry, Guidance for Prevention and Management and the International Maritime Organisation (IMO) Ballast Water Management Convention and Guidelines. They will be applied to all marine plant and equipment that is used on the Project and which has the potential to be a vector of live organisms, spores, larvae and young and will include ballast water management, use of antifouling coatings, cleaning of equipment prior to deployment and the change of cooling water;
- Use anti-fouling coatings (non- Tributyltin (TBT)) or sealing coatings to minimise inadvertent transport of organisms;
- Careful cleaning of hulls, tanks and dredging equipment before use (wherever practically possible prior to entering the Black Sea); and
- All ships using ballast water exchange should conduct ballast water exchange at least 50 nautical miles (NM) from the nearest land and in water at least 200 m in depth, taking into account Guidelines developed by IMO.

With the implementation of such measures, no significant transboundary impacts associated with invasive species are expected as a result of planned Project Activities in any of the Project phases.

15.5.8 Release of Gas

A Shipping Risk Report undertaken for the Project (Ref. 15.5) has considered possible shipping hazards which might affect the integrity of the Pipelines, specifically, a ship sinking or a ship dropping an object (such as a container) onto the pipeline, resulting in pipeline damage or failure, which could result in the release of gas (and potential subsequent fire) which may in turn impact the environment and socio-economic receptors.

As a result of the engineering design standards being applied and quality assurance during construction, together with the high external pipeline pressure at 2,000 m water depth, the potential for such an event is remote. For a fire incident following a gas leakage to impact upon human receptors, it would require a pipeline failure and gas leakage, followed by ignition at the sea surface in conjunction with a passing vessel, the likelihood of which is extremely unlikely.

If a Pipeline rupture were to occur in the Turkish EEZ, in some cases gas would not escape from the Pipeline, rather water would ingress the Pipeline due to the external water ambient pressure. This would occur along approximately a third of the pipeline length through the Turkish EEZ. Elsewhere, any gas released from the Pipeline would rise through the water column as a plume of gas bubbles, eventually dispersing into the air. Acute environmental damage would not occur, although such releases would represent an increase in greenhouse gas emissions in Turkey. Methane levels at the release site would be temporarily elevated which could locally impact upon any present marine ecology including seabirds. Gas passage through the water column could also impact upon marine organisms (such as fish), resulting in potential acute or chronic impacts depending upon exposure levels. In neither case, however, are significant transboundary impacts considered likely.

15.6 Conclusions

Some planned and unplanned Project Activities have the potential to result in adverse transboundary environmental and social impacts given that Project Activities will be taking place close to EEZ boundaries. However, defined mitigation strategies and the very low probability of unplanned events occurring will mean that no significant transboundary impacts are anticipated.

References

Number	Reference
Ref. 15.1	IFC Guidance Note 1: Assessment and Management of Environmental and Social Risks and Impacts. January 2012.
Ref. 15.2	IFC (2012) Performance Standard 1 - Assessment and Management of Environmental and Social Risks and Impacts. Accessed at: http://www.ifc.org/wps/wcm/connect/3be1a68049a78dc8b7e4f7a8c6a8312a/PS1_English_2012.pdf?MOD=AJPERES Accessed on 20 September 2013.
Ref. 15.3	Black Sea Diesel and Fuel Release Modelling: South Stream Development. Genesis: Technical Note August 2013.
Ref. 15.4	Black Sea Contingency Plan 2002. To the Protocol on Cooperation in Combating Pollution of the Black Sea by Oil and Other Harmful Substances in Emergency Situations – Volume 1 Response to Oil Spills. AG ESAS 8.4d.
Ref. 15.5	South Stream Offshore Pipeline FEED - Shipping Risk Analysis Report. Intecsea Report 10-00050-10-SR-REP-0040-0011 dated February 2013.